



**Australian Government**

# **UEENEEM035A Conduct a conformity assessment of explosion-protected equipment - coal mining**

**Release 4**

## UEENEEM035A Conduct a conformity assessment of explosion-protected equipment - coal mining

### Modification History

| Release | Action | Core/Elective | Details                                                                                               | Points |
|---------|--------|---------------|-------------------------------------------------------------------------------------------------------|--------|
| 4       | Update |               | Update pre-requisite<br>UEENEEE084A – Write specifications for electrotechnology engineering projects |        |
| 4       | Update |               | Update pre-requisite<br>UEENEEE124A – Compile and produce an energy sector detailed report            |        |

### Unit Descriptor

#### Unit Descriptor

1)

#### 1.1) Descriptor

This Competency Standard Unit covers assessing the Certification documentation of explosion-protected equipment with a certificate of conformity other than an IEC Ex, ANZ Ex or AUS Ex Certificate, and producing a conformity assessment document. It encompasses skills and knowledge to examine and compare document content, compare requirements of IEC or AS/NZS Standards with alternative Standards on which the original certification was based, knowledge of explosion-protection techniques and technical report writing.

This unit is directly equivalent to the Unit 2.9 *Conduct a conformity assessment of explosion-protected equipment* in the Australian/New Zealand Standard AS/NZS 4761.1 *Competencies for working with electrical equipment for hazardous areas (EEHA) Part 1: Competency Standards*. Equivalence includes endorsement in the explosion-protection techniques listed in the Range statement of this unit.

#### Note

This unit is for the preparation of a conformity assessment

## **Unit Descriptor**

1)

### **1.1) Descriptor**

document, including Standards to alternative Standards assessment only.

## **Application of the Unit**

### **Application of the Unit 4)**

This unit augments other formally-acquired competencies in a relevant industry and shall be used only in conjunction such competencies. It applies to engineering job functions, which involve design and selection of explosion-protected electrical equipment..

Note:

Examples of relevant industries include aviations, electrical installation and maintenance, fuel storage and dispensing industrial process, instrumentation and control, marine, material handling and storage, mining, and petrochemical.

## Licensing/Regulatory Information

### 1.2) License to practice

The skills and knowledge described in this unit require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. Other conditions related to communications, electrical work, fire protection, gas work, high voltage work, refrigeration/air conditioning and security may apply in some jurisdictions subject to regulations. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships and the like

## Pre-Requisites

**Prerequisite Unit(s)**      **2)**

### 2.1) Competencies

Granting competency in this unit shall be made after confirming competencies in compliance assessment of electrical / electronic equipment and general technical evaluation and report writing at AQF 5 or equivalent. Example are (but not limited to):

|                 |                                                                                                 |
|-----------------|-------------------------------------------------------------------------------------------------|
| UEENEEC0<br>04B | Prepare specifications for the supply of materials and equipment for electrotechnology projects |
| UEENEEE0<br>15B | Develop design briefs for electrotechnology projects                                            |
| UEENEEE0<br>84A | Write specifications for electrotechnology engineering projects                                 |
| UEENEEE1<br>24A | Compile and produce an energy sector detailed report                                            |

## Employability Skills Information

### Employability Skills

3)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

## Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

## Elements and Performance Criteria

### ELEMENT

### PERFORMANCE CRITERIA

|                                             |     |                                                                                                                                                                                                                                                              |
|---------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 Prepare to conduct conformity assessment. | 1.1 | Certification documentation is obtained and read to determine the certification specifications for which the equipment has been assessed.                                                                                                                    |
|                                             | 1.2 | Relevant Standards required to begin the conformity assessment are obtained in accordance with established procedures.                                                                                                                                       |
|                                             | 1.3 | OHS policies and procedures are followed where a site inspection is required to identify equipment subject to the conformity assessment that is already installed.<br><br>NOTE: The conformity assessment document process is essentially a desktop process. |
| 2 Conduct conformity assessment.            | 2.1 | Conformity assessment is carried out in accordance with OHS and other established procedures.                                                                                                                                                                |
|                                             | 2.2 | Knowledge of IEC or AS/NZS Standards is applied to a detailed comparison with alternative                                                                                                                                                                    |

## ELEMENT

## PERFORMANCE CRITERIA

Standards on which original certification is based.

