



Australian Government

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

Release: 1

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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 electrical equipment connected to low voltage (LV) installation wiring.

It includes preparing electrical equipment for disconnecting and then reconnecting equipment connected to LV installation wiring. It also includes inspecting and testing the reconnected electrical equipment for safe operation, identifying and reporting electrical faults and providing status reports. This must be incidental to a primary or regular function of the workplace.

The unit excludes disconnecting or reconnecting circuits at a switchboard or to general electrical accessories (including switches, socket outlets and circuit protective devices), or installation of or alteration to any part of the fixed electrical wiring system (defined as electrical installation work).

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 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

The skills and knowledge described in this unit may require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. 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.

Additional and/or other conditions may also apply under State and Territory legislation and regulations related to licencing, electrical work and work health and safety (WHS)/occupational health and safety (OHS) regulations, which must be confirmed prior to commencing this unit.

In some jurisdictions additional information related to licencing may be required on certification documentation. Further guidance can be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Pre-requisite Unit

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

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 procedures are followed
- 1.2** Relevant person/s is consulted to ensure work is coordinated effectively with others involved at the worksite
- 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 and 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 needed to carry out 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 workplace procedures are followed
- 2.2** Electrical equipment is isolated in accordance with relevant electrical installation industry standards and workplace procedures
- 2.3** Isolated equipment is confirmed as de-energised
- 2.4** Conductor connection sequence is recorded and labelled in accordance with workplace procedures

- 2.5 Visual inspection 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
 - 2.6 Electrical equipment is disconnected from fixed wiring without damage to other components
 - 2.7 Disconnected conductors/cables are terminated in accordance with relevant industry standards to ensure they are safe and present no potential hazard
 - 2.8 Approval is obtained in accordance with workplace procedures from relevant person/s before any contingencies are implemented
- 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 involved in the work site
 - 3.3 Point of isolation of the circuit to which the electrical equipment to be connected is determined
 - 3.4 Replacement electrical equipment is selected on the basis of rating and specifications being the same as that of the original electrical equipment
 - 3.5 Appropriate 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 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 installation industry standards and workplace procedures

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| | 4.3 | Earth continuity of the equipment is tested to determine whether it is in accordance with relevant industry standards |
| | 4.4 | Insulation resistance of the equipment is tested to confirm that it is in accordance with relevant industry standards |
| | 4.5 | Appropriate person/s is consulted regarding any non-compliant conditions identified during testing |
| | 4.6 | Electrical equipment is connected in accordance with previously recorded conductor connection sequence and relevant industry standards |
| | 4.7 | Connections to the equipment are checked to confirm they are correct |
| | 4.8 | Continuity between exposed conductive parts of the equipment and the main earth or metal switchboard enclosure is confirmed |
| 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 is followed |
| | 5.2 | Supply is reinstated to equipment and checked in accordance with established procedures and industry requirements |
| | 5.3 | Arrangements are made with relevant person/s to test the operation of the electrical equipment in accordance with workplace procedures |
| | 5.4 | Operational non-conformances are identified and reported in accordance with workplace procedures |
| 6 | Complete compliance documentation | |
| | 6.1 | Equipment status report/s are completed and relevant person/s notified in accordance with task requirements and workplace procedures |
| | 6.2 | Complete compliance documentation in accordance with industry standards and regulatory requirements |

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.

Disconnection and reconnection of electrical equipment must include at least one of the following, and must be selected to align with the candidates' primary trade or work function:

- air conditioning/refrigeration equipment
- instrumentation equipment
- electronic equipment
- electrical equipment
- neon signs
- composite equipment
- control devices
- water heaters
- motors
- gas appliances
- electrical work associated with fixed wiring, circuits at a switchboard or to general electrical equipment, including switches, socket outlets, circuit protective devices etc
- in hazardous areas or on electrical equipment that is part of an explosion-protection technique
- where high fault currents are possible
- which are luminaires

MUST NOT INCLUDE:

disconnect/reconnect electrical equipment connected to supplies up to 1,000 volts (V) alternating current (a.c.) or 1,500 V direct current (d.c.) must not include the following:

