



**T R A I N I N G
S T A N D A R D S**

**National
Electrotechnology
Training Package**

Volume 2

**Support
Units**

UTE99 Electrotechnology Training Package

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Glossary

Italic typeface is used in this National Training Package and the associated competency standards indicates terms and variables that require further explanation. Explanation of terms and variables that have meaning in a particular unit are given in the range statements and should be referenced accordingly at all times. Those that have a common meaning throughout this standard are explained below.

In many instances, the explanations of relevant terms are direct extracts from or are derived from technical standards published by Standards Australia or jointly by Standards Australia and Standards New Zealand.

It should be noted that some Units of competency have unique features. Consequently, these units have additional glossary terms included within.

Common terms and variables

Accessories -

Any device associated with, and forming an integral part of, the wiring systems such as switch, fuse, plug, socket outlet, lampholder, fitting, adaptor, ceiling rose; connectors, clamps, splitters, termination posts, lugs, strips and blocks; clips, ties and bindings.

Apparatus -

Any equipment forming a component part of an installation used for a particular purpose. *Apparatus* includes, but is not limited to, that contained in the following divisions. It will necessarily include new and emerging technologies:

- **Audio/visual equipment** including televisions, radios, monitors, cameras, closed circuit television, mono and stereo sound systems, gaming machines, electronic display panels, cassette recorders, video cassette recorders, CDROM players, tape recorders, sound and video duplication equipment, digital versatile discs, digital audio tapes, professional and domestic speaker systems, mixer desks.
- **Air conditioning equipment** including room air conditioners, split systems, package units, ducted units, evaporative coolers, ventilation systems.
- **Appliances** including portable electric tools, motor driven pumps, vacuum cleaners, food preparation equipment, hair dryers, refrigerators, washing machines, dish washers, paper shredders, water coolers, clothes dryers, pest exterminators, electric motor driven industrial tools and equipment, sanitary disposal units, radial and tangential fans and blowers.
- **Business equipment** including facsimile machines, photocopiers, printers, scanners, modems, computers and peripherals, financial transaction devices and systems.
- **Communications equipment** including radio transmitters, television transmitters, microwave transmitters and receivers, repeaters, two way radios, antennae, satellite linkage equipment.

- **Computer systems** including personal computers, computer networks, peripherals, supervisory control and data acquisition systems, modems, bridges, servers, routers, automatic data capture equipment.
- **Electrical and electronic controllers and control systems** including switchboards and control centres, alternating and direct current regulated and unregulated power supplies, rectifiers and filters, electromechanical and solid state relays and contactors, programmable controllers, uninterruptible power supplies, oscillators, motor speed controllers, electromechanical and dynamic brakes, battery charging and electroplating equipment, lamp dimmers and flashers, transducers, frequency injection systems.
- **Electrical machines and associated drives** including single phase and polyphase alternating current cage and wound rotor induction motors and synchronous motors and generators, direct current motors and generators, amplidynes, dynamometers, stepper motors, servo motors and synchros, double wound and auto transformers, induction regulators, electronic variable speed and eddy current drives.
- **Energy management and sustainable energy equipment** including solar cells, stand-by batteries, inverters, wind generators, hybrid systems, stand-by alternators, power factor correction controllers.
- **Heating equipment** including single and polyphase instantaneous and quick recovery water heaters, space heaters, induction heaters, electric furnaces, commercial food warmers, microwave and dielectric heaters, electric ranges, stoves and oven tops.
- **Instrumentation/process control devices and equipment** including controllers, transmitters, final control elements, detectors, process loop auxiliary equipment, indicators and recorders, monitors and computer interface equipment.
- **Lighting** including incandescent, quartz halogen and vapour lamps, applications in domestic, commercial, industrial and sporting settings, advertising signs, security lighting, road and highway lighting.
- **Measuring instruments** including digital and analogue ammeters, voltmeters, watt and var meters, frequency meters, phase rotation devices, oscilloscopes, power factor indicators, energy meters, insulation resistance devices, continuity testers, chart recorders, voltage detectors, Wheatstone and double bridges, instruments to measure signal strength, harmonic distortion, electro-magnetic and electro-static fields.
- **Medical electronics and equipment** including x-ray machines, cardiographic monitoring equipment, electrophoresis equipment, electron microscopes, infra-red (deep heat) equipment, physical therapy equipment, CAT scan equipment, ultrasound equipment, defibrillators, infusion pumps, incubators, ventilators, foetal monitors, thermometric devices, anaesthetic units, gas monitors, dialysis equipment, pacemakers, lasers, endoscopes, blood warmers, physiological monitors.

- **Power distribution/transmission systems** including wood, concrete, steel and composite poles and structures, transmission towers, overhead and underground conductors and cables, electrical metering and recording devices.
- **Refrigeration systems** including refrigerators, freezers, icemakers, cool rooms, freeze rooms, beverage coolers, merchandising and display cabinets, blast freezers.
- **Scanning and detection systems** including: radar systems, sonar systems.
- **Security and fire detection systems** including sensors, controllers, alarm devices, telecommunications interfaces, closed circuit television cameras and monitoring systems.
- **Telecommunication equipment** including switching equipment, PABX, microwave transmitters and receivers, customer premises equipment, customer access networks, transmission equipment.

See also *wiring systems*.

Apparatus, fixed wired -

Apparatus (electrical/electronic) connected to a system of wiring in which cables protected or unprotected are fixed or supported in position.

Appliances -

A fixed (for support only), hand-held (held in hand during normal use), portable (moved whilst in operation or easily moved from one place to another while connected to the supply) or stationary (can be moved, but not easily) consuming device, other than a lamp.

Individuals with responsibilities for co-ordination, design installation, maintenance, production, or servicing activities. This can include:

- site managers
- project managers
- engineers and technicians
- technical experts
- line managers/supervisors
- regulatory personnel
- team leaders
- other personnel designated by an organisation or enterprise

Approval of equipment -

Acceptance by the relevant authority for an item of equipment to be used in a particular situation.

AQF -

Australian Qualifications Framework, which describes qualifications in terms of levels, characterised by the outcomes of vocational education and training.

Capacity, load and duty -

Flow rates of air, fluids and gases; current-carrying capacity; air, fluids and gas pressures; mechanical loading on piping, tubing or cables and supports; maximum demand and current ratings; duty cycles; frequency; environmental conditions.

Categories – general -

Competency can be achieved for any number of the following categories for which **formal endorsement** is to be provided, as prescribed in the evidence guide and critical aspects for each unit. These are:

- a. Computer systems:** The adaptation of Electrotechnology to the processing and control, communication and storage of information.
- b. Electrical:** Encompasses the systems associated with wiring reticulation, distribution centres, utilising devices and electrical machines for the conversion of electrical energy into other forms and conversely for the conversion of other forms of energy into electromotive force.
- c. Electronics:** The use of discrete solid state components and integrated circuits and devices and their associated circuits for application within process control systems, communication systems, computers, measurement, entertainment equipment, electro-medical equipment and the like.
- d. Instrumentation:** The measurement and control of process system data and parameters for industrial and commercial use. It includes the calibration and maintenance of instrument and processes in the chemical, energy, biotechnology, environmental, food processing and manufacturing industries.
- e. Refrigeration and air conditioning:** Air conditioning is the provision of clean air to an area at proper temperature and humidity. Refrigeration is the cooling of a space or its contents to a lower temperature than that of the surrounding space or of the ambient atmosphere.
- f. Data communications:** Encompassing the systems associated with communication distribution equipment, components, and the related devices for the distribution of audiovisual and data between points of transmission and reception.

Categories - relating to wiring systems -

- g. Cabling/wiring support and protection:** Including cable enclosure, ducts, trunking, roughing and cable trays and conduits, cable supports, aerial systems, catenary systems, underground systems, cable harnesses and looms.
- h. Network communications:** Including wiring systems and cables for the purpose of transmitting audio, visual or data information and may be associated with such things as twisted pair cables, telephone cables, screened and shielded cables, coaxial cables and optical fibre cables.
- i. Power and control – extra low voltage:** Including wiring systems and cables for the purposes of providing power and/or analogue or digital control and may be associated with such things as figure eight cables, unshielded twisted pair cables, ribbon cables, coaxial cables, and may include the production of printed circuit boards
- j. Power and control – low voltage:** Including wiring systems and cables for the purpose of providing power and/or analogue or digital control and may be associated with such things as thermoplastic/elastomer insulated/sheathed cable, multicore, armoured cable, mineral insulated metal sheathed (MIMS) cables, fire retardant cables, flexible cables, trailing cables and busways and includes those cables related to the category power and control extra low voltage.

Categories - relating to powerline switching -

- k. Low voltage switching:** The isolation and energising of low voltage powerlines for power distribution through approved switching and isolation procedures.
- l. High voltage switching:** The isolation and energising of high voltage powerlines for power transmission and distribution through approved switching and isolation procedures.
- m. System switching:** The isolation and energising of feeders in switchgear substations on low voltage and/or high voltage systems including load transfer and may include systems control room operations.

Categories - relating to business support -

- n. Administration:** Functions of record maintenance, quotation preparation, promotion of work and products, attending to customer and employees enquiries and complaints, preparation of invoices, business plans, service reports, maintenance reports and stock control.
- p. Technical:** Functions of estimating preparation of quotations, tenders related to installation, maintenance, repair and servicing of electrical/electronic apparatus and systems. Managing contracting projects and contracting business operation.

- q. **Wholesaling:** Sales and supply of apparatus/equipment and electrical accessories to contractors and industrial end-users covering wholesaling-general or wholesaling-warehouse or wholesaling-point of sale.

Circuits -

Covers electrical, hydraulic, pneumatic, optical, magnetic, air flow, hydropic and refrigerant circuits.

Competency can be demonstrated in:

- basic circuits and associated apparatus
- complex circuits and associated apparatus
- systems' circuits and associated apparatus
- advanced circuits/systems and associated apparatus

A hierarchy of circuit complexity has been established within this document (independent of supply circuits) and are defined as follows:

Basic circuits: A basic circuit is defined as a single circuit with a single output.

A single circuit may be controlled by one or more devices and the output may control one or more devices.

Complex circuits: A complex circuit is defined as one made up of more than one interdependent circuit.

A complex circuit is made up of more than one circuit, controlling and processing inputs or outputs.

Systems' circuits: A systems' circuit is defined as one that interconnects between a number of interdependent apparatus.

A systems' circuit is made up of more than one interconnecting circuit controlling and processing apparatus inputs and outputs.

Advanced circuits/systems: Advanced circuits/systems may be complex circuits or systems circuits which contain complicated networks, hybrid circuits and which rely on digital or analogue closed loop feedback for the control of outputs.

Component -

That portion of a unit of *equipment*, which has been designed as a discrete unit and that can be identified as such.

Conditions and ratings -

Relates to flexible cables and plugs that are selected in accordance with Australian and New Zealand Standards and technical data including factors such as:

- Voltage rating
- Current rating

- Sheathing requirement
- Length of cable
- Pin configuration
- Control circuits
- Environmental conditions
- Weather proofing
- Fitting types – shielding, anchorage, earthing and polarity

Consistent performance -

Relates to sufficient evidence being present. This requires evidence that competence has been demonstrated for each element of each unit having been achieved at least three times autonomously and to *requirements*.

Design brief/proposal -

Instructions/specifications/outcomes defining the performance of circuits and associated apparatus, usually for the purpose of ensuring the optimum efficiency, environmental performance, economical effectiveness and operation of the system.

Endorsement: to be reported -

Refers to the endorsement on which an item of *apparatus, appliances, components, equipment, plant and machinery*, enclosures and the like that work can be performed on, (including any inspections, reports and risk assessment), as prescribed in regulations and/or by regulatory authorities, to which the unit applies.

Engineering data -

Refers to documents and other sources from which technical data and product specifications/characteristic are obtained, includes recognised standards publications, manufacturers product data publications and design features.

Environment -

The area surrounding the work site which can be directly or indirectly affected by occurrences at the work site. It includes the atmosphere, soils, drains, underground water tables, and the ecosystem. Protection of the environment would require the proper disposal of waste materials, restriction of burning off, the correct handling of toxic substances, the containment of CFCs and the like.

The protection of the environment would also include the minimisation of those factors that contribute, directly or indirectly, to the production of *greenhouse gases*.

These contributing factors might include the minimisation of waste materials, the correct use of enterprise vehicles and machinery, the re-use or recycling of trade

materials where possible and the overall reduction of energy usage through general awareness and the use of appropriate technologies.

Equipment (which is not apparatus) -

Any contributing part of an *installation* which may or may not be composed of *components*.

Established procedures -

Formal arrangements of an organisation, enterprise or statutory authority of how work is to be done. These may include, for example:

- quality assurance systems incorporating, for example:
 - specifications, requirements and procedures
 - work orders / instructions
 - reporting procedures
 - improvement mechanisms
 - compliance requirements
 - safety management
- work clearance systems incorporating, for example:
 - work permits
 - monitoring and clearance procedures
 - isolation procedures
- OH&S practices
- procedures for operating safety systems, operating plant and equipment and reporting work activities
- maintenance, modification or supply of relevant schematic drawings and technical data
- arrangements for dealing with emergency situations.

Greenhouse gases -

Gaseous components of the atmosphere contributing to the greenhouse effect. These gases are produced, for example, when fossil fuels are burned to produce electricity and in other industrial processes.

The greenhouse effect leads to global warming with its ecological and environmental problems.

The minimisation of the use of energy in the workplace, derived from burning fossil fuels, reduces the production of greenhouse gases.

See also *environment*

Initial audit -

An audit that is carried out initially to ascertain whether: a) appropriate procedures have been followed to ensure the safety of the area; b) equipment, systems and installation conform with the design specification and are free from damage; c) any modification have been properly documented and appropriately approved.

Installation -

Wiring systems, *apparatus* and other required items as they are fixed in place and connected as necessary to operate as intended.

Modifications -

To make changes to the physical parameters or operational function of a device, component or piece of equipment or apparatus.

Notification (notified) -

Can include verbal, written, electronic or recorded information at completion of work which may be required to be completed in accordance with established procedures.

OH&S policies and procedures -

Arrangements of an organisation or enterprise to meet their legal and ethical obligations of ensuring the workplace is safe and without risk to health. This may include:

- hazardous and risk assessment mechanisms
- implementation of safety regulations
- safety training
- safety systems incorporating,
 - work clearance procedures
 - isolation procedures
 - gas and vapour
 - monitoring/testing procedures
 - use of protective equipment and clothing
- use of codes of practice

Periodic audit -

An audit that is carried out periodically to ascertain whether: a) appropriate procedures have been followed to ensure the safety of the area; b) equipment, systems and installation conform with the design specification and are free from damage; c) any modification have been properly documented and appropriately approved.

Plant and machinery -

Devices or machines (not considered to be hand tools or hand held power tools) used to facilitate construction, installation or maintenance and are removed after the completion of the work. Examples include chain blocks, winches, compressors, ladders, elevated work platforms, explosive power tools, hand operated battery mobile lift and transfer equipment, accessories and attachments and the like.

Requirements -

That to which equipment and procedures and their outcomes must conform and includes statutory obligations and regulations and *standards* called-up by legislation or regulations. Requirements may also include:

- statutory regulations
- codes of practice
- job specifications
- transport documentation
- *standards* called-up in specifications be they Australian/New Zealand or International
- procedures and work instructions
- quality assurance systems
- manufacturers' specifications
- maintenance manuals, schedules and specifications/standards
- circuit/cable schedules
- design specifications
- customer/client requirements and specifications
- specified underpinning knowledge (specified in units' Evidence Guides)
- National and State guidelines , policies and imperatives relating to the *environment*

Representative range -

That which requires a sufficient body of evidence undertaken across a range of activities and work functions to be present in order that a valid, reliable, fair and timely judgement about an individual's performance for attributing competence can be made.

Sample audits -

A sample audit that is carried out to ascertain whether: a) appropriate procedures have been followed to ensure the safety of the area; b) equipment, systems and installation conform with the design specification and are free from damage; c) any modification have been properly documented and appropriately approved.

Servicing -

Undertaking routine inspection, repair and maintenance of circuits, systems or apparatus.

Specialisation -

Describes the work environment in which the core technical requirements of learning are to apply.

Standards -

Technical documents, which set out specifications and other criteria for equipment, materials, and methods to ensure they consistently, perform as intended. The *standards* referred to in this competency standard are those published by Standards Australia or in joint venture with Standards New Zealand. Competency in the use of other technical standards may be required in industries not restricted to Australian *requirements*. For example, shipping and off-shore petroleum industries are subject to standards agreed to by underwriters and enterprises or some other international convention.

Statutory Authority -

The person or body responsible for the implementation of legislation.

Sustainable Energy Principles and Practice -

Sustainable Energy Practice refers to workplace actions that contribute to the reduction of greenhouse gases. These are caused by the combustion of fossil fuels such as coal and gas. As most electricity is generated using fossil fuels, a reduction in the unnecessary use of electricity reduces the production of greenhouse gases. Also, most materials used in the workplace are manufactured using electricity or gas, so recycling and reducing the wastage of these materials also helps. There is a worldwide commitment to reducing greenhouse gases, which are considered to contribute to global warming. This User Guide promotes workplace strategies to assist in achieving the same goals.

Sustainable Energy Practice is closely related to the 'environment'. Sustainable energy practice aims to reduce the amount of wastage in electricity and other forms of energy that lead to the production of greenhouse gases. Many of the principles and practices that apply in the workplace also apply in the home and the general environment. These include:

- examining work practices that may use excessive electrical energy
- reducing energy by using energy efficient machines and appliances (eg. star ratings)
- switching off devices such as lights, machines and computers when not in use
- using power-save devices, such as those incorporated in photocopiers, business machines and the like

- replacing incandescent lamps with compact fluorescent lamps
- using natural light to replace artificial light
- regularly cleaning air conditioner filters
- closing windows and doors when climate control units are used
- insulating dwellings, offices and workplaces and preventing draughts
- using reflective curtains to control heat
- using natural or artificial shade to control sunlight
- using solar water heating
- using automatic processes to manage energy usage
- reusing materials used in construction, engineering and manufacturing
- recycling waste materials
- driving motor vehicles and other machines with care
- using natural gas for heating rather than oil or coal based fuels
- using devices to reduce water usage
- checking for leakage in hot water system pressure relief valves and elsewhere in plumbing systems
- sharing information about energy conservation with other workers

System -

A group or combination of inter-related, inter-dependent or interlocking elements forming a collective entity. Includes *circuits, apparatus, equipment* and the like.

Termination -

The act by means of which an electrical connection to an apparatus is established; specifically a prepared joint or connection between a cable, cord or conductor and a point in an electrical circuit such as a terminal or connection point. Such terminations include soldering, crimping, clamping, wire wrapping, insulation piercing/compression.

Testing devices -

Devices and instruments used to ensure safety requirements and operational functions are met, and to diagnose faults in apparatus, circuits or systems.

Utility -

The provision of energy services such as power, water, gas and telecommunications. In the case of UTE NES013 A it applies specifically to remote area essential services operations.

Wiring systems -

Permitted cables, enclosures, supports and *accessories* for power, measurement, control or communications purposes. (See also *Category*)

Work clearances -

Includes any system of permissions and notifications for safely working on or removing equipment/apparatus for service.

Additional glossary terms related to electrical equipment in hazardous area units of competency

Actions -

To limit risk of an explosion can include organisational arrangements for reporting and rectifying non-conformances; shutting down plant or machinery under emergency conditions; evacuating a hazardous area; reporting non-conformances and conditions of plant and machinery; monitoring the hazards area for presence of an explosive atmosphere; meeting OH&S obligations.

Authority -

Refers to documents from which explosive characteristics of products are obtained and include:

- recognised standards publications
- manufacturers product data publications

Certification documentation -

A formal certificate issued by a certifying body stating that an item of equipment/apparatus conforms to particular requirements of a standard. Documentation may include details of limitations of use and manufacturer's specifications and drawings.

Certification of equipment -

A means of verifying that equipment intended for use in a hazardous area complies with the accepted standards.

Classification of hazardous areas -

A concept, which is accepted internationally, of dealing with the risk of fire and explosion by area classification.

Competent person -

A person who has the relevant competencies described in this competency standard.

Electrical equipment -

Equipment used for power, measurement, control or communication purposes.

- N. Pre-assembled** Type 1 and Type 2 cold cathode Neon signs only.
- P. A single enclosed control device** contained in an enclosure which is not part of a Control Panel or Distribution/Switch Board.
- Q. Control devices**, e.g. solenoids, limit switches, pressure switches, thermostats.

- R. Electrical heaters**, such as water heaters, duct heaters, heaters incorporated as part of a machine or appliance. e.g. moulding machines, cooking appliances and the like.
- S. Motors** – refers to a single or three phase motor incorporated as part of plant or machinery. For example, a chiller unit, automated production and assembly unit, NC Machine; or independent motors driving such things as pumps, conveyors and other similar parts of plant and machinery.

Engineering assessments -

Using measurements, calculations and test results to determine whether an item of equipment complies with the relevant standard.

Equipment marking -

Information with regards to certification that is required to be marked on each item of equipment incorporating an explosion-protection technique.

Explosion properties of hazardous materials -

- for gases, vapours and mists; vapour pressure; boiling point; flash point; ignition energy; explosive limits relative to vapour density; minimum ignition energy
- for dusts; layer ignition temperature; cloud ignition temperature; minimum ignition temperature

Explosion-protection -

Technique of protection which is applied to equipment or parts of equipment to prevent the ignition of flammable vapours and gases or combustible dusts in hazardous areas. See *Explosion-protected equipment*.

Explosion-protected equipment -

Equipment using the technique which is applied to equipment or parts of equipment to prevent the ignition of flammable vapours and gases or combustible dusts in hazardous areas. Such equipment employs one or more of the following techniques:

- T. Mixed explosion-protection techniques - Ex mixed:** e.g. the use of one or more explosion-protection techniques for the following sub-endorsements. See *explosion-protection*.
- T1 – Ex “pD” – Pressurisation, dust
 - T2 – Ex “mD” – Encapsulation, dust
 - T3 – Ex “iD” – Intrinsic safety, dust
- U. Pressurised enclosure - Ex p:** e.g. rotating machines; specific products
- V. Dust-exclusion ignition-proof - DIP:** e.g. rotating machines; equipment within (DIP) enclosures

- W. Non-sparking - Ex n:** e.g. rotating machines; equipment within Ex n enclosures
- X. Intrinsic safety - Ex i:** e.g. specific products
- Y. Increased safety equipment - Ex e:** e.g. rotating machines; enclosures, equipment within Ex e enclosures
- Z. Flameproof enclosure - Ex d:** e.g. rotating machines; enclosures (eg. junction boxes; light fitting; stop-start statics); equipment within enclosures
- Encapsulation - Ex m
- Oil immersion - Ex o
- Purging - Ex pl
- Sand-filled - Ex q
- Special protection - Ex s
- Ventilation - Ex v
- Hermetic sealing - Ex h

Functions and process equipment -

Activities that produce a potentially hazardous area and the equipment used in such activities.

Gas groups -

Classification of electrical equipment for use in gas or vapour atmosphere according to groups and sub-groups of gases and vapours.

Hazardous area documentation -

Auditable documentation that shows that a hazardous area has been appropriately classified and the electrical equipment complies with the appropriate certification and other explosion-protection requirements specific to the site.

Under Australian/New Zealand Standards or Codes these records are referred to as a 'Verification Dossier' and include:

- Hazardous area classification drawings and justifications
- The explosion-protection systems design drawings/specifications
- Certification documents for each item type of explosion-protected equipment
- Inspection, testing and maintenance schedules and reports
- Re-classification and authorised modifications documentation, where applicable
- Competent persons

Hazard and risk assessment -

Any recognised methodology of identifying hazards and assessing risks such as 'hazard and operability study' (Hazop) and 'fault tree analysis' (HAZAN).

Hazardous materials -

Flammable gases and vapours and combustible dusts.

Inspection, close -

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

Inspection, detailed -

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

Inspection, maintenance schedules -

A program of periodic inspections and maintenance that follow set procedures and check lists for the purpose of ensuring the integrity of the explosion-protection and to comply with *requirements*. Details of a schedule will vary depending on the nature of the explosion-protection techniques used and environmental conditions.

Inspection, periodic -

Inspections of all equipment carried out on a routine basis, usually as part of scheduled maintenance.

Inspection, sample -

Inspection of a portion of installed equipment for the purposes of monitoring the effects of environmental conditions, vibration, inherent design weakness and the like.

Inspection, schedule -

A formal arrangement for conducting inspections which details the extent, grade and frequency of the inspections and the explosion-protected characteristics and compliances to be checked.

Inspection, visual -

An inspection which identifies, without the use of access equipment or tools, those non-conformances which are apparent to the eye.

Installation -

Explosion-protected equipment, wiring and other required items as they are fixed in place and connected as necessary to operate as intended.

Integrity of explosion-protected equipment -

Aspects of the equipment design and use that afford explosion-protection.

Load and duty requirements -

Wiring systems include: sufficient current-carrying capacity; maximum permitted voltage drop is not exceeded; temperature limits are not exceeded under normal or fault conditions.

Non-conformances -

Visual damage or corrosion of equipment and wiring and loose or missing fasteners.

Non-conformances and faults -

Equipment or wiring that does not conform to the design specification or other requirements.

Other items -

Those items that are not in themselves explosion-protected but have an influence on the integrity of the explosion-protection technique used. For example, an overload device for a motor or associated equipment in the case of intrinsic safety technique.

Pre-commission testing -

- tests specified by *requirement*, such as, performance and setting of protection devices and systems, earth loop impedance, insulation resistance, and earth continuity
- equipment connection and operation tests

Process specialist personnel -

To responsible persons with expertise in the technical aspects of the activities that produce the explosive hazard and include chemical engineers, process engineers, mining engineers, safety managers and the like.

Re-certification -

The submission of previously certified equipment to an approved testing body or authority to determine whether the equipment complies with the accepted standards after modification or where original certification is not fully known.

Recommended actions -

- non-connection of supply until a non-conformance or fault is rectified
- notice of period in which a non-conformance or fault is to be rectified
- other actions within the scope of statutory regulations

Regulatory or statutory authority -

The person or body responsible for the implementation of legislation relating to the handling, processing or storage of materials constituting a hazard.

Servicing -

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

Special tools, equipment and testing devices -

Tools for the removal of enclosure covers and connecting conductors; measuring devices such as feeler gauges and micrometer; gas and vapour sensors; electrical testing devices approved for use in a particular hazardous area.

Specifications -

Can include: documentation of hazardous material; documentation of process pressures and temperatures; process flow diagrams.

Standards -

Technical documents which set out specifications and other criteria for equipment, materials and methods to ensure they consistently perform as intended. The *Standards* referred to in this competency standard are those published by Standards Australia or in joint venture with Standards New Zealand. Competency in the use of other technical standards may be required in industries not restricted to Australian/New Zealand *requirements*. For example, shipping and off-shore petroleum industries are subject to standards agreed to by underwriters and enterprises or some other international convention.

Temperature class -

Classification of electrical equipment according to its maximum surface temperature.

Verification dossier -

See *hazardous area records*.

Zones -

The zones into which hazardous areas are classified based upon the frequency of the appearance and the duration of an explosive gas atmosphere.

UTE NES001 (A to Z qualifier) A

Undertake basic work activities

Descriptor: Undertake basic work activities which contributes to the effectiveness of the workplace.

Alignment: Nil.

Specific unit outcomes

This is presented as a composite unit that has six specific units as outcomes, based on the *category* in which competence is achieved. This is done because of the high degree of commonality in process or function. Reporting the unit with the inclusion of a *category* allows for the identification of the necessary training outcomes in terms of the generic and transferable skills and at the same time reflects the work classification(s) generally understood by industry. The specific unit outcomes are:

UTE NES001A A	Undertake basic work activities (<i>Computer systems</i>)
UTE NES001B A	Undertake basic work activities (<i>Electrical</i>)
UTE NES001C A	Undertake basic work activities (<i>Electronics</i>)
UTE NES001D A	Undertake basic work activities (<i>Instrumentation</i>)
UTE NES001E A	Undertake basic work activities (<i>Refrigeration & a/conditioning</i>)
UTE NES001F A	Undertake basic work activities (<i>Data communications</i>)

Elements		Performance criteria	
001.1	Prepare to undertake basic work activities	001.1.1	Instructions are received and checked to ensure they are clearly understood
		001.1.2	Tools, <i>equipment</i> and personnel protective equipment needed to do the work are obtained and checked to ensure they work correctly and are safe to use
		001.1.3	<i>OH&S policies and procedures</i> are read to ensure they are understood
		001.1.4	<i>Appropriate personnel</i> are consulted to ensure the work is co-ordinated effectively with others involved on the site
001.2	Carry out work activities as instructed	001.2.1	<i>OH&S policies and procedures</i> are followed
		001.2.2	Instruction for the work activities are followed

Elements	Performance criteria
	001.2.3 Further instructions are sought from <i>appropriate personnel</i> in the event of unplanned events or condition occurring
	001.2.4 On going checks of quality of the work undertaken in accordance with instructions
001.3 Check results of completed work activity	001.3.1 Final check is made to ensure work conforms with instruction and <i>requirements</i>
	001.3.2 <i>Appropriate personnel</i> is notified of completion of the work
	001.3.3 Tools and <i>equipment</i> are cleaned and checked and returned to storage
	001.3.4 Work area is cleaned up and made safe

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Categories

This unit recognises the commonality of skills and knowledge that exists for the unit as well as the additional specific outcome; which is to be reported on. Therefore, competency can be displayed on one, some or all of the following categories and in addition to the respective common underpinning knowledge associated with the selected specialisation:

- (A) Computer systems
- (B) Electrical
- (C) Electronics
- (D) Instrumentation
- (E) Refrigeration and air conditioning
- (F) Data communications

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating consistent performance for each element of the unit in the related *category* and *specialisation* which is to be exhibited across a *representative range* of applications; autonomously and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace for each of the *categories* and areas of *specialisation* undertaken from those listed in the Range statement or Evidence guide.
- demonstrating an understanding of the Underpinning knowledge and skills identified for the categories and related specialisation undertaken in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of applications which includes such things as *apparatus, circuits, wiring systems, plant, equipment, tools, accessories, components* and the like relative to that required for the *category* undertaken within and relevant to this unit of competency; autonomously and to requirements. Equivalent evidence from other sources is also acceptable.

Interdependent assessment of units

Nil.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Since this unit covers a range of *categories* each having multiple *specialisations* a content listing is provided below. Each *category* has all of the required underpinning knowledge and skill listed even though this sometimes results in duplication between *categories*.

Common

Occupational health and safety.

Occupational health and safety act: aims; acts; representatives; inspectors; offences

Personal safety: injuries and diseases in the workplace; repetitive strain injuries; manual handling procedures; handling of ladders; adequate lighting in the workplace; industrial radiation; chemical hazards; protective equipment; electrical hazards; thermal stress; exposure to excessive vibration; high level industrial noise

Workplace hazards: identification of potential workplace hazards; preventative measures

Working with electrically operated tools and equipment: nature of electric shock; causes of electrical accidents; working safely with electricity; safety items used in electrical environments

Rescue from a live electrical situation

Emergency first aid/resuscitation: procedures for performing emergency first aid and resuscitation for an electric shock victim; CPR

Use of tools.

Identification and application of tools for: marking out a measuring; cutting; shaping; drilling; threading; tapping; finishing; dismantling/assembly

Tool use: hazards; safety procedures; techniques

Fabrication: materials, types, applications; techniques, marking out, cutting, bending, drilling/punching, soldering, cutting mitres

Assembly/disassembly techniques

Electrical theory.

Fundamental and derived units: basic units; SI derived units; multiples and sub-multiples

Power, work and energy: conservation of energy; torque; losses and efficiency; maximum efficiency of machines

Electrical characteristics of materials: conductors, insulators, semi-conductors; electric charge; electric current; electromotive force

The simple circuit: source, load, current path and control; open-circuit; short-circuit

Resistance: Ohm's law; determine V, I, R; power dissipation

Effects of current: physiological effects; principles of protection from physiological effects; conversion of electrical energy to other forms (heating, light, magnetic, chemical) Sources of electrical energy - conversion of other forms to electrical energy

Using measuring instruments: handling measuring instruments; selecting an instrument; setting-up and connecting into circuits; reading scales and read-outs; setting up a CRO

Factors effecting resistance: length, csa and resistivity; temperature change; influence on practical circuits

Resistors: types and applications; value and rating

Series circuits (single source): determine V, I, R, P; Kirchhoff's Voltage Law; voltage divider Parallel circuits: determine V, I, R, P; Kirchhoff's Current Law; current divider

Series/parallel circuits: determine V, I, R, P; bridge network Resistance measurement: hazards; characteristics of instruments and loading effect; direct, volt-ammeter and bridge method; typical field instruments and applications

Capacitance: concept; units; time constant relationship Capacitors: hazards; factors effecting capacitance; in series; in parallel; measuring/testing/hazards

Inductance: concept; units; time constant relationship

Inductors: factors effecting inductance

Wiring techniques.

Electrical/electronic safety testing: isolation; testing; tagging; earthing; appliance electrical safety testing

Standards pertinent to industry sector: purpose; standards bodies; applications

Cables: types, power, signal; terms; colour coding; structure; identification cables; cable applications

Wiring systems: wiring looms; enclosures and supports; selecting wiring systems

Connectors and terminations: requirements; connectors, types and applications, assembly/disassembly; terminating conductors, extension cords

Accessories and fixings appropriate to industry sector: applications; fixing devices and methods

Drawing interpretation and sketching.

Technical drawing standards appropriate to the industry sector, conventions and specifications to AS 1100, with strong emphasis on interpretation: sheet types, title block information, materials parts list, revision table, grid referencing scales, line types – visible outlines, hidden outlines, dimensioning lines, centre lines; orthogonal projection of views – 3rd angle (detail and assembly drawings); mechanical conventions; fabrication conventions; three dimensional view drawings – axonometric, isometric, oblique; sectioning standards and conventions – whole, part; engineering drawing symbols, components and equipment – mechanical, electrical, electronic, computer, instrument, refrigeration; dimensioning – orthogonal, isometric; layout and plans; geometric tolerance interpretation (straightness, flatness, squareness, parallelism and concentricity only); engineering abbreviations; drawing interpretation techniques – detail drawings, orthogonal projection (3rd angle only) and three dimensional, assembly drawings and three dimensions exploded (e.g. as in equipment manuals)

Equipment and service manuals: flow charts; assembly/disassembly diagrams; schematic diagrams; block diagrams; trouble shooting guides

Freehand drawing skills appropriate to the industry sector: 3rd angle orthogonal projections; isometric; interpretation of drawing symbols; practical exercises

Science and materials.

Trade calculations: mathematical techniques; relevant calculations; linear measurement, areas, volumes, ratios

Engineering mechanics: base physical quantities; concepts, principles, S.I. units; calculations in relation to physical; quantities and associated formulae (mass, velocity, acceleration, force, weight, density, angles); energy/work/power; moments/torque; centre of gravity; mechanical advantage; levers; pulley blocks; efficiency; friction; vectors; resolution of forces; determination of sag; pressure/stress; elementary fluid mechanics

Engineering materials: classification; ferrous and non-ferrous metals; steels, alloys; properties; tensile strength; temperature and expansion in metals; stress and strain; ductility; applications; corrosion; galvanic corrosion; hardwoods and soft woods

Introduction to the electrotechnology industry.

The electrotechnology industry: organisation of work; role and responsibilities

Effective communication

Training in the electrotechnology industry: arrangements, roles and responsibilities

Preparing for work at a new site

Equal employment opportunity policy and practice

Category: Computer systems (A)

Specialisation: Computer systems

Computing in the electrotechnology industry.

Use of computers in the electrotechnology industry

Introduction to computers: types of computers; hardware names; meaning of words and terms commonly associated with computers

Introduction to operating systems

Peripheral devices: purpose of input, output and ancillary storage devices

Use of computers: input and run a simple program; enter data, retrieve data

Application packages used in the electrotechnology industry: use of application programmes

Category: Electrical (B)

Specialisation: Electrical

Computing in the electrotechnology industry.

Use of computers in the electrotechnology industry

Introduction to computers: types of computers; hardware names; meaning of words and terms commonly associated with computers

Introduction to operating systems

Peripheral devices: purpose of input, output and ancillary storage devices

Use of computers: input and run a simple program; enter data, retrieve data

Application packages used in the electrotechnology industry: use of application programmes

Category: Electronics (C)

Specialisation: Electronics

Computing in the electrotechnology industry.

Use of computers in the electrotechnology industry

Introduction to computers: types of computers; hardware names; meaning of words and terms commonly associated with computers

Introduction to operating systems

Peripheral devices: purpose of input, output and ancillary storage devices

Use of computers: input and run a simple program; enter data, retrieve data

Application packages used in the electrotechnology industry: use of application programmes

Category: Instrumentation (D)

Specialisation: Instrumentation

Computing in the electrotechnology industry.

Use of computers in the electrotechnology industry

Introduction to computers: types of computers; hardware names; meaning of words and terms commonly associated with computers

Introduction to operating systems

Peripheral devices: purpose of input, output and ancillary storage devices

Use of computers: input and run a simple program; enter data, retrieve data

Application packages used in the electrotechnology industry: use of application programmes

Category: Refrigeration and air conditioning (E)

Specialisation: Refrigeration and air conditioning

Computing in the electrotechnology industry.

Use of computers in the electrotechnology industry

Introduction to computers: types of computers; hardware names; meaning of words and terms commonly associated with computers

Introduction to operating systems

Peripheral devices: purpose of input, output and ancillary storage devices

Use of computers: input and run a simple program; enter data, retrieve data

Application packages used in the electrotechnology industry: use of application programmes

Category: Data communications (F)

Specialisation: Data communications

Computing in the electrotechnology industry.

Use of computers in the electrotechnology industry

Introduction to computers: types of computers; hardware names; meaning of words and terms commonly associated with computers

Introduction to operating systems

Peripheral devices: purpose of input, output and ancillary storage devices

Use of computers: input and run a simple program; enter data, retrieve data

Application packages used in the electrotechnology industry: use of application programmes

UTE NES002 A

Attend to breakdown

Descriptor: Attend to breakdowns of apparatus and installations.

Elements	Performance criteria
002.1 Prepare to attend breakdown	<p>002.1.1 Nature of the breakdown is confirmed with <i>appropriate personnel</i> to establish the need to attend</p> <p>002.1.2 Work clearance are obtained and other preliminary <i>OH&S procedures</i> are followed, where required</p> <p>002.1.3 <i>Appropriate personnel</i> are consulted to ensure the work is co-ordinated effectively with others involved on the work site</p> <p>002.1.4 Tools, <i>equipment</i> and <i>testing devices</i> anticipated as being needed to carry out the work are obtained in accordance with <i>established procedures</i> and checked for correct operation and safety</p>
002.2 Evaluate extent of work	<p>002.2.1 Customer service requirements are dealt with</p> <p>002.2.2 <i>OH&S policies and procedures</i> for working in the area at the breakdown</p> <p>002.2.3 Extent of breakdown is evaluated and confirmed with <i>appropriate personnel</i></p> <p>002.2.4 <i>Appropriate personnel</i> required to determine cause and rectify breakdown is ascertained from available evidence and arrangements made for their attendance where applicable</p> <p>002.2.5 Extent of repair work is ascertained from available evidence and confirmed with <i>appropriate personnel</i></p> <p>002.2.6 Limits of repair work that can be carried out in-situ are established with regards to potential hazards and in accordance with <i>established procedures</i> and requirements</p> <p>002.2.7 Arrange repair work by <i>appropriate personnel</i>, where necessary</p>
002.3 Confirm completion	<p>002.3.1 <i>Apparatus</i> and systems are inspected and tested after repairs completed to ensure <i>requirements</i> are met</p>

Elements	Performance criteria
	002.3.2 <i>Appropriate personnel</i> is notified of the completion of the repair work and details are documented in accordance with <i>established procedures</i> and <i>requirements</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to undertake activities that directly support the operational and business activities of an enterprise. This could include the following:

Enterprise documentation and record systems including the use of computers, information systems and business equipment technologies, as appropriate

Enterprise occupational health and safety instructions

Responsibilities and rights of others involved including clients, property owners, other workers and the public

Time management and co-ordination processes.

Organisational arrangements for communicating plans, information, intentions and safety criteria to others by appropriate means

Operation of plant and equipment associated with a given workplace

Perform necessary actions to protect the *environment*

UTE NES003 A

Transport apparatus & materials

Descriptor: Transport *apparatus, plant accessories* and materials.

Elements	Performance criteria
003.1 Plan and prepare for the transport of apparatus and materials	<p>003.1.1 Transport of <i>apparatus</i> and materials is planned and prepared to ensure <i>OH&S policies and procedures</i> are followed, the work is appropriately sequenced in accordance with <i>requirements</i></p> <p>003.1.2 <i>Appropriate personnel</i> are consulted to ensure <i>apparatus, accessories, plant, equipment</i> and/or materials are appropriately identified, and checked against manufacture's transport instructions and <i>requirements</i></p> <p>003.1.3 Transport details of <i>apparatus</i> and materials are checked against <i>job requirements</i></p> <p>003.1.4 <i>Plant</i> needed to carry out the work is obtained in accordance with <i>established procedures</i> and checked for correct operation and safety</p> <p>003.1.5 Where appropriate, the teams and individuals work roles and responsibilities within the team are identified</p> <p>003.1.6 Preparatory work is checked to ensure no unnecessary damage has occurred and complies with <i>requirements</i></p>
003.2 Transport <i>apparatus</i> and materials	<p>003.2.1 <i>OH&S policies and procedures</i> for the transport of <i>apparatus plant</i> and materials are followed</p> <p>003.2.2 <i>Apparatus, plant</i> and materials are transported in accordance with <i>requirements</i>, and manufacture's transport instructions without damage or distortion to the surrounding environment or services</p> <p>003.2.3 Unplanned events or conditions are responded to in accordance with <i>established procedures</i></p> <p>003.2.4 Approval is obtained in accordance with <i>established procedures</i> from <i>appropriate personnel</i> before any contingencies are implemented</p> <p>003.2.5 On-going checks of the quality of the work are undertaken in accordance with <i>established procedures</i></p>

Elements	Performance criteria
003.3 Check and notify completion of work	003.3.1 Final inspections are undertaken to ensure the transported <i>apparatus</i> and materials conforms to <i>requirements</i> 003.3.2 Work completion is <i>notified</i> in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to undertake activities that directly support the operational and business activities of an enterprise. This could include the following:

OH&S procedures and codes of practice

Manual lifting

Applications of standards, regulations, road permits, specifications, procedures and other requirements

Communication principles

Regulatory requirements, including driving license

Use of maps and drawings

Operational and maintenance procedures

Equipment capabilities and limitations

Recording/log systems

Warning and directional signals

Loading and off loading procedures

Pre start, start up and shut down procedures

UTE NES004 A

Operate plant, machinery & equipment

Descriptor: Operate and routinely maintain plant, machinery and equipment used in the preparation of worksite and in support of installation and maintenance work.

Elements	Performance criteria
004.1 Plan and prepare for the operation of <i>plant</i> , machinery and equipment	004.1.1 Operation of plant, machinery and equipment is planned and prepared to ensure <i>OH&S policies and procedures</i> are followed, the work is appropriately sequenced in accordance with <i>requirements</i>
	004.1.2 <i>Appropriate personnel</i> are consulted to ensure the work is co-ordinated effectively with others involved on the work site
	004.1.3 Operation of <i>plant</i> , machinery and equipment is checked against job <i>requirements</i>
	004.1.4 Materials necessary to complete the work are obtained in accordance with <i>established procedures</i> and checked against job <i>requirements</i>
	004.1.5 Tools and <i>equipment</i> needed to carry out the work are obtained in accordance with <i>established procedures</i> and checked for correct operation and safety
	004.1.6 Preparatory and routine maintenance work is checked to ensure no unnecessary damage has occurred and complies with <i>requirements</i>
004.2 Operate <i>plant</i> , machinery and equipment	004.2.1 <i>OH&S policies and procedures</i> for operating <i>plant</i> , machinery and equipment are followed
	004.2.2 <i>Plant</i> , machinery and equipment are operated in accordance with <i>requirements</i> , without damage or distortion to the surrounding environment or services
	004.2.3 Unplanned events or conditions are responded to in accordance with <i>established procedures</i>
	004.2.4 Approval is obtained in accordance with <i>established procedures</i> from <i>appropriate personnel</i> before any contingencies are implemented
	004.2.5 On-going checks of the quality of the work are undertaken in accordance with <i>established procedures</i>

Elements	Performance criteria
004.3 Inspect and notify completion of work	004.3.2 Final inspections are undertaken to ensure the work conforms to <i>requirements</i>
	004.3.2 Work completion is <i>notified</i> in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to undertake activities that directly support the operational and business activities of an enterprise. This could include the following:

OH&S procedures and codes of practice

Safety issues relating to work in the proximity of overhead lines

Notification and information relating to on-site underground reticulation systems

Communication *requirements* relating to on-site underground reticulation systems

Applications of standards, regulations, specifications, procedures and other installation requirements

Application of architectural and route plans

Traffic control *requirements*

Environmental and site management *requirements*

Soil types

Stabilisation procedures for plant, machinery and equipment

Procedures for working at heights

Basic engineering principles related to operator level routine maintenance of plant, machinery and equipment

Permitted clearances from energised conductors and *apparatus*

Selection and use of hand and power tools related to operator level routine maintenance of plant, machinery and equipment

Engineering practices related to operator level routine maintenance of plant, machinery and equipment

Communication principles

Operator maintenance

Pre start, start up and shut down procedures

Slinging, ropes and chain types and techniques

Warning and directional signals

UTE NES005 A

Co-ordinate materials

Descriptor: Co-ordinate apparatus, associated accessories, components, materials and *circuit* wiring required to prepare and implement work.

Elements	Performance criteria
005.1 Plan and prepare to co-ordinate materials	<p>005.1.1 Materials co-ordination are planned and prepared to ensure <i>OH&S policies and procedures</i> are followed, the work is appropriately sequenced in accordance with <i>requirements</i></p> <p>005.1.2 <i>Appropriate personnel</i> are consulted to ensure material is co-ordinated effectively with others involved on the work site</p> <p>005.1.3 Materials are identified in accordance with <i>established procedures</i> and checked against <i>requirements</i></p>
005.2 Co-ordinate materials	<p>005.2.1 <i>OH&S policies and procedures</i> are followed</p> <p>005.2.2 Materials co-ordination are detailed in accordance with <i>requirements</i></p> <p>005.2.3 Obtain approval to change specifications where appropriate in accordance with <i>established procedures</i> and from <i>appropriate personnel</i></p> <p>005.2.4 On-going checks on the co-ordination of materials are undertaken in accordance with <i>established procedures</i></p>
005.3 Inspect and notify completion of work	<p>005.3.1 Final inspections of material are undertaken in accordance with <i>established procedures</i></p> <p>005.3.2 Store and dispatch materials in conjunction with others involved or effected by the work in accordance with <i>established procedures</i></p> <p>005.3.3 Completion of materials co-ordination is <i>notified</i> in accordance with <i>established procedures</i></p>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to undertake activities that directly support the operational and business activities of an enterprise. This could include the following:

Enterprise documentation and record systems including the use of computers, information systems and business equipment technologies, as appropriate

Enterprise occupational health and safety instructions

Responsibilities and rights of others involved including clients, property owners, other workers and the public

Time management and co-ordination processes.

Organisational arrangements for communicating plans, information, intentions and safety criteria to others by appropriate means

Operation of plant and equipment associated with a given workplace

Perform necessary actions to protect the *environment*

UTE NES006 A

Estimate projects

Descriptor: Estimate projects encompassing quantity take-offs, labour, sub-contract services and costing.

