Australian Government

UETTDRIS41A Install network infrastructure electrical equipment

Release: 2

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

UETTDRIS41A Install network infrastructure electrical equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This Competency Standard Unit covers the installation of electrical equipment, such as fuse switches, drop out switches, sectionalisers, links, surge arrestors, gas filled and or oil filled switches, which are relevant to the transmission, distribution and rail networks. It includes the termination/connection of the equipment in accordance to enterprise requirements; the relevant pre-commissioning tests involving the equipment/system and the interpretation of these tests against agreed specifications.

Application of the Unit

Application of the Unit **2)**

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice **3)**

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

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

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Common Unit Group

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications

Prerequisite Unit(s) **4)**

UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDREL16A	Working safely near live electrical apparatus

Transmission Overhead Pathway Group

Unit Code	Unit Title
UETTDRIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTDRTP26A	Install transmission structures and associated hardware
UETTDRTP27A	Maintain transmission structures and associated hardware
UETTDRTP29A	Install and maintain transmission overhead conductors and cables

Distribution Overhead Pathway Group

Unit Code	Unit Title
UETTDRDP12A	Maintain overhead energised low voltage conductors and cables
UETTDRIS52A	Install and maintain poles, structures and associated hardware
UETTDRIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTDRIS56A	Install and maintain low voltage

Prerequisite Unit(s) **4)**

overhead services

Rail Traction Pathway Group

Unit Code	Unit Title
UETTDRIS52A	Install and maintain poles, structures and associated hardware
UETTDRIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTDRRT21A	Install traction overhead wiring systems
UETTDRRT22A	Maintain traction overhead wiring systems
UETTDRRT23A	Install rail traction bonds
UETTDRRT27A	Install overhead traction components and equipment
UETTDRRT28A	Maintain overhead traction components and equipment

Distribution Cable Jointing Pathway Group

Unit Code	Unit Title
UETTDRCJ21A	Lay ESI electrical cables
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
UETTDRIS55A	Install and maintain low voltage underground services

Literacy and numeracy skills **4.2)**

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

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the installation of electrical equipment (network infrastructure)	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
	1.2 Relevant requirements and established procedures for the work are communicated to all

ELEMENT	PERFORMANCE CRITERIA
	personnel and identified for all work sites.
	1.3 OHS policies and procedures related to requirements and established procedures for the installation of electrical equipment (network infrastructure) are obtained and confirmed for the purposes of the work to be performed and communicated.
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
	1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
	1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
	1.8 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established

ELEMENT	PERFORMANCE CRITERIA	
		procedures.
	1.12	Road signs, barriers and warning devices are positioned in accordance with requirements.
2 Carry out installation of electrical equipment (network infrastructure)	2.1	OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3	Essential knowledge and associated skills are applied in the safe installation of electrical equipment (network infrastructure) to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.4	Electrical equipment and associated hardware is positioned, secured and terminated/connected in accordance with requirements and established procedures.
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.6	Unplanned events in the installation of electrical equipment (network infrastructure) are undertaken within the scope of established procedures.
	2.7	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.8	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.

ELEMENT	PERFORMANCE CRITERIA	
3 Complete the installation of electrical equipment (network infrastructure)	3.1	Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3	Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5	Relevant work permit(s) are signed off and, electrical equipment (network infrastructure) are returned to service in accordance with requirements.
	3.6	Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing electrical equipment (network infrastructure).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS41A Substations, power transformers and reactors

Evidence shall show an understanding of substations and power transformers to an extent indicated by the following aspects:

T1 Relationship between the substations within an overall power system

• Note: Examples include purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment

T2 Characteristics of a power transformer

• Note: Examples include basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches including solid state types, efficiency and cooling

T3 Auxiliary equipment used on transformers encompassing:

• Function and basic operation

T4 Maintenance of a power transformer

• Note: Examples include basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault finding procedures

T5 Characteristics of a reactors encompassing:

• Description and purpose

KS02-TIS41A Switchgear installation

Evidence shall show an understanding of the installation of switchgear and associated equipment to an extent indicated by the following aspects:

T1 Types and function of various switchgear

- Note: Examples include isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing, requirements and techniques

T2 Types of equipment

- Note: Examples include transformers, reactors, regulators, capacitors, relays, surge

REQUIRED SKILLS AND KNOWLEDGE

arrestors, fault indicators and mobile generators

T3 Installation procedures for switchgear and equipment encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements
- Assembly and erecting procedures
- Earthing requirements and techniques
- Pole mounted locations

T4 Testing and commissioning encompassing:

- Electricity supply industry standards and procedures

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

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

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

be required and the critical nature of the competencies being assessed.

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

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

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

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

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 – UET12". 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 this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated

environment; and

- Demonstrate an appropriate level of employability skills; 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:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	**The minimum number of items on which skill is to be demonstrated**	**Item List**
A	Any three of the following:	Fuse switches Dropout fuses Sectionalisers Disconnectors Links Fuses Surge arrestors
B	Any one of the following:	Reclosers Motorised switches Gas filled switches Ring main units Line fault indicators Oil filled switches Air break switches
C	Any one of the following:	Transformers Reactors Regulators Capacitors
D	Any three of the following:	Voltage detectors Phasing equipment

		Clip-on ammeters Insulation resistance testers Recording meters Earth resistance tester
E	At least one occasion:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment **9.3)**

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

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation of electrical equipment in a network infrastructure.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment **9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit

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

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

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

This Competency Standard Unit shall be demonstrated in relation to the installation, termination/connection of overhead electrical equipment relevant to the transmission, distribution and rail networks, and includes pre-commissioning.

Electrical equipment and associated hardware may include relevant transmission or distribution linework/network; switchgear (e.g. reclosers, sectionalisers, drop-out fuses, disconnectors, isolators, air break switches, gas filled switches, links, fuses, fuse switches and circuit breakers); transformers (e.g. padmount, pole-mounted and mobile); reactors; fault indicators; regulators; street lighting control points; capacitors; cables; underground/overhead cable terminations; relays (simple); mobile generators and surge arrestors; support brackets and the like.

It does not include the energisation of equipment in a highly complex, interdependent and interconnected electricity supply Network system, where the affects of unintended consequences on the system are high risk and appropriate personnel effect energisation.

Test and recording equipment includes voltage detectors, phasing equipment, tong ammeters, voltmeters, recording meters and insulation resistance testers used for the purposes as intended and according to requirements, and does not include use of such in energising installed equipment in a highly complex, interdependent and interconnected electricity supply Network system, where the affects of unintended consequences on the system are high risk.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures

RANGE STATEMENT

- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units