



Australian Government

UETTDRRT33 Maintain energised traction overhead electrical apparatus using glove techniques

Release: 1

UETTDRT33 Maintain energised traction overhead electrical apparatus using glove techniques

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers the maintenance and repair of energised traction overhead electrical apparatus via the use of approved live line glove and barrier techniques.

It includes the verification of site conditions and the potential hazards, the conformance with and calculation of physical loads, the selection of appropriate tools and equipment, and authorised work methods. It encompasses the undertaking of correct procedures and precautions to working live line in accordance with the work plan and enterprise requirements.

It also includes the visual inspection and necessary checks to confirm that the electrical apparatus and components are in a safe condition to test and/or return to service, and the recommissioning tests of the electrical apparatus and components.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in one (1) of the identified Pathway Unit Group(s) must have been completed.

Pathway 1

Qualified and authorised Rail Traction Lineworker

Pathway 2

BSBLDR403 Lead team effectiveness

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDNIS52 Install and maintain poles, structures and associated hardware

UETTDNIS54 Install and maintain poles, structures and overhead conductors and cables

UETTDNIS65 Contribute to coordinated HV live working

UETTDRT21 Install traction overhead wiring systems

UETTDRT22 Maintain traction overhead wiring systems

UETTDRT23 Install rail traction bonds

UETTDRT25 Install overhead rail traction configurations

UETTDRT26 Maintain overhead rail traction configurations

UETTDRT27 Install overhead traction components and equipment

UETTDRT28 Maintain overhead traction components and equipment

UETTDRT29 Operate rail road traction height access equipment

UETTDRT31 Maintain energised d.c. traction overhead wiring system

UETTDRT99 Test and verify rail traction installations

Competency Field

Rail Traction

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Prepare/plan to maintain energised traction overhead electrical apparatus (glove)

PERFORMANCE CRITERIA

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

1.1 Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work

determined for planning and coordination

- 1.2** Calculation of physical loads and authorised work methods are obtained and relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
- 1.3** Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
- 1.4** Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
- 1.5** Hazards associated with the work are identified and risk control measures implemented, including the rendering inoperative of automatic reclosing device
- 1.6** Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
- 1.7** Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
- 1.8** Relevant personnel at worksite are confirmed current in first aid, cardiopulmonary resuscitation (CPR), pole top and other rescue procedures according to requirements
- 1.9** Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
- 1.10** Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
- 1.11** Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised,

- where applicable, in accordance with established procedures
- 1.12** Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
- 2 Carry out the maintenance of energised traction overhead electrical apparatus (glove)**
- 2.1** WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
- 2.2** First aid, CPR, pole top, other rescue procedures and other related work procedures are performed according to requirements and/or established procedures
- 2.3** Lifting, climbing, and working aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
- 2.4** Auto-reclose devices associated with the circuits being worked on are rendered inoperative and necessary work documentation acquired in accordance with enterprise requirements
- 2.5** Essential knowledge and associated skills are applied in the safe maintenance of energised traction overhead electrical apparatus to ensure completion within an agreed timeframe and to quality standards with a minimum of waste according to requirements
- 2.6** Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
- 2.7** Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
- 2.8** Solutions to non-routine problems are identified and actioned in the maintenance of energised traction overhead electrical apparatus using acquired essential knowledge and associated skills according to requirements and established procedures
- 2.9** Ongoing checks of quality of the work are undertaken in accordance with requirements and established

		procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the maintenance of energised traction overhead electrical apparatus (glove)	3.1	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work documentation is signed off and traction overhead electrical apparatus returned to service, including returning of auto-reclosing device to normal, and client/customer advised in accordance with requirements
	3.6	Work completion records, reports, as installed//modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified

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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRT33A Maintain energised traction overhead electrical apparatus using glove techniques.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - <https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7>

Assessment Requirements for UETTDRT33 Maintain energised traction overhead electrical apparatus using glove techniques

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Performance Evidence

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

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- operating from at least one (1) of the following:
 - elevated work platform (EWP)
 - insulated ladder
 - insulated mobile platform
- using at least two (2) of the following:
 - specialised tools
 - insulated gloves and barriers
 - tensioning equipment
 - geometry profiling equipment
- using at least two (2) of the following:
 - air-break switches
 - insulators
 - surge arrestors
 - hardware and fittings
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

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

- working on energised lines to 33 kV using live line glove and barrier techniques encompassing:
 - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on energised lines to 33 kV

