

Australian/New Zealand Standard™

Competencies for working with electrical equipment for hazardous areas (EEHA)

Part 1: Competency Standards



AS/NZS 4761.1:2018

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee MS-066, Hazardous Areas Competencies. It was approved on behalf of the Council of Standards Australia on 10 June 2018 and by the New Zealand Standards Approval Board on 4 July 2018.

This Standard was published on 24 July 2018.

The following are represented on Committee MS-066:

Australian Petroleum Production and Exploration Association
Aviation and Marine Engineers Association
Department of Natural Resources, Mines and Energy, Qld
Electrical Safety New Zealand
ElectroComms and Energy Utilities Industries Skills Council
Energy Skills Queensland
Engineers Australia
Institute of Electrical Inspectors
Institute of Instrumentation, Control and Automation Australia
SafeWork NSW
The Skills Organisation
TAFE NSW
WorkSafe New Zealand

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about joint Australian/New Zealand Standards can be found by visiting the Standards Web Shop at www.saiglobal.com or Standards New Zealand web site at www.standards.govt.nz and looking up the relevant Standard in the on-line catalogue.

For more frequent listings or notification of revisions, amendments and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national Standards organization.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of Standards Australia or the New Zealand Standards Executive at the address shown on the back cover.

This Standard was issued in draft form for comment as DR AS/NZS 4761.1:2017.

Australian/New Zealand Standard™

Competencies for working with electrical equipment for hazardous areas (EEHA)

Part 1: Competency Standards

First published as part of AS/NZS 4761.1(Int):2000, AS/NZS 4761.2(Int):2000, AS/NZS 4761.3(Int):2000 and AS/NZS 4761.4(Int):2000.
AS/NZS 4761.1(Int):2000, AS/NZS 4761.2(Int):2000, AS/NZS 4761.3(Int):2000 and AS/NZS 4761.4(Int):2000 jointly revised, amalgamated and redesignated in part as AS/NZS 4761.1:2003.
AS/NZS 4761.1:2008 and AS/NZS 4761.2:2008 revised, amalgamated and redesignated as AS/NZS 4761.1:2018.

COPYRIGHT

© Standards Australia Limited

© The Crown in right of New Zealand, administered by the New Zealand Standards Executive

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Australia) or the Copyright Act 1994 (New Zealand).

Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, PO Box 1473, Wellington 6140.

ISBN 978 1 76072 150 3

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee MS-066, Hazardous Areas Competencies, to supersede AS/NZS 4761.1:2008, *Competencies for working with electrical equipment for hazardous areas (EEHA)*, Part 1: *Competency Standards* and AS/NZS 4761.2:2008, *Competencies for working with electrical equipment for hazardous areas (EEHA)*, Part 2: *Guide to assessing competency*.

The objective of this Standard is to set out the generic cross-industry competencies needed for work associated with electrical equipment for hazardous areas; these competencies are intended for use by any industry sector or enterprise with regard to explosion-protection related to the relevant functional areas.

This Standard is intended to be applied with reference to the AS/NZS 60079 series, *Explosive Atmospheres*, and the AS/NZS 80079 series, *Explosive Atmospheres*, and other AS/NZS standards such as AS/NZS 3800, *Electrical equipment for explosive atmospheres—Repair and overhaul*.

This Standard has been revised in consultation with the members of other AS/NZS hazardous area and mining committees and relevant industry experts with experience in the use of the previous editions.

Other factors that influenced this revision are as follows:

- (a) The Australian/New Zealand adoption of the IEC 60079 series for explosive atmospheres.
- (b) The demand from other countries for access to competencies for hazardous areas.

The principle differences between this edition and the previous editions are as follows:

- (i) The competency units and assessment are contained in a single document.
- (ii) The elimination of Sections 3 and 4 and some Appendices by including with each unit, the assessment required and evidence of competency under a main clause.
- (iii) Ensuring the required evidence focuses on that expected of a competent person and not on the learning process.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendices to which they apply. A normative appendix is an integral part of a Standard, whereas an informative appendix is only for information and guidance.

CONTENTS

	<i>Page</i>
FOREWORD.....	5
 SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE.....	6
1.2 APPLICATION	6
1.3 REFERENCED DOCUMENTS.....	7
1.4 TERMS AND DEFINITIONS	7
 SECTION 2 COMPETENCY STANDARDS	
2.1 GENERAL.....	10
2.2 ENTER A CLASSIFIED HAZARDOUS AREA TO UNDERTAKE WORK RELATED TO ELECTRICAL EQUIPMENT	11
2.3 CONDUCT VISUAL AND CLOSE INSPECTION OF ELECTRICAL INSTALLATIONS FOR HAZARDOUS AREAS	15
2.4 DETERMINE THE EXPLOSION-PROTECTION REQUIREMENTS TO MEET A SPECIFIED CLASSIFIED HAZARDOUS AREA	20
2.5 INSTALL EXPLOSION-PROTECTED EQUIPMENT AND ASSOCIATED APPARATUS AND WIRING SYSTEMS.....	30
2.6 MAINTAIN ELECTRICAL EQUIPMENT ASSOCIATED WITH HAZARDOUS AREAS	37
2.7 CONDUCT DETAILED INSPECTION OF ELECTRICAL INSTALLATIONS FOR HAZARDOUS AREAS.....	43
2.8 PLAN ELECTRICAL INSTALLATIONS FOR HAZARDOUS AREAS	51
2.9 DEVELOP AND MANAGE PERIODIC ELECTRICAL INSPECTION AND MAINTENANCE PROGRAMS FOR HAZARDOUS AREAS	57
2.10 MANAGE CONTINUOUS SUPERVISION INSPECTION OF ELECTRICAL INSTALLATIONS FOR HAZARDOUS AREAS	62
2.11 CONDUCT A CONFORMITY ASSESSMENT REVIEW OF EXPLOSION- PROTECTED EQUIPMENT	68
2.12 ASSESS THE FITNESS-FOR-PURPOSE OF EXPLOSION-PROTECTED EQUIPMENT	73
2.13 APPLY EXPLOSION-PROTECTION REQUIREMENTS TO THE DESIGN OF ELECTRICAL SYSTEMS AND INSTALLATIONS.....	79
2.14 PERFORM COMPLIANCE AUDITS OF HAZARDOUS AREAS AND THE RELATED ELECTRICAL INSTALLATION	84
2.15 CLASSIFY AREAS WHERE FLAMMABLE GAS OR VAPOUR HAZARDS MAY ARISE	90
2.16 CLASSIFY AREAS WHERE A COMBUSTIBLE DUST HAZARD MAY ARISE ..	96
2.17 REPAIR REELING, TRAILING AND FLEXIBLE CABLES USED IN COAL MINING	101
2.18 TEST REELING, TRAILING AND FLEXIBLE CABLES AND THEIR ATTACHMENTS FOR USE IN COAL MINING	106
2.19 INSPECT, MAINTAIN AND FIT PLUGS/COUPLERS FOR REELING, TRAILING AND FLEXIBLE CABLES FOR USE IN COAL MINING	111
2.20 VERIFY COMPLIANCE OF REPAIRED REELING, TRAILING AND FLEXIBLE CABLES AND ATTACHMENTS FOR USE IN COAL MINING.....	120
2.21 SUPPLY CERTIFIED EXPLOSION-PROTECTED EQUIPMENT FOR EXPLOSIVE ATMOSPHERES.....	124

	<i>Page</i>
2.22 SUPERVISE REPAIR AND OVERHAUL OF EXPLOSION-PROTECTED EQUIPMENT	128
APPENDICES	
A COMPETENCE ASSESSMENT GUIDE	141
B GUIDE TO QUALIFICATION FRAMEWORKS	144
C VOCATIONAL COMPETENCIES FOR UNDERTAKING REPAIR AND OVERHAUL OF EX EQUIPMENT	146
D SUMMARY OF ASSESSMENT PRECONDITIONS	147

FOREWORD

In the context of this document, ‘hazardous areas’ are areas in which an explosive atmosphere may be present. Unless equipment situated for such areas is constructed, installed and maintained appropriately, it may provide the energy or temperature necessary to ignite the atmosphere, which may have severe consequences. The special design features of equipment and systems used for these ‘hazardous areas’ are known as ‘explosion-protected’. They form part of the risk management strategies to ensure a safe and healthy working environment.

Since the early 1990s industries have expressed the need for a set of national competency Standards to be used by each industry sector or enterprise with regard to explosion-protected equipment for hazardous areas. To meet this need, a set of national competency Standards for Electrical Equipment in Hazardous areas (EEHA) was developed in 1996 through industry workshops held in each Australian state and in New Zealand.

The development of competency standards for electrical equipment for hazardous areas arose from concern about the variability in skills and knowledge of persons dealing with the risks that hazardous areas pose. This led to the inclusion in standards for explosive atmospheres, covering design, installation, inspection, maintenance, repair and area classification, of a recommendation for persons to be ‘competent’* to undertake the related tasks. However, the criteria on which the relevant competencies could be attributed was not well understood.

An industry research project initiated by the National Utilities and Electrotechnology Industry Training Advisory Board (NUEITAB) with participation of both mining and non-mining industry sectors resulted in the Standards Australia and New Zealand joint publication CS-EEHA-001—1998, *Electrical Equipment in Hazardous Areas*. This initial document formed the basis of a four-part series of interim Standards in 2000, the AS/NZS 4761 series, *Competencies for working with electrical equipment for hazardous areas (EEHA)*, developed by the Australian and New Zealand Joint Committee P/12, EEHA—Competency Standards Advisory Panel. New editions of the series were published in two parts in 2003 and 2008.

