



Australian Government

Assessment Requirements for UETTD RIS58 Locate faults in power system underground power cables

Release: 1

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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
- locating faults in power system underground power cables using at least three (3) of the following:
 - time domain reflectometry (TDR)
 - pool of potential in earth (POPIE)
 - differential TDR radar
 - current impulse
 - Murray loop
 - Varley loop
 - radio detection
 - capacitance/inductance
 - continuity tests
 - insulation tests
 - voltage detection
- 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:

- installation of underground cable, including:
 - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
 - safety precautions specific to the installation of underground cable - excavation and trench safety regulations, gas detection procedures, working in confined spaces, personal

- protective equipment (PPE), hazards for the use of liquid petroleum gas (LPG), equipment for jointing of underground cable, gas bottle testing procedures, permit to work systems and isolation procedures
- trench excavation and reinstatement procedures
 - installation of underground cable procedures - types of tools and equipment, methods of installing conduits, methods of installing cables and sealing cable ends (direct buried, ducts cleated and racked)
 - procedures for the safe use of LPG equipment for cable jointing
 - location of cable faults in underground power cables, including:
 - standards, codes, legislation, supply authority regulations and/or enterprise requirements
 - types of faults
 - methods of locating faults - Murray loop test, Fisher connection of Murray loop, modified Fisher connection, Varley loop test, TDR, differential TDR radar, digital arc reflection, differential digital arc reflection, current impulse test, differential current impulse, decay, differential decay, POPIE, radio detection, capacitance inductance test, pending faults (thermography and cable/joint temperature measurement), cable location devices/equipment and methods (signal generator/receiver, phasing methods using 'megger', current injection and cable stabbing techniques), and cable identification
 - low voltage (LV) energised working practices - regulations, working methods, insulating glove, bare hand, work procedures and specialist equipment
 - safety precautions specific to working near conductors - safe working practices and procedures, working in confined spaces, permit to work systems and isolation procedures
 - jointing and termination of LV polymeric cable, including:
 - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the jointing of LV polymeric cables
 - types of cables - single core, multi-core and cross-linked polyethylene (XLPE) insulation
 - methods of cable handling - direct laid cables, duct laid cables, solid laid cables, cables supported in cleats or hangers, corrosion protection and minimum bending radius of cables
 - methods of cable sealing - shorting of cables cores, core of un-terminated cables, methods of protection from corrosion, polymeric sheathed cables sealing with mastic lined, and heat shrink caps buried sealed ends
 - types of jointing tools - general hand tools and compression tools
 - techniques in the use of LPG - safety precautions, PPE, and general maintenance and repair
 - safety precautions when cable jointing - working in confined spaces; permit to work systems and isolation procedures; and emergency rescue/response, including first aid
 - LV polymeric cable jointing principles; including:
 - techniques in jointing LV XLPE cables - straight through joint, jointing different types of cable and service and street light cable joints
 - techniques in terminating LV XLPE - pole top terminations, substation terminations, distribution pillar/column/cubicle terminations and service and street light cable terminations
 - techniques in repairing LV XLPE cable - different types of damage, repairs to sheath and

repairs to cores

- methods of testing cable after jointing
- standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the jointing of high voltage (HV) underground polymeric cables
- HV underground polymeric cables requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, including:
 - characteristics of different types of cables and components
 - purpose of stress control
 - applications of various tools and equipment for HV jointing
- procedure for isolating HV underground polymeric cables, including:
 - method for proving safe to work
 - earthing procedures
- techniques in jointing HV underground polymeric cables, including:
 - short circuit cores and seal cable
 - straight through
 - trifurcating
- techniques in HV underground polymeric cable terminations, including:
 - pole top termination
 - substation/switchgear termination
 - aerial bundled cable (ABC) termination
 - telcon termination
- procedures for repairing HV underground polymeric cables, including:
 - location of faults
 - types of damage
 - techniques to repairs to sheath
 - techniques to repairs to core
- jointing LV paper lead/lead type cables, including:
 - requirements for the use of enterprise manuals, system diagrams/plans and drawings
 - types of tools and equipment
 - types of LV cables
 - structure of LV PLY cables
 - techniques for lead wiping
 - technique for preparing and jointing LV lead sheathed paper insulated cables
 - installation methods of LV straight joint
 - inspection and repair procedures to outer sheath of lead sheathed LV cable
 - techniques in terminating LV lead sheathed paper insulated cables
 - methods of testing cable after jointing
- HV paper lead cable jointing principles, including:
 - requirements for the use of enterprise manuals, system diagrams/plans and drawings
 - types of tools and equipment

- types of HV cables
- structure of HV cables
- technique for the installation of transition joint between XLPE and lead sheathed paper insulated cables
- technique for the jointing, terminating and repairing of HV paper lead insulated cables
- methods of testing cable after jointing
- underground cables construction and types, including:
 - safety precautions specific to handling underground cables
 - requirements for the use of enterprise manuals, system diagrams/plans and drawings
 - types and applications of underground cables
 - construction types and structures of underground cables
 - characteristics of different types of underground cables
 - ratings
- aluminium and lead cable sheathed jointing procedures, including:
 - safety precautions specific to handling and jointing underground aluminium and lead cable, including provision of WHS/OHS information, such as material safety data sheets (MSDS)
 - requirements for the use of enterprise manuals, system diagrams/plans and drawings
 - construction and structure(s) of aluminium and lead cable underground cables
 - characteristics of aluminium and lead cable
 - ratings
 - techniques in the jointing of aluminium and lead sheathed cable
 - methods of testing cable after jointing.

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, facilities, equipment and PPE currently used in industry for locating faults in power system underground power cables
- applicable documentation, including workplace procedures, relevant industry standards,

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>