



Australian Government

UEENEEM071A Test reeling, trailing and flexible cables

Release 3

UEENEEM071A Test reeling, trailing and flexible cables

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This Competency Standard Unit covers the pre and post repair testing of reeling, trailing and flexible cables. It requires the ability to work safely and to Standards, evaluate the condition of cables, conduct cable tests, write repair specifications, and document test results and cable repair history.

This unit is directly equivalent to the Unit 2.24 *Test reeling, trailing and flexible cables* in the Australian/New Zealand Standard AS/NZS 4761.1 *Competencies for working with electrical equipment for hazardous areas (EEHA) Part 1: Competency Standards*. Equivalence includes endorsement in the explosion-protection techniques listed in the Range statement of this unit.

Note:

Although this unit is primarily intended for the repair of cable types specified by AS/NZS 1802 and AS/NZS 2802 and used in mining, it may be applied to the repair of other similar cables.

Application of the Unit

Application of the Unit

4)

This unit applies to mining cable and associated equipment overhaul and repair job functions at AQF 3 level or higher. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit do not require a license to practice in the work place. However practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

There are no prerequisites specified for this unit; however, competencies in compliance, testing and inspection of general overhaul or repair work would assist in achieving this unit.

Employability Skills Information

Employability Skills 3)

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 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 cables	1.1 OHS policies and procedures for entering a work site are followed. 1.2 Cable to be repaired is confirmed with appropriate personnel and the cable type is identified. 1.3 Cable history test records are reviewed to identify potential issues and ascertain the viability of repair. 1.4 Materials required for the repair are obtained in accordance with established procedures. 1.5 Special tools, equipment and testing devices needed to carry out the tests are obtained and checked for correct operation, safety and currency of calibration certification.

ELEMENT	PERFORMANCE CRITERIA
2 Specify the extent of cable repair required	2.1 OHS policies and procedures for inspecting and testing cables are followed.
	2.2 Cable testing devices are handled carefully and set up correctly prior to each test.
	2.3 Cables are inspected and tested to ascertain the viability of repairs or extent of repairs required.
	2.4 Viability or extent of the cable repair is determined from inspection/test results and cable repair history records.
	2.5 Specifications and instructions for the cable repair are documented in accordance with established procedures.
	2.6 Appropriate personnel are notified of the cable repair work required in accordance with established quality procedures.
3 Test repaired cable	3.1 OHS policies and procedures for testing cables are followed.
	3.2 Knowledge of cable design parameters and how they are tested/measured are applied to cable testing.
	3.3 Cable testing devices handled carefully and set up correctly prior to each test.
	3.4 Each test reading is taken accurately and recorded in accordance with established procedures.
	3.5 Actions in accordance with established procedures are taken to rectify any non-conformance shown by test results.
4 Document cable tests	4.1 OHS policies and procedures for completing cables tests are followed.
	4.2 Cable history test records are updated in accordance with established quality procedures.
	4.3 In accordance with established quality procedures appropriate personnel are notified of the completion of the work and provided with

ELEMENT

PERFORMANCE CRITERIA

copies of the documents.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) 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 testing installations in hazardous areas.

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

KS01-EM071 Ex reeling cable repair - testing

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Evidence shall show an understanding of Ex reeling cable repairs testing to an extent indicated by the following aspects:

T1 Occupational Health and Safety responsibilities related to hazardous areas encompassing:

- the main features and purpose of a 'clearance to work' system (includes hot work permit systems).
- typical safety procedures that should be followed before entering a hazardous area;
- the purpose of gas detectors and their limitations;
- effects of temperature on gas and vapour detection;
- frequency of monitoring for presence of gas or vapours, i.e. effects of temperature rise;
- factors affecting the accuracy of gas detectors, for example, contamination, condensation, temperature;
- safety in use of gas detectors, for example, 'read and run concept'
- the safety precautions to be taken when working in a hazardous area.

T2 The roles of the parties involved in the safety of hazardous areas encompassing:

- common Acts and Regulations related to the safety of hazardous areas and the Authorities responsible for their implementation;
- where assistance and further information can be obtained to assist persons with hazardous area responsibilities, for example, Standard bodies, experienced consultants; and
- the hazardous area responsibilities of the owner of premises in which a hazardous area exists; the occupier of premises in which a hazardous area exists; enterprises and personnel engaged in installation and/or maintenance of

REQUIRED SKILLS AND KNOWLEDGE

explosion-protection systems; enterprises and personnel engaged in the classification of hazardous areas and/or design of explosion-protection systems; enterprises and personnel engaged in the overhaul, modification and/or assessment of explosion-protected equipment; enterprises and personnel engaged in the inspection of explosion-protection installations; manufacturers of explosion-protected equipment; designated authorities; insurers.