This edition of the Standard, developed by Australian and New Zealand Joint Committee MS-066, has been condensed to a single document. The criteria specifying competent performance and the evidence to be considered when assessing competence in a given activity are provided under the clause of the relevant competency unit.

NOTE: The numbering of the element/performance criteria (e.g. 002.1/002.1.1) is to provide a cross reference to the performance and knowledge evidence specified for the unit.

Although informed by the national adoption of the IEC 60079 series for explosive atmospheres, the principles of this Standard may be applied to any acceptable explosive atmospheres Standard.

* The notion of competency was introduced in Australia and New Zealand in the late 1980s to provide a performance-based approach to learning and assessment focusing on skills and knowledge relevant to work-related functions/activities rather than attaining a pass mark in a prescribed syllabus

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**Competencies for working with electrical equipment for hazardous areas (EEHA)****Part 1: Competency Standards**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies the competencies required for persons to work with equipment and installations associated with explosive atmospheres and the performance and knowledge evidence required to assess and attribute competence.

The competencies specified in this Standard relate only to the explosion protection aspects of designated work activities. These competencies are additional to other competencies required for a designated work activity that may be applied for non-explosive atmospheres. The various units in this Standard include pre-requisite competencies that may be relevant to the work activity for hazardous areas. As such a candidate seeking assessment needs to also be deemed competent in the designated work activity for non-explosive atmospheres.

NOTES:

- 1 Although this Standard is intended to be applied with reference to the AS/NZS 60079, and AS/NZS 80079 series, and other AS/NZS standards such as AS/NZS 3800, it may be used in conjunction with other internationally accepted Standards that are in use in specific industries. Examples of these industries include marine, shipping, off-shore oil and gas processing facilities, petroleum, petrochemical, printing, mobile drilling rigs, mining operations and aviation.
- 2 Other such standards may be referenced for the application of some competency units or where specifically sought for the competency of the personnel concerned. For example, to meet a specific need of an organization.

1.2 APPLICATION

This Standard applies to persons dealing with explosion-protected and associated electrical equipment for hazardous areas, and covers the following work functions:

- (a) Producing, processing or servicing functions in a hazardous area (and not directly involved in installing, maintaining or repairing explosion-protected equipment and systems).
- (b) Installing and maintaining explosion-protected equipment and systems in hazardous areas.
- (c) Overhauling, repairing and modifying explosion-protected equipment.
- (d) Developing/designing and maintaining explosion-protection strategies. This includes persons—
 - (i) classifying hazardous areas;
 - (ii) managing a hazardous area installation;
 - (iii) designing electrical systems for hazardous areas; and
 - (iv) inspecting equipment, systems and installations in hazardous areas.

- (e) This Standard is intended for use by—
- (i) bodies certifying competency of persons;
 - (ii) bodies certifying overhaul and repair workshops;
 - (iii) enterprises establishing the required competencies of personnel;
 - (iv) organizations developing competency and assessment standards for a given jurisdiction;
 - (v) organizations developing assessment resources; and
 - (vi) organizations developing resources training and/or training programs.

NOTE: Examples of bodies assessing competency of persons are as follows:

- (a) Registered Training Organizations (RTOs) accredited under Australian Standards for registered training, with scope to provide hazardous area competency assessment.
- (b) Skills organizations recognized under the New Zealand Qualifications Framework.
- (c) Conformity assessment bodies (CABs) accredited under the International Accreditation Forum (IAF) requirements for AS/NZS ISO/IEC 17024, with scope/resources related to hazardous areas.
- (d) Bodies accredited under the IEC Ex scheme for certification of personnel competencies for explosive atmospheres.

1.3 REFERENCED DOCUMENTS

1.3.1 Normative references

The following documents are referred to in this Standard.

AS/NZS

1747 Reeling, trailing and feeder cables used for mining—Repair, testing and fitting of accessories

1.3.2 Informative references

AS/NZS

3800 Electrical equipment for explosive atmospheres—Repair and overhaul

60079 Explosive atmospheres (series)

80079 Explosive atmospheres (series)

AS/NZS ISO

9001 Quality management systems—Requirements

AS/NZS ISO/IEC

17024 Conformity assessment—General requirements for bodies operating certification of persons

1.4 TERMS AND DEFINITIONS

For the purpose of this Standard, the definitions below apply.

For definitions related to explosive atmospheres, refer to the relevant documents listed in Clause 1.3.2.

1.4.1 Assessment

1.4.1.1 *Assessment, competence*

The process of making judgments about an individual's competence through evaluating evidence collected.

NOTE: Judgement is against the performance and knowledge evidence specified for a competency unit.

1.4.1.2 *Assessment, conditions*

The means conditions under which performance and knowledge evidence are gathered, including resources and assessor requirements.

1.4.1.3 *Assessment, preconditions*

The conditions that are required to be met before competence in a given unit is assessed.

NOTES:

- 1 Vocational competencies are those required for non-hazardous area job functions relevant to a given unit in this document and specify a minimum qualification framework level.
- 2 Prerequisite hazardous area competencies specify a unit or units that underpin a given unit in this document.

1.4.1.4 *Assessment requirements*

What an individual is required to demonstrate to be assessed as competent, including performance and knowledge evidence, and the conditions necessary for this assessment, as specified for a given unit.

1.4.2 *Assessor*

A person who holds evidence of current competencies or qualification to assess a person's work competence.

1.4.3 *Authorized person*

A person who is authorized by policy, procedures or regulation to undertake a particular role.

1.4.4 *Competency*

The attainment of knowledge and skills and the application of that knowledge and those skills to the standards of performance required in the workplace. It includes all aspects of work performance and not only a narrow skill set.

NOTE: The concept of competency focuses on what is expected of an employee in the workplace rather than on the learning process. The four components of competency are: task skills, task management skills, contingency management skills and job/role environment skills.

1.4.5 *Competency unit*

A statement defining the knowledge and skills an individual needs to perform a given work function, the evidence required to attribute competency and the assessment conditions.

1.4.6 *Evidence of competence*

1.4.6.1 *Performance evidence*

The process that an individual needs to undertake to demonstrate competence to perform the work task and the relation between the evidence and the performance criteria.

NOTE: 'Process' can mean a tangible outcome such as a report.

1.4.6.2 *Knowledge evidence*

The type and depth of knowledge that an individual needs to demonstrate to be assessed as competent to perform the work task described for the element and in the performance criteria.

1.4.7 *Hazardous area*

An area in which an explosive 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 equipment.

1.4.8 Non-hazardous area

An area in which an explosive atmosphere is not expected to be present in quantities such as to require special precautions for the construction, installation and use of equipment.

1.4.9 Qualifications framework

A policy established by a country for regulating qualifications.

NOTES:

- 1 In this document the Australian and New Zealand qualification frameworks are used to specify prerequisite vocational qualifications and are intended as a benchmark for comparison with those of other jurisdictions.
- 2 Further information is given in Appendix B.

1.4.10 Range of conditions

The types of work environment where a competency is used (e.g. a plant site, workshop, office) and the operating conditions under which work is carried out (e.g. permit to work, limitations, access to documents).

1.4.11 Resources, equipment and artefacts

Items a candidate needs to demonstrate performance evidence whether in a real or simulated environment.

1.4.12 Resources, pseudo plant

Documentation specifying the requirement of a process or plant and other information relevant to planning, design, engineering management or area classification where the instances for gathering evidence of competence from real processes or plant are not regularly available.

1.4.13 Resources, simulated environment

A work environment arranged to simulate a real work environment for the purpose of gathering performance evidence.

1.4.14 Subject matter expert

A person with demonstrable expertise and many years of continuing practice in a broad range of areas related to the particular subject.

NOTE: This includes ongoing continuing education and peer recognition in the given subject field.

SECTION 2 COMPETENCY UNITS

2.1 GENERAL

The requirements of this Standard are divided into competency units. Each unit specifies the knowledge and skills needed to carry out a given work activity relevant to a job function and specifies the requirements by which competency is assessed and attributed. The competency units for each work activity are described in detail in Clauses 2.2 to 2.22 as listed in Table 2.1.

A summary of assessment preconditions for all competency units is given in Appendix D.

NOTE: As the competency units relate only to the explosion-protection aspects of a designated work activity, each unit includes other vocational competencies candidates are required to have as pre-condition for assessment.

TABLE 2.1
LISTING OF COMPETENCY UNITS

Clause	Title
2.2	Enter a classified hazardous area to undertake work related to electrical equipment
2.3	Conduct visual and close inspection of electrical installations for hazardous areas
2.4	Determine the explosion-protection requirements to meet a specified classified hazardous area
2.5	Install explosion-protected equipment and associated apparatus and wiring systems
2.6	Maintain electrical equipment associated with hazardous areas
2.7	Conduct detailed inspection of electrical installations for hazardous areas
2.8	Plan electrical installations for hazardous areas
2.9	Develop and manage periodic electrical inspection and maintenance programs for hazardous areas
2.10	Manage continuous supervision inspection of electrical installations for hazardous areas
2.11	Conduct a conformity assessment review of explosion-protected equipment
2.12	Assess the fitness-for-purpose of explosion-protected equipment
2.13	Apply explosion-protection requirements to the design of electrical systems and installations
2.14	Perform compliance audits of hazardous areas and related electrical installation
2.15	Classify areas where flammable gas or vapour hazards may arise
2.16	Classify areas where a combustible dust hazard may arise
2.17	Repair reeling, trailing and flexible cables used in coal mining
2.18	Test reeling, trailing and flexible cables and their attachments used in coal mining
2.19	Inspect, maintain and fit plugs/couplers for reeling, trailing and flexible cables used in coal mining
2.20	Verify compliance of repaired reeling, trailing and flexible cables and attachments used in coal mining
2.21	Supply certified explosion-protected equipment for explosive atmospheres
2.22	Supervise repair and overhaul of explosion-protected equipment

2.2 ENTER A CLASSIFIED HAZARDOUS AREA TO UNDERTAKE WORK RELATED TO ELECTRICAL EQUIPMENT

2.2.1 Scope of unit

This unit specifies the obligations and safety practices for entering a classified hazardous area and the performance criteria by which competency is assessed.

