Australian Government

UEENEEN104A Test copper rail signalling cables

Release: 2

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

UEENEEN104A Test copper rail signalling cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers testing of signal and communication copper cables. It encompasses safe working, regulatory requirements and following work procedures determining the tools required setting up and conducting test, interpreting test results, determining activities to maintain system integrity and reporting activities.

Application of the Unit

Application of the Unit **2)**

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.

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

License to practice **3)**

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 121A	Repair rail signalling power and control cables

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

Employability Skills Information

Employability Skills **5)**

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 test rail signalling cable	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 that have not previously been identified are noted, and established risk control measures are implemented.
	1.4	Access times and methods are confirmed to comply with customer requirements and relevant legislation
	1.5	Service is checked for availability for testing and is isolated/disconnected from use and carriers network/equipment to ensure no equipment damage can occur during testing
	1.6	Required tests and purpose of tests are identified from site, client documentation and manufacturer specifications
	1.7	Tools and testing devices needed for cable testing are obtained in accordance with established procedures and checked for correct operation and safety
	1.8	Testing devices calibration certification is checked and is current to ensure manufacturers specifications are achieved

ELEMENT	PERFORMANCE CRITERIA	
2 Test rail signal cables	2.1	Work area and cable system is made safe for testing and other OHS risk control measures and procedures for carrying out the testing are followed.
	2.2	Tests are set up and performed in accordance with safety measures and manufacturer specifications.
	2.3	Test results are read accurately and compared against manufacturers and site specifications for cable performance
	2.4	Established methods for dealing with unexpected situations are dealt with safely and with the approval of an authorised person
	2.5	Testing is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
	2.6	Available services are connected and tested for functionality to ensure all previous services have been resumed
3 Report test results	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Recommendations on actions needed to maintain cable system integrity resulting from cable tests are made and documented
	3.3	Results of tests are documented accurately and without delay to ensure test results remain current
	3.4	Site and installation files are updated to ensure traceability of information on system performance is maintained, 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 performing copper rail signalling cable tests.

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

KS01-EN104A Rail signalling cable testing

Evidence shall show an understanding of rail signalling cable testing, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

Performance parameters associated with copper cables and coaxial cables encompassing:

Open circuit, short circuit and pair continuity

Split pair and crossed pair

Attenuation

Return loss

Insulation Resistance (leakage)

Near end cross talk (NEXT)

Attenuation to cross talk ratio (ACR)

Loop resistance

Noise (Impulse noise and average noise)

Characteristic impedance

Note: Structured cabling including, twisted pair cabling, shielded twisted pair (STP), unshielded twisted pair (UTP) and higher performance cabling.

Test results for compliance with required regulation, standards, and or codes for structured copper cables and coaxial encompassing:

Tests required to evaluate a given performance parameter

Test equipment and leads needed to evaluate a given performance parameter.

Operation of test equipment for correct evaluation of specific cable performance parameters and to obtain accurate and reliable results.

Transmission performance requirements.

REQUIRED SKILLS AND KNOWLEDGE

Typical causes of non compliant test results.

Enterprise work activities records encompassing:

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

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/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 time frames 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, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Perform copper rail signalling cable tests as described in 8) and including:
  a. Interpreting plans and specifications correctly,
  b. Testing cable in accordance with workplace procedures,
  c. Using test equipment and tools correctly and safely,
  d. Confirming the integrity of a cable system,
  e. Checking that technically/operational specifications are met and that cable is in compliance with specification,
  f. Following relevant codes of practice, procedures and requirements, and
  g. Completing relevant technical reports, records and documentation
  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

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 performing cable system tests.

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 testing functions relating to cables, repairing cables and testing cables.

Concurrent assessment may include:

UEENEEN121A Repair rail signalling cables

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.
- Testing and identifying at least five non-compliant test results.

Activities may include procedures for the isolation of cable from supply and/or equipment, and may also include the use of plans and drawings, manufacturer's / enterprise specifications and manuals.

Activities may also include; determining fit for purpose, compliance and functional testing and completing the necessary documentation.

Test equipment could include; insulation resistance and continuity tester, multimeter, bell/buzz tester, voltage detector and or daisy chain.

Specialised equipment, tools and devices could include cable locator and cable fault tester.

Equipment relevant to a particular rail network.

Associated hardware could include Trunking, cable pits, conduits and terminals.

Cable types may include; copper (all categories) and co-axial

Tests may typically address the following items: attenuation, length, balance, noise levels, pair assignment, reversals, short circuits, open circuits, insulation resistance, reflection, signal loss, expected response times, speed, loop resistance

Technical report may include: incident report, cable test report, and site survey.

Other test devices may also include: TDR (Time Domain Reflectometer), multimeter, tong meter, proprietary devices, oscillator and probe set, bridge megger (computerised), pulse echo, hand held cable testers, spectrum analysers, ohmmeters

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