

Title	Demonstrate underpinning knowledge of permanently-installed gas detection apparatus in explosive atmospheres		
Level	4	Credits	4

Purpose	<p>This unit standard covers the essential underpinning knowledge additional to or in greater detail than that required for portable apparatus.</p> <p>This unit standard is for people working with or intending to work with fixed gas detection apparatus in explosive atmospheres.</p> <p>People credited with this unit standard are able to demonstrate knowledge of:</p> <ul style="list-style-type: none"> – requirements and techniques for installation and maintenance specific to fixed gas detection apparatus; – the factors to consider in establishing the operating requirements for fixed gas and vapour detection apparatus in accordance with AS/NZS 60079.29.2, AS/NZS 60079.20, Workplace Exposure Standards, and integrity of explosion-protected apparatus; and – the use of published data in terms of selecting and installing gas detection apparatus.
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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 26741, <i>Demonstrate underpinning knowledge of gas detection apparatus in explosive atmospheres</i> , or demonstrate equivalent skills and knowledge.

Explanatory notes

- 1 This unit standard has been designed for training and assessment off-job.
- 2 References
AS/NZS 1826:2008, *Electrical equipment for explosive gas atmospheres – Special protection – Type of protection 's'*;
AS/NZS 3000:2007, *Electrical installations (known as the Australian/New Zealand Wiring Rules)*;

AS/NZS 4641:2007, *Electrical apparatus for detection of oxygen and other gases and vapours at toxic levels – General requirements and test methods*;
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 60079.0:2008 – *Explosive atmospheres – Equipment – General requirements*;
AS/NZS 60079.1:2007, *Explosive atmospheres – Equipment protection by flameproof enclosures 'd'*;
AS/NZS 60079.11:2006, *Explosive atmospheres – Equipment protection by intrinsic safety 'i'*;
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 60079.20:2000, *Explosive atmospheres – Data for flammable gases and vapours, relating to the use of electrical apparatus*;
AS/NZS 60079.29.1:2008, *Explosive atmospheres – Gas detectors – Performance requirements of detectors for flammable gases*;
AS/NZS 60079.29.2:2008, *Explosive atmospheres – Gas detectors – Selection, installation, use and maintenance of detectors for flammable gases and oxygen*;
Standards Australia HB13-2007, *Electrical equipment for hazardous areas*;
Electricity Act 1992;
Electricity (Safety) Regulations 2010;
Workplace Exposure Standards and Biological Exposure Indices, available from the Department of Labour, <http://www.osh.govt.nz/order/catalogue/329.shtml>;
Hazardous Substances and New Organisms Act 1996;
Health and Safety in Employment Act 1992, and associated regulations;
and their subsequent amendments and replacements.

3 Definitions

Apparatus group – Group I is for apparatus for coal 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 apparatus and on Certificates of Compliance.

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 *apparatus*, as mentioned in many relevant Standards.

Explosive atmosphere – an atmosphere comprising ignitable substances mixed with air under atmospheric conditions in the form of gases, vapours, mist, dust or flyings 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 duration and/or frequency 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.

4 Range

a For assessment against this unit standard it is expected that AS/NZS 60079.29.2 and other reference material may be used 'open book', provided candidates can demonstrate they can use it accurately and efficiently, as they would use it in the workplace.

b 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 requirements and techniques for installation and maintenance specific to fixed gas detection apparatus.

Evidence requirements

1.1 Gas and vapour releases and propagation are described in relation to a given site.

Range	the nature of the site, likely emission sources, containment in high or low spots depending on density, effect of openings in buildings, natural and mechanical ventilation.
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- 1.2 Positioning of fixed sample points or sensors is explained in terms of the ideal locations and most practical locations.
- Range compromise between gas/vapour propagation, coverage of site, speed of response, access for maintenance and calibration, protection against environment and mechanical damage, purpose of alarms.
- 1.3 Use of manufacturers' instruction manuals is described.
- Range operating instructions, adjustment procedures, operational limitations, storage.
- 1.4 Installation and maintenance Standards and/or Codes of Practice for gas detection apparatus are identified.
- 1.5 Common problems associated with fixed gas detection apparatus are identified.
- Range includes but is not limited to – contamination, poisoning, saturation, inadequate maintenance.
- 1.6 The need and procedures for maintenance and calibration of fixed gas detection apparatus are described.
- 1.7 The need and procedures for integrity and response checking of fixed gas detection apparatus are described.

Outcome 2

Demonstrate knowledge of the factors to consider in establishing the operating requirements for fixed gas and vapour detection apparatus in accordance with AS/NZS 60079.29.2, AS/NZS 60079.20, Workplace Exposure Standards, and integrity of explosion-protected apparatus.

Evidence requirements

- 2.1 Requirements for gas detection for a given situation are described in terms of sources for obtaining data on the physical chemistry of the gas or vapour to be detected and the conditions under which the gas or vapour may be present.
- 2.2 Processes of assessing the specifications of permanently installed gas detection apparatus against established requirements, in relation to a typical manufacturer's specification or data sheet, are described.
- Range possible sensor technology in terms of compounds expected, required sensitivity; possible limiting technology options in terms of expected concentrations; required integrity of explosion-protected apparatus in terms of expected compounds (apparatus group and temperature class); required integrity of explosion-protected apparatus in terms of Zone of operation; required outputs for recording, alarms and other ancillary apparatus; system integrity requirements where applicable.

Outcome 3

Demonstrate knowledge of the use of published data in terms of selecting and installing gas detection apparatus.

Evidence requirements

- 3.1 Measuring principles used by all nine detection techniques documented in AS/NZS 60079-29-2 are evaluated and techniques are selected for common applications.
- Range common applications may include but are not limited to – sensitivity, limitations and interferences caused by other gases, sensor poisoning.
- 3.2 Techniques for obtaining representative gas detection results are explained in terms of electrical explosion protection and single tube and multi tube sampling systems.
- Range electrical explosion protection – single point sensors, multipoint sensors, transportable sensors, open path sensors; single tube and multi tube sampling systems – with hazardous area sampling points used with safe area gas analysers.
- 3.3 Benefits of the different methods for obtaining representative gas detection results are evaluated with respect to sampling requirements, instrument maintenance and calibration requirements, and environmental protection.
- Range sampling requirements – zone of use, speed of response, sampling delays; environmental protection – temperature extremes, precipitation, condensation, airborne mists, dusts, oil, adhesive and corrosive materials, vibration, mechanical damage, electromagnetic radiation, plant maintenance and cleaning.
- 3.4 The requirements for and process of selecting fixed gas detection apparatus are described.
- Range environment, gas or vapour to be detected, likely interfering gases or vapours, measuring principles and techniques, methods for obtaining representative results with regard to establishing the operating requirements, system response delay.
- 3.5 Behaviour of gas and vapour releases are described.
- Range mechanism and rate of release; gas and vapour density; effects of temperature, pressure, and dilution.

3.6 Installation design and installation procedures for gas detection apparatus are described in terms of methods of obtaining representative gas detection results in terms of sample point locations using the requirements of evidence requirement 1.2.

Range includes but is not limited to – open path apparatus, point sensors and/or sample tubes where contaminants or condensation could be present.

3.7 Integrity and safety of gas and vapour sampling apparatus is described.

Range redundancy, integrity of power supply, planned maintenance.

3.8 Commissioning and scheduled maintenance of gas and vapour sampling apparatus is described.

Range integrity of sample lines, porosity of diffusion sensor screens, initial gas calibration, adjustment of alarm set points, maintenance of plans and records, verification dossier.

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.