



Australian Government

Department of Education, Employment and Workplace Relations

UEENEEP021A Disconnect - reconnect explosion-protected appliances and control devices connected to low voltage installation wiring

Release: 1

UEENEEP021A Disconnect - reconnect explosion-protected appliances and control devices connected to low voltage installation wiring

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers disconnecting and reconnecting flame proof, increased safety and intrinsic safety electrical equipment to supply up to 1,000V a.c. or 1,500V d.c. under restrictions of designated electrical equipment and conditions specified. It encompasses working safely in hazardous area, identifying supply arrangements, following isolation procedures, handling explosion-protection equipment, selecting and using testing and measuring devices, terminating and connecting cables and conductors, safety testing and reporting.

This unit is directly equivalent to the Unit 2.27

Disconnect and reconnect explosion-protected equipment connected to low voltage supply 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 2)

This unit applies to any formal recognition for this standard at the aligned AQF 3 level or higher.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit requires a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

Candidates are to meet regulator eligibility requirements by providing formal confirmation from the relevant state/territory regulator for the respective work class and scope of work prior to developing and being conferred competent.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace; and
UEENEEP012A Disconnect / reconnect composite appliances connected to low voltage installation wiring; or
UEENEEP013A Disconnect /reconnect electrical equipment connected to low voltage installation wiring
Competencies needed for emergency services and equipment repair.

Literacy and numeracy skills

4.2)

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

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

This unit contains Employability Skills
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 competency standard unit
Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to disconnect electrical equipment	1.1	Disconnection is planned to ensure OHS policies and procedures are followed.
	1.2	Appropriate persons are consulted to ensure work is coordinated effectively with others involved in the work site.
	1.3	Safety hazards which have not previously been electrical characteristics of electrical equipment and electrical supply are determined and recorded in accordance with established procedures.
	1.4	The point of isolation of electrical equipment to be disconnected is determined.
	1.5	Tools, equipment and testing devices needed to carry out the work are obtained in accordance

ELEMENT	PERFORMANCE CRITERIA
	with established procedures and checked for correct operation and safety.
2 Disconnect electrical equipment	2.1 OHS policies and procedures are followed.
	2.2 Electrical equipment is isolated in accordance with AS/NZS 4836 and established procedures (see Range Statement).
	2.3 Conductor connection sequence is recorded and labelled in accordance with established procedures.
	2.4 Visual checks of the electrical equipment and associated wiring are carried out in accordance with established procedures to detect any abnormal or obvious damage or fault.
	2.5 Isolated equipment is confirmed as de-energised.
	2.6 Electrical equipment is disconnected from fixed wiring without damage to other components.
	2.7 Approval is obtained in accordance with established procedures from appropriate personnel, before any contingencies are implemented.
	2.8 Disconnected conductors/cables are terminated in accordance with requirements to ensure they are safe and present no potential hazard.
3 Prepare to reconnect electrical equipment	3.1 Reconnection is planned to ensure OHS policies and procedures are followed.
	3.2 Appropriate personnel are consulted to ensure work is coordinated effectively with others involved in the work site.
	3.3 The point of isolation of the circuit to which the electrical equipment is to be connected is determined.
	3.4 Replacement electrical equipment is selected on the basis of rating and characteristics being the same as that of the original electrical equipment.

ELEMENT	PERFORMANCE CRITERIA
	3.5 Appropriate personnel are consulted in the event that replacement electrical equipment are not available.
	3.6 Original and/or replacement electrical equipment is tested to ensure it is safe to connect to the electrical supply and use.
	3.7 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.
4 Reconnect electrical equipment	4.1 OHS policies and procedures are followed.
	4.2 Measures are taken to ensure circuit to which electrical equipment is to be connected remains isolated and de-energised in accordance with AS/NZS 4836.
	4.3 The continuity of the protective earthing conductor is tested to determine whether it is sufficiently low.
	4.4 The resistance between the protective earthing conductor and the neutral conductor is tested to determine whether it is sufficiently low, i.e. not greater than 2 Ohms.
	4.5 The insulation resistance of active conductors is tested to confirm that it is greater than 1 Megohm.
	4.6 An appropriate qualified person is engaged to rectify any non-compliance condition revealed by the testing under item 4.3 to 4.5.
	4.7 Continuity between exposed conductive parts of the appliance and the main earth or metal switchboard enclosure is confirmed.
	4.8 Electrical equipment is connected to comply with requirements.
	4.9 Connections to the electrical equipment are checked to confirm they are correct.

