



Australian Government

UEEHA0008 Design gas detection systems

Release: 1

UEEHA0008 Design gas detection systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design gas detection electrical systems and installation for a hazardous area.

It includes determining gas detection electrical system equipment parameters and evaluating these against manufacturer specifications. It also includes designing and documenting gas detection electrical system.

This unit augments formally-acquired competencies in a relevant industry. It applies to engineering design job functions at least at an engineering associate level.

Hazardous area (gas or vapour) is one in which an explosive gas 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.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Hazardous

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

PERFORMANCE CRITERIA

Performance criteria describe the performance needed to demonstrate achievement of the element.

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|---|------------|--|
| 1 Determine gas detection electrical system parameters | 1.1 | Requirements for gas detection system are obtained or determined with relevant person/s |
| | 1.2 | System parameters for gas detection are obtained and documented from consultation with relevant person/s |
| | 1.3 | Explosion-protection requirement for gas detection equipment is determined from area classification documents |
| 2 Select gas detection electrical equipment | 2.1 | Manufacturer specifications and operating limitations of gas equipment are obtained and analysed in accordance with workplace requirements |
| | 2.2 | Manufacturer specifications and operating limitations are compared with the required workplace parameters for gas detection system |
| | 2.3 | Gas detection equipment is selected on compatibility with hazardous area workplace parameters and economic considerations |
| 3 Document gas detection equipment design | 3.1 | Proposed gas detection equipment design is checked in accordance with workplace procedures for compliance with relevant industry standards and hazardous area requirements |
| | 3.2 | Gas system specification for gas detection equipment is documented in accordance with workplace procedures |

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEM079A Design of gas detection systems.

Links

Companion Volume implementation guides are found in VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>

Assessment Requirements for UEEHA0008 Design gas detection systems

Modification History

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- accessing and interpreting gas detection hazardous area workplace needs and parameters
- applying relevant contingency management skills
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
 - risk control measures
 - workplace procedures and practices
- applying sustainable energy principles and practices
- designing gas detection systems within a hazardous area
- documenting gas detection equipment system design
- following, checking and documenting workplace procedures
- providing gas detection equipment selection options based on parameters for gas detection and economic considerations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- maintenance procedures in hazardous areas that will ensure the integrity of the explosion-protection technique, including:
 - the purpose of a maintenance schedule
 - the purpose and extent of ‘close’, ‘sample’ and ‘periodic’ inspections
 - the features of each explosion-protection techniques that should be included in a maintenance schedule
 - the impact of environmental conditions on explosion-protected equipment, including corrosion and frequency of maintenance
 - the documentation requirements for recording the maintenance process and results
 - the use of standards in determining the requirements with which the design of explosion-protected apparatus shall comply

- techniques for the installation and maintenance of fixed gas detection equipment, including:
 - use of manufacturer instruction manuals; for example, operating instructions, adjustments procedures and operational limitations
 - installation and maintenance of standards and/or codes of practice for gas detection equipment
- location of fixed sample points or sensors, including:
 - optimal sensing
 - maintainability and ease of calibration
 - protection against environmental and mechanical damage
- gas and vapour releases, including:
 - the nature of a site
 - natural and mechanical ventilation
- common problems with fixed gas detectors
- calibration and response checking
- factors to consider in the evaluation and selection of portable and fixed gas detection equipment, including:
 - requirements for gas detection for a given situation, including:
 - sources for obtaining data on physical chemistry of the gas to be detected
 - sources for obtaining data on the conditions under which the gas may be present
 - processes of assessing the specifications of gas detection equipment against established requirements
- detecting gases and vapours, including:
 - apparatus capability and users' knowledge
 - propagation of gases - release of gas and vapours, ventilation, density, and temperature and location
 - gases to be detected and not to be detected
 - intended application
 - environmental effects
 - safety when monitoring for flammable gases where personnel could be present
 - common properties of gases and vapours - density of gases, vapours and their mixtures; effect of temperature on density; lower explosive limit (LEL) and upper explosive limit (UEL) of combustibles and toxicity
 - the differences between detecting gases and vapours - added complication of evaporation, condensation and temperature effects of vapours and their effect on propagation, calibration and detection, including sampling
- oxygen deficiency and effects on safety, including:
 - chemical reaction of oxygen with solid products
 - chemical reaction of oxygen with gaseous products
 - dilution of the air by displacement by some other gas or vapour
- measuring principles of catalytic sensors, electrochemical sensors, infrared sensors and semi-conductor sensors, including:

- common applications
- limitations and safety
- interferences of other gases with the measurement
- poisoning of the sensor
- measuring principles of thermal conductivity sensors, flame ionisation, detectors (FID), flame temperature analysers (FTA), photo ionisation detectors (PID) and paramagnetic oxygen detectors
- selection of apparatus, including:
 - environment
 - system response delay
 - gas to be detected with respect to measurement principles
- behaviour of gas and vapour releases, including:
 - rate of release
 - density
 - temperature/pressure
- design and installation, including:
 - sensor, sampling or open path
 - location
 - site
 - environmental conditions (adverse weather, excess temperature, vibration and other mechanical interference, hosing, airborne contaminants and corrosion)
- integrity and safety, including:
 - redundancy
 - protection against loss of power supply
- commissioning and scheduled maintenance, including:
 - sample lines
 - diffusion sensor screens
 - initial gas calibration
 - adjustment of alarm set points
 - plans and records.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to designing gas detection systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

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