Elements	Performance criteria
006.1 Plan and prepare to estimate projects	006.1.1 Project estimations are planned and prepared to ensure <i>OH&S policies and procedures</i> are followed, the work is appropriately sequenced in accordance with <i>requirements</i>
	006.1.2 Projects for estimation are checked against <i>requirements</i>
	006.1.3 <i>Appropriate personnel</i> are consulted to ensure project estimation is co-ordinated effectively with others involved
	006.1.4 Measuring equipment, software and materials necessary to complete project estimations are identified in accordance with <i>established procedures</i> and checked against <i>requirements</i>
006.2 Estimate projects	006.2.1 <i>OH&S policies and procedures</i> are followed
	006.2.2 Estimations are detailed in accordance with <i>established procedures</i> and <i>requirements</i>
	006.2.3 Response to unplanned events or conditions are detailed in accordance with <i>established procedures</i>
	006.2.4 Approval to implement contingencies in accordance with <i>established procedures</i> from <i>appropriate personnel</i> are detailed
	006.2.5 On-going checks of the quality of the work in accordance with <i>established procedures</i> are detailed
006.3 Inspect and notify completion of work	006.3.1 Final inspections of estimations are undertaken in accordance with <i>established procedures</i>
	006.3.2 Completion of estimations is <i>notified</i> in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to undertake activities that directly support the operational and business activities of an enterprise. This could include the following:

Enterprise documentation and record systems including the use of computers, information systems and business equipment technologies, as appropriate

Enterprise occupational health and safety instructions

Responsibilities and rights of others involved including clients, property owners, other workers and the public

Time management and co-ordination processes.

Organisational arrangements for communicating plans, information, intentions and safety criteria to others by appropriate means

Operation of plant and equipment associated with a given workplace

UTE NES007 A

Supply projects

Descriptor: Supply projects encompassing sourcing, purchasing, receiving and dispatching of plant, *apparatus*, test and safety equipment, tools, wiring, enclosures, supports, piping, tubing, ducting, *accessories*, materials and fixings.

Elements	Performance criteria
007.1 Plan and prepare to supply projects	<p>007.1.1 Project supplies are planned and prepared to ensure <i>OH&S policies and procedures</i> are followed, the work is appropriately sequenced in accordance with <i>requirements</i></p> <p>007.1.2 <i>Appropriate personnel</i> are consulted to ensure project supply is co-ordinated effectively with others involved</p> <p>007.1.3 Projects supplies are checked against <i>requirements</i></p> <p>007.1.4 Documentation and software necessary to complete the supply of projects are identified in accordance with <i>established procedures</i> and checked against <i>requirements</i></p>
007.2 Supply projects	<p>007.2.1 <i>OH&S policies and procedures</i> are followed</p> <p>007.2.2 Supply enquiries, sourcing, investigations and acquisitions are detailed in accordance with <i>established procedures and requirements</i></p> <p>007.2.3 Response to unplanned events or conditions are detailed in accordance with <i>established procedures</i></p> <p>007.2.4 Approval to implement contingencies in accordance with <i>established procedures</i> from <i>appropriate personnel</i> are detailed.</p> <p>007.2.5 On-going checks of the quality of the work related to supplying projects are in accordance with <i>established procedures</i> are detailed</p>
007.3 Receipt, inspect, dispatch and notify completion of supply	<p>007.3.1 Receipt, final inspections and dispatch of supplies are undertaken in accordance with <i>established procedures</i></p> <p>007.3.2 Completion of supply are <i>notified</i> in accordance with <i>established procedures</i></p>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

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Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to undertake activities that directly support the operational and business activities of an enterprise. This could include the following:

Enterprise documentation and record systems including the use of computers, information systems and business equipment technologies, as appropriate

Enterprise occupational health and safety instructions

Responsibilities and rights of others involved including clients, property owners, other workers and the public

Time management and co-ordination processes.

Organisational arrangements for communicating plans, information, intentions and safety criteria to others by appropriate means

Operation of plant and equipment associated with a given workplace

Perform necessary actions to protect the *environment*

UTE NES008 A

Provide technical leadership in the workplace

Descriptor: Provide technical leadership in the workplace appropriate to the level of autonomy accorded to individuals and teams.

Elements		Performance criteria	
008.1	Demonstrate standards of performance	008.1.1	Work demonstrated follows <i>OH&S policies and procedures</i> with the work is appropriately sequenced in accordance with <i>requirements</i>
		008.1.2	Work demonstrated is co-ordinated effectively with others involved on the work site
		008.1.3	Work demonstrated meets <i>requirements</i>
		008.1.4	Unplanned events or conditions are responded to in accordance with <i>established procedures</i>
008.2	Maintain personal competence	008.2.1	Personal competence is assessed against <i>requirements</i> to determine personal training needs
		008.2.2	Feedback on competence is used to develop personal training needs in accordance with <i>established procedures</i>
		008.2.3	Participation in technical programs to enhance competence are undertaken in accordance with <i>established procedures</i>
008.3	Organise personal work priorities	008.3.1	Work priorities are organised in accordance with <i>established procedures</i>
		008.3.2	Work is managed effectively to accomplish <i>requirements</i>
		008.3.3	Technology is used to improve efficiency in the management of information in accordance with <i>established procedures</i>
		008.3.4	Personal training within the workplace is managed in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to undertake activities that directly support the operational and business activities of an enterprise. This could include the following:

Enterprise documentation and record systems including the use of computers, information systems and business equipment technologies, as appropriate

Enterprise occupational health and safety instructions

Responsibilities and rights of others involved including clients, property owners, other workers and the public

Time management and co-ordination processes.

Organisational arrangements for communicating plans, information, intentions and safety criteria to others by appropriate means

Operation of plant and equipment associated with a given workplace

UTE NES009 A

Participate in the training of others

Descriptor: Provide opportunities to and supervision of learners with respect to their vocational development during work activities, at a level appropriate to the stage of development in the training program, giving feedback on performance and verifying the work undertaken.

Elements	Performance criteria
009.1 Plan and prepare to provide for learning opportunities	<p>009.1.1 Stage of development of the learner is determined from discussion with the learner, observation of the learner and/or a formal assessment being carried out</p> <p>009.1.2 Measures are taken to ensure the learner understands <i>OH&S requirements</i> and safe working <i>procedures</i> and practises for the particular worksite and the activities to be undertaken</p> <p>009.1.3 Preparation for particular work includes deciding which activities are to be undertaken by the learner and the level of supervision</p> <p>009.1.4 Confirmations from the learner are sought regarding the level of understanding of the work activity to be performed</p>
009.2 Supervise/mentor learners	<p>009.2.1 Learner is provided with clear instructions on the work to be undertaken and the respective responsibilities associated with the work and to others involved</p> <p>009.2.2 Learner is supervised/mentored and on-going checks of performance(s) are made at a level appropriate to the stage of development</p> <p>009.2.3 Learners progress is monitored in accordance with <i>established procedures</i></p> <p>009.2.4 Learner is provided with feedback on work activities and actions are taken to correct any defective performance</p> <p>009.2.5 Learner is assisted where appropriate to identify and recognise the respective industry standards for recording purposes</p>
009.3 Verify activities undertaken by learner	<p>009.3.1 Measures are taken to ensure the learner completes relevant documentation of the work performed in accordance with <i>established procedures</i></p>

Elements	Performance criteria
	009.3.2 Work activities undertaken and documented by the learner are verified in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to assist learners apply knowledge and skills to new work experiences. This could include the following:

Enterprise documentation and record systems including the use of computers, information systems and business equipment technologies, as appropriate

Enterprise occupational health and safety instructions

Responsibilities and rights of others involved including clients, property owners, other workers and the public

Time management and co-ordination processes.

Organisational arrangements for communicating plans, information, intentions and safety criteria to others by appropriate means

Operation of plant and equipment associated with a given workplace

UTE NES010 A

Report on the integrity of explosion-protected equipment in hazardous areas

Descriptor: Provide assistance to ensure the *integrity of explosion-protected equipment and wiring system in hazardous areas* by correctly operating plant and machinery and taking actions to limit the risk of an explosion in the event of explosion-protected equipment or wiring being damaged or changes in the hazard to a potentially dangerous state.

Alignment: This unit aligns to the Competency Standard 'Electrical equipment in hazardous areas' CS-EEHA-001-1998, unit NEE 001.

Elements	Performance criteria
010.1 Prepare to work in hazardous area	<p>010.1.1 Nature of the explosion hazard in the area is known and the status of the explosion hazard is ascertained through <i>established procedures</i></p> <p>010.1.2 Operational and condition of plant and machinery, with regards to explosion-protection, is ascertained through <i>established procedures</i></p> <p>010.1.3 <i>Established procedures</i> for use of the plant and machinery, with regards to explosion-protection techniques used in the area, are followed</p>
010.2 Observe condition of explosion-protection system area	<p>010.2.1 <i>OH&S policies and procedures</i>, with regards to explosion-protection, are followed</p> <p>010.2.2 Performance of plant and machinery is monitored to identify faults that may effect the <i>integrity</i> of the explosion-protected equipment and wiring system</p> <p>010.2.3 Observations of <i>explosion-protected equipment and wiring</i> are made during normal operations and visual <i>non-conformances</i> that may effect the integrity of the explosion-protection technique are identified</p> <p>010.2.4 Explosion hazard monitoring equipment is observed and a potentially dangerous state of the hazard is identified</p>
010.3 Take actions to limit risk of an explosion	<p>010.3.1 <i>Non-conformances</i> are reported and documented in accordance with <i>established procedures</i></p> <p>010.3.2 <i>Established procedures</i> are followed in the event of a potential or immediate hazardous condition arising from any <i>non-conformance</i> identified in equipment/wiring or changes in the explosion hazard to a potentially dangerous state</p>

Range statement

Competency can be demonstrated in relation to any classified hazardous area.

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating consistent performance for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Competence must be demonstrated in relation to the explosion-protection technique for which competency is sought. It is essential that working safely in a potentially hazardous area is demonstrated in relation to:

- work permits and clearance;
- hazard monitoring and evacuation procedures;
- operation of plant and machinery;
- plant and electrical isolation;
- identifying visual damage and corrosion of equipment and wiring systems;
- reporting non-conformances.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range of plant, equipment, tools, accessories, components* and the like for the *category* undertaken within a unit of competency; autonomously and to requirements. Equivalent evidence from other sources is also acceptable.

Interdependent assessment of units

Competency in this unit should be assessed in combination with other competencies required by a given industry or enterprise for plant or machinery operation or to installation, maintenance or service functions.

Underpinning knowledge

Evidence of knowledge related to hazardous areas and to Ex d, Ex e, Ex n, Ex i and DIP *explosion-protection* techniques and any other technique relevant to a particular workplace is required. The following is a summary of knowledge related to hazardous areas:

Safe working requirements and procedures; definition of a hazardous area; meaning of terms "classification", "class" and "zone"; conditions that lead to an explosion; meaning of the terms "combustion", "detonation" and "propagation"; characteristics of an explosive atmosphere (LEL/UEL); OH&S responsibilities; parties responsible for safety of hazardous areas

The following is a summary of knowledge related to explosion-protected equipment and applicable to an explosion-protection technique:

Basic principles of explosion protection; actions that void explosion-protection; visible conditions that may indicate that the explosion-protection provided by equipment or wiring is voided; basic characteristics/markings of equipment that identify a particular explosion-protection technique

UTE NES011 A

Monitor energy usage in an electrotechnology context

Descriptor: Monitor energy usage and provide basic sustainable energy options to reduce the energy consumption in buildings and structures with respect to the electrotechnology environment.

Elements	Performance criteria
011.1 Prepare to monitor energy usage	<p>011.1.1 Monitoring activities are planned and prepared for to ensure <i>OH&S policies and procedures</i> are followed with the work appropriately sequenced in accordance with <i>requirements</i></p> <p>011.1.2 <i>Appropriate personnel</i> are consulted to ensure the work is co-ordinated effectively with others involved</p> <p>011.1.3 Materials are obtained and checked in accordance with <i>established procedures</i> and to comply with <i>requirements</i></p> <p>011.1.4 Location in which monitoring activities is determined from job <i>requirements</i></p> <p>011.1.5 Materials necessary to complete the work are obtained in accordance with <i>established procedures</i> and checked against job <i>requirements</i></p> <p>011.1.6 Materials needed to carry out the monitoring are obtained in accordance with <i>established procedures</i></p>
011.2 Undertake monitoring of energy usage	<p>011.2.1 <i>OH&S policies and procedures</i> for undertaking monitoring activities are followed</p> <p>011.2.2 Monitoring activities are undertaken in accordance with <i>requirements</i>, without damage or distortion to the surrounding environment or services</p> <p>011.2.3 Unplanned events or conditions are responded to in accordance with <i>established procedures</i></p> <p>011.2.4 Approval is obtained in accordance with <i>established procedures</i> from <i>appropriate personnel</i> before any contingencies are implemented</p>

Elements	Performance criteria
	011.2.5 On-going checks of the quality of the work are undertaken in accordance with <i>established procedures</i>
011.3 Complete monitoring activities	011.3.1 Documentation/reports are completed to ensure administrative <i>requirements</i> are met 011.3.2 Work completion is <i>notified</i> in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this Unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgments about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

There is no interdependency associated with this unit. However, this unit has been designed as a natural progression from unit UTE NES301 A. Therefore, it is expected that to achieve this unit, without having gained competence in unit UTE NES301 A, will require that the relevant aspects of knowledge and skills related to unit UTE NES301 A be developed and form part of the requirements for achieving competence in this unit.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Sustainable energy

The earth's atmosphere (composition and functions); the green house effect (causes and consequences); international and national greenhouse imperatives; the role of government authorities; energy usage in Australia – contribution to the greenhouse effect (energy from gas, energy from electricity, motor vehicles and gases other than CO₂); opportunities for reducing greenhouse emissions (domestic, commercial and industrial strategies and trade related technologies and methods); an overview of sustainable energy technologies (solar, wind, biomass and co-generation); economic benefits of sustainable energy initiatives.

Building design and building retrofits

Principles of passive solar design; use of natural light; energy efficient retrofits (overview); insulation and ventilation; energy management control systems; assessment of requirements and selection of design/technologies; use/application of different types of glazing.

Selection of control devices

Components within a lighting system; energy efficient lighting products, design and installation; use of natural light; automated lighting control systems; assessment of requirements and selection of system; system maintenance

or;

Components within a HVAC and refrigeration control system; energy efficient refrigerants; detection systems to control air flow; energy star ratings for coefficient of performance; energy control systems; advantages of evaporative air conditioners in dry climates

General

Enterprise documentation and record systems including the use of computers, information systems and business equipment technologies, as appropriate; enterprise occupational health and safety instructions; responsibilities and rights of others involved including clients, property owners, other workers and the public; time management and co-ordination processes; organisational arrangements for communicating plans, information, intentions and safety criteria to others by appropriate means; operation of plant and equipment associated with a given workplace; dealing with customers to ensure their needs are appropriately; perform necessary actions to protect the *environment*.

UTE NES012 (A to Z qualifier) A

Attend to breakdowns in hazardous areas

Descriptor: Attend to breakdowns of *explosion-protected equipment* and installations situated in a *hazardous area* and *other items* of equipment located in a safe area that may influence the *explosion-protection technique*.

Alignment: This unit aligns to the Competency Standard 'Electrical equipment in hazardous areas' CS-EEHA-001-1998, unit NEE 005.

Specific unit outcomes

This is a composite unit that can be achieved in any of seven *endorsements* related to explosion protection techniques. This is done because of the high degree of commonality in knowledge, process and function. Reporting the unit with the inclusion of one or more *endorsements* will identify the necessary applied skills related to workplace outcomes and at the same time reflects the work classification(s) generally understood by industry. The specific unit *endorsements* are:

UTE NES012T A	Attend to breakdowns in hazardous areas (<i>Mixed explosion-protection techniques Ex mixed</i>)
UTE NES012U A	Attend to breakdowns in hazardous areas (<i>Pressurised enclosure Ex p</i>)
UTE NES012V A	Attend to breakdowns in hazardous areas (<i>Dust-exclusion ignition-proof Dip</i>)
UTE NES012W A	Attend to breakdowns in hazardous areas (<i>Non-sparking Ex n</i>)
UTE NES012X A	Attend to breakdowns in hazardous areas (<i>Intrinsic safety Ex i</i>)
UTE NES012Y A	Attend to breakdowns in hazardous areas (<i>Increased safety equipment Ex e</i>)
UTE NES012Z A	Attend to breakdowns in hazardous areas (<i>Flameproof enclosure Ex d</i>)

Elements	Performance criteria
012.1 Prepare to attend breakdown	<p>012.1.1 Nature of the breakdown is confirmed with <i>appropriate personnel</i> to establish the need to enter the hazardous area</p> <p>012.1.2 Safety to enter the hazardous area is established in accordance with <i>established procedures</i> and relevant clearance to do the work is obtained</p> <p>012.1.3 Testing devices and tools, anticipated as being needed for the work, are obtained and checked for correct operation and safety</p>

Elements	Performance criteria
012.2 Evaluate extent of work	<p>012.2.1 <i>OH&S policies and procedures</i> for working in a hazardous area are followed</p> <p>012.2.2 Extent of breakdown is evaluated and confirmed with <i>appropriate personnel</i></p> <p>012.2.3 <i>Other personnel</i> required to determine cause and rectify breakdown is ascertained from available evidence and arrangements made for their attendance where applicable</p> <p>012.2.4 Extent of repair work is ascertained from available evidence and confirmed with <i>appropriate personnel</i></p> <p>012.2.5 Limits of repair work that can be carried out in-situ are established with regards to explosion risk and in accordance with <i>established procedures</i> and requirements</p>
012.3 Arrange repair work	<p>012.3.1 Equipment is isolated in accordance with <i>established procedures</i></p> <p>012.3.2 Circuits of equipment being withdrawn from service are terminated or isolated safely and in manner approved for the classification of the area</p> <p>012.3.3 <i>Certification documentation</i> for replacement equipment is sighted to ensure that it is identical with the equipment it replaces and is in accordance with the explosion-protection system design</p> <p>012.3.4 Repair work carried out in-situ is done in accordance with <i>established procedures</i> and requirements</p>
012.4 Confirm completion of work	<p>012.4.1 <i>Explosion-protected equipment</i> and systems are inspected and tested after repairs are completed to ensure the <i>integrity</i> of the system</p> <p>012.4.2 <i>Appropriate personnel</i> is notified of the completion of the repair work and details are documented in accordance with <i>established procedures</i> and requirements</p>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Endorsements

Competency can be demonstrated in relation to any classified hazardous areas listed:

- (T) Mixed explosion-protection techniques Ex mixed
- (U) Pressurised enclosure Ex p
- (V) Dust-exclusion ignition-proof DIP
- (W) Non-sparking Ex n
- (X) Intrinsic safety Ex i
- (Y) Increased safety equipment Ex e
- (Z) Flameproof enclosure Ex d

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Competence must be demonstrated in relation to the explosion-protection technique for which competency is sought. It is essential that working safely in a potentially hazardous area is demonstrated in relation to:

- work permits and clearance;
- hazard monitoring and evacuation procedures;
- plant and electrical isolation;
- evacuating extent of breakdown;
- interpreting certification documentation in relation to repair and replacement;
- following established breakdown procedures.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range of plant, equipment, tools, accessories, components* and the like for the *category* undertaken within a unit of competency; autonomously and to requirements. Equivalent evidence from other sources is also acceptable.

Interdependent assessment of units

This unit should be addressed only after competency in unit UTE NES010 A of this standard has been achieved.

Competency in this unit should be assessed only after competency related to the attending to breakdowns in electrical equipment has been achieved at *AQF* Certificate III level. Similar competency and qualifications related to instrument and electronic equipment would be sufficient pre-requisite where explosion-protected equipment operates at extra-low voltage.

Underpinning knowledge

Evidence of knowledge related to hazardous areas and to Ex d, Ex e, Ex n Ex i, and DIP explosion-protection techniques and any other technique relevant to a particular workplace is required. The following is a summary of knowledge related to hazardous areas:

Safe working requirements and procedures; definition of a hazardous area; conditions that lead to an explosion; meaning of the terms "combustion", "detonation" and "propagation"; OH&S responsibilities; parties responsible for safety of hazardous areas; definition of classes and zones; identify classes, zones and groups from system design documentation; characteristics of an explosive atmosphere (LEL/UEL) and relationship to ignition energy; combustible properties of materials

The following is a summary of knowledge of explosion-protected equipment and applicable to an explosion-protection technique:

Method of explosion protection; mechanisms of explosion protection employed by a technique; interpretation of installation limitations specified in certification and approval documentation; requirements of electrical protection devices; application and limitations of equipment; identification of gas grouping and temperature class of equipment; parties responsible for certification/approval system; temperature limitations of wiring and equipment; limitations on non-metallic and specific alloy enclosures; interpretation of equipment marking; application, selection and use of fasteners; requirements for inspecting and testing circuits; requirements for detailed initial/sample and close/visual inspections standards and procedures for terminating and connecting cables; relationship between equipment, cables and glands; standards and requirements for the installation of equipment and wiring; selection and application of sealing compounds; actions and conditions that will void explosion-protection; standards for wiring systems in hazardous areas; requirements for establishing and maintaining hazardous area records (site dossier); maintenance requirements and procedures for an explosion-protection technique; arrangements for approval for use of equipment in a hazardous area

UTE NES013 A

Monitor a remote area essential services operation

Descriptor: Monitoring the readings of instruments and gauges and general operating conditions of a remote area essential service operation involving power and/or water. This unit can only apply in a *utility* context.

Alignment: Nil.

Elements	Performance criteria
013.1 Plan and prepare for monitoring	<p>013.1.1 Monitoring is planned and prepared for to ensure <i>OH&S policies and procedures</i> are followed and the work is appropriately sequenced in accordance with <i>requirements</i></p> <p>013.1.2 <i>Appropriate personnel</i> are consulted to ensure the work is co-ordinated effectively with others involved on the work site</p> <p>013.1.3 Location in which monitoring is to be carried out is determined from <i>job requirements</i></p> <p>013.1.4 Materials necessary to complete the work are obtained in accordance with <i>established procedures</i> and checked against <i>job requirements</i></p> <p>013.1.5 <i>Tools, equipment and testing devices</i> needed to carry out the monitoring work are obtained in accordance with <i>established procedures</i> and checked for correct operation and safety, if needed</p> <p>013.1.6 Observations are undertaken to ensure no damage has previously occurred to <i>plant or equipment</i></p>
013.2 Monitor operations	<p>013.2.1 <i>OH&S policies and procedures</i> for monitoring operations are followed</p> <p>013.2.2 Monitoring is carried out in accordance with <i>requirements</i>, without damage or distortion to <i>equipment</i> or the surrounding environment or related services</p> <p>013.2.3 Unplanned events or conditions are responded to in accordance with <i>established procedures</i></p> <p>013.2.4 Approval is obtained in accordance with <i>established procedures</i> from <i>appropriate personnel</i> before any contingencies are implemented</p>

Elements	Performance criteria
	013.2.5 On-going checks of the quality of the work are undertaken in accordance with <i>established procedures</i>
013.3 Inspect and notify completion of work	013.3.1 Final inspections are undertaken to ensure the monitoring conforms to <i>requirements</i> 013.3.2 Work completion is <i>notified</i> in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating consistent performance for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Nil

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Common

Occupational health and safety.

Occupational health and safety act: aims; acts; representatives; inspectors; offences

Personal safety: injuries and diseases in the workplace; repetitive strain injuries; manual handling procedures; handling of ladders; adequate lighting in the workplace; industrial radiation; chemical hazards; protective equipment; electrical hazards; thermal stress; exposure to excessive vibration; high level industrial noise

Workplace hazards: identification of potential workplace hazards; preventative measures

Working with electrically operated tools and equipment: nature of electric shock; causes of electrical accidents; working safely with electricity; safety items used in electrical environments

Rescue from a live electrical situation

First aid

Role of the first aider: basic structure and function of the body; priorities for casualty management; importance of airway clearance; recognition of unconsciousness; recognition and management of – stroke casualty, diabetic casualty, seizures, fainting

Resuscitation techniques: expired air resuscitation; cardiopulmonary resuscitation

Injuries: breathing disorders; heart conditions; severe bleeding; shock

Wounds and related infections: burns; poisoning; bites and stings; overexposure to heat and cold

Other injuries: bone joint and muscle injuries; injuries of the abdomen; head, face and jaw injuries; chest, injuries

Remote area essential services

Telephone Operations: answer calls promptly and clearly, using designated business protocol procedures; make and receive telephone calls in a workplace related context; obtain accurate telephone numbers from an appropriate source; establish contact using designated business protocol procedures; convey purpose of call clearly and concisely

Mathematics: use basic mathematical skills to perform calculations with whole numbers

Electrical: identification and basic function of electrical components used for generating and distributing; electricity safety procedures when working with electricity; identification of faulty electrical components; reporting of faulty electrical components

Fire lighting equipment: fire extinguishers and signage; types of fire extinguishers; contents and colour; correct identification; use of fire extinguishers; use of water hose and reel; safety awareness

Specialisation: Combined utilities

Power station instrument/meter reading

Information displayed by the instruments/meters in the power station: generating equipment (diesel engine) – engine lubrication system oil pressure, engine cooling system coolant temperature (in and out), fuel pressure; Switchboard – amperes, voltage, kilowatt, kilowatt hours, frequency hertz (Hz), engine running hours

Station services: fuel tank dip; lubricating oil tank level; fuel flow meter

Use of the information gathered from the instruments/meters for ordering of – fuel, lubricating oil, coolant; schedule regular servicing and maintenance for – engine oil and filter changes, fuel filters, drive belt (condition/adjustment), valve

adjustments (if applicable), major and minor mechanical servicing by outside agents, air cleaner (both dry paper and oil bath types)

Power station log sheets and readings: completed log sheets; forwarding information to appropriate person/location at regular intervals (weekly)

Potable water distribution system (reticulation)

Valve operation: types of valves; location; identification; isolation operations; make safe procedures; maintenance; safety awareness

Fault conditions: location; identification; notification; make safe protection; rectification; safety awareness

Power station compound: fence and gate; weeds; grass; rubbish containers; fuel and oil supply (drums); water reticulation; safety awareness

Tools and equipment: location/storage; cleanliness; maintenance; drain/drip tins; safety awareness

Safety signage: location; condition; suitability

Waste water connection point

Fault identification: location of faults; identification of faults; fumes and gases; breathing apparatus; public awareness; protective barricading; signage; recording; notification; safety awareness

Corrosion control: identification; descaling; repair as necessary; prevention procedures; reporting procedures; safety awareness

Leaking pipes: location; identification; repairing of the leak/s; area protection; isolation; excavation; emergency repairs; safety awareness

Water meters: identification and location; reading and recording; fault identification; isolation of the system; changing a faulty meter; notification; safety awareness

Water supply – sources collection and storage

Operation of water pumps: pump selection; pump types; water pump operation; diesel engine service; bore operation; safety awareness

Reading and recording of the systems instruments: reading and recording of information; mechanical instruments; electrical instruments; bore instruments; flow meters; notification of faults; safety awareness

Operation and isolation of components: isolation valves; flow devices; identification and operation; systems isolation; filtration equipment; inspection of the system; recognition of faults; notification of repairs and maintenance (RandM) performed; lock out devices; safety awareness

Maintenance: painting preparation; corrosion control; paint selection; application methods; cleaning and storage; solar panels; structural; storage tank; reporting problems; housekeeping; safety awareness

Water sampling (analysis): cleaning and scouring; weeds and debris; water samples; recording and reporting of information; reporting of findings; safety awareness

Waste water treatment and storage

Identification and isolation of fault condition/s: identifying fault/s; types of fault/s; make safe procedures; isolating the fault/s; gas and fume detection; notification; personal hygiene; safety awareness

Emergency repairs and blockages: identifying the emergency; locating the emergency; prioritising the repairs; notifying the appropriate person/s; public safety precautions; breathing apparatus; safety signage; repairing the system; reactivating the system; personal hygiene; safety awareness

Treatment and storage of pumping equipment maintenance: identifying the systems pumping equipment; identifying the systems control mechanism/s; isolating the system; make safe procedures; operating the pumps; maintenance of the system; recording work details; notification; personal hygiene; safety awareness

Manhole and grounds maintenance: safety barricades and fences; safety signage; manhole cover condition; clearing debris; grounds maintenance; personal hygiene; safety awareness

Treatment pond maintenance: weed and grass control; pest control; scraping of the pond/s; closing pen stocks; cleaning trash baskets; reactivating the system; removing the waste; burying the waste; housekeeping; personal hygiene; safety awareness

Instrumentation, reading and recording of information: locating the instrumentation; identify the instruments; read the displayed information; log the information; notification; personal hygiene; safety awareness

Radio equipment (as required) – antenna types, antenna insulators, cleanliness of the antenna, antenna deterioration, radio set, weather protection, radio security, radio connections (leads), safety awareness; radio operation – phonetic alphabet, call signs, transmitting and receiving messages, special use periods

Specialisation: Power

Power station instrument/meter reading

Information displayed by the instruments/meters in the power station:
generating equipment (diesel engine) – engine lubrication system oil pressure, engine cooling system coolant temperature (in and out), fuel pressure;
Switchboard – amperes, voltage, kilowatt, kilowatt hours, frequency hertz (Hz), engine running hours

Station services: fuel tank dip; lubricating oil tank level; fuel flow meter

Use of the information gathered from the instruments/meters for ordering of – fuel, lubricating oil, coolant; schedule regular servicing and maintenance for – engine oil and filter changes, fuel filters, drive belt (condition/adjustment), valve

adjustments (if applicable), major and minor mechanical servicing by outside agents, air cleaner (both dry paper and oil bath types)

Power station log sheets and readings: completed log sheets; forwarding information to appropriate person/location at regular intervals (weekly)

Specialisation: Water

Waste water treatment and storage

Identification and isolation of fault condition/s: identifying fault/s; types of fault/s; make safe procedures; isolating the fault/s; gas and fume detection; notification; personal hygiene; safety awareness

Emergency repairs and blockages: identifying the emergency; locating the emergency; prioritising the repairs; notifying the appropriate person/s; public safety precautions; breathing apparatus; safety signage; repairing the system; reactivating the system; personal hygiene; safety awareness

Treatment and storage of pumping equipment maintenance: identifying the systems pumping equipment; identifying the systems control mechanism/s; isolating the system; make safe procedures; operating the pumps; maintenance of the system; recording work details; notification; personal hygiene; safety awareness

Manhole and grounds maintenance: safety barricades and fences; safety signage; manhole cover condition; clearing debris; grounds maintenance; personal hygiene; safety awareness

Treatment pond maintenance: weed and grass control; pest control; scraping of the pond/s; closing pen stocks; cleaning trash baskets; reactivating the system; removing the waste; burying the waste; housekeeping; personal hygiene; safety awareness

Instrumentation, reading and recording of information: locating the instrumentation; identify the instruments; read the displayed information; log the information; notification; personal hygiene; safety awareness

Radio equipment (as required) – antenna types, antenna insulators, cleanliness of the antenna, antenna deterioration, radio set, weather protection, radio security, radio connections (leads), safety awareness; radio operation – phonetic alphabet, call signs, transmitting and receiving messages, special use periods

UTE NES014 (A to Z qualifier) B

Undertake basic office/warehouse administration

Descriptor: Undertake basic administrative activities associated with an office or warehouse related to an electrotechnology environment.

Alignment: Nil.

Specific unit outcomes

This is presented as a composite unit that has two specific units as outcomes, based on the *category* in which competence is achieved. This is done because of the high degree of commonality in process or function. Reporting the unit with the inclusion of a *category* allows for the identification of the necessary training outcomes in terms of the generic and transferable skills and at the same time reflects the work classification(s) generally understood by industry. The specific unit outcomes are:

- UTE NES014N B Undertake basic office/warehouse administration
(Administration)
- UTE NES014Q B Undertake basic office/warehouse administration
(Wholesaling)

Elements	Performance criteria
014.1 Plan and prepare for administrative activities	<p>014.1.1 Administrative activities are planned and prepared for to ensure <i>OH&S policies and procedures</i> are followed with the work appropriately sequenced in accordance with <i>requirements</i></p> <p>014.1.2 <i>Appropriate personnel</i> are consulted to ensure the work is co-ordinated effectively with others involved</p> <p>014.1.3 Materials are obtained and checked in accordance with <i>established procedures</i> and to comply with <i>requirements</i></p> <p>014.1.4 Location in which administrative activities to be undertaken is determined from job <i>requirements</i></p> <p>014.1.5 Materials necessary to complete the work are obtained in accordance with <i>established procedures</i> and checked against job <i>requirements</i></p> <p>014.1.6 Materials needed to carry out the installation work are obtained in accordance with <i>established procedures</i> and checked for correct operation and safety</p>

Elements	Performance criteria
	014.1.7 Preparatory work is undertaken to ensure no unnecessary damage has occurred and complies with <i>requirements</i>
014.2 Undertake administrative functions	014.2.1 <i>OH&S policies and procedures</i> for undertaking administrative functions are followed 014.2.2 Administrative functions are undertaken in accordance with <i>requirements</i> , without damage or distortion to the surrounding environment or services 014.2.3 Unplanned events or conditions are responded to in accordance with <i>established procedures</i> 014.2.4 Approval is obtained in accordance with <i>established procedures</i> from <i>appropriate personnel</i> before any contingencies are implemented 014.2.5 On-going checks of the quality of the work are undertaken in accordance with <i>established procedures</i>
014.3 Complete administrative documentation/reports	014.3.1 Documentation/reports are completed to ensure administrative <i>requirements</i> are met 014.3.2 Work completion is <i>notified</i> in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Categories

This unit recognises the commonality of skills and knowledge that exists for the unit as well as the additional specific outcome; which is to be reported on. Therefore, competency can be displayed on one, some or all of the following categories and in addition to the respective common underpinning knowledge associated with the selected specialisation:

(N) *Administration – general*

(Q) *Wholesaling - covering wholesaling-general or wholesaling-warehouse or wholesaling-point of sale.*

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Category: Administration (N) - General

Occupational Health and Safety

Occupational Health and Safety Act: Aims; Acts; Representatives'; Inspectors; Offences

Personal safety: health at and at work; stress related illnesses; injuries and diseases in the workplace; repetitive strain injuries; manual handling procedures; handling of ladders; adequate lighting in the workplace; industrial radiation; chemical hazards; protective equipment; special situations (eg. Scaffolding); electrical hazards; thermal stress; exposure to excessive vibration; high level industrial noise; safety in the general workplace

Workplace hazards: - Safety checks within the workplace; Identification of potential workplace hazards; Preventative measures

Working with electrically operated tools and equipment: nature of electric shock; causes of electrical accidents; working safely with electricity; safety items used in electrical environments; protection; isolation

Rescue from a live electrical situation

Emergency first aid/resuscitation: procedures for performing emergency first aid and; resuscitation from an electric shock.

Workplace Communication

Gathering, recording and conveying simple routine information using telephone, face to face, electronic media and documents in a workplace related context

Giving and following simple and routine instructions

Participating in small informal workgroups

Interacting with clients within and external to the workplace about simple routine matters using the telephone and face to face contact

Writing Skills for Work

Identify principles of effective writing: correct punctuation; sentence structure; readability; appropriateness; completeness; correctness

Complete workplace documentation: workplace forms which may include job diaries, faxes, memos, letters, reports; proformas which may include time sheets, tax declaration forms, sick leave/leave application forms, telephone message forms, customer order forms, delivery forms, damaged stock forms, notification of accident/incident forms, OH&S forms –hazard chemical forms

Produce work related documents: write faxes; email; memos; letters; reports

Electrical Concepts

Basic electrical concepts: SI units; electrical quantities (charge, current, voltage, resistance); factors affecting resistance; work, energy, power (mechanical, electrical); conventional current flow, electron flow

Effects of current: physiological; chemical (electroplating, corrosion); magnetic; thermal (ohmic, peltier)

Sources of emf: photovoltaic; thermal; electromagnetic; chemical

Simple practical circuit: voltage source with fuse or circuit breaker (briefly explained) and single resistor; principle of operation; terms (short – circuit, open – circuit, overload)

Series, parallel and series - parallel DC circuits, including the connection of meters in either series or parallel: series circuit connection; resistance in series: parallel circuit connection; resistance in parallel; series - parallel circuit connections

Batteries and battery connections: characteristics of primary and secondary cells; handling and charging secondary cells; terminal voltage

Measurement using meters: multimeters; ideal and practical meter characteristics; loading effect; sources of error in meter reading

Computing in the Electrotechnology Industry

Use of computers in the metals and engineering industry: applications in an engineering enterprise – communication, machine control, production control, office support- record keeping (e.g. stores), professional support (e.g. CAD/CAM)

Introduction to computers: types of computers; hardware names; meaning of words and terms commonly associated with computers

Introduction to operating systems

Peripheral devices: purpose of - input devices, output devices, ancillary storage devices

Use of computers: input and run a simple program, enter data, save data, retrieve data, print out data

Application packages used in the metals and engineering industry: use of application programs - word processing, spreadsheet, database, drawing

Quality Concepts

Quality: History of quality; Importance of quality; Definition of quality; Elements of good quality in a product/service; Principles of quality management; Objectives of quality control

Quality Systems: Definitions of quality systems; Australian quality standards; Components of a quality system - quality manual, procedures, work instructions, records; Quality audits and inspection

Quality Improvement Techniques: PDCA Cycle; Frequency diagrams; Histograms; Run charts; Flow charts; Brainstorming; Cause & Effect diagrams

Office Administration – Electrical Contracting

Aims and objectives of the business, its personnel and departments and its products and services: enterprise to complete routine administrative tasks; information provision from own function area; follow-up action when required; preparation and processing financial documentation for cash flow and accounting records; recording and balancing petty cash transactions; reconciling invoices for payments to creditors; preparing invoices for debtors; preparing and process banking documents; preparing invoices and service reports; preparing and process financial documentation for cash flow and accounting records; monitoring stock levels and records to maintain enterprise activities; preparing material orders;

Client enquiries and resolution to issues related to products and services: telephone, oral and written requests for information; drafting routine correspondence in response to a need or request; quotation preparation presentations; redirecting enquiries

Responding to visitors and their needs: collecting and providing information to facilitate communications flow; clarifying specific needs of client; providing information and advice; processing client complaints to ensure the goals of the organisation are met; responding to client complaints

Promoting a positive image of the enterprise: includes knowledge of the enterprise to promote the products and services of the organisation such as - how and why electrical power is distributed in a building, the purpose of a main switchboard and its associated equipment, the purpose of a distribution board and its associated equipment, services and products associated with electrical distribution in a building, common electrical accessories including their purpose and typical location in a premises, eg: switches, fuses, circuit breakers, safety switch, electric motor, motor starter, fluorescent light and components, batten holder, socket outlet, main switch, switchboard and meter, describing services or installation work activities

Following workplace Occupational Health & Safety procedures and policies

Maintaining records of electrical installation work: responsibilities in electrical safety and related regulations; scope and differences of the Australian Standards and local regulations concerning the supply of electricity systems; consequences of unsafe work practices; need to maintain records of installation testing and

completion; completing appropriate documentation required by the local supply authority for the supply of electricity and test reporting; service reports

Preparing quotation presentations: purpose of plans, specifications, and tenders; quotations preparation from job specifications and customer requests; quotation letters preparation from estimators documentation and information that should and should not be included; tender documents preparation for submission; legal implications in quotations and tenders; implications of various clauses in specifications and tender documents; quotation documents presentation from a variety of previously successful submissions.

Enterprise Specific

Nature of the business

Structure goals and business philosophy of the enterprise

Employer/employee rights and responsibilities

Contributing to the goals of the enterprise

Dress standards

Workplace behaviour codes

EEO and anti discrimination

Introduction to Electrical Industry

The electrotechnology industry: Organisation of work; Role and responsibilities

Effective communication

Training in the electrotechnology industry: Arrangements; Roles and responsibilities

Preparing for work at a new site

Equal employment opportunity policy and practice

Parts and Component Selection

Part and component identification: Name, function, type number and ratings of a range of typical components used in the electrotechnology and engineering industries

Information about parts and components: Catalogues; Computer access; Telephone inquiry; as they relate to the following: part codes and what they mean, manufactures and manufactures supply outlets, availability and delivery times, price, including discounts, tax and delivery costs; alternative parts

Ordering procedures: Customer approval; Supplier requirements; In-house requirements

Receiving/dispatching procedures: Supplier requirements; In-house requirements; Handling and storage

Software Awareness

Communications: software used for data communication in the workplace; use of the computer system for email, faxes, the Internet and EDI;

Software: software used in the workplace; policies and procedures that relate to computer and computer system use ; computer system security and virus protection.

Word processing and database management in an electrical wholesale environment

Word processing software: word processing software to create and print documents; formatting and editing existing/new documents in a word processing system; storing existing/new documents in a word processing system; menus and buttons; entering text; corrections; moving, copying and deleting; other features

Database management: accessing and storing information in a data base management system; printing required information from a data base management system; advantages of databases; disadvantages of databases; authorised access to use a database management system including logging on/off

Spreadsheets: software used for spreadsheets; basic features of spreadsheet software

Graphics: options for producing graphics from spreadsheets; production of graphs; using spreadsheets to produce graphs

Merchandise Products

Pricing merchandise: reasons for price marking; methods and location of price marking used according to product types; information commonly found on price and shelf tickets; sources for obtaining price information; “First in First out” principle and relationship to price marking; European Article Number (EAN) and its relationship to barcoding; data categories incorporated within EAN symbol; advantages and disadvantages of barcoding for the manufacturer, wholesaler, retailer, and consumer; role of EAN in relation to product numbering, legal requirements and code of practice

Merchandise display tickets: principles and essential features for inclusion on a display ticket.; range of methods for incorporating creativity in ticket writing; displaying signs and tickets appropriately on stock, in accordance with enterprise procedures and guidelines; designing and producing display tickets, in accordance with enterprise procedures and guidelines

Classifying merchandise: classifying and grouping merchandise in accordance with enterprise procedures and guidelines; the advantage of classifying merchandise in relation to the customer, store, salesperson and sales; methods used to draw customers, in accordance with enterprise procedures and guidelines; types of store layout; merchandise position to obtain optimum store layout; “Hot” and “Cold” spots in a store layout; “Focal Point” within a store layout to maximise customer view of merchandise

Presenting merchandise: purpose of displays; features and principles of an effective display; selecting and presenting a range of suitable merchandise for display, in accordance with enterprise procedures and guidelines; utilising a variety of in-store displays to create an appropriate merchandise display; principles for choosing or designing a prop; key principles of window display on four window display styles; range of elements of safety and housekeeping in relation to window displays

Category: Wholesaling (Q)

Common

Occupational Health and Safety

Occupational Health and Safety Act: Aims; Acts; Representatives'; Inspectors; Offences

Personal safety: health at and at work; stress related illnesses; injuries and diseases in the workplace; repetitive strain injuries; manual handling procedures; handling of ladders; adequate lighting in the workplace; industrial radiation; chemical hazards; protective equipment; special situations (eg. Scaffolding); electrical hazards; thermal stress; exposure to excessive vibration; high level industrial noise; safety in the general workplace

Workplace hazards: - Safety checks within the workplace; Identification of potential workplace hazards; Preventative measures

Working with electrically operated tools and equipment: nature of electric shock; causes of electrical accidents; working safely with electricity; safety items used in electrical environments; protection; isolation

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Produce work related documents: write faxes; email; memos; letters; reports

Electrical Concepts

Basic electrical concepts: SI units; electrical quantities (charge, current, voltage, resistance); factors affecting resistance; work, energy, power (mechanical, electrical); conventional current flow, electron flow

Effects of current: physiological; chemical (electroplating, corrosion); magnetic; thermal (ohmic, peltier)

Sources of emf: photovoltaic; thermal; electromagnetic; chemical

Simple practical circuit: voltage source with fuse or circuit breaker (briefly explained) and single resistor; principle of operation; terms (short – circuit, open – circuit, overload)

Series, parallel and series - parallel DC circuits, including the connection of meters in either series or parallel: series circuit connection; resistance in series: parallel circuit connection; resistance in parallel; series - parallel circuit connections

Batteries and battery connections: characteristics of primary and secondary cells; handling and charging secondary cells; terminal voltage

Measurement using meters: multimeters; ideal and practical meter characteristics; loading effect; sources of error in meter reading

Computing in the Electrotechnology Industry

Use of computers in the metals and engineering industry: applications in an engineering enterprise – communication, machine control, production control, office support- record keeping (e.g. stores), professional support (e.g. CAD/CAM)

Introduction to computers: types of computers; hardware names; meaning of words and terms commonly associated with computers

Introduction to operating systems

Peripheral devices: purpose of - input devices, output devices, ancillary storage devices

Use of computers: input and run a simple program, enter data, save data, retrieve data, print out data

Application packages used in the metals and engineering industry: use of application programs - word processing, spreadsheet, database, drawings

Wholesaling-General

Stock Control

Stock maintenance: minimum stock levels - ascertaining stock needs, requests for purchase, ordering of stock from suppliers, reconciling delivery documents, orders and invoices with actual stock delivered, checking the GST component; maintaining stock control records to ensure accuracy and security of information; methods of maintaining a well organised stock storage area to ensure theft and other losses are kept to a minimum; assuring adequate control over stock being issued; lead times; economic/budgetary considerations; production schedules; identification of optimum stock levels; stock rotation procedures for merchandise and wrapping and packing materials; excess stock placed in storage or disposed of; product quality standards

Stock records; GST compliance; Stock levels; minimum, optimum; Purchasing: authorisation, orders; Receiving: delivery dockets/documentation, invoices/tax invoices (GST); Storage: location, security, turnover; Issue of stock: receiving orders, stock requisitions, despatching stock; Returns: in, out; Security: separation of duties, rotation of duties; Manual and/or electronic stock control - electronic recording equipment; Barcodes; Stock cards, recording GST component; Specialised computer software, recording GST component

GST compliance; Organisational policy and procedures; Australian taxation office guidelines; Refund sales tax - current trading stock; Valuation methods - actual cost (including GST), FIFO (GST), weighted average (GST), standard cost (GST); Stock records/cards; Specialised software applications; Adjustments to recording keeping for GST; Regular checks ATO; Retention of documents (receipts/tax invoices)

Organisational policy and procedures; Periodic inventory method; Perpetual inventory method; Stocktaking procedures; GST compliance; Stock records/cards; Specialised software application; Upgrading of recording systems for GST; Reporting (GST compliance); Regular checks (ATO)

Government legislation; GST compliance; Security; Methods of archiving - paper-based records, electronic records (specialised software applications); Upgrading of recording systems for GST; Reporting (GST compliance); Regular checks (ATO); Retention of records (receipts/tax invoices); Refunds of sales tax

Warehouse Operations

Terminology: factory; raw materials; manufacturing process; materials handling systems - value-added management, just In Time; finished goods; wholesale and retail; distribution; buyers and customers; inventory; warehousing; storage/binning systems

Purpose of a warehouse: storage; distribution; transport costs

Types of Warehouses: cold storage; temperature controlled; bonded; records; household goods; general merchandise; commodity; manufacturing/parts; manual, semi automated, automated; others.

