Title | Conduct detailed inspection of electrical installations for explosive atmospheres
---|---
Level | 5
Credits | 5

Purpose
This unit standard is intended for use in the training and assessment of people who work with electrical equipment in explosive atmospheres. This unit standard covers close and detailed inspections of explosion-protected equipment and installations. It requires the ability to use a verification dossier, work safely in a hazardous area, inspect against Standards, and report on inspection results.

People credited with this unit standard are able to:
- demonstrate knowledge of techniques used to inspect installations of explosion-protected and associated equipment and wiring systems;
- demonstrate knowledge of modifications to explosion-protected equipment;
- prepare for inspection;
- conduct inspection; and
- record results of detailed inspection.

Classification
Explosive Atmospheres > Electrical Apparatus in Explosive Atmospheres - Compliance

Available grade
Achieved

Entry information
Critical health and safety prerequisites
Unit 17056, *Install explosion-protected equipment and associated equipment and wiring systems*, and Unit 17058, *Maintain electrical equipment associated with explosive atmospheres*, or demonstrate equivalent knowledge and skills.

It is recommended that candidates are Electrical Inspectors holding current registration and a practising license issued by the Electrical Workers Registration Board (EWRB).

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 equipment and wiring systems similar to those encountered in a real workplace.
2 This unit standard is directly equivalent to Clause 2.7, *Conduct detailed inspection of electrical installations for hazardous areas*, in the Australian/New Zealand Standard AS/NZS 4761:2017 *Competencies for working with electrical equipment in hazardous areas (EEHA)*.

3 Achievement of this unit standard alone does not entitle trainees to legally perform prescribed electrical work without supervision. Until registered and licensed under the Electricity Act 1992, trainees are assisting, and must work under supervision when carrying out prescribed electrical work.

4 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:

<table>
<thead>
<tr>
<th>Unit endorsement suffix</th>
<th>Competence demonstrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex 'd'</td>
<td>Flameproof</td>
</tr>
<tr>
<td>Ex 'e'</td>
<td>Increased safety</td>
</tr>
<tr>
<td>Ex 'n'</td>
<td>Non-sparking</td>
</tr>
<tr>
<td>Ex 'i'</td>
<td>Intrinsic safety</td>
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<tr>
<td>Ex 'p'</td>
<td>Pressurization</td>
</tr>
<tr>
<td>Ex 'tD'</td>
<td>Protection by enclosure – dusts</td>
</tr>
<tr>
<td>'I'</td>
<td>Group I equipment only</td>
</tr>
<tr>
<td>'Gases'</td>
<td>Gas hazards only</td>
</tr>
<tr>
<td>'Dusts'</td>
<td>Dust hazards only</td>
</tr>
<tr>
<td>‘ELV’</td>
<td>For equipment and systems operating at extra-low voltage.</td>
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</tbody>
</table>

5 Competence is to be demonstrated in relation to any classified explosive atmospheres and explosion-protection techniques. Where the competency is demonstrated on wiring/cabling and equipment that operate at extra low voltage and low voltage, registration with the Electrical Workers Registration Board is required. For work on wiring and equipment operating above 1000 V a.c. or 1500 V d.c., and for underground mines 1200 V a.c. or 1500 V d.c, competency in high voltage work must be held.

6 References
AS/NZS 4761:2017 *Competencies for working with electrical equipment in hazardous areas (EEHA)* – pending publication;
AS/NZS 3000:2007 *Electrical installations (known as the Australian/New Zealand Wiring Rules)*;
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*;
Electricity Act 1992;
Electricity (Safety) Regulations 2010;
Hazardous Substances and New Organisms Act 1996;
Health and Safety at Work Act 2015, 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*;

7 Definitions

ANZEx – Australian/New Zealand Certification Scheme for explosion-protected electrical apparatus (ANZEx Scheme).

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.

ATEX – Appareils destinés à être utilisés en Atmosphères Explosibles, comprises two European Union directives (Directive 94/9/EC) that describe what apparatus, protective systems, and work that is permitted in potentially explosive atmospheres.

Certification documentation – document(s) that assure(s) the conformity of a product, process, system, person, or organisation with specified requirements.

Competent person – a person who can demonstrate a combination of knowledge and skills to effectively, efficiently, and safely carry out activities in explosive atmospheres covered by AS/NZS 4761.1:2017. Competency in some cases may be limited to one or more specific types of explosion-protection technique, e.g. Ex ‘d’, Ex ‘i’, and/or activity e.g. design, selection, installation, maintenance, testing and inspection.

EPL – equipment protection levels.

Equipment group – Group I is for equipment for underground mines. Group II is for gases and vapours in surface industries, and is divided into Groups IIA, IIB and IIC for substances with increasing ease of ignition. Group III is for dusts in surface industries, and is similarly divided into Groups IIIA, IIIB and IIIC. These are added as roman number suffixes to explosion-protection technique markings on equipment and on Certificates of Compliance.

Explosion-protected equipment – electrical equipment to which one or more explosion-protection techniques are applied to avoid ignition of a surrounding explosive atmosphere.

Explosion-protection techniques – techniques applied to the design of electrical equipment, components, and systems to prevent electrical energy from becoming an ignition source in the presence of a surrounding explosive atmosphere, as follows:

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 with levels of protection Ex nA, Ex nC, Ex nL, Ex nR, and Ex nZ;

For dust
Ex iD – intrinsic safety (dusts);
Ex tD – enclosed;

Others, less common
Ex p – Pressurisation, with levels of protection Ex pX, Ex pY, and Ex pZ, 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; for example; Ex s (Zone 0);
Ex o – oil immersion;
Ex op – optical radiation;
Ex q – sand filled;
Ex v – ventilation.