(poles) using live line glove and barrier techniques

- safety precautions working on energised lines to 33 kV using live line high voltage (HV) rubber gloving techniques - live line minimum approach distances of persons and plant; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of personnel protective equipment (PPE); live line access authority/permit system; disabling auto-reclosing function; ensuring functioning of fault current protective devices; checking integrity of insulation prior to work commencement; types and function of specialised live line working equipment and tools inspection before use; safe working policies, procedures and practices when using/operating specialised equipment and tools; methods of using specialised equipment and tools; work team communication; use of safety observers; and emergency response and rescue, including first aid
- policies and procedures dealing with general work practices - definitions of terms used, responsibilities of personnel, types of structures from which glove and barrier methods can be performed, types of equipment and their compliance with relevant standards
- relationship between combined glove and barrier and stick methods - conditions under which they can be practiced
- techniques in installing and/or replacing HV insulators when working live line glove and barrier - intermediate insulators, angle insulators, bridging insulators, strain insulators and suspension insulators
- techniques in erecting and/or replacing HV cross-arms when working live line glove and barrier - intermediate, angle, strain, termination and suspension
- techniques in connecting and/or disconnecting HV bridges connections when working live line glove and barrier - strain/Tee bridges, bypass bridges/connections, HV ABC and similar/dissimilar metals
- techniques in the installation and/or maintenance of electrical equipment - air-break switches, gas switches, fuse assemblies, isolators, bird covers, surge diverters and fault indicators
- techniques in erecting and/or removing temporary midspan switching devices
- techniques using live line glove and barrier to erect and/or replace of poles - intermediate, angle and strain
- techniques using live line glove and barrier for the repair and/or replacement of HV conductors/cables
- techniques in repairing and/or replacing HV armour rods and/or line guards
- conversion methods using live line glove and barrier of intermediate construction to strain construction
- working on energised lines to 33 kV (poles) using live line glove and barrier/hot-stick combined encompassing:
 - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on energised lines to 33 kV (poles) using live line glove and barrier/hot-stick combined
 - safety precautions working on energised lines to 33 kV using live line glove and barrier/hot-stick combined - live line minimum approach distances of persons and plant; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE; live line access

authority/permit system; disabling auto-reclosing function; ensuring functioning of fault current protective devices; checking integrity of insulation prior to work commencement ;types and function of specialised live line working equipment and tools inspection before use; safe working policies, procedures and practices when using/operating specialised equipment and tools; methods of using specialised equipment; work team communication; use of safety observers; and emergency response and rescue, including first aid

- policies and procedures dealing with general work practices for both glove and barrier/hot-stick combined, - definitions of terms used, responsibilities of personnel, types of structures from which glove and barrier methods can be performed, and types of equipment and their compliance with relevant standards
- relationship between combined glove and barrier/ hot-stick methods - conditions under which they can be practiced
- techniques for installing and/or replacing HV insulators using glove and barrier/hot-stick combined - intermediate insulators, angle insulators, bridging insulators, strain insulators and suspension insulators
- techniques for erecting and/or replacing HV cross-arms using glove and barrier/hot-stick combined - intermediate and angle
- techniques for connecting and/or disconnecting HV bridges connections using glove and barrier/hot-stick combined - strain/Tee bridges, bypass bridges/connections, HV ABC and HV and similar/dissimilar metals
- techniques in the installation and/or maintenance of electrical equipment using hot-stick - air-break switches, gas switches, fuse assemblies, isolators, bird covers, surge diverters and fault indicators
- techniques in the erection and/or replacement of poles - intermediate/suspension, angle, strain and termination
- techniques in repairing and/or replacing HV armour rods and/or line guards and/or conversion methods of intermediate construction to strain in construction
- techniques in the repairing and replacing HV conductors/cables and the identification of equipment used
- techniques in installing and/or maintaining switching devices using glove and barrier
- plant, equipment and tools used for HV live line work encompassing:
 - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with plant, equipment and tools used for HV live line work
 - safety precautions when working on plant, equipment and tools using hot-stick combined - safe working clearances; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses (PPE) and authorisation to work systems
 - identification of plant, equipment and tools used for HV live line work – types, applications, construction, characteristics, limitations and safe working load
 - serviceability of plant, equipment and tools used for HV live line work - inspection procedures, testing procedures, maintenance procedures and storage procedures
 - relationship of live line work access authority/permit, disabling auto-reclose function and

