

| | | | |
|--------------|---|----------------|----------|
| Title | Report on the integrity of explosion-protected electrical apparatus in explosive atmospheres | | |
| Level | 3 | Credits | 3 |

| | |
|----------------|---|
| Purpose | <p>This unit standard covers the explosion-protection aspects of plant and machinery operation and maintenance. It requires the ability to visually identify any damage or deterioration of explosion-protected apparatus, monitor apparatus and plant in relation to changes in the explosion hazard and to follow procedures to limit the risk of an explosion.</p> <p>This unit standard is intended for people who are responsible for plant operation, maintenance, and inspections.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – demonstrate knowledge of visible conditions of explosion-protected 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 work in hazardous area; – observe and document condition of explosion-protected system area; and – take actions to limit the risks of an explosion. |
|----------------|---|

| | |
|-----------------------|--|
| Classification | Explosive Atmospheres > Electrical Apparatus in Explosive Atmospheres - Operations |
|-----------------------|--|

| | |
|------------------------|----------|
| Available grade | Achieved |
|------------------------|----------|

| | |
|---|--|
| Entry information | |
| Recommended skills and knowledge | Unit 26739, <i>Demonstrate introductory underpinning knowledge of electrical apparatus in explosive atmospheres</i> and Unit 26740, <i>Demonstrate and apply intermediate underpinning knowledge of electrical apparatus in explosive atmospheres.</i> |

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 2.2 *Report on the integrity of explosion-protected equipment in hazardous areas* 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 Standard *UEENEEM080A* from the 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 operation, installation, maintenance, or servicing of plant or machinery in explosive atmospheres at NZQF Level 3 or above.
- 4 Competence is to be demonstrated in relation to any classified hazardous areas.
- 5 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);
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.

Defects – visual damage or corrosion of the explosion-protection aspect of the installation or apparatus.

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.

The term *apparatus* includes *equipment*, as mentioned in many relevant Standards.

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.

Integrity of explosion-protected apparatus – the condition of being unified, complete or sound in construction of the apparatus design and use that ensures explosion-protection, for example, the structural integrity of the apparatus.

Visual inspection – inspection which identifies, without the use of access apparatus or tools, those defects, such as missing bolts, which will be apparent to the eye.

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

Wiring system – permitted wiring and accessories for power, measurement, control or communications purposes.

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 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.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of visible conditions of explosion-protected 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

- 1.1 Visible defects that can be expected in explosion-protected apparatus and wiring are described.
- 1.2 Conditions that may indicate a change in a given explosion hazard are identified.
- 1.3 Procedures to be followed in the event of a change in the explosion hazard are explained.

Outcome 2

Prepare to work in hazardous area.

Evidence requirements

- 2.1 OSH procedures to be followed before entering explosive atmospheres environment and while conducting visual inspection are described.

- 2.2 Nature of the explosion hazard(s) in the area and risks are identified, and the status of the explosion hazard is ascertained through established procedures.
- 2.3 Operation and condition of plant and machinery, with regard to explosion-protection, is ascertained through established procedures.
- 2.4 Established procedures for use of the plant and machinery, with regard to explosion-protection techniques used in the area, are followed.

Range identification of visual damage or deterioration of explosive-protected apparatus, plant, and machinery operation, examination of apparatus certificate to determine any special installation requirements.

Outcome 3

Observe and document condition of explosion-protected system area.

Evidence requirements

- 3.1 Performance of plant and machinery is monitored to identify faults that may affect the integrity of the explosion-protected apparatus and wiring system.
- 3.2 Observations of explosion-protected apparatus and wiring are made during normal operations and visual non-conformances that may affect the integrity of the explosion-protection technique are identified.
- Range observation includes – integrity of earthing systems, integrity of installation to apparatus certificate.
- 3.3 Explosion hazard monitoring apparatus is observed and any dangerous state of the hazard is identified.
- 3.4 Variations outside normal operating conditions are reported to appropriate personnel where relevant and documented in accordance with established procedures.
- Range reporting includes but is not limited to – appropriate personnel, verification dossier.
- 3.5 Purpose of reporting defects in explosion-protected apparatus and wiring are described.
- Range the purpose of a verification dossier, methods of reporting defects in explosion-protected apparatus and wiring.

Outcome 4

Take actions to limit the risk of an explosion.

Range actions may include but are not limited to established procedures for – reporting and rectifying defects, shutting down plant or machinery under emergency

conditions, plant and electrical isolation procedures, evacuating a hazardous area, reporting defects and conditions of plant and machinery, monitoring the hazardous area for presence of an explosive atmosphere, meeting OSH obligations;
defects may include – visual damage and corrosion of apparatus and wiring, loose fasteners, missing fasteners.

Evidence requirements

- 4.1 Established procedures are followed in the event of a potential or immediate hazardous condition arising from any non-conformance identified in apparatus and/or wiring, or changes in the explosion hazard to a dangerous state.

| | |
|----------------------------|------------------|
| Planned review date | 31 December 2016 |
|----------------------------|------------------|

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 |
| Revision | 2 | 3 April 2001 | 30 June 2012 |
| Review | 3 | 20 May 2011 | N/A |

| | |
|--|------|
| Consent and Moderation Requirements (CMR) reference | 0003 |
|--|------|

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.