



Australian Government

**UEENEEM047A Develop and manage
maintenance programs for hazardous areas
electrical equipment - coal mining**

Release 4

UEENEEM047A Develop and manage maintenance programs for hazardous areas electrical equipment - coal mining

Modification History

Release	Action	Core/Elective	Details	Points
4	Update		Update recommended pre-requisite UEENEEE110A Develop and implement energy sector maintenance programs	

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the explosion-protection aspects of plant maintenance schemes. It requires the ability to develop and manage maintenance programs incorporating strategies for inspections, repair/overhaul/replacement of components and recording of maintenance outcomes.

This unit is directly equivalent to the Unit 2.13 *Develop and manage maintenance programs for hazardous areas electrical 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.

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 electrical, instrumentation, electronics and data communication

Application of the Unit 4)

maintenance management job functions.

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 do not require a license to practice in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made after or concurrently with confirming competency in any one of the following units:

UEENEEM02 Maintain equipment in hazardous areas
7A coal mining

OR

UEENEEM08 Report on the integrity of
0A explosion-protected equipment in a
hazardous area

AND

Competencies in developing and managing general electrical/instrumentation maintenance programs at AQF 4 or equivalent An example is (but not limited to):

Prerequisite Unit(s) 2)

UEENEEE11 0A Develop and implement energy sector maintenance programs

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 | Establish maintenance requirements. | 1.1 | Policies and procedures are developed to include OHS practices, skills required and frequency and level of maintenance work. |
| | | 1.2 | Systems are established to manage and record maintenance work and up-to-date verification dossier in accordance with requirements. |
| | | 1.3 | Level of repair to be done under maintenance work is established in accordance with requirements. |
| | | 1.4 | Arrangements are made to check that the hazardous area, explosion-protected equipment |

ELEMENT	PERFORMANCE CRITERIA
	and installation comply with the verification dossier.
	1.5 Discrepancies between the hazardous area, explosion-protected equipment and installation and the verification dossier are documented and arrangements made to ensure the area is appropriately classified and explosion-protection systems are adequate for the area classification.
2 Develop and implement maintenance schedule.	2.1 Maintenance schedules are developed from recommendations of Standards and equipment manufacturers and in accordance with requirements.
	2.2 Procedures are developed and implemented to ensure the maintenance program is followed in accordance with the planned schedule and site requirements.
	2.3 Procedures are developed and implemented to ensure the verification dossier is maintained in accordance with planned schedule and site requirements.
3 Evaluate maintenance program.	3.1 Periodic and sample inspection reports are used to ascertain maintenance quality and the need for revision of maintenance schedule and frequency.
	3.2 Maintenance schedule is periodically reviewed and revised to maintain the integrity of the explosion-protection system.

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 developing and managing maintenance programs for hazardous areas electrical equipment.

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

KS01-EM047 Hazardous areas maintenance management

A

Evidence shall show an understanding of hazardous areas maintenance management to an extent indicated by the following aspects:

- T1 Explosion-protection equipment — Ex certification schemes encompassing:
- Purpose and scope of certification schemes.
 - Schemes accepted in Australia and New Zealand.
 - 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.
- T2 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.
- T3 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

REQUIRED SKILLS AND KNOWLEDGE

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.

T4 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.

T5 Intrinsic safety (Ex 'i') explosion-protection technique encompassing:

- The purpose and characteristics of the design features of apparatus and circuits 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.

T6 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

REQUIRED SKILLS AND KNOWLEDGE

pressurization technique;

- The use of Standards in determining the requirements to which the installation of pressurization explosion-protected apparatus shall comply.

T7 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.

T8 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 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).

T9 Maintenance procedures in hazardous areas that will ensure the integrity of the explosion-protection technique encompassing:

- 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; and
- the use of Standards in determining the requirements with which the design of explosion-protected apparatus shall comply.

REQUIRED SKILLS AND KNOWLEDGE

T10 The responsibilities of a person managing activities or a site related to a hazardous area, encompassing:

- OHS procedures that are to be established;
- responsibilities for ensuring that a hazardous area is safe; and
- responsibilities and processes for establishing and maintaining a verification dossier.

T11 Explosion-protection strategies in relation to a hazardous area, encompassing:

- the process of classifying a hazardous area;
- various ways in which electrical systems /apparatus can be treated to prevent them from becoming an ignition source; and
- the cost of the different ways of treating electrical systems/apparatus associated with hazardous areas.

T12 Requirements for the maintenance of electrical systems associated with hazardous areas, encompassing:

- the type and grades of inspection of hazardous areas;
- maintenance programs for electrical explosion-protected systems/apparatus; and
- documentation requirements associated with maintenance procedures.

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, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Develop and manage maintenance programs for hazardous areas electrical equipment as described in 8) and including:
 - A Establishing maintenance policies and procedures that encompass OHS responsibilities.
 - B Establishing management maintenance systems that address the special requirements for explosion-protected equipment and installations.
 - C Ensuring a hazardous area is appropriately classified and explosion-protection strategies are

EVIDENCE GUIDE

adequate.

- D Developing and implementing maintenance plans and schedules in relation to explosion-protected equipment and installations.
- E Evaluating maintenance programs in relation to explosion-protected equipment and installations.
- F Applying relevant contingency management.

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 developing and managing maintenance programs for hazardous areas electrical equipment.

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 any of the following:

Competencies in developing and managing general electrical/instrumentation maintenance programs

UEENEEM080A Report on the integrity of explosion-protected equipment in a hazardous area

UEENEEM027A Maintain equipment in hazardous areas coal mining

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 overhaul of equipment incorporating all the following explosion-protection techniques:

- Flameproof, (Ex 'dI')
- Increased safety, (Ex 'eI')
- Intrinsic safety, (Ex 'iI')
- Pressurization, (Ex 'p')

Note: 'I' signifies Group I equipment

Generic terms used throughout this Vocational Standard shall be regarded as part of

RANGE STATEMENT

the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in 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	5	Writing	5	Numeracy	5
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Custom Content Section

Competency Field	5)
	Hazards