Functions and processes: receiving; unloading; unpacking; storing/putaway; picking orders; packaging; consolidation and assembly; dispatch

Layout: storage systems - binning, racking, bulk stacking, floor marking, fixed location, random slot locations, planned/unplanned warehouses; operational sections – receiving, unloading, order picking/assembly, packing/packaging area, dispatch, administration/office; exits/entrances; safety areas and equipment

Definitions: organisational structure; occupation; position description; departments

Personnel/key roles: store person; order picker; replenisher; administration; department manager; general manager; hierarchy; duties/responsibilities

Departments in the warehouse: administration; receiving/putaway; buying/purchasing; dispatch; sales; human resource management

Administration: role and function; purpose of documentation; computerised/manual systems; form of documentation

Storage: bins/racks; bulk storage; floor marking; commodity systems as addresses; fixed location; random slot locations; unplanned/planned warehouses; size of areas; special requirements - coldrooms/freezers, dangerous goods

Reasons for type/size of storage area: type of stock; special requirements; logistics; relation to equipment and other departments

Equipment and technology: computers/computerised system - inventory management equipment, hardware/software, visual display units, radio frequency equipment/two way radios; bar coding/scanning equipment; automated equipment/machinery - AGV (Automatic Guided Vehicle), gravity feed storage, conveyor belts/sorters; photocopiers/copying machines; facsimile machines; portable data entry units

Purpose: efficiency; cost effectiveness; time/distance management; reducing manual handling

Manual Materials Handling

Legislation: worker obligations; employer obligations

Lifting and Lowering Principles

Manual Handling Techniques

Using mechanical handling equipment

Manual handling: equipment including simple aids - ladders, stairs, steps, levers, sliding rails, belt and roller conveyors, trolleys, pallet/lift jacks, hoists, forklift trucks; types of mechanical handling equipment including ladders, steps, stairs; trolleys; loaded trolley weight; trolley, height, length and width; handle height; wheels – size, material, castors; maintenance; conveyors - roller conveyors, belt

conveyors, screw conveyors, chutes, monorails, trolley conveyors; hoists including related licences; forklift trucks including related licences

Lifting/lowering styles: 7 steps to safe lifting/lowering

Pushing/pulling loads: techniques for push/pull tasks

Team lifting: manual handling of objects by two or more people at the same time; decreasing the risk of manual handling injury when a load is too heavy or awkward for one person to lift or carry safely; considerations for Team Lifting

Manual handling risks and hazards: identifying area of Risk/Hazard; factors in the work environment that can create hazards

Mechanical Materials Handling

Occupational health and safety requirements related to load shifting equipment; State/Territory legislation and regulations; Regulations: Occupational Health and Safety; State regulations; Licensing requirements; Regulations/policies: state licensing regulations - hours of required training, licence test, medical requirement, relevant state authorities; certificate of competency - crane driver, crane chaser, forklift driver; supervision requirements; company policies and procedures; Occupational Health and Safety regulations; Company policies and procedures; Manufacturer's specifications

Equipment types, characteristics, uses and limitations of load shifting equipment; operation, control mechanisms and functions of load shifting equipment; load types and handling/stacking techniques; pre-start, start-up and shut-down procedures; pre-use, checking and post use procedures; emergency procedures; load shifting equipment documentation and records system; types of materials and their characteristics; relevant materials handling plant; lifting equipment relevant to handling materials; workplace safety requirements including relevant statutory regulations, codes and standards; material products; materials handling eg: heavy and irregular shaped; stacking/storing materials safely allowing egress to others and easy access to materials for retrieval; hazards eg: identification and prevention methods adopted; tools and equipment relevant to handling of materials; measuring and calculating related to lineal, spacial and mass determinations; Worksafe Australia Standards for Users and Operators of Industrial Equipment

Mechanical Materials Handling equipment: forklift - counter balance, reach trucks, pedestrian forklifts - "walky stackers", attachments, fuel - (gas, electricity, petrol, diesel); automatic guided vehicle (AVG) - tow motors; high level order picker; conveyor system - sliding rail, roller; mechanised pallet mover/truck; cranes and hoists – overhead, fixed/travelling, power operated, mobile hoists, plate clamps, eye bolts, shackles (dee/bow), wire rope slings, chain slings; manual skates and trucks

Load characteristics: weight; dimension; placement area; mechanical materials handling equipment – capacity, limitations

Use of mechanical materials handling equipment: forklifts; daily maintenance - check oil levels, check fuel, connect to charger, tyre pressure, change over gas cylinder, cooling level, condition and spread of forks, brake pedal; instruments

and controls - up-down levers, brake, accelerator, tilt control, forward/reverse, instrument gauges, loading and unloading:, types of loads, transporting load, height of load, parking, lifting heights, fork lift in travel, speed, operational areas, attachments, pallet splitter, double width; tow motors - daily maintenance , check fuel, change over gas cylinder, check oil, brake pedal operation, tyre pressure, trailer couplings, fill gas cylinder, attaching and loading trailers - trailer couplings, types of loads, tying down loads, trailer maintenance, loading and unloading trailers, tow motor operation, speed in plant, operation areas, safety aspects, parking the tow motor, carting hazardous materials; conveyor equipment - maintenance procedures:, lubrication, check belts, check rollers, adjust height if applicable, record and report faulty equipment, loading/unloading - centre load on belt, balance object flat on belt, supply bins close by, set belt speed (if applicable), safety - sharp edges on objects, stop/start signals down line, personal protective equipment, position of self to belt, keep equipment free of scrap - methods of checking, procedures for freeing jammed equipment; mechanised pallet mover/truck - daily maintenance - instruments and controls, methods of loading and unloading, method of operation, safety precautions when operating; automatic guided vehicle (driverless) - the principles and functions of computer controlled equipment, the operations of computer controlled equipment, control panel programming and adjustment, maintenance requirements, safety precautions; other equipment

Quality Concepts

Quality: History of quality; Importance of quality; Definition of quality; Elements of good quality in a product/service; Principles of quality management; Objectives of quality control

Quality Systems: Definitions of quality systems; Australian quality standards; Components of a quality system - quality manual, procedures, work instructions, records; Quality audits and inspection

Quality Improvement Techniques: PDCA Cycle; Frequency diagrams; Histograms; Run charts; Flow charts; Brainstorming; Cause & Effect diagrams

Electrical Wholesale Techniques (1)

Electrical equipment, switch gear and wiring accessories; identification; ratings; selecting materials from catalogues and data bases

Electrical distribution in buildings: single and three phase systems; distribution components (mains, submains, final subcircuits, main switchboard, distribution board); purpose of main switchboards and distribution boards; power rating of typical appliances and equipment; importance of earthing

Electrical / electronic systems: system level functions of power and control devices; controllers (function, application)

Supply of electricity and safety: responsibilities; standards and regulations; procedures and documentation

Electrical Wholesale Techniques (2)

The features, purposes and use of block, circuit and wiring diagrams

Use of drawing symbols and Australian Standard 1102

Electrical diagram conventions

The features purpose and use of site and floor plans and detail and standard drawings

Locating the position of electrical services from architectural drawings

The relationship between electrical and other trades in the building construction sequence

Building materials used in house construction

Building materials and their properties

Cords and Cables: materials and specifications; colour coding; cable structures; typical applications

Conductors: size; types

Electrical accessories: type and applications; fixing methods and techniques (timber, metal, hollow wall, masonry – expansion and chemical, explosive)

Merchandise Products

Pricing merchandise: reasons for price marking; methods and location of price marking used according to product types; information commonly found on price and shelf tickets; sources for obtaining price information; “First in First out” principle and relationship to price marking; European Article Number (EAN) and its relationship to barcoding; data categories incorporated within EAN symbol; advantages and disadvantages of barcoding for the manufacturer, wholesaler, retailer, and consumer; role of EAN in relation to product numbering, legal requirements and code of practice

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four window display styles; range of elements of safety and housekeeping in relation to window displays

Customer Service

Receiving and dealing with internal customer inquiries

Applying product knowledge to respond to customer needs in line with enterprise policies and procedures

Dealing with internal and external customer inquiries

Dealing appropriately with a difficult situation involving a dissatisfied customer

Approaches for dealing with customers

Receiving documentation, check against product(s) received and process according to workplace policy and procedures in order to respond to customer enquiries

Responding to customer needs in line with enterprise policies and procedures

Wholesaling-Warehouse

Stock Control

Stock maintenance: minimum stock levels - ascertaining stock needs, requests for purchase, ordering of stock from suppliers, reconciling delivery documents, orders and invoices with actual stock delivered, checking the GST component; maintaining stock control records to ensure accuracy and security of information; methods of maintaining a well organised stock storage area to ensure theft and other losses are kept to a minimum; assuring adequate control over stock being issued; lead times; economic/budgetary considerations; production schedules; identification of optimum stock levels; stock rotation procedures for merchandise and wrapping and packing materials; excess stock placed in storage or disposed of; product quality standards

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Purpose of a warehouse: storage; distribution; transport costs

Types of Warehouses: cold storage; temperature controlled; bonded; records; household goods; general merchandise; commodity; manufacturing/parts; manual, semi automated, automated; others.

Functions and processes: receiving; unloading; unpacking; storing/putaway; picking orders; packaging; consolidation and assembly; dispatch

Layout: storage systems - binning, racking, bulk stacking, floor marking, fixed location, random slot locations, planned/unplanned warehouses; operational sections – receiving, unloading, order picking/assembly, packing/packaging area, dispatch, administration/office; exits/entrances; safety areas and equipment

Definitions: organisational structure; occupation; position description; departments

Personnel/key roles: store person; order picker; replenisher; administration; department manager; general manager; hierarchy; duties/responsibilities

Departments in the warehouse: administration; receiving/putaway; buying/purchasing; dispatch; sales; human resource management

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Purpose: efficiency; cost effectiveness; time/distance management; reducing manual handling

Manual Materials Handling

Legislation: worker obligations; employer obligations

Lifting and Lowering Principles

Manual Handling Techniques

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Manual handling: equipment including simple aids - ladders, stairs, steps, levers, sliding rails, belt and roller conveyors, trolleys, pallet/lift jacks, hoists, forklift trucks; types of mechanical handling equipment including ladders, steps, stairs; trolleys; loaded trolley weight; trolley, height, length and width; handle height; wheels – size, material, castors; maintenance; conveyors - roller conveyors, belt conveyors, screw conveyors, chutes, monorails, trolley conveyors; hoists including related licences; forklift trucks including related licences

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Mechanical Materials Handling

Occupational health and safety requirements related to load shifting equipment; State/Territory legislation and regulations; Regulations: Occupational Health and Safety; State regulations; Licensing requirements; Regulations/policies: state licensing regulations - hours of required training, licence test, medical requirement, relevant state authorities; certificate of competency - crane driver, crane chaser, forklift driver; supervision requirements; company policies and procedures; Occupational Health and Safety regulations; Company policies and procedures; Manufacturer's specifications

Equipment types, characteristics, uses and limitations of load shifting equipment; operation, control mechanisms and functions of load shifting equipment; load types and handling/stacking techniques; pre-start, start-up and shut-down procedures; pre-use, checking and post use procedures; emergency procedures; load shifting equipment documentation and records system; types of materials and their characteristics; relevant materials handling plant; lifting equipment relevant to handling materials; workplace safety requirements including relevant statutory regulations, codes and standards; material products; materials handling eg: heavy and irregular shaped; stacking/storing materials safely allowing egress to others and easy access to materials for retrieval; hazards eg: identification and prevention methods adopted; tools and equipment relevant to handling of materials; measuring and calculating related to lineal, spacial and mass

determinations; Worksafe Australia Standards for Users and Operators of Industrial Equipment

Mechanical Materials Handling equipment: forklift - counter balance, reach trucks, pedestrian forklifts - 'walky stackers', attachments, fuel - (gas, electricity, petrol, diesel); automatic guided vehicle (AVG) - tow motors; high level order picker; conveyor system - sliding rail, roller; mechanised pallet mover/truck; cranes and hoists – overhead, fixed/travelling, power operated, mobile hoists, plate clamps, eye bolts, shackles (dee/bow), wire rope slings, chain slings; manual skates and trucks

Load characteristics: weight; dimension; placement area; mechanical materials handling equipment – capacity, limitations

Use of mechanical materials handling equipment: forklifts; daily maintenance - check oil levels, check fuel, connect to charger, tyre pressure, change over gas cylinder, cooling level, condition and spread of forks, brake pedal; instruments and controls - up-down levers, brake, accelerator, tilt control, forward/reverse, instrument gauges, loading and unloading; types of loads, transporting load, height of load, parking, lifting heights, fork lift in travel, speed, operational areas, attachments, pallet splitter, double width; tow motors - daily maintenance , check fuel, change over gas cylinder, check oil, brake pedal operation, tyre pressure, trailer couplings, fill gas cylinder, attaching and loading trailers - trailer couplings, types of loads, tying down loads, trailer maintenance, loading and unloading trailers, tow motor operation, speed in plant, operation areas, safety aspects, parking the tow motor, carting hazardous materials; conveyor equipment - maintenance procedures; lubrication, check belts, check rollers, adjust height if applicable, record and report faulty equipment, loading/unloading - centre load on belt, balance object flat on belt, supply bins close by, set belt speed (if applicable), safety - sharp edges on objects, stop/start signals down line, personal protective equipment, position of self to belt, keep equipment free of scrap - methods of checking, procedures for freeing jammed equipment; mechanised pallet mover/truck - daily maintenance - instruments and controls, methods of loading and unloading, method of operation, safety precautions when operating; automatic guided vehicle (driverless) - the principles and functions of computer controlled equipment, the operations of computer controlled equipment, control panel programming and adjustment, maintenance requirements, safety precautions; other equipment

Electrical Wholesale Techniques (1)

Electrical equipment, switch gear and wiring accessories; identification; ratings; selecting materials from catalogues and data bases

Electrical distribution in buildings: single and three phase systems; distribution components (mains, submains, final subcircuits, main switchboard, distribution board); purpose of main switchboards and distribution boards; power rating of typical appliances and equipment; importance of earthing

Electrical / electronic systems: system level functions of power and control devices; controllers (function, application)

Supply of electricity and safety: responsibilities; standards and regulations; procedures and documentation

Electrical Wholesale Techniques (2)

The features, purposes and use of block, circuit and wiring diagrams

Use of drawing symbols and Australian Standard 1102

Electrical diagram conventions

The features purpose and use of site and floor plans and detail and standard drawings

Locating the position of electrical services from architectural drawings

The relationship between electrical and other trades in the building construction sequence

Building materials used in house construction

Building materials and their properties

Cords and Cables: materials and specifications; colour coding; cable structures; typical applications

Conductors: size; types

Electrical accessories: type and applications; fixing methods and techniques (timber, metal, hollow wall, masonry – expansion and chemical, explosive)

Merchandise Products

Pricing merchandise: reasons for price marking; methods and location of price marking used according to product types; information commonly found on price and shelf tickets; sources for obtaining price information; “First in First out” principle and relationship to price marking; European Article Number (EAN) and its relationship to barcoding; data categories incorporated within EAN symbol; advantages and disadvantages of barcoding for the manufacturer, wholesaler, retailer, and consumer; role of EAN in relation to product numbering, legal requirements and code of practice

Merchandise display tickets: principles and essential features for inclusion on a display ticket.; range of methods for incorporating creativity in ticket writing; displaying signs and tickets appropriately on stock, in accordance with enterprise procedures and guidelines; designing and producing display tickets, in accordance with enterprise procedures and guidelines

Classifying merchandise: classifying and grouping merchandise in accordance with enterprise procedures and guidelines; the advantage of classifying merchandise in relation to the customer, store, salesperson and sales; methods used to draw customers, in accordance with enterprise procedures and guidelines; types of store layout; merchandise position to obtain optimum store layout; “Hot” and “Cold” spots in a store layout; “Focal Point” within a store layout to maximise customer view of merchandise

Presenting merchandise: purpose of displays; features and principles of an effective display; selecting and presenting a range of suitable merchandise for display, in accordance with enterprise procedures and guidelines; utilising a variety of in-store displays to create an appropriate merchandise display; principles for choosing or designing a prop; key principles of window display on four window display styles; range of elements of safety and housekeeping in relation to window displays

Dangerous Goods

Health and safety policy: chemical exposures; working and handling chemicals safely

Responsibilities for handling, storage and package of dangerous goods: employer and employee responsibilities in relation to dangerous goods

Procedures for the safe handling of dangerous goods: Personal Protective Equipment (PPE); first aid, emergency equipment and fire equipment; procedures for use of chemicals; procedures for storage of dangerous goods

Segregation of dangerous goods: Australian Dangerous Goods Code; segregation of certain classes of Dangerous Goods; using dangerous goods segregation chart to determine the compatibility of dangerous goods in the workplace; specific handling requirements for each dangerous good

Procedures in the event of an accident/incident involving dangerous goods: emergency plans and procedures to protect people, property and the environment; responding and reporting accidents/incidents; Accident/Incident report forms; key authorised persons that can be contacted or advised

Storing dangerous goods correctly

Implementing first aid and emergency procedures in case of an accident

Forklift Operations

Duty of care requirements pertaining to the operation of a forklift; OHS and environmental procedures and regulations; Forklift controls, instruments and indicators and their use; Forklift power types; Forklift attachment types; Forklift handling procedures - handling loads and driving defensively; Procedures to be followed in the event of an operational emergency; Engine power management and safe operating strategies; Efficient driving techniques - managing forklift controls, reading instruments and adjusting engine power to site requirements; Pre-operational checks carried out on forklift and related action; Site layout and obstacles; Operating hazards and related defensive driving and hazard control techniques; Principles of stress management when driving a forklift; Workplace operating procedures; points of balance and safe lifting positions on a range of loads when operating a forklift; Instructions, procedures and signage relevant to the operation of a forklift - operating a forklift safely in workplace environment, use of communication devices such two-way radios for effective communication, forklift manufacturer's guidelines and instructions; Monitoring and anticipating operational hazards and take appropriate action, operational hazards and the use of appropriate defensive driving and hazard control techniques; Relevant State/Territory regulations and licence requirements pertaining to forklift

operation - codes and standards, including Australian Standard 2359 - Industrial Truck Code, State/Territory OHS legislation, State/Territory fatigue management regulations, State/Territory environmental protection legislation manufacturer's specifications for forklift and associated equipment, operations and service record book or log, ADG Code and material safety data sheets; Reporting and/or rectifying accidents, incidents and any identified faults or malfunctions in accordance with manufacturer's instructions, regulatory requirements and workplace procedures

Wholesaling-Point of Sale

Product Knowledge

Check the “quality” of the product/stock and follow workplace procedures for reporting problems

Cataloguing and labelling systems to identify and locate products

Seek out sources of product knowledge

Locating stock using catalogues or computer systems

Identifying product: selling to a customer over the counter, checking on stock availability for customers, picking stock to complete customer orders for dispatch, assisting with receipt, inspections and storage of stock, conducting cyclical stock counts, conducting stocktakes

Product storage requirements including dangerous goods and their location: type of stock; special requirements for storage; logistics; access by equipment to move the stock; closeness to receipt and dispatch areas; stock items - size, shape, fragility, quantity, liquid or gas, dangerous goods; storage methods - bins, racks, marked floor space, bulk stacking, fixed locations, random locations, special requirements

Problem stock: identification - damaged, broken, unusable, incomplete, replaced, returned, disposed

Layout, function of and processes involved in wholesale operations

Manual Materials Handling

Legislation: worker obligations; employer obligations

Lifting and Lowering Principles

Manual Handling Techniques

Using mechanical handling equipment

Manual handling: equipment including simple aids - ladders, stairs, steps, levers, sliding rails, belt and roller conveyors, trolleys, pallet/lift jacks, hoists, forklift trucks; types of mechanical handling equipment including ladders, steps, stairs; trolleys; loaded trolley weight; trolley, height, length and width; handle height; wheels – size, material, castors; maintenance; conveyors - roller conveyors, belt

conveyors, screw conveyors, chutes, monorails, trolley conveyors; hoists including related licences; forklift trucks including related licences

Lifting/lowering styles: 7 steps to safe lifting/lowering

Pushing/pulling loads: techniques for push/pull tasks

Team lifting: manual handling of objects by two or more people at the same time; decreasing the risk of manual handling injury when a load is too heavy or awkward for one person to lift or carry safely; considerations for Team Lifting

Manual handling risks and hazards: identifying area of Risk/Hazard; factors in the work environment that can create hazards

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Load characteristics: weight; dimension; placement area; mechanical materials handling equipment – capacity, limitations

Use of mechanical materials handling equipment: forklifts; daily maintenance - check oil levels, check fuel, connect to charger, tyre pressure, change over gas cylinder, cooling level, condition and spread of forks, brake pedal; instruments

and controls - up-down levers, brake, accelerator, tilt control, forward/reverse, instrument gauges, loading and unloading:, types of loads, transporting load, height of load, parking, lifting heights, fork lift in travel, speed, operational areas, attachments, pallet splitter, double width; tow motors - daily maintenance , check fuel, change over gas cylinder, check oil, brake pedal operation, tyre pressure, trailer couplings, fill gas cylinder, attaching and loading trailers - trailer couplings, types of loads, tying down loads, trailer maintenance, loading and unloading trailers, tow motor operation, speed in plant, operation areas, safety aspects, parking the tow motor, carting hazardous materials; conveyor equipment - maintenance procedures:, lubrication, check belts, check rollers, adjust height if applicable, record and report faulty equipment, loading/unloading - centre load on belt, balance object flat on belt, supply bins close by, set belt speed (if applicable), safety - sharp edges on objects, stop/start signals down line, personal protective equipment, position of self to belt, keep equipment free of scrap - methods of checking, procedures for freeing jammed equipment; mechanised pallet mover/truck - daily maintenance - instruments and controls, methods of loading and unloading, method of operation, safety precautions when operating; automatic guided vehicle (driverless) - the principles and functions of computer controlled equipment, the operations of computer controlled equipment, control panel programming and adjustment, maintenance requirements, safety precautions; other equipment

Quality Concepts

Quality: History of quality; Importance of quality; Definition of quality; Elements of good quality in a product/service; Principles of quality management; Objectives of quality control

Quality Systems: Definitions of quality systems; Australian quality standards; Components of a quality system - quality manual, procedures, work instructions, records; Quality audits and inspection

Quality Improvement Techniques: PDCA Cycle; Frequency diagrams; Histograms; Run charts; Flow charts; Brainstorming; Cause & Effect diagrams

Wholesale Calculations

Calculating numerical information manually to perform routine electrical wholesale tasks

Operating arithmetical functions of a numeric keypad to perform routine electrical wholesale tasks: performing basic arithmetic functions; converting simple fractions to decimals; calculating percentages; estimating the result of calculations

Using memory and constant functions of an electronic calculator to perform routine electrical wholesale tasks: addition; subtraction; multiplication; division; percentage; vulgar fractions to decimal; constant functions in calculations involving repetition

Interpreting symbols, diagrams and pictorial representations in electrical wholesaling environment

Calculations: performing basic calculations manually; performing accurate calculations using electronic equipment; recognising and identifying symbols, diagrams and pictorial representations in the electrical wholesale environment

Inventory Management

Receiving documentation, checking against product(s) received and process according to workplace policy and procedures: maintain the presentation and cleanliness of the receiving, dispatch and other stores areas; receive, unpack, inspect and record incoming stock, including identifying and recording non-conforming goods; store stock for reliable identification in appropriate area

Different methods of maintaining control over stock: pick, pack, inspect and dispatch items

Applying appropriate workplace procedures for ordering and maintaining stock levels: ordering stock using appropriate company procedures

Participating in stocktake and cyclical stock counts: recording stock movements

Identifying discrepancies in stock and adjust inventory data as required: maintaining appropriate stock levels; applying stocktaking procedures

Point of Sale Systems and Procedures

Operating data entry/computer system: developing a checklist and operating a data entry/computer system; computer system that may be used for recording orders, ordering products, invoicing customers, stock and price queries, stock control, customer correspondence; accessing information using computer technology - keyboard skills, turning the screen and keyboard/system unit on and off, logging onto the system, using a navigation device (mouse), locating the file/folder to be accessed; entering, editing and saving data; printing data from the computer system - back order list, product details

Operating scanner: developing a checklist and operating a scanner; bar code identification for product by brand, size, type and price - point of sale, stock control, reordering

Operating an electronic product guide: computer systems based electronic product guide (EPG) which stores information about products; logging on and accessing information; searching for products list/types; simultaneous accessing of information about a particular product - can be written information and/or pictures; in format for presentation to customer; benefits for sales representatives and customers

Selling Skills

Greeting the customer: establish rapport with the customer; grab the customer's attention; arouse interest in the product

Establishing customer needs: identifying the customers' needs

Selling the benefits: opening; establishing customer needs; selling the benefits; identifying features and benefits of products; offering add-ons if appropriate;

Offering add-ons if appropriate: observing the customer's actions; timing your approach; deciding on your approach to create a good impression.

Closing the sale: trialling close; giving a choice; asking closing questions – to gain customer agreement; reviewing benefits the customer is particularly interested in completing the paper work – assume the customer is going to buy; keeping quite!; assisting procrastinator to make a decision

Merchandise Products

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Customer Service

Receiving and dealing with internal customer inquiries

Applying product knowledge to respond to customer needs in line with enterprise policies and procedures

Dealing with internal and external customer inquiries

Dealing appropriately with a difficult situation involving a dissatisfied customer

Approaches for dealing with customers

Receiving documentation, check against product(s) received and process according to workplace policy and procedures in order to respond to customer enquiries

Responding to customer needs in line with enterprise policies and procedures

UTE NES015 (A to Z qualifier) B

Promote basic organisational services/products

Descriptor: Promote the basic services/products of an electrotechnology business in an office or warehouse environment.

Alignment: Nil.

Specific unit outcomes

This is presented as a composite unit that has two specific units as outcomes, based on the *category* in which competence is achieved. This is done because of the high degree of commonality in process or function. Reporting the unit with the inclusion of a *category* allows for the identification of the necessary training outcomes in terms of the generic and transferable skills and at the same time reflects the work classification(s) generally understood by industry. The specific unit outcomes are:

UTE NES015N B	Promote basic organisational services/products (Administration)
UTE NES015Q B	Promote basic organisational services/products (Wholesaling)

Elements	Performance criteria
015.1 Plan and prepare for promoting services/products	<p>015.1.1 Basic promotional activities are planned and prepared for to ensure <i>OH&S policies and procedures</i> are followed with the work appropriately sequenced in accordance with <i>requirements</i></p> <p>015.1.2 <i>Appropriate personnel</i> are consulted to ensure the work is co-ordinated effectively with others involved</p> <p>015.1.3 Materials are obtained and checked in accordance with <i>established procedures</i> and to comply with <i>requirements</i></p> <p>015.1.4 Location in which basic promotional activities is determined from <i>job requirements</i></p> <p>015.1.5 Materials necessary to complete the work are obtained in accordance with <i>established procedures</i> and checked against <i>job requirements</i></p> <p>015.1.6 Materials needed to carry out the basic promotional work are obtained in accordance with <i>established procedures</i></p>
015.2 Undertake basic promotional activities	015.2.1 <i>OH&S policies and procedures</i> for undertaking basic promotional activities are followed

Elements	Performance criteria
	<p>015.2.2 Basic promotional activities are undertaken in accordance with <i>requirements</i>, without damage or distortion to the surrounding environment or services</p> <p>015.2.3 Unplanned events or conditions are responded to in accordance with <i>established procedures</i></p> <p>015.2.4 Approval is obtained in accordance with <i>established procedures</i> from <i>appropriate personnel</i> before any contingencies are implemented</p> <p>015.2.5 On-going checks of the quality of the work are undertaken in accordance with <i>established procedures</i></p>
015.3 Complete promotional activities	<p>015.3.1 Documentation/reports are completed to ensure administrative <i>requirements</i> are met</p> <p>015.3.2 Work completion is <i>notified</i> in accordance with <i>established procedures</i></p>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Categories

This unit recognises the commonality of skills and knowledge that exists for the unit as well as the additional specific outcome; which is to be reported on. Therefore, competency can be displayed on one, some or all of the following categories and in addition to the respective common underpinning knowledge associated with the selected specialisation:

(N) *Administration – general*

(Q) *Wholesaling - covering wholesaling-general or wholesaling-warehouse or wholesaling-point of sale.*

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to undertake activities that directly support the operational and business activities of an enterprise. This could include the following:

Category: Administration (N) - General

Occupational Health and Safety

Occupational Health and Safety Act: Aims; Acts; Representatives'; Inspectors; Offences

Personal safety: health at and at work; stress related illnesses; injuries and diseases in the workplace; repetitive strain injuries; manual handling procedures; handling of ladders; adequate lighting in the workplace; industrial radiation; chemical hazards; protective equipment; special situations (eg. Scaffolding); electrical hazards; thermal stress; exposure to excessive vibration; high level industrial noise; safety in the general workplace

Workplace hazards: - Safety checks within the workplace; Identification of potential workplace hazards; Preventative measures

Working with electrically operated tools and equipment: nature of electric shock; causes of electrical accidents; working safely with electricity; safety items used in electrical environments; protection; isolation

Rescue from a live electrical situation

Emergency first aid/resuscitation: procedures for performing emergency first aid and; resuscitation from an electric shock.

Workplace Communication

Gathering, recording and conveying simple routine information using telephone, face to face, electronic media and documents in a workplace related context

Giving and following simple and routine instructions

Participating in small informal workgroups

Interacting with clients within and external to the workplace about simple routine matters using the telephone and face to face contact

Writing Skills for Work

Identify principles of effective writing: correct punctuation; sentence structure; readability; appropriateness; completeness; correctness

Complete workplace documentation: workplace forms which may include job diaries, faxes, memos, letters, reports; proformas which may include time sheets, tax declaration forms, sick leave/leave application forms, telephone message forms, customer order forms, delivery forms, damaged stock forms, notification of accident/incident forms, OH&S forms –hazard chemical forms

Produce work related documents: write faxes; email; memos; letters; reports

Electrical Concepts

Basic electrical concepts: SI units; electrical quantities (charge, current, voltage, resistance); factors affecting resistance; work, energy, power (mechanical, electrical); conventional current flow, electron flow

Effects of current: physiological; chemical (electroplating, corrosion); magnetic; thermal (ohmic, peltier)

Sources of emf: photovoltaic; thermal; electromagnetic; chemical

Simple practical circuit: voltage source with fuse or circuit breaker (briefly explained) and single resistor; principle of operation; terms (short – circuit, open – circuit, overload)

Series, parallel and series - parallel DC circuits, including the connection of meters in either series or parallel: series circuit connection; resistance in series: parallel circuit connection; resistance in parallel; series - parallel circuit connections

Batteries and battery connections: characteristics of primary and secondary cells; handling and charging secondary cells; terminal voltage

Measurement using meters: multimeters; ideal and practical meter characteristics; loading effect; sources of error in meter reading

Computing in the Electrotechnology Industry

Use of computers in the metals and engineering industry: applications in an engineering enterprise – communication, machine control, production control, office support- record keeping (e.g. stores), professional support (e.g. CAD/CAM)

Introduction to computers: types of computers; hardware names; meaning of words and terms commonly associated with computers

Introduction to operating systems

Peripheral devices: purpose of - input devices, output devices, ancillary storage devices

Use of computers: input and run a simple program, enter data, save data, retrieve data, print out data

Application packages used in the metals and engineering industry: use of application programs - word processing, spreadsheet, database, drawing

Quality Concepts

Quality: History of quality; Importance of quality; Definition of quality; Elements of good quality in a product/service; Principles of quality management; Objectives of quality control

Quality Systems: Definitions of quality systems; Australian quality standards; Components of a quality system - quality manual, procedures, work instructions, records; Quality audits and inspection

Quality Improvement Techniques: PDCA Cycle; Frequency diagrams; Histograms; Run charts; Flow charts; Brainstorming; Cause & Effect diagrams

Office Administration – Electrical Contracting

Aims and objectives of the business, its personnel and departments and its products and services: enterprise to complete routine administrative tasks; information provision from own function area; follow-up action when required; preparation and processing financial documentation for cash flow and accounting records; recording and balancing petty cash transactions; reconciling invoices for payments to creditors; preparing invoices for debtors; preparing and process banking documents; preparing invoices and service reports; preparing and process financial documentation for cash flow and accounting records; monitoring stock levels and records to maintain enterprise activities; preparing material orders;

Client enquiries and resolution to issues related to products and services: telephone, oral and written requests for information; drafting routine correspondence in response to a need or request; quotation preparation presentations; redirecting enquiries

Responding to visitors and their needs: collecting and providing information to facilitate communications flow; clarifying specific needs of client; providing information and advice; processing client complaints to ensure the goals of the organisation are met; responding to client complaints

Promoting a positive image of the enterprise: includes knowledge of the enterprise to promote the products and services of the organisation such as - how and why electrical power is distributed in a building, the purpose of a main switchboard and its associated equipment, the purpose of a distribution board and its associated equipment, services and products associated with electrical distribution in a building, common electrical accessories including their purpose and typical location in a premises, eg: switches, fuses, circuit breakers, safety switch, electric motor, motor starter, fluorescent light and components, batten holder, socket outlet, main switch, switchboard and meter, describing services or installation work activities

Following workplace Occupational Health & Safety procedures and policies

Maintaining records of electrical installation work: responsibilities in electrical safety and related regulations; scope and differences of the Australian Standards and local regulations concerning the supply of electricity systems; consequences of unsafe work practices; need to maintain records of installation testing and

completion; completing appropriate documentation required by the local supply authority for the supply of electricity and test reporting; service reports

Preparing quotation presentations: purpose of plans, specifications, and tenders; quotations preparation from job specifications and customer requests; quotation letters preparation from estimators documentation and information that should and should not be included; tender documents preparation for submission; legal implications in quotations and tenders; implications of various clauses in specifications and tender documents; quotation documents presentation from a variety of previously successful submissions.

Enterprise Specific

Nature of the business

Structure goals and business philosophy of the enterprise

Employer/employee rights and responsibilities

Contributing to the goals of the enterprise

Dress standards

Workplace behaviour codes

EEO and anti discrimination

Introduction to Electrical Industry

The electrotechnology industry: Organisation of work; Role and responsibilities

Effective communication

Training in the electrotechnology industry: Arrangements; Roles and responsibilities

Preparing for work at a new site

Equal employment opportunity policy and practice

Parts and Component Selection

Part and component identification: Name, function, type number and ratings of a range of typical components used in the electrotechnology and engineering industries

Information about parts and components: Catalogues; Computer access; Telephone inquiry; as they relate to the following: part codes and what they mean, manufactures and manufactures supply outlets, availability and delivery times, price, including discounts, tax and delivery costs; alternative parts

Ordering procedures: Customer approval; Supplier requirements; In-house requirements

Receiving/dispatching procedures: Supplier requirements; In-house requirements; Handling and storage

Software Awareness

Communications: software used for data communication in the workplace; use of the computer system for email, faxes, the Internet and EDI;

Software: software used in the workplace; policies and procedures that relate to computer and computer system use ; computer system security and virus protection.

Word processing and database management in an electrical wholesale environment

Word processing software: word processing software to create and print documents; formatting and editing existing/new documents in a word processing system; storing existing/new documents in a word processing system; menus and buttons; entering text; corrections; moving, copying and deleting; other features

Database management: accessing and storing information in a data base management system; printing required information from a data base management system; advantages of databases; disadvantages of databases; authorised access to use a database management system including logging on/off

Spreadsheets: software used for spreadsheets; basic features of spreadsheet software

Graphics: options for producing graphics from spreadsheets; production of graphs; using spreadsheets to produce graphs

Merchandise Products

Pricing merchandise: reasons for price marking; methods and location of price marking used according to product types; information commonly found on price and shelf tickets; sources for obtaining price information; “First in First out” principle and relationship to price marking; European Article Number (EAN) and its relationship to barcoding; data categories incorporated within EAN symbol; advantages and disadvantages of barcoding for the manufacturer, wholesaler, retailer, and consumer; role of EAN in relation to product numbering, legal requirements and code of practice

Merchandise display tickets: principles and essential features for inclusion on a display ticket.; range of methods for incorporating creativity in ticket writing; displaying signs and tickets appropriately on stock, in accordance with enterprise procedures and guidelines; designing and producing display tickets, in accordance with enterprise procedures and guidelines

Classifying merchandise: classifying and grouping merchandise in accordance with enterprise procedures and guidelines; the advantage of classifying merchandise in relation to the customer, store, salesperson and sales; methods used to draw customers, in accordance with enterprise procedures and guidelines; types of store layout; merchandise position to obtain optimum store layout; “Hot” and “Cold” spots in a store layout; “Focal Point” within a store layout to maximise customer view of merchandise

Presenting merchandise: purpose of displays; features and principles of an effective display; selecting and presenting a range of suitable merchandise for display, in accordance with enterprise procedures and guidelines; utilising a variety of in-store displays to create an appropriate merchandise display; principles for choosing or designing a prop; key principles of window display on four window display styles; range of elements of safety and housekeeping in relation to window displays

Category: Wholesaling (Q)

Common

Occupational Health and Safety

Occupational Health and Safety Act: Aims; Acts; Representatives'; Inspectors; Offences

Personal safety: health at and at work; stress related illnesses; injuries and diseases in the workplace; repetitive strain injuries; manual handling procedures; handling of ladders; adequate lighting in the workplace; industrial radiation; chemical hazards; protective equipment; special situations (eg. Scaffolding); electrical hazards; thermal stress; exposure to excessive vibration; high level industrial noise; safety in the general workplace

Workplace hazards: - Safety checks within the workplace; Identification of potential workplace hazards; Preventative measures

Working with electrically operated tools and equipment: nature of electric shock; causes of electrical accidents; working safely with electricity; safety items used in electrical environments; protection; isolation

Rescue from a live electrical situation

Emergency first aid/resuscitation: procedures for performing emergency first aid and; resuscitation from an electric shock.

Workplace Communication

Gathering, recording and conveying simple routine information using telephone, face to face, electronic media and documents in a workplace related context

Giving and following simple and routine instructions

Participating in small informal workgroups

Interacting with clients within and external to the workplace about simple routine matters using the telephone and face to face contact

Writing Skills for Work

Identify principles of effective writing: correct punctuation; sentence structure; readability; appropriateness; completeness; correctness

Complete workplace documentation: workplace forms which may include job diaries, faxes, memos, letters, reports; proformas which may include time sheets, tax declaration forms, sick leave/leave application forms, telephone message forms, customer order forms, delivery forms, damaged stock forms, notification of accident/incident forms, OH&S forms –hazard chemical forms

Produce work related documents: write faxes; email; memos; letters; reports

Electrical Concepts

Basic electrical concepts: SI units; electrical quantities (charge, current, voltage, resistance); factors affecting resistance; work, energy, power (mechanical, electrical); conventional current flow, electron flow

Effects of current: physiological; chemical (electroplating, corrosion); magnetic; thermal (ohmic, peltier)

Sources of emf: photovoltaic; thermal; electromagnetic; chemical

Simple practical circuit: voltage source with fuse or circuit breaker (briefly explained) and single resistor; principle of operation; terms (short – circuit, open – circuit, overload)

Series, parallel and series - parallel DC circuits, including the connection of meters in either series or parallel: series circuit connection; resistance in series: parallel circuit connection; resistance in parallel; series - parallel circuit connections

Batteries and battery connections: characteristics of primary and secondary cells; handling and charging secondary cells; terminal voltage

Measurement using meters: multimeters; ideal and practical meter characteristics; loading effect; sources of error in meter reading

Computing in the Electrotechnology Industry

Use of computers in the metals and engineering industry: applications in an engineering enterprise – communication, machine control, production control, office support- record keeping (e.g. stores), professional support (e.g. CAD/CAM)

Introduction to computers: types of computers; hardware names; meaning of words and terms commonly associated with computers

Introduction to operating systems

Peripheral devices: purpose of - input devices, output devices, ancillary storage devices

Use of computers: input and run a simple program, enter data, save data, retrieve data, print out data

Application packages used in the metals and engineering industry: use of application programs - word processing, spreadsheet, database, drawings

Wholesaling-General

Stock Control

Stock maintenance: minimum stock levels - ascertaining stock needs, requests for purchase, ordering of stock from suppliers, reconciling delivery documents, orders and invoices with actual stock delivered, checking the GST component; maintaining stock control records to ensure accuracy and security of information; methods of maintaining a well organised stock storage area to ensure theft and other losses are kept to a minimum; assuring adequate control over stock being issued; lead times; economic/budgetary considerations; production schedules; identification of optimum stock levels; stock rotation procedures for merchandise and wrapping and packing materials; excess stock placed in storage or disposed of; product quality standards

Stock records; GST compliance; Stock levels; minimum, optimum; Purchasing: authorisation, orders; Receiving: delivery dockets/documentation, invoices/tax invoices (GST); Storage: location, security, turnover; Issue of stock: receiving orders, stock requisitions, despatching stock; Returns: in, out; Security: separation of duties, rotation of duties; Manual and/or electronic stock control - electronic recording equipment; Barcodes; Stock cards, recording GST component; Specialised computer software, recording GST component

GST compliance; Organisational policy and procedures; Australian taxation office guidelines; Refund sales tax - current trading stock; Valuation methods - actual cost (including GST), FIFO (GST), weighted average (GST), standard cost (GST); Stock records/cards; Specialised software applications; Adjustments to recording keeping for GST; Regular checks ATO; Retention of documents (receipts/tax invoices)

Organisational policy and procedures; Periodic inventory method; Perpetual inventory method; Stocktaking procedures; GST compliance; Stock records/cards; Specialised software application; Upgrading of recording systems for GST; Reporting (GST compliance); Regular checks (ATO)

Government legislation; GST compliance; Security; Methods of archiving - paper-based records, electronic records (specialised software applications); Upgrading of recording systems for GST; Reporting (GST compliance); Regular checks (ATO); Retention of records (receipts/tax invoices); Refunds of sales tax

Warehouse Operations

Terminology: factory; raw materials; manufacturing process; materials handling systems - value-added management, just In Time; finished goods; wholesale and retail; distribution; buyers and customers; inventory; warehousing; storage/binning systems

Purpose of a warehouse: storage; distribution; transport costs

Types of Warehouses: cold storage; temperature controlled; bonded; records; household goods; general merchandise; commodity; manufacturing/parts; manual, semi automated, automated; others.