Unit Mapping Information

No equivalent unit

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

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 work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
 - selecting and using an appropriate range of personal protective equipment (PPE)
 - hazard identification
 - using risk control measures
 - using safe working practices when carrying out electrical disconnect/reconnect work
 - working safely with low voltage (LV) electrical installations
- determining electrical characteristics of electrical equipment
- selecting tools, equipment and testing devices
- identifying the point of isolation
- preparing to disconnect and reconnect electrical equipment
- disconnecting and reconnecting electrical equipment
- connecting circuits from the schematic diagrams
- connecting and using voltmeters and ammeters, including selecting the correct range in terms of magnitude and whether the supply is alternating current (a.c.) or direct current (d.c.)
- isolating, testing and tagging accessories
- connecting a simple electrical circuit, including supply, control switch and load
- measuring voltage and current within a simple circuit
- producing a wiring diagram of the connections used in following the schematic diagram
- connecting a simple circuit following a wiring diagram
- producing a schematic diagram from the wiring diagram
- using an analogue multimeter for voltage measurement ensuring the following: setting zero, correct scale, a.c. or d.c., polarity and magnitude, avoiding parallax error and estimating between division readings
- using a digital multimeter for voltage measurement ensuring the following: correct range and no active conductors are connected to any meter earth
- measuring resistance using a digital multimeter

- conducting insulation resistance tests using a handheld insulation tester after checking for zero and meter calibration
- checking the polarity of a three-core extension cord using a continuity tester
- measuring current using a clip-on (tong tester) taking each circuit conductor in turn
- terminating cables using stud, screw, tunnel and lug terminal types employing the correct preparation and the relevant terminating tools
- identifying the type and arrangement of circuits supplying equipment that is to be disconnected
- testing the availability of supply for electrical equipment about to be disconnected
- locating isolation device/s, including lockable adjacent switching device, and/or identification of fuse/circuit breaker at switchboard, and use of equipment schedules where provided
- determining the method of isolation to be used; which available device
- isolating a supply at a fuse, ensuring the fuse wedge is removed only after the electrical equipment is turned off and demonstrating why the empty wedge is replaced once the fusible link has been removed
- isolating a supply at a circuit breaker, ensuring the circuit breaker is locked and secured in the open position
- undertaking tests to determine if the electrical equipment is turned off when isolating at a fuse/circuit breaker
- using danger tags at the point of isolation
- identifying the type and arrangement of circuits supplying equipment that is to be disconnected from a single phase and/or multiphase supply of voltages up to 1,000 V a.c. or 1,500 V d.c.
- applying procedures that ensure the safe isolation of the supply to equipment which is to be disconnected
- disconnecting isolated equipment from fixed wiring with minimal damage to wiring system after ensuring no visible faults or damage, and the recording of conductor connection sequence
- applying termination practices in regard to disconnected wiring
- checking the new electrical equipment nameplate details against those of the electrical equipment being replaced
- visually inspecting and testing equipment's electrical characteristics using suitable test equipment to ensure equipment is safe to connect in regard to sufficiently high insulation resistance, arrangements for protection against indirect contact are undamaged and in place, appropriate ingress protection (IP) rating, and arrangements for protection against dangers of mechanical movement are undamaged and in place
- testing compliance of the electrical equipment, i.e. insulation resistance and continuity
- testing the disconnected electrical equipment for faults (open circuits, partial open circuits, short circuits, partial short circuits and earth faults), and recognise any unsatisfactory test results obtained
- identifying the type and arrangement of circuits supplying equipment that is to be reconnected to a single phase and/or multi-phase supply of voltages up to 1,000 V a.c. or 1,500 V d.c.
- reconnecting electrical equipment to fixed wiring with minimal damage to wiring system
- ensuring continuity between exposed conductive parts of the equipment and the main earth or

metal switchboard enclosure

- restoring supply after ensuring correct connections, and all safety requirements have been met
- testing the supply at the electrical equipment
- restoring all mechanical protection, e.g. terminal covers
- checking operation of reconnected equipment
- dealing with unplanned events/situations in accordance with workplace procedures and in a manner that minimises risk to personnel and equipment
- producing reports and documents to describe a suitable procedure to safely disconnect a component from a single-phase supply and/or multi-phase supply in accordance with workplace, industry and regulatory requirements
- producing reports and compliance documentation for the safe reconnection/commissioning of a component to the supply in accordance with workplace, industry and regulatory requirements
- completing required regulatory compliance documentation.