ELEMENT	PERFORMANCE CRITERIA
5 Test the reconnected electrical equipment for safe operation	5.1 OHS policies and procedures, and established procedures for the reinstatement of isolated circuits and electrical equipment are followed.
	5.2 Arrangements are made with appropriate personnel to test the operation of the electrical equipment in accordance with established procedures.
	5.3 Operational non-conformances are identified and reported in accordance with established procedures.
6 Identify and report faults	6.1 Electrical equipment is isolated in accordance with established procedures.
	6.2 Other OHS policies and procedures are followed.
	6.3 Visual checks of the electrical equipment to be disconnected and/or reconnected are carried out in accordance with established procedures to detect any abnormal or obvious damage or fault.
	6.4 Fault(s) at point of disconnection and/or reconnection are identified and reported in accordance with established procedures.
	6.5 Approval is obtained in accordance with established procedures from appropriate personnel, before any contingencies are implemented.
7 Provide status report(s)	7.1 Status report(s) are completed and notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) 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 disconnecting and reconnecting fixed wired explosion-protected electrical equipment connected to a Low Voltage supply.

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

KS01-EP021A Disconnect and Reconnect Explosion- Protected Electrical Equipment

Evidence shall show an understanding of working safely in hazardous areas to an extent indicated by the following aspects:

T1 Hazardous area safe working practices encompassing:

- Occupational Health and Safety responsibilities related to hazardous areas: the main features and purpose of a 'clearance to work' (includes hot work permit systems) system;
- Typical safety procedures that should be followed before entering a hazardous area;
- The purpose of gas detectors and their use and limitations
- Effects of temperature on gas and vapour detection; frequency of monitoring for presence of gas or vapours, i.e. effects of temperature rise; factors affecting the accuracy of gas detectors, for example, contamination, condensation, temperature; safety in use of gas detectors, for example, 'read and run concept'
- Safety measures to be taken when working in a hazardous area.
- The roles of the parties (include Standard bodies, experienced consultants) involved in the safety of hazardous areas: common Acts and Regulations related to the safety of hazardous areas and the Authorities responsible for their implementation; where assistance and further information can be obtained to assist persons with hazardous area responsibilities: Persons with hazardous area responsibilities include the hazardous area responsibilities of the owner of premises in which a hazardous area exists; the occupier of premises in which a hazardous area exists; enterprises and personnel engaged in installation and/or maintenance of explosion-protection systems; enterprises and personnel engaged in the classification of hazardous areas and/or design of explosion-protection systems; enterprises and personnel engaged in the overhaul, modification and/or assessment of explosion-protected equipment; enterprises and personnel engaged in the inspection of explosion-protection installations; manufacturers of explosion-protected equipment; designated authorities; insurers.

T2 Hazardous area and explosion protection principles encompassing:

- Properties of combustible substances and their potential to create an explosive hazard: condition in the workplace that will lead to an explosion; the terms 'combustion', 'ignition' and 'propagation'; explosive range of substances

REQUIRED SKILLS AND KNOWLEDGE

encountered in the workplace i.e. LEL/UEL; explosive parameters of substances as given in tables of substance properties

- Note: Combustible materials are gases, vapours (from liquids), and dusts; flash point, the difference between gases and vapours; and the toxic nature of gases and vapours and potential harmful consequences.
- The nature of hazardous areas: the Standards definition of a 'hazardous area'; the recommended methods for classifying the type and degree of explosion hazard in an area; hazardous area classifications as defined by Standards; and factors that are considered when a hazardous area is classified.
- The basics of how explosion-protection is achieved by the methods of exclusion, containment, energy limitation, dilution, avoidance of ignition source.

T3 Explosion-protected techniques — Principles encompassing:

- The principles of each explosion-protection technique, the methods used and how each technique works.
- How explosion-protected equipment is identified by the 'Ex' symbol marked on the equipment, including old equipment and equipment certified in another country.
- Visible conditions or actions that would void the explosion-protection provided by a particular technique.

T4 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; and
- The use of Standards in determining the requirements to which the installation of flameproof explosion-protected apparatus shall comply.