Explosive atmosphere – mixture with air, under atmospheric conditions, of flammable
substances in the form of gas, vapour, dust, fibres, or flyings which, after ignition,
permits self-sustaining propagation.

Hazardous area – a three-dimensional region or space 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 equipment.

IECEx – International Electrotechnical Commission certification scheme covering
product that meets the requirements of International Standards.

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

LEL – lower explosive limit – the concentration of flammable gas, vapour, or dust in
air below which, an explosive atmosphere will not be formed.

Mixed explosion-protection – equipment that comprises several components, each
with its own explosion-protection technique, contained within the one enclosure.

Safe and sound practice – as it relates to the installation of electrical equipment is
declared in AS/NZS 3000:2007, Electrical Installations (known as the Australian/New
Zealand Wiring Rules).

Temperature class – classification system of electrical equipment, based on its
maximum surface temperature, related to the specific explosive atmosphere for
which it is intended to be used.

UEL – upper explosive limit – the concentration of flammable gas, vapour, or dust in
air above which, an explosive atmosphere will not be formed.

Verification dossier – a set of documents showing the complete compliance history of
electrical equipment and installations within explosive atmospheres, as defined in
Standards.

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

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

Work permit – permit allowing tools to be taken into, and work to be carried out in, a
hazardous area.

Assessment is to take account of variations between the industry sectors and
enterprises. For example, equipment used in underground mining will be different in
some respects from that used in a petrochemical plant.

On-job assessment
For on-job assessment each candidate shall have access to:

a verification dossier for the site including:
   i design documentation
   ii area classification drawings
   iii certification documents for each item of equipment
   iv inspection records
   v maintenance records;

b explosive atmosphere equipment, installation and inspection Standards;
c compliant and safe tools and testing devices.

10 Off-job simulated work environment assessment
For a simulated work environment each candidate shall have access to:
- an area designated as a explosive atmosphere area which is a close facsimile of a real work environment
- an area entry point
- delineation of the area into zones for both gas and dust
- a person to act as the authorised person for the site
- a qualified supervisor
- an assessor.

11 Range
- The application of contingency management skills must be demonstrated for all outcomes and evidence requirements.
- Established maintenance procedures must be followed.
- Candidates must refer to current legislation and Standards during assessment.
- Demonstration of safe working practices and installation in accordance with safe and sound practice are essential components of assessment of this unit standard.
- All activities and evidence presented for all outcomes and evidence requirements in this unit standard must be in accordance with:
  - legislation;
  - policies and procedures;
  - ethical codes;
  - Standards – may include but are not limited to those listed in Schedule 2 of the Electricity (Safety) Regulations 2010;
  - applicable site, enterprise, and industry practice; and,
  - manufacturers’ instructions, specifications, and data sheets.

Outcomes and evidence requirements

Outcome 1
Demonstrate knowledge of techniques used to inspect installations of explosion-protected and associated equipment and wiring systems.

Evidence requirements

1.1 Describe the relationship between the documentation held in a verification dossier and the installed equipment.

Range consistency between the location and type of equipment with the area classification details in the verification dossier, equipment certification and any attached conditions that relate to the equipment as it is installed.

1.2 Explain grades of inspection and how and when they should be applied.

Range close, detailed, visual.
1.3 Explain the requirements for the inspection of a hazardous area installation.

Range inspection processes, requirements applicable to a given installation, inspection report.

Outcome 2

Demonstrate knowledge of modifications to explosion-protected equipment.

Evidence requirements

2.1 Describe the scope and limitations for design and development of permitted modifications of explosion-protected equipment.

2.2 Explain the requirements of a competent person for a registered workshop engaged in design and development of modifications to explosion-protected equipment.

2.3 Describe the requirements for identifying and documenting modified explosion-protected equipment.

Range modification report document, requirements for distribution of reports on modifications.

Outcome 3

Prepare for inspection.

Evidence requirements

3.1 Ascertain the classification of the area from explosive atmospheres layout drawings retained in the verification dossier.

3.2 Ascertain the type and grade of inspection from the inspection schedule retained in the verification dossier.

3.3 Determine the classification details and specified location of each item of equipment and circuits subject to inspection from design drawings and equipment certification documentation retained in the verification dossier.

3.4 Obtain special tools, equipment, and testing devices needed for the inspection are obtained and check them for correct operation and safety and rectify or replace any defective items.

Outcome 4

Conduct inspection.
Evidence requirements

4.1 Inspect equipment, systems, and installation for compliance with the design specifications retained in the verification dossier and in accordance with the inspection schedule and Standards.

4.2 Where applicable in a given jurisdiction, direct an appropriately qualified person to remove equipment enclosure covers and internal components where needed to enable inspection.

4.3 Make arrangements to store and protect equipment covers and components that are removed to enable inspection.

4.4 Where applicable in a given jurisdiction, after the inspection of each item, direct an appropriately qualified person to replace components and equipment covers in a manner that ensures the integrity of the explosion-protection system.

Outcome 5

Record detailed inspection results in accordance with inspection Standards.

Evidence requirements

5.1 Record the results of an inspection.

5.2 Record defects such as equipment deterioration, faults, and unauthorised modifications.

5.3 Specify actions to rectify defects in the inspection record.

5.4 Forward the inspection record to the appropriate personnel for inclusion in the verification dossier.

Replacement information

This unit standard replaced unit standard 17075.

Planned review date

31 December 2021

Status information and last date for assessment for superseded versions

<table>
<thead>
<tr>
<th>Process</th>
<th>Version</th>
<th>Date</th>
<th>Last Date for Assessment</th>
</tr>
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<tr>
<td>Registration</td>
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<td>16 March 2017</td>
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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 (CMR). 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 Skills Organisation reviewcomments@skills.org.nz if you wish to suggest changes to the content of this unit standard.