A person competent in this unit will understand the following:

- (a) The risks associated with flammable gas/vapours or combustible dust and the need for areas where such substances may be present to be classified as explosive atmosphere areas.
- (b) The basic principles of explosion-protected electrical equipment.
- (c) The limitations of devices/equipment that be may be taken into the area.
- (d) Their health and safety responsibilities.
- (e) The necessary procedures to enter and work in explosive atmosphere areas.

NOTE: This unit covers the aspects of health and safety in the workplace relevant to explosive atmospheres and does not negate the other competencies required for general and functional health and safety in the workplace.

2.2.2 Application

Typically, this unit is used in relation to any job function requiring entry to a classified hazardous area.

2.2.3 Precondition for assessment

2.2.3.1 Vocational competencies

A candidate seeking assessment in this unit shall have been deemed competent in a job function requiring entry to a classified hazardous area.

2.2.3.2 Prerequisite hazardous area competencies

There are no prerequisite competencies for this unit.

2.2.4 Elements and performance criteria

The elements and performance criteria are as follows:

Element		Performance criteria	
002.1	Prepare to enter and work in a classified hazardous area	002.1.1	The need for specific safety, entry and work procedures is understood from the knowledge of the properties of flammable substances and the nature of hazardous areas and explosion-protected electrical equipment and the responsibilities of owners/occupiers for safety of the area.
		002.1.2	Site safety procedures in relation to the explosive atmosphere area are obtained from the person authorized to issue sitesafety procedures and entry and clearance-to-work permits.
		002.1.3	Site safety procedures in relation to the hazardous area are read and understood.
		002.1.4	Permission to take particular devices and equipment into a hazardous area is sought from the authorized person.
		002.1.5	Entry and clearance-to-work permits are obtained from the authorized person, read and understood.

Element		Performance criteria	
002.2	Follow all safety instructions and procedures in a classified explosive atmosphere	002.2.1	Site safety procedures including entry and clearance-to-work permits are strictly followed.
		002.2.2	Limitation on the use of devices and equipment permitted to be taken into the hazardous area are strictly followed.
		002.2.3	All instructions and signage related to the hazardous area are followed.
		002.2.4	Emergency procedures and instructions are followed.

2.2.5 Range of conditions

2.2.5.1 Work environment

The competencies specified in this unit are used for any classified hazardous area. Typically, these include petrochemical and gas processes and storage, fuel storage and dispensing, coal mining and coal handling, grain handling, processing and the like.

2.2.5.2 Operating conditions

This unit applies to WHS responsibilities for any person with a legitimate need to enter an area where an explosive atmosphere may be present.

2.2.6 Assessment requirements

2.2.6.1 Performance evidence

Evidence shall be gathered for all the following performance aspects of entering a classified hazardous area:

Performance evidence	Performance criteria
2.2.6.1.1 Prepares to enter a hazardous area encompassing: (a) Obtains, reads and understands hazardous area site safety procedures. (b) Seeks permission from the authorized person to take particular devices and equipment into a hazardous area. (c) Obtains, reads and understands the conditions of entry and clearance-to-work permit.	002.1.2 002.1.4 002.1.5
2.2.6.1.2 Observes all safety requirements for the hazardous area encompassing: (a) Follows the limitations on the use of devices/equipment permitted to be taken into the hazardous area. (b) Follows entry permit and clearance-to-work conditions. (c) Follows all hazardous area instructions and signage. (d) Complies with all emergency procedures and instructions.	002.2.2 002.2.3 002.2.4

2.2.6.2 Knowledge evidence

Evidence shall be gathered for all of the following knowledge aspects of a classified hazardous area:

Knowledge evidence	Performance criteria
2.2.6.2.1 Nature of hazardous areas and explosion protection encompassing: (a) The standard definition of a hazardous area. (b) Conditions in an explosive atmosphere that will lead to ignition, combustion and propagation of a hazardous area. (c) The explosive nature of flammable substances in the form of gas, vapour, dust, fibres, or flyings. (d) Typical parameters for flammable gases and vapours such as lower and upper explosive limits (LEL/UEL), flash point, auto ignition temperature, minimum ignition energy and relative density. (e) The toxic nature of gases and vapours and potential harmful consequences. (f) Typical parameters for combustible dusts such as minimum explosible concentration, minimum cloud and layer ignition temperatures' minimum ignition energy and the considerations of clouds versus layers of dust. (g) The classifications given to hazardous areas. (h) Electrical equipment as a potential source of ignition. (i) Characteristics of devices/equipment that require authorization to be taken into a hazardous area.	002.1.1
2.2.6.2.2 The responsibilities for the safety of a hazardous area and the responsibilities of persons entering a hazardous area encompassing: (a) Responsibilities of owners/occupiers of sites where production, process, handling and/or storage activities may cause explosive atmospheres to be present. (b) The features and purpose of an entry permit and clearance-to-work system. (c) The safety precautions to be taken while in a hazardous area. (d) Safety procedures that shall be followed before entering a hazardous area. (e) Typical procedures to be followed in the event of an emergency.	002.1 002.1.3 002.2.1 002.2.4

2.2.6.3 Assessment conditions

NOTE: Guidance on competency assessment is given in Appendix A.

2.2.6.3.1 Means of gathering performance evidence

Candidates shall enter a classified hazardous area to undertake work as specified under Clause 2.2.6.1.

Performance evidence shall be gathered from relevant work activities and situations—

- (a) through direct observation in an actual work environment that shall include resources specified in Clause 2.2.6.5.1;
- (b) through direct observation in a simulated work environment arranged as specified in Clause 2.2.6.5.2; or
- (c) through a log/portfolio of work experience relevant to the specified performance for the unit and verified by a person qualified to supervise the work and validated by an assessor.

2.2.6.3.2 Means of gathering knowledge evidence

Knowledge evidence shall confirm that a candidate has acquired all knowledge specified under Clause 2.2.6.2.

Knowledge evidence shall be gathered from more than one source such as the following:

- (a) Knowledge tests (written or oral), skill tests and technical interviews sampling all aspects of specified knowledge that cover the types of knowledge—factual, technical and procedural—appropriate to the unit.
- (b) Aspects of performance evidence where the application of factual, technical and procedural knowledge is appropriate to the unit.

2.2.6.4 Currency and sufficiency of evidence

Evidence specified in Clauses 2.2.6.1 and 2.2.6.2 shall be current and sufficient with all aspects giving a connected whole to enable a valid assessment of a person's competence now and their ability to maintain competence into the future. Where the evidence presented is not considered recent, sufficient further evidence shall be gathered as required.

NOTE: Guidance on competency assessment is given in Appendix A.

2.2.6.5 Resources**2.2.6.5.1 Equipment and artefacts**

Each candidate shall have access to the following:

- (a) Safe work methods.
- (b) Plan of the site showing delineation of classified zones.
- (c) Details of signage used on the site.
- (d) Limitations of devices and equipment that may be taken into the area.
- (e) Limitations of work that may be undertaken in the area.
- (f) Procedures and instruction in the case of an emergency.
- (g) An entry and clearance-to-work system.
- (h) Examples of typical devices/equipment (compliant and non-compliant) that a person may wish to take into an explosive atmosphere area (e.g. mobile phones, testing devices/equipment, tools).

2.2.6.5.2 *Simulated work environment*

Where evidence is gathered from a simulated work environment, the environment shall be arranged to include the following:

- (a) An area designated as a hazardous area which is a close facsimile of a real work environment.
- (b) An area entry point.
- (c) Delineation of the area into zones for both gas and dust.
- (d) A person to act as the 'authorized person' for the site.
- (e) A qualified supervisor.
- (f) An assessor.

2.2.6.6 *Assessor and subject matter experts*

2.2.6.6.1 *Assessor competency*

Assessors shall hold evidence of acceptable current competencies or qualifications to assess a person's work competence and have currency in this hazardous area unit or be assisted by a subject matter expert.

2.2.6.6.2 *Subject matter expert*

A subject matter expert assisting an assessor shall have extensive experience related to hazardous area work health and safety and be currently engaged in this work.

2.3 CONDUCT VISUAL AND CLOSE INSPECTION OF ELECTRICAL INSTALLATIONS FOR HAZARDOUS AREAS

2.3.1 *Scope of unit*

This unit specifies the requirements for conducting visual and close inspections of the explosion-protection aspects of electrical installations associated with hazardous areas and the performance criteria by which competency is to be assessed.

A person competent in this unit will be able to do the following:

- (a) Work safely in a hazardous area.
- (b) Identify by visual or close inspection conditions of the electrical installation that affect the integrity of explosion-protection.
- (c) Document inspection findings.

2.3.2 *Application*

This unit applies to basic inspection functions.

2.3.3 *Precondition for assessment*

2.3.3.1 *Vocational competencies*

A candidate seeking assessment in this unit shall have been deemed competent to either inspect, operate, install, maintain and/or service equipment for non-hazardous areas at Australian Qualification Framework (AQF) level 2 or New Zealand Qualification Framework (NZQF) level 3 or higher.

NOTE: The application of this unit is subject to a licence to undertake electrical work where the tasks undertaken are within the scope of electrical work as defined by WHS and electrical safety regulations. There may be some variations in regulations across jurisdictions.

2.3.3.2 Prerequisite hazardous area competencies

Competence in this unit shall be assessed in combination with, or after gaining competency in, the unit specified in Clause 2.2.

