



**Australian Government**

# **UEERL0008 Disconnect-reconnect explosion-protected appliances and control devices connected to LV installation**

**Release: 1**

# **UEERL0008 Disconnect-reconnect explosion-protected appliances and control devices connected to LV installation**

## **Modification History**

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

## **Application**

This unit involves the skills and knowledge required to disconnect and reconnect flameproof (Ex 'd'), increased safety (Ex 'e') and intrinsic safety (Ex 'i') electrical equipment to supply up to 1,000 volts (V) alternating current (a.c.) or 1,500 volts (V) direct current (d.c.).

It includes working safely in hazardous areas, identifying supply arrangements, following isolation procedures, handling explosion-protected equipment, selecting and using testing and measuring devices, terminating and connecting cables and conductors, safety testing, reporting electrical faults and providing status report/s.

Hazardous area is one 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. In hazardous areas, precautions should be taken to reduce the likelihood of installed electrical equipment causing an ignition.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

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

## **Pre-requisite Unit**

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEERL0004 Disconnect-reconnect electrical equipment connected to low voltage (LV) installation wiring

## **Competency Field**

Restricted Licensing

## Unit Sector

Electrotechnology

## Elements and Performance Criteria

### ELEMENTS

Elements describe the essential outcomes.

#### **1 Prepare to disconnect electrical equipment**

### PERFORMANCE CRITERIA

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

- 1.1** Electrical equipment disconnection is planned to ensure WHS/OHS policies and workplace procedures are followed
- 1.2** Relevant person/s is consulted to ensure work is coordinated effectively with others
- 1.3** Safety hazards which have not previously been identified are documented, risks assessed, and control measures determined and implemented in consultation with relevant person/s in accordance with workplace procedures
- 1.4** Point of isolation of electrical equipment to be disconnected is determined
- 1.5** Tools, equipment and testing devices required for electrical work are obtained in accordance with workplace procedures and checked for correct operation and safety

#### **2 Disconnect electrical equipment**

- 2.1** WHS/OHS policies and procedures are followed
- 2.2** Electrical equipment is isolated in accordance with relevant electrical installations, industry standards and workplace procedures
- 2.3** Conductor connection sequence is recorded and labelled in accordance with workplace procedures
- 2.4** Visual inspections and checks of the electrical equipment and associated wiring are carried out in accordance with workplace 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 workplace procedures from relevant person/s before any contingencies are implemented
  - 2.8** Disconnected conductors/cables are terminated in accordance with relevant industry standards to ensure they are safe and present no potential hazard
- 3 Prepare to reconnect electrical equipment**
  - 3.1** Reconnection is planned to ensure WHS/OHS policies and workplace procedures are followed
  - 3.2** Relevant person/s is consulted to ensure work is coordinated effectively with others
  - 3.3** 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 specifications in accordance with designated electrical equipment and conditions
  - 3.5** Relevant person/s is consulted in the event that replacement electrical equipment is not available
  - 3.6** Original and/or replacement electrical equipment is inspected and 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 electrical work are obtained in accordance with workplace procedures and checked for correct operation and safety
- 4 Reconnect electrical equipment**
  - 4.1** WHS/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 relevant electrical installations, industry standards and workplace procedures
  - 4.3** Continuity of the protective earthing conductor is tested to determine whether it is sufficiently low
  - 4.4** Resistance between the protective earthing conductor

- and the neutral conductor is inspected and tested to determine that it is in accordance with relevant industry standards
- 4.5** Insulation resistance of active conductors is inspected and tested to confirm that it is in accordance with relevant industry standards
- 4.6** Appropriate person/s is consulted to regarding any non-compliance condition identified during the earthing and resistance conductor inspection and testing
- 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 in accordance with relevant industry standards
- 4.9** Connections to the electrical equipment are checked to confirm they are correct
- 5 Test the reconnected electrical equipment for safe operation**
- 5.1** WHS/OHS policies and workplace procedures for the reinstatement of isolated circuits and electrical equipment are followed
- 5.2** Arrangements are made with relevant person/s to test the operation of the electrical equipment in accordance with workplace procedures
- 5.3** Operational non-conformances are identified and reported in accordance with workplace procedures
- 6 Identify and report faults**
- 6.1** Electrical equipment is isolated in accordance with workplace procedures
- 6.2** WHS/OHS policies and procedures are followed
- 6.3** Visual inspection and checks of the electrical equipment to be disconnected and/or reconnected are carried out in accordance with workplace procedures to detect any abnormal or damage or fault
- 6.4** Faults at point of disconnection and/or reconnection are identified and reported in accordance with workplace procedures
- 6.5** Approval is obtained in accordance with workplace procedures from relevant person/s before any

contingencies are implemented

- 6.6** Status report/s is completed and relevant person/s notified in accordance with workplace procedures

## Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

## Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Disconnecting and reconnecting equipment connected to supplies up to 1,000 V a.c. or 1,500 V d.c. explosion-protection techniques must include the following:

- flameproof (Ex ‘d’)
- increased safety (Ex ‘e’)
- intrinsic safety (Ex ‘i’)

### MUST NOT INCLUDE

Disconnecting and reconnecting equipment connected to supplies up to 1,000 V a.c. or 1,500 V d.c. explosion-protection techniques must not include the following:

- comprised of complex electrical apparatus and circuits:
  - 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); or
  - installation of or alteration to any part of the fixed electrical wiring system (defined as electrical installing work)
- where high fault currents are possible
- which are luminaries
- in hazardous areas or on electrical equipment that is part of an explosion-protection technique

## Unit Mapping Information

This unit replaces and is equivalent to UEENEEP021A Disconnect - reconnect explosion-protected appliances and control devices connected to low voltage installation wiring.