- ensuring correct functioning of fault current protective devices prior to live line work
- live line access authorities, disabling auto-reclose function and ensuring fault current protective devices prior to live line work
- conductor supports – methods, types of equipment, construction, characteristics and limitations
- techniques in selecting appropriate conductor support methods in accordance with requirements
- calculation of loads and wind loading on conductors
- effects of resultant forces when transferring conductor loads
- rigging procedures for conductor support equipment
- principles of HV encompassing:
 - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on or near HV
 - electrical and electrostatic principles related to HV lines - relationship of current, voltage and resistance as related to transmission lines, relationship of phase voltage and respective line voltages
 - production of an electric field – units, effect of distance, potential of an object within the field and the effect of distances to the potential
 - HV insulators - construction of a disc insulator, construction of a polymeric insulator, effects of an electrical field on disc insulators, identification of the number of disc insulators needed for a single line voltage, and performance of a failed disc insulator on the line and the system
 - determining the minimum allowable number of discs per string for each line voltage in the system before bare hand work is to proceed
 - techniques in detecting a failed disc in a string
 - techniques in using appropriate tools and equipment to test a string
 - methods of recording data
 - effects of electrostatic induction on the human body - relationship of the resistance of a human body to different levels of current and voltage, relationship of a human body to an electric field, and effects of electrostatic induction on bare hand work
 - application of Faraday's cage - effects of a body, advantages, and description of the Faraday's cage used by bare-hand live-line workers
 - safety precautions working on or near HV electrical apparatus - safe approach distances (SAD) from live line; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE, permit to work systems and isolation procedures
 - types and function of specialised live working equipment
 - safe working policies, procedures and practices when using and operating specialised equipment
 - methods of using specialised equipment
 - emergency response and rescue, including first aid
 - effects of lighting and switching surges on performance of string insulators - health effects to workers

- methods used to alleviate surges on transmission lines
- magnetic field - difference between magnetic fields and electrostatic fields; source of magnetic field; techniques in locating, measuring and analysing known sources of magnetic fields; reasons for monitoring magnetic field exposure and techniques used to monitor magnetic fields
- HV switching principles encompassing:
 - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of HV to a given schedule
 - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and network interconnectors source of possible back-feed
 - role of the HV switching operator
 - operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits; purpose and procedures for operational forms, access authorities and permits
 - use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc strangles
 - types and categories of HV switchgear
 - application, function and operating capabilities of switchgear
 - restrictions pertaining to HV switching equipment
 - procedures for the isolation of HV transmission main and working earths
 - earthing HV electrical apparatus practices and procedures for access - purposes of operational and additional work part on-site earths, factors determining the location and effectiveness of operational earthing, acceptable industry procedures, PPE and high voltage switching techniques
 - operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- HV fault switching principles encompassing:
 - primary causes, effects and types of HV electrical faults
 - HV protection devices - main components, types, categories, applications and functions
 - basic principle of operation of HV system protection devices
 - protection coordination and protection zoning
 - HV feeder auto-reclosing suppression – function and application
 - circuit condition requirements and switching considerations when paralleling and separating HV feeders
- HV distribution transformer principles encompassing:
 - operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms, operating limitations and the relationship between transformer and HV fuse rating, purpose and principle operation of HV distribution transformer tap changers, HV distribution transformer and transformer - cable combination switching practices, paralleling requirements, isolation and earthing

- procedures for access, common distribution transformer and associated electrical apparatus faults
- HV underground switching equipment - arc strangles, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers
- HV single wire earth return (SWER) system encompassing:
 - application and function of SWER system components
 - circuit arrangement
 - principle of operation
 - hazards and procedures associated with faulty SWER earth systems
 - procedure to isolate, energise and commission SWER substations
- feeder automation system encompassing:
 - function of feeder automation system and the main components
 - operation procedure for a remote field device from a local control station
 - functions of supervisory control and data acquisition (SCADA) (or any other relevant data acquisition and control) systems and its main components
 - SCADA system security interlocks and access restrictions
 - SCADA system operation when switching apparatus or retrieving data via a remote access device, such as remote access terminal (RAT), dial up voice annunciated system and local control station
 - function of the main components of a local/remote control system
 - operation of a field devices using SCADA systems via a RAT, dial up voice annunciated system and local control station
- safe working on energised HV alternating current (a.c.) and/or direct current (d.c.) traction equipment encompassing:
 - Commonwealth/state/territory/local government legislation, standards, codes, supply authority regulations and/or enterprise requirements
 - safety precautions specific to working on energised LV d.c. traction overhead conductors and cables - live line minimum approach distances; WHS/OHS hazards and precautions; identification of hazards; assessing and controlling risks; types, selection, maintenance and uses of PPE; live line permit system; disabling auto-reclosing function; ensuring functioning of fault current protective devices; checking integrity of insulation prior to work commencement; types and function of specialised live line working equipment and tools inspection before use; safe working practices when using specialised equipment and tools; methods of using specialised equipment; work team communication; use of safety observers; and emergency response and rescue, including first aid
 - techniques in the use of hot-sticks for the maintenance of energised traction overhead apparatus
 - techniques in the use of glove and barrier on energised traction overhead apparatus.

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 workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational 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, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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