

<b>Title</b>	<b>Disconnect and reconnect explosion-protected apparatus connected to low voltage supply</b>		
<b>Level</b>	<b>4</b>	<b>Credits</b>	<b>2</b>

<b>Purpose</b>	<p>This unit standard covers isolating, disconnecting and reconnecting flameproof, increased safety and intrinsic safety electrical apparatus to supply up to 1000 V a.c. or 1500 V d.c. under the restrictions of the designated electrical apparatus and conditions specified. It encompasses working safely in hazardous areas, following isolation procedures, handling explosion-protected apparatus, selecting and using testing and measuring devices, terminating and connecting cables and conductors, safety testing and reporting.</p> <p>This unit standard is intended for electricians who are responsible for undertaking prescribed electrical maintenance work in hazardous areas.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> <li>– demonstrate knowledge of status and service reporting;</li> <li>– prepare for disconnection or reconnection;</li> <li>– disconnect electrical apparatus;</li> <li>– reconnect electrical apparatus; and</li> <li>– prepare electrical apparatus for service.</li> </ul>
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<b>Classification</b>	Explosive Atmospheres > Electrical Apparatus in Explosive Atmospheres - Operations
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<b>Available grade</b>	Achieved
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<b>Entry information</b>	
<b>Critical health and safety prerequisites</b>	Unit 26740, <i>Demonstrate and apply intermediate 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 Candidates who achieve this unit standard will be given industry endorsement for explosion-protection techniques relating to one or more of: mining, gases or dusts, depending on which explosion-protection technique competence is demonstrated. The explosion-protection endorsements are as follows:

<b>Unit endorsement suffix</b>	<b>Competence demonstrated</b>
Ex 'd'	Flameproof
Ex 'e'	Increased safety
Ex 'n'	Non-sparking
Ex 'i'	Intrinsic safety
Ex 'p'	Pressurization
Ex 'tD' (DIP)	Protection by enclosure – dusts
'I'	Group I apparatus only
'Gases'	Gas hazards only
'Dusts'	Dust hazards only
'ELV'	For apparatus and systems operating at extra-low voltage.

For further detail about the explosion-protection endorsements, please contact ETITO at <http://www.etito.co.nz>.

- 3 This unit standard is intended to be delivered and assessed against in conjunction with other work skills related to operation, installation, maintenance, or servicing of plant or machinery in explosive atmospheres.

#### 4 References

AS/NZS 1768:2007, *Lightning protection*;  
 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 for 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;  
 Standards Australia HB13-2007, *Electrical equipment for hazardous areas*;

Workplace Exposure Standards 2002, 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 Competence is to be demonstrated in relation to disconnecting and reconnecting explosion-protected electrical apparatus connected to supplies up to 1,000 V a.c or 1,500 V d.c. and for which endorsement is sought, which for this unit standard, is limited to endorsements for flameproof (Ex 'd'), increased safety (Ex 'e') and/or intrinsically safe (Ex 'i') explosion-protected techniques. This unit standard does not cover disconnection or reconnection where high fault currents are possible or for complex electrical apparatus and circuits.
- 6 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.
- Explosive atmosphere* – an atmosphere comprising volatile substances mixed with air under atmospheric conditions in the form of gases, vapours, mist, or dust in which, after ignition has occurred, combustion spreads to the entire unburned mixture.

*Hazardous area* – area in which an explosive atmosphere is present or may be expected to be present in quantities such as to require special precautions for the construction, installation, and use of apparatus.

*Requirements* – those to which apparatus, procedures and their outcomes have to conform and include statutory obligations and regulations and Standards called up by legislation or regulations.

## 7 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.

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## Outcomes and evidence requirements

### Outcome 1

Demonstrate knowledge of status and service reporting.

#### Evidence requirements

1.1 The purpose of reports is explained.

Range safety or maintenance record components, informing the extent of work undertaken or to be done in relation to charging, invoicing, quoting.

1.2 Types of reports are explained in terms of their content.

Range types – handwritten, data logged, completion form.  
content – safety status of apparatus and circuits, actions taken with regard to unsafe apparatus and circuits, recommendations, item lists, labour, charges.

### Outcome 2

Prepare for disconnection or reconnection.

#### Evidence requirements

2.1 Electrical apparatus to be disconnected or reconnected is identified and the purpose of the work to be carried out is verified with the appropriate personnel.

- 2.2 Work clearances are obtained, apparatus is isolated in accordance with established procedures, and the work area is proved to be safe.

### **Outcome 3**

Disconnect electrical apparatus.

#### **Evidence requirements**

- 3.1 Electrical characteristics and explosion-protection specifications are identified.
- 3.2 Visual checks of the electrical apparatus and associated wiring are carried out in accordance with prescribed procedures to detect any abnormalities, obvious damage or fault.
- 3.3 Isolated apparatus is confirmed as de-energised.
- 3.4 Approval is obtained in accordance with prescribed procedures from appropriate personnel, before any contingency plans are implemented.
- 3.5 Electrical apparatus is dismantled to the extent necessary to allow for disconnection without unnecessary damage.
- 3.6 Electrical apparatus components are stored appropriately to protect them from damage or loss.
- 3.7 Cables are identified and marked and the connection sequence recorded.
- 3.8 Cables are disconnected avoiding unnecessary damage to terminals or components.
- 3.9 Electrical apparatus is inspected for damage to the explosion-protection components and conclusions verified with authorised personnel.
- 3.10 Any repairs required to explosion-protection apparatus are carried out in accordance with established procedures and requirements.

### **Outcome 4**

Reconnect electrical apparatus.

#### **Evidence requirements**

- 4.1 Cables are connected without damage to terminals or components.
- 4.2 Connections are checked and tested to confirm correct polarity and continuity.
- 4.3 Electrical apparatus is assembled to comply with the relevant Standards for the given explosion-protection technique.
- 4.4 Electrical apparatus is tested for safety and correct operation.

**Outcome 5**

Prepare electrical apparatus for service.

**Evidence requirements**

- 5.1 Isolation devices are removed and work clearance is released in accordance with established procedures.
- 5.2 Documentation and certificate of compliance are completed in accordance with established procedures.
- 5.3 Operational personnel are notified when electrical apparatus is ready for service in accordance with established procedures.

<b>Planned review date</b>	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

<b>Consent and Moderation Requirements (CMR) reference</b>	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](mailto:reviewcomments@etito.co.nz) if you wish to suggest changes to the content of this unit standard.