## Links

Companion Volume implementation guides are found in VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>

# **Assessment Requirements for UEERL0008 Disconnect-reconnect explosion-protected appliances and control devices connected to LV installation**

## **Modification History**

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

## **Performance Evidence**

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant electrical installations industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying sustainable energy principles and practices
- completing workplace documentation
- dealing with unplanned events/situations in accordance with workplace procedures to minimise risk to personnel and equipment
- determining electrical characteristics of explosion-protected electrical equipment
- disconnecting and reconnecting fixed wired electrical equipment connected to a low voltage (LV) supply
- disconnecting and reconnecting electrical equipment
- disconnecting explosion-protected electrical equipment
- identifying and isolating circuit
- identifying and reporting faults
- identifying faults at point of disconnection and reconnection in accordance with workplace procedures
- identifying point of installation
- inspecting and testing disconnected and reconnected electrical equipment for safe operation
- preparing to disconnect and reconnect electrical equipment
- preparing to disconnect explosion-protected electrical equipment
- preparing to reconnect explosion-protected electrical equipment
- reconnecting explosion-protected electrical equipment
- selecting tools, equipment and testing devices
- testing of the reconnected explosion-protected electrical equipment for safe operation, including polarity and earth continuity
- undertaking visual checks of the explosion-protected electrical equipment and associated wiring to detect and report any abnormal damage or faults.

## Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- hazardous area safe working practices, including:
  - WHS/OHS responsibilities related to hazardous areas: the main features and purpose of a clearance to work (including 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; and 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 (including standard bodies and 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, including 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 and insurers
- hazardous area and explosion-protection principles, including:
  - 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 encountered in the workplace i.e. lower explosion limit (LEL)/upper explosion limit (UEL); and explosive parameters of substances as given in tables of substance properties
  - combustible materials, including 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 standard 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 and avoidance of ignition source
- explosion-protected techniques and principles, including:
  - 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
- flameproof (Ex ‘d’) explosion-protection technique, including:
  - the purpose and characteristics of the design features of apparatus and circuits protected by the Ex ‘d’ technique (flame paths, integrity under pressure, pressure piling and enclosure entries)
  - typical situations where the Ex ‘d’ explosion-protection technique is used
  - actions or conditions that would void the protection provided by the Ex ‘d’ technique
  - the use of standards in determining the requirements to which the installation of Ex ‘d’ explosion-protected apparatus shall comply
- increased safety (Ex ‘e’) explosion-protection technique, including:
  - the purpose and characteristics of the design features of apparatus and circuits protected by the Ex ‘e’ technique (temperature rise, maximum power dissipation, protection devices, certified components, creepage and clearance distances, absence of sparking contacts and enclosure entries)
  - typical situations where the Ex ‘e’ explosion-protection technique is used
  - actions or conditions that would void the protection provided by the Ex ‘e’ technique
  - the use of standards in determining the requirements to which the installation of Ex ‘e’ explosion-protected apparatus shall comply
- intrinsic safety (Ex ‘i’) explosion-protection technique, including:
  - the purpose and characteristics of the design features of apparatus and circuits protected by the Ex ‘i’ technique (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 Ex ‘i’ explosion-protection technique is used
  - actions or conditions that would void the protection provided by the Ex ‘i’ technique
  - the use of standards in determining the requirements to which the installation of Ex ‘i’ explosion-protected apparatus shall comply
- common characteristics of explosion-protection techniques, including:
  - 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 (conduit seals and barrier and compression glands for cables with or without armouring, screening and/or drain wires)
- hazardous areas cable termination devices and applications, including:

- explosion-protection features of cable terminations devices
- selecting compliant cable termination devices
- hazardous areas cable termination techniques, including:
  - 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, steel wire armoured (SWA), overall screened and individual screened cable into an enclosure
  - testing termination/connections of installed cables/circuits
- enterprise reporting and recording system, including:
  - 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
- disconnect and reconnect explosion-protected electrical equipment, including:
  - common characteristics of explosion-protection techniques
  - explosion-protected techniques and principles
  - Ex 'd' explosion-protection technique
  - hazardous area and explosion protection principles
  - hazardous areas cable termination devices and applications
  - hazardous areas cable termination techniques
  - Ex 'e' explosion-protection technique
- relevant job safety assessments or risk mitigation processes, including working in hazardous areas and precautions to reduce the likelihood of electrical equipment causing an ignition
- relevant manufacturer specifications
- relevant relationships in an electrical circuit
- relevant testing equipment
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including purpose and extent of maintaining work activities records
- relevant workplace policies and procedures.

## Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to disconnecting and reconnecting fixed wired explosion-protected electrical equipment connected to a LV supply
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

## Links

Companion Volume implementation guides are found in VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>