

Title	Conduct testing of electrical apparatus in explosive atmospheres installations		
Level	4	Credits	4

Purpose	<p>This unit standard covers the explosion-protection aspects for conducting testing of electrical, electronic, instrument, and data communication installations for explosive atmospheres. It requires the ability to select, prepare and use appropriate testing devices, work safely to Standards, and to interpret and record test results.</p> <p>This unit standard is for electricians who are responsible for conducting testing of electrical, electronic, instrument, and data communication installations for explosive atmospheres.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – demonstrate knowledge of testing installations of explosion-protected apparatus, wiring, and circuits associated with explosive atmospheres; – demonstrate knowledge of visible conditions of explosion-protection apparatus that indicate the protection is void, and changes in the nature of the explosion hazard that may render the explosion-protection unsafe; – prepare to conduct testing; – conduct testing; and – confirm and document test results.
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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 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:

Unit endorsement suffix	Competence demonstrated
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 directly equivalent to Unit 2.10 *Conduct testing of hazardous areas installations* 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 *UEENEEM038A*, *UEENEEM039A*, *UEENEEM040A* and *UEENEEM041A* from UEE07 Electrotechnology Training Package Version 3.1 (copyright Australian National Training Information Service).
- 4 This unit standard is intended to be assessed against in conjunction with other work skills related to testing of electrical, electronic, instrument and data communication installations.
- 5 Competence is to be demonstrated in relation to any classified hazardous areas and explosion-protection techniques. Where the competency is demonstrated on wiring/cabling and apparatus that operate at extra low voltage and low voltage, registration with the Electrical Workers Registration Board is required. For work on wiring and apparatus operating above 1000 V a.c. or 1500 V d.c., competency in high voltage work must be held. A copy of a candidate's current practicing license must be presented at the time of assessment.
- 6 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;
New Zealand Electrical Codes of Practice (NZECP), ISSN 0114-0663 (available from the Ministry of Economic Development);
Standards Australia HB13-2007, *Electrical equipment for hazardous areas; 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 all subsequent amendments and replacements.

7 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.

Verification dossier – a set of documents showing the complete compliance history of electrical apparatus and installations within hazardous areas, as defined in Standards.

8 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 breakdown 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.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of testing installations of explosion-protected apparatus, wiring, and circuits associated with explosive atmospheres.

Evidence requirements

- 1.1 Preparation for conducting installation testing in an explosive atmosphere is described.

Range	OSH requirements, procedures for determining whether a given explosive atmosphere is safe to conduct electrical testing.
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- 1.2 Characteristics and limitations of testing apparatus used to test installations in explosive atmosphere are described in terms of the devices required and their suitability.

1.3 Documentation of results of explosive atmosphere installation tests is described.

Range test results to be recorded in a verification dossier; procedures and options for dealing with test results that show non-conformance.

Outcome 2

Demonstrate knowledge of visible conditions of explosion-protection apparatus that indicate the protection is void, and changes in the nature of the explosion hazard that may render the explosion-protection unsafe.

Evidence requirements

2.1 Visible defects that can be expected in explosion-protected apparatus and wiring are described.

2.2 Conditions that may indicate a change in a given explosion hazard are identified.

2.3 Procedures to be followed in the event of a change in the explosion hazard are identified.

Outcome 3

Prepare to conduct testing.

Evidence requirements

3.1 Area classification is ascertained from the hazardous areas layout drawings or other classification documents.

3.2 Location of each item of apparatus and of circuits subject to testing are determined from design drawings and documentation.

3.3 Special tools, apparatus, and testing devices needed for the testing work are obtained and checked for correct operation and safety.

Outcome 4

Conduct testing.

Range testing may include but is not limited to – tests specified by technical and statutory requirements, such as performance and setting of protection devices and systems, earth loop impedance, insulation resistance, earth continuity; tests to verify apparatus connection and operation.

Evidence requirements

4.1 Parts of apparatus that are dismantled in order to conduct testing are stored to protect them against loss or damage.

- 4.2 Certified and approved low-energy testing devices are selected and used to test in areas where explosive hazards may be present.
- 4.3 Sensitive circuit components required to be tested that are likely to be damaged by high test voltages, are tested using an appropriate testing method.
- 4.4 Tests necessary to determine whether the installation complies with requirements for the explosion-protection techniques to be used and for electrical safety are conducted in accordance with established procedures.
- 4.5 When testing has been completed, apparatus parts and circuit connections are replaced in a manner that ensures the integrity of the explosion-protection system.

Outcome 5

Confirm and document test results.

Evidence requirements

- 5.1 Non-conformances and faults revealed by the testing and the resulting recommended actions are documented and reported to appropriate personnel.

Range defects and faults may include but are not limited to – parameters under test that do not meet statutory requirements; recommended actions may include but are not limited to – non-connection of supply until a defect or fault is rectified, notice of period in which a defect or fault is to be rectified, other actions within the scope of statutory regulations.

- 5.2 Completion of testing is verified and a copy of the testing documentation submitted to the appropriate personnel for inclusion in the verification dossier 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	29 August 2000	30 June 2012
Review	2	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.