- 2.3 The documented certification criteria of the equipment are compared to those required by currently acceptable Standards, including any test on which the certification is based.

NOTE: The conformity assessment document will provide, in addition to the direct product evaluation, any information that is relevant to its use, e.g. installation, maintenance, overhaul/repair and conditions of use.

- 2.4 Discrepancies between the certification documentation and IEC or AS/NZS Standards are identified and actions needed to correctly address each of these are recorded.

- 3 Document and submit conformity assessment report.

- 3.1 Conformity assessment results are documented in a conformity assessment document, which informs whether the equipment provides an 'equivalent level of safety' to be installed, maintained, overhauled/repared and used safely in a hazardous area.

- 3.2 Recommendations for corrective actions to address discrepancies are included in the conformity assessment document.

- 3.3 Conformity assessment document is forwarded to appropriate personnel in accordance with established procedures for inclusion in the verification dossier.

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and assessing explosion protected equipment for compliance with Standards.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

### **KS01-EM035 Explosion-protected equipment conformity assessment A**

Evidence shall show an understanding of explosion-protected equipment conformity assessment to an extent indicated by the following aspects:

T1 Occupational Health and Safety responsibilities related to hazardous areas encompassing:

- the main features and purpose of a 'clearance to work' system (includes hot work permit systems).
- typical safety procedures that should be followed before entering a hazardous area;
- the purpose of gas detectors and their limitations;
- effects of temperature on gas and vapour detection;
- frequency of monitoring for presence of gas or vapours, i.e. effects of temperature rise;
- factors affecting the accuracy of gas detectors, for example, contamination, condensation, temperature;
- safety in use of gas detectors, for example, 'read and run concept'
- the safety precautions to be taken when working in a hazardous area.

T2 The roles of the parties involved in the safety of hazardous areas encompassing:

- common Acts and Regulations related to the safety of hazardous areas and the Authorities responsible for their implementation;
- where assistance and further information can be obtained to assist persons with hazardous area responsibilities, for example, Standard bodies, experienced consultants; and
- the hazardous area responsibilities of the owner of premises in which a hazardous area exists; the occupier of premises in which a hazardous area exists; enterprises and personnel engaged in installation and/or maintenance of

## REQUIRED SKILLS AND KNOWLEDGE

explosion-protection systems; enterprises and personnel engaged in the classification of hazardous areas and/or design of explosion-protection systems; enterprises and personnel engaged in the overhaul, modification and/or assessment of explosion-protected equipment; enterprises and personnel engaged in the inspection of explosion-protection installations; manufacturers of explosion-protected equipment; designated authorities; insurers.

T3 Properties of combustible substances and their potential to create an explosive hazard encompassing:

- condition in the workplace that will lead to an explosion;
- the terms ‘combustion’, ‘ignition’ and ‘propagation’;
- explosive range of substances encountered in the workplace i.e. LEL/UEL;
- explosive parameters of substances as given in tables of substance properties
- Note: Combustible materials are gases, vapours (from liquids), and dusts; flash point.
- the difference between gases and vapours; and
- the toxic nature of gases and vapours and potential harmful consequences.

T4 The nature of hazardous areas encompassing:

- the Standards definition of a ‘hazardous area’;
- the recommended methods for classifying the type and degree of explosion hazard in an area;
- hazardous area classifications as defined by Standards; and
- factors that are considered when a hazardous area is classified.
- the basics of how explosion-protection is achieved by the methods of exclusion, containment, energy limitation, dilution, avoidance of ignition source.

T5 Explosive-protected equipment encompassing:

- The principles of each explosion-protection technique, the methods used and how each technique works (Flameproof (Ex ‘d’); Increased safety (Ex ‘e’); Non-sparking (Ex ‘n’); Intrinsic safety (Ex ‘i’) and Pressurization (Ex ‘p’) for gas atmospheres and Dust-exclusion enclosures (Ex ‘tD’); Pressurization (Ex ‘pD’); Encapsulation (Ex ‘mD’); and Intrinsic safety (Ex ‘iD’) for dusts)
- How explosion-protected equipment is identified by the ‘Ex’ symbol marked on the equipment, including old equipment and equipment certified in another country.
- Visible conditions or actions that would void the explosion-protection provided by a particular technique.