Functions and processes: receiving; unloading; unpacking; storing/putaway; picking orders; packaging; consolidation and assembly; dispatch

Layout: storage systems - binning, racking, bulk stacking, floor marking, fixed location, random slot locations, planned/unplanned warehouses; operational sections – receiving, unloading, order picking/assembly, packing/packaging area, dispatch, administration/office; exits/entrances; safety areas and equipment

Definitions: organisational structure; occupation; position description; departments

Personnel/key roles: store person; order picker; replenisher; administration; department manager; general manager; hierarchy; duties/responsibilities

Departments in the warehouse: administration; receiving/putaway; buying/purchasing; dispatch; sales; human resource management

Administration: role and function; purpose of documentation; computerised/manual systems; form of documentation

Storage: bins/racks; bulk storage; floor marking; commodity systems as addresses; fixed location; random slot locations; unplanned/planned warehouses; size of areas; special requirements - coldrooms/freezers, dangerous goods

Reasons for type/size of storage area: type of stock; special requirements; logistics; relation to equipment and other departments

Equipment and technology: computers/computerised system - inventory management equipment, hardware/software, visual display units, radio frequency equipment/two way radios; bar coding/scanning equipment; automated equipment/machinery - AGV (Automatic Guided Vehicle), gravity feed storage, conveyor belts/sorters; photocopiers/copying machines; facsimile machines; portable data entry units

Purpose: efficiency; cost effectiveness; time/distance management; reducing manual handling

Manual Materials Handling

Legislation: worker obligations; employer obligations

Lifting and Lowering Principles

Manual Handling Techniques

Using mechanical handling equipment

Manual handling: equipment including simple aids - ladders, stairs, steps, levers, sliding rails, belt and roller conveyors, trolleys, pallet/lift jacks, hoists, forklift trucks; types of mechanical handling equipment including ladders, steps, stairs; trolleys; loaded trolley weight; trolley, height, length and width; handle height; wheels – size, material, castors; maintenance; conveyors - roller conveyors, belt

conveyors, screw conveyors, chutes, monorails, trolley conveyors; hoists including related licences; forklift trucks including related licences

Lifting/lowering styles: 7 steps to safe lifting/lowering

Pushing/pulling loads: techniques for push/pull tasks

Team lifting: manual handling of objects by two or more people at the same time; decreasing the risk of manual handling injury when a load is too heavy or awkward for one person to lift or carry safely; considerations for Team Lifting

Manual handling risks and hazards: identifying area of Risk/Hazard; factors in the work environment that can create hazards

Mechanical Materials Handling

Occupational health and safety requirements related to load shifting equipment; State/Territory legislation and regulations; Regulations: Occupational Health and Safety; State regulations; Licensing requirements; Regulations/policies: state licensing regulations - hours of required training, licence test, medical requirement, relevant state authorities; certificate of competency - crane driver, crane chaser, forklift driver; supervision requirements; company policies and procedures; Occupational Health and Safety regulations; Company policies and procedures; Manufacturer's specifications

Equipment types, characteristics, uses and limitations of load shifting equipment; operation, control mechanisms and functions of load shifting equipment; load types and handling/stacking techniques; pre-start, start-up and shut-down procedures; pre-use, checking and post use procedures; emergency procedures; load shifting equipment documentation and records system; types of materials and their characteristics; relevant materials handling plant; lifting equipment relevant to handling materials; workplace safety requirements including relevant statutory regulations, codes and standards; material products; materials handling eg: heavy and irregular shaped; stacking/storing materials safely allowing egress to others and easy access to materials for retrieval; hazards eg: identification and prevention methods adopted; tools and equipment relevant to handling of materials; measuring and calculating related to lineal, spacial and mass determinations; Worksafe Australia Standards for Users and Operators of Industrial Equipment

Mechanical Materials Handling equipment: forklift - counter balance, reach trucks, pedestrian forklifts - "walky stackers", attachments, fuel - (gas, electricity, petrol, diesel); automatic guided vehicle (AVG) - tow motors; high level order picker; conveyor system - sliding rail, roller; mechanised pallet mover/truck; cranes and hoists – overhead, fixed/travelling, power operated, mobile hoists, plate clamps, eye bolts, shackles (dee/bow), wire rope slings, chain slings; manual skates and trucks

Load characteristics: weight; dimension; placement area; mechanical materials handling equipment – capacity, limitations

Use of mechanical materials handling equipment: forklifts; daily maintenance - check oil levels, check fuel, connect to charger, tyre pressure, change over gas cylinder, cooling level, condition and spread of forks, brake pedal; instruments

and controls - up-down levers, brake, accelerator, tilt control, forward/reverse, instrument gauges, loading and unloading; types of loads, transporting load, height of load, parking, lifting heights, fork lift in travel, speed, operational areas, attachments, pallet splitter, double width; tow motors - daily maintenance, check fuel, change over gas cylinder, check oil, brake pedal operation, tyre pressure, trailer couplings, fill gas cylinder, attaching and loading trailers - trailer couplings, types of loads, tying down loads, trailer maintenance, loading and unloading trailers, tow motor operation, speed in plant, operation areas, safety aspects, parking the tow motor, carting hazardous materials; conveyor equipment - maintenance procedures; lubrication, check belts, check rollers, adjust height if applicable, record and report faulty equipment, loading/unloading - centre load on belt, balance object flat on belt, supply bins close by, set belt speed (if applicable), safety - sharp edges on objects, stop/start signals down line, personal protective equipment, position of self to belt, keep equipment free of scrap - methods of checking, procedures for freeing jammed equipment; mechanised pallet mover/truck - daily maintenance - instruments and controls, methods of loading and unloading, method of operation, safety precautions when operating; automatic guided vehicle (driverless) - the principles and functions of computer controlled equipment, the operations of computer controlled equipment, control panel programming and adjustment, maintenance requirements, safety precautions; other equipment

Quality Concepts

Quality: History of quality; Importance of quality; Definition of quality; Elements of good quality in a product/service; Principles of quality management; Objectives of quality control

Quality Systems: Definitions of quality systems; Australian quality standards; Components of a quality system - quality manual, procedures, work instructions, records; Quality audits and inspection

Quality Improvement Techniques: PDCA Cycle; Frequency diagrams; Histograms; Run charts; Flow charts; Brainstorming; Cause & Effect diagrams

Electrical Wholesale Techniques (1)

Electrical equipment, switch gear and wiring accessories; identification; ratings; selecting materials from catalogues and data bases

Electrical distribution in buildings: single and three phase systems; distribution components (mains, submains, final subcircuits, main switchboard, distribution board); purpose of main switchboards and distribution boards; power rating of typical appliances and equipment; importance of earthing

Electrical / electronic systems: system level functions of power and control devices; controllers (function, application)

Supply of electricity and safety: responsibilities; standards and regulations; procedures and documentation

Electrical Wholesale Techniques (2)

The features, purposes and use of block, circuit and wiring diagrams

Use of drawing symbols and Australian Standard 1102

Electrical diagram conventions

The features purpose and use of site and floor plans and detail and standard drawings

Locating the position of electrical services from architectural drawings

The relationship between electrical and other trades in the building construction sequence

Building materials used in house construction

Building materials and their properties

Cords and Cables: materials and specifications; colour coding; cable structures; typical applications

Conductors: size; types

Electrical accessories: type and applications; fixing methods and techniques (timber, metal, hollow wall, masonry – expansion and chemical, explosive)

Merchandise Products

Pricing merchandise: reasons for price marking; methods and location of price marking used according to product types; information commonly found on price and shelf tickets; sources for obtaining price information; “First in First out” principle and relationship to price marking; European Article Number (EAN) and its relationship to barcoding; data categories incorporated within EAN symbol; advantages and disadvantages of barcoding for the manufacturer, wholesaler, retailer, and consumer; role of EAN in relation to product numbering, legal requirements and code of practice

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four window display styles; range of elements of safety and housekeeping in relation to window displays

Customer Service

Receiving and dealing with internal customer inquiries

Applying product knowledge to respond to customer needs in line with enterprise policies and procedures

Dealing with internal and external customer inquiries

Dealing appropriately with a difficult situation involving a dissatisfied customer

Approaches for dealing with customers

Receiving documentation, check against product(s) received and process according to workplace policy and procedures in order to respond to customer enquiries

Responding to customer needs in line with enterprise policies and procedures

Wholesaling-Warehouse

Stock Control

Stock maintenance: minimum stock levels - ascertaining stock needs, requests for purchase, ordering of stock from suppliers, reconciling delivery documents, orders and invoices with actual stock delivered, checking the GST component; maintaining stock control records to ensure accuracy and security of information; methods of maintaining a well organised stock storage area to ensure theft and other losses are kept to a minimum; assuring adequate control over stock being issued; lead times; economic/budgetary considerations; production schedules; identification of optimum stock levels; stock rotation procedures for merchandise and wrapping and packing materials; excess stock placed in storage or disposed of; product quality standards

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records/cards; Specialised software application; Upgrading of recording systems for GST; Reporting (GST compliance); Regular checks (ATO)

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Purpose: efficiency; cost effectiveness; time/distance management; reducing manual handling

Manual Materials Handling

Legislation: worker obligations; employer obligations

Lifting and Lowering Principles

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Load characteristics: weight; dimension; placement area; mechanical materials handling equipment – capacity, limitations

Use of mechanical materials handling equipment: forklifts; daily maintenance - check oil levels, check fuel, connect to charger, tyre pressure, change over gas cylinder, cooling level, condition and spread of forks, brake pedal; instruments and controls - up-down levers, brake, accelerator, tilt control, forward/reverse, instrument gauges, loading and unloading; types of loads, transporting load, height of load, parking, lifting heights, fork lift in travel, speed, operational areas, attachments, pallet splitter, double width; tow motors - daily maintenance , check fuel, change over gas cylinder, check oil, brake pedal operation, tyre pressure, trailer couplings, fill gas cylinder, attaching and loading trailers - trailer couplings, types of loads, tying down loads, trailer maintenance, loading and unloading trailers, tow motor operation, speed in plant, operation areas, safety aspects, parking the tow motor, carting hazardous materials; conveyor equipment - maintenance procedures:, lubrication, check belts, check rollers, adjust height if applicable, record and report faulty equipment, loading/unloading - centre load on belt, balance object flat on belt, supply bins close by, set belt speed (if applicable), safety - sharp edges on objects, stop/start signals down line, personal protective equipment, position of self to belt, keep equipment free of scrap - methods of checking, procedures for freeing jammed equipment; mechanised pallet mover/truck - daily maintenance - instruments and controls, methods of loading and unloading, method of operation, safety precautions when operating; automatic guided vehicle (driverless) - the principles and functions of computer controlled equipment, the operations of computer controlled equipment, control panel programming and adjustment, maintenance requirements, safety precautions; other equipment

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Supply of electricity and safety: responsibilities; standards and regulations; procedures and documentation

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Dangerous Goods

Health and safety policy: chemical exposures; working and handling chemicals safely

Responsibilities for handling, storage and package of dangerous goods: employer and employee responsibilities in relation to dangerous goods

Procedures for the safe handling of dangerous goods: Personal Protective Equipment (PPE); first aid, emergency equipment and fire equipment; procedures for use of chemicals; procedures for storage of dangerous goods

Segregation of dangerous goods: Australian Dangerous Goods Code; segregation of certain classes of Dangerous Goods; using dangerous goods segregation chart to determine the compatibility of dangerous goods in the workplace; specific handling requirements for each dangerous good

Procedures in the event of an accident/incident involving dangerous goods: emergency plans and procedures to protect people, property and the environment; responding and reporting accidents/incidents; Accident/Incident report forms; key authorised persons that can be contacted or advised

Storing dangerous goods correctly

Implementing first aid and emergency procedures in case of an accident

Forklift Operations

Duty of care requirements pertaining to the operation of a forklift; OHS and environmental procedures and regulations; Forklift controls, instruments and indicators and their use; Forklift power types; Forklift attachment types; Forklift handling procedures - handling loads and driving defensively; Procedures to be followed in the event of an operational emergency; Engine power management and safe operating strategies; Efficient driving techniques - managing forklift controls, reading instruments and adjusting engine power to site requirements; Pre-operational checks carried out on forklift and related action; Site layout and obstacles; Operating hazards and related defensive driving and hazard control techniques; Principles of stress management when driving a forklift; Workplace operating procedures; points of balance and safe lifting positions on a range of loads when operating a forklift; Instructions, procedures and signage relevant to the operation of a forklift - operating a forklift safely in workplace environment, use of communication devices such two-way radios for effective communication, forklift manufacturer's guidelines and instructions; Monitoring and anticipating operational hazards and take appropriate action, operational hazards and the use of appropriate defensive driving and hazard control techniques; Relevant State/Territory regulations and licence requirements pertaining to forklift

operation - codes and standards, including Australian Standard 2359 - Industrial Truck Code, State/Territory OHS legislation, State/Territory fatigue management regulations, State/Territory environmental protection legislation manufacturer's specifications for forklift and associated equipment, operations and service record book or log, ADG Code and material safety data sheets; Reporting and/or rectifying accidents, incidents and any identified faults or malfunctions in accordance with manufacturer's instructions, regulatory requirements and workplace procedures

Wholesaling-Point of Sale

Product Knowledge

Check the “quality” of the product/stock and follow workplace procedures for reporting problems

Cataloguing and labelling systems to identify and locate products

Seek out sources of product knowledge

Locating stock using catalogues or computer systems

Identifying product: selling to a customer over the counter, checking on stock availability for customers, picking stock to complete customer orders for dispatch, assisting with receipt, inspections and storage of stock, conducting cyclical stock counts, conducting stocktakes

Product storage requirements including dangerous goods and their location: type of stock; special requirements for storage; logistics; access by equipment to move the stock; closeness to receipt and dispatch areas; stock items - size, shape, fragility, quantity, liquid or gas, dangerous goods; storage methods - bins, racks, marked floor space, bulk stacking, fixed locations, random locations, special requirements

Problem stock: identification - damaged, broken, unusable, incomplete, replaced, returned, disposed

Layout, function of and processes involved in wholesale operations

Manual Materials Handling

Legislation: worker obligations; employer obligations

Lifting and Lowering Principles

Manual Handling Techniques

Using mechanical handling equipment

Manual handling: equipment including simple aids - ladders, stairs, steps, levers, sliding rails, belt and roller conveyors, trolleys, pallet/lift jacks, hoists, forklift trucks; types of mechanical handling equipment including ladders, steps, stairs; trolleys; loaded trolley weight; trolley, height, length and width; handle height; wheels – size, material, castors; maintenance; conveyors - roller conveyors, belt

conveyors, screw conveyors, chutes, monorails, trolley conveyors; hoists including related licences; forklift trucks including related licences

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Mechanical Materials Handling

Occupational health and safety requirements related to load shifting equipment; State/Territory legislation and regulations; Regulations: Occupational Health and Safety; State regulations; Licensing requirements; Regulations/policies: state licensing regulations - hours of required training, licence test, medical requirement, relevant state authorities; certificate of competency - crane driver, crane chaser, forklift driver; supervision requirements; company policies and procedures; Occupational Health and Safety regulations; Company policies and procedures; Manufacturer's specifications

Equipment types, characteristics, uses and limitations of load shifting equipment; operation, control mechanisms and functions of load shifting equipment; load types and handling/stacking techniques; pre-start, start-up and shut-down procedures; pre-use, checking and post use procedures; emergency procedures; load shifting equipment documentation and records system; types of materials and their characteristics; relevant materials handling plant; lifting equipment relevant to handling materials; workplace safety requirements including relevant statutory regulations, codes and standards; material products; materials handling eg: heavy and irregular shaped; stacking/storing materials safely allowing egress to others and easy access to materials for retrieval; hazards eg: identification and prevention methods adopted; tools and equipment relevant to handling of materials; measuring and calculating related to lineal, spacial and mass determinations; Worksafe Australia Standards for Users and Operators of Industrial Equipment

Mechanical Materials Handling equipment: forklift - counter balance, reach trucks, pedestrian forklifts - "walky stackers", attachments, fuel - (gas, electricity, petrol, diesel); automatic guided vehicle (AVG) - tow motors; high level order picker; conveyor system - sliding rail, roller; mechanised pallet mover/truck; cranes and hoists – overhead, fixed/travelling, power operated, mobile hoists, plate clamps, eye bolts, shackles (dee/bow), wire rope slings, chain slings; manual skates and trucks

Load characteristics: weight; dimension; placement area; mechanical materials handling equipment – capacity, limitations

Use of mechanical materials handling equipment: forklifts; daily maintenance - check oil levels, check fuel, connect to charger, tyre pressure, change over gas cylinder, cooling level, condition and spread of forks, brake pedal; instruments

and controls - up-down levers, brake, accelerator, tilt control, forward/reverse, instrument gauges, loading and unloading; types of loads, transporting load, height of load, parking, lifting heights, fork lift in travel, speed, operational areas, attachments, pallet splitter, double width; tow motors - daily maintenance, check fuel, change over gas cylinder, check oil, brake pedal operation, tyre pressure, trailer couplings, fill gas cylinder, attaching and loading trailers - trailer couplings, types of loads, tying down loads, trailer maintenance, loading and unloading trailers, tow motor operation, speed in plant, operation areas, safety aspects, parking the tow motor, carting hazardous materials; conveyor equipment - maintenance procedures; lubrication, check belts, check rollers, adjust height if applicable, record and report faulty equipment, loading/unloading - centre load on belt, balance object flat on belt, supply bins close by, set belt speed (if applicable), safety - sharp edges on objects, stop/start signals down line, personal protective equipment, position of self to belt, keep equipment free of scrap - methods of checking, procedures for freeing jammed equipment; mechanised pallet mover/truck - daily maintenance - instruments and controls, methods of loading and unloading, method of operation, safety precautions when operating; automatic guided vehicle (driverless) - the principles and functions of computer controlled equipment, the operations of computer controlled equipment, control panel programming and adjustment, maintenance requirements, safety precautions; other equipment

Quality Concepts

Quality: History of quality; Importance of quality; Definition of quality; Elements of good quality in a product/service; Principles of quality management; Objectives of quality control

Quality Systems: Definitions of quality systems; Australian quality standards; Components of a quality system - quality manual, procedures, work instructions, records; Quality audits and inspection

Quality Improvement Techniques: PDCA Cycle; Frequency diagrams; Histograms; Run charts; Flow charts; Brainstorming; Cause & Effect diagrams

Wholesale Calculations

Calculating numerical information manually to perform routine electrical wholesale tasks

Operating arithmetical functions of a numeric keypad to perform routine electrical wholesale tasks: performing basic arithmetic functions; converting simple fractions to decimals; calculating percentages; estimating the result of calculations

Using memory and constant functions of an electronic calculator to perform routine electrical wholesale tasks: addition; subtraction; multiplication; division; percentage; vulgar fractions to decimal; constant functions in calculations involving repetition

Interpreting symbols, diagrams and pictorial representations in electrical wholesaling environment

Calculations: performing basic calculations manually; performing accurate calculations using electronic equipment; recognising and identifying symbols, diagrams and pictorial representations in the electrical wholesale environment

Inventory Management

Receiving documentation, checking against product(s) received and process according to workplace policy and procedures: maintain the presentation and cleanliness of the receiving, dispatch and other stores areas; receive, unpack, inspect and record incoming stock, including identifying and recording non-conforming goods; store stock for reliable identification in appropriate area

Different methods of maintaining control over stock: pick, pack, inspect and dispatch items

Applying appropriate workplace procedures for ordering and maintaining stock levels: ordering stock using appropriate company procedures

Participating in stocktake and cyclical stock counts: recording stock movements

Identifying discrepancies in stock and adjust inventory data as required: maintaining appropriate stock levels; applying stocktaking procedures

Point of Sale Systems and Procedures

Operating data entry/computer system: developing a checklist and operating a data entry/computer system; computer system that may be used for recording orders, ordering products, invoicing customers, stock and price queries, stock control, customer correspondence; accessing information using computer technology - keyboard skills, turning the screen and keyboard/system unit on and off, logging onto the system, using a navigation device (mouse), locating the file/folder to be accessed; entering, editing and saving data; printing data from the computer system - back order list, product details

Operating scanner: developing a checklist and operating a scanner; bar code identification for product by brand, size, type and price - point of sale, stock control, reordering

Operating an electronic product guide: computer systems based electronic product guide (EPG) which stores information about products; logging on and accessing information; searching for products list/types; simultaneous accessing of information about a particular product - can be written information and/or pictures; in format for presentation to customer; benefits for sales representatives and customers

Selling Skills

Greeting the customer: establish rapport with the customer; grab the customer's attention; arouse interest in the product

Establishing customer needs: identifying the customers' needs

Selling the benefits: opening; establishing customer needs; selling the benefits; identifying features and benefits of products; offering add-ons if appropriate;

Offering add-ons if appropriate: observing the customer's actions; timing your approach; deciding on your approach to create a good impression.

Closing the sale: trialling close; giving a choice; asking closing questions – to gain customer agreement; reviewing benefits the customer is particularly interested in completing the paper work – assume the customer is going to buy; keeping quiet!; assisting procrastinator to make a decision

Merchandise Products

Pricing merchandise: reasons for price marking; methods and location of price marking used according to product types; information commonly found on price and shelf tickets; sources for obtaining price information; “First in First out” principle and relationship to price marking; European Article Number (EAN) and its relationship to barcoding; data categories incorporated within EAN symbol; advantages and disadvantages of barcoding for the manufacturer, wholesaler, retailer, and consumer; role of EAN in relation to product numbering, legal requirements and code of practice

Merchandise display tickets: principles and essential features for inclusion on a display ticket.; range of methods for incorporating creativity in ticket writing; displaying signs and tickets appropriately on stock, in accordance with enterprise procedures and guidelines; designing and producing display tickets, in accordance with enterprise procedures and guidelines

Classifying merchandise: classifying and grouping merchandise in accordance with enterprise procedures and guidelines; the advantage of classifying merchandise in relation to the customer, store, salesperson and sales; methods used to draw customers, in accordance with enterprise procedures and guidelines; types of store layout; merchandise position to obtain optimum store layout; “Hot” and “Cold” spots in a store layout; “Focal Point” within a store layout to maximise customer view of merchandise

Presenting merchandise: purpose of displays; features and principles of an effective display; selecting and presenting a range of suitable merchandise for display, in accordance with enterprise procedures and guidelines; utilising a variety of in-store displays to create an appropriate merchandise display; principles for choosing or designing a prop; key principles of window display on four window display styles; range of elements of safety and housekeeping in relation to window displays

Customer Service

Receiving and dealing with internal customer inquiries

Applying product knowledge to respond to customer needs in line with enterprise policies and procedures

Dealing with internal and external customer inquiries

Dealing appropriately with a difficult situation involving a dissatisfied customer

Approaches for dealing with customers

Receiving documentation, check against product(s) received and process according to workplace policy and procedures in order to respond to customer enquiries

Responding to customer needs in line with enterprise policies and procedures

UTE NES016 A

Promote detailed organisational services/products

Descriptor: Undertake detailed promotion activities of services/products in an electrotechnology environment.

Alignment: Nil.

Elements	Performance criteria
016.1 Plan and prepare for promoting detailed services/products	<p>016.1.1 Detailed promotional activities are planned and prepared for to ensure <i>OH&S policies and procedures</i> are followed with the work appropriately sequenced in accordance with <i>requirements</i></p> <p>016.1.2 <i>Appropriate personnel</i> are consulted to ensure the work is co-ordinated effectively with others involved</p> <p>016.1.3 Materials are obtained and checked in accordance with <i>established procedures</i> and to comply with <i>requirements</i></p> <p>016.1.4 Location in which detailed promotional activities are to be undertaken is determined from job <i>requirements</i></p> <p>016.1.5 Materials necessary to complete the work are obtained in accordance with <i>established procedures</i> and checked against job <i>requirements</i></p> <p>016.1.6 Preparatory work is undertaken to ensure no unnecessary damage has occurred and complies with <i>requirements</i></p>
016.2 Undertake detailed promotional activities of services/products	<p>016.2.1 <i>OH&S policies and procedures</i> for undertaking administrative functions are followed</p> <p>016.2.2 Detailed promotional activities are undertaken in accordance with <i>requirements</i>, without damage or distortion to the surrounding environment or services</p> <p>016.2.3 Unplanned events or conditions are responded to in accordance with <i>established procedures</i></p> <p>016.2.4 Approval is obtained in accordance with <i>established procedures</i> from <i>appropriate personnel</i> before any contingencies are implemented</p>

Elements	Performance criteria
	016.2.5 On-going checks of the quality of the work are undertaken in accordance with <i>established procedures</i>
016.3 Complete detailed promotional activities	016.3.1 Documentation/reports are completed to ensure detailed promotional activities <i>requirements</i> are met 016.3.2 Work completion is <i>notified</i> in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to undertake activities that directly support the operational and business activities of an enterprise. This could include the following:

Typical electrical problems and work practices that may be the subject of customer complaints

How to document customer complaints and forward them to the appropriate personnel

The responsibilities in electrical safety and related regulations

The scope of the Australian Standards and local regulations concerning the supply of electricity

The consequences of unsafe work practices

The need to maintain records of installation testing and completion

The purpose of plans, specifications and tenders

How quotations are prepared from job specifications and customer requests

How quotation letters are prepared from estimator's documentation and the information that should and should not be included

How tender documents are prepared for submission

The legal implications in quotations and tenders

Common electrical accessories including their purpose and typical location in a premises, e.g. switches, fuses, circuit breakers, safety switch, electric motor, motor starter, fluorescent light and components, batten holder, socket outlet, main switch, switchboard and meter

How electricity is distributed in a building including the types of circuits and appliances they supply

Ways to adequately and politely question customers to clearly determine the nature of their enquiry or complaint

UTE NES017 A

Project tendering

Descriptor: Apply technical operational management practices related to installation, maintenance, repair and servicing of electrical/electronic apparatus and systems under formal and informal contract arrangements.

Elements		Performance criteria	
017.1	Establish requirements for particular work activities	017.1.1	Technical aspects of work to be undertaken are determined from specification, regulatory requirements and/or client requests
		017.1.2	Application of products is establish from manufacturers documentation, regulatory requirements and industry practices
017.2	Prepare quotations and tenders	017.2.1	Quotations and tenders are checked for financial and technical accuracy before being submitted to the client
		017.2.2	Quotations and tenders are recorded in accordance with <i>established procedures</i>
		017.2.3	Legal implications and business obligations of contracts are established before the business is committed to them
017.3	Plan and manage technical operations	017.3.1	Equipment and accessories are selected to comply with <i>requirements</i>
		017.3.2	Wiring systems are selected to comply with <i>requirements</i>
		017.3.3	<i>Established procedures</i> are implemented and used to ensuring work complies with job specifications and regulatory requirements
		017.3.4	Work records are maintained in order to verify compliance with requirements
017.4	Support staff	017.4.1	Human resource requirements are determined and specified in terms of competencies required to meet contract arrangements
		017.4.2	Process are established to ensure staff are kept up-to-date with technical developments to the extent necessary for the business to achieve the business goals

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to undertake activities that directly support the operational and business activities of an enterprise. This could include the following:

Enterprise documentation and record systems including the use of computers, information systems and business equipment technologies, as appropriate

Enterprise occupational health and safety instructions

Responsibilities and rights of others involved including clients, property owners, other workers and the public

Time management and co-ordination processes.

Organisational arrangements for communicating plans, information, intentions and safety criteria to others by appropriate means

Operation of plant and equipment associated with a given workplace

UTE NES018 A

Assemble & disassemble scaffolding to enable access to the work area

Descriptor: Assemble scaffolding to enable access to work on *apparatus*.

Elements	Performance criteria
018.1 Plan and prepare for the assembly and disassembly of scaffolding	018.1.1 Assembly and disassembly of scaffolding is planned and prepared to ensure <i>OH&S policies and procedures</i> are followed, the work is appropriately sequenced in accordance with <i>requirements</i> 018.1.2 <i>Appropriate personnel</i> are consulted to ensure the work is co-ordinated effectively with others involved on the work site 018.1.3 Scaffold assembly and disassembly is checked against job <i>requirements</i> 018.1.4 Materials necessary to complete the work are obtained in accordance with <i>established procedures</i> and checked against job <i>requirements</i> 018.1.5 <i>Tools and equipment</i> needed to carry out the work are obtained in accordance with <i>established procedures</i> and checked for correct operation and safety 018.1.6 Preparatory work is checked to ensure no unnecessary damage has occurred and complies with <i>requirements</i>
018.2 Assemble and disassemble scaffolding	018.2.1 <i>OH&S policies and procedures</i> for assembly and disassembly of scaffolding are followed 018.2.2 Scaffold is assembled and disassembled in accordance with <i>requirements</i> , without damage or distortion to the surrounding environment or services 018.2.3 Unplanned events or conditions are responded to in accordance with <i>established procedures</i> 018.2.4 Approval is obtained in accordance with <i>established procedures</i> from <i>appropriate personnel</i> before any contingencies are implemented 018.2.5 On-going checks of the quality of the work are undertaken in accordance with <i>established procedures</i>

Elements	Performance criteria
018.3 Inspect and notify completion of work	018.3.1 Final inspections are undertaken to ensure the work conforms to <i>requirements</i> 018.3.2 Work completion is <i>notified</i> in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating consistent performance for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the *category* of the unit(s) being assessed relative to the qualification and any *specialisation* to be issued. Qualifications shall be supplemented with transcripts of information that is meaningful for maximum recognition and skills transfer. Generally, this would be the individual unit(s) of competence title(s) with their *categories* and including the *specialisation(s)* as well as detailed statements about the achievement of underpinning knowledge and skills.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Nil.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to undertake activities that directly support the operational and business activities of an enterprise. This could include the following:

OH&S procedures and codes of practice

Safety issues relating to work in the proximity of overhead lines

Applications of standards, regulations, specifications, procedures and other installation requirements

Characteristics, capabilities, uses and limitation of the type of scaffolding being used

Traffic control *requirements*

Environmental and site management *requirements*

Procedures for working at heights

Basic engineering principles related scaffolding

Permitted clearances from energised conductors and *apparatus*

Selection and use of hand and power tools related to scaffolding

Engineering practices related to scaffolding

Communication principles

Inspection techniques

Lifting and slinging techniques

UTE NES019 A

Perform rigging of heavy loads to facilitate placement & the assembly of apparatus

Descriptor: Perform rigging by moving, placing and securing loads to facilitate placement and the assembly of *apparatus*.

Elements	Performance criteria
019.1 Plan and prepare for rigging of heavy loads	<p>019.1.1 Rigging of heavy loads is planned and prepared to ensure <i>OH&S policies and procedures</i> are followed, the work is appropriately sequenced in accordance with <i>requirements</i></p> <p>019.1.2 <i>Appropriate personnel</i> are consulted to ensure the work is co-ordinated effectively with others involved on the work site</p> <p>019.1.3 Rigging of heavy loads is checked against job <i>requirements</i></p> <p>019.1.4 Materials necessary to complete the work are obtained in accordance with <i>established procedures</i> and checked against job <i>requirements</i></p> <p>019.1.5 <i>Tools and equipment</i> needed to carry out the work are obtained in accordance with <i>established procedures</i> and checked for correct operation and safety</p> <p>019.1.6 Preparatory work is checked to ensure no unnecessary damage has occurred and complies with <i>requirements</i></p>
019.2 Perform rigging of heavy loads	<p>019.2.1 <i>OH&S policies and procedures</i> for rigging of heavy loads are followed</p> <p>019.2.2 Heavy loads are rigged in accordance with <i>requirements</i>, without damage or distortion to the surrounding environment or services</p> <p>019.2.3 Unplanned events or conditions are responded to in accordance with <i>established procedures</i></p> <p>019.2.4 Approval is obtained in accordance with <i>established procedures</i> from <i>appropriate personnel</i> before any contingencies are implemented</p> <p>019.2.5 On-going checks of the quality of the work are undertaken in accordance with <i>established procedures</i></p>

Elements	Performance criteria
019.3 Inspect and notify completion of work	019.3.1 Final inspections are undertaken to ensure the work conforms to <i>requirements</i>
	019.3.2 Work completion is <i>notified</i> in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating consistent performance for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the *category* of the unit(s) being assessed relative to the qualification and any *specialisation* to be issued. Qualifications shall be supplemented with transcripts of information that is meaningful for maximum recognition and skills transfer. Generally, this would be the individual unit(s) of competence title(s) with their *categories* and including the *specialisation(s)* as well as detailed statements about the achievement of underpinning knowledge and skills.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Nil.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to undertake activities that directly support the operational and business activities of an enterprise. This could include the following:

OH&S procedures and codes of practice

Safety issues relating to work in the proximity of overhead lines

Applications of standards, regulations, specifications, procedures and other installation requirements

Characteristics, capabilities, uses, care and limitation of the type of rigging and slings being used including ropes, knots and splices

Slinging and directing the movement of heavy loads *requirements*

Signals used to direct the movement of heavy loads either in sight or out of sight of operator

Helicopter rigging techniques including air-ground co-ordination, hook-up procedures and aircraft safety

Load weight calculations and measurement conversion for lift and transfer operations

Applying anchoring techniques

Removal rigging techniques

Variety limitations and uses of cranes and hoists

Traffic control *requirements*

Environmental and site management *requirements*

Procedures for working at heights

Basic engineering principles related to the performance of rigging heavy loads

Permitted clearances from energised conductors and *apparatus*

Selection and use of hand and power tools related to operator level routine maintenance of plant, machinery and equipment

Engineering practices related to the performance of rigging heavy loads

Communication principles

UTE NES020A

Apply OHS practices in the work place

Descriptor: This competency standard unit specifies the mandatory requirements of occupational health and safety and how they apply to the various electrotechnology work functions. It encompasses responsibilities for health and safety, risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

Note:

Components of this unit are included in the critical aspects of evidence of each applicable unit to ensure that OHS practices are demonstrated as they apply to specific work functions and situation.

Elements	Performance criteria
020.1 Prepare to enter a work area	<p>020.1.1 Instruction in hazards and risk control measures for specific work functions and work areas is obtained.</p> <p>020.1.2 Work area access permits are obtained from appropriate personnel according to established procedures.</p> <p>020.1.3. Preparations for electrical and non-electrical isolation are made to prevent creation of hazards from loss of machine/system/process control according to established procedures.</p> <p>020.1.4 Tools and equipment needed for the work are checked for safety and correct functionality according to established procedures and regulatory requirements.</p>
020.2 Apply safe working practices.	<p>020.2.1 Workplace procedures and work instructions for controlling risk are followed accurately.</p> <p>020.2.2 Workplace procedures for dealing with accidents, fires and emergencies are followed according to work procedures and scope of responsibility and competencies.</p>
020.3 Follow work place procedures for hazard identification and risk control	<p>020.3.1 Participates actively in the consultation process with employer and other employees to identify hazards and implement and monitor control measures.</p> <p>020.3.2 Hazards in the work area are recognised and reported to appropriate personnel according to established procedures.</p> <p>020.3.3 OHS records of incidents are completed in accordance with regulatory requirements and established procedures.</p>

Elements	Performance criteria
	020.3.4 Workplace instructions and training are followed accurately within established procedures.

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

This competency standard unit shall be demonstrated in relation to:

- (a) Relevant Occupational Health and Safety legislation, regulations and codes of practice related to hazards present in the industry and particular workplace, and
- (b) Accepted industry work procedures and the specific safety procedures and work instructions for particular workplace.

Currency in unit of competence

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, *e.g. consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

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

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range encompassing;
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in the Underpinning Knowledge of this unit; and
 - Demonstrate an appropriate level of skills enabling employment; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - A Preparing to enter the workplace including, the use of work permits and clearances and isolation permissions.
 - B Applying work procedures and instructions as they apply to risk control measures.
 - C Dealing with accidents and emergencies within the scope of responsibility.
 - D Participation in consultation processes, identifying hazards and implementing and monitoring control measures.
 - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items, and
 - Applying OHS practices in the work place as described in Range
- Note:
Implementing these Occupation Health and Safety measures shall be demonstrated on all occasions safety issues arise.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Occupational Health and Safety principles

Evidence shall show an understanding of Occupational Health and Safety to an extent indicated by the following aspects

- a) The basic legal requirements covering occupational health and safety in the workplace encompassing:
 - general aims and objectives of the relevant state or territory legislation relating to OHS.;
 - employer and employee responsibilities, rights and obligations
 - major functions of safety committees and representatives); and
 - powers give to Occupational Health and Safety Inspectors.
- b) The requirements for personal safety in the workplace encompassing:
 - the safety precautions that are required to ensure personal safety in the workplace
 - potential hazards in relation to improper industrial housekeeping; and
 - sources of pollution in an engineering environment and outline control measures
- c) Workplace safety check, identifying potential workplace hazards and suggested measures for accident prevention encompassing:
 - safety checklist for a typical workplace environment,
 - identifying and reporting potential workplace hazards
 - methods of prevention of safety hazards within a typical workplace environment
- d) working safely with electrical tools or equipment encompassing:
 - causes of electrical accidents and state the effects that electric shock can cause.);
 - purpose of circuit protection devices, such as fuses, circuit breakers and Residual Current Devices (RCDs), and
 - safe isolation of an electrical supply.

- e) emergency procedures for the rescue of an electric shock victim equipment
- f) emergency first aid for an electric shock victim

Note:

Emergency first aid is limited to first-on-the scene assistance to a victim of electric shock ,
and basics of CPR.

UTE NES021A**Solve problems in extra-low voltage single path circuits**

Descriptor: This competency standard unit covers providing known solutions to predictable problems in single path circuits operated at extra-low voltage as they apply to various electrotechnology work functions. It encompasses working safely, problem solving procedures, including the use of basic voltage, current and resistance measuring devices, providing known solutions to predictable circuit problems.

Elements	Performance Criteria
021.1 Prepare to work on extra-low voltage single path electrical circuits.	021.1.1 OHS procedures for a given work area are obtained and understood. 021.1.2 OHS risk control work preparation measures and procedures are followed. 021.1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken. 021.1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others. 021.1.5 Sources of materials that may be required for the work are established in accordance with established procedures. 021.1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
021.2 Solve problem in extra-low voltage single path electrical circuits.	021.2.1 OHS risk control work measures and procedures are followed. 021.2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures. 021.2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures. 021.2.4 Established routines are used to solve circuit problems using measured and calculated values as they apply to single path, single source circuits.

	021.2.5	Problems are solved without unnecessary damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
021.3 Complete work and document problem solving activities.	021.3.1	OHS work completion risk control measures and procedures are followed.
	021.3.2	Work site is cleaned and made safe in accordance with established procedures.
	021.3.3	Justification for solutions used to solve circuit problems is documented.
	021.3.4	Work completion is documented and an appropriate person or persons notified in accordance with established routine procedures.

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

This competency standard unit shall be demonstrated in relation to:

- Single source single path circuits as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following disciplines:
 - Computers
 - Data Communications
 - Electrical
 - Electronics
 - Fire protection
 - Instrumentation
 - Refrigeration and Air Conditioning,
 - Renewable and sustainable energy systems, and
 - Security technology
- In relation to at least three of the following types of circuit problems and on at least two occasions:
 - Determining the operating parameters of an existing circuit

- Identifying and locating open-circuits
- Identifying and locating short-circuits
- Identifying loss of supply

Currency in unit of competence

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

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

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in the Underpinning Knowledge of this unit; and
 - Demonstrate an appropriate level of skills enabling employment; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Solve problems in extra-low voltage single path circuits as described in Range: and including:
 - A Determining the operating parameters of an existing circuit.
 - B Altering an existing circuit to comply with specified operating parameters.

- C Developing circuits to comply with a specified function and operating parameters.
- D Identifying loss of supply.
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Fundamental electrical principles

Evidence shall show an understanding of electrical principles to an extent indicated by the following aspects:

- a) Fundamental and derived units encompassing
 - basic units of measurement.
 - SI derived units for force, pressure, energy/work temperature and

- power.
 - conversion of units to multiple and submultiple units.
 - transposition of a given equation for any variable in the equation.
 - value of electrical and related mechanical quantities given in any combination of units, multiple units or submultiple units.
- b) Power, work and energy encompassing
 - relationship between power, work and energy.
 - input, output, efficiency or losses of electrical systems and machines in terms of units / multiple units of power.
 - effect of losses in electrical wiring and machines.
- c) Electrical characteristics of materials encompassing
 - characteristics of solid conductors, electrolytes, insulators and semi-conductors.
 - mechanisms of electrical conduction in solids, liquids and gases.
 - The terms “electric charge”, “electric current” and “electromotive force.”
- d) The simple circuit encompassing
 - symbols used to represent an electrical energy source, a load, a switch and a circuit protection device in circuit diagram.
 - purpose of each component in the circuit.
 - effects of an open-circuit, a closed-circuit and a short-circuit.
- e) Resistance encompassing
 - relationship between voltage and current from measured values in a simple circuit.
 - Value of voltage, current and resistance in a circuit given any two of these quantities.
 - power dissipated in a circuit from voltage, current and resistance values.
 - relationship between voltage, current and resistance and the power dissipated in a circuit.
- f) Effects of current encompassing
 - physiological effects of current.
 - the fundamental principles (listed in AS/NZS 3000) for protection against the physiological effects of current.
 - basic principles by which electric current can result in the production of heat; the production of light; the production of magnetic fields; a chemical reaction.
 - typical uses of the effects of current.
 - mechanisms by which metals corrode.
 - The fundamental principles (listed in AS/NZS 3000) for protection against the damaging effects of current.
- g) Sources of electrical energy – conversion of other forms to electrical energy encompassing
 - basic principles which electricity is produced from a chemical reaction (primary cells, secondary cells and fuel cells); produced from a magnetic field coupled with motion; produced from light; produced

- from heat; produced from force.
 - single emf source equivalent circuit.
- h) Using measuring instruments encompassing
- safe working procedures when working with instruments.
 - handling and storage of instruments to ensure they are protected from damaged.
 - selection of an instrument to measure voltage, current or resistance.
 - connection of instruments into a circuit to measure voltage, current and resistance
 - reading analogue scales and digital readouts in measuring voltage, current and resistance.

Occupational Health and Safety principles

Evidence shall show an understanding of Occupational Health and Safety to an extent indicated by the following aspects

- a) The basic legal requirements covering occupational health and safety in the workplace encompassing:
- general aims and objectives of the relevant state or territory legislation relating to OHS.;
 - employer and employee responsibilities, rights and obligations
 - major functions of safety committees and representatives); and
 - powers give to Occupational Health and Safety Inspectors.
- b) The requirements for personal safety in the workplace encompassing:
- the safety precautions that are required to ensure personal safety in the workplace
 - potential hazards in relation to improper industrial housekeeping; and
 - sources of pollution in an engineering environment and outline control measures
- c) Workplace safety check, identifying potential workplace hazards and suggested measures for accident prevention encompassing:
- safety checklist for a typical workplace environment,
 - identifying and reporting potential workplace hazards
 - methods of prevention of safety hazards within a typical workplace environment
- d) working safely with electrical tools or equipment encompassing:
- causes of electrical accidents and state the effects that electric shock can cause.);
 - purpose of circuit protection devices, such as fuses, circuit breakers and Residual Current Devices (RCDs), and
 - safe isolation of an electrical supply.
- e) emergency procedures for the rescue of an electric shock victim equipment
- f) emergency first aid for an electric shock victim

Note:

Emergency first aid is limited to first-on-the scene assistance to a victim of electric shock , and basics of CPR.

UTE NES022A

Solve problems in multiple path d.c. circuits

Descriptor: This competency standard unit covers determining correct operation of single source d.c. parallel and series-parallel circuits and providing solutions as they apply to various electrotechnology work functions. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in multiple path circuit.

Elements	Performance Criteria
022.1 Prepare to work on multiple path d.c. electrical circuits.	<p>022.1.1 OHS procedures for a given work area are obtained and understood.</p> <p>022.1.2 OHS risk control work preparation measures and procedures are followed.</p> <p>022.1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.</p> <p>022.1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.</p> <p>022.1.5 Sources of materials that may be required for the work are established in accordance with established procedures.</p> <p>022.1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
022.2 Solve multiple path d.c. circuit problems.	<p>022.2.1 OHS risk control work measures and procedures are followed.</p> <p>022.2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p>022.2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>022.2.4 Established methods are used to solving d.c. circuit problems from measure and calculated values as they apply to multiple path electrical circuit.</p>

		022.2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
		022.2.6	Problems are solved without unnecessary damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
022.3	Complete work and document problem solving activities.	022.3.1	OHS work completion risk control measures and procedures are followed.
		022.3.2	Work site is cleaned and made safe in accordance with established procedures.
		022.3.3	Justification for solutions used to solve circuit problems is documented.
		022.3.4	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

This competency standard unit shall be demonstrated in relation to:

- Single source parallel and series-parallel d.c. circuits as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following disciplines:
 - Computers
 - Data Communications
 - Electrical
 - Electronics
 - Fire protection
 - Instrumentation
 - Refrigeration and Air Conditioning, and
- In relation to at least two of the following types of circuit problems and on at least two occasions:
 - Determining the operating parameters of an existing circuit

- Alternating an existing circuit to comply with specified operating parameters
- Developing circuits to comply with a specified function and operating parameters

Currency in unit of competence

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

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

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in the Underpinning Knowledge of this unit; and
 - Demonstrate an appropriate level of skills enabling employment; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Solving problems in multiple path d.c. circuits as described in Range: and including:
 - A Determining the operating parameters of an existing circuit.
 - B Alternating an existing circuit to comply with specified operating

parameters.

- C Developing circuits to comply with a specified function and operating parameters.
- D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Direct current circuit principles

Evidence shall show an understanding of electrical principles to an extent indicated by the following aspects:

- a) Factors affecting resistance encompassing
 - the factors of length, cross-sectional area and material effect the resistance of conductors.
 - effects of temperature change on the resistance of various conducting

- materials.
 - the resistance of a conductor from factors such as conductor length, cross-sectional area, resistivity and changes in temperature.
 - effects of resistance on the current-carrying capacity and voltage drop in cables.
- b) Resistors encompassing
 - features of fixed and variable resistor types and typical applications.
 - characteristics of temperature, voltage and light dependent resistors and typical applications of each.
 - specifying a resistor for a particular application.
 - resistance of a colour coded resistor from colour code table and confirm the value by measurement.
- c) Series circuits encompassing
 - setting up and connecting a single-source series dc circuit.
 - measurement of resistance, voltage and current values in a single source series circuit.
 - the voltage, current, resistances or power dissipated from measured or given values of any two of these quantities.
 - relationship between the voltage drops around a circuit and the applied voltage.
 - relationship between voltage drops and resistance in a simple voltage divider network.
 - output voltage and current levels of connecting cells in series.
- d) Parallel circuits encompassing
 - setting up and connecting a single-source parallel circuit.
 - measurement of resistance, voltage and current values in a single-source parallel circuit.
 - the voltage, current, resistance or power dissipated from measured or given values of any of these quantities.
 - relationship between currents entering a junction and currents leaving a junction.
 - relationship between branch currents and resistances in a two branch current divider network.
 - voltage and current levels of connecting cells in parallel.
- e) Series/parallel circuits encompassing
 - setting up and connecting a single-source series / parallel circuit.
 - measurement of resistance, voltage and current values in a single-source series / parallel circuit.
 - the voltage, current, resistances or power dissipated from measured or given values of any two of these quantities.
 - relationship between voltages, currents and resistances in a bridge network.
 - voltage and current levels of connecting cells in series parallel.
- f) Measurement of electrical qualities encompassing
 - hazards involved in using electrical instruments and the safety control measures that should be taken.

- operating characteristics of analogue and digital meters.
 - selecting an appropriate meter in terms of units to be measured, range, loading effect and accuracy for a given application.
 - measuring resistance using direct, volt-ammeter and bridge methods.
 - instruments used in the field to measure voltage, current, resistance and insulation resistance and the typical circumstances in which they are used.
- g) Capacitance encompassing
- definition of capacitance and explain how a capacitor is charged.
 - the units by which capacitance is measured.
 - relationship between capacitance, voltage and charge.
 - behaviour of a series d.c. circuit containing resistance and capacitance components.
- h) Capacitors encompassing
- hazards involved in working with capacitance effects and the safety control measures that should be taken.
 - factors which determine the capacitance of a capacitor and explain how these factors are present in all circuits to some extent.
 - effects of capacitors connected in parallel by calculating their equivalent capacitance.
 - effects on the total capacitance of capacitors connected in series.
 - common faults in capacitors.
 - testing of capacitors to determine serviceability

Occupational Health and Safety principles

Evidence shall show an understanding of Occupational Health and Safety to an extent indicated by the following aspects

- a) The basic legal requirements covering occupational health and safety in the workplace encompassing:
- general aims and objectives of the relevant state or territory legislation relating to OHS.;
 - employer and employee responsibilities, rights and obligations
 - major functions of safety committees and representatives); and
 - powers give to Occupational Health and Safety Inspectors.
- b) The requirements for personal safety in the workplace encompassing:
- the safety precautions that are required to ensure personal safety in the workplace
 - potential hazards in relation to improper industrial housekeeping; and
 - sources of pollution in an engineering environment and outline control measures
- c) Workplace safety check, identifying potential workplace hazards and suggested measures for accident prevention encompassing:
- safety checklist for a typical workplace environment,
 - identifying and reporting potential workplace hazards
 - methods of prevention of safety hazards within a typical workplace environment

- d) working safely with electrical tools or equipment encompassing:
 - causes of electrical accidents and state the effects that electric shock can cause.);
 - purpose of circuit protection devices, such as fuses, circuit breakers and Residual Current Devices (RCDs), and
 - safe isolation of an electrical supply.
- e) emergency procedures for the rescue of an electric shock victim equipment
- f) emergency first aid for an electric shock victim

Note:

Emergency first aid is limited to first-on-the scene assistance to a victim of electric shock , and basics of CPR.

UTE NES023 A

Apply Contracting and Estimating Procedures

Descriptor: Undertake contracting and estimating procedures so as to operate and maintain a contracting and estimating business.

Elements	Performance criteria
023.1 Plan and prepare to undertake contracting and estimating procedures	023.1.1 Operations are planned and prepared to ensure <i>OH&S policies and procedures</i> are followed, the work is appropriately sequenced in accordance with <i>requirements</i> 023.1.2 Operations are checked against <i>requirements</i> 023.1.3 <i>Appropriate personnel</i> are consulted to ensure business co-ordination is undertaken effectively with others involved 023.1.4 Equipment, software and materials necessary to complete project are identified in accordance with <i>established procedures</i> and checked against <i>requirements</i>
023.2 Undertake contracting and estimating procedures	023.2.1 <i>OH&S policies and procedures</i> are followed 023.2.2 Operations are detailed in accordance with <i>established procedures</i> and <i>requirements</i> 023.2.3 Response to unplanned events or conditions are detailed in accordance with <i>established procedures</i> 023.2.4 Approval to implement contingencies in accordance with <i>established procedures</i> from <i>appropriate personnel</i> are detailed 023.2.5 On-going checks of the quality of the work in accordance with <i>established procedures</i> are detailed
023.3 Inspect and notify completion of work	023.3.1 Final inspections of operations are undertaken in accordance with <i>established procedures</i> 023.3.2 Completion of operations is <i>notified</i> in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating consistent performance for each element of the unit in the related *category* and *specialisation* which is to be exhibited across a *representative range* of applications; autonomously and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace for each of the *categories* and areas of *specialisation* undertaken from those listed in the Range statement or Evidence guide.
- demonstrating an understanding of the underpinning knowledge and skills identified for the *categories* and related *specialisation* undertaken in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of applications which includes such things as *apparatus, circuits, wiring systems, plant, equipment, tools, accessories, components* and the like relative to that required for the *category* undertaken within and relevant to this unit of competency; autonomously and to requirements. Equivalent evidence from other sources is also acceptable.

Interdependent assessment of units

This unit should be addressed only after competency in unit UTE NES402 Test apparatus & circuits of the National Electrotechnology Training Package Competency Standards has been achieved.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Contracting Principles

Business performance and structures: strengths and weaknesses; characteristics of the entrepreneur: management skills, personal appraisal, personal development, self-motivation, goal setting and planning; sources of information; legal structures: sole trader, partnerships, corporations, trusts.

The marketplace: market opportunities created through developments in technology, legislation, society; agencies and franchises: scope and relevance, points to be considered in agreements; assessing the marketplace using surveys and statistics: market opportunities in general, further training to fulfil market niches, competitive business characteristics including pricing, positioning strategy; demographic distribution of potential client groups; advertising mediums: their general costs, characteristics, features and viability for the small contracting business including the following types: newspaper, radio, television – capital city and country, signage, magazines, particularly specialist magazines, direct mail.

Costing: cost of labour: wages, long service leave allowance, workcare/compensation insurance, termination/redundancy allowance, workplace facilities, holiday leave loading, other as applicable; long term annual/weekly chargeable hours for a small contracting business, including the

influence of: non-chargeable labour, annual leave, public holidays, sick/compassionate leave, RDO's, long service, site and workplace non-chargeable periods, eg: workshop organisation & cleaning, training, business-place meetings, poorly planned labour utilisation on site; industry cost/comparison ratios for typical small contracting businesses, including the listing of a variety of expense categories and expressing these as a percentage of the total, eg: materials, wages + profit, indirect employment overheads, motor vehicle, equipment/capital items, advertising, accounting, finance expenses, phone; the complete overhead burden; break-even hourly chargeout rates then setting realistic rates to include profit margins; reasons for differing chargeable rates being encountered, including the practice of some businesses: recovering some of the overhead burden in high material profits, sacrificing profit to win jobs, recovering some of the overhead burden by separate call-out and travelling charges; break even charting exercises to examine the effects of differing chargeout rates, attaining different chargeable hours over the time period, different business expense; sales budgets.

General Legislative Requirements

Legislation which applies to contractors and/or their employees: state legislation (note: titles will vary from state to state) relating to : Anti-Discrimination Building And Construction Industry Portable Long Service Leave, Building, Building Services Authority, Business Names, Companies, Employment, Fair Trading, Fire Services, Freedom of Information, Health , Industrial Relations, Motor Vehicles Safety, Occupational/Workplace Health and Safety, Partnership, Superannuation, Vocational Education/Industrial and Commercial Training(apprentices, awards), Worker's Compensation, Applicable Codes of Practice, other necessary legislation.

Commonality of legislation between states: summary of legislation applicable to contracting for example: commonwealth legislation; acts relating to: Australian Securities Commission, Corporations Law, Copyright, Design, and Patents, Freedom of Information, Human Rights and Equal Opportunities, Industrial Relations, Mutual Recognition, Racial Discrimination, Sex Discrimination, Superannuation, Trade Practices, other necessary legislation.

