



Australian Government

UEEHA0021 Design explosion-protected electrical systems and installations

Release: 1

UEEHA0021 Design explosion-protected electrical systems and installations

Modification History

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

Application

This unit involves the skills and knowledge required to apply explosion-protection aspects in designing electrical power, control and instrumentation systems and installations for hazardous areas.

It includes: understanding of the explosion-protection required for electrical installation for hazardous areas; determining the scope of the required electrical installation from hazardous area classification drawings, process specifications and plant design; documenting detailed specifications of compliant explosion-protected equipment and wiring systems, equipment locations, cable routes; and obtaining and interpreting the standards to which the installations need to comply.

This unit applies to electrical, instrumentation and control engineering design job functions.

Site-specific work permits may be required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment such as elevated work platforms in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

This unit of competency and associated assessment requirements is adopted from clause 2.13 of AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA). There may be differences between the content of this unit and AS/NZS 4761.1:2018, so the Standard must be checked to ensure compliance with it. Clause 2.13 of AS/NZS 4761.1:2018 also includes the following precondition for assessment:

- “A candidate seeking assessment in this unit shall have been deemed competent to design general electrical and control systems and installations at AQF level 6 or NZQF level 7 or equivalent.”

Pre-requisite Unit

UEEHA0022 Determine the explosion-protection requirements to meet a specified classified hazardous area

Competency Field

Hazards

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Establish the explosion-protection requirements for an electrical system and installation

2 Incorporate the explosion-protection requirements in electrical systems and installation design

PERFORMANCE CRITERIA

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

1.1 Explosion- protection requirements for electrical installation for hazardous areas are obtained, interpreted and applied

1.2 Hazardous area classification drawings, process specifications and plant design documentation are reviewed and the scope of the required electrical installation determined

1.3 Explosion-protection requirements are determined from reviewing the standards to the installation is required to comply

2.1 Consideration is given to locating electrical equipment in non-hazardous areas, where possible

2.2 The installation is designed to maximise ease of access for inspection and maintenance

2.3 Ability to obtain the required degree of operational safety for the installation is incorporated in the design

2.4 The specification for the ratings and characteristics of electrical equipment in the installation are compatible with the explosion-protection requirements

2.5 Engineering principles are applied to ensure the parameters for each equipment type, equipment group,

		equipment temperature class, cables and other factors for correct application are compliant and correctly specified
	2.6	Equipment is specified for the explosive atmosphere, zone and external influences in the locations where equipment is to be installed
	2.7	Wiring systems (cables, supports, enclosures) are specified for the atmosphere, zones and external influences along the routes where they are to be installed
3	Document and finalise design	
	3.1	Design is checked for compliance with the requirements established for the electrical system and installation
	3.2	Design is documented to include specification of all explosion-protected equipment and wiring systems, equipment location and cable route drawings and compliance documents for each item of explosion-protected equipment
	3.3	Design is submitted for appropriate organisational approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are included in the verification dossier

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 Electrotechnology Training Package Companion Volume Implementation Guide.

Essential operating conditions include:

- an engineering office engaged in electrical design of electrical systems and installations for explosive atmospheres
- hazardous area classification drawings
- process specifications
- plant design documentation

- relevant standards and codes and relevant technical data from manufacturers of explosion-protected equipment

Unit Mapping Information

This is a new unit.

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 UEEHA0021 Design explosion-protected electrical systems and installations

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:

- establishing the explosion-protection requirements including:
 - determining the scope of the electrical system and installation from reviewing hazardous area classification drawings, process specifications and plant design documentation
 - determining explosion-protection requirements by reviewing the standards with which the installation is required to comply
- incorporating the explosion-protection requirements in the design including:
 - locating equipment in non-hazardous areas if possible and providing ease of access for inspection and maintenance
 - incorporating the ability to obtain the required degree of protection for operational safety
 - applying relevant engineering disciplines to ensure parameters for each equipment type, equipment group, equipment temperature class and cables are compliant and correctly specified
 - specifying equipment for the explosive atmosphere, zone and external influences in the locations where they are to be installed
 - specifying wiring systems (cables, supports, enclosures) relevant to the atmosphere, zones and external influences along the routes where they are to be installed
- documenting and finalising the design including:
 - checking the design for compliance with the requirements established for the electrical system and installation
 - documenting the explosion-protection aspects of the design to include specification of all explosion-protected equipment and wiring systems, equipment location and cable route drawings and compliance documents for each item of explosion-protected equipment
 - submitting the design to the relevant parties for approval
 - including approved copies of the design in the verification dossier.

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:

- design aspects of electrical installation for hazardous area equipment including:
 - location of explosion-protected equipment
 - electrical rating and characteristics of equipment
 - providing ease of access for inspection and maintenance
 - means of obtaining the required degree of operational safety
 - documentation (additional to that required for a non-hazardous area) to be included in the verification dossier
 - assurance of conformity of equipment including:
 - equipment with acceptable certification
 - equipment without acceptable required certification
 - repaired, second-hand or existing equipment
- explosion-protected requirements including:
 - explosive atmosphere electrical installation design and selection of equipment including:
 - general requirements
 - information required for selecting explosion-protected equipment
 - procedure for selection of repaired or existing equipment
 - selection of equipment
 - protection from dangerous incendive sparking
 - electrical protection
 - emergency switch-off and electrical isolation
 - wiring systems
 - additional requirements for each type of protection including determination of required parameters
 - verification of intrinsically safe circuits
 - method for determining maximum safety parameters for intrinsically safe circuits
 - equipment protection levels (EPLs) as an alternative method for the selection of equipment.

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 workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in 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 other simulations
- relevant and appropriate tools and testing devices and PPE currently used in industry
- applicable documentation including:
 - hazardous area classification drawings
 - process specifications
 - plant design documentation
 - relevant standards and codes
- relevant technical data from manufacturers of explosion-protected equipment.

Links

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