2.3.4 Elements and performance criteria

The elements and performance criteria are as follows:

	Element		Performance criteria
003.1	Prepare for inspection	003.1.1	Safe work methods for undertaking visual and close inspections are obtained and understood.
		003.1.2	Knowledge of the purpose, scope and limitations of visual and close inspections is applied to preparation for the work.
		003.1.3	Type and location of each item of equipment subject to inspection are determined from the inspection program for the site.
003.2	Conduct inspection	003.2.1	Safe work methods for undertaking visual and close inspections in hazardous areas including isolation of equipment, are followed.
		003.2.2	Knowledge of defects impairing the integrity of the type of protection, that are identifiable by visual and close inspection, is applied.
		003.2.3	Equipment is visually and closely inspected and defects impairing the integrity of the type of protection are identified.
003.3	Record inspection results	003.3.1	Defects identified by visual and close inspection are recorded in accordance with inspection standards and site record systems.
		003.3.2	Documentation in relation to all aspects of the inspection is forwarded to the authorized person for inclusion in the verification dossier.

2.3.5 Range of conditions

2.3.5.1 Work environment

The competencies specified in this unit are used for any site that has a classified hazardous area. These may include petrochemical and gas processes and storage, fuel storage and dispensing, coal mining and coal handling, grain handling and processing, and the like.

2.3.5.2 Operating conditions

The work to which this unit applies relates to visual and close inspection as part of the scheduled inspection program for a given site. It requires the use of access equipment and basic tools but normally does not require the opening of enclosures or de-energizing of equipment.

2.3.6 Assessment requirements

2.3.6.1 Performance evidence

Evidence shall be gathered for all the following performance aspects of conducting visual and close inspection of electrical installations for explosive atmospheres:

Performance evidence	Performance criteria
2.3.6.1.1 Prepares to conduct a visual and close inspection of electrical installations for gas and dust hazardous areas encompassing: (a) Reviewing safe work methods associated with the classified area in which the work is to be carried out. (b) Determining the type and location of equipment subject to the inspection.	003.1.1 003.1.3
2.3.6.1.2 Conducts visual and close inspections of electrical installations in gas and dust hazardous areas encompassing: (a) Accepting and following safe work methods. (b) Identifying defects impairing the integrity of the type of protection.	003.2.1 003.2.3
2.3.6.1.3 Completes record of visual and close inspections of electrical installations in gas and dust hazardous areas encompassing: (a) Recording defects identified in the inspection impairing the integrity of the type of protection. (b) Forwarding the inspection record for inclusion in the verification dossier.	003.3.1 003.3.2

2.3.6.2 Knowledge evidence

Evidence shall be gathered for all of the following knowledge aspects of conducting visual and close inspection of electrical installations for explosive atmospheres:

Knowledge evidence	Performance criteria
2.3.6.2.1 Purpose, scope and limitations of visual and close inspections encompassing: (a) Inspection program for the site based on schedules specified in inspection standards. (b) Periodic inspection schedules covering equipment, installations and environment for: (i) Ex 'd', Ex 'e' and Ex 'n' installations. (ii) Ex 'i', Ex 'iD' and Ex 'nL' installations. (iii) Ex 'p' and Ex 'pD'. (iv) Ex 'tD'.	003.1.2
2.3.6.2.2 Aspects of close and visual inspections encompassing: (a) Items subject to visual and close inspection listed in schedules specified in inspection standards. (b) Defects impairing the integrity of the type of protection that can be identified by visual and close inspection including: (i) Excessive corrosion. (ii) Missing cover and mounting bolts. (iii) Enclosure or cable damage. (iv) Non-secured cables. (v) Exposed armouring/cable cores at glanding points. (vi) Missing or illegible labels.	003.2.2

2.3.6.3 Assessment conditions

NOTE: Guidance on competency assessment is given in Appendix A.

2.3.6.3.1 Means of gathering performance evidence

Candidates shall conduct visual and close inspection as specified under Clause 2.3.6.1.

Performance evidence shall be gathered from relevant work activities and situations—

- (a) through direct observation in an actual work environment that shall include resources specified in Clause 2.3.6.5.1;
- (b) through a log/portfolio of work experience relevant to the specified performance for the unit and verified weekly for each week of work by a person qualified to supervise the work and validated by an assessor; or
- (c) a combination of the above.

Evidence from a simulated work environment, as specified in Clause 2.3.6.5.2, may be used to supplement evidence from an actual work environment.

2.3.6.3.2 Means of gathering knowledge evidence

Knowledge evidence shall confirm that a candidate has acquired all knowledge specified under Clause 2.3.6.2.

Knowledge evidence shall be gathered from more than one source such as the following:

- (a) Knowledge tests (written or oral), skill tests and technical interviews sampling all aspects of specified knowledge that cover the types of knowledge, factual, technical, procedural and theoretical, appropriate to AQF level 2 or NZQF level 3.
- (b) Aspects of performance evidence where the application of basic factual, technical and procedural knowledge at AQF level 2 or NZQF level 3 is evident.
- (c) A combination of the above.

2.3.6.4 Currency and sufficiency of evidence

Evidence specified in Clauses 2.3.6.1 and 2.3.6.2 shall be current and sufficient with all aspects giving a connected whole to enable a valid assessment of a person's competence now and their ability to maintain competence into the future. Where the evidence presented is not considered recent or sufficient further evidence shall be gathered as required.

NOTE: Guidance on competency assessment is given in Appendix A.

2.3.6.5 Resources

2.3.6.5.1 Equipment and artefacts

Each candidate shall have access to the following equipment and artefacts:

- (a) Safe work methods.
- (b) Site inspection schedule.
- (c) Inspection reporting system.
- (d) Explosion-protected electrical installation with and without defects that can be detected by visual and close inspection.

2.3.6.5.2 Simulated work environment

Where evidence is gathered from a simulated work environment, the environment shall be arranged to include the following:

- (a) An area designated as an explosive atmosphere area which is a close facsimile of a real work environment.
- (b) An area entry point.
- (c) Delineation of the area into zones for both gas and dust.
- (d) A person to act as the 'authorized person' for the site.
- (e) A qualified supervisor.
- (f) An assessor.

2.3.6.6 Assessor and subject matter experts

2.3.6.6.1 Assessor competency

Assessors shall hold evidence of acceptable current competencies or qualifications to assess a person's work competence and have currency in this hazardous area competency unit or be assisted by a subject matter expert.

2.3.6.6.2 Subject matter expert

A subject matter expert assisting an assessor shall have extensive experience related to this competency unit and be currently engaged in this work.

2.4 DETERMINE THE EXPLOSION-PROTECTION REQUIREMENTS TO MEET A SPECIFIED CLASSIFIED HAZARDOUS AREA

2.4.1 Scope of unit

This unit specifies requirements for determining the type of explosion-protected equipment for a given explosive atmosphere and performance criteria by which competency is to be assessed.

A person competent in this unit will be able to do the following:

- (a) Read and interpret the explosion-protection fundamentals in explosive atmosphere technical standards.
- (b) Understand the information given in certification documents, verification dossiers and equipment marking.
- (c) Identify the design features of each type of explosion-protected equipment.
- (d) Understand actions and conditions that would void the explosion-protection afforded by each equipment type.
- (e) Understand where each equipment type may be used.

2.4.2 Application

This unit applies to design, installation, maintenance, inspection, auditing, and repair and overhaul functions.

2.4.3 Precondition for assessment

2.4.3.1 Vocational competencies

A candidate seeking assessment in this unit shall have been deemed competent to install, maintain, inspect, and/or engineer electrotechnology equipment and installations from AQF level 3 or NZQF level 4 or higher.

2.4.3.2 Prerequisite hazardous area competencies

Competence in this unit shall be assessed in combination with, or after gaining competency in, the requirements of Clause 2.2.

2.4.4 Elements and performance criteria

The elements and performance criteria are as follows:

Element		Performance criteria	
004.1	Prepare to review explosion-protection technical standards	004.1.1	The technical standards specifying the requirements to which each type of explosion-protected equipment is required to comply are identified.
		004.1.2	A verification dossier for a site that has gas hazards is reviewed and requirements for the explosive atmospheres are established.
		004.1.3	A verification dossier for a site that has dust hazards is reviewed and requirements for the explosive atmospheres are established.
004.2	Ascertain the requirements for each explosion-protection type	004.2.1	Knowledge of explosion-protection methods and each equipment type is applied to identify their protective features.
		004.2.2	The equipment standards are reviewed to establish the compliance requirements for each equipment type.
		004.2.3	Aspects that are vulnerable to voiding the protection due to defective installation or poor maintenance are determined from knowledge of equipment types and equipment standards.
		004.2.4	Items of explosion-protected equipment are examined to identify any condition that would void the protection.
		004.2.5	It is established where the particular explosion-protected equipment types may be used from the relevant technical standards, equipment certification and the verification dossier for a given site.
004.3	Identify acceptable equipment certification	004.3.1	Knowledge of the equipment certification process and acceptable standards are applied.
		004.3.2	The required marking on certified equipment is obtained from relevant technical standards.
		004.3.3	The suitability of explosion-protection equipment items for a given application and location is ascertained from relevant technical standards, certification documents, equipment marking and the verification dossier for a given site.

2.4.5 Range of conditions

2.4.5.1 Work environment

The competencies specified in this unit are used in engineering offices, site workshops and in the field prior to and during installation, maintenance, inspection and auditing activities and in-service facilities involved in the repair and overhaul of explosion-protected equipment.

2.4.5.2 Operating conditions

The work to which this unit applies involves the extensive use of standards, equipment certification and installation design documentation and site-specific verification dossiers for any application in which explosion-protected equipment is used.