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:

- the basic electrical circuit, including:
 - elements of a simple electric circuit (supply, control switch, protection device and load)
 - definition, the symbol and the abbreviation of the unit for electromotive force, potential difference, current and resistance
 - types of electrical load
 - need for devices to afford electrical protection and the mechanisms used in protection devices, including resetting
 - a.c supply (both single and multi-phase) and d.c. supply
 - need for isolating, testing and tagging electrical circuits
- relationships in an electrical circuit, including:
 - relationship between voltage, current and resistance
 - definition of power in electrical terms (for d.c. or resistive a.c. circuits)
 - electrical diagrams, including:
 - symbols used for fuse, circuit breaker, isolator, normally open contacts, normally closed contacts, coil, energy meter, a.c. motor and transformer
 - using a block diagram as means of developing concepts and understanding
 - function of single line diagrams, including their application in three phase systems
 - definition of a circuit or schematic diagrams
 - wiring diagrams
- test equipment selection and care, including:
 - fault currents and the implications of incorrectly connecting a meter to a high fault current

source

- category ratings of multimeters in terms of their breaking capacity (fault current interruption) and identification of the appropriate category of instrument for typical domestic work and for typical commercial work
- regulatory requirements in regard to the maintenance and testing of test instrumentation
- steps and procedures for the safe use, care and storage of electrical instruments
- selecting test equipment for given situations
- test equipment - voltage measurement, including:
 - voltage measurement - meters connected in parallel
- test equipment - resistance measurement, including:
 - insulation resistance, and the required minimum values for insulation resistance LV equipment (including the insulation resistance values for electrical equipment incorporating heating elements)
 - insulation resistance needs to be measured at higher than supply voltage and the voltages to be used
 - continuity and what a continuity tester does
- test equipment - current measurement, including advantage/s of the clip-on method of current measurement
- cable connections, including:
 - construction of typical power cables
 - principle of operation of the following types of terminals stud, screw, tunnel and lugs
 - cable preparation and terminating methods appropriate to each type of terminal, including any special requirements which apply
- protection for safety, including:
 - dangers associated with earth-faults
 - protection of persons against electric shock from earth-faults
 - maintaining a low earth-fault current path resistance
 - components in an earth-fault current path
 - regulatory issues/requirements/limitations in regard to working live
- safety testing preparation and procedures, including:
 - faulty earth-fault current paths
 - using safe working practices when carrying out fault-finding work
 - identification of earthing system components
 - unsatisfactory resistance of a fault current path
 - actions to rectify unsatisfactory resistance of an earth-fault current path or insulation
- isolating supplies, including:
 - regulatory requirements in regard to working de-energised, and ensuring and maintaining isolation
 - reasons for advising all personnel likely to be affected
 - preventing others wanting to remake supply
 - reason for isolation and approximate time of outage to allow planning of alternate

activities

- identification of the type and arrangement of circuits supplying equipment that is to be disconnected
- use of and reason for danger tags at the point of isolation
- reason for the following steps: testing on a known live supply, testing for isolation, retesting on a known live supply after confirming isolation
- disconnecting electrical equipment - LV, including:
 - identification of the type and arrangement of circuits supplying equipment that is to be disconnected from a single phase and/or multi-phase supply of voltages up to 1,000 V a.c. or 1,500 V d.c.
 - procedures that ensure the safe isolation of the supply to equipment which is to be disconnected
 - disconnection of isolated equipment from fixed wiring with minimal damage to wiring system after ensuring no visible faults or damage, and the recording of conductor connection sequence
- reconnecting electrical equipment - LV, including:
 - importance of checking the new electrical equipment nameplate details against those of the electrical equipment being replaced
 - need to visually inspect and test the equipment's electrical characteristics using suitable test equipment to ensure equipment is safe to connect in regard to sufficiently high insulation resistance, arrangements for protection against indirect contact are undamaged and in place, appropriate IP rating, and arrangements for protection against dangers of mechanical movement are undamaged and in place
 - procedures for equipment with unsatisfactory results - unsuitability for reconnection
 - identification of the type and arrangement of circuits supplying equipment that is to be reconnected to a single phase and/or multi-phase supply of voltages up to 1,000 V a.c. or 1,500 V d.c.
 - procedures ensuring isolation of supply
 - engaging appropriately qualified person to rectify any non-compliance
- produce documentation and reports in accordance with workplace, industry and regulatory requirements, including:
 - need to produce status reports and documents to locate and identify isolation mechanisms for a wide range of circuits and associated loads
 - production of reports and documents to use a suitable procedure to safely disconnect a component from a single-phase supply and/or multi-phase supply
 - content required in reports and documents used to safely determine the suitability of a component for reconnection to supply
 - production of reports and documents for the safe reconnection/commissioning of a component to the supply.
 - need to comply with regulatory compliance documentation requirements.

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, including where not permissible under regulatory and licencing requirements, assessment must occur in suitable simulated 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 other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources used should reflect current industry practices in relation to disconnecting and reconnecting electrical equipment connected to a LV supply
- applicable documentation, including workplace procedures, equipment specifications, regulations, standards, codes of practice and operation manuals.

Links

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