



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **UETDRRT22A Maintain traction overhead wiring systems**

**Release: 1**

## UETTDRRRT22A Maintain traction overhead wiring systems

### Modification History

Not applicable.

### Unit Descriptor

#### Unit Descriptor

#### 1) Scope:

##### 1.1) Descriptor

This Competency Standard Unit covers the maintenance and repair of overhead traction wiring systems to ensure their serviceability, in particular the correct registration of the contact wire with respect to the current collectors. It includes the undertaking of safe working practises on or about the running line/track, the preparation needed for stringing and profiling including the isolation of systems and circuits for safe working according to work plans, the diagnosis of faults and the modification and re-adjustment to appropriate standards. It may also encompass the correct positioning of road signs, barriers and or warning devices and the procedure of issuing/accepting electrical permits, the re-commissioning tests as required to ensure the integrity of the traction system prior to returning to service and, the updating of system data and/or maintenance records.

### 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 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.

#### 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
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules,

<b>Prerequisite Unit(s)</b>	<b>4)</b>	standards, codes and specifications
	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
	UETTD RIS52A	Install and maintain poles, structures and associated hardware
	UETTD RIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTD RRT21A	Install traction overhead 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 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

**Employability Skills**

5)

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 to maintain overhead traction wiring systems	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 maintenance of overhead traction wiring systems 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.

**ELEMENT****PERFORMANCE CRITERIA**

- |      |   |   |
|------|---|---|
| 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 maintenance on overhead traction wiring systems   |   |
| 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.   |
| 2.4  | Essential knowledge and associated skills are   |   |

**ELEMENT****PERFORMANCE CRITERIA**

- applied for the safe maintenance of overhead traction wiring systems to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.5 Maintenance, including repair and/or replacement of overhead traction wiring systems, including the modification and re-adjustment of overhead traction conductors is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.6 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.
- 2.7 Unplanned events in the maintenance on overhead traction wiring systems are undertaken within the scope of established procedures.
- 2.8 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.9 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
- 2.10 Recommissioning checks and tests are undertaken to ensure the integrity of the system prior to returning to service.
- 3 Complete the maintenance on overhead traction wiring systems
- 3.1 Work undertaken is checked 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,

**ELEMENT****PERFORMANCE CRITERIA**

- checked and returned to storage in accordance with established procedures.
- 3.5 Relevant work permit(s) are signed off and, the overhead traction wiring system is 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 of maintaining overhead traction wiring systems has been acquired.

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

**KS01-TRT22A** Maintain overhead traction wiring systems

Evidence shall show an understanding of the maintenance of overhead wiring systems indicated by the following aspects:

**T1** Electrical wiring system components

- (Note: Examples include catenary wire, contact/trolley wire, droppers, feeder wire, return conductor, insulators, surge arresters, cantilevers, tensioning equipment, tram support network, tram fittings, bridge/tunnel fittings, current collectors)

**T2** Electrical traction circuits encompassing:

- Types
- Applications

**T3** Relationship of the components, apparatus and conductors to the operation of the traction system

**T4** Effective current collection and wire interface

**T5** Effective registration in the traction power system

**T6** Dynamic and static forces encompassing:

- Types that effect traction systems
- Effects on effective registration
- Techniques to minimise adverse effects

**T7** Safe and effective use of repair and maintenance tools, equipment and machinery

**T8** Maintenance of overhead traction wiring systems encompassing:

- Types of equipment and components
- Types and function of tools and equipment
- Maintenance/repair procedures
- Inspection and recording procedures

**T9** Diagnose and correct simple faults in specific overhead wiring systems encompassing:

- Types and causes
- Determination of appropriate corrective actions

## REQUIRED SKILLS AND KNOWLEDGE

- Repair and replace procedures for overhead wiring systems

## 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:

<b>Range of tools/equipment/materials/procedures/workplaces/other variables</b>		
<b>Group No</b>	<b>The minimum number of items on which skill is to be demonstrated</b>	<b>Item List</b>
A	At least four of the following:	Support structure Span Section insulator Neutral section Midpoint anchor Support equipment Tension regulators Stay/guy wire Tramway support network
B	At least two of the following:	Catenary Dropper Contact/trolley* Feeder Earth conductor Drape/potential jumper (* must do)
C	At least one of the following:	Elevating work platform Ladder Mobile platform
D	At least two of the following:	Tensioning equipment* Specialised tools Ropes Geometry profiling equipment (* must do)

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.
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**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 maintenance of overhead traction wiring systems.

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)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETDRRT2 8A Maintain overhead traction components and equipment

UETDRRT2 9A Operate rail road traction height access equipment.

## 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 maintenance of overhead traction wiring systems as it relates to the correct registration of the contact wire with respect to the current collectors

Maintenance may include the removal, repair and replacement of cables, conductors and associated hardware.

Types of conductor may include HD, CAD, tin bearing and magnesium copper, aluminium, steel, aluminium conductor steel reinforced (ACSR), insulated screened and unscreened cable and pilot and control cables.

Materials and equipment may include porcelain, glass, ceramic, fibre glass and composite insulators, steel, brass, stainless steel, neoprene, copper, cast and galvanized fittings, drums, pulleys, hooks, yoke plate, line grips, tensioning devices, ropes, slings, hydraulic/manual crimping and cutting tools, specialized tools and dynamometers.

Conductors and support wires include droppers wire, catenary wire, contact/trolley wire, earth wire, feeder wire, drape/potential jumper wire, stay wire, cross-span, networks and head span wire.

Associated equipment to conductors may include registration arms, midpoint anchors, section insulators, neutral sections, supports, cantilevers, portals, drop verticals, surge diverters and tensioning devices.

Plant may include ladders, elevating work platform, winches and capstans, specialist tensioning stringing equipment, cable trailers and drum stands, rail and road rail mounted overhead wiring vehicles.

Installing tension regulators encompasses fitting, positioning and securing weight chains and pulley systems.

Permits may include access permits, permits to work and or other relevant permits and documents by recognised bodies.

Profiling encompasses sag, tension, encumbrances, offsets, cants and registration which involves horizontal and vertical calibration of the contact wire or trolley wire to a design height and stagger in reference to the running rail.

Current collectors may include pantographs and tram trolley poles.

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

## **RANGE STATEMENT**

- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of 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