T6 Explosion-protection equipment — Ex certification schemes encompassing:

- Purpose and scope of certification schemes.
- Schemes accepted in Australia and New Zealand.

## REQUIRED SKILLS AND KNOWLEDGE

- Schemes commonly used in countries other than Australia and New Zealand.
  - Processes for having equipment certified under the acceptable Ex schemes — scheme procedures; quality management requirements; conformance testing and assessment; and requirements for ongoing certification.
- T7 Flameproof (Ex ‘d’) explosion-protection technique encompassing:
- The purpose and characteristics of the design features of apparatus and circuits protected by the flameproof (Ex ‘d’) technique. (Examples of characteristics and design features are flame paths, integrity under pressure, pressure piling, and enclosure entries).
  - Typical situations where the flameproof explosion-protection technique is used;
  - Actions or conditions that would void the protection provided the Flameproof technique;
  - The use of Standards in determining the requirements to which the installation of flameproof explosion-protected apparatus shall comply.
- T8 Increased safety (Ex ‘e’) explosion-protection technique encompassing:
- The purpose and characteristics of the design features of apparatus and circuits protected by the Increased safety (Ex ‘e’) technique (Examples of characteristics and design features are temperature rise, maximum power dissipation, protection devices, certified components, creepage and clearance distances, absence of sparking contacts and enclosure entries).
  - Typical situations where the Increased safety explosion-protection technique is used;
  - Actions or conditions that would void the protection provided the Increased safety technique;
  - The use of Standards in determining the requirements to which the installation of Increased safety explosion-protected apparatus shall comply.
- T9 Non-sparking (Ex ‘n’) explosion-protection technique encompassing:
- The purpose and characteristics of the design features of apparatus and circuits protected by the Non-sparking (Ex ‘n’) technique (Examples of characteristics and design features are creepage and clearance distances and restricted breathing).
  - Typical situations where the Non-sparking explosion-protection technique is used;
  - Actions or conditions that would void the protection provided the Non-sparking technique; and
  - The use of Standards in determining the requirements to which the installation of Non-sparking explosion-protected apparatus shall comply.
- T10 Intrinsic safety (Ex ‘i’) explosion-protection technique encompassing:
- The purpose and characteristics of the design features of apparatus and circuits

## REQUIRED SKILLS AND KNOWLEDGE

protected by the Intrinsic safety (Ex ‘i’) technique (Examples of characteristics and design features are field devices, cables, safe area devices, earthing, entity versus integrated system concept, simple devices and interface devices and their parameters, segregation, infallible components, current and voltage limiting, creepage and clearance distances).

- Typical situations where the Intrinsic safety explosion-protection technique is used;
- Actions or conditions that would void the protection provided the Intrinsic safety;
- The use of Standards in determining the requirements to which the installation of Intrinsic safety explosion-protected apparatus shall comply.

T11 Pressurization (Ex ‘p’) explosion-protection technique encompassing:

- The purpose and characteristics of the design features of apparatus and circuits protected by the Pressurization (Ex ‘p’) technique (Examples of characteristics and design features are exclusion and dilution; purge periods, controlled shut down, monitoring and sources of internal release).
- Typical situations where the pressurization explosion-protection technique is used;
- Actions or conditions that would void the protection provided the pressurization technique;
- The use of Standards in determining the requirements to which the installation of pressurization explosion-protected apparatus shall comply.

T12 Enclosures for dusts (Ex ‘tD’) - explosion-protection technique encompassing:

- The purpose and characteristics of the design features of apparatus and circuits protected by the techniques for dusts (Examples of characteristics and design features are for enclosures; pressurization; encapsulation; and intrinsic safety).
- Typical situations where the each dust explosion-protection technique is used;
- Actions or conditions that would void the protection provided the each dust technique;
- The use of Standards in determining the requirements to which the installation of dust explosion-protected apparatus shall comply.