2.4.6 Assessment requirements

2.4.6.1 Performance evidence

Evidence shall be gathered for all the following performance aspects of determining the explosion-protection requirements specified for a classified explosive atmosphere:

Performance evidence	Related performance criteria
2.4.6.1.1 Selects the correct standard(s) relevant to each equipment type	004.1.1
2.4.6.1.2 Establishes the requirement for explosive atmospheres from a verification dossier	004.1.2 004.1.3
2.4.6.1.3 Examines Ex 'd', Ex 'e' and Ex 'i' items of explosion-protected equipment and identifies any condition that would void the protection	004.2.4
2.4.6.1.4 Ascertains the suitability of items of explosion-protected equipment for a given application and location from equipment standards, certification documents, equipment marking and the verification dossier	004.3.1 004.3.2 004.3.3

2.4.6.2 Knowledge evidence

Evidence shall be gathered for all of the following knowledge aspects of determining the explosion-protection requirements specified for a classified explosive atmosphere:

Knowledge evidence	Performance criteria
2.4.6.2.1 Methods for preventing ignition of a explosive atmosphere by an electrical source encompassing: (a) Exclusion method including: (i) Dust ignition protection type ‘tD’ or ‘t’. (ii) Pressurization ‘p’. (iii) Encapsulated ‘m’. (iv) Oil-immersed ‘o’. (v) Powder filling ‘q’. (b) Explosion containment method—Flameproof ‘d’ enclosure type. (c) Energy limitation including: (i) Intrinsic safety ‘i’. (ii) Protection type ‘n’ (e.g. non-sparking, hermetically sealed, enclosed break). (d) Avoidance of ignition source including: (i) Increased safety ‘e’. (ii) Protection type ‘n’. (e) Dilution—ventilation.	004.2.1
2.4.6.2.2 Equipment and circuits protected by the flameproof (Ex ‘d’) enclosure type encompassing: (a) How flameproof-type enclosures work to provide explosion protection. (b) Features of flameproof enclosures and their function including: (i) Enclosure materials. (ii) Flame paths. (iii) Fasteners. (iv) Gaskets. (v) Enclosure entries. (vi) Breathing and drain devices. (c) Attributes of flameproof enclosures including: (i) Integrity under pressure. (ii) Suitability for power switching equipment. (iii) Situations where this type can be used.	004.2.1 004.2.2 004.2.5

Knowledge evidence	Performance criteria
(d) Aspects that are vulnerable to voiding the protection due to defective installation or poor maintenance including: (i) Installed location. (ii) Cable/conduit entries. (iii) Flame paths. (iv) Gaskets. (v) Fasteners. (vi) Pressure piling.	004.2.3
2.4.6.2.3 Equipment and circuits protected by the increased safety (Ex ‘e’) method encompassing: (a) How increased safety ‘e’ type works to provide explosion protection. (b) Features of increased safety and their function including: (i) Electrical connections. (ii) Length of conductors within an enclosure. (iii) Clearances between bare conductive parts. (iv) Creepage distances. (v) Enclosure entries. (vi) IP rating of enclosures. (vii) Temperature limitation. (viii) Certified components. (c) Attributes of increased safety including: (i) Absence of sparking contacts. (ii) Situations where this type can be used. (d) Aspects that are vulnerable to voiding the protection due to poor installation or maintenance including: (i) Installed location. (ii) Electrical connections. (iii) Clearances. (iv) Preservation of temperature limitations. (v) Components.	004.2.1 004.2.2 004.2.5 004.2.3

Knowledge evidence	Performance criteria
2.4.6.2.4 The purpose and characteristics of the design features of equipment and circuits protected by the intrinsic safety (Ex ‘i’) type encompassing: (a) How the intrinsic safety type works to provide explosion protection. (b) Features of intrinsic safety and their function including: (i) Associated equipment. (ii) Simple devices. (iii) Dependant components. (iv) Infallible components, assemblies and connections. (v) External wiring. (vi) Safety barrier. (c) Attributes of intrinsic safety including: (i) Levels of protection. (ii) Ignition energy limiting. (iii) Entity versus integrated system concept. (iv) Situations where this type can be used. (d) Aspects that are vulnerable to voiding the protection due to poor installation or maintenance including: (i) Installed location. (ii) Stored energy sources. (iii) Insulation ratings. (iv) External wiring. (v) Methods of earthing/bonding.	004.2.1 004.2.2 004.2.5 004.2.3
2.4.6.2.5 The purpose and characteristics of the design features of equipment and circuits protected by the type of protection ‘n’ (Ex ‘n’) technique encompassing: (a) How type of protection ‘n’ works to provide explosion protection. (b) Features of type of protection ‘n’ and their application including: (i) Non-sparking device ‘nA’. (ii) Range of devices and components designated ‘nC’. (iii) Energy-limited equipment ‘nL’. (iv) Associated energy-limited equipment ‘[nL]’ or ‘[Ex nL]’. (v) Self-protected energy-limited equipment ‘nA nL’. (vi) Restricted-breathing enclosure ‘nR’.	004.2.1 004.2.2 004.2.5

Knowledge evidence	Performance criteria
(c) Aspects that are vulnerable to voiding the protection due to poor installation or maintenance including: (i) Installed location. (ii) Enclosures. (iii) Cable/conduit entries. (iv) External connections.	004.2.3
2.4.6.2.6 The purpose and characteristics of the design features of equipment protected by the encapsulation (Ex ‘m’) technique covering the following: (a) How the encapsulation type works to provide explosion protection. (b) Features of type of protection ‘m’ and their function including: (i) Levels of protection. (ii) Temperature limitations. (iii) Protective devices. (iv) Situations where this type can be used. (c) Aspects that are vulnerable to voiding the protection due to poor installation or maintenance.	004.2.1 004.2.2 004.2.5 004.2.3
2.4.6.2.7 The purpose and characteristics of the design features of equipment by the oil immersion (Ex ‘o’) technique covering the following: (a) How the oil immersion type works to provide explosion protection. (b) Features of type of protection ‘o’ and their function including: (i) Protective liquid. (ii) Limiting temperature. (iii) Immersion depth. (iv) Situations where this type can be used.	004.2.1 004.2.2 004.2.5
2.4.6.2.8 The purpose and characteristics of the design features of equipment protected by the powder filled (Ex ‘q’) technique covering the following: (a) How the powder-filling type works to provide explosion protection. (b) Features of the type of powder-filling ‘q’ and their function including: (i) Permanently sealed enclosures. (ii) Enclosures intended to be opened for repair. (iii) Temperature limitation. (iv) Types of devices. (v) Situations where this type can be used.	004.2.1 004.2.2 004.2.5

Knowledge evidence	Performance criteria
2.4.6.2.9 The purpose and characteristics of the design features of equipment and circuits protected by the pressurization enclosure (Ex ‘p’) technique covering the following: (a) How the pressurization enclosure type works to provide explosion protection. (b) Features of the type of pressurization enclosure ‘p’ and their function including: (i) Types of pressurization. (ii) Pressurization system. (iii) Purging. (iv) Temperature limitation. (v) Safety devices. (vi) Containment systems. (vii) Protection types. (viii) Situations where this type can be used. (c) Aspects that are vulnerable to voiding the protection due to pressure failure including: (i) Inadequate cable/conduit entries. (ii) Poorly secured doors and covers. (iii) Failed safety devices. (iv) Negating purging requirements after maintenance.	004.2.1 004.2.2 004.2.5 004.2.3
2.4.6.2.10 The purpose and characteristics of the design features of equipment protected from dust ignition by enclosure ‘t’ covering the following: (a) How the dust ignition by enclosure type works to provide explosion-protection. (b) Features of dust ignition by enclosure ‘t’ and their function including: (i) Level of protection. (ii) Protective devices. (iii) Gaskets. (iv) Cable/conduit entries. (v) Situations where this type can be used. (vi) Type protection ‘pD’ in legacy systems. (c) Aspects that are vulnerable to voiding the protection due to poor installation or maintenance including: (i) Cable/conduit entries. (ii) Sealing. (iii) Dust layer accumulation.	004.2.1 004.2.2 004.2.5 004.2.3

Knowledge evidence	Performance criteria
2.4.6.2.11 The common characteristics of explosion-protection types encompassing: (a) Criteria on which equipment protection levels (EPLs) are assigned. (b) The purposes of ‘temperature classification’ and ‘equipment grouping’. (c) Equipment markings (nameplate). (d) Limitations of non-metallic or specific alloy enclosures. (e) The purpose and use of conformity and certification/approval for equipment used in explosive atmospheres. (f) Environmental conditions that may impact on explosion-protection techniques. (g) The principles and applications of other and mixed explosion-protection techniques.	004.2.2 004.2.3
2.4.6.2.12 Standards to which explosion-protected equipment is required to comply encompassing: (a) Standards to which the protective features of each type of explosion protection are required to comply. (b) Typical content of equipment (Ex) certificates including: (i) Explosion protection parameters. (ii) Electrical parameters. (iii) Instruction and limitation of use. (c) Verification dossiers including: (i) Purpose. (ii) Content.	004.1.1 004.1.2 004.1.3
2.4.6.2.13 Ex certification schemes to accepted standards encompassing: (a) Purpose and scope of certification schemes. (b) Accepted certification schemes. (c) Processes for having equipment certified under the acceptable Ex schemes including: (i) Scheme procedures. (ii) Quality management requirements. (iii) Conformance testing and assessment. (iv) Requirements for ongoing certification.	004.3.1 004.3.2 004.3.3

2.4.6.3 *Assessment conditions*

NOTE: Guidance on competency assessment is given in Appendix A.

