

Title	Repair reeling, trailing, and flexible electrical cables		
Level	4	Credits	2

Purpose	<p>This unit standard covers the sheathing, insulation, and conductor repair of reeling, trailing and flexible cables. It requires the ability to work safely and to Standards, follow repair instructions, apply repair techniques and document the repair work.</p> <p>This unit standard is intended for electrical service technicians who are responsible for electrical apparatus overhaul and repair.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – demonstrate knowledge of reeling, trailing, and flexible cable, and repair techniques; – prepare to repair cable; – carry out cable repair; and – complete and document cable repair work.
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Classification	Explosive Atmospheres > Electrical Apparatus in Explosive Atmospheres - Operations
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Available grade	Achieved
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Entry information	
Critical health and safety prerequisites	Unit 26739, <i>Demonstrate introductory underpinning knowledge of electrical apparatus in explosive atmospheres</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- 1 This unit standard has been designed for training and assessment on-job or off-job in a simulated environment which includes explosion-protected apparatus and wiring systems similar to those encountered in a real workplace.

- 2 This unit standard is directly equivalent to Unit 2.23 *Repair reeling, trailing and flexible cables* in the Australian/New Zealand Standard AS/NZS 4761.1:2008 *Competencies for working with electrical equipment in hazardous areas (EEHA) Part 1: Competency standards* and includes essential skills and knowledge as specified in the relevant clauses. It aligns with Australian Competency Standards *UEENEEM070A* from UEE07 Electrotechnology Training Package Version 3.1 (copyright Australian National Training Information Service).
- 3 This unit standard is intended to be assessed against in conjunction with other work skills related to general overhaul and repair work including maintenance, or servicing conductor repair of reeling, trailing and flexible cables.
- 4 References
AS/NZS 1768:2007, *Lightning protection*;
AS/NZS 2802:2000, *Electric cables – Reeling and trailing for mining and general use (other than underground coal mining)*;
AS/NZS 3000:2007, *Electrical installations (known as the Australian/New Zealand Wiring Rules)*;
AS/NZS 4761.1.2008, *Competencies for working with electrical equipment for hazardous areas (EEHA) Part 1 – Competency standards*;
AS/NZS 4761.2.2008, *Competencies for working with electrical equipment in hazardous areas (EEHA) Part 2 – Guide to assessing competency*;
AS/NZS 60079.10.1:2009, *Explosive atmospheres – Classification of areas – Explosive gas atmospheres*;
AS/NZS 60079.14:2009, *Explosive atmospheres – Electrical installations design, selection and erection*;
AS/NZS 60079.17:2009, *Explosive atmospheres – Electrical installations inspection and maintenance*;
AS/NZS 60079.29.2.2008, *Explosive atmospheres – Gas detectors – Selection, installation, use and maintenance of detectors for flammable gases and oxygen*;
AS/NZS 61241.0:2005, *Electrical apparatus for use in the presence of combustible dust – General requirements*;
AS/NZS 61241.14:2005, *Electrical apparatus for use in the presence of combustible dust – Selection and installation*;
AS/NZS 61241.2.1:2000, *Electrical apparatus for use in the presence of combustible dust – Test methods – Methods for determining the minimum ignition temperature of dust*;
Electricity Act 1992;
Electricity (Safety) Regulations 2010;
Hazardous Substances and New Organisms Act 1996;
Health and Safety in Employment Act 1992, and associated regulations;
Workplace Exposure Standards and Biological Exposure Indices, available from the Department of Labour, <http://www.osh.govt.nz/order/catalogue/329.shtml>, and associated regulations;
and their subsequent amendments and replacements.

5 Definitions

Appropriate personnel – individuals with responsibilities for co-ordination, design, installation, maintenance, production, or servicing activities. This can include: site managers, project managers, engineers and technicians, technical experts, line managers or supervisors, regulatory personnel, team leaders, other personnel designated by an organisation or enterprise.

Established procedures – formal documented arrangements of an organisation, enterprise or statutory authority in regard to how work is to be done and by whom and may include but are not limited to – quality management systems, safety management systems, work clearance systems, work instructions, reporting systems, and arrangements for dealing with emergencies.

