



Australian Government

UEENEEN105A Install and maintain rail signalling power supplies

Release: 2

UEENEEN105A Install and maintain rail signalling power supplies

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers installation and maintenance of rail signalling power supplies. It encompasses working safely and to installation/maintenance standards, matching equipment with that specified for a given location, terminating cables and connecting wiring, compliance and functional testing, certifying and reporting.

Application of the Unit

Application of the Unit 2)

This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes codes of practice such as the 'Code Of Practice for the Defined Interstate Rail Network' for work carried out on that network.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

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

UEENEEN 102A Assemble and wire internal electrical rail signalling equipment

AND

Relevant work place requirements in 'Work site protection' have been acquired.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in 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
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Employability Skills Information

Employability Skills 5)

This unit contains Employability Skills

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 to install and maintain signalling power supplies	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
	1.3 Safety hazards which have not previously been identified are noted, and established risk control measures are implemented.
	1.4 Nature of the work and location of power supply is determined by site inspection and from job instructions, specifications and/or diagrams.
	1.5 Materials needed for the installation, maintenance/repair work are obtained in accordance with established procedures and checked against job requirements.
	1.6 Tools, equipment and testing devices needed to install or maintain/repair power supplies are obtained in accordance with established procedures and checked for correct operation and safety.
2 Install and maintain signalling power supplies	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Power supply is installed to comply with technical standards and job specifications and requirements.

ELEMENT	PERFORMANCE CRITERIA
2.3	Wiring is run and cables terminated to comply with technical standards and job specifications and requirements.
2.4	Tests are conducted to ensure installed, maintained/ repaired power supply complies with specifications and functions as intended.
2.5	Installation, maintenance/repair of power supply is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
2.6	Correct functioning of equipment is established from reference to manuals, system specifications and commissioning data.
2.7	Faults are identified by reference to appropriate technical information and applying knowledge of power supplies to logical fault finding techniques.
2.8	Faulty, worn, damaged or insecure components are replaced, repaired or secured in accordance with manufacturer specifications and enterprise requirements.
2.9	Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.
3 Complete installation and maintain of signalling power supplies	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Work completion is documented and appropriate person(s) notified in accordance with established procedures, and relevant reports produced.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Evidence shall show that knowledge has been acquired of safe working practices and installing and maintaining rail signalling power supplies.

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

KS01-EN105A **maintenance**

Rail signal power supply installation and

Evidence shall show an understanding of rail signal power supply installation and maintenance, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

Basic rail operations

Rail terminology encompassing:

Rail signalling nomenclature

Rail signalling symbols

State/Territory Standards (where they apply)

Standard glossary of terms relevant to each State/Territory.

Note:

Identify where the standard originated from and how new standards are developed to meet a national standard.

Train dynamics encompassing:

Types of rail vehicles

Note:

Vehicles include: Suburban/country passenger, freight, maintenance vehicles and heritage/tourism.

Braking distance

Gradients/terrain

Sighting distance

The relationship to the Signalling arrangement plan/scheme.

Essentials of safe movement of trains encompassing:

The role of the signalling system in enabling safe and efficient movement of trains

Standard operating conditions as per operating timetable/schedule

Degraded signalling system performance

REQUIRED SKILLS AND KNOWLEDGE

Note: Degraded may be partial failure of signalling infrastructure or a system override

Abnormal train operating conditions

Note:

Examples are signaller operation error, driver operation error, train delayed and train breakdown.

Emergency train and signal system operation

Scheduled infrastructure maintenance

Unscheduled infrastructure maintenance.

Note:

Examples are civil, signalling, traction and overhead.

Purpose of rail signalling encompassing:

Safe distances between rail vehicles

Safe movement of rail vehicles

Conflicting movement between rail vehicles

How the signalling system provides driver information

How the driver interprets the information to safely control a train

Restrictions on the signaller and driver following an operation error.

Note:

Examples of error are: signals passed at stop, driver exceeding speed requirement and signaller setting incorrect route.

Enterprise work activities records

Purpose and extent of maintaining work activities records in an enterprise

Types of records for maintaining work activities in an enterprise

Methods for recording and maintaining work records

Work records required by regulation requirements

Environmental and heritage awareness

Purpose of environmental and heritage regulation

Typical issues affecting electrotechnology services and systems

Meeting requirements

Rail signalling, power supplies

REQUIRED SKILLS AND KNOWLEDGE

Equipment and their components encompassing:

Transformers

Batteries

Converters

Inverters

UPS

Generator

Solar Panels

Earthing

Surge protection

Switchboards

High voltage and low voltage power distribution

Automatic power changeover panels

Wiring and termination.

Operating principles and parameters encompassing:

Normal mode operation

Alarm mode

Redundancy mode

Power interruption / standby mode

Interpreting circuits diagrams to evaluate correct operation and relationship to other signalling circuits.

Servicing procedures encompassing:

Maintenance documentation

Coordination/planning sequence

Operational test procedures

Scheduled / preventative maintenance

Unscheduled / corrective maintenance

Certifying power supply equipment (commission and de-commission).

- Note:

Certifying procedures are only applicable for compliance with rail operator and/or enterprise standards.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components 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-preferred model for apprenticeships. However, where summative (or final) assessment is used it must 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. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

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 issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/much 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 practised. 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 must 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 – UEE11'. Evidence shall also comprise:

- A representative body of work performance 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 statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Install and maintain rail signalling power supplies as described in 8) and including:
 - a. Interpreting specifications and circuit diagrams correctly
 - b. Maintaining, repairing and installing power supplies correctly

- c. Using appropriate diagnostic and fault finding techniques
- d. Using tools and test instruments correctly
- e. Following relevant codes of practice, procedures and requirements
- f. Completing relevant technical reports, records and documentation, and
- 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

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.

**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 work as prescribed by this unit.

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

Note:

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

The resources used for assessment should reflect current industry practices in relation to installing and maintaining signalling power supplies.

**Method of
assessment****9.4)**

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

**Concurrent
assessment and
relationship with
other units****9.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged in combination with other competencies required by a given enterprise installation, maintenance and repair functions.

Concurrent assessment may include:

UEENEEN102A Assemble and wire internal electrical rail signalling equipment

UEENEEN118A Find and repair rail signal system faults

Range Statement

RANGE STATEMENT

10) This relates to the 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 unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Code of practice for the defined interstate rail network.

Activities may include procedures for the isolation of power supplies and may also include the use of plans and drawings, manufacturer's / enterprise specifications and manuals.

Activities may also include: determining fit for purpose, installation of power supplies, maintenance of power supplies, terminating cables and connecting wiring, compliance and functional testing and completing the necessary documentation.

Codes/practices could include dial before you dig.

Plant may include: portable generators

Equipment relevant to a particular rail network may include, but not be limited to, the following:

Electrical equipment may include; Power supplies, including; low voltage AC, low voltage DC, electro-hydraulic, electro, pneumatic, solar, generators, alternators, batteries and surge protection

Test equipment may include; multimeters, insulation resistance and continuity testers, battery testers, pneumatic pressure gauges and hydraulic pressure gauges

Technical report may include: incident report, electrical access report, site survey and data log report.

Power supplies may include: standby plants, battery chargers, solar supplies, regulated power supplies, uninterrupted power supplies, primary and secondary supplies

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

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Rail Signalling