T3 Properties of combustible substances and their potential to create an explosive hazard encompassing:

- condition in the workplace that will lead to an explosion;
- the terms 'combustion', 'ignition' and 'propagation';
- explosive range of substances encountered in the workplace i.e. LEL/UEL;
- explosive parameters of substances as given in tables of substance properties
- Note: Combustible materials are gases, vapours (from liquids), and dusts; flash point.
- the difference between gases and vapours; and
- the toxic nature of gases and vapours and potential harmful consequences.

T4 The nature of hazardous areas encompassing:

- the Standards definition of a 'hazardous area';
- the recommended methods for classifying the type and degree of explosion hazard in an area;
- hazardous area classifications as defined by Standards; and
- factors that are considered when a hazardous area is classified.
- the basics of how explosion-protection is achieved by the methods of exclusion, containment, energy limitation, dilution, avoidance of ignition source.

T5 Cable types encompassing:

- cable construction, materials and design features;
- function of each design feature;
- conditions under which cables should be stored;
- Standards to which cables are manufactured; and
- typical applications.

T6 Cable repair preparation and conductor splicing methods encompassing:

- criteria for determining the section of cable suitable to be joined;
- cable preparation and methods; and
- splicing methods and application for power, pilot and earthing conductors.

T7 Replacement of cable insulation encompassing:

- preparation of a power conductors prior to the application of insulation;

REQUIRED SKILLS AND KNOWLEDGE

- types of insulation repair tapes and their application; and
 - techniques for applying insulation repair tape.
- T8 Techniques for joining pliable wire armour.
- T9 Replacing and repairing cable sheath encompassing:
- techniques used in replacing cable sheath;
 - setting up a vulcanizer to vulcanize a repair; and
 - vulcanizing techniques and issues.
- T10 Electrical fundamentals and testing techniques encompassing:
- Nature of electrical current and charge.
 - Sources of electricity.
 - Effects of current.
 - Single-source single-load circuits — components that make up the circuit;
 - the relationship between voltage and current.
 - Consequences of a short-circuit and an open-circuit.
 - Insulation materials and properties; and types and applications in cable technology.
 - Conducting materials, properties; factor affecting resistance;
 - types and applications in cable technology.
 - Semiconducting materials and semiconducting properties;
 - types and applications in cable technology.
 - Electrical parameters of cables and their measurement.
 - Care and handling of testing devices and requirement of measuring instruments to have current calibration certification.
 - Types of devices used for testing cables.
- T11 Testing design parameters of cables and cable assemblies encompassing—
- causes of inaccuracies and overcoming them;
 - test device set up and safety procedures;
 - interpreting test readings; and
 - test results that show a cable complies with the Standards requirements.

NOTE: Cable tests include continuity, phase rotation, insulation resistance, high-voltage proof test, partial break test, symmetrical load test and sheath hardness tests.

Evidence Guide

EVIDENCE GUIDE

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

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 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.

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. 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 9.2)

EVIDENCE GUIDE

evidence required to demonstrate competency in this unit

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 must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. 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:
 - Pre and post repair testing of at least four separate cables as described in 8) and including:
 - A Following OHS procedures.
 - B Ascertaining the viability of repair appropriately.
 - C Specifying cable repairs required from inspection/test results and cable repair history records.
 - D Setting up and using cable testing devices correctly.

EVIDENCE GUIDE

- E Performing and recording all required tests accurately.
- F Documenting cable testing, including updating history records in accordance with established quality procedures.
- G Applying relevant contingency management skills.

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 also be part of 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 testing installations in hazardous areas.

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 primarily intended for learning/assessment which 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

9.5)

No units applicable.

EVIDENCE GUIDE

other units

Range Statement

RANGE STATEMENT

8) 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 pre and post repair testing of at least four separate cables. Among the four cables for which competency is demonstrated, all of the following features shall be included:

Cable features	AS/NZS designated cable type
Standard conductor construction	209; 210; 240; 241; 260; 275; 409; 412.1; 440; 441.1; 441; 450; 455.
Super flexible	245.
HV-EP-90 insulated	441; 450; 455.
Semi conductive extruded screens	241; 245; 441.1; 441; 450; 455.
Metal braided screens	209; 210; 240; 260; 409; 440; 450.
Interstitial earths	241; 245; 275; 412.1; 441.1; 441; 450; 455.
Interstitial pilots	240; 260; 440; 450; 455.
Central pilot	209; 210; 241; 245; 275; 409; 441.1; 441.
Pliable armour	260; 412.1.
Sheath reinforcement	241; 245; 274; 441.1; 441; 450; 455.

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, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

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	3	Writing	3	Numeracy	3
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Custom Content Section

Competency Field	5)
	Hazards