Explosion-protection techniques – techniques applied to the design of electrical apparatus, components, and systems to prevent the electrical energy from becoming an ignition source in the presence of flammable vapours and gases or combustible dusts in explosive atmospheres. See *explosion-protected apparatus*.

Explosion-protected apparatus – electrical apparatus to which specific measures are applied to avoid ignition of a surrounding explosive atmosphere. Such apparatus employs one or more of the following explosion-protection techniques:

For gas and vapour atmospheres

Ex d – flameproof;

Ex e – increased safety;

Ex i – intrinsic safety; with levels of protection Ex ia, Ex ib and Ex ic;

Ex n – non-sparking;

For dusts

Ex iD – intrinsic safety (dusts);

Ex tD – enclosed;

Others, less common

Ex p – pressurisation; Ex pD (dust);

Ex m – encapsulation, with levels of protection Ex ma, Ex mb, Ex mc (gases and vapours), and Ex mD (dusts);

Ex s – special protection; categorised by Zone of application; e.g. 'Ex s (Zone 0);

Ex o – oil immersion;

Ex q – sand filled;

Ex v – ventilation.

6 Range

- a Assessment is to take account of variations between the industry sectors and enterprises. For example, apparatus used in underground coal mining will be different in some respects from that used in a petrochemical plant.
- b Occupational Safety and Health (OSH) policies and procedures may include but are not limited to – work permits and clearances, hazard monitoring, evacuation procedures, plant and electrical isolation.
- c The application of contingency management skills must be demonstrated for all outcomes and evidence requirements.
- d Established maintenance procedures must be followed.

- e All activities and evidence presented for all outcomes and evidence requirements in this unit standard must be in accordance with safe working principles and practices, legislation, policies, procedures, ethical codes and Standards, safe and sound practice, and industry practice; and, where appropriate, manufacturers' instructions, specifications, and data sheets.
- f Evidence is required for repair to at least four separate cables, which have all of the following features and associated 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.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of reeling, trailing, and flexible cable, and repair techniques.

Evidence requirements

- 1.1 Cable types are described in terms of construction, materials, and design features.
- Range function of each design feature, cable storage conditions, Standards to which cables are manufactured, applications.
- 1.2 Cable repair preparation and conductor splicing methods are explained.
- Range criteria for determining the section of cable suitable to be joined; cable preparation methods; splicing methods; application for power, pilot, and earthing conductors.

- 1.3 Replacement of cable insulation is explained.
- Range preparation of power conductors before the application of insulation, types of insulation repair materials and their application, techniques for applying insulation repair materials.
- 1.4 Techniques for joining pliable wire armour are described.
- 1.5 Techniques for replacing and repairing cable sheath are described.
- Range setting up a vulcanizer to vulcanize a repair, vulcanizing techniques and issues.

Outcome 2

Prepare to repair cable.

Evidence requirements

- 2.1 Cable to be repaired and repair specifications are confirmed with appropriate personnel.
- 2.2 Materials required for the repair are obtained in accordance with established procedures.
- 2.3 Special tools, apparatus, and testing devices needed to carry out the repair work are obtained and checked for correct operation, safety, and currency of calibration certification.

Outcome 3

Carry out cable repair.

Evidence requirements

- 3.1 Specifications and instructions for the cable repair are followed in accordance with established procedures.
- 3.2 Damaged cable material is removed and cables are prepared for joining.
- 3.3 Conductors are sliced and jointed in accordance with established procedures.
- 3.4 Insulation and covering is replaced on all cores and outer sheath using appropriate materials.
- 3.5 Pliable cable armour is jointed in accordance with established procedures.
- 3.6 Cable sheath is repaired using sheath material and vulcanised in accordance with established procedures.

- 3.7 Cable repair is carried out in a manner that does not reduce the operating parameters for the cable type.

Outcome 4

Complete and document cable repair work.

Evidence requirements

- 4.1 Cable repair work is documented in accordance with established procedures.
- 4.2 Appropriate personnel are notified of the completion of the work in accordance with established procedures.

Planned review date	31 December 2016
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	20 May 2011	N/A

Consent and Moderation Requirements (CMR) reference	0003
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Please note

Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMRs). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

Comments on this unit standard

Please contact the ElectroTechnology Industry Training Organisation (ETITO) reviewcomments@etito.co.nz if you wish to suggest changes to the content of this unit standard.