2.4.6.3.1 *Means of gathering performance evidence*

Candidates shall determine the explosion-protection requirements specified for a classified explosive atmosphere as specified under Clause 2.4.6.1.

Performance evidence shall be gathered from relevant work activities and situations—

- (a) through direct observation in a simulated work environment, specified in Clause 2.4.6.5.2 arranged with resources as specified in Clause 2.4.6.5.1;
- (b) through a log/portfolio of work experience relevant to the specified performance evidence for the unit and verified daily by a person qualified to supervise the work and validated by an assessor; or
- (c) a combination of the above.

2.4.6.3.2 *Means of gathering knowledge evidence*

Knowledge evidence shall confirm that a candidate has acquired all knowledge specified under Clause 2.4.6.2.

Knowledge evidence shall be gathered from more than one source such as the following:

- (a) Knowledge tests (written or oral), skill tests and technical interviews sampling all aspects of specified knowledge that cover the types of knowledge, factual, technical, procedural and theoretical, appropriate to AQF level 3 or NZQF level 4;
- (b) Aspects of performance evidence where the application of factual, technical, procedural and theoretical knowledge at AQF level 3 or NZQF level 4 is evident.

2.4.6.4 *Currency and sufficiency of evidence*

Evidence specified in Clauses 2.4.6.1 and 2.4.6.2 shall be current and sufficient with all aspects giving a connected whole to enable a valid assessment of a person's competence now and their ability to maintain competence into the future. Where the evidence presented is not considered recent or sufficient further evidence shall be gathered as required.

NOTE: Guidance on competency assessment is given in Appendix A.

2.4.6.5 *Resources*

2.4.6.5.1 *Equipment and artefacts*

Each candidate shall have access to the following:

- (a) Safe work methods.
- (b) Technical standards for explosive-protected electrical equipment types and explosive atmospheres.
- (c) Verification dossier for a classified gas atmosphere area.
- (d) Verification dossier for a classified dust atmosphere area.
- (e) Safety procedures for the area.
- (f) Defective and non-defective items of Ex 'd', Ex 'e' and Ex 'i' explosion-protected equipment.
- (g) Equipment certification documents.

2.4.6.5.2 *Simulated work environment*

Where evidence is gathered from a simulated work environment, the environment shall be arranged to include the following:

- (a) An area designated as a site workshop or engineering office which is a close facsimile of a real work environment.
- (b) A qualified supervisor.
- (c) An assessor.

2.4.6.6 *Assessor and subject matter experts*

2.4.6.6.1 *Assessor competency*

Assessors shall hold evidence of acceptable current competencies or qualification to assess a person's work competence and have currency in this hazardous area competency unit or be assisted by a subject matter expert.

2.4.6.6.2 *Subject matter expert*

A subject matter expert assisting an assessor shall have extensive experience related to this competency unit and be currently engaged in this work.

2.5 INSTALL EXPLOSION-PROTECTED EQUIPMENT AND ASSOCIATED APPARATUS AND WIRING SYSTEMS

2.5.1 Scope of unit

This unit specifies the requirements for installing explosion-protected and associated equipment and wiring systems for hazardous areas and performance criteria by which competency is assessed.

A person competent in this unit will be able to:

- (a) Understand and apply the explosion-protection aspects of installing electrical equipment and wiring systems for hazardous areas.
- (b) Match items of explosion protected-equipment with that specified for a given location.
- (c) Comply with installation standards and retain/complete the required documentation.

2.5.2 Application

This unit applies to hazardous area electrical installation functions.

2.5.3 Precondition for assessment

2.5.3.1 *Vocational competencies*

A candidate seeking assessment in this unit shall have been deemed competent to install electrotechnology equipment and wiring systems for non-explosive atmospheres at AQF level 3 or NZQF level 4.

NOTE: The application of this unit is subject to a licence to undertake electrical work where the tasks undertaken are within the scope of electrical work as defined by WHS and electrical safety regulations. There may be some variations in regulations across jurisdictions.

2.5.3.2 *Prerequisite hazardous area competencies*

Competence in this unit shall be assessed in combination with, or after gaining competencies specified in, the following Clauses:

- (a) Clause 2.2
- (b) Clause 2.4

2.5.4 Elements and performance criteria

The elements and performance criteria are as follows:

Elements		Performance criteria	
005.1	Prepare to install equipment and wiring	005.1.1	WHS procedures and safe work methods are reviewed in preparing to work in a classified hazardous area.
		005.1.2	Knowledge of requirements for installing electrical equipment and wiring for a hazardous area is applied to preparation for the work.
		005.1.3	Types of explosion-protected equipment and wiring systems to be installed are determined from the area classification and planning and/or design documentation.
		005.1.4	Location in which specific items of equipment and circuits are to be installed is determined from the area classification and planning and/or design documentation.
		005.1.5	Explosion-protected equipment markings are checked to ensure they conform to their certification document and planning and/or design specifications.
		005.1.6	Certification document supplied with each item of equipment is collected for forwarding to the appropriate person for filing in the verification dossier.
		005.1.7	Cables and cable enclosures to be installed are checked to ensure they conform to planning and/or design documentation.
		005.1.8	Cable glands, seals and conductor terminations are checked to ensure they are compatible with the cable types and equipment specified in the planning and/or design documentation.
		005.1.9	Special tools, equipment and testing devices needed to carry out the installation work are checked to ensure they are safe and serviceable and any defective items are either rectified or replaced.

Elements		Performance criteria	
005.2	Install the equipment and wiring systems	005.2.1	Safe work methods (SWM) relating to explosive atmospheres are accepted and followed.
		005.2.2	Knowledge of requirements for installing electrical equipment and wiring for hazardous areas is applied to installing equipment and wiring systems.
		005.2.3	Equipment enclosure covers and internal components are removed where needed to enable installation and covers, components and their fixing devices are stored to protect them against loss or damage.
		005.2.4	Equipment is installed to conform with the planning and/or design documentation, installation standards and within the limits specified by the equipment certification and manufacturer's instructions.
		005.2.5	Equipment is installed in a manner that maintains the integrity of protection afforded by the equipment type.
		005.2.6	Cables and conduits are installed to conform with installation standards, planning and/or design documentation.
		005.2.7	Cables and conduits are terminated to conform with installation standards and equipment certification and manufacturer's instructions.
		005.2.8	Circuits are tested before connecting them to devices to ensure protective earth resistance is sufficiently low, insulation resistance is safe, polarity and connections are correct and each circuit complies with installation standards.
		005.2.9	Conductors are terminated and connected complying with planning and/or design documentation, installation standards, equipment certification and manufacturer's instructions.
		005.2.10	Equipment covers and internal components are removed to enable installation and are replaced ensuring the integrity of the equipment type is not compromised.
005.3	Confirm that the installation is complete	005.3.1	An appropriate person is notified that the installation has been completed and is ready for the initial inspection.
		005.3.2	Action is taken to rectify non-conformance and general installation defects found during the initial inspection and to ensure the installation complies with requirements.
		005.3.3	Documents used during the installation are forwarded to the person responsible for compiling the verification dossier.

2.5.5 Range of conditions

2.5.5.1 Work environment

The competencies specified in this unit apply to new installations and additions, and repairs to existing installations related to a classified hazardous area.

2.5.5.2 Operating conditions

The work to which this unit applies varies between new installations before being energized and existing installations which may be in the vicinity of operating plant. Commonly a permit to undertake work in a particular location is required and limits the types of tools and equipment used.

2.5.6 Assessment requirements

2.5.6.1 Performance evidence

Evidence shall be gathered for all the following performance aspects of installing explosion-protected equipment and associated apparatus and wiring systems:

Performance evidence	Performance criteria
2.5.6.1.1 Prepares to install: (a) Reviewing safe work methods associated with the classified area in which the work is to be carried out. (b) Determining the types and locations of equipment and cabling to be installed from area classification and planning and/or design documentation. (c) Carries out pre-installation checks including: (i) Equipment supplied complies with planning and/or design specifications. (ii) Equipment marking conforms to the certification documentation provided with the equipment. (iii) Cables and cable enclosures to be installed conform to planning and/or design documentation. (iv) Cable glands, seals and conductor terminations are suitable for the cable types and equipment specified. (v) Serviceability and safety of tools and testing devices needed to carry out the installation work is checked.	005.1.1 005.3 005.1.4 005.1.5 00.1.1.6 005.1.7 005.1.8 005.1.9
2.5.6.1.2 Installs Ex 'd', Ex 'e', Ex 'i' and Ex 't' equipment and associated apparatus and wiring systems encompassing: (a) Accepts and follows safe work method statements (SWMS) relating to the work. (b) Carries out the installation to requirements including: (i) Removing equipment enclosure covers and internal components and their fixing devices to enable installation and safe storage. (ii) Installing equipment to conform to planning and/or design documentation, installation standards, manufacturer's instructions and limitations. (iii) Installing equipment in a manner that maintains the integrity of the equipment protection type. (iv) Tests circuits before connecting them to ensure resistance of protective earthing conductors is sufficiently low, insulation resistance is safe, polarity and connections are correct. (v) Replacing internal components and equipment covers previously removed to enable installation.	005.2.1 005.2.3 005.2.4 005.2.5 005.2.8 005.2.10

Performance evidence	Performance criteria
2.5.6.1.3 Terminates cables and conduits conforming with installation standards and equipment certification and manufacturer's instructions encompassing: (a) Installing conduit systems, including seals to meet hazardous area requirements (gases and liquids). (b) Terminating cables with a barrier gland (gases and liquids). (c) Terminating multicore, steel wire armoured (SWA), overall screened and individual screened cable into an enclosure. (d) Terminating and connecting conductors in accordance with requirements.	005.2.6 005.2.7 005.2.9
2.5.6.1.4 Replaces equipment internal components and covers ensuring the integrity of the equipment type	005.2.9
2.5.6.1.5 Confirms that installation is complete encompassing: (a) Notifying an appropriate person that the installation is completed and ready for the initial inspection. (b) Taking action to rectify any installation defects revealed by the initial inspection. (c) Forwarding documents used during the installation to the person responsible for compiling the verification dossier.	005.3.1 005.3.2 005.3.3

