



Australian Government

