



Australian Government

Department of Education, Employment and Workplace Relations

UETDRRT35A Install and maintain traction network equipment and components

Release: 1

UETTDRT35A Install and maintain traction network equipment and components

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of the overhead traction electrical equipment and components as well as associated hardware including ancillary equipment. It includes the repair or replacement of “like for like” electrical components/equipment and associated hardware and the undertaking of safe working practices on or about the running line/track. It also encompasses the isolation of systems and circuits for safe working according to work plans and the correct positioning of road signs, barriers and or warning devices and the procedure of issuing/accepting electrical permits. It also includes the visual inspection and necessary checks to confirm that equipment, components and associated hardware have been correctly installed according to design and are in a safe condition to test prior to putting to service, the undertaking of pre-commissioning tests as required to ensure the integrity of the traction system prior to putting back into service and the updating of installation data and relevant quality assurance documentation.

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 requires 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 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):

Common Unit Group

Unit Code	Unit Title
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

Prerequisite Unit(s)**4)**

UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UEENEEG103A	Install low voltage wiring and accessories
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and

Prerequisite Unit(s) 4)

	circuits
UEENEEG109A	Develop and connect electrical control circuits
UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
UETTDREL16A	Working safely near live electrical apparatus
UETTDRI62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTDRI63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
UETTDRI67A	Solve problems in energy supply network equipment
UETTDRT34A	Install and maintain traction network wiring systems

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 4 Writing 4 Numeracy 4

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

Employability Skills**5)**

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 and maintenance of traction network equipment/components	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 personnel and identified for all work sites. 1.3 OHS policies and procedures related to requirements and established procedures for the installation and maintenance of overhead traction equipment/components 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
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ELEMENT	PERFORMANCE CRITERIA
	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 CPR, First Aid, and other rescue 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 procedures.
	1.12 Rail/road signs, barriers and warning devices are positioned in accordance with requirements.
	1.13 Environmental constraints applicable to work are identified and control measures applied.
2 Carry out the installation and maintenance of traction network equipment/components	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 aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.

ELEMENT**PERFORMANCE CRITERIA**

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|---|--|
| | <p>2.4 Essential knowledge and associated skills are applied in the safe installation of overhead traction equipment/components to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.5 Electrical components/equipment and associated hardware are positioned, secured and terminated/connected in accordance with requirements and established procedures.</p> <p>2.6 Electrical component/equipment and associated hardware is ascertained as operating within normal operating parameters and in accordance with requirements and established procedures.</p> <p>2.7 Maintenance, including repair and/or replacement of overhead traction equipment/components is carried out, in accordance with the work schedule and requirements/established procedures.</p> <p>2.8 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.</p> <p>2.9 Unplanned events during the installation of overhead traction equipment/components are undertaken within the scope of established procedures.</p> <p>2.10 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.</p> <p>2.11 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures</p> |
| <p>3 Complete the installation and maintenance of traction network equipment/components</p> | <p>3.1 Work undertaken is checked against design drawings and works schedule for conformance with requirements and anomalies reported in accordance with established procedures.</p> <p>3.2 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.</p> |

ELEMENT**PERFORMANCE CRITERIA**

- 3.3 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.4 Relevant work permit(s) are signed off after final inspections and the system is energised, tested and returned to service in accordance with requirements.
- 3.5 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 of installing overhead traction equipment and components has been acquired.

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

KS01-TRT35A Electrical Rail Traction Equipment Installation

Evidence shall show an understanding of electrical rail traction equipment installation to an extent indicated by the following aspects:

T1 Overhead traction equipment encompassing:

- Types - switches/isolators, fuse switches, links, section insulators, and fuses
- Purpose

T2 Types of overhead traction components encompassing:

- Types - cantilever hardware, droppers, bay components, portal hardware, head span hardware, section insulators, neutral sections, registration fittings, steady span, tension regulators, and cross spans
- Purposes

T3 Types of conductors used for overhead wiring such as hard-drawn, CAD, and tin-bearing copper, aluminium, steel, and other alloyed conductors

T4 Types of traction wire support structures that may consist of portals, cantilevers, drop pieces, head spans, cross spans and pull-offs

T5 Ancillary equipment

- Types - surge arresters, booster and auxiliary transformers
- Purpose

T6 Methods for installing/replacing conductors that may consist the use of:

- Preformed fittings
- Compression fittings
- Wedged fittings
- Bolted splices
- Lugs
- Bolted clamps

T7 Methods for installing/replacing components such as:

- Feeders
- Droppers
- Dissimilar conductors
- Jumpers

REQUIRED SKILLS AND KNOWLEDGE

- Surge arresters

T8 Use of plant and equipment for installation/maintenance work, such as:

- Elevating work platforms
- Ladders
- Works trains
- Rail-mounted overhead wiring equipment/vehicles
- Road/rail height access machinery/vehicles
- Voltage detectors
- Micrometer/gauges
- Tension wrenches
- Dynamometers
- Other specialised tools

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit 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	Install and maintain traction network equipment and components and incorporate at least two of the following:	Fuse switches Dropout fuses Section insulators Switches/isolators Links Fuses Surge diverters Transformers
B	With regards to "A" incorporate at least five of the following:	Cantilever hardware Head span Neutral sections Pull offs Registration fittings Steady span Tension regulators Cross spans Tramway support network Pendulum

C	With regards to "A" incorporate at least two of the following:	Preformed fittings Compression fittings Wedge fittings Bolted splices
D	With regards to "A" incorporate at least three of the following:	Feeders Dissimilar conductors Lugs Bolted clamp Drapes/potential jumper Droppers
E	With regards to the above incorporate at least two of the following:	Voltage detectors Micrometer/gauge Tension wrench Dynamometer Specialised tools
F	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 and maintenance of traction

network equipment and components.

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 Transmission, Distribution and Rail Traction Industry. 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 recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit 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, visual inspection and pre-commissioning tests of the overhead traction electrical equipment and components as well as associated hardware including ancillary equipment.

Installation includes but is not limited to fitting, setting up and putting in place conductors, equipment, systems and conducting tests for operational soundness.

Types of traction wire support structures may consist of portals, pull-off, drop-pieces, head spans, cross spans and tramway support networks.

Types of traction components may include droppers, bay components, cantilever hardware, portal hardware, steady spans hardware, steady spans, insulators, pull-off, tension regulators, section insulators, neutral sections, tramway frogs, pendulums, crossing pans and ears/hangers, booster and auxiliary transformers, air break switches, in-span feeders, isolation switches knuckles (insulated and non-insulated), cross arms.

Traction system components may consist of metalwork, wires, hardware, fittings and insulators.

Types of conductor may include HD, CAD and tin bearing copper, aluminium, steel, aluminium conductor steel reinforced, copper cover steel.

Types of wiring arrangements include single wire/tram systems, simple and compound catenary systems.

Plant may include ladders, elevating work platforms, winches, specialist tension string equipment, cable trailers, work trains, rail mounted overhead wiring equipment/vehicles and road rail mounted overhead wiring equipment/vehicles.

Ancillary equipment may include, transformers, switches, and surge diverters.

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 of work events, record keeping and or storage of

RANGE STATEMENT

- information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- 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)**

Rail Traction Units