Estimating, Tendering and Contracting

Tender documents: project drawings; specifications; other tender documentation.

Contracts: basic structure of law including: basic court structure, common law, statute law, criminal law, law of tort; essential features of a contract including: intention to create legal relationships, offer and acceptance including: verbal, mail, facsimile, implied; form and consideration; capacity; genuine consent; legal object; letters and diaries including: formal structure, without prejudice, evidence making; relationships between various contracts, estimates, tenders, and related documents including Australian Standards; industry contract terms and conditions.

Estimating: tools of estimating; methods of extracting, recording, compiling, and calculating data; comparison of methods; factors and conditions affecting estimating outcomes.

Project management: charting and scheduling of project times and resources; activities and documentation associated with projects.

Financing and Controlling

General management policy: trade associations; business ethics; forms of assistance; quality assurance, state purchasing policies; operational policies; insurance requirements.

Financial requirements: cash flow forecasting; sources of finance; loan applications; review business plan.

Financial monitoring: bookkeeping: manual entry systems, commercial entry systems; balance sheets; payroll records; debtor control; information technology as a tool; payment claiming, including rise & fall; taxation, including PAYE, FBT, sales tax, capital gains and PPS requirements.

Management of human and physical resources: defining, advertising and interviewing for employment; human resource management; comparing subcontract, casual and full time employment of labour; resolution of industrial conflict; enterprise bargaining; award conditions, including termination & redundancy; physical resource management; project control.

UTE NES024A

Document occupational hazards and risks in Electrotechnology

Descriptor: This competency standard unit covers i) occupational work hazard identification, ii) identifying health and safety risks to workers, iii) classification of risks, iv) documenting control measures intended to eliminate or reduce the risk that could potentially arise during the conduct of work activities and v) consultation processes with those involved with electrotechnology work. This unit primarily deals with the process involved in completing documentation and/or making appropriate modifications to pre-prepared documents.

Elements	Performance criteria
024.1 Identify and document hazards and risks.	024.1.1 Hazards are identified using appropriate processes with involvement of others, where appropriate. Note: Typically this will relate to such things as: The type of job, Electrical conditions, Energy levels, Radiation levels, Toxic substances, Airborne particles, Pressure discharge, Explosive atmosphere, Work-site location, General work-site conditions, Specific work location, Moving parts, Tools and equipment, Workers competence and/or capacity and/or personal effects 024.1.2 Risks associated with identified hazards are determined in consultation with others, where appropriate, and documented in accordance with regulations and following established procedures. 024.1.3 Provision is made to accommodate changes to documentation should unforeseen hazards be identified.
024.2 Determine risk class and document control measures.	024.2.1 Risk class is determined for the risks involved in accordance with the regulations and following established procedures. 024.2.2 Control measures are developed on the basis of the determined risk(s) and risk class to eliminate and/or mitigate the risk to health and safety in accordance with regulations and following established procedures. 024.2.3 Risk class and control measures are agreed to and documented in consultation with all involved, where appropriate, in accordance with regulations and established procedures.

Elements	Performance criteria
024.3 Monitor and review the control measures.	<p>024.3.1 Documented control measures are made available for reference by all involved with the work.</p> <p>024.3.2 Control measures are modified where required in consultation with all involved with the work in accordance with established procedures.</p> <p>024.3.3 Documentation associated with the risk assessment process are filed in accordance with established procedures</p>

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

This competency standard unit shall be demonstrated in relation to:

- Relevant occupational health and safety legislation, regulations and codes of practice related to electrical devices and systems and hazards present in domestic, commercial and industrial buildings, and
- Accepted industry work procedures and the specific safety procedures and work instructions for a particular workplace.

Currency in unit of competence

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, *e.g. consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

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

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in the Underpinning Knowledge of this unit; and
 - Demonstrate an appropriate level of skills enabling employment; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Document occupational hazards and risks in electrotechnology as described in Range: and including:
 - A Identifying and noting hazards.
 - B Assessing the risks and developing and documenting control measures.
 - C Reviewing and documenting variations to prior arranged documents.
 - D Recording activities.
 - E Dealing with unplanned activities by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Enterprise communication methods

Evidence shall show an understanding of enterprise communication methods to an extent indicated by the following aspects:

- a) Communicating with personnel encompassing
 - Oral communications
 - Written procedures and work instructions
- b) Communicating with suppliers
- c) Communicating with customers

Enterprise work activities records

Evidence shall show an understanding of work activities records to an extent indicated by the following aspects:

- a) Purpose and extent of maintaining work activities records in an enterprise
- b) Types of records for maintaining work activities in an enterprise
- c) Methods for recording and maintaining work records
- d) Work records required by regulation requirements

Occupational Health and Safety principles

Evidence shall show an understanding of Occupational Health and Safety to an extent indicated by the following aspects

- a) The basic legal requirements covering occupational health and safety in the workplace encompassing:

- general aims and objectives of the relevant state or territory legislation relating to OHS.;
 - employer and employee responsibilities, rights and obligations
 - major functions of safety committees and representatives); and
 - powers give to Occupational Health and Safety Inspectors.
- b) The requirements for personal safety in the workplace encompassing:
- the safety precautions that are required to ensure personal safety in the workplace
 - potential hazards in relation to improper industrial housekeeping; and
 - sources of pollution in an engineering environment and outline control measures
- c) Workplace safety check, identifying potential workplace hazards and suggested measures for accident prevention encompassing:
- safety checklist for a typical workplace environment,
 - identifying and reporting potential workplace hazards
 - methods of prevention of safety hazards within a typical workplace environment
- d) Working safely with electrical tools or equipment encompassing:
- causes of electrical accidents and state the effects that electric shock can cause.);
 - purpose of circuit protection devices, such as fuses, circuit breakers and Residual Current Devices (RCDs), and
 - safe isolation of an electrical supply.
- e) Emergency procedures for the rescue of an electric shock victim equipment
- f) Emergency first aid for an electric shock victim

Note:

Emergency first aid is limited to first-on-the scene assistance to a victim of electric shock , and basics of CPR.

Documenting hazards and identifying risks

Evidence shall show an understanding of occupational hazard identification, risk assessment and control measures to eliminate or mitigate the risk to an extent indicated by the following aspects:

- a) Hazard identification by work-site inspections involving visual checks, looking at ways work can be carried out, consulting with others, review of prior incident reports, using manufactures equipment details
- b) Recording hazards and assessing the risk in relation to voltage levels, nature of the job, number of people involved, plant, machinery and equipment involved, working environment and conditions, capability and experience and age of the people doing the work and foreseeable abnormal conditions.
- c) Determine the degree of the risk in relation to high (potential to kill or permanent disability), medium (potential to cause an injury or illness of a permanent nature) or low (potential to cause a cause minor injury requiring first aid but no permanent disability)
- d) Identify control measures so as to eliminate the risk (discontinue activity, use different approaches to the work, use different equipment or fix faulty machinery), redesign the equipment or work process and/or adopt administrative procedures and use of personal protective equipment.

- e) Monitor and review processes to ensure control measures remain valid, are updated should an accident occur, unforeseen hazards are identified and/or work practices, equipment or material change.
- f) Principles and legal responsibilities of respective parties in managing and administering hazards and assessing risk in the workplace; with particular attention to elimination and mitigation measures, and documentation requirements for identifying risks and documenting hazards.
- g) Practices and processes associated with implementing hazards identification and risk management

UTE NES025A

Participate in development and follow a personal competency development plan

Descriptor: This competency standard unit covers the application of skills and knowledge in taking responsibility for ones own competency development. It encompasses understanding the structure of a competency development plan, participating the development of a personal competency development plan, understanding responsibilities and obligation under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.

Elements	Performance criteria
025.1 Participate in the development of a personal competency development plan.	025.1.1 The nature of competency based training is sought from discussions with appropriate persons and understood. 025.1.2 The responsibilities/obligations of trainees, their employers, trainers and assessors in a competency based development program are sought from discussions with appropriate persons and understood. 025.1.3 Competencies to be achieved in a personal competency development plan are established in discussions with appropriate persons. 025.1.4 Details on how to achieve the individual competencies in the plan are sought from discussions with appropriate persons and understood.
025.2 Follow a personal competency development plan.	025.2.1 All aspects of the competency development plan are put into practice and followed diligently. 025.2.2 Opportunities to practice skills and apply knowledge relative to a particular competency are pursued 025.2.3 Assistance is sought from appropriate persons to overcome difficulties in develop skills and apply knowledge relevant to a particular competency. 025.2.4 Progress in competency development is self monitored against the competency development plan.

Elements	Performance criteria
	<p>025.2.5 Modifications to the personal competency development plan are made in consultation with appropriate persons.</p> <p>025.2.6 Trainee's responsibility for periodic and timely reporting of competency development activities is followed.</p>

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

This competency standard unit shall be demonstrated in relation to an individual's competency development in an electrotechnology discipline and qualification. It includes a competency development plan and instructions.

Currency in unit of competence

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, *e.g. consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

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

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and

- Demonstrate an understanding of the essential knowledge and associated skills as described in the Underpinning Knowledge of this unit; and
- Demonstrate an appropriate level of skills enabling employment; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Participate in development and follow a personal competency development plan as described in Range: and including:
 - A Seeking and understanding the responsibilities under a competency development plan.
 - B Seeking and understanding how to achieve the individual competencies in the plan.
 - C Following all aspects of the plan diligently.
 - D Pursuing opportunities to develop competency.
 - E Seeking assistance to overcome difficulties in developing competency.
 - F Self-monitoring competency development.
 - G Periodically reporting competency development activities.
 - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Responsibilities under a competency development plan

Evidence shall show an understanding of responsibilities under a competency development plan to an extent indicated by the following aspects:

- a) Training authority requirements and processes
- b) Responsibilities of trainee's/apprentice's employer
- c) Responsibility of trainee and apprentices
- d) Responsibility of nominated Registered Training Organisation (RTO)

Methods of monitoring and reporting competency development activities

Evidence shall show an understanding of methods of reporting competency development activities to an extent indicated by the following aspects:

- a) RTOs responsibility to monitor development of competency
- b) Trainee's/Apprentice's responsibility to participate in the reporting development activities
- c) Acceptable methods for monitoring and reporting development activities
- d) Employers responsibilities to participate in monitoring and reporting competency development activities

UTE NES026A

Maintain documentation

Descriptor: This competency standard unit covers the maintenance of the variety of documentation required to record work activities, purchases and expenses and compliance obligations. It encompasses documentation typically required in an electrotechnology enterprise, work instructions and procedures and time management.

Elements	Performance criteria
026.1 Prepare to maintain documentation	<p>1.1 Documentation requirements and methods for the organisation/enterprise are obtained and understood.</p> <p>1.2 Advice is sought from the work supervisor, when necessary, to ensure the work is correctly documented and co-ordinated effectively with others.</p> <p>1.3 Forms required to document work are obtained in accordance with established routines and procedures.</p> <p>1.4 OHS risk assessment and control measures are document before work is commenced in accordance with established routine/procedures.</p>
026.2 Maintain documentation.	<p>2.1 Activities are documented promptly and at the appropriate time in accordance with established routine/procedures.</p> <p>2.2 Documentation is checked for accuracy and clarity and any anomalies corrected.</p> <p>2.3 Where applicable, signature is obtained from an appropriate person and the person's identification documented.</p> <p>2.4 Where applicable, a copy of any required documentation is forwarded to an appropriate person in accordance with established routine/procedures.</p> <p>2.5 Procedures for referring non-routine events to immediate supervisor for directions are followed.</p>

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

This competency standard unit shall be demonstrated by maintaining documentation in any electrotechnology enterprise information system.

Currency in unit of competence

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, *e.g. consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

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

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in the Underpinning Knowledge of this unit; and
 - Demonstrate an appropriate level of skills enabling employment; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Maintain documentation as described in Range: and including:
 - A Following enterprise documentation requirements.

- B Enabling documentation to communicate clearly to others.
- C Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Enterprise communication methods

Evidence shall show an understanding of enterprise communication methods to an extent indicated by the following aspects:

- a) Communicating with personnel encompassing
 - Oral communications
 - Written procedures and work instructions
- b) Communicating with suppliers
- c) Communicating with customers

Enterprise work activities records

Evidence shall show an understanding of work activities records to an extent indicated by the following aspects:

- a) Purpose and extent of maintaining work activities records in an enterprise
- b) Types of records for maintaining work activities in an enterprise
- c) Methods for recording and maintaining work records
- d) Work records required by regulation requirements

Computer use basics

Evidence shall show an understanding of computer use basics to an extent indicated by the following aspects:

- a) Starting up
- b) Selecting application
- c) Entering information
- d) Saving
- e) Printing

Occupational Health and Safety principles

Evidence shall show an understanding of Occupational Health and Safety to an extent indicated by the following aspects:

- a) The basic legal requirements covering occupational health and safety in the workplace encompassing:
 - general aims and objectives of the relevant state or territory legislation relating to OHS;
 - employer and employee responsibilities, rights and obligations
 - major functions of safety committees and representatives); and
 - powers give to Occupational Health and Safety Inspectors.
- b) The requirements for personal safety in the workplace encompassing:
 - the safety precautions that are required to ensure personal safety in the workplace
 - potential hazards in relation to improper industrial housekeeping; and
 - sources of pollution in an engineering environment and outline control measures
- c) Workplace safety check, identifying potential workplace hazards and suggested measures for accident prevention encompassing:
 - safety checklist for a typical workplace environment,
 - identifying and reporting potential workplace hazards
 - methods of prevention of safety hazards within a typical workplace environment
- d) Working safely with electrical tools or equipment encompassing:
 - causes of electrical accidents and state the effects that electric shock can cause.);
 - purpose of circuit protection devices, such as fuses, circuit breakers and Residual Current Devices (RCDs), and
 - safe isolation of an electrical supply.

- e) Emergency procedures for the rescue of an electric shock victim equipment
- f) Emergency first aid for an electric shock victim

Note:

Emergency first aid is limited to first-on-the scene assistance to a victim of electric shock ,
and basics of CPR.

UTE NES027A

Source and purchase material/parts for installation or service jobs

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

Note:

In the Competency Standard Unit the value of materials for installation jobs is limited to \$20k.

Elements	Performance criteria
027.1 Establish the extent of the materials to be purchased.	027.1.1 OHS procedures for a given work area are obtained and understood. 027.1.2 Established OHS risk control measures and procedures are followed. 027.1.3 The extent of installation or service work is determined from and job specifications, drawings or results of service calls. 027.1.4 Materials required for the work are determined from job specifications or requirements resulting from service calls. 027.1.5 Materials or parts required are documented in accordance with established routine procedures.
027.2 Source and purchase materials.	027.2.1 Sources of materials are obtained based on availability and price using catalogues, computers and/or telephone in accordance with established routine procedures. 027.2.2 Approval to purchase alternative materials/parts is sought from an appropriately qualified and authorised person. 027.2.3 Price for the supply of materials/parts, particularly non-standard high cost items, are sought in accordance with routine established procedures. 027.2.4 Approval to purchase materials or parts is obtained in writing from the customer or other authorised person in accordance with established routine procedures.

Elements	Performance criteria
027.3 Document material purchases.	<p>027.2.5 Purchases are initiated based on price and availability of materials/parts within the required timeframe and in accordance with established routine procedures.</p> <p>027.3.1 Material or part purchases are allocated against the appropriate jobs.</p> <p>027.3.2 Material or part purchases are documented in accordance with established routine procedures.</p> <p>Note. Prices shall include discounts, GST and delivery costs</p>

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

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

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

Currency in unit of competence

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation,

regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

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

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in the Underpinning Knowledge of this unit; and
 - Demonstrate an appropriate level of skills enabling employment; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Source and purchase material/parts for installation or service jobs as described in Range: and including:
 - A Establishing the extent of work on which purchases are to be based.
 - B Determining the material or parts required accurately.
 - C Using at least two methods to source materials.
 - D Obtaining quotations for supply of materials/parts.
 - E Obtaining approval to purchase.
 - F Establishing availability and arranging supply within the required timeframe.
 - G Documenting material/part purchases accurately.
 - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Enterprise purchasing system

Evidence shall show an understanding of the purchasing system within an enterprise to an extent indicated by the following aspects:

- a) Purchasing process
- b) Common suppliers
- c) Authorities to purchase

Enterprise communication methods

Evidence shall show an understanding of enterprise communication methods to an extent indicated by the following aspects:

- a) Communicating with personnel encompassing
 - Oral communications
 - Written procedures and work instructions

- b) Communicating with suppliers
- c) Communicating with customers

Enterprise work activities records

Evidence shall show an understanding of work activities records to an extent indicated by the following aspects:

- a) Purpose and extent of maintaining work activities records in an enterprise
- b) Types of records for maintaining work activities in an enterprise
- c) Methods for recording and maintaining work records
- d) Work records required by regulation requirements

Computer use basics

Evidence shall show an understanding of computer use basics to an extent indicated by the following aspects:

- a) Starting up
- b) Selecting application
- c) Entering information
- d) Saving
- e) Printing

Occupational Health and Safety principles

Evidence shall show an understanding of Occupational Health and Safety to an extent indicated by the following aspects

- a) The basic legal requirements covering occupational health and safety in the workplace encompassing:
 - general aims and objectives of the relevant state or territory legislation relating to OHS.;
 - employer and employee responsibilities, rights and obligations
 - major functions of safety committees and representatives); and
 - powers give to Occupational Health and Safety Inspectors.
- b) The requirements for personal safety in the workplace encompassing:
 - the safety precautions that are required to ensure personal safety in the workplace
 - potential hazards in relation to improper industrial housekeeping; and
 - sources of pollution in an engineering environment and outline control measures
- c) Workplace safety check, identifying potential workplace hazards and suggested measures for accident prevention encompassing:
 - safety checklist for a typical workplace environment,
 - identifying and reporting potential workplace hazards
 - methods of prevention of safety hazards within a typical workplace environment
- d) Working safely with electrical tools or equipment encompassing:
 - causes of electrical accidents and state the effects that electric shock can cause.);

- purpose of circuit protection devices, such as fuses, circuit breakers and Residual Current Devices (RCDs), and
 - safe isolation of an electrical supply.
- e) Emergency procedures for the rescue of an electric shock victim equipment
- f) Emergency first aid for an electric shock victim

Note:

Emergency first aid is limited to first-on-the scene assistance to a victim of electric shock , and basics of CPR.

UTE NES028A

Receive and store materials and equipment for electrotechnology work

Descriptor: This competency standard unit covers the receiving and storing of materials and equipment for a construction site or workshop store. It encompasses receiving materials and equipment, checking consignment notes, storing materials and equipment and completing the necessary documentation.

Elements	Performance criteria
028.1 Receive materials and equipment.	028.1.1 OHS procedures for a given work area are obtained and understood. 028.1.2 OHS risk control work measures and procedures are followed. 028.1.3 Documentation on pending material and equipment deliveries is read and content and time of the delivery is understood. 028.1.4 Deliveries are checked against consignment documentation before they are received. 028.1.5 Discrepancies in deliveries are notified to work supervisor and supplier in accordance with established routines. 028.1.6 Materials and equipment are handled in strict accordance with OHS risk control work preparation measures and procedures.
028.2 Store materials and equipment.	028.2.1 OHS risk control work measures and procedures are followed. 028.2.2 Material and equipment are stored to prevent damage or loss in accordance with established routines. 028.2.3 Security of the stored materials and equipment is maintained in accordance with established routines. 028.2.4 Material and equipment documentation is forwarded to an appropriate person in accordance with established routine/procedures.

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

This competency standard unit shall be demonstrated in relation to receiving and storing materials and equipment for a construction site or workshop store.

Currency in unit of competence

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, *e.g. consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

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

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in the Underpinning Knowledge of this unit; and
 - Demonstrate an appropriate level of skills enabling employment; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Receive and store materials and equipment for electrotechnology work as described in Range: and including:

- A Determining content and time of pending deliveries from relevant documentation.
- B Dealing with discrepancies in deliveries.
- C Storing and securing materials and equipment to prevent damage or loss.
- D Forwarding documentation appropriately.
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Enterprise stock control methods

Evidence shall show an understanding of stock control methods to an extent indicated by the following aspects:

- a) Enterprise purchasing policy
- b) Stock data base

- c) Purchase and sales entry mechanisms
- d) Reordering methods

Enterprise communication methods

Evidence shall show an understanding of enterprise communication methods to an extent indicated by the following aspects:

- a) Communicating with personnel encompassing
 - Oral communications
 - Written procedures and work instructions
- b) Communicating with suppliers
- c) Communicating with customers

Enterprise work activities records

Evidence shall show an understanding of work activities records to an extent indicated by the following aspects:

- a) Purpose and extent of maintaining work activities records in an enterprise
- b) Types of records for maintaining work activities in an enterprise
- c) Methods for recording and maintaining work records
- d) Work records required by regulation requirements

Computer use basics

Evidence shall show an understanding of computer use basics to an extent indicated by the following aspects:

- a) Starting up
- b) Selecting application
- c) Entering information
- d) Saving
- e) Printing

Occupational Health and Safety principles

Evidence shall show an understanding of Occupational Health and Safety to an extent indicated by the following aspects

- a) The basic legal requirements covering occupational health and safety in the workplace encompassing:
 - general aims and objectives of the relevant state or territory legislation relating to OHS;
 - employer and employee responsibilities, rights and obligations
 - major functions of safety committees and representatives); and
 - powers give to Occupational Health and Safety Inspectors.
- b) The requirements for personal safety in the workplace encompassing:
 - the safety precautions that are required to ensure personal safety in the workplace
 - potential hazards in relation to improper industrial housekeeping; and
 - sources of pollution in an engineering environment and outline control

measures

- c) Workplace safety check, identifying potential workplace hazards and suggested measures for accident prevention encompassing:
- safety checklist for a typical workplace environment,
 - identifying and reporting potential workplace hazards
 - methods of prevention of safety hazards within a typical workplace environment
- d) Working safely with electrical tools or equipment encompassing:
- causes of electrical accidents and state the effects that electric shock can cause.);
 - purpose of circuit protection devices, such as fuses, circuit breakers and Residual Current Devices (RCDs), and
 - safe isolation of an electrical supply.
- e) Emergency procedures for the rescue of an electric shock victim equipment
- f) Emergency first aid for an electric shock victim

Note:

Emergency first aid is limited to first-on-the scene assistance to a victim of electric shock , and basics of CPR.

UTE NES029A

Provide basic instruction in the use of Electrotechnology apparatus

Descriptor: This competency standard unit covers instructing customers/users in the use of Electrotechnology apparatus. The unit encompasses appropriate customer relations, the use of apparatus manufacturer's instruction material, basic instruction methods and evaluation and completing documentation.

Elements	Performance criteria
029.1 Prepare to instruct users.	<p>029.1.1 OHS procedures for a given work area are obtained and understood through established routines and procedures.</p> <p>029.1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>029.1.3 Apparatus on which users are to be instructed is confirmed with work supervisor and/or other appropriate person(s).</p> <p>029.1.4 Safety features and safe use of the apparatus are reviewed by and understood.</p> <p>029.1.5 Familiarity with the apparatus is gained by reference to manufacturer's user material and a preliminary run through to ensure the process is understood.</p> <p>029.1.6 Materials required to instruct are obtained in accordance with established routines and procedures.</p>
029.2 Instruct users.	<p>029.2.1 Users are informed of all the safety features and safe use of the apparatus in accordance with manufacturer's instruction and regulatory requirements.</p> <p>029.2.2 Users are instructed in the set up and use of the apparatus in accordance with manufacturer's instruction.</p> <p>029.2.3 Users are given the opportunity to show that they understand the safety aspects, set up features and operation of the apparatus.</p> <p>029.2.4 A copy of the apparatus manufacturer's user instruction and other related documentation is given the appropriate person(s).</p>

Elements	Performance criteria
	<p>029.2.5 Procedures for referring non-routine events to immediate supervisor for directions are followed.</p> <p>029.2.6 Instructions are given efficiently without damage to apparatus, the surrounding environment or services and using sustainable energy practices.</p>

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

This competency standard unit shall be demonstrated in relation to any single item of Electrotechnology apparatus and its control.

Currency in unit of competence

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, *e.g. consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

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

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and

- Demonstrate an understanding of the essential knowledge and associated skills as described in the Underpinning Knowledge of this unit; and
- Demonstrate an appropriate level of skills enabling employment; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Provide basic instruction in the use of Electrotechnology apparatus as described Range: and including:
 - A Following manufacturer's user instructions.
 - B Giving clear instructions in the use of the apparatus.
 - C Giving users the opportunity to show that they understand the safe use of the apparatus.
 - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

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

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Enterprise communication methods

Evidence shall show an understanding of enterprise communication methods to an extent indicated by the following aspects:

- a) Communicating with personnel encompassing
 - Oral communications
 - Written procedures and work instructions
- b) Communicating with suppliers
- c) Communicating with customers

Enterprise work activities records

Evidence shall show an understanding of work activities records to an extent indicated by the following aspects:

- a) Purpose and extent of maintaining work activities records in an enterprise
- b) Types of records for maintaining work activities in an enterprise
- c) Methods for recording and maintaining work records
- d) Work records required by regulation requirements

Enterprise customer relations protocols

Evidence shall show an understanding of enterprise customer relations protocols to an extent indicated by the following aspects:

- a) Purpose of customer relations
- b) Procedures for dealing with customers
- c) Dealing with customer issues

User instruction techniques

Evidence shall show an understanding of instructing users in the use of specific items of equipment and systems to an extent indicated by the following aspects:

- a) Methods for evaluating user needs

Note:

User needs should include how equipment is used efficiently and safely and identifying wear and tear and damage to the equipment that requires repairing.

- b) Basic instruction methods

Note:

Methods of instruction should be appropriate to the culture of the users and the equipment for which instruction is given.

- c) Methods for evaluating user's ability use equipment correctly

Occupational Health and Safety principles

Evidence shall show an understanding of Occupational Health and Safety to an extent indicated by the following aspects

- a) The basic legal requirements covering occupational health and safety in the workplace encompassing:
 - general aims and objectives of the relevant state or territory legislation relating to OHS.;
 - employer and employee responsibilities, rights and obligations
 - major functions of safety committees and representatives); and
 - powers give to Occupational Health and Safety Inspectors.
- b) The requirements for personal safety in the workplace encompassing:
 - the safety precautions that are required to ensure personal safety in the workplace
 - potential hazards in relation to improper industrial housekeeping; and
 - sources of pollution in an engineering environment and outline control measures
- c) Workplace safety check, identifying potential workplace hazards and suggested measures for accident prevention encompassing:
 - safety checklist for a typical workplace environment,
 - identifying and reporting potential workplace hazards
 - methods of prevention of safety hazards within a typical workplace environment
- d) Working safely with electrical tools or equipment encompassing:
 - causes of electrical accidents and state the effects that electric shock can cause.);
 - purpose of circuit protection devices, such as fuses, circuit breakers and Residual Current Devices (RCDs), and
 - safe isolation of an electrical supply.
- e) Emergency procedures for the rescue of an electric shock victim equipment
- f) Emergency first aid for an electric shock victim

Note:

Emergency first aid is limited to first-on-the scene assistance to a victim of electric shock , and basics of CPR.

UTE NES030A

Participate in fire protection control work and competency development activities

Descriptor: This competency standard unit covers the application industry/enterprise policies in actively participating in work activities and ones own competency development. It encompasses complying with established industry/enterprise procedures in how work is conducted, understanding responsibilities and obligations under a competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.

Elements		Performance criteria	
030.1	Comply with fire protection control industry/enterprise work policies and procedures	030.1.1	Industry/enterprise policies and procedures for all work activities are obtained.
		030.1.2	Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.
		030.1.3	Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures and with the approval of an authorised person.
030.2	Monitor and respond to a personal competency development plan.	030.2.1	All aspects of the competency development plan are confirmed in consultation with appropriate persons and followed diligently.
		030.2.2	All components of the competency development plan are followed diligently.
		030.2.3	Opportunities to practice skills and apply knowledge relative to a particular competency are pursued.
		030.2.4	Assistance is sought from appropriate persons to overcome difficulties in develop skills and apply knowledge relevant to a particular competency.
		030.2.5	Progress in competency development is self monitored against the competency development plan and industry/enterprise policies and procedures.
		030.2.6	Modifications to the personal competency development plan are made in consultation with appropriate persons.

Elements	Performance criteria
	<p>030.2.7 Obligation for periodic and timely reporting of competency development activities is followed.</p> <p>030.2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.</p>

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

This competency standard unit shall be demonstrated in relation to an individual's competency development in an electrotechnology discipline and qualification. It includes a competency development plan and instructions.

Currency in unit of competence

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, *e.g. consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

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

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the

- performance criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in the Underpinning Knowledge of this unit; and
- Demonstrate an appropriate level of skills enabling employment; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Participate in fire protection control work and competency development activities as described in Range: and including:
 - A Obtaining and understanding industry/enterprise policies and procedures for all work activities.
 - B Appropriately seeking clarification of how particular work is to be carried out and the procedures involved.
 - C Dealing with unexpected situations in accordance with industry policies and procedures and with the approval of an authorised person.
 - C Confirming and following all components of the competency development plan diligently.
 - D Pursuing opportunities to develop competency.
 - E Seeking assistance to overcome difficulties in developing competency.
 - F Self-monitoring competency development.
 - G Periodically reporting competency development activities.
 - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Responsibilities under a competency development plan

Evidence shall show an understanding of responsibilities under a competency development plan to an extent indicated by the following aspects:

- a) Training authority requirements and processes
- b) Responsibilities of trainee's/apprentice's employer
- c) Responsibility of trainee and apprentices
- d) Responsibility of nominated Registered Training Organisation (RTO)

Methods of monitoring and reporting competency development activities

Evidence shall show an understanding of methods of reporting competency development activities to an extent indicated by the following aspects:

- a) RTOs responsibility to monitor development of competency
- b) Trainee's/Apprentice's responsibility to participate in the reporting development activities
- c) Acceptable methods for monitoring and reporting development activities
- d) Employers responsibilities to participate in monitoring and reporting competency development activities

Enterprise work activities policies and procedures

Evidence shall show an understanding of enterprise work activities policies and procedures to an extent indicated by the following aspects:

- a) Need for policies and procedures

b) Scope for an industry/enterprise to establish work activity policies and procedures

Note.

Example are policies and procedure related to safety, effective work outcomes, customer relations, conflict resolution and competency development.

c) Following work activities procedures

UTE NES031A

Solve problems in multiple path a.c. circuits

Descriptor: This competency standard unit covers determining correct operation of single source a.c. parallel and series-parallel circuits and providing solutions as they apply to various electrotechnology work functions. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in multiple path circuits.

Elements	Performance criteria
031.1 Prepare to work on multiple path a.c. electrical circuits.	031.1.1 OHS procedures for a given work area are obtained and understood. 031.1.2 OHS risk control work preparation measures and procedures are followed. 031.1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken. 031.1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others. 031.1.5 Sources of materials that may be required for the work are established in accordance with established procedures. 031.1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
031.2 Solve multiple path a.c. circuit problems.	031.2.1 OHS risk control work measures and procedures are followed. 031.2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures. 031.2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures. 031.2.4 Established methods are used to solving a.c. circuit problems from measure and calculated values as they apply to multiple path electrical circuit.

Elements	Performance criteria
	031.2.5 Unexpected situations are dealt with safely and with the approval of an authorised person. 031.2.6 Problems are solved without unnecessary damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
031.3 Complete work and document problem solving activities.	031.3.1 OHS work completion risk control measures and procedures are followed. 031.3.2 Work site is cleaned and made safe in accordance with established procedures. 031.3.3 Justification for solutions used to solve circuit problems is documented. 031.3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

This competency standard unit shall be demonstrated in relation to:

- Single source parallel and series-parallel a.c. circuits as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following disciplines:
 - Computers
 - Data Communications
 - Electrical
 - Electronics
 - Fire protection
 - Instrumentation
 - Refrigeration and Air Conditioning
- In relation to at least two of the following types of circuit problems and on at least two occasions:
 - determining the operating parameters of an existing circuit
 - alternating an existing circuit to comply with specified operating parameters
 - developing circuits to comply with a specified function and operating parameters

Currency in unit of competence

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

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

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in the Underpinning Knowledge of this unit; and
 - Demonstrate an appropriate level of skills enabling employment; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Solve problems in multiple path a.c. circuits as described in Range: and including:
 - A Determining the operating parameters of an existing circuit.
 - B Alternating an existing circuit to comply with specified operating parameters.
 - C Developing circuits to comply with a specified function and operating parameters.
 - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions

incorporated in the holistic assessment with the above listed items.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Alternating current principles - power

Evidence shall show an understanding of alternating currents principles used in power circuits to an extent indicated by the following aspects:

- a) Sinusoidal alternating voltage and current encompassing:
 - generation of a sinusoidal voltage with a single turn coil rotated in a uniform magnetic field.
 - the terms 'period', 'maximum value', 'peak-to-peak value', 'instantaneous value', 'average value', 'root-mean-square (r.m.s.) value', 'crest factor' and 'form factor' in relation to a sinusoidal waveform.
 - the instantaneous value of induced voltage of a generated sinusoidal waveform.
 - measurement of the instantaneous, peak, peak-to-peak values and the

- period of a sinusoidal waveform.
 - the root-mean-square (r.m.s.) value and frequency of a sinusoidal waveform .
 - phase relationship between two or more sinusoidal waveforms.
- b) Phasors encompassing:
- the terms ‘in-phase’, ‘out-of-phase’, ‘phase angle’, ‘lead’, and ‘lag’.
 - the phase angle between two or more alternating quantities from a given sinusoidal waveform diagram.
 - convention for representing voltage, current and the reference quantity in a phasor diagram.
 - phasor diagrams two or more a.c. values of voltage and/or current.
- c) Resistance in a.c. circuits encompassing:
- connection of a single-source a.c. circuit to take resistance, voltage and current measurements.
 - the voltage, current, resistances or power dissipated from measured or given values of any two of these quantities.
 - the relationship between voltage drops and current in a resistive a.c. circuit.
- d) Inductance in a.c. circuits encompassing:
- definition of ‘inductive reactance’.
 - the inductive reactance of a given inductor and show the relationship between inductive reactance and frequency.
 - equivalent inductive reactance in an a.c. circuit or any part of a circuit.
 - application of Ohm’s Law to determine voltage, current or inductive reactance in a purely inductive a.c. circuit given any two of these quantities.
 - examples of inductive components in power circuits and systems and describe their effect on the phase relationship between voltage and current.
 - the comparative current limiting characteristics of inductors and resistors.
- e) Capacitance in a.c. circuits encompassing:
- definition of ‘capacitive reactance’.
 - the capacitive reactance of a given capacitor and the relationship between capacitive reactance and frequency.
 - equivalent capacitive reactance in an a.c. circuit or any part of a circuit.
 - application of Ohm’s Law to determine voltage, current or capacitive reactance in a purely capacitive a.c. circuit given any two of these quantities.
 - examples of capacitive components in power circuits and systems and describe their effect on the phase relationship between voltage and current.
- f) Impedance encompassing:
- definition of ‘impedance’.
 - impedance of series, parallel and series-parallel circuits and diagrams showing the relationship between resistive, inductive and capacitive

- components (impedance triangle).
 - connection of a single-source a.c. circuit and take resistance, voltage and current measurements.
 - voltage, current or impedance values from measured or given values of any two of these quantities.
 - phasor diagram usage to solve problems and show the relationship between voltages and currents in a.c. circuits.
- g) Resonance encompassing:
- conditions in a circuit that produce resonance.
 - the relationship between resonance and frequency.
 - the effect on the current of series resonance and parallel resonance conditions.
 - applications where resonance is applied
- h) Power and power factor encompassing:
- difference between true power, apparent power and reactive power and the units.
 - definition of the term "power factor".
 - the effects of low power factor.
 - local and AS/NZS 3000 requirements regarding the power factor of an installation and power factor improvement equipment.
- i) Multiphase systems encompassing:
- features of a multiphase system.
 - voltages generated by single and multiphase alternators.
 - reasons for the adoption of three-phases for power systems.
- j) Three-phase principles encompassing:
- Generation of three-phases in a single alternator.
 - r.m.s. value of voltage generated in each phase.
 - the relationship between the phase voltages generated in a three-phase alternator and the conventions for identifying each.
 - the term "phase sequence" (also, referred to as "phase rotation").
 - determination of the phase sequence of a three-phase supply.
- k) Three-phase star-connections encompassing:
- connection of three-phase star system.
 - the phase relationship between line and phase voltages and line and phase currents of a star-connected system.
 - the r.m.s. value of line and phase voltage given any one of these quantities.
 - the r.m.s. value of line and phase current given any one of these quantities.
 - the terms "balanced load" and "unbalanced load".
 - example of balanced and unbalanced loads in typical power systems.
- l) Three-phase four wire systems encompassing:
- purpose of the neutral conductor in a three-phase four wire systems.
 - effects of a high impedance in the neutral conductor of a three-phase four wire system supplying an unbalanced load where MEN earthing is

- employed.
 - the value and phase relationship of neutral current in an unbalanced three-phase four wire systems given line currents and power factors.
 - the AS/NZS 3000 requirements regarding neutral conductors.
- m) Three-phase delta-connections encompassing:
 - connection of three-phase delta system.
 - phase relationship between line and phase voltages and line and phase currents of a delta-connected system.
 - the r.m.s. value of line and phase voltage given any one of these quantities.
 - the r.m.s. value of line and phase current given any one of these quantities.
 - example of delta-connection loads in typical power systems.
- n) Interconnected star and delta systems encompassing:
 - relationship between line and phase voltages and line and phase currents in a system with a star-connected supply device and a delta-connected load.
 - relationship between line and phase voltages and line and phase currents in a system with a delta-connected supply device and a star-connected load.
- o) Energy and power requirements of a.c. systems encompassing:
 - the purposes for measuring power, energy, power factor and maximum demand of a.c. power systems and loads.
 - methods used to measure power, energy power factor and maximum demand.
 - power factor improvement of a three-phase installation.
- p) Harmonics encompassing:
 - the term “harmonic” in relation to the sinusoidal waveform of an a.c. power system.
 - sources in a.c. systems that produce harmonics.
 - problems that may arise in a.c. circuits as a result of harmonics and how these are overcome.

Electromagnetic principles

Evidence shall show an understanding of electromagnetic principles to an extent indicated by the following aspects:

- a) Magnetism encompassing:
 - field patterns around given permanent magnets.
 - magnetic induction and its effects.
 - principles of magnetic shielding and its application.
 - Classification of magnetic materials.
 - typical applications of permanent magnets.
- b) Electromagnetism encompassing:
 - magnetic field patterns around a straight current carrying conductor and a solenoid.
 - direction in which the magnetic field around a straight current carrying

- conductor.
 - direction of the north pole of a solenoid.
 - factors effecting the force and direction between adjacent current-carrying conductors.
- c) Magnetic quantities encompassing:
- magnetic terms and units for magnetomotive force, reluctance, magnetic flux, magnetising force and flux density.
 - property of permeability and the meaning of actual and relative permeability.
 - values of magnetomotive force, magnetising force, flux density, permeability and reluctance in given magnetic circuits.
- d) Magnetisation curve encompassing:
- the terms “saturation”, “hysteresis” and “losses’ in relation to magnetic materials and circuits.
 - magnetic characteristics of various materials from magnetisation curves, permeability curves and hysteresis loops.
 - magnetic losses and the resulting effects on the performance of electrical machines.
- e) Electromagnetic induction encompassing:
- factors required to induce an emf in a conductor.
 - Faraday’s Law.
 - direction of induced voltage in a moving conductor in a magnetic field.
 - relationship between the forces acting on a closed conductor when an emf is induced in it. (Lenz’s law).
- f) Inductance and inductors encompassing:
- concept of inductance, self-inductance and mutual inductance. (in terms of storage of magnetic energy).
 - factors affecting inductance and how the unit of inductance is derived.
 - inductance of a solenoid given necessary physical data.
 - value of induced voltage in a given circuit.
 - growth/decay of current in an inductor and determine the time constant of a series L-R circuit.
 - Types of inductors
- g) Application of electromagnetic principles encompassing:
- principles of operation and applications of magnetism, electromagnetism and induction.
 - hazards associated with induced voltages.
 - situations where the effects of inductance and electromagnetism has an adverse effect.
- h) Rotating machine construction and operating principles encompassing:
- main components of a rotating machine.
 - voltage generated and back emf induced in the “armature” conductors of a machine.
 - motor effect produced by an electric current, including the development of torque in a motor and opposing torque in a generator.

- induced voltage in a conductors, force on a conductor and torque of various machines.
- i) Generators encompassing:
- circuit arrangement and connection of various types of generators.
 - common methods of excitation used for generators.
 - methods used to regulate the output voltage of generators.
 - effects of load on a generator.
 - applications of generators.
- j) Machines encompassing:
- circuit arrangements and connections of various common motors.
 - performance of motors from measured values.
 - effects of load on a motor.
- k) Specialty machines encompassing:
- tachogenerator – construction, operation and applications.
 - servomotors – construction, operation and applications.
 - stepper motors – construction, operation and applications.
 - EC motors – construction, operation and applications.

Hand tools

Evidence shall show an understanding of hand tools and their use to an extent indicated by the following aspects:

- a) Hand tools for cutting, shaping, drilling, threading, tapping, and finishing metallic and non-metallic components encompassing:
- types of tools and their purpose
 - techniques for the correct and safe use of these tools
 - hazards associated with their use
 - care and maintenance of hand tools
- b) Tools for measuring and marking out.
- types of tools and their purpose
 - techniques for the correct and safe use of these tools
 - hazards associated with their use
 - care and maintenance of hand tools
- c) Tools for dismantling and assembling electrical and electronic components encompassing:
- types of tools and their purpose
 - techniques for the correct and safe use of these tools
 - hazards associated with their use
 - care and maintenance of hand tools

Occupational Health and Safety principles

Evidence shall show an understanding of Occupational Health and Safety to an extent indicated by the following aspects

- a) The basic legal requirements covering occupational health and safety in the workplace encompassing:
- general aims and objectives of the relevant state or territory legislation

- relating to OHS.;
 - employer and employee responsibilities, rights and obligations
 - major functions of safety committees and representatives); and
 - powers give to Occupational Health and Safety Inspectors.
- b) The requirements for personal safety in the workplace encompassing:
- the safety precautions that are required to ensure personal safety in the workplace
 - potential hazards in relation to improper industrial housekeeping; and
 - sources of pollution in an engineering environment and outline control measures
- c) Workplace safety check, identifying potential workplace hazards and suggested measures for accident prevention encompassing:
- safety checklist for a typical workplace environment,
 - identifying and reporting potential workplace hazards
 - methods of prevention of safety hazards within a typical workplace environment
- d) working safely with electrical tools or equipment encompassing:
- causes of electrical accidents and state the effects that electric shock can cause.);
 - purpose of circuit protection devices, such as fuses, circuit breakers and Residual Current Devices (RCDs), and
 - safe isolation of an electrical supply.
- e) emergency procedures for the rescue of an electric shock victim equipment
- f) emergency first aid for an electric shock victim

Note:

Emergency first aid is limited to first-on-the scene assistance to a victim of electric shock , and basics of CPR.

UTE NES032A

Implement and monitor OHS policies and procedures

Descriptor:

This competency standard unit covers the mandatory requirements of persons in a supervisory role to implement and monitor an organisation's occupational health and safety policies, procedures and programs. It encompasses understanding an organisation's OHS obligations, providing safety information to staff, implementing and monitoring participative arrangements, safety procedures and training and maintaining safety records.

Elements	Performance criteria
032.1 Provide OHS information to the work group.	<p>032.1.1 Relevant provisions of occupational health and safety legislation and codes of practice are accurately and clearly explained to the work group.</p> <p>032.1.2 Information on the organisation's occupational health and safety policies, procedures and programs is provided in a readily accessible manner and is accurately and clearly explained to the work group.</p> <p>032.1.3 Information about identified hazards and the outcomes of risk assessment and risk control procedures is regularly provided and is accurately and clearly explained to the work group.</p>
032.2 Implement and monitor participative arrangements for the management of OHS.	<p>032.2.1 Organisational procedures for consultation over occupational health and safety issues are implemented and monitored to ensure that all members of the work group have the opportunity to contribute.</p> <p>032.2.2 Issues raised through consultation are dealt with and resolved promptly or referred to the appropriate personnel for resolution in accordance with workplace procedures for issue resolution.</p> <p>032.2.3 The outcomes of consultation over occupational health and safety issues are made known to the work group promptly.</p>
032.3. Implement and monitor the procedures for identifying hazards,	032.3.1 Existing and potential hazards in the work area are identified and reported so that risk assessment and risk control procedures can be applied.

Elements	Performance criteria
assessing risk and controlling risks.	<p>032.3.2 Work procedures to control risks are implemented and adherence to them by the work group is monitored in accordance with workplace procedures.</p> <p>032.3.3 Existing procedures to control risks are implemented and adherence to them by the work group is monitored in accordance with workplace procedures.</p> <p>032.3.4 Inadequacies in existing risk control measures are identified in accordance with the hierarchy of control and reported to designated personnel.</p> <p>032.3.5 Inadequacies in resource allocation for implementation of risk control measures identified and reported to designated personnel.</p>
032.4 Implement the procedures for dealing with hazardous events.	<p>032.4.1 Workplace procedures for dealing with hazardous events are implemented whenever necessary to ensure that prompt control action is taken.</p> <p>032.4.2 Hazardous events are investigated to identify their cause in accordance with investigation procedures.</p> <p>032.4.3 Control measures to prevent recurrence and minimise risks of hazardous events are implemented based on the hierarchy of control if within scope of responsibilities and competencies or alternatively referred to designated personnel for implementation.</p>
032.5 Implement and monitor the procedures for OHS training.	<p>032.5.1 Occupational health and safety training needs are identified accurately, specifying gaps between occupational health and safety competencies required and those held by work group members.</p> <p>032.5.2 Arrangements are made for fulfilling identified occupational health and safety training needs in both on and off-the-job training programs in consultation with relevant parties.</p>
032.6 Implement and monitor the procedures for maintaining OHS records.	032.6.1 Occupational health and safety records for work area are accurately and legibly completed in accordance with workplace requirements for occupational health and safety records and legal requirements for the maintenance of records of occupational injury and disease.

Elements	Performance criteria
	032.6.2 Aggregate information from the area's occupational health and safety records is used to identify hazards and monitor risk control procedures within work according to organisational procedures and within scope of responsibilities and competencies.

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

This competency standard unit shall be demonstrated in relation to:

- Relevant Occupational Health and Safety legislation, regulations and codes of practice related to hazards present in the industry and particular workplace
- Implementation of OHS and the specific safety procedures and work instructions for particular workplace

Currency in unit of competence

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, *e.g. consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

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

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and

- practices including the use of risk control measures as specified in the performance criteria and range; and
- Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in the Underpinning Knowledge of this unit; and
 - Demonstrate an appropriate level of skills enabling employment; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Implement and monitor OHS policies and procedures as described in Range and including:
 - A Providing OHS information to the work group.
 - B Implementing and monitoring participative arrangements for the management of OHS.
 - C Implementing and monitoring the procedures for identifying procedures for identifying hazards, assessing risks and controlling risks.
 - D Implementing the procedures for dealing with hazardous events.
 - E Implementing and monitoring the procedures for OHS.
 - F Implementing and monitoring the procedures for maintaining OHS records.
 - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Occupational Health and Safety, supervisory responsibilities

Evidence shall show an understanding of OHS enterprise responsibilities to an extent indicated by the following aspects:

- a) Provisions of relevant occupational health and safety legislation
- b) Principles and practice of effective occupational health and safety management
- c) Workplace hazards, range and selection of control measures
- d) Organisational health and safety management systems and policies and procedures needed for legislative compliance
- e) Impact of characteristics and composition of the workforce on occupational health and safety management
- f) Relevance of occupational health and safety management to other organisational management policies, procedures and systems.
- g) Analysis of entire work environment and judge occupational health and safety interventions
- h) Analysis of relevant workplace data
- i) Ability to assess resources needed for risk control.