T13 Common characteristics of explosion-protection techniques encompassing:

- The purposes of ‘temperature classification’ and ‘gas grouping/apparatus grouping’.
- Compliance plate markings.
- Limitations of non-metallic or specific alloy enclosures.
- The purpose of conformity and certification/approval for equipment used in hazardous areas.
- Environmental conditions that may impact on explosion-protection techniques.
- The principles and applications of other and mixed explosion-protection

## REQUIRED SKILLS AND KNOWLEDGE

techniques (Other techniques include encapsulation Ex 'm'; oil-immersion Ex 'o'; powder-filling Ex 'q', ventilation Ex 'v' and special protection Ex 's').

- Features and purpose of conduit seals and cable termination devices designed for use in hazardous areas (These include conduit seals and barrier and compression glands for cables with or without armouring, screening and/or drain wires).

T14 The compliance certification and the 'Ex' scheme for recognition of certification encompassing:

- the purposes of certification of explosion-protected equipment;
- the parties involved in the assessment/testing and certification of explosion-protected equipment and their responsibilities; and
- the process for recognition of assessment/testing and certification of explosion-protected equipment from other countries.

T15 The preparation required to assess explosion-protected equipment for compliance with Standards encompassing:

- the special safety measures that should be taken when assessing/testing explosion-protected equipment;
- documentation required prior to conducting conformity assessment;
- tests necessary to establish that an item of explosion-protected equipment conforms with relevant Standards; and
- situations where testing is not applicable or required.

T16 Assessing and testing explosion-protected equipment encompassing:

- assessment and test requirements; and
- procedures for conducting a conformity assessment.

T17 Documentation used in assessing explosion-protected equipment for conformance to accepted Standards encompassing:

- The documentation and Standard(s) required to begin an assessment.
- The differences between the test requirements of Standards from other countries and the compliant/acceptable Standards against which the equipment is being assessed.
- Results given in equipment test reports.
- Conformity assessment processes and procedures.

T18 Assessing to a current acceptable Standard existing equipment that has been certified to previously acceptable Standards encompassing:

- processes and procedures used; and
- possible outcomes.

T19 A clause by clause assessment between the equipment manufacturing

## **REQUIRED SKILLS AND KNOWLEDGE**

Standard(s) and the current acceptable Ex Standards encompassing:

- processes and procedures used; and
- differences between the Standards that may be detected.

## Evidence Guide

### EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### Overview of Assessment

##### 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

#### Critical aspects of 9.2)

## EVIDENCE GUIDE

### evidence required to demonstrate competency in this unit

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Assess explosion protected equipment for compliance with Standards as described in 8) and including:
    - A Following OHS procedures
    - B Determining the certification specification of the equipment to be assessed.
    - C Obtaining and understanding the relevant Standards to be used, including various national and international Standards
    - D Accurately comparing documented certification criteria with the requirements of the various

## EVIDENCE GUIDE

certification schemes.

- E Identifying discrepancies relating to the certification documentation used.
- F Making appropriate recommendations of actions to correctly address discrepancies.
- G Producing a conformity assessment document that clearly informs whether the equipment provides an 'equivalent level of safety' to be installed, maintained, overhauled/repaired and used safely in a hazardous area.
- H Applying relevant contingency management skills.

### Context of and specific resources for assessment

#### 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

#### Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to assessing explosion protected equipment for compliance with Standards.

## EVIDENCE GUIDE

### Method of assessment

#### 9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

#### Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

### Concurrent assessment and relationship with other units

#### 9.5)

For optimisation of training and assessment effort competency development in this unit may be arranged concurrently with competencies in compliance assessment of electrical / electronic equipment and general technical evaluation and report writing.

## Range Statement

### RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to any hazardous area of coal mining and all the following explosion-protection techniques:

- Flameproof, (Ex 'dI')
- Increased safety, (Ex 'eI')
- Intrinsic safety, (Ex 'iI')
- Pressurization, (Ex 'p')
- Protection by enclosure-dusts, (Ex 't')

Note 'I' signifies Group I equipment

The following constants and variables included in the element/performance criteria in this unit are fully described in the Volume 2, Part 2.1.

## Unit Sector(s)

Not Applicable

## Competency Field

### 2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

|         |   |         |   |          |   |
|---------|---|---------|---|----------|---|
| Reading | 3 | Writing | 3 | Numeracy | 3 |
|---------|---|---------|---|----------|---|

## Custom Content Section

|                  |         |
|------------------|---------|
| Competency Field | 5)      |
|                  | Hazards |