2.5.6.2 Knowledge evidence

Evidence shall be gathered for all of the following knowledge aspects of installing explosion-protected equipment and wiring systems:

Knowledge evidence	Performance criteria
2.5.6.2.1 Safe work procedures for explosive gas atmospheres encompassing: (a) WHS procedures for working in hazardous areas. (b) Permit to work that covers the hazardous aspects of the specific work and location.	005.1.1
2.5.6.2.2 Requirements for installing equipment and wiring systems for explosive atmospheres encompassing: (a) Required documentation. (b) Installation requirements for protection from dangerous (incendive) sparking including: (i) Earthing system requirements. (ii) SELV and PELV systems. (iii) Electrical separation. (iv) Limitation of equipment installed above a hazardous area.	005.1.2 005.2.2

Knowledge evidence	Performance criteria
(c) Requirements for potential equalization for the following: (i) Various earthing systems. (ii) Bonding systems. (iii) Cable armour and screens. (iv) Exposed conductive parts. (v) Metallic enclosures. (vi) Temporary bonding. (d) Limitation of cathodic protection.	005.1.2 005.2.2
(e) Wiring systems including: (i) Limitation on the use of aluminium conductors. (ii) Fixed cable and wiring systems permitted for Groups I, II and III. (iii) The wiring systems permitted and not permitted in or above hazardous areas. (iv) Cables supplying transportable and portable equipment. (v) Flexible connections and flexible cables.	005.1.2 005.2.2
(f) Connection to equipment including: (i) Cable glands and blanking elements per enclosure type. (ii) Non-electrical entries. (iii) Conduit systems. (iv) Termination of conductors. (v) Treatment of unused core. (vi) Unused opening/entries in enclosures. (vii) Joining cables. (viii) Openings in walls. (ix) Passage and collection of flammables.	005.1.2 005.2.2
2.5.6.2.3 Additional requirements for each type of explosion protection	005.2.2
2.5.6.2.4 Cable and conduit termination devices and techniques encompassing: Cable glands, conduits and sealing including: (a) Types of glands and components. (b) Techniques for fitting glands and applying sealing compound. (c) Techniques for using conduit seals and applying sealing compound.	005.2.2 005.2.7

Knowledge evidence	Performance criteria
2.5.6.2.5 Conductor terminations and techniques encompassing: (a) Installing conduit systems, where applicable, including seals to meet hazardous area requirements (gases and liquids). (b) Terminating a cable with a barrier gland (gases and liquids). (c) Terminating a multicore, SWA, overall screened and individual screened cable into an enclosure. (d) Methods for terminating MIMS cable in accordance with manufacturer's instructions. (e) Testing termination/connections of installed cables/circuits.	005.2.2 005.2.8

2.5.6.3 Assessment conditions

NOTE: Guidance on competency assessment is given in Appendix A.

2.5.6.3.1 Means of gathering performance evidence

A candidate shall install explosion-protected equipment and associated apparatus and wiring systems as specified under Clause 2.5.6.1.

Performance evidence shall be gathered from relevant work activities and situations—

- (a) direct observation in an actual work environment that shall include resources specified in Clause 2.5.6.5.1;
- (b) through direct observation in a simulated work environment, as specified in Clause 2.5.6.5.2 arranged with resources as specified in Clause 2.5.6.5.1;
- (c) through a log/portfolio of work experience relevant to the specified performance for the unit and verified weekly by a person qualified to supervise the work and validated by an assessor;
- (d) or a combination of the above.

2.5.6.3.2 Means of gathering knowledge evidence

Knowledge evidence shall confirm that a candidate has acquired all knowledge specified under Clause 2.5.6.2.

Knowledge evidence shall be gathered from more than one source such as the following:

- (a) Knowledge tests (written or oral), skill tests and technical interviews sampling all aspects of specified knowledge that cover the types of knowledge, factual, technical, procedural and theoretical, appropriate to AQF level 3 or NZQF level 4.
- (b) Aspects of performance evidence where the application of factual, technical, theoretical and procedural knowledge at AQF level 3 or NZQF level 4 is evident.
- (c) A combination of the above.

2.5.6.4 Currency and sufficiency of evidence

Evidence specified in Clauses 2.5.6.1 and 2.5.6.2 shall be current and sufficient with all aspects giving a connected whole to enable a valid assessment of a person's competence now and their ability to maintain competence into the future. Where the evidence presented is not considered recent or sufficient further evidence shall be gathered as required.

NOTE: Guidance on competency assessment is given in Appendix A.

2.5.6.5 Resources

2.5.6.5.1 Equipment and artefacts

Each candidate shall have access to the following:

- (a) Safe work methods.
- (b) Verification dossier for the site.
- (c) Planning and/or design documentation specifying:
 - (i) Ex 'd', Ex 'e', Ex 'i' and Ex 't' equipment to be installed.
 - (ii) Cables and cable enclosures to be installed.
 - (iii) Cable glands, seals and conductor terminations.
- (d) Serviceable and safe tools and testing devices.

2.5.6.5.2 Simulated work environment

Where evidence is gathered from a simulated work environment, the environment shall be arranged to include the following:

- (a) An area designated as an explosive atmosphere area which is a close facsimile of a real work environment.
- (b) An area entry point.
- (c) Delineation of the area into zones for both gas and dust.
- (d) A person to act as the 'authorized person' for the site.
- (e) A qualified supervisor.
- (f) An assessor.

2.5.6.6 Assessor and subject matter experts

2.5.6.6.1 Assessor competency

Assessors shall hold evidence of acceptable current competencies or qualifications to assess a person's work competence and have currency in this hazardous area competency unit or be assisted by a subject matter expert.

2.5.6.6.2 Subject matter expert

A subject matter expert assisting an assessor shall have extensive experience related to this competency unit and be currently engaged in this work.

2.6 MAINTAIN ELECTRICAL EQUIPMENT ASSOCIATED WITH HAZARDOUS AREAS

2.6.1 Scope of unit

This unit specifies the requirements for maintaining the explosion-protection aspects of equipment and wiring systems associated with hazardous areas and performance criteria by which competency is assessed.

A person competent in this unit will be able to do the following:

- (a) Determine required remedial maintenance from inspection reports.
- (b) Carry out remedial and breakdown maintenance in compliance with regulations and safe working methods, standards and manufacturer's instructions.
- (c) Complete the necessary maintenance documentation.

2.6.2 Application

This unit applies to electrical maintenance functions.

2.6.3 Precondition for assessment

2.6.3.1 Vocational competencies

A candidate seeking assessment in this unit shall have been deemed competent to maintain electrical equipment in a non-hazardous area at AQF level 3 or NZQF level 4.

NOTE: The application of this unit is subject to a licence to undertake electrical work where the tasks undertaken are within the scope of electrical work as defined by WHS and electrical safety regulations. There may be some variations in regulations across jurisdictions.

2.6.3.2 Prerequisite hazardous area competencies

Competence in this unit shall be assessed in combination with, or after gaining competencies in, the requirements of the following Clauses:

- (a) Clause 2.2
- (b) Clause 2.4

2.6.4 Elements and performance criteria

The elements and performance criteria are as follows:

Element		Performance criteria	
006.1	Prepare to carry out maintenance	006.1.1	Safe work methods for undertaking maintenance are obtained and understood.
		006.1.2	Area classification and details of explosion-protected equipment and wiring are ascertained from hazardous area zone drawings and equipment certification documents held in the verification dossier.
		006.1.3	Extent of remedial maintenance to be conducted is determined from regulatory requirements and/or inspection records held in the verification dossier.
		006.1.4	Extent of breakdown maintenance is evaluated and confirmed with personnel reporting the breakdown.
		006.1.5	Limits of breakdown maintenance that can be carried out in situ with regard to explosion risk is determined in consultation with technical management personnel.
		006.1.6	Compliant tools, equipment and testing devices needed to carry out the maintenance work are checked to ensure they are safe and operate correctly.

Element		Performance criteria	
006.2	Carry out maintenance	006.2.1	Safe work methods for undertaking maintenance in hazardous areas, including isolation of equipment, are followed.
		006.2.2	Work is carried out as specified in inspection records.
		006.2.3	Knowledge and application of requirements and limitations of scheduled and breakdown remedial maintenance requirements.
		006.2.4	Equipment is adjusted and maintained within the limits permitted by the equipment certification and in accordance with the manufacturer's instructions.
		006.2.5	Certification documentation for like-for-like replacement parts is sighted to ensure compliance with the equipment certification and manufacturer's instructions.
		006.2.6	Circuits of equipment being withdrawn from service are isolated and terminated safely and in accordance with maintenance standards.
		006.2.7	Flexible cables and cords are examined and removed from service if they are not in immediate use or are found to be defective or damaged.
		006.2.8	Spare equipment, flexible cables and cords are maintained and suitably stored where they are not likely to suffer deterioration or damage.
006.3	Complete maintenance work and documentation	006.3.1	Arrangements are made, in compliance with maintenance standards and regulatory requirements, for a detailed inspection of the work subject to the maintenance.
		006.3.2	Action is taken to rectify maintenance defects (non-conformances) found during the detailed inspection of the maintenance work.
		006.3.3	Safety assessment for isolation of equipment is recorded in accordance with maintenance standards.
		006.3.4	Completed maintenance work is documented in accordance with requirements and forwarded to appropriate personnel for inclusion in the verification dossier.