UTE NES033A

Compile and produce an Electrotechnology report

Descriptor: This competency standard unit covers complying and producing an electrotechnology report. The unit encompasses determining the safety requirements are met and all regulatory responsibilities are adhered to. The person competent in this unit must demonstrate an ability to identify information sources and collect and analyse and format information applicable to the electrotechnology industry and produce a report as required.

Elements		Performance criteria	
033.1	Prepare to develop a report.	033.1.1	OHS processes and procedures for a given work area are obtained and understood.
		033.1.2	Established techniques for report writing are reviewed are adopted in accordance with organisation's policies.
		033.1.3	The scope of the report is evaluated and report parameters established using a formal evaluation/survey processes.
		033.1.4	Criteria from other related works impacting on the report are determined from other sources.
		033.1.5	Identify source and availability of information.
033.2	Develop report.	033.2.1	Report is developed to include scenarios/requirements established in consultation with appropriate person(s) regulatory requirements.
		033.2.2	Report is developed in collaboration with all relevant personnel.
		033.2.3	Competent persons are identified to assist in the compilation of the report.
		033.2.4	Report is reviewed against all inputs and adjusted to rectify any anomalies.
		033.2.5	Compile report in accordance with organisation's policies and procedures.
		033.2.6	Compile and analyse research report information
033.3	Obtain approval for final report.	033.3.1	Report is presented and discussed with person(s) of higher authority.

Elements	Performance criteria
	033.3.2 Alterations to the report resulting from the presentation/discussion, are negotiated with person(s) of higher authority within the constraints of organisation's policy.
	033.3.3 Final report is presented and approval obtained from appropriate person(s).

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

This competency standard unit describes work conducted by technical personnel who contribute to the conduct of report writing.

This competency standard unit is typically performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. This generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the research process.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the subject matter being reported upon. This competency standard unit should be demonstrated in accordance with the organisations

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Standard Operating Procedures
- Resources
- Technical standards
- Regulatory requirements

Currency in unit of competence

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

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

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in the Underpinning Knowledge of this unit; and
 - Demonstrate an appropriate level of skills enabling employment; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Compile and produce an electrotechnology report as described in Range: and including:
 - A Typical organisation policies and procedures.
 - B Access to a report brief to established report parameters.
 - C Access to appropriate person(s) to establish report requirements.
 - D Establishing the scope and parameters of the report.
 - E Determining the impact of other related works.

- F Developing design brief incorporating scenarios and all requirements.
- G Appropriate computer application.
- H Identifying competencies required for the report.
- I Documenting report proposal.
- J Negotiating alterations to the proposed report successfully.

Note:

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

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Enterprise communication methods

Evidence shall show an understanding of enterprise communication methods to an extent indicated by the following aspects:

- a) Communicating with personnel encompassing
 - Oral communications
 - Written procedures and work instructions
- b) Communicating with suppliers
- c) Communicating with customers

Enterprise work activities records

Evidence shall show an understanding of work activities records to an extent indicated by the following aspects:

- a) Purpose and extent of maintaining work activities records in an enterprise
- b) Types of records for maintaining work activities in an enterprise
- c) Methods for recording and maintaining work records
- d) Work records required by regulation requirements

Computer use basics

Evidence shall show an understanding of computer use basics to an extent indicated by the following aspects:

- a) Starting up
- b) Selecting application
- c) Entering information
- d) Saving
- e) Printing

Engineering analysis, decision making and reporting

Evidence shall show an understanding of analysis, decision making and reporting as they apply to engineering work functions to an extent indicated by the following aspects:

- a) Techniques of analysis
 - use of appropriate sampling techniques to collect data.
 - types of data and classification.
 - effective questionnaire design
 - data collection errors.
 - frequency tables.
 - statistical diagrams – drawing and interpretation.
 - the general shape of a frequency distribution.
 - different types of diagrams.
 - mean time between failures calculations
- b) Summary of statistics
 - measures of central tendency
 - measures of dispersion
 - a 5-point summary for a given data set, box and whisker plot distribution

- data sets comparison using measures of centre and spread
 - the effect of outliers on measures of centre and spread
 - use computer programs or calculators to simplify calculations
- c) Correlation and regression
- bivariate data and scatter diagrams.
 - product-moment correlation coefficient calculation and interpretation.
 - difference between causation and correlation.
 - equations of regression lines from bivariate data with a calculator and line plotting on a scatter diagram.
 - using the equation of regression to make predictions in practical situations.
 - investigation of practical problems using correlation and regression.
- d) Investigation and reporting
- presentation of a well formatted report with a clearly stated aim.
 - using the internet to obtain relevant data.
 - description of the statistical method and design chosen to meet the aim of the investigation.
 - statistical analysis and results reporting.
 - evaluation and interpretation of the results of the investigation.
 - discussion of the investigation with reference to real world applications.
 - chronology of the investigation.

Research Concepts

Evidence shall show an understanding of research concepts and techniques, as they apply in the workplace, to an extent indicated by the following aspects:

a) Terminology

Note.

Examples may include: Terminology used in a research workplace; Terminology used in research-specific literature and the like.

b) Theory – why conduct research?

Note. Examples may include: The history of research; Past research successes; Past research failures; Research Protocols; Research practices and the like.

c) The research environment

Note.

Examples may include: The research work environment; Standard research practices; Industrial, legal, ethical, political and market environment considerations; Legislation and regulation; Contractual obligations of all parties and the like.

d) Planning to conduct research

Note.

Examples may include: Concept development and/or research brief analysis; Research objectives; Research deliverables; Research project plan; Literature reviews; Methodology development, including; Experimental design, Technology selection, Information Management system selection and the like

e) Clients

Note.

Examples may include: Identifying client viewpoints and stake in project; Identifying client requirements and parameters; Determining research budgets, timelines, milestones and quality attributes with clients.

f) Research, Development and Commercialisation

Note.

Examples may include: Research and Development goals versus Commercialisation goals and realities; Research and Development to inspire a commercialisation process.

Working in a Team

Evidence shall show an understanding of the teams that may exist in the workplace, to an extent indicated by the following aspects:

a) Types of teams

Note.

Examples may include; Managerial, Administrative, Project-based, Commercial and Social

b) Roles, responsibilities and accountabilities of team members

Note

Examples may include; the role, responsibility and accountability of individuals, teams, organisational management, clients and the like.

c) Working in a team

Note.

Examples may include; Identification and utilisation of team member skills and knowledge; Maximising benefits of team diversity; Team planning; Team commitment and cooperation; Improving/Maximising team performance to achieve goals; Team monitoring and adjustment; Plain English literacy and communication; Leading, facilitating, participating, coaching, mentoring.

d) Working with clients

Note

Examples may include; client relations, client liaison, the practice of working with clients and the like.

e) Conflict resolution

Note.

Examples may include: Personality analysis tools, Strategies for dealing with difficult people and the like.

Data Collection Techniques

Evidence shall show an understanding of data collection concepts and techniques as they apply in the workplace, to an extent indicated by the following aspects:

a) Data types

Note. Examples may include: Quantitative data, including; empirical, non-parametric, parametric; Qualitative data; Raw; Graphic; Diagrams; Original; Textual; Multimedia; Electronic and the like.

b) Data Collection

Note.

Examples may include: Data sources; Consultation protocols and practices; Survey methodologies, including; interviews, surveys, chat rooms, focus groups; Literature reviews, including; traditional and web-based; Group facilitation and presentation; Questioning, active listening and clarification; Obstacles to data collection, including; unavailable data, inconsistent data, confidentiality, security; Data limitations.

c) Evaluating data quality

Note.

Examples may include: Reliability; Accuracy; Clarity; Validity; Contribution to research; Relevance to research objectives.

Data Analysis and Presentation

Evidence shall show an understanding of data analysis and presentation concepts

and techniques as they apply in the workplace, to an extent indicated by the following aspects:

a) Data analysis techniques

Note.

Examples may include: Univariate analysis; Multivariate analysis; Decision trees; Genetic Algorithms; Neural Networks; Gap Analysis; Urgency and impact, and the like.

b) Data analysis technique selection

Note.

Examples may include: Determining the correct analysis technique(s); Determining the correct sequence of analysis techniques; Accommodating influencing factors including research objectives, budget, timeline and quality requirements, data limitations, confidentiality, security and the like.

c) Data interpretation

Note.

Examples may include: Determining results; Determining conclusions; Benchmarking; Quality Assurance, including consideration of accuracy, validity, clarity and the like.

d) Data presentation

- Determining the correct form of presentation for the audience, including; colleagues, scientific community, marketing and commercialisation specialists, general community, industry, mixed (i.e. conference audience).

Note.

Examples may include: Forms of documentary presentation, including reports, journal articles, scientific papers, graphs, tables, diagrams, electronic formats; Forms of verbal presentation, including meetings, client briefings, conferences, support of a new concept, need for further research, commercialisation opportunity; Quality Assurance, including accuracy, validity, clarity of information presented.

Occupational Health and Safety, enterprise responsibilities

Evidence shall show an understanding of OHS enterprise responsibilities to an extent indicated by the following aspects:

a) Provisions of relevant health and safety legislation

b) Principles and practice of effective occupational health and safety management

c) Management arrangements relating to regulatory compliance

d) Enterprise hazards and risks, control measures and relevant expertise required

e) Characteristics and composition of workforce and their impact on occupational health and safety management

f) Relevance of enterprise management systems to occupational health and safety management

g) Analysis of working environment and design of appropriate occupational health and safety management systems

h) Analysis of relevant data and evaluation of occupational health and safety system effectiveness

i) Assess resources to establish and maintain occupational health and safety management systems.

UTE NES038A**Use drawings, diagrams, schedules and manuals**

Descriptor: This competency standard unit covers the use of drawings, diagrams, equipment and cable schedules and manuals as they apply to the various electrotechnology work functions. It encompasses the rudiments for communicating with schematic, wiring and mechanical diagrams and equipment and cable/connection schedules, manuals, site and architectural drawings and plans showing the location of services, apparatus, plant and machinery.

Elements	Performance Criteria
038.1 Prepare to use drawings, diagrams, schedules and manuals.	038.1.1 Established OHS risk control measures and procedures are followed. 038.1.2 The need for drawings, diagrams, schedules or manual is determined from the nature of the work to be undertaken. 038.1.3 Established routines and procedures are followed to obtain drawings, diagrams, schedules or manuals required for the work to be undertaken.
038.2 Use drawings, diagrams, schedules and manuals to obtain job information.	038.2.1 Drawings, diagrams, schedules and/or manuals are selected, appropriate to the work being undertaken. 038.2.2 Drawings, diagrams and schedules are interpreted using knowledge of drawing layouts, conventions and symbols. 038.2.3 Dimensions are extracted from drawings and diagrams for application to work undertaken. 038.2.4 Location of equipment is determined from equipment schedules and location diagrams. 038.2.5 Manuals are reviewed to ascertain their format and where information relevant to the work to be undertaken is located. 038.2.6 Information given in manuals is interpreted in relation to the work to be undertaken.
038.3 Use drawings, diagrams, schedules and manuals to convey information	038.3.1 Drawing conventions are used in neat freehand drawings to convey information and ideas to others involved in the work to be undertaken. 038.3.2 Drawing conventions are used to neatly correct freehand original job drawing to show final 'as-installed' arrangement.

and ideas.

038.3.3 Corrected drawings are forwarded to appropriate person(s) in accordance with established procedures.

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

This competency standard unit shall be demonstrated in relation to assembly, installation, fault finding, maintenance or development work functions in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy, and
- Security technology

Currency in unit of competence

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, *e.g. consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

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

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in the Underpinning Knowledge of this unit; and
 - Demonstrate an appropriate level of skills enabling employment; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Use drawings, diagrams, schedules and manuals as described in Clause Range and including:
 - A Identifying drawings, diagrams, schedules and manuals relevant to the work to be undertaken.
 - B Interpreting drawings, diagrams, schedules and manuals correctly.
 - C Using correct conventions in freehand drawings.
 - D Giving correct information in freehand drawings.
 - E Dealing with unplanned events and drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency will be determined on evidence of having *consistently performed* across a *representative range* of activities and where required support the outcomes of other units within a qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to transfer and apply such knowledge and skills to new situations and environments.

This section includes that set of knowledge and skills additional to that specified in the above mentioned section titled 'Interdependent assessment of units'.

Drawings and diagrams

Evidence shall show an understanding of drawings, diagrams and schedules used in electrotechnology work to an extent indicated by the following aspects:

a) Drawing types and applications encompassing:

- Drawing layouts and conventions

Note:

Examples include mechanical drawings, electrical/electronic schematics, wiring diagrams, PC boards, location diagrams (architectural drawings), cable routes and switching arrangements and building details.

- Drawing symbols

Note:

Examples include symbols representing electrotechnology circuit components, equipment location and cable routes and control arrangements.

b) Cable/wiring/connection and equipment/component/schedules.

Occupational Health and Safety principles

Evidence shall show an understanding of Occupational Health and Safety to an extent indicated by the following aspects

a) The basic legal requirements covering occupational health and safety in the workplace encompassing:

- general aims and objectives of the relevant state or territory legislation relating to OHS
- employer and employee responsibilities, rights and obligations
- major functions of safety committees and representatives); and
- powers give to Occupational Health and Safety Inspectors.

b) The requirements for personal safety in the workplace encompassing:

- the safety precautions that are required to ensure personal safety in the workplace
 - potential hazards in relation to improper industrial housekeeping; and
 - sources of pollution in an engineering environment and outline control measures
- c) Workplace safety check, identifying potential workplace hazards and suggested measures for accident prevention encompassing:
- safety checklist for a typical workplace environment,
 - identifying and reporting potential workplace hazards
 - methods of prevention of safety hazards within a typical workplace environment
- d) working safely with electrical tools or equipment encompassing:
- causes of electrical accidents and state the effects that electric shock can cause.);
 - purpose of circuit protection devices, such as fuses, circuit breakers and Residual Current Devices (RCDs), and
 - safe isolation of an electrical supply.
- e) emergency procedures for the rescue of an electric shock victim equipment
- f) emergency first aid for an electric shock victim

Note:

Emergency first aid is limited to first-on-the scene assistance to a victim of electric shock , and basics of CPR.

UTE NES050 A

Identify & select components/accessories/materials for Electrotech work activities

Descriptor: Undertake a schedule of work for selecting appropriately identified components, accessories or materials in an agreed time, to a quality standard and with a minimum of waste, using appropriate technology mediums where required.

Elements	Performance criteria
050.1 Prepare to identify components, accessories and materials	<p>050.1.1 Instructions for the preparation of components, accessories or materials identification is communicated and confirmed to ensure clear understanding</p> <p>050.1.2 <i>OH&S policies and procedures</i> are communicated and confirmed to ensure they are understood as to be applied in the carrying out of the work</p> <p>050.1.3 Tools, <i>equipment</i> and personnel protective equipment where needed to do the work are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with <i>established procedures</i></p> <p>050.1.4 <i>Appropriate personnel</i> are consulted to ensure the work is coordinated effectively with others involved</p> <p>050.1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with <i>established procedures</i></p> <p>050.1.6 Schedule for identifying components, accessories or materials including practices for working safely are confirmed as in accordance with instructions and <i>requirements</i></p>
050.2 Select components, accessories and materials	<p>050.2.1 <i>OH&S policies and procedures</i> and safe work practices are followed to eliminate or minimise incidents</p> <p>050.2.2 Schedule for selecting components, accessories or materials is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste using appropriate technology mediums where appropriate</p>

Elements	Performance criteria
	050.2.3 Further instructions are sought from <i>appropriate personnel</i> in the event of unplanned events or conditions occurring 050.2.4 On going checks of quality of the work are undertaken in accordance with instructions and <i>requirements</i>
050.3 Confirm selection of components, accessories and materials	050.3.1 Final checks are made to ensure selection of components, accessories or materials conforms with instructions and to <i>requirements</i> 050.3.2 <i>Appropriate personnel</i> are notified of completion of the selection process 050.3.3 Tools, <i>equipment</i> and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with <i>established procedures</i> 050.3.4 Work area is cleaned up and made safe and <i>sustainable energy practices</i> are followed 050.3.5 Appropriate records are updated in accordance with instructions and <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Electrotechnology environment includes one or more the following *category* or allied industry areas:

Computer Systems

Data Communications

Electronics

Electrical

Instrumentation

Refrigeration and Air conditioning

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation,

regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge and Skills'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be reported in accordance with the Regulator's requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in one or more of the following *category* areas: *Computer Systems; Data Communications; Electronics; Electrical; Instrumentation; Refrigeration and Air conditioning and/or allied industry areas*.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge and skills

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

Note: The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to the topic of *Electrotechnology Systems, Materials and Accessories* detailed below. Appropriate measures for this topic must be put in place to ensure a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any voltages that exceed extra low voltage. Extra low voltage is defined in Standards Australia publications, eg. SA/NZ 3000:2001. However, the use of such equipment does not negate the duty of care in treating electricity other than as a hazard.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

Underpinning knowledge and skills topics pertaining to this unit – listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic

that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:

Topics:

- **Occupational Health and Safety**
- **Electrotechnology Calculations**
- **Applied Electrical Science**
- **Electrical Concepts and Applications**
- **Parts and Components Selection**
- **Electrotech Industry - Overview & Practices**
- **Identify & select components/accessories/materials for Electrotech work activities – Work Performance**

Specialisation: Engineering

- **Drawing Interpretation and Sketching**
- **Electrotechnology Systems, Materials and Accessories**
- **Workshop Practices**

Specialisation: Renewable Energy

- **Introduction Renewable Energy Technologies**

Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from DEST's website.

Occupational Health and Safety

Occupational Health and Safety Act: Aims; Acts; Representatives'; Inspectors; Offences

Personal safety: health at and at work; stress related illnesses; injuries and diseases in the workplace; repetitive strain injuries; manual handling procedures; handling of ladders; adequate lighting in the workplace; industrial radiation; chemical hazards; protective equipment; special situations (eg. Scaffolding); electrical hazards; thermal stress; exposure to excessive vibration; high level industrial noise; safety in the general workplace

Workplace hazards: -Safety checks within the workplace; Identification of potential workplace hazards; Preventative measures

Working with electrically operated tools and equipment: nature of electric shock; causes of electrical accidents; working safely with electricity; safety items used in electrical environments; protection; isolation

Rescue from a live electrical situation

Emergency first aid/resuscitation: procedures for performing emergency first aid and; resuscitation from an electric shock.

Electrotechnology Calculations

Basic operations and estimating the results of a calculation

Graphs and tables

Transposition

Trigonometry

Vectors/phasors

Systematic Problem Solving

Applied Electrical Science

Components: resistors - fixed (composition & wire wound), variable (rheostats, potentiometers & trimmers), non-linear (thermistors, VDRs, LDRs); capacitors -

fixed (ceramic, plastic & electrolytic), variable, trimmers; magnetic - transformers (AF, RF and power), chokes, relays, contactors

Basic physics: conductors - definition, common types, typical applications; insulators - definition, common types, typical applications; semiconductors - definition, common types, typical applications; current flow - direction (electron/conventional), unit, effects of current flow; voltage - (i) sources (electromagnetic, chemical, heat & pressure) - unit; resistance - (ii) factors effecting (material, length, CSA & temp) - effect on circuit, colour code, preferred values (mention only), power rating; Ohms law - electrical Units (include sub and multiple) - volt, ampere, Ohm & Watt; power in electrical circuits - $P = IV$ only; introductory circuit symbols

Effects of electric current: heating, light, magnetic, chemical, physiological

Circuits: series and parallel (three resistive elements max.), V,I,R & P relationships, use lab experiments to validate theory

Protection: purpose, fuses, circuit breaking, safety interlocks, earthing – personnel safety

Electrical Concepts and Applications

DC resistive circuits: series; parallel; series parallel; measurement of V, I and R; calculation of R, V, I; and P

Capacitance: concept; unit; time constant; capacitors – basic construction and types

Magnetism: magnetic and non magnetic materials; magnetic field patterns; force between magnetic fields; applications

Electromagnetism: magnetic field around a current-carrying conductor and solenoid; force between current-carrying conductors; applications

Electromagnetic Induction: induced EMF; inductance (concept, unit, time constant, applications)

AC Principles: sine waves; frequency; amplitude; peak voltage; peak to peak voltage; RMS voltage; single phase; three phase; generation of AC voltages; circuit measurement; earthing; electrical supply system

Transformers: construction; principles of operation; primary and secondary voltage and current; applications

Motors: motor action; generator action; DC motors; AC motors; applications

Electrical Safety Testing: Regulations

Parts and Component Selection

Part/component identification: name; basic function; mounting/fixing arrangements

Information about parts and components: catalogues (structure of reference books, different and common features)

Computer access (starting the computer and moving around the screens)

Telephone inquiry (knowing who to ask for and posing the right question)

Each of the above with respect to the following: part codes (alpha numeric numbers) and what they mean; manufacturers and manufacturers supply outlets; availability and delivery times; price, including discounts, tax and delivery costs; alternative parts

Ordering procedures: customer approval; supplier requirements; in-house requirements

Receiving/dispatch procedures: supplier requirements; in-house (enterprise) requirements; handling and storage

Electrotech Industry - Overview & Practices

Electrotechnology Vocations: Electrical; Electronics – including communications; Computer Systems; Communications; Refrigeration and Air Conditioning; Instrumentation and Control; Lifts

Career Paths in Electrotechnology: Australian Qualification Framework (AQF); Qualifications/Classifications; Scope of work-installation, maintenance, and servicing

Training in Electrotechnology Vocations: traineeships and apprenticeships; licensed Electrician minimum requirements; career advancements

Industry Organisations: employers; employee – trade union groups (eg. CEPU, ETU); Government - ITABs/ISCs, TAFE, RTO, ERAC, NACs; private providers

Qualification Requirements: unit of competency; competency standards; training and assessment; national training packages; training models - on-job components and off-job components; qualification requirements and assessments

Policies and Practices in Electrotechnology Industry: licensing and/or registration requirements and/or codes of practices; OH&S requirements including roles and responsibilities of employers and employees; awards, industrial agreements and enterprise bargaining

Job Application: research – employer organisations, trade unions, career advisers, job agencies, newspapers/magazines, personal contacts, industry training advisory boards (ITABs); writing – formal, content, handwritten/word processor, presentation; method of application – mail, fax, telephone, internet

Job Interview: preparation – dress code, timekeeping, what to take to the interview; presentation – appearance, introduction, mannerisms, strategies, techniques (questions/responses); evaluation – performance (appraisal/improvements)

Identify & select components/accessories/materials for Electrotech work activities - Work Performance

Identify and select components/accessories/materials for Electrotech work activities in any one or more of the above *categories* across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment

Specialisation: Engineering**Drawing Interpretation and Sketching**

Technical drawing standards appropriate to the industry sector, conventions and specifications to AS 1100, with strong emphasis on interpretation: sheet types, title block information, materials parts list, revision table, grid referencing scales, line types – visible outlines, hidden outlines, dimensioning lines, centre lines; orthogonal projection of views – 3rd angle (detail and assembly drawings); mechanical conventions; fabrication conventions; three dimensional view drawings – axonometric, isometric, oblique; sectioning standards and conventions – whole, part; engineering drawing symbols, components and equipment – mechanical, electrical, electronic, computer, instrument, refrigeration; dimensioning – orthogonal, isometric; layout and plans; geometric tolerance interpretation (straightness, flatness, squareness, parallelism and concentricity only); engineering abbreviations; drawing interpretation techniques – detail drawings, orthogonal projection (3rd angle only) and three dimensional, assembly drawings and three dimensions exploded (e.g. as in equipment manuals)

Equipment and service manuals: flow charts; assembly/disassembly diagrams; schematic diagrams; block diagrams; trouble shooting guides

Freehand drawing skills appropriate to the industry sector: 3rd angle orthogonal projections; isometric; interpretation of drawing symbols; practical exercises

Electrotechnology Systems, Materials and Accessories

Overview of Electrical Power System: generation system – fossil fuel and renewable sources, co-generation and typical power station equipment; transmission system – types and equipment; distribution system – equipment; grid system

Overview of Telecommunication System: customer access network (CAN); customer premises equipment (CPE)

Statutory requirements and standards: scope of work permitted by various licences; legislated requirements; purpose of technical standards; role of standards bodies; use of technical standards

Cables: types – power, signal, communication; terms; colour coding; structure; identification; cable applications

Wiring systems: types; wiring looms; enclosures and supports

Terminating power, signal and communication cables: requirements; plugs/sockets and connectors types and applications; assembly/disassembly plugs/sockets and connectors

Accessories and fixings appropriate to industry sector: types of accessories and applications; fixing devices and methods

Workshop Practices

Identification and application of tools for: marking out a measuring; cutting; shaping; drilling; threading; tapping; finishing; dismantling/assembling

Tool use: hazards; safety procedures; techniques

Fabrication: materials, types, applications; techniques, marking out, cutting, bending, drilling/punching, soldering, cutting mitres

Assembly/disassembly techniques

Specialisation: Renewable Energy

Introduction Renewable Energy Technologies

General issues: current economic social; environmental and political issues; impact on a renewable energy technology

Energy services/demand: terminology; energy; temperature; power; symbols; units; energy conversion and efficiency; domestic dwelling - energy services, energy source, selection; primary energy and end use energy

Solar radiation resource: terminology; units - symbols, conversions; sun position, sun path diagrams; solar radiation on fixed and tracking collectors

Wind energy resource and technology: terminology, units, symbols; wind patterns (Australia); local terrain, wind speed, direction, turbulence, wind power; maps, data sheets, measuring instruments; Wind Energy Conversion Systems (WECS) – terminology, characteristics, applications, specifications, sizing

Micro-hydro resource and technology: terminology, units, symbols; flow rates, heads, assessment; turbines, operating characteristics; control requirements; specifications, sizing

Biomass resource and technology: terminology; common biofuels - types, energy contents, production, applications; resource assessment

Solar thermal systems: terminology; components; applications; types of hot water systems; system features, orientation, tilt angles, placement; system selection, size, cost

Energy efficient building design: terminology; climate and thermal comfort; thermal conductivity of building elements; solar heat gain; ventilation; glazing; thermal mass; insulation; shading devices; siting of buildings; active solar systems

RAPS systems configuration: configuration; components - functions, efficiencies; regulators, inverters, battery chargers, generators

Photovoltaic arrays: terminology; modules - types, efficiency, applications; IV curve; irradiance and temperature effects; blocking and bypass diodes; wiring diagrams, configurations; specifications and sizing

Energy storage: terminology; types and methods; battery life, temperature effects, charge and discharge rates; precautions, maintenance, safety; stratification; boosting and equalising charges; specifications, capacity, configuration; operating characteristics; types, sizes

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Use of routine equipment/plant/technologies in an Electrotech environment

Descriptor: Routine tools, equipment and personnel protective equipment required to do work in the Electrotechnology environment, is used in accordance with the schedule of work to ensure work is completed in an agreed time, to a quality standard and with a minimum waste.

Elements		Performance criteria
051.1	Prepare to use routine equipment, plant and technologies	051.1.1 Instructions for the preparation in the use of routine equipment, plant or technologies are communicated and confirmed to ensure clear understanding
		051.1.2 <i>OH&S policies and procedures</i> are communicated and confirmed to ensure they are understood as to be applied in the carrying out of the work
		051.1.3 Tools, <i>equipment</i> and personnel protective equipment needed to do the work are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with <i>established procedures</i>
		051.1.4 <i>Appropriate personnel</i> are consulted to ensure the work is coordinated effectively with others involved
		051.1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with <i>established procedures</i>
		051.1.6 Schedule of work including practices for working safely are confirmed as in accordance with instructions and <i>requirements</i>
051.2	Use routine equipment, plant and technologies	051.2.1 <i>OH&S policies and procedures</i> and safe work practices are followed to eliminate or minimise incidents
		051.2.2 Routine equipment, plant or technologies is used in accordance with schedule of work to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste
		051.2.3 Further instructions are sought from <i>appropriate personnel</i> in the event of unplanned events or conditions occurring

Elements	Performance criteria
	051.2.4 On going checks of quality of the work are undertaken in accordance with instructions and <i>requirements</i>
051.3 Complete use of routine equipment, plant and technologies	051.3.1 Final checks are made to ensure the use of routine equipment, plant or technologies conforms with instructions and to <i>requirements</i> 051.3.2 <i>Appropriate personnel</i> are notified of completion of the work using routine equipment, plant or technologies 051.3.3 Tools, <i>equipment</i> and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with <i>established procedures</i> 051.3.4 Work area is cleaned up and made safe and <i>sustainable energy practices</i> are followed 051.3.5 Appropriate records are updated in accordance with instructions and <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in *italics*, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Electrotechnology environment includes one or more the following *category* or allied industry areas:

Computer Systems

Data Communications

Electronics

Electrical

Instrumentation

Refrigeration and Air conditioning

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be reported in accordance with the Regulator's requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in one or more of the following *category* areas: *Computer Systems; Data Communications; Electronics; Electrical; Instrumentation; Refrigeration and Air conditioning and/or* allied industry areas.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the

Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge and skills

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

Note: The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to the topic of *Electrotechnology Systems, Materials and Accessories* detailed below. Appropriate measures for this topic must be put in place to ensure a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any voltages that exceed extra low voltage. Extra low voltage is defined in Standards Australia publications, eg. SA/NZ 3000:2001. However, the use of such equipment does not negate the duty of care in treating electricity other than as a hazard.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

Underpinning knowledge and skills topics pertaining to this unit – listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:

Topics:

Occupational Health and Safety

Electrotechnology Calculations

Parts and Components Selection

Electrotech Industry - Overview & Practices

Use of Routine equipment/plant/technologies in an Electrotechnology environment – Work performance

Specialisation: Engineering

Drawing Interpretation and Sketching

Electrotechnology Systems, Materials and Accessories

Workshop Practices

Specialisation: Renewable Energy

Introduction Renewable Energy Technologies

Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from DEST's website.

Occupational Health and Safety

Occupational Health and Safety Act: Aims; Acts; Representatives'; Inspectors; Offences

Personal safety: health at and at work; stress related illnesses; injuries and diseases in the workplace; repetitive strain injuries; manual handling procedures; handling of ladders; adequate lighting in the workplace; industrial radiation; chemical hazards; protective equipment; special situations (eg. Scaffolding); electrical hazards; thermal stress; exposure to excessive vibration; high level industrial noise; safety in the general workplace

Workplace hazards: - Safety checks within the workplace; Identification of potential workplace hazards; Preventative measures

Working with electrically operated tools and equipment: nature of electric shock; causes of electrical accidents; working safely with electricity; safety items used in electrical environments; protection; isolation

Rescue from a live electrical situation

Emergency first aid/resuscitation: procedures for performing emergency first aid and; resuscitation from an electric shock.

Electrotechnology Calculations

Basic operations and estimating the results of a calculation

Graphs and tables

Transposition

Trigonometry

Vectors/phasors

Systematic Problem Solving

Parts and Component Selection

Part/component identification: name; basic function; mounting/fixing arrangements

Information about parts and components: catalogues (structure of reference books, different and common features)

Computer access (starting the computer and moving around the screens)

Telephone inquiry (knowing who to ask for and posing the right question)

Each of the above with respect to the following: part codes (alpha numeric numbers) and what they mean; manufacturers and manufacturers supply outlets; availability and delivery times; price, including discounts, tax and delivery costs; alternative parts

Ordering procedures: customer approval; supplier requirements; in-house requirements

Receiving/dispatch procedures: supplier requirements; in-house (enterprise) requirements; handling and storage

Electrotech Industry - Overview & Practices

Electrotechnology Vocations: Electrical; Electronics – including communications; Computer Systems; Communications; Refrigeration and Air Conditioning; Instrumentation and Control; Lifts

Career Paths in Electrotechnology: Australian Qualification Framework (AQF); Qualifications/Classifications; Scope of work-installation, maintenance, and servicing

Training in Electrotechnology Vocations: traineeships and apprenticeships; licensed Electrician minimum requirements; career advancements

Industry Organisations: employers; employee – trade union groups (eg. CEPU, ETU); Government - ITABs, TAFE, RTO, ERAC, NACs; private providers

Qualification Requirements: unit of competency; competency standards; training and assessment; national training packages; training models - on-job components and off-job components; qualification requirements and assessments

Policies and Practices in Electrotechnology Industry: licensing and/or registration requirements and/or codes of practices; OH&S requirements including roles and responsibilities of employers and employees; awards, industrial agreements and enterprise bargaining

Job Application: research – employer organisations, trade unions, career advisers, job agencies, newspapers/magazines, personal contacts, industry training advisory boards (ITABs); writing – formal, content, handwritten/word processor, presentation; method of application – mail, fax, telephone, internet

Job Interview: preparation – dress code, timekeeping, what to take to the interview; presentation – appearance, introduction, mannerisms, strategies,

techniques (questions/responses); evaluation – performance (appraisal/improvements)

Use of Routine equipment/plant/technologies in an Electrotechnology environment – Work performance

Use Routine equipment/plant/technologies in an Electrotechnology environment in any one or more of the above *categories* across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment

Specialisation: Engineering

Drawing Interpretation and Sketching

Technical drawing standards appropriate to the industry sector, conventions and specifications to AS 1100, with strong emphasis on interpretation: sheet types, title block information, materials parts list, revision table, grid referencing scales, line types – visible outlines, hidden outlines, dimensioning lines, centre lines; orthogonal projection of views – 3rd angle (detail and assembly drawings); mechanical conventions; fabrication conventions; three dimensional view drawings – axonometric, isometric, oblique; sectioning standards and conventions – whole, part; engineering drawing symbols, components and equipment – mechanical, electrical, electronic, computer, instrument, refrigeration; dimensioning – orthogonal, isometric; layout and plans; geometric tolerance interpretation (straightness, flatness, squareness, parallelism and concentricity only); engineering abbreviations; drawing interpretation techniques – detail drawings, orthogonal projection (3rd angle only) and three dimensional, assembly drawings and three dimensions exploded (e.g. as in equipment manuals)

Equipment and service manuals: flow charts; assembly/disassembly diagrams; schematic diagrams; block diagrams; trouble shooting guides

Freehand drawing skills appropriate to the industry sector: 3rd angle orthogonal projections; isometric; interpretation of drawing symbols; practical exercises

Electrotechnology Systems, Materials and Accessories

Overview of Electrical Power System: generation system – fossil fuel and renewable sources, co-generation and typical power station equipment; transmission system – types and equipment; distribution system – equipment; grid system

Overview of Telecommunication System: customer access network (CAN); customer premises equipment (CPE)

Statutory requirements and standards: scope of work permitted by various licences; legislated requirements; purpose of technical standards; role of standards bodies; use of technical standards

Cables: types – power, signal, communication; terms; colour coding; structure; identification; cable applications

Wiring systems: types; wiring looms; enclosures and supports

Terminating power, signal and communication cables: requirements; plugs/sockets and connectors types and applications; assembly/disassembly plugs/sockets and connectors

Accessories and fixings appropriate to industry sector: types of accessories and applications; fixing devices and methods

Workshop Practices

Identification and application of tools for: marking out a measuring; cutting; shaping; drilling; threading; tapping; finishing; dismantling/assembling

Tool use: hazards; safety procedures; techniques

Fabrication: materials, types, applications; techniques, marking out, cutting, bending, drilling/punching, soldering, cutting mitres

Assembly/disassembly techniques

Specialisation: Renewable Energy

Introduction Renewable Energy Technologies

General issues: current economic social; environmental and political issues; impact on a renewable energy technology

Energy services/demand: terminology; energy; temperature; power; symbols; units; energy conversion and efficiency; domestic dwelling - energy services, energy source, selection; primary energy and end use energy

Solar radiation resource: terminology; units - symbols, conversions; sun position, sun path diagrams; solar radiation on fixed and tracking collectors

Wind energy resource and technology: terminology, units, symbols; wind patterns (Australia); local terrain, wind speed, direction, turbulence, wind power; maps, data sheets, measuring instruments; Wind Energy Conversion Systems (WECS) – terminology, characteristics, applications, specifications, sizing

Micro-hydro resource and technology: terminology, units, symbols; flow rates, heads, assessment; turbines, operating characteristics; control requirements; specifications, sizing

Biomass resource and technology: terminology; common biofuels - types, energy contents, production, applications; resource assessment

Solar thermal systems: terminology; components; applications; types of hot water systems; system features, orientation, tilt angles, placement; system selection, size, cost

Energy efficient building design: terminology; climate and thermal comfort; thermal conductivity of building elements; solar heat gain; ventilation; glazing; thermal mass; insulation; shading devices; siting of buildings; active solar systems

RAPS systems configuration: configuration; components - functions, efficiencies; regulators, inverters, battery chargers, generators

Photovoltaic arrays: terminology; modules - types, efficiency, applications; IV curve; irradiance and temperature effects; blocking and bypass diodes; wiring diagrams, configurations; specifications and sizing

Energy storage: terminology; types and methods; battery life, temperature effects, charge and discharge rates; precautions, maintenance, safety; stratification; boosting and equalising charges; specifications, capacity, configuration; operating characteristics; types, sizes

UTE NES052 A

Interact with customers/clients for quality service

Descriptor: Interact with customers/clients by providing or receiving appropriate instruction(s) and/or requirement(s) when communicating, related to carrying out the work.

Elements	Performance criteria
052.1 Prepare to interact with customers or clients	052.1.1 Instructions for the preparation to interact with customers or clients is communicated and confirmed to ensure clear understanding 052.1.2 <i>OH&S policies and procedures</i> are communicated and confirmed to ensure they are understood as to be applied in the carrying out of the work 052.1.3 Tools, <i>equipment</i> and personnel protective equipment needed to do the work are identified, scheduled and checked, where appropriate, to ensure they work correctly as intended and are safe to use in accordance with <i>established procedures</i> 052.1.4 <i>Appropriate personnel</i> are consulted to ensure the work is coordinated effectively with others involved 052.1.5 Resources and materials needed to interact with customers or clients is confirmed, scheduled and obtained in accordance with <i>established procedures</i> 052.1.6 Practices for interacting with customers or clients including practices for working safely are confirmed as in accordance with instructions and <i>established procedures</i>
052.2 Interact with customers or clients	052.2.1 <i>OH&S policies and procedures</i> and safe work practices are followed to eliminate or minimise incidents 052.2.2 Interaction with customers or clients is followed to ensure communication is completed in an agreed time, to a quality standard and with a minimum of waste 052.2.3 Further instructions are sought from <i>appropriate personnel</i> in the event of unplanned events or conditions occurring 052.2.4 On going checks in quality of interaction are undertaken in accordance with instructions and <i>requirements</i>

Elements	Performance criteria
052.3 Confirm results of interaction with customers or clients	052.3.1 Final checks are made to ensure interaction with customers or clients conforms with instructions and to <i>requirements</i>
	052.3.2 <i>Appropriate personnel</i> are notified of completion of interaction with customers or clients
	052.3.3 Tools, <i>equipment</i> and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with <i>established procedures</i>
	052.3.4 Work area is cleaned up and made safe and <i>sustainable energy practices</i> are followed
	052.3.5 Appropriate records are updated in accordance with instructions and <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and

resources available in the workplace within the context of the Range Statement.

- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge and Skills'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements/transcripts about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in one or more of the following *category* areas: *Computer Systems; Data Communications; Electronics; Electrical; Instrumentation; Refrigeration and Air conditioning and/or* allied industry areas.

Due regard must be given to the relationship between the development of underpinning knowledge and skills - Safety and Regulations vis-à-vis the Electrotechnology Industry and workplace application when determining the context in which development and assessment is to occur. Such underpinning knowledge and skills should be developed and assessed in a controlled and structured environment with appropriate direct supervision.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit should include related underpinning specified knowledge and skills associated with other units within the respective endorsed qualification structure, where appropriate.

Additionally, this unit should be assessed in conjunction with or after competency has been demonstrated in UTE NES060 Carry out routine work activities in an Electrotech environment, UTE NES050 Identify & select components/ accessories/ materials for Electrotech work activities and UTE

NES051 Use of routine equipment/ plant/ technologies in an Electrotech Environment.

Underpinning Knowledge and Skills

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to undertake activities that directly support the operational and business activities of an enterprise. This could include the following:

Relevant occupational health and safety regulations

Relevant statutory legislation

Relevant enterprise/site safety procedures

Enterprise/site emergency procedures and techniques

Environmental legislation

Enterprise recording and standing operating procedures and policies

Routine planning techniques and principles

Problem solving techniques and principles

General business and organisational skills

Interact with customers/clients for quality service in any one or more of the *categories* across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment

Communication principles including: awareness of cultural difference issues; appropriate report and letter writing; written and verbal communication; effective telephone techniques; diagrams, drawings and symbols

Principles of teamwork

Principles and application of basic time management

Sustainable Energy Principles

Customer communication principles

UTE NES053 A

Participate in job data records collection of the business

Descriptor: Complete work related recording system and/or data collection and ensure appropriate records are updated in accordance with instructions and established procedures.

Elements		Performance criteria
053.1	Prepare to participate in job data records collection	<p>053.1.1 Instructions for the preparation to participate in job data records collection is communicated and confirmed to ensure clear understanding</p> <p>053.1.2 <i>OH&S policies and procedures</i> are communicated and confirmed to ensure they are understood as to be applied in the carrying out of the work</p> <p>053.1.3 Tools, <i>equipment</i> and personnel protective equipment needed to do the work are identified, scheduled and checked, where needed, to ensure they work correctly as intended and are safe to use in accordance with <i>established procedures</i></p> <p>053.1.4 <i>Appropriate personnel</i> are consulted to ensure the work is coordinated effectively with others involved</p> <p>053.1.5 Resources and materials needed to participate in job data records collection is confirmed, scheduled and obtained in accordance with <i>established procedures</i></p> <p>053.1.6 Schedule to participate in job data records collection including practices for working safely is confirmed as in accordance with instructions and <i>requirements</i></p>
053.2	Participate in job data records collection	<p>053.2.1 <i>OH&S policies and procedures</i> and safe work practices are followed to eliminate or minimise incidents</p> <p>053.2.2 Schedule for participating in job data records collection is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste</p> <p>053.2.3 Further instructions are sought from <i>appropriate personnel</i> in the event of unplanned events or conditions occurring</p>

Elements	Performance criteria
	053.2.4 On going checks of quality of the work are undertaken in accordance with instructions and <i>requirements</i>
053.3 Confirm completion of job data records collection	053.3.1 Final checks are made to ensure participation in job data records collection conforms with instructions and to <i>requirements</i>
	053.3.2 <i>Appropriate personnel</i> are notified of completion of the work
	053.3.3 Tools, <i>equipment</i> and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with <i>established procedures</i>
	053.3.4 Work area is cleaned up and made safe and <i>sustainable energy practices</i> are followed
	053.3.5 Appropriate records are updated in accordance with instructions and <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.

- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge and Skills'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Regulatory requirements in individual jurisdictions may require recording of additional information. Recognition of knowledge and skills transfer may be maximised by recording and issuing transcripts covering additional information. This could be detailed statements/transcripts about the achievement of knowledge and skills. Any additional reporting is a matter for negotiation between the RTO and its clients.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in one or more of the following *category* areas: *Computer Systems; Data Communications; Electronics; Electrical; Instrumentation; Refrigeration and Air conditioning and/or* allied industry areas.

Due regard must be given to the relationship between the development of underpinning knowledge and skills - Safety and Regulations vis-à-vis the Electrotechnology Industry and workplace application when determining the context in which development and assessment is to occur. Such underpinning knowledge and skills should be developed and assessed in a controlled and structured environment with appropriate direct supervision.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit should include related underpinning specified knowledge and skills associated with other units within the respective endorsed qualification structure, where appropriate.

Additionally, this unit should be assessed in conjunction with or after competency has been demonstrated in UTE NES060 Carry out routine work

activities in an Electrotech environment, UTE NES050 Identify & select components/ accessories/ materials for Electrotech work activities and UTE NES051 Use of routine equipment/ plant/ technologies in an Electrotech Environment.

Underpinning Knowledge and Skills

This section specifies the knowledge and skills required to underpin the elements and performance criteria relevant to the unit. This, with other aspects of evidence, will ensure that an individual is able to undertake activities that directly support the operational and business activities of an enterprise. This could include the following:

Relevant occupational health and safety regulations

Relevant statutory legislation

Relevant enterprise/site safety procedures

Enterprise/site emergency procedures and techniques

Environmental legislation

Enterprise recording and standing operating procedures and policies

Routine planning techniques and principles

Problem solving techniques and principles

General business and organisational skills

Participate in job data records collection of the business in any one or more of the *categories* across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment

Communication principles including: awareness of cultural difference issues; appropriate report and letter writing; written and verbal communication; effective telephone techniques; diagrams, drawings and symbols

Principles of teamwork

Principles and application of basic time management

Sustainable Energy Principles

Control and data acquisition systems

UTE NES054 A

Produce routine products for carrying out Electrotech work activities

Descriptor: Routine products required to do work in the Electrotechnology environment are produced in accordance with the schedule of work ensuring work is completed in an agreed time, to a quality standard and with a minimum waste.

Elements	Performance criteria
054.1 Prepare to produce routine products	<p>054.1.1 Instructions for the preparation of the work activity are communicated and confirmed to ensure clear understanding</p> <p>054.1.2 <i>OH&S policies and procedures</i> are communicated and confirmed to ensure they are understood as to be applied in the carrying out of the work</p> <p>054.1.3 Tools, <i>equipment</i> and personnel protective equipment needed to do the work are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with <i>established procedures</i></p> <p>054.1.4 <i>Appropriate personnel</i> are consulted to ensure the work is coordinated effectively with others involved</p> <p>054.1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with <i>established procedures</i></p> <p>054.1.6 Schedule of work including practices for working safely are confirmed as in accordance with instructions and <i>requirements</i></p>
054.2 Produce routine products	<p>054.2.1 <i>OH&S policies and procedures</i> and safe work practices are followed to eliminate or minimise incidents</p> <p>054.2.2 Schedule of work is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste</p> <p>054.2.3 Further instructions are sought from <i>appropriate personnel</i> in the event of unplanned events or conditions occurring</p>

Elements	Performance criteria
	054.2.4 On going checks of quality of the work are undertaken in accordance with instructions and <i>requirements</i>
054.3 Check results of products produced	054.3.1 Final checks are made to ensure the completed work conforms with instructions and to <i>requirements</i>
	054.3.2 <i>Appropriate personnel</i> are notified of completion of the work
	054.3.3 Tools, <i>equipment</i> and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with <i>established procedures</i>
	054.3.4 Work area is cleaned up and made safe and <i>sustainable energy practices</i> are followed
	054.3.5 Appropriate records are updated in accordance with instructions and <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Products may include the production of items such as tool boxes, containers, panels, instrument boxes and the like using a variety of materials such as sheet metal, wood, plastic, aluminium and the like.

Electrotechnology environment includes one or more the following *category* or allied industry areas:

Computer Systems

Data Communications

Electronics

Electrical

Instrumentation

Refrigeration and Air conditioning

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation,

regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be reported in accordance with the Regulator's requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in one or more of the following *category* areas: *Computer Systems; Data Communications; Electronics; Electrical; Instrumentation; Refrigeration and Air conditioning and/or allied industry areas*.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit should include related underpinning specified knowledge and skills associated with other units within the respective endorsed qualification structure, where appropriate.

Additionally, this unit should be assessed in conjunction with or after competency has been demonstrated in UTE NES060 Carry out routine work activities in an Electrotech environment, UTE NES050 Identify & select components/ accessories/ materials for Electrotech work activities and UTE NES051 Use of routine equipment/ plant/ technologies in an Electrotech Environment.