T5 Increased safety (Ex 'e') explosion-protection technique encompassing:

- The purpose and characteristics of the design features of apparatus and circuits protected by the Increased safety (Ex 'e') technique (Examples of characteristics and design features are temperature rise, maximum power dissipation, protection devices, certified components, creepage and clearance distances, absence of sparking contacts and enclosure entries).
- Typical situations where the Increased safety explosion-protection technique is used;
- Actions or conditions that would void the protection provided the Increased safety technique; and

REQUIRED SKILLS AND KNOWLEDGE

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

T6 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; and
- The use of Standards in determining the requirements to which the installation of Intrinsic safety explosion-protected apparatus shall comply.

T7 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.
- 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).

T8 Hazardous areas cable termination devices and applications encompassing:

- Explosion protection features of cable terminations devices.
- Selecting compliant cable termination devices.

T9 Hazardous areas cable termination techniques encompassing:

- Installing conduit systems, where applicable, including seals to meet hazardous areas requirements. (Gases only.)
- Terminating a cable with a barrier gland. (Gases only.)
- Terminating a multipair, SWA, overall screened, individual screened cable into an enclosure.
- Testing termination/connections of installed cables/circuits.

REQUIRED SKILLS AND KNOWLEDGE

T10 Enterprise reporting and recording system encompassing:

- purpose and extent of maintaining work activities records in an enterprise
- types of records for maintaining work activities in an enterprise
- methods for recording and maintaining work records
- work records for regulation requirements
- producing enterprise records and documents for the safe reconnection/commissioning of a component to the supply.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this Unit and shall 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. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance 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 issues inherent in working with electricity, electrical equipment, gas or any other hazardous

substance/material present a challenge for those determining competence. 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 evidence
required to
demonstrate
competency in
this unit** 9.2)

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 shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within 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:
 - Disconnect and reconnect fixed wired electrical equipment connected to a Low Voltage supply as described in 8) for each endorsement and including:
 - a. OHS practice
 - b. Determining electrical characteristics of explosion-protected electrical equipment
 - c. Selecting tools, equipment, and testing devices
 - d. Identifying point of installation
 - e. Identifying and isolating circuit (including testing for safe isolation)
 - f. Preparing to disconnect explosion-protected electrical equipment
 - g. Undertaking visual checks of the explosion-protected electrical equipment and associated wiring to detect and reporting any abnormal or obvious damage or fault
 - h. Disconnecting of explosion-protected electrical equipment
 - i. Preparing to reconnect explosion-protected electrical equipment
 - j. Reconnection of explosion-protected electrical equipment
 - k. Testing of the reconnected explosion-protected electrical equipment for safe operation including polarity and earth continuity
 - l. Identifying fault(s) at point of disconnection and/or reconnection in accordance with established procedures
 - m. Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

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.
- Workplace evidence to be produced in an industry/regulator approved recording system (logbook) confirming skills development under appropriate supervision

These should 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 disconnecting and reconnecting fixed wired explosion-protected electrical equipment connected to a Low Voltage supply.

**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 which is intended primarily for learning/assessment and 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)

There are no concurrent assessment recommendations for this unit

Range Statement

RANGE STATEMENT

10) 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 a gas hazardous area and disconnecting and reconnecting equipment connected to supplies up to 1,000V a.c or 1,500V d.c which incorporating the following explosion-protection techniques:

- Flame proof (Ex d)
- Increased safety (Ex e)
- Intrinsic safety (Ex 'i')

Note:

Limitations of this unit. This unit does not cover installations

- a. where high fault currents are possible,
- b. comprised of complex electrical apparatus and circuits,
- c. associated with fixed wiring including locating and rectifying faults of circuits at a switchboard or to general electrical accessories (including switches, socket outlets, circuit protective devices etc); or installation of or alteration to any part of the fixed electrical wiring system (defined as electrical installing work),
- d. which are luminaries,
- e. in hazardous areas or on electrical equipment that is part of an explosion-protection technique.

Safe Working. Safe procedures for working within in the scope of this unit shall be in accordance with AS/NZS 4836 'Safe working on low-voltage electrical installations.' Generic terms used throughout this Vocational Standard shall be regarded as part of 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

Competency Field **11)**

Restricted and Specialisations