2.6.5 Range of conditions

2.6.5.1 Work environment

The competencies specified in this unit are used in operating plant that is in a classified hazardous area.

2.6.5.2 Operating conditions

The work to which this unit applies relates to regulatory, programmed and breakdown maintenance. It requires access to maintenance records and inspection reports, the use of access equipment, tools and testing devices permitted in a hazardous area and clearance-to-work permit in particular locations and situations.

2.6.6 Assessment requirements

2.6.6.1 Performance evidence

Evidence shall be gathered for all the following performance aspects of maintaining electrical equipment associated with hazardous areas:

Performance evidence	Performance criteria
2.6.6.1.1 Prepares to undertake maintenance of electrical equipment associated with explosive atmospheres encompassing: (a) Reviewing safe work methods associated with the classified area in which the work is to be carried out. (b) Ascertaining the area classification and details of equipment from documentation held in the verification dossier. (c) Reviewing inspection records to determine the extent of remedial maintenance. (d) Evaluating the extent of breakdown maintenance in consultation with reporting personnel. (e) Consulting with technical personnel to determine the limits of maintenance and repair that can be carried out in situ. (f) Checking the safety of compliant tools, equipment and testing devices needed to carry out the inspection.	006.1.1 006.1.2 006.1.3 006.1.4 006.1.5 006.1.6
2.6.6.1.2 Maintains electrical equipment associated with explosive atmospheres encompassing: (a) Accepting and following safe work methods relating the work including isolation of equipment. (b) Carrying out maintenance as specified in the inspection records including: (i) Adjusting and repairing equipment within the limits permitted by the equipment certification regulations and in accordance with manufacturer's instructions. (ii) Using replacement parts permitted by the equipment certification, regulations and manufacturer's instructions. (iii) Isolating and terminating circuits of equipment withdrawn from service in accordance with applicable standards. (iv) Examining flexible cables and cords and removing them from service if not in immediate use or if showing defections. (v) Maintaining spare equipment flexible cable and cords and storing them to prevent deterioration or damage.	006.2.1 006.2.2 006.2.4 006.2.5 006.2.6 006.2.7 006.2.8

Performance evidence	Performance criteria
2.6.6.1.3 Completes maintenance work inspections and documentation encompassing: (a) Arranging for a detailed inspection of the maintenance work. (b) Rectifying maintenance defects (non-conformances) found by the detailed inspection of the maintenance work. (c) Recording safety assessments undertaken for isolation equipment during maintenance. (d) Completing maintenance work, documenting the work and forwarding the documentation for inclusion in the verification dossier.	006.3.1 006.3.2 006.3.3 006.3.4

2.6.6.2 Knowledge evidence

Evidence shall be gathered for all of the following knowledge aspects of maintaining electrical equipment associated with gas and dust explosive atmospheres:

Knowledge evidence	Performance criteria
2.6.6.2.1 Safe work procedures for explosive atmospheres encompassing: (a) WHS procedures for working in hazardous areas. (b) Permit to work systems that cover the hazardous aspects of specific work and locations.	006.1.1
2.6.6.2.2 Requirements and limitations of remedial maintenance encompassing: (a) Scheduled maintenance specified in inspection records for particular items of equipment. (b) Limits of maintenance in response to a breakdown. (c) Isolation and termination of circuits of equipment being withdrawn from service. (d) Compliance standards, equipment certification and manufacturer's instructions regarding use, maintenance and repair of explosion-protected equipment.	006.2.3 006.1.5 006.2.3 006.2.1 006.2.3

2.6.6.3 Assessment conditions

NOTE: Guidance on competency assessment is given in Appendix A.

2.6.6.3.1 Means of gathering performance evidence

Candidates shall maintain electrical equipment associated with explosive atmospheres as specified under Clause 2.6.6.1.

Performance evidence shall be gathered from relevant work activities and situations—

- (a) through direct observation in an actual work environment that shall include resources as specified in Clause 2.6.6.5.1;
- (b) through direct observation in a simulated work environment, as specified in Clause 2.6.6.5.2 and arranged with resources as specified in Clause 2.6.6.5.1;

- (c) through a log/portfolio of work experience relevant to the specified performance for the unit and verified weekly by a person qualified to supervise the work and validated by an assessor; or
- (d) a combination of the above.

2.6.6.3.2 *Means of gathering knowledge evidence*

Knowledge evidence shall confirm that a candidate has acquired all the knowledge specified under Clause 2.6.6.2.2.

Knowledge evidence shall be gathered from more than one source such as the following:

- (a) Knowledge tests (written or oral), skill tests and technical interviews sampling all aspects of specified knowledge that cover the types of knowledge, factual, technical, procedural and theoretical, appropriate to AQF level 3 or NZQF level 4.
- (b) Aspects of performance evidence where the application of factual, technical, theoretical, and procedural knowledge at AQF level 3 or NZQF level 4 is evident.
- (c) A combination of the above.

2.6.6.4 *Currency and sufficiency of evidence*

Evidence specified in Clauses 2.6.6.1 and 2.6.6.2 shall be current and sufficient with all aspects giving a connected whole to enable a valid assessment of a person's competence now and their ability to maintain competence into the future. Where the evidence presented is not considered recent or sufficient further evidence shall be gathered as required.

NOTE: Guidance on competency assessment is given in Appendix A.

2.6.6.5 *Resources*

2.6.6.5.1 *Equipment and artefacts*

Each candidate shall have access to the following equipment and artefacts:

- (a) Safe work methods.
- (b) Verification dossier for the site including:
 - (i) Design documentation.
 - (ii) Area classification drawings.
 - (iii) Certification documents for each item of equipment.
 - (iv) Inspection records.
 - (v) Maintenance records.
- (c) Explosive atmosphere equipment, installation and inspection standards.
- (d) Compliant and safe tools and testing devices.

2.6.6.5.2 *Simulated work environment*

Where evidence is gathered from a simulated work environment, the environment shall be arranged to include the following:

- (a) An area designated as a hazardous area which is a close facsimile of a real work environment.
- (b) An area entry point.
- (c) Delineation of the area into zones for both gas and dust.
- (d) A person to act as the 'authorized person' for the site.

- (e) A qualified supervisor.
- (f) An assessor.

2.6.6.6 *Assessor and subject matter experts*

2.6.6.6.1 *Assessor competency*

Assessors shall hold evidence of acceptable current competencies or qualifications to assess a person's work competence and have currency in this hazardous area competency unit or be assisted by a subject matter expert.

2.6.6.6.2 *Subject matter expert*

A subject matter expert assisting an assessor shall have extensive experience related to this competency unit and be currently engaged in this work.

2.7 CONDUCT DETAILED INSPECTION OF ELECTRICAL INSTALLATIONS FOR HAZARDOUS AREAS

2.7.1 Scope of unit

This unit specifies the requirements for conducting detailed inspections of the explosion-protection aspects of electrical installations for hazardous areas and performance criteria by which competency is assessed.

A person competent in this unit will be able to do the following:

- (a) Use a verification dossier.
- (b) Work safely in a hazardous area.
- (c) Conduct initial, periodic and sample inspections.
- (d) Comply with inspection standards.
- (e) Record inspection results.

2.7.2 Application

This unit applies to inspection functions.

2.7.3 Precondition for assessment

2.7.3.1 *Vocational competencies*

A candidate seeking assessment in this unit shall have been deemed competent to inspect electrical installations in a non-hazardous area at AQF level 3 or NZQF level 4 or higher.

NOTE: The application of this unit is subject to a licence to undertake electrical inspection work where the tasks undertaken are within the scope of work as defined by WHS and/or electrical safety regulations. There may be some variations in regulations across jurisdictions.

2.7.3.2 *Prerequisite hazardous area competencies*

Competence in this unit shall be assessed in combination with, or after gaining competencies specified in—

- (a) Clause 2.2 and Clause 2.4;
- (b) Clause 2.5; or
- (c) Clause 2.6.

2.7.4 Elements and performance criteria

The elements and performance criteria are as follows:

Element		Performance criteria	
007.1	Prepare for inspection	007.1.1	WHS procedures and safe work methods are reviewed in preparing to work in a classified hazardous area.
		007.1.2	Knowledge of the scope of detailed inspections specified in inspection standards and site inspection program is applied to preparation for the work.
		007.1.3	Classification of the area is ascertained from hazardous area layout drawings retained in the verification dossier.
		007.1.4	Type and grade of inspection is ascertained from the inspection schedule retained in the verification dossier.
		007.1.5	Classification details and specified location of each item of equipment and circuits subject to inspection are determined from design drawings and equipment certification documentation retained in the verification dossier.
		007.1.6	Special tools, equipment and testing devices needed to carry out the inspection are checked to ensure they are safe and serviceable and any defective items are either rectified or replaced.
007.2	Conduct inspection	007.2.1	Safe work methods relating explosive atmospheres and inspections including isolation of equipment are accepted and followed.
		007.2.2	Knowledge of the explosion-protection aspects of equipment and hazardous area installation requirements is applied.
		007.2.3	Equipment, systems and installation are inspected for compliance with the design specifications retained in the verification dossier and in accordance with the inspection schedule and standards.
		007.2.4	Where applicable in a given jurisdiction, an appropriately authorized person is directed to remove equipment enclosure covers and internal components, where needed, to enable inspection.
		007.2.5	Arrangements are made to store and protect equipment covers and components that are removed to enable inspection.
		007.2.6	Where applicable in a given jurisdiction, after the inspection of each item, an appropriately authorized person is directed to replace equipment covers and components in a manner that ensures the integrity of the explosion-protection system.