Underpinning knowledge and skills

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

Note: The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to the topic of *Electrotechnology Systems, Materials and Accessories* detailed below. Appropriate measures for this topic must be put in place to ensure a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any voltages that exceed extra low voltage. Extra low voltage is defined in Standards Australia publications, eg. SA/NZ 3000:2001. However, the use of such equipment does not negate the duty of care in treating electricity other than as a hazard.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

Underpinning knowledge and skills topics pertaining to this unit – *listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:*

Topics:

- **Drawing Interpretation and Sketching**
- **Electrotechnology Systems, Materials and Accessories**
- **Workshop Practices**
- **Introduction to Welding**
- **Electrotech Engineering Practices**
- **Produce routine products for carrying out Electrotech work activities – Work performance**

Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from DEST's website.

Drawing Interpretation and Sketching

Technical drawing standards appropriate to the industry sector, conventions and specifications to AS 1100, with strong emphasis on interpretation: sheet types, title block information, materials parts list, revision table, grid referencing scales, line types – visible outlines, hidden outlines, dimensioning lines, centre lines; orthogonal projection of views – 3rd angle (detail and assembly drawings); mechanical conventions; fabrication conventions; three dimensional view drawings – axonometric, isometric, oblique; sectioning standards and conventions – whole, part; engineering drawing symbols, components and equipment – mechanical, electrical, electronic, computer, instrument, refrigeration; dimensioning – orthogonal, isometric; layout and plans; geometric tolerance interpretation (straightness, flatness, squareness, parallelism and concentricity only); engineering abbreviations; drawing interpretation techniques – detail drawings, orthogonal projection (3rd angle only) and three dimensional, assembly drawings and three dimensions exploded (e.g. as in equipment manuals)

Equipment and service manuals: flow charts; assembly/disassembly diagrams; schematic diagrams; block diagrams; trouble shooting guides

Freehand drawing skills appropriate to the industry sector: 3rd angle orthogonal projections; isometric; interpretation of drawing symbols; practical exercises

Electrotechnology Systems, Materials and Accessories

Overview of Electrical Power System: generation system – fossil fuel and renewable sources, co-generation and typical power station equipment; transmission system – types and equipment; distribution system – equipment; grid system

Overview of Telecommunication System: customer access network (CAN); customer premises equipment (CPE)

Statutory requirements and standards: scope of work permitted by various licences; legislated requirements; purpose of technical standards; role of standards bodies; use of technical standards

Cables: types – power, signal, communication; terms; colour coding; structure; identification; cable applications

Wiring systems: types; wiring looms; enclosures and supports

Terminating power, signal and communication cables: requirements; plugs/sockets and connectors types and applications; assembly/disassembly plugs/sockets and connectors

Accessories and fixings appropriate to industry sector: types of accessories and applications; fixing devices and methods

Workshop Practices

Identification and application of tools for: marking out a measuring; cutting; shaping; drilling; threading; tapping; finishing; dismantling/assembling

Tool use: hazards; safety procedures; techniques

Fabrication: materials, types, applications; techniques, marking out, cutting, bending, drilling/punching, soldering, cutting mitres

Assembly/disassembly techniques

Introduction to Welding

Welding processes: manual metal arc welding; gas metal arc welding; oxyacetylene welding; gas tungsten arc welding; submerged arc welding; resistance welding; fuel gas cutting; plasma cutting; industrial uses

Brazing: process description; consumables; flame setting; joints; typical uses; safety; application; weld horizontal

Thermal cutting: principles of operation; process description; manual cutting; machine straight line cutting; gases - oxygen, acetylene, LPG; nozzles; cutting aids; machine cutting; cutting faults ;safety; application, flame cut shapes and bevels

Manual metal arc welding: process description; equipment; consumables; typical uses; safety; application, fillet weld in the flat position

Flammable and hazardous location: hazardous locations; confined spaces; containers used for flammable materials; safety procedures and responsibilities

Electrotech Engineering Practices

Building materials: cement sheet; masonry; plaster; timber - treated pine, untreated pine, hardwood, plywood, particle board, cedar

Adhesives: PVA wood gules; araldite; liquid nails; multipurpose adhesives

Hand skills: hammering; screwing; sawing/cutting; filing/rasping; chiselling; sanding; clamping; mitring; joining; plastering; rendering; drilling - wood, masonry/concrete and steel, drill sharpening, care/maintenance of drills

Soldering: techniques - soldering irons, gas, solder pot (basting), brazing, CAD welding; materials - solder - tin-lead alloy, silver and silver alloy; flux – passive and active

Crimping: techniques – ratchet, compression; lugs – stanco, courtney, pre-insulated, un-insulated, patch leads; compounds

Cable joins: tee; whye; marriage

Conduit/Truck/Ducting: pvc – flexible, rigid; steel – flexible, rigid; pipe – round, square; dual purpose/segregated

Cable tray/ladder: perforated tray; mesh

Fasteners: saddles – pvc, steel, ramset; unistrut supports; catenary supports; plugs - masonry anchor, nylon, wood, loxins; toggle bolts – spring, gravity; turn buckles; screws/bolts - metal thread, self tapping, wood, dynabolts, eye bolts, U-bolts

Fastening devices/tools: battery drills; battery screw drivers; manual fasteners – screwdrivers, flat, phillips and posidrive; spanners – open, ring and socket; grips – multi and vice

**Produce routine products for carrying out Electrotech work activities –
Work performance**

Produce routine products for carrying out Electrotech work activities in any one or more of the above *categories* across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment

UTE NES055 A

Produce routine tools/devices for carrying out Electrotech work activities

Descriptor: Routine tools/devices required to do work in the Electrotechnology environment are produced in accordance with the schedule of work ensuring work is completed in an agreed time, to a quality standard and with a minimum waste.

Elements		Performance criteria
055.1	Prepare produce routine tools and devices	055.1.1 Instructions for the preparation of the work activity are communicated and confirmed to ensure clear understanding
		055.1.2 <i>OH&S policies and procedures</i> are communicated and confirmed to ensure they are understood as to be applied in the carrying out of the work
		055.1.3 Tools, <i>equipment</i> and personnel protective equipment needed to do the work are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with <i>established procedures</i>
		055.1.4 <i>Appropriate personnel</i> are consulted to ensure the work is coordinated effectively with others involved
		055.1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with <i>established procedures</i>
		055.1.6 Schedule of work including practices for working safely are confirmed as in accordance with instructions and <i>requirements</i>
055.2	Produce routine tools and devices	055.2.1 <i>OH&S policies and procedures</i> and safe work practices are followed to eliminate or minimise incidents
		055.2.2 Schedule of work is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste
		055.2.3 Further instructions are sought from <i>appropriate personnel</i> in the event of unplanned events or conditions occurring

Elements	Performance criteria
	055.2.4 On going checks of quality of the work are undertaken in accordance with instructions and <i>requirements</i>
055.3 Check results routine tools and devices produced	055.3.1 Final checks are made to ensure the completed work conforms with instructions and to <i>requirements</i> 055.3.2 <i>Appropriate personnel</i> are notified of completion of the work 055.3.3 Tools, <i>equipment</i> and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with <i>established procedures</i> 055.3.4 Work area is cleaned up and made safe and <i>sustainable energy practices</i> are followed 055.3.5 Appropriate records are updated in accordance with instructions and <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in *italics*, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Routine tools and devices may include the production of items such as hammers, punches, measuring devices, levers and the like using a variety of materials such as metal, aluminium, wood, bakelite and the like.

Electrotechnology environment includes one or more the following *category* or allied industry areas:

Computer Systems

Data Communications

Electronics

Electrical

Instrumentation

Refrigeration and Air conditioning

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation,

regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge and Skills'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be reported in accordance with the Regulator's requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in one or more of the following *category* areas: *Computer Systems; Data Communications; Electronics; Electrical; Instrumentation; Refrigeration and Air conditioning and/or allied industry areas*.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit should include related underpinning specified knowledge and skills associated with other units within the respective endorsed qualification structure, where appropriate.

Additionally, this unit should be assessed in conjunction with or after competency has been demonstrated in UTE NES060 Carry out routine work activities in an Electrotech environment, UTE NES050 Identify & select components/ accessories/ materials for Electrotech work activities and UTE NES051 Use of routine equipment/ plant/ technologies in an Electrotech Environment.

Underpinning knowledge and skills

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

Note: The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to the topic of *Electrotechnology Systems, Materials and Accessories* detailed below. Appropriate measures for this topic must be put in place to ensure a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any voltages that exceed extra low voltage. Extra low voltage is defined in Standards Australia publications, eg. SA/NZ 3000:2001. However, the use of such equipment does not negate the duty of care in treating electricity other than as a hazard.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

Underpinning knowledge and skills topics pertaining to this unit – listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:

Topics:

- **Drawing Interpretation and Sketching**
- **Electrotechnology Systems, Materials and Accessories**
- **Workshop Practices**
- **Introduction to Optics**
- **CAD for Electrotechnology**
- **Produce routine tools/devices for carrying out Electrotech work activities – Work performance**

Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from DEST's website.

Drawing Interpretation and Sketching

Technical drawing standards appropriate to the industry sector, conventions and specifications to AS 1100, with strong emphasis on interpretation: sheet types, title block information, materials parts list, revision table, grid referencing scales, line types – visible outlines, hidden outlines, dimensioning lines, centre lines; orthogonal projection of views – 3rd angle (detail and assembly drawings); mechanical conventions; fabrication conventions; three dimensional view drawings – axonometric, isometric, oblique; sectioning standards and conventions – whole, part; engineering drawing symbols, components and equipment – mechanical, electrical, electronic, computer, instrument, refrigeration; dimensioning – orthogonal, isometric; layout and plans; geometric tolerance interpretation (straightness, flatness, squareness, parallelism and concentricity only); engineering abbreviations; drawing interpretation techniques – detail drawings, orthogonal projection (3rd angle only) and three dimensional, assembly drawings and three dimensions exploded (e.g. as in equipment manuals)

Equipment and service manuals: flow charts; assembly/disassembly diagrams; schematic diagrams; block diagrams; trouble shooting guides

Freehand drawing skills appropriate to the industry sector: 3rd angle orthogonal projections; isometric; interpretation of drawing symbols; practical exercises

Electrotechnology Systems, Materials and Accessories

Overview of Electrical Power System: generation system – fossil fuel and renewable sources, co-generation and typical power station equipment; transmission system – types and equipment; distribution system – equipment; grid system

Overview of Telecommunication System: customer access network (CAN); customer premises equipment (CPE)

Statutory requirements and standards: scope of work permitted by various licences; legislated requirements; purpose of technical standards; role of standards bodies; use of technical standards

Cables: types – power, signal, communication; terms; colour coding; structure; identification; cable applications

Wiring systems: types; wiring looms; enclosures and supports

Terminating power, signal and communication cables: requirements; plugs/sockets and connectors types and applications; assembly/disassembly plugs/sockets and connectors

Accessories and fixings appropriate to industry sector: types of accessories and applications; fixing devices and methods

Workshop Practices

Identification and application of tools for: marking out a measuring; cutting; shaping; drilling; threading; tapping; finishing; dismantling/assembling

Tool use: hazards; safety procedures; techniques

Fabrication: materials, types, applications; techniques, marking out, cutting, bending, drilling/punching, soldering, cutting mitres

Assembly/disassembly techniques

Introduction to Optics

Introduction to Optics: Photonics – applications, advantages, disadvantages

Optical Fibre: Optical fibre – construction, types, physical properties and characteristics; glass cladding; bend radius; specifications

Optics and light: electromagnetic spectrum; light as an electromagnetic wave; the particle properties of light; transmission of light

Optic fibre: safety requirements; connectors; splicing/Joining; sensors; lasers

CAD for Electrotechnology

Computer Systems (Introduction): types; computer hardware; computer software; Windows 95 – 98, 2000 NT and new platforms

CAD programs (eg AutoCAD 14)

CAD basics: terminologies; commands - window/frames, menus, toolbars, opening / closing files

Design: domestic floor plans; SAA symbols; electrical services; dimensioning style - vertical, horizontal, angular, continuous, editing

Printing/plotting: selection; setup; paper selection - A1, A2, A3, A4, A5; scaling - manual and best fit

Creating text: text entry; spelling; customisation - font, characters, size, colour

Produce routine tools/devices for carrying out Electrotech work activities – Work performance

Produce routine tools/devices for carrying out Electrotech work activities in any one or more of the above *categories* across a *representative range* of apparatus

and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment

UTE NES056 A

Apply technologies and concepts to Electrotech work activities

Descriptor: Undertake Electrotechnology work activities using a range of technologies such as computers and the like, and apply analytical concepts to achieve the desired outcome ensuring work is completed in an agreed time, to a quality standard and with a minimum of waste.

Elements	Performance criteria
056.1 Prepare to apply technologies and concepts	<p>056.1.1 Instructions for the preparation to apply technologies and concepts are communicated and confirmed to ensure clear understanding</p> <p>056.1.2 <i>OH&S policies and procedures</i> are communicated and confirmed to ensure they are understood as to be applied in the carrying out of the work</p> <p>056.1.3 Tools, <i>equipment</i> and personnel protective equipment needed to do the work are identified, scheduled and checked, where appropriate, to ensure they work correctly as intended and are safe to use in accordance with <i>established procedures</i></p> <p>056.1.4 <i>Appropriate personnel</i> are consulted to ensure the work is coordinated effectively with others involved</p> <p>056.1.5 Resources and materials needed to apply technologies and concepts are confirmed, scheduled and obtained in accordance with <i>established procedures</i></p> <p>056.1.6 Schedule to apply technologies and concepts including practices for working safely are confirmed as in accordance with instructions and <i>requirements</i></p>
056.2 Use technologies and apply concepts to the carrying out of work	<p>056.2.1 <i>OH&S policies and procedures</i> and safe work practices are followed to eliminate or minimise incidents</p> <p>056.2.2 Schedule of using technologies and applying concepts to the achieving the desired outcome is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste</p> <p>056.2.3 Further instructions are sought from <i>appropriate personnel</i> in the event of unplanned events or conditions occurring</p>

Elements	Performance criteria
	056.2.4 On going checks of quality of the work are undertaken in accordance with instructions and <i>requirements</i>
056.3 Check results in the use of technologies and applications of concepts	<p>056.3.1 Final checks are made to ensure the use of technologies and applications of concepts conforms with instructions and to <i>requirements</i></p> <p>056.3.2 <i>Appropriate personnel</i> are notified of completion in the use of technologies and applications of concepts</p> <p>056.3.3 Tools, <i>equipment</i> and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with <i>established procedures</i></p> <p>056.3.4 Work area is cleaned up and made safe and <i>sustainable energy practices</i> are followed</p> <p>056.3.5 Appropriate records are updated in accordance with instructions and <i>established procedures</i></p>

Range statement

General

Generic items in this unit are shown in italics, eg. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Technologies include personal computers (PCs), related software and the like and, the application of analytical concepts to achieve the desired outcome(s).

Electrotechnology environment includes one or more the following *category* or allied industry areas:

Computer Systems

Data Communications

Electronics

Electrical

Instrumentation

Refrigeration and Air conditioning

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation,

regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge and Skills'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be reported in accordance with the Regulator's requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in one or more of the following *category* areas: *Computer Systems; Data Communications; Electronics; Electrical; Instrumentation; Refrigeration and Air conditioning and/or allied industry areas*.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit should include related underpinning specified knowledge and skills associated with other units within the respective endorsed qualification structure, where appropriate.

Additionally, this unit should be assessed in conjunction with or after competency has been demonstrated in UTE NES060 Carry out routine work activities in an Electrotech environment, UTE NES050 Identify & select components/ accessories/ materials for Electrotech work activities and UTE NES051 Use of routine equipment/ plant/ technologies in an Electrotech Environment.

Underpinning knowledge and skills

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

Note: The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to the topic of *Electrotechnology Systems, Materials and Accessories* detailed below. Appropriate measures for this topic must be put in place to ensure a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any voltages that exceed extra low voltage. Extra low voltage is defined in Standards Australia publications, eg. SA/NZ 3000:2001. However, the use of such equipment does not negate the duty of care in treating electricity other than as a hazard.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

Underpinning knowledge and skills topics pertaining to this unit – listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:

Topics:

- **Drawing Interpretation and Sketching**
- **Electrotechnology Systems, Materials and Accessories**
- **Workshop Practices**
- **Application Software Introduction**
- **PC Hardware and Configuration**
- **Apply technologies and concepts to Electrotech work activities – Work performance**

Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from ANTA's website.

Drawing Interpretation and Sketching

Technical drawing standards appropriate to the industry sector, conventions and specifications to AS 1100, with strong emphasis on interpretation: sheet types, title block information, materials parts list, revision table, grid referencing scales, line types – visible outlines, hidden outlines, dimensioning lines, centre lines; orthogonal projection of views – 3rd angle (detail and assembly drawings); mechanical conventions; fabrication conventions; three dimensional view drawings – axonometric, isometric, oblique; sectioning standards and conventions – whole, part; engineering drawing symbols, components and equipment – mechanical, electrical, electronic, computer, instrument, refrigeration; dimensioning – orthogonal, isometric; layout and plans; geometric tolerance interpretation (straightness, flatness, squareness, parallelism and concentricity only); engineering abbreviations; drawing interpretation techniques – detail drawings, orthogonal projection (3rd angle only) and three dimensional, assembly drawings and three dimensions exploded (e.g. as in equipment manuals)

Equipment and service manuals: flow charts; assembly/disassembly diagrams; schematic diagrams; block diagrams; trouble shooting guides

Freehand drawing skills appropriate to the industry sector: 3rd angle orthogonal projections; isometric; interpretation of drawing symbols; practical exercises

Electrotechnology Systems, Materials and Accessories

Overview of Electrical Power System: generation system – fossil fuel and renewable sources, co-generation and typical power station equipment; transmission system – types and equipment; distribution system – equipment; grid system

Overview of Telecommunication System: customer access network (CAN); customer premises equipment (CPE)

Statutory requirements and standards: scope of work permitted by various licences; legislated requirements; purpose of technical standards; role of standards bodies; use of technical standards

Cables: types – power, signal, communication; terms; colour coding; structure; identification; cable applications

Wiring systems: types; wiring looms; enclosures and supports

Terminating power, signal and communication cables: requirements; plugs/sockets and connectors types and applications; assembly/disassembly plugs/sockets and connectors

Accessories and fixings appropriate to industry sector: types of accessories and applications; fixing devices and methods

Workshop Practices

Identification and application of tools for: marking out a measuring; cutting; shaping; drilling; threading; tapping; finishing; dismantling/assembling

Tool use: hazards; safety procedures; techniques

Fabrication: materials, types, applications; techniques, marking out, cutting, bending, drilling/punching, soldering, cutting mitres

Assembly/disassembly techniques

Application Software Introduction

Introduction to computers: types of computers; hardware identification; peripherals; common computer terminology

Introduction to computer operating systems: MS Windows - current versions; Windows NT; Macintosh; Other operating systems

Computers usage: load and run a simple program; enter data; save data; retrieve data; manipulate data

Software applications: office support - word processing, data base, spread sheet, graphics, record keeping (stores, bill back); communication – email, schedule, fax; networks; machine control

PC Hardware and Configuration

Introduction: laboratory familiarisation; electrical and mechanical safety; identification and use of hand tools

Computer PC hardware: motherboard/s and their major components; power supplies; keyboards; monitors and video adaptors; disk drives; printers; memory – primary, secondary (media and recording techniques), cache; additions, ie. mouse, CD ROM, etc.; configuration documentation – DIP switch settings; diagnostic software; analysis of user requirements

Operating systems: types of operating systems and versions thereof; file and data structures; file naming conventions; directory structures and access; operating system bootstrapping process; operating system commands; basic concepts of batch (startup) files and their use; basic concepts of configuration files

Skills: digital component identification; socket type integrated circuit removal and insertion; cable troubleshooting and repair; using technical service data

Instruments: introduction to the Digital Multimeter; in-circuit voltage measurements; continuity and resistance measurements

Apply technologies and concepts to Electrotech work activities – Work performance

Apply technologies and concepts to Electrotech work activities in any one or more of the above *categories* across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment

UTE NES057 A

Apply computation when using equipment/materials/concepts in an Electrotech environment

Descriptor: Undertake computations to produce appropriate results using a range of equipment, materials and concepts in carrying out Electrotechnology work activities, whilst ensuring work is completed in an agreed time, to a quality standard and with a minimum of waste.

Elements	Performance criteria
057.1 Prepare to apply computations when using equipment, materials and concepts	<p>057.1.1 Instructions for the preparation to apply computations when using equipment, materials or concepts are communicated and confirmed to ensure clear understanding</p> <p>057.1.2 <i>OH&S policies and procedures</i> are communicated and confirmed to ensure they are understood as to be applied in the carrying out of the work</p> <p>057.1.3 Tools, <i>equipment</i> and personnel protective equipment needed to do the work are identified, scheduled and checked, where appropriate, to ensure they work correctly as intended and are safe to use in accordance with <i>established procedures</i></p> <p>057.1.4 <i>Appropriate personnel</i> are consulted to ensure computations when using equipment, materials or concepts is coordinated effectively with others involved</p> <p>057.1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with <i>established procedures</i></p> <p>057.1.6 Schedule of computations to be applied when using equipment, materials or concepts including practices for working safely are confirmed as in accordance with instructions and <i>requirements</i></p>
057.2 Carry out computations when using equipment, materials and concepts	<p>057.2.1 <i>OH&S policies and procedures</i> and safe work practices are followed to eliminate or minimise incidents</p> <p>057.2.2 Schedule of computations is followed to ensure the use equipment, materials or concepts is completed in an agreed time, to a quality standard and with a minimum of waste</p>

Elements	Performance criteria
	057.2.3 Further instructions are sought from <i>appropriate personnel</i> in the event of unplanned events or conditions occurring 057.2.4 On going checks of quality of the computations are undertaken in accordance with instructions and <i>requirements</i>
057.3 Confirm results of computations when using equipment, materials and concepts	057.3.1 Final checks are made to ensure the computations applied when using equipment, materials or concepts conforms with instructions and to <i>requirements</i> 057.3.2 <i>Appropriate personnel</i> are notified of completion of the computations 057.3.3 Tools, <i>equipment</i> and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with <i>established procedures</i> 057.3.4 Work area is cleaned up and made safe and <i>sustainable energy practices</i> are followed 057.3.5 Appropriate records are updated in accordance with instructions and <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in *italics*, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Electrotechnology environment includes one or more the following *category* or allied industry areas:

Computer Systems

Data Communications

Electronics

Electrical

Instrumentation

Refrigeration and Air conditioning

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation,

regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge and Skills'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be reported in accordance with the Regulator's requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in one or more of the following *category* areas: *Computer Systems; Data Communications; Electronics; Electrical; Instrumentation; Refrigeration and Air conditioning and/or allied industry areas*.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit should include related underpinning specified knowledge and skills associated with other units within the respective endorsed qualification structure, where appropriate.

Additionally, this unit should be assessed in conjunction with or after competency has been demonstrated in UTE NES060 Carry out routine work activities in an Electrotech environment, UTE NES050 Identify & select components/ accessories/ materials for Electrotech work activities and UTE NES051 Use of routine equipment/ plant/ technologies in an Electrotech Environment.

Underpinning knowledge and skills

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

Note: The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to the topic of *Electrotechnology Systems, Materials and Accessories* detailed below. Appropriate measures for this topic must be put in place to ensure a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any voltages that exceed extra low voltage. Extra low voltage is defined in Standards Australia publications, eg. SA/NZ 3000:2001. However, the use of such equipment does not negate the duty of care in treating electricity other than as a hazard.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

Underpinning knowledge and skills topics pertaining to this unit – listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:

Topics:

- **Projects for Electrotech Vocations**
- **Drawing Interpretation and Sketching**
- **Electrotechnology Systems, Materials and Accessories**
- **Workshop Practices**
- **Applied Mathematics Concepts 1**
- **Applied Mathematics Concepts 2**
- **Apply computation when using equipment/materials/concepts in an Electrotech environment – Work performance**

Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from ANTA's website.

Projects for Electrotech Vocations

Project Planning: research; aims and objectives of the project; application of project in the Electrotechnology industry

Reporting/Documentation: written; drawings/sketches

Project Building: material requirement; assembly; final testing

Presentation: overview of project; aims/objectives; operating principles; conclusion

Drawing Interpretation and Sketching

Technical drawing standards appropriate to the industry sector, conventions and specifications to AS 1100, with strong emphasis on interpretation: sheet types, title block information, materials parts list, revision table, grid referencing scales, line types – visible outlines, hidden outlines, dimensioning lines, centre lines; orthogonal projection of views – 3rd angle (detail and assembly drawings); mechanical conventions; fabrication conventions; three dimensional view drawings – axonometric, isometric, oblique; sectioning standards and conventions – whole, part; engineering drawing symbols, components and equipment – mechanical, electrical, electronic, computer, instrument, refrigeration; dimensioning – orthogonal, isometric; layout and plans; geometric tolerance interpretation (straightness, flatness, squareness, parallelism and concentricity only); engineering abbreviations; drawing interpretation techniques – detail drawings, orthogonal projection (3rd angle only) and three dimensional, assembly drawings and three dimensions exploded (e.g. as in equipment manuals)

Equipment and service manuals: flow charts; assembly/disassembly diagrams; schematic diagrams; block diagrams; trouble shooting guides

Freehand drawing skills appropriate to the industry sector: 3rd angle orthogonal projections; isometric; interpretation of drawing symbols; practical exercises

Electrotechnology Systems, Materials and Accessories

Overview of Electrical Power System: generation system – fossil fuel and renewable sources, co-generation and typical power station equipment;

transmission system – types and equipment; distribution system – equipment; grid system

Overview of Telecommunication System: customer access network (CAN); customer premises equipment (CPE)

Statutory requirements and standards: scope of work permitted by various licences; legislated requirements; purpose of technical standards; role of standards bodies; use of technical standards

Cables: types – power, signal, communication; terms; colour coding; structure; identification; cable applications

Wiring systems: types; wiring looms; enclosures and supports

Terminating power, signal and communication cables: requirements; plugs/sockets and connectors types and applications; assembly/disassembly plugs/sockets and connectors

Accessories and fixings appropriate to industry sector: types of accessories and applications; fixing devices and methods

Workshop Practices

Identification and application of tools for: marking out a measuring; cutting; shaping; drilling; threading; tapping; finishing; dismantling/assembling

Tool use: hazards; safety procedures; techniques

Fabrication: materials, types, applications; techniques, marking out, cutting, bending, drilling/punching, soldering, cutting mitres

Assembly/disassembly techniques

Applied Mathematics Concepts 1

Linear Measurement: Precision and error of measurement - significant figures, relative and % errors, scientific notation on a calculator; Conversion of linear units - review of perimeter of plane figures; Pythagoras' theorem; Perimeter of polygons; Arc lengths; Perimeter of shapes involving arcs

Spatial Measurement: Areas of combined shapes; Volume and surface area of solids; Applied problems

Right triangle trigonometry: Revision of right-angled triangles trigonometry; Angles of elevation/depression, and compass directions (bearings); Vocational problems involving both trigonometric ratios and Pythagora's Rule; Applications to the inclined plane

Sine and Cosine Rule: Sine rule and area of a triangle rule; Cosine rule; Applications of the three rules

Surveying: Radial survey; Triangulation survey using sine rule; Use of Simpson's rule to find the area between a curve and a straight line

Algebra: Algebraic operations; Solutions of linear equations; Substitution into simple non-linear equations; Transposition of non-linear equations

Linear Graphs: Graphing linear functions; Application of the linear function - derive formula from graphs and tables; Simultaneous equations – both graphical and algebraic solutions; Practical applications (cost/revenue, supply/demand); Find line of best fit graphically, then determine equation

Polynomials: Types of polynomials - add/subtract, multiply polynomials; Factorising trinomials; Solution of quadratic equations using both factorising method and formula

Quadratic Graphs: Properties of the parabola – symmetry, axis of symmetry, turning point; Graphic quadratic functions $y = ax^2 + bx + c$; Finding maximum and minimum values of quadratic functions by using axis of symmetry/turning point; Application of quadratic functions to problems - maxima and minima problems, solution of quadratic equations graphically

Applications: Graphic trig functions (sine/cosine only); Applications in the physical sciences

Or equivalent Year 12 High School Mathematics 1 that meets respective University Admittance Index (UAI) or Tertiary Entrance Rank (TER)

Applied Mathematics Concepts 2

Presentation of Data: What are statistics and who uses them?; Frequency distributions - frequency tables, histograms and polygons, stem and leaf plots; Range of visual presentations - comparisons – tables versus graphs, introduction to spreadsheets to present data graphically

Sampling (collecting data): Design and use of experiments, surveys and census; Selecting a sample using various sampling techniques; Coding and tabulating responses

Describing Distributions: Measures of central tendency - determination and uses of mode, median and mean; Estimating percentiles and deciles from cumulative frequency polygons (ogives); Interpreting data from tables and graphs - interpolation/extrapolation; Analysis of misleading graphs

Measures of Dispersion: Box-and-whisker graphs; Measuring dispersion - variance & standard deviation; Standardisation – using Z-scores to compare different sets of scores and standardising scores

Correlation and Linear Regression: Correlation - scatter diagrams, calculation of correlation coefficient for a set of data; Regression lines - calculation of the regression equation, using the regression line for prediction

Experimental and Theoretical Probability: Simple experiments with dice, spinners etc. to investigate equally likely outcomes; The addition theory of probability; Complementary events; Compound events – probability trees, arrays, etc.; Simple counting techniques - use of “box filling” method

Applications of Probability: Gambling games; Expected outcomes – the use of probability in real life situations such as insurance, investments etc.; Counting techniques – factorial, permutations, combinations

Pascal's Triangle and the Normal Curve: Pascal's triangle; Applications; Normal probability distribution - probabilities using 1, 2 and 3 standard deviations

Or equivalent Year 12 High School Mathematics 2 that meets respective University Admittance Index (UAI) or Tertiary Entrance Rank (TER)

Apply computation when using equipment/materials/concepts in an Electrotech environment – Work performance

Apply computation when using equipment/materials/concepts in an Electrotech environment in any one or more of the above *categories* across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment

UTE NES058 A

Identify affects of energy on machinery/materials in an Electrotech environment

Descriptor: Affects of energy on machinery and/or materials used in an Electrotechnology environment are identified and completed in an agreed time, to a quality standard and using appropriate technology mediums, where required.

Elements	Performance criteria
058.1 Prepare to identify affects of energy on machinery and materials	058.1.1 Instructions for the preparation to identify affects of energy on machinery or materials are communicated and confirmed to ensure clear understanding
	058.1.2 <i>OH&S policies and procedures</i> are communicated and confirmed to ensure they are understood as to be applied in the carrying out of the work
	058.1.3 Tools, <i>equipment</i> and personnel protective equipment needed to do the work are identified, scheduled and checked, where appropriate, to ensure they work correctly as intended and are safe to use in accordance with <i>established procedures</i>
	058.1.4 <i>Appropriate personnel</i> are consulted to ensure affects of energy on machinery or materials are identified and coordinated effectively with others involved
	058.1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with <i>established procedures</i>
	058.1.6 Schedule for identifying affects of energy on machinery or materials including practices for working safely are confirmed as in accordance with instructions and <i>requirements</i>
058.2 Identify affects of energy on machinery and materials	058.2.1 <i>OH&S policies and procedures</i> and safe work practices are followed to eliminate or minimise incidents
	058.2.2 Schedule for identifying affects of energy on machinery or materials work is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste

Elements	Performance criteria
	058.2.3 Further instructions are sought from <i>appropriate personnel</i> in the event of unplanned events or conditions occurring 058.2.4 On going checks of quality of the work are undertaken in accordance with instructions and <i>requirements</i>
058.3 Check results of the affects of energy on machinery and materials	058.3.1 Final checks are made to ensure the affects of energy on machinery or materials as identified conforms with instructions and to <i>requirements</i> 058.3.2 <i>Appropriate personnel</i> are notified of completion of the affects of energy on machinery or materials 058.3.3 Tools, <i>equipment</i> and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with <i>established procedures</i> 058.3.4 Work area is cleaned up and made safe and <i>sustainable energy practices</i> are followed 058.3.5 Appropriate records are updated in accordance with instructions and <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in *italics*, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Electrotechnology environment includes one or more the following *category* or allied industry areas:

Computer Systems

Data Communications

Electronics

Electrical

Instrumentation

Refrigeration and Air conditioning

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation,

regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge and Skills'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be reported in accordance with the Regulator's requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in one or more of the following *category* areas: *Computer Systems; Data Communications; Electronics; Electrical; Instrumentation; Refrigeration and Air conditioning and/or allied industry areas*.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit should include related underpinning specified knowledge and skills associated with other units within the respective endorsed qualification structure, where appropriate.

Additionally, this unit should be assessed in conjunction with or after competency has been demonstrated in UTE NES060 Carry out routine work activities in an Electrotech environment, UTE NES050 Identify & select components/ accessories/ materials for Electrotech work activities and UTE NES051 Use of routine equipment/ plant/ technologies in an Electrotech Environment.

Underpinning knowledge and skills

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

Note: The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to the topic of *Electrotechnology Systems, Materials and Accessories* detailed below. Appropriate measures for this topic must be put in place to ensure a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any voltages that exceed extra low voltage. Extra low voltage is defined in Standards Australia publications, eg. SA/NZ 3000:2001. However, the use of such equipment does not negate the duty of care in treating electricity other than as a hazard.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

Underpinning knowledge and skills topics pertaining to this unit – listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:

Topics:

Projects for Electrotech Vocations

Drawing Interpretation and Sketching

Electrotechnology Systems, Materials and Accessories

Workshop Practices

Applied Physics Concepts 1

Applied Physics Concepts 2

Identify affects of energy on machinery/materials in an Electrotech environment – Work performance

Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from ANTA's website.

Projects for Electrotech Vocations

Project Planning: research; aims and objectives of the project; application of project in the Electrotechnology industry

Reporting/Documentation: written; drawings/sketches

Project Building: material requirement; assembly; final testing

Presentation: overview of project; aims/objectives; operating principles; conclusion

Drawing Interpretation and Sketching

Technical drawing standards appropriate to the industry sector, conventions and specifications to AS 1100, with strong emphasis on interpretation: sheet types, title block information, materials parts list, revision table, grid referencing scales, line types – visible outlines, hidden outlines, dimensioning lines, centre lines; orthogonal projection of views – 3rd angle (detail and assembly drawings); mechanical conventions; fabrication conventions; three dimensional view drawings – axonometric, isometric, oblique; sectioning standards and conventions – whole, part; engineering drawing symbols, components and equipment – mechanical, electrical, electronic, computer, instrument, refrigeration; dimensioning – orthogonal, isometric; layout and plans; geometric tolerance interpretation (straightness, flatness, squareness, parallelism and concentricity only); engineering abbreviations; drawing interpretation techniques – detail drawings, orthogonal projection (3rd angle only) and three dimensional, assembly drawings and three dimensions exploded (e.g. as in equipment manuals)

Equipment and service manuals: flow charts; assembly/disassembly diagrams; schematic diagrams; block diagrams; trouble shooting guides

Freehand drawing skills appropriate to the industry sector: 3rd angle orthogonal projections; isometric; interpretation of drawing symbols; practical exercises

Electrotechnology Systems, Materials and Accessories

Overview of Electrical Power System: generation system – fossil fuel and renewable sources, co-generation and typical power station equipment;

transmission system – types and equipment; distribution system – equipment; grid system

Overview of Telecommunication System: customer access network (CAN); customer premises equipment (CPE)

Statutory requirements and standards: scope of work permitted by various licences; legislated requirements; purpose of technical standards; role of standards bodies; use of technical standards

Cables: types – power, signal, communication; terms; colour coding; structure; identification; cable applications

Wiring systems: types; wiring looms; enclosures and supports

Terminating power, signal and communication cables: requirements; plugs/sockets and connectors types and applications; assembly/disassembly plugs/sockets and connectors

Accessories and fixings appropriate to industry sector: types of accessories and applications; fixing devices and methods

Workshop Practices

Identification and application of tools for: marking out a measuring; cutting; shaping; drilling; threading; tapping; finishing; dismantling/assembling

Tool use: hazards; safety procedures; techniques

Fabrication: materials, types, applications; techniques, marking out, cutting, bending, drilling/punching, soldering, cutting mitres

Assembly/disassembly techniques

Applied Physics Concepts 1

Motion in two dimensions: projectile motion - vertical and horizontal components of velocity, determination of the vertical component of velocity, resolution of velocity into components, time of flight, range, effect of air resistance, *-application: projectiles in sport*; uniform circular motion – centripetal acceleration, force causing the centripetal acceleration, *-application: the banking of road curves*; gravitation and satellites – Newton's law of universal gravitation, satellites in circular orbits, *-application: weather and communication satellites*; momentum in two dimensions – vector form of Newton's second law of motion, Newton's second law of motion in terms of momentum, law of conservation of momentum, *-application: rockets*

Electricity and magnetism: electric fields – Coulomb's law, principle of superposition, electric field, pictorial representation of electric fields, superposition of electric fields, electric field due to one or two charged plates, electric fields and conductors, electric field inside a hollow conductor, electric fields near sharp points, *-application: photocopiers and laser printers*; the motion of charges particles in electric fields – electric potential difference, acceleration in a constant electric field, motion of a charged particle in a constant electric field, *-application: the use of electric fields in cyclotrons*; magnetic

fields – magnetic fields and their pictorial representation, magnetic force on a current-carrying conductor, *-application: the moving-coil loudspeaker*; the motion of charges particles in magnetic fields – force on a charged particle in a magnetic field, motion of a charged particle at right angles to a magnetic field, *-application: the use of magnetic fields in cyclotrons*

Or Year 12 High School Physics 1 that meets respective University Admittance Index (UAI) or Tertiary Entrance Rank (TER) or equivalent

Applied Physics Concepts 2

Light and matter: electromagnetic waves – characteristics of electromagnetic waves, speed/ frequency/ and wavelength, *-application: laser airborne depth sounder (LADS)*; the interference of light – coherent wave sources, interference, two-source interference, diffraction, two-slit interference, transmission diffraction gratings, speckle, *-application: compact discs*; photons – photons, the photoelectric effect, x-rays, *-application: the use of x-rays in medicine*; wave behaviour of particles – wave behaviour of particles, experimental evidence for wave behaviour of particles, *-application: electron microscopes*

Atoms and nuclei: the structure of the atom – line emission spectrum, energy levels in atoms, spectrum of atomic hydrogen, ionisation energy, continuous spectrum, line absorption spectrum, fluorescence, stimulated emission, *-application: lasers*; the structure of the nucleus – composition of nuclei, the nucleon force, isotopes, mass defect and binding energy, conservation laws in nuclear reactions, *-application: the production of radioisotopes*; radioactivity – stable and unstable nuclei, types of decay of unstable nuclei, alpha decay, beta minus decay, beta plus decay, half-life and activity, *-application: radioactive dating*, some properties of radioactive emissions, the effects of ionising radiation on living matter; nuclear fission and fusion – spontaneous and induced nuclear fission, chain reaction, *-application: fission nuclear power*, nuclear fusion

Skills: experimental skills – purpose and variables, procedure, observation, presentation, interpretation; investigation design skills – designing and investigation, evaluating and investigation; information skills – planning an information search, searching for information, evaluating information; communication skills – oral communication, written communication, evaluation of oral and written communications

Or Year 12 High School Physics 2 that meets respective University Admittance Index (UAI) or Tertiary Entrance Rank (TER) or equivalent

Identify affects of energy on machinery/materials in an Electrotech environment – Work performance

Identify affects of energy on machinery/materials in an Electrotech environment in any one or more of the above *categories* across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment

UTE NES059 A

Identify building techniques, methods and materials used in Electrotech work activities

Descriptor: Identify a range of techniques, methods and materials used in Electrotechnology work activities including types of fixing devices, segregation requirements, fixing structures, walls and floor structures, lifting techniques and other related building materials.

Elements	Performance criteria
059.1 Prepare to identify building techniques, methods and materials	<p>059.1.1 Instructions for the preparation to identify building techniques, methods and materials used in Electrotech work are communicated and confirmed to ensure clear understanding</p> <p>059.1.2 <i>OH&S policies and procedures</i> are communicated and confirmed to ensure they are understood as to be applied in the carrying out of the work</p> <p>059.1.3 Tools, <i>equipment</i> and personnel protective equipment needed to do the work are identified, scheduled and checked, where appropriate, to ensure they work correctly as intended and are safe to use in accordance with <i>established procedures</i></p> <p>059.1.4 <i>Appropriate personnel</i> are consulted to ensure the identification of building techniques, methods and materials used is coordinated effectively with others involved</p> <p>059.1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with <i>established procedures</i></p> <p>059.1.6 Schedule for identifying building techniques, methods and materials used including practices for working safely are confirmed as in accordance with instructions and <i>requirements</i></p>
059.2 Identify building techniques, methods and materials	<p>059.2.1 <i>OH&S policies and procedures</i> and safe work practices are followed to eliminate or minimise incidents</p> <p>059.2.2 Schedule to identify building techniques, methods and materials used is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste</p>

Elements	Performance criteria
	059.2.3 Further instructions are sought from <i>appropriate personnel</i> in the event of unplanned events or conditions occurring 059.2.4 On going checks of quality of the work are undertaken in accordance with instructions and <i>requirements</i>
059.3 Confirm building techniques, methods and materials used	059.3.1 Final checks are made to ensure the identification of building techniques, methods and materials used conforms with instructions and to <i>requirements</i> 059.3.2 <i>Appropriate personnel</i> are notified of completion to identify techniques, methods and materials used 059.3.3 Tools, <i>equipment</i> and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with <i>established procedures</i> 059.3.4 Work area is cleaned up and made safe and <i>sustainable energy practices</i> are followed 059.3.5 Appropriate records are updated in accordance with instructions and <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in *italics*, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Techniques, methods, and materials used in Electrotechnology work activities may include types of fixing devices, segregation requirements, fixing structures, walls and floor structures, lifting techniques and other related building materials.

Electrotechnology environment includes one or more the following *category* or allied industry areas:

Computer Systems

Data Communications

Electronics

Electrical

Instrumentation

Refrigeration and Air conditioning

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge and Skills'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be reported in accordance with the Regulator's requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in one or more of the

following *category* areas: *Computer Systems; Data Communications; Electronics; Electrical; Instrumentation; Refrigeration and Air conditioning and/or* allied industry areas.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit should include related underpinning specified knowledge and skills associated with other units within the respective endorsed qualification structure, where appropriate.

Additionally, this unit should be assessed in conjunction with or after competency has been demonstrated in UTE NES060 Carry out routine work activities in an Electrotech environment, UTE NES050 Identify & select components/ accessories/ materials for Electrotech work activities and UTE NES051 Use of routine equipment/ plant/ technologies in an Electrotech Environment.

Underpinning knowledge and skills

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

Note: The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to the topic of *Electrotechnology Systems, Materials and Accessories* detailed below. Appropriate measures for this topic must be put in place to ensure a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any voltages that exceed extra low voltage.

Extra low voltage is defined in Standards Australia publications, eg. SA/NZ 3000:2001. However, the use of such equipment does not negate the duty of care in treating electricity other than as a hazard.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

Underpinning knowledge and skills topics pertaining to this unit – *listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:*

Topics:

- **Drawing Interpretation and Sketching**
- **Electrotechnology Systems, Materials and Accessories**
- **Workshop Practices**
- **Science and Materials**
- **Building Systems and Materials**
- **Identify building techniques, methods, and materials used in Electrotech work activities – Work performance**

Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from ANTA's website.

Drawing Interpretation and Sketching

Technical drawing standards appropriate to the industry sector, conventions and specifications to AS 1100, with strong emphasis on interpretation: sheet types, title block information, materials parts list, revision table, grid referencing scales, line types – visible outlines, hidden outlines, dimensioning lines, centre lines; orthogonal projection of views – 3rd angle (detail and assembly drawings); mechanical conventions; fabrication conventions; three dimensional view drawings – axonometric, isometric, oblique; sectioning standards and conventions – whole, part; engineering drawing symbols, components and equipment – mechanical, electrical, electronic, computer, instrument, refrigeration; dimensioning – orthogonal, isometric; layout and plans; geometric tolerance interpretation (straightness, flatness, squareness, parallelism and concentricity only); engineering abbreviations; drawing interpretation techniques – detail drawings, orthogonal projection (3rd angle only) and three dimensional, assembly drawings and three dimensions exploded (e.g. as in equipment manuals)

Equipment and service manuals: flow charts; assembly/disassembly diagrams; schematic diagrams; block diagrams; trouble shooting guides

Freehand drawing skills appropriate to the industry sector: 3rd angle orthogonal projections; isometric; interpretation of drawing symbols; practical exercises

Electrotechnology Systems, Materials and Accessories

Overview of Electrical Power System: generation system – fossil fuel and renewable sources, co-generation and typical power station equipment; transmission system – types and equipment; distribution system – equipment; grid system

Overview of Telecommunication System: customer access network (CAN); customer premises equipment (CPE)

Statutory requirements and standards: scope of work permitted by various licences; legislated requirements; purpose of technical standards; role of standards bodies; use of technical standards

Cables: types – power, signal, communication; terms; colour coding; structure; identification; cable applications

Wiring systems: types; wiring looms; enclosures and supports

Terminating power, signal and communication cables: requirements; plugs/sockets and connectors types and applications; assembly/disassembly plugs/sockets and connectors

Accessories and fixings appropriate to industry sector: types of accessories and applications; fixing devices and methods

Workshop Practices

Identification and application of tools for: marking out a measuring; cutting; shaping; drilling; threading; tapping; finishing; dismantling/assembling

Tool use: hazards; safety procedures; techniques

Fabrication: materials, types, applications; techniques, marking out, cutting, bending, drilling/punching, soldering, cutting mitres

Assembly/disassembly techniques

Science and Materials

Trade calculations: mathematical techniques; relevant calculations; linear measurement, areas, volumes, ratios

Engineering mechanics: base physical quantities; concepts, principles, S.I. units; calculations in relation to physical; quantities and associated formulae (mass, velocity, acceleration, force, weight, density, angles); energy/work/power; moments/torque; centre of gravity; mechanical advantage; levers; pulley blocks; efficiency; friction; vectors; resolution of forces; determination of sag; pressure/stress; elementary fluid mechanics

Engineering materials: classification; ferrous and non-ferrous metals; steels, alloys; properties; tensile strength; temperature and expansion in metals; stress and strain; ductility; applications; corrosion; galvanic corrosion; hardwoods and soft woods

Building Systems and Materials

Building structures: domestic - footing types, floor construction, internal and external walls, roofs; commercial - floor, walls and roof construction

Building materials: timber; concrete; brick/masonry; plasterboard; tiles; steel; paints

Building structure and materials: safety and hazards

Architectural drawings: site plans; floor plans

Manual handling techniques: safe manual handling for lifting, pushing, pulling and holding; state/territory regulations for safe manual handling

Identify building techniques, methods, and materials used in Electrotech work activities – Work performance

Identify building, methods and materials used in Electrotech work activities in any one or more of the above *categories* across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment

UTE NES060 A

Carry out routine work activities in an Electrotech environment

Descriptor: Undertake scheduled routine work activities in the Electrotechnology Industry in an agreed time, to a quality standard and with a minimum of waste.

