



Australian Government

Assessment Requirements for UETTD RRT33 Maintain energised traction overhead electrical apparatus using glove techniques

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Modification History

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

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>