Elements	Performance criteria
060.1 Prepare to undertake routine work activities	<p>060.1.1 Instructions for the preparation of the work activity are communicated and confirmed to ensure clear understanding</p> <p>060.1.2 <i>OH&S policies and procedures</i> are communicated and confirmed to ensure they are understood as to be applied in the carrying out of the work</p> <p>060.1.3 Tools, <i>equipment</i> and personnel protective equipment needed to do the work are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with <i>established procedures</i></p> <p>060.1.4 <i>Appropriate personnel</i> are consulted to ensure the work is coordinated effectively with others involved</p> <p>060.1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with <i>established procedures</i></p> <p>060.1.6 Schedule of work including practices for working safely are confirmed as in accordance with instructions and <i>requirements</i></p>
060.2 Carry out work as instructed	<p>060.2.1 <i>OH&S policies and procedures</i> and safe work practices are followed to eliminate or minimise incidents</p> <p>060.2.2 Schedule of work is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste</p> <p>060.2.3 Further instructions are sought from <i>appropriate personnel</i> in the event of unplanned events or conditions occurring</p> <p>060.2.4 On going checks of quality of the work are undertaken in accordance with instructions and <i>requirements</i></p>

Elements	Performance criteria
060.3 Check results of the completed work	060.3.1 Final checks are made to ensure the work conforms with instructions and to <i>requirements</i> 060.3.2 <i>Appropriate personnel</i> are notified of completion of the work 060.3.3 Tools, <i>equipment</i> and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with <i>established procedures</i> 060.3.4 Work area is cleaned up and made safe and <i>sustainable energy practices</i> are followed 060.3.5 Appropriate records are updated in accordance with instructions and <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Electrotechnology environment includes one or more the following *category* or allied industry areas:

Computer Systems

Data Communications

Electronics

Electrical

Instrumentation

Refrigeration and Air conditioning

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge and Skills'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be reported in accordance with the Regulator's requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in one or more of the following *category* areas: *Computer Systems; Data Communications; Electronics; Electrical; Instrumentation; Refrigeration and Air conditioning and/or allied industry areas*.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge and skills

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

Note: The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to the topic of *Electrotechnology Systems, Materials and Accessories* detailed below. Appropriate measures for this topic must be put in place to ensure a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any voltages that exceed extra low voltage. Extra low voltage is defined in Standards Australia publications, eg. SA/NZ 3000:2001. However, the use of such equipment does not negate the duty of care in treating electricity other than as a hazard.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

Underpinning knowledge and skills topics pertaining to this unit – listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:

Topics:

- **Occupational Health and Safety**
- **Electrotechnology Calculations**
- **Applied Electrical Science**
- **Electrical Concepts and Applications**

- **Overview and Practices in the Electrotechnology Industry**
- **Carrying out routine work activities in an Electrotech environment – Work Performance**

In the Specialisation of: Engineering

- **Drawing Interpretation and Sketching**
- **Electrotechnology Systems, Materials and Accessories**
- **Workshop Practices**

In the Specialisation of: Renewable Energy

- **Introduction to Renewable Energy Technologies**

Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from ANTA's website.

Occupational Health and Safety

Occupational Health and Safety Act: Aims; Acts; Representatives'; Inspectors; Offences

Personal safety: health at and at work; stress related illnesses; injuries and diseases in the workplace; repetitive strain injuries; manual handling procedures; handling of ladders; adequate lighting in the workplace; industrial radiation; chemical hazards; protective equipment; special situations (eg. Scaffolding); electrical hazards; thermal stress; exposure to excessive vibration; high level industrial noise; safety in the general workplace

Workplace hazards: - Safety checks within the workplace; Identification of potential workplace hazards; Preventative measures

Working with electrically operated tools and equipment: nature of electric shock; causes of electrical accidents; working safely with electricity; safety items used in electrical environments; protection; isolation

Rescue from a live electrical situation

Emergency first aid/resuscitation: procedures for performing emergency first aid and; resuscitation from an electric shock.

Electrotechnology Calculations

Basic operations and estimating the results of a calculation

Graphs and tables

Transposition

Trigonometry

Vectors/phasors

Systematic Problem Solving

Applied Electrical Science

Components: resistors - fixed (composition & wire wound), variable (rheostats, potentiometers & trimmers), non-linear (thermistors, VDRs, LDRs); capacitors -

fixed (ceramic, plastic & electrolytic), variable, trimmers; magnetic - transformers (AF, RF and power), chokes, relays, contactors

Basic physics: conductors - definition, common types, typical applications; insulators - definition, common types, typical applications; semiconductors - definition, common types, typical applications; current flow - direction (electron/conventional), unit, effects of current flow; voltage - (i) sources (electromagnetic, chemical, heat & pressure) - unit; resistance - (ii) factors effecting (material, length, CSA & temp) - effect on circuit, colour code, preferred values (mention only), power rating; Ohms law - electrical Units (include sub and multiple) - volt, ampere, Ohm & Watt; power in electrical circuits - $P = IV$ only; introductory circuit symbols

Effects of electric current: heating, light, magnetic, chemical, physiological

Circuits: series and parallel (three resistive elements max.), V,I,R & P relationships, use lab experiments to validate theory

Protection: purpose, fuses, circuit breaking, safety interlocks, earthing – personnel safety

Electrical Concepts and Applications

DC resistive circuits: series; parallel; series parallel; measurement of V, I and R; calculation of R, V, I; and P

Capacitance: concept; unit; time constant; capacitors – basic construction and types

Magnetism: magnetic and non magnetic materials; magnetic field patterns; force between magnetic fields; applications

Electromagnetism: magnetic field around a current-carrying conductor and solenoid; force between current-carrying conductors; applications

Electromagnetic Induction: induced EMF; inductance (concept, unit, time constant, applications)

AC Principles: sine waves; frequency; amplitude; peak voltage; peak to peak voltage; RMS voltage; single phase; three phase; generation of AC voltages; circuit measurement; earthing; electrical supply system

Transformers: construction; principles of operation; primary and secondary voltage and current; applications

Motors: motor action; generator action; DC motors; AC motors; applications

Electrical Safety Testing: Regulations

Overview & Practices in the Electrotechnology Industry

Electrotechnology Vocations: Electrical; Electronics – including communications; Computer Systems; Communications; Refrigeration and Air Conditioning; Instrumentation and Control; Lifts

Career Paths in Electrotechnology: Australian Qualification Framework (AQF); Qualifications/Classifications; Scope of work-installation, maintenance and servicing

Training in Electrotechnology Vocations: traineeships and apprenticeships; licensed Electrician minimum requirements; career advancements

Industry Organisations: employers; employee – trade union groups (eg. CEPU, ETU); Government - ITABs, TAFE, RTO, ERAC, NACs; private providers

Qualification Requirements: unit of competency; competency standards; training and assessment; national training packages; training models - on-job components and off-job components; qualification requirements and assessments

Policies and Practices in Electrotechnology Industry: licensing and/or registration requirements and/or codes of practices; OH&S requirements including roles and responsibilities of employers and employees; awards, industrial agreements and enterprise bargaining

Job Application: research – employer organisations, trade unions, career advisers, job agencies, newspapers/magazines, personal contacts, industry training advisory boards (ITABs); writing – formal, content, handwritten/word processor, presentation; method of application – mail, fax, telephone, internet

Job Interview: preparation – dress code, timekeeping, what to take to the interview; presentation – appearance, introduction, mannerisms, strategies, techniques (questions/responses); evaluation – performance (appraisal/improvements)

Carrying out routine work activities in an Electrotech environment – Work Performance

Carry out routine work activities in an Electrotech environment in any one or more of the above *categories* across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment

In the Specialisation of: Engineering

Drawing Interpretation and Sketching

Technical drawing standards appropriate to the industry sector, conventions and specifications to AS 1100, with strong emphasis on interpretation: sheet types, title block information, materials parts list, revision table, grid referencing scales, line types – visible outlines, hidden outlines, dimensioning lines, centre lines; orthogonal projection of views – 3rd angle (detail and assembly drawings); mechanical conventions; fabrication conventions; three dimensional view drawings – axonometric, isometric, oblique; sectioning standards and conventions – whole, part; engineering drawing symbols, components and equipment – mechanical, electrical, electronic, computer, instrument, refrigeration; dimensioning – orthogonal, isometric; layout and plans; geometric tolerance interpretation (straightness, flatness, squareness, parallelism and concentricity only); engineering abbreviations; drawing interpretation techniques – detail drawings, orthogonal projection (3rd angle only) and three

dimensional, assembly drawings and three dimensions exploded (e.g. as in equipment manuals)

Equipment and service manuals: flow charts; assembly/disassembly diagrams; schematic diagrams; block diagrams; trouble shooting guides

Freehand drawing skills appropriate to the industry sector: 3rd angle orthogonal projections; isometric; interpretation of drawing symbols; practical exercises

Electrotechnology Systems, Materials and Accessories

Overview of Electrical Power System: generation system – fossil fuel and renewable sources, co-generation and typical power station equipment; transmission system – types and equipment; distribution system – equipment; grid system

Overview of Telecommunication System: customer access network (CAN); customer premises equipment (CPE)

Statutory requirements and standards: scope of work permitted by various licences; legislated requirements; purpose of technical standards; role of standards bodies; use of technical standards

Cables: types – power, signal, communication; terms; colour coding; structure; identification; cable applications

Wiring systems: types; wiring looms; enclosures and supports

Terminating power, signal and communication cables: requirements; plugs/sockets and connectors types and applications; assembly/disassembly plugs/sockets and connectors

Accessories and fixings appropriate to industry sector: types of accessories and applications; fixing devices and methods

Workshop Practices

Identification and application of tools for: marking out a measuring; cutting; shaping; drilling; threading; tapping; finishing; dismantling/assembly

Tool use: hazards; safety procedures; techniques

Fabrication: materials, types, applications; techniques, marking out, cutting, bending, drilling/punching, soldering, cutting mitres

Assembly/disassembly techniques

In the Specialisation of: Renewable Energy

Introduction to Renewable Energy Technologies

General issues: current economic social; environmental and political issues; impact on a renewable energy technology

Energy services/demand: terminology; energy; temperature; power; symbols; units; energy conversion and efficiency; domestic dwelling - energy services, energy source, selection; primary energy and end use energy

Solar radiation resource: terminology; units - symbols, conversions; sun position, sun path diagrams; solar radiation on fixed and tracking collectors

Wind energy resource and technology: terminology, units, symbols; wind patterns (Australia); local terrain, wind speed, direction, turbulence, wind power; maps, data sheets, measuring instruments; Wind Energy Conversion Systems (WECS) – terminology, characteristics, applications, specifications, sizing

Micro-hydro resource and technology: terminology, units, symbols; flow rates, heads, assessment; turbines, operating characteristics; control requirements; specifications, sizing

Biomass resource and technology: terminology; common biofuels - types, energy contents, production, applications; resource assessment

Solar thermal systems: terminology; components; applications; types of hot water systems; system features, orientation, tilt angles, placement; system selection, size, cost

Energy efficient building design: terminology; climate and thermal comfort; thermal conductivity of building elements; solar heat gain; ventilation; glazing; thermal mass; insulation; shading devices; siting of buildings; active solar systems

RAPS systems configuration: configuration; components - functions, efficiencies; regulators, inverters, battery chargers, generators

Photovoltaic arrays: terminology; modules - types, efficiency, applications; IV curve; irradiance and temperature effects; blocking and bypass diodes; wiring diagrams, configurations; specifications and sizing

Energy storage: terminology; types and methods; battery life, temperature effects, charge and discharge rates; precautions, maintenance, safety; stratification; boosting and equalising charges; specifications, capacity, configuration; operating characteristics; types, sizes

UTE NES061 A**Provide basic sustainable energy solutions for energy reduction in domestic premises**

Descriptor: Monitor energy usage and provide basic sustainable energy options to reduce the energy consumption in domestic residences

Elements	Performance criteria
061.1 Prepare to monitor energy usage and provide basic solutions for energy reduction	061.1.1 Monitoring activities are planned and prepared for to ensure <i>OH&S policies and procedures</i> are followed with the work appropriately sequenced in accordance with <i>requirements</i> 061.1.2 <i>Appropriate personnel</i> are consulted to ensure the work is co-ordinated effectively with others involved 061.1.3 Materials are obtained and checked in accordance with <i>established procedures</i> and to comply with <i>requirements</i> 061.1.4 Location in which monitoring activities is determined from job <i>requirements</i> 061.1.5 Materials necessary to complete the work are obtained in accordance with <i>established procedures</i> and checked against job <i>requirements</i> 061.1.6 Materials needed to carry out the monitoring are obtained in accordance with <i>established procedures</i>
061.2 Undertake monitoring of energy usage and provide basic solutions for energy reduction	061.2.1 <i>OH&S policies and procedures</i> for undertaking monitoring activities are followed 061.2.2 Monitoring activities are undertaken in accordance with <i>requirements</i> , without damage or distortion to the surrounding environment or services 061.2.3 Unplanned events or conditions are responded to in accordance with <i>established procedures</i> 061.2.4 Approval is obtained in accordance with <i>established procedures</i> from <i>appropriate personnel</i> before any contingencies are implemented

Elements	Performance criteria
	061.2.5 On-going checks of the quality of the work are undertaken in accordance with <i>established procedures</i>
061.3 Complete monitoring activities and provide and provide reports where necessary	061.3.1 Documentation/reports are completed to ensure administrative <i>requirements</i> are met 061.3.2 Work completion is <i>notified</i> in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Energy usage and basic sustainable energy options are monitored and provided to reduce the energy consumption in domestic residences and includes but is not limited to: using reflective curtains to control heat; using natural or artificial shade to control sunlight; double glazing and reflective films; using solar water heating; making sure trees do not shade solar hot water collectors; checking for leakage in hot water system pressure relief valves and elsewhere in plumbing systems; replacing incandescent lamps with compact fluorescent lamps; insulating dwellings, offices and workplaces; preventing draughts; installing timers or sensors on lighting and climate control systems; installing self-closing doors to minimise heat/cooling loss; using natural gas for heating rather than oil or coal based fuels; using devices to reduce water usage; using sunlight to replace artificial light; ventilating roof cavities to reduce ceiling heating; installing renewable energy systems e.g. photovoltaics.

Currency in unit of competency

In order to maintain currency in this Unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge and Skills'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be reported in accordance with the Regulator's requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in the provision of sustainable energy solutions for energy reductions in domestic premises and/or allied industry areas.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge and skills

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

Note: The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to ensuring a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any unsafe conditions. The use of such equipment does not negate the duty of care responsibilities that apply.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

Underpinning knowledge and skills topics pertaining to this unit – listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:

Topics:

- **Occupational Health and Safety**
- **Applied Electricity 1**
- **Electrical Concepts and Applications**
- **Introduction to Renewable Energy Technologies**
- **Greenhouse Reduction Strategies**
- **Provide basic sustainable energy solutions for energy reduction in domestic premises – Work performance**

Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from ANTA's website.

Occupational Health and Safety

Occupational health and safety act: aims; acts; representatives; inspectors; offences

Personal safety: injuries and diseases in the workplace; repetitive strain injuries; manual handling procedures; handling of ladders; adequate lighting in the workplace; industrial radiation; chemical hazards; protective equipment; electrical hazards; thermal stress; exposure to excessive vibration; high level industrial noise

Workplace hazards: identification of potential workplace hazards; preventative measures

Working with electrically operated tools and equipment: nature of electric shock; causes of electrical accidents; working safely with electricity; safety items used in electrical environments

Rescue from a live electrical situation

Emergency first aid/resuscitation: procedures for performing emergency first aid and resuscitation for an electric shock victim; CPR

Applied Electricity 1

Fundamental and derived units: basic units; SI derived units; multiples and sub-multiples

Power, work and energy: conservation of energy; torque; losses and efficiency; maximum efficiency of machines

Electrical characteristics of materials: conductors, insulators, semi-conductors; electric charge; electric current; electromotive force

The simple circuit: source, load, current path and control; open-circuit; short-circuit

Resistance: Ohm's law; determine V, I, R; power dissipation

Effects of current: physiological effects; principles of protection from physiological effects; conversion of electrical energy to other forms (heating, light, magnetic, chemical) Sources of electrical energy - conversion of other forms to electrical energy

Using measuring instruments: handling measuring instruments; selecting an instrument; setting-up and connecting into circuits; reading scales and read-outs; setting up a CRO

Electrical Concepts and Applications

DC resistive circuits: series; parallel; series parallel; measurement of V, I and R; calculation of R, V, I, and P

Capacitance: concept; unit; time constant; capacitors – basic construction and types

Magnetism: magnetic and non magnetic materials; magnetic field patterns; force between magnetic fields; applications

Electromagnetism: magnetic field around a current-carrying conductor and solenoid; force between current-carrying conductors; applications

Electromagnetic induction: induced EMF; inductance, concept, unit, time constant, applications

AC principles: sine waves; frequency; amplitude; peak voltage; peak to peak voltage; RMS voltage; single phase; three phase; generation of AC voltages; circuit measurement; earthing; electrical supply system

Transformers: construction; principles of operation; primary and secondary voltage and current; applications

Motors: motor action; generator action; DC motors; AC motors; applications

Electrical safety testing: regulations.

Introduction Renewable Energy Technologies

Non-technical issues: current economic, social, environmental and political issues, impact on a renewable energy technology; topic review

Energy services/demand: terminology; energy, temperature, power, symbols, units; energy conversion and efficiency; domestic dwelling - energy services, energy source selection; primary energy and end use energy

Solar radiation resource: terminology; units, symbols, conversions; sun position, sun path diagrams; solar radiation on fixed and tracking collectors

Wind energy resource and technology: terminology, units, symbols; wind patterns (Australia); local terrain, wind speed, direction, turbulence, wind power; maps, data sheets, measuring instruments, wind energy conversion systems (WECS); characteristics; applications; specifications, sizing

Micro-hydro resource and technology: terminology, units, symbols; flow rates, heads, assessment; turbines; operating characteristics; control requirements; specifications

Biomass resource and technology: terminology; common biofuels – types, energy contents, production, applications; resource assessment

Solar thermal systems: terminology; components; applications; types of hot water systems; system features, orientation, tilt angles, placement; system selection, size, cost

Energy efficient building design: terminology; climate and thermal comfort; thermal conductivity of building elements; solar heat gain; ventilation; glazing; thermal mass; insulation; shading devices; siting of buildings; active solar systems

RAPS system configuration: configuration; components – functions, efficiencies; regulators, inverters, battery chargers, generators

Photovoltaic arrays: terminology; modules (types, efficiency, applications); IV curve; irradiance and temperature effects; blocking and bypass diodes; wiring diagrams, configurations; specification and sizing

Energy storage: terminology; types and methods; battery life, temperature effects, charge and discharge rate; precautions, maintenance, safety; stratification; boosting and equalising charges; specification, capacity, configuration; operating characteristics; types, sizes

Greenhouse Reduction Strategies

Nature of greenhouse gases and other forms of pollution; atmospheric elements

Profiling Australia's greenhouse gas emissions: greenhouse inventories; access to inventory information; projecting future emissions

Understanding and communicating climate change and its impacts: improving our understanding of climate change; identifying climate change impacts; climate change communication and education

Partnerships for greenhouse action: governments, industry and community: government policy; working with the private sector; fostering community engagement; promoting international partnerships; emissions trading

Efficient and sustainable energy use and supply: reducing the greenhouse intensity of energy supply; harnessing renewable energy; improving end-use energy efficiency

Efficient transport and sustainable urban planning: integrating land use and transport planning; travel demand and traffic management; encouraging greater use of public transport, walking and cycling; improving vehicle fuel efficiency and fuel technologies; freight and logistics systems

Greenhouse sinks and sustainable land management: enhancing greenhouse sinks; encouraging sustainable forestry and vegetation management; reducing greenhouse gas emissions from agricultural production

Greenhouse best practice in industrial processes and waste management: reducing greenhouse gas emissions from industry; reducing methane emissions from waste treatment and disposal

Adaptation to climate change: a national framework for adaptation to climate change; adaptation strategies for key sectors

Provide basic sustainable energy solutions for energy reduction in domestic premises – Work performance

Providing basic sustainable energy solutions for energy reduction in domestic premises in the Sustainable and/or Renewable Energy sector across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment

UTE NES062 A**Apply sustainable energy practice in daily activities**

Descriptor: Apply sustainable energy practices in daily activities both at, and outside the workplace

Elements	Performance criteria
062.1 Plan and prepare to apply sustainable energy practice	062.1.1 Activities are planned and prepared for to ensure <i>OH&S policies and procedures</i> are followed with the work appropriately sequenced in accordance with <i>requirements</i> 062.1.2 <i>Appropriate personnel</i> are consulted to ensure the work is co-ordinated effectively with others involved 062.1.3 Materials are obtained and checked in accordance with <i>established procedures</i> and to comply with <i>requirements</i> 062.1.4 Location in which activities are to be undertaken is determined from <i>requirements</i> 062.1.5 Materials necessary to complete the work are obtained in accordance with <i>established procedures</i> and checked against job <i>requirements</i>
062.2 Apply sustainable energy practice	062.2.1 <i>OH&S policies and procedures</i> for undertaking administrative functions are followed 062.2.2 Activities are undertaken in accordance with <i>requirements</i> , without damage or distortion to the surrounding environment or services 062.2.3 Unplanned events or conditions are responded to in accordance with <i>established procedures</i> 062.2.4 Approval is obtained in accordance with <i>established procedures</i> from <i>appropriate personnel</i> before any contingencies are implemented 062.2.5 On-going checks of the quality of the work are undertaken in accordance with <i>established procedures</i>
062.3 Complete the application of sustainable energy practice	062.3.1 Documentation/reports are completed to ensure detailed promotional activities <i>requirements</i> are met 062.3.2 Completion is <i>notified</i> in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Sustainable energy practices/principles applied in daily activities both at, and outside the workplace and include, but is not limited to such items as: examining work practices that may use excessive electrical energy; reducing energy consumption by using energy efficient machines and appliances (star ratings); switching off devices such as lights, machines and computers when not in use; using power save mode on photocopiers and other business machines; using natural light to replace artificial light; cleaning air conditioner filters; closing windows and doors when climate control is used; reusing materials used in construction, engineering and manufacturing; minimising construction and demolition waste; recycling waste materials; using recycled material such as paper; driving motor vehicles and other machines with care; keeping vehicle engines tuned; using public transport as much as possible; using 'greenpower' electricity.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, *e.g. consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.

- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled ‘Underpinning knowledge and Skills’.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be reported in accordance with the Regulator’s requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed across a representative range* of activities in the application of sustainable energy practices in daily activities and/or allied industry areas.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge and skills

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of

underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

Note: The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to ensuring a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any unsafe conditions. The use of such equipment does not negate the duty of care responsibilities that apply.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

Underpinning knowledge and skills topics pertaining to this unit – *listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:*

Topics:

- **Occupational Health and Safety**
- **Introduction to Renewable Energy Technologies**
- **Greenhouse Reduction Strategies**
- **Apply sustainable energy practice in daily activities – Work performance**

Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from ANTA's website.

Occupational Health and Safety

Occupational health and safety act: aims; acts; representatives; inspectors; offences

Personal safety: injuries and diseases in the workplace; repetitive strain injuries; manual handling procedures; handling of ladders; adequate lighting in the workplace; industrial radiation; chemical hazards; protective equipment; electrical hazards; thermal stress; exposure to excessive vibration; high level industrial noise

Workplace hazards: identification of potential workplace hazards; preventative measures

Working with electrically operated tools and equipment: nature of electric shock; causes of electrical accidents; working safely with electricity; safety items used in electrical environments

Rescue from a live electrical situation

Emergency first aid/resuscitation: procedures for performing emergency first aid and resuscitation for an electric shock victim; CPR

Introduction to Renewable Energy Technologies

Non-technical issues: current economic, social, environmental and political issues, impact on a renewable energy technology; topic review

Energy services/demand: terminology; energy, temperature, power, symbols, units; energy conversion and efficiency; domestic dwelling - energy services, energy source selection; primary energy and end use energy

Solar radiation resource: terminology; units, symbols, conversions; sun position, sun path diagrams; solar radiation on fixed and tracking collectors

Wind energy resource and technology: terminology, units, symbols; wind patterns (Australia); local terrain, wind speed, direction, turbulence, wind power; maps, data sheets, measuring instruments, wind energy conversion systems (WECS); characteristics; applications; specifications, sizing

Micro-hydro resource and technology: terminology, units, symbols; flow rates, heads, assessment; turbines; operating characteristics; control requirements; specifications

Biomass resource and technology: terminology; common biofuels – types, energy contents, production, applications; resource assessment

Solar thermal systems: terminology; components; applications; types of hot water systems; system features, orientation, tilt angles, placement; system selection, size, cost

Energy efficient building design: terminology; climate and thermal comfort; thermal conductivity of building elements; solar heat gain; ventilation; glazing; thermal mass; insulation; shading devices; siting of buildings; active solar systems

RAPS system configuration: configuration; components – functions, efficiencies; regulators, inverters, battery chargers, generators

Photovoltaic arrays: terminology; modules (types, efficiency, applications); IV curve; irradiance and temperature effects; blocking and bypass diodes; wiring diagrams, configurations; specification and sizing

Energy storage: terminology; types and methods; battery life, temperature effects, charge and discharge rate; precautions, maintenance, safety; stratification; boosting and equalising charges; specification, capacity, configuration; operating characteristics; types, sizes

Greenhouse Reduction Strategies

Nature of greenhouse gases and other forms of pollution; atmospheric elements

Profiling Australia's greenhouse gas emissions: greenhouse inventories; access to inventory information; projecting future emissions

Understanding and communicating climate change and its impacts: improving our understanding of climate change; identifying climate change impacts; climate change communication and education

Partnerships for greenhouse action: governments, industry and community; government policy; working with the private sector; fostering community engagement; promoting international partnerships; emissions trading

Efficient and sustainable energy use and supply: reducing the greenhouse intensity of energy supply; harnessing renewable energy; improving end-use energy efficiency

Efficient transport and sustainable urban planning: integrating land use and transport planning; travel demand and traffic management; encouraging greater use of public transport, walking and cycling; improving vehicle fuel efficiency and fuel technologies; freight and logistics systems

Greenhouse sinks and sustainable land management: enhancing greenhouse sinks; encouraging sustainable forestry and vegetation management; reducing greenhouse gas emissions from agricultural production

Greenhouse best practice in industrial processes and waste management: reducing greenhouse gas emissions from industry; reducing methane emissions from waste treatment and disposal

Adaptation to climate change: a national framework for adaptation to climate change; adaptation strategies for key sectors

Apply sustainable energy practice in daily activities – Work performance

Applying sustainable energy practice in daily activities in the Sustainable and/or Renewable Energy sector across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment

UTE NES063 A

Contribute to the operation of support plant & equipment used in Electricity Supply

Descriptor: Contribute to the operation of support plant & equipment used in the Electricity Supply Industry for scheduled work in an agreed time, to a quality standard and with a minimum of waste.

Elements		Performance criteria
051.1	Prepare to contribute to operating plant and equipment	051.1.1 Instructions for the preparation in contributing to operating plant and equipment are communicated and confirmed to ensure clear understanding
		051.1.2 <i>OH&S policies and procedures</i> are communicated and confirmed to ensure they are understood as to be applied in the carrying out of the work
		051.1.3 Tools, <i>equipment</i> and personnel protective equipment needed to do the work are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with <i>established procedures</i>
		051.1.4 <i>Appropriate personnel</i> are consulted to ensure the work is coordinated effectively with others involved
		051.1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with <i>established procedures</i>
		051.1.6 Schedule of work including practices for working safely are confirmed as in accordance with instructions and <i>requirements</i>
051.2	Contribute to operating plant and equipment	051.2.1 <i>OH&S policies and procedures</i> and safe work practices are followed to eliminate or minimise incidents
		051.2.2 Plant and equipment is operated according to schedule of work to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste
		051.2.3 Further instructions are sought from <i>appropriate personnel</i> in the event of unplanned events or conditions occurring

Elements	Performance criteria
	051.2.4 On going checks of quality of the work are undertaken in accordance with instructions and <i>requirements</i>
051.3 Complete contribution to operating plant and equipment	051.3.1 Final checks are made to ensure the operation of plant and equipment conforms with instructions and to <i>requirements</i> 051.3.2 <i>Appropriate personnel</i> are notified of completion of the work in contributing to operating plant and equipment 051.3.3 Tools, <i>equipment</i> and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with <i>established procedures</i> 051.3.4 Work area is cleaned up and made safe and <i>sustainable energy practices</i> are followed 051.3.5 Appropriate records are updated in accordance with instructions and <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in *italics*, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Electricity Supply Industry refers to the Transmission and Distribution sector of the industry involving the contribution to the operation of support plant and equipment used observing relevant legislation, codes of practice, safety measures and hazards.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in *italics*, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge and Skills'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be reported in accordance with the Regulator's requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in one or more of the following *category* areas: *Computer Systems; Data Communications; Electronics; Electrical; Instrumentation; Refrigeration and Air conditioning and/or* allied industry areas.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit should include related underpinning specified knowledge and skills associated with other units within the respective endorsed qualification structure, where appropriate.

Additionally, this unit should be assessed in conjunction with or after competency has been demonstrated in UTE NES060 Carry out routine work activities in an Electrotech environment, UTE NES050 Identify & select components/ accessories/ materials for Electrotech work activities and UTE NES051 Use of routine equipment/ plant/ technologies in an Electrotech Environment.

Underpinning knowledge and skills

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

Note: The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to the topic of *Electrotechnology Systems, Materials and Accessories* detailed below. Appropriate measures for this topic must be put in place to ensure a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any voltages that exceed extra low voltage. Extra low voltage is defined in Standards Australia publications, eg. SA/NZ 3000:2001. However, the use of such equipment does not negate the duty of care in treating electricity other than as a hazard.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

Underpinning knowledge and skills topics pertaining to this unit – listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:

Topics:

- **Drawing Interpretation and Sketching**
- **Electrotechnology Systems, Materials and Accessories**
- **Workshop Practices**
- **Science and Materials**
- **Mobile Plant, Tools and Equipment**
- **Powerline Safety Practices**
- **Contribute to the operation of support plant & equipment used in Electricity Supply – Work performance**

Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from ANTA's website.

Drawing Interpretation and Sketching

Technical drawing standards appropriate to the industry sector, conventions and specifications to AS 1100, with strong emphasis on interpretation: sheet types, title block information, materials parts list, revision table, grid referencing scales, line types – visible outlines, hidden outlines, dimensioning lines, centre lines; orthogonal projection of views – 3rd angle (detail and assembly drawings); mechanical conventions; fabrication conventions; three dimensional view drawings – axonometric, isometric, oblique; sectioning standards and conventions – whole, part; engineering drawing symbols, components and equipment – mechanical, electrical, electronic, computer, instrument, refrigeration; dimensioning – orthogonal, isometric; layout and plans; geometric tolerance interpretation (straightness, flatness, squareness, parallelism and concentricity only); engineering abbreviations; drawing interpretation techniques – detail drawings, orthogonal projection (3rd angle only) and three dimensional, assembly drawings and three dimensions exploded (e.g. as in equipment manuals)

Equipment and service manuals: flow charts; assembly/disassembly diagrams; schematic diagrams; block diagrams; trouble shooting guides

Freehand drawing skills appropriate to the industry sector: 3rd angle orthogonal projections; isometric; interpretation of drawing symbols; practical exercises

Electrotechnology Systems, Materials and Accessories

Overview of Electrical Power System: generation system – fossil fuel and renewable sources, co-generation and typical power station equipment; transmission system – types and equipment; distribution system – equipment; grid system

Overview of Telecommunication System: customer access network (CAN); customer premises equipment (CPE)

Statutory requirements and standards: scope of work permitted by various licences; legislated requirements; purpose of technical standards; role of standards bodies; use of technical standards

Cables: types – power, signal, communication; terms; colour coding; structure; identification; cable applications

Wiring systems: types; wiring looms; enclosures and supports

Terminating power, signal and communication cables: requirements; plugs/sockets and connectors types and applications; assembly/disassembly plugs/sockets and connectors

Accessories and fixings appropriate to industry sector: types of accessories and applications; fixing devices and methods

Workshop Practices

Identification and application of tools for: marking out a measuring; cutting; shaping; drilling; threading; tapping; finishing; dismantling/assembling

Tool use: hazards; safety procedures; techniques

Fabrication: materials, types, applications; techniques, marking out, cutting, bending, drilling/punching, soldering, cutting mitres

Assembly/disassembly techniques

Science and Materials

Trade calculations: mathematical techniques; relevant calculations; linear measurement, areas, volumes, ratios

Engineering mechanics: base physical quantities; concepts, principles, S.I. units; calculations in relation to physical; quantities and associated formulae (mass, velocity, acceleration, force, weight, density, angles); energy/work/power; moments/torque; centre of gravity; mechanical advantage; levers; pulley blocks; efficiency; friction; vectors; resolution of forces; determination of sag; pressure/stress; elementary fluid mechanics

Engineering materials: classification; ferrous and non-ferrous metals; steels, alloys; properties; tensile strength; temperature and expansion in metals; stress and strain; ductility; applications; corrosion; galvanic corrosion; hardwoods and soft woods

Mobile Plant, Tools and Equipment

Legislative and safety requirements for plant and equipment

Mobile equipment: elevating work platforms (safety and electrical, clearances, inspection, operation, maintenance, safety observers, other mobile plant)

Hydraulic and pneumatic equipment: operation; maintenance

Portable equipment: operation; maintenance; chainsaws (operation and maintenance)

Enterprise vehicles: statutory requirements; trucks; four wheel drives; load securing

Powerline Safety Practices

Protective apparatus and apparel for linework: types; belts and harnesses; proper use; maintenance

Use of ladders: types; maintenance; carrying and erecting; clearances from live conductors

Climbing and working aloft: safety clearances; procedures; body belts; pole chairs; pre inspection of poles

Traffic management: purpose; lineworker responsibilities; procedures; operation of road signs and devices; guidance signals; responsibilities of traffic controller; use of radio communication

Small fire control: extinguishing mediums; precautions; select and operate portable extinguishers

Rescue procedures: from pole top; from switchboard; from tower; from pit

Contribute to the operation of support plant & equipment used in Electricity Supply – Work performance

Contribute to the operation of support plant and equipment used in Electricity Supply in the electricity supply industry across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment

UTE NES064 A

Undertake computations in an Electrotechnology environment

Descriptor: Use computational and mathematical procedures to solve problems or to enhance given data

Elements		Performance criteria
064.1	Prepare to undertake computations	064.1.1 Computational activities are planned and prepared to ensure <i>OH&S policies and procedures</i> are followed with the work appropriately sequenced in accordance with <i>requirements</i>
		064.1.2 Data for computations are obtained and verified in accordance with <i>established procedures</i> and to comply with <i>requirements</i>
		064.1.3 Location in which activities are undertaken or data gathered is determined from job <i>requirements</i>
		064.1.4 Materials/devices needed to carry out the computations are obtained in accordance with <i>established procedures</i>
064.2	Undertake computations	064.2.1 <i>OH&S policies and procedures</i> for undertaking monitoring activities are followed
		064.2.2 Computations are undertaken in accordance with <i>requirements</i> .
		064.2.3 Unplanned events or conditions are responded to in accordance with <i>established procedures</i>
		064.2.4 On-going checks of the quality/accuracy of the work are undertaken in accordance with <i>established procedures</i>
064.3	Complete monitoring activities	064.3.1 Computations are verified and checked against estimates
		064.3.2 Documentation/reports/computations are completed to ensure all <i>requirements</i> are met
		064.3.3 Work completion is <i>notified</i> in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Computational and mathematical procedures are used to solve problems or to enhance given data. Data includes but is not limited to; records, figures, numbers, facts, statistics, and information. This also includes but is not limited to utilising a range of related computation applications and devices, which aid in the development of appropriate results.

Currency in unit of competency

In order to maintain currency in this Unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, *e.g. consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge and Skills'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be

reported in accordance with the Regulator's requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in the provision of sustainable energy solutions for energy reductions in domestic premises and/or allied industry areas.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit should include related underpinning specified knowledge and skills associated with other units within the respective endorsed qualification structure, where appropriate.

Additionally, this unit should be assessed in conjunction with or after competency has been demonstrated in UTE NES061 Provide basic sustainable energy solutions for energy reduction in domestic premises, UTE NES062 Apply sustainable energy practices in daily activities and UTE NES065 Promote sustainable/renewable energy practice in the community.

Underpinning knowledge and skills

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

Note: The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to ensuring a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any unsafe conditions. The use of such equipment does not negate the duty of care responsibilities that apply.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

Underpinning knowledge and skills topics pertaining to this unit – *listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:*

Topics:

- **Applied Electricity 1**
- **Electrical Concepts and Applications**
- **Applied Mathematics Concepts 1**
- **Applied Mathematics Concepts 2**
- **Undertake computations in an Electrotechnology environment – Work performance**

Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from ANTA's website.

Applied Electricity 1

Fundamental and derived units: basic units; SI derived units; multiples and sub-multiples

Power, work and energy: conservation of energy; torque; losses and efficiency; maximum efficiency of machines

Electrical characteristics of materials: conductors, insulators, semi-conductors; electric charge; electric current; electromotive force

The simple circuit: source, load, current path and control; open-circuit; short-circuit

Resistance: Ohm's law; determine V, I, R; power dissipation

Effects of current: physiological effects; principles of protection from physiological effects; conversion of electrical energy to other forms (heating, light, magnetic, chemical) Sources of electrical energy - conversion of other forms to electrical energy

Using measuring instruments: handling measuring instruments; selecting an instrument; setting-up and connecting into circuits; reading scales and read-outs; setting up a CRO

Electrical Concepts and Applications

DC resistive circuits: series; parallel; series parallel; measurement of V, I and R; calculation of R, V, I, and P

Capacitance: concept; unit; time constant; capacitors – basic construction and types

Magnetism: magnetic and non magnetic materials; magnetic field patterns; force between magnetic fields; applications

Electromagnetism: magnetic field around a current-carrying conductor and solenoid; force between current-carrying conductors; applications

Electromagnetic induction: induced EMF; inductance, concept, unit, time constant, applications

AC principles: sine waves; frequency; amplitude; peak voltage; peak to peak voltage; RMS voltage; single phase; three phase; generation of AC voltages; circuit measurement; earthing; electrical supply system

Transformers: construction; principles of operation; primary and secondary voltage and current; applications

Motors: motor action; generator action; DC motors; AC motors; applications

Electrical safety testing: regulations.

Applied Mathematics Concepts 1

Linear Measurement: Precision and error of measurement - significant figures, relative and % errors, scientific notation on a calculator; Conversion of linear units - review of perimeter of plane figures; Pythagoras' theorem; Perimeter of polygons; Arc lengths; Perimeter of shapes involving arcs

Spatial Measurement: Areas of combined shapes; Volume and surface area of solids; Applied problems

Right triangle trigonometry: Revision of right-angled triangles trigonometry; Angles of elevation/depression, and compass directions (bearings); Vocational problems involving both trigonometric ratios and Pythagora's Rule; Applications to the inclined plane

Sine and Cosine Rule: Sine rule and area of a triangle rule; Cosine rule; Applications of the three rules

Surveying: Radial survey; Triangulation survey using sine rule; Use of Simpson's rule to find the area between a curve and a straight line

Algebra: Algebraic operations; Solutions of linear equations; Substitution into simple non-linear equations; Transposition of non-linear equations

Linear Graphs: Graphing linear functions; Application of the linear function - derive formula from graphs and tables; Simultaneous equations – both graphical and algebraic solutions; Practical applications (cost/revenue, supply/demand); Find line of best fit graphically, then determine equation

Polynomials: Types of polynomials - add/subtract, multiply polynomials; Factorising trinomials; Solution of quadratic equations using both factorising method and formula

Quadratic Graphs: Properties of the parabola – symmetry, axis of symmetry, turning point; Graphic quadratic functions $y = ax^2 + bx + c$; Finding maximum and minimum values of quadratic functions by using axis of symmetry/turning point; Application of quadratic functions to problems - maxima and minima problems, solution of quadratic equations graphically

Applications: Graphic trig functions (sine/cosine only); Applications in the physical sciences

Or equivalent Year 12 High School Mathematics 1 that meets respective University Admittance Index (UAI) or Tertiary Entrance Rank (TER)

Applied Mathematics Concepts 2

Presentation of Data: What are statistics and who uses them?; Frequency distributions - frequency tables, histograms and polygons, stem and leaf plots; Range of visual presentations - comparisons – tables versus graphs, introduction to spreadsheets to present data graphically

Sampling (collecting data): Design and use of experiments, surveys and census; Selecting a sample using various sampling techniques; Coding and tabulating responses

Describing Distributions: Measures of central tendency - determination and uses of mode, median and mean; Estimating percentiles and deciles from cumulative frequency polygons (ogives); Interpreting data from tables and graphs - interpolation/extrapolation; Analysis of misleading graphs

Measures of Dispersion: Box-and-whisker graphs; Measuring dispersion - variance & standard deviation; Standardisation – using Z-scores to compare different sets of scores and standardising scores

Correlation and Linear Regression: Correlation - scatter diagrams, calculation of correlation coefficient for a set of data; Regression lines - calculation of the regression equation, using the regression line for prediction

Experimental and Theoretical Probability: Simple experiments with dice, spinners etc. to investigate equally likely outcomes; The addition theory of probability; Complementary events; Compound events – probability trees, arrays, etc.; Simple counting techniques - use of “box filling” method

Applications of Probability: Gambling games; Expected outcomes – the use of probability in real life situations such as insurance, investments etc.; Counting techniques – factorial, permutations, combinations

Pascal’s Triangle and the Normal Curve: Pascal’s triangle; Applications; Normal probability distribution - probabilities using 1, 2 and 3 standard deviations

Or equivalent Year 12 High School Mathematics 2 that meets respective University Admittance Index (UAI) or Tertiary Entrance Rank (TER)

Undertake computations in an Electrotechnology environment – Work performance

Undertaking computations in an Electrotechnology environment in the Sustainable and/or Renewable Energy sector across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment

UTE NES065 A

Promote sustainable energy practice in the community

Descriptor: Promote recognised sustainable energy practices to others in the community.

Elements	Performance criteria
065.1 Plan and prepare to promote sustainable energy practice	<p>065.1.1 Activities are planned and prepared for to ensure <i>OH&S policies and procedures</i> are followed with the work appropriately sequenced in accordance with <i>requirements</i></p> <p>065.1.2 <i>Appropriate personnel</i> are consulted to ensure the work is co-ordinated effectively with others involved</p> <p>065.1.3 Materials are obtained and checked in accordance with <i>established procedures</i> and to comply with <i>requirements</i></p> <p>065.1.4 Location in which activities are to be undertaken is determined from <i>requirements</i></p> <p>063.1.5 Materials necessary to complete the work are obtained in accordance with <i>established procedures</i> and checked against job <i>requirements</i></p>
065.2 Promote sustainable energy practice	<p>065.2.1 <i>OH&S policies and procedures</i> for undertaking administrative functions are followed</p> <p>065.2.2 Activities are undertaken in accordance with <i>requirements</i>, without damage or distortion to the surrounding environment or services</p> <p>065.2.3 Unplanned events or conditions are responded to in accordance with <i>established procedures</i></p> <p>065.2.4 Approval is obtained in accordance with <i>established procedures</i> from <i>appropriate personnel</i> before any contingencies are implemented</p> <p>065.2.5 On-going checks of the quality of the work are undertaken in accordance with <i>established procedures</i></p>
065.3 Complete the promotion of sustainable energy	<p>065.3.1 Documentation/reports are completed to ensure detailed promotional activities <i>requirements</i> are met</p>

Elements	Performance criteria
practice	065.3.2 Completion is <i>notified</i> in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, *e.g. established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Recognised *sustainable energy practices/principles* is promoted, includes written, oral and other mediums, to others in the community - public presentations, magazine articles, letters to newspapers, community surveys with recommendations, reports, participation in environment committees, posters/flyers, website applications, and the like.

Currency in unit of competency

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, *e.g. consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competency is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge and Skills'.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be reported in accordance with the Regulator's requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in the promotion of *sustainable energy practice/principles* in the community and/or allied industries.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit should include related underpinning specified knowledge and skills associated with other units within the respective endorsed qualification structure, where appropriate.

Underpinning knowledge and skills

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

Note: The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which

the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to ensuring a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any unsafe conditions. The use of such equipment does not negate the duty of care responsibilities that apply.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

Underpinning knowledge and skills topics pertaining to this unit – *listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:*

Topics:

- **Occupational Health and Safety**
- **Introduction to Renewable Energy Technologies**
- **Greenhouse Reduction Strategies**
- **Projects for Electrotech Vocations**
- **Promote sustainable energy practice in the community – Work performance**

Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from ANTA's website.

Occupational Health and Safety

Occupational health and safety act: aims; acts; representatives; inspectors; offences

Personal safety: injuries and diseases in the workplace; repetitive strain injuries; manual handling procedures; handling of ladders; adequate lighting in the workplace; industrial radiation; chemical hazards; protective equipment; electrical hazards; thermal stress; exposure to excessive vibration; high level industrial noise

Workplace hazards: identification of potential workplace hazards; preventative measures

Working with electrically operated tools and equipment: nature of electric shock; causes of electrical accidents; working safely with electricity; safety items used in electrical environments

Rescue from a live electrical situation

Emergency first aid/resuscitation: procedures for performing emergency first aid and resuscitation for an electric shock victim; CPR

Introduction to Renewable Energy Technologies

Non-technical issues: current economic, social, environmental and political issues, impact on a renewable energy technology; topic review

Energy services/demand: terminology; energy, temperature, power, symbols, units; energy conversion and efficiency; domestic dwelling - energy services, energy source selection; primary energy and end use energy

Solar radiation resource: terminology; units, symbols, conversions; sun position, sun path diagrams; solar radiation on fixed and tracking collectors

Wind energy resource and technology: terminology, units, symbols; wind patterns (Australia); local terrain, wind speed, direction, turbulence, wind power; maps, data sheets, measuring instruments, wind energy conversion systems (WECS); characteristics; applications; specifications, sizing

Micro-hydro resource and technology: terminology, units, symbols; flow rates, heads, assessment; turbines; operating characteristics; control requirements; specifications

Biomass resource and technology: terminology; common biofuels – types, energy contents, production, applications; resource assessment

Solar thermal systems: terminology; components; applications; types of hot water systems; system features, orientation, tilt angles, placement; system selection, size, cost

Energy efficient building design: terminology; climate and thermal comfort; thermal conductivity of building elements; solar heat gain; ventilation; glazing; thermal mass; insulation; shading devices; siting of buildings; active solar systems

RAPS system configuration: configuration; components – functions, efficiencies; regulators, inverters, battery chargers, generators

Photovoltaic arrays: terminology; modules (types, efficiency, applications); IV curve; irradiance and temperature effects; blocking and bypass diodes; wiring diagrams, configurations; specification and sizing

Energy storage: terminology; types and methods; battery life, temperature effects, charge and discharge rate; precautions, maintenance, safety; stratification; boosting and equalising charges; specification, capacity, configuration; operating characteristics; types, sizes

Greenhouse Reduction Strategies

Nature of greenhouse gases and other forms of pollution; atmospheric elements

Profiling Australia's greenhouse gas emissions: greenhouse inventories; access to inventory information; projecting future emissions

Understanding and communicating climate change and its impacts: improving our understanding of climate change; identifying climate change impacts; climate change communication and education

Partnerships for greenhouse action: governments, industry and community; government policy; working with the private sector; fostering community engagement; promoting international partnerships; emissions trading

Efficient and sustainable energy use and supply: reducing the greenhouse intensity of energy supply; harnessing renewable energy; improving end-use energy efficiency

Efficient transport and sustainable urban planning: integrating land use and transport planning; travel demand and traffic management; encouraging greater use of public transport, walking and cycling; improving vehicle fuel efficiency and fuel technologies; freight and logistics systems

Greenhouse sinks and sustainable land management: enhancing greenhouse sinks; encouraging sustainable forestry and vegetation management; reducing greenhouse gas emissions from agricultural production

Greenhouse best practice in industrial processes and waste management: reducing greenhouse gas emissions from industry; reducing methane emissions from waste treatment and disposal

Adaptation to climate change: a national framework for adaptation to climate change; adaptation strategies for key sectors

Projects for Electrotech Vocations

Project Planning: research; aims and objectives of the project; application of project in the Electrotechnology industry

Reporting/Documentation: written; drawings/sketches

Project Building: material requirement; assembly; final testing

Presentation: overview of project; aims/objectives; operating principles; conclusion

Presentation Skills

Researching material, analysing information, producing documents and notes; producing presentation material such as charts, handouts, overhead projector slides, electronic slide presentation; seeking feedback; flyers and publications

Promote sustainable energy practice in the community – Work performance

Promoting sustainable/renewable energy practice in the community in the Sustainable and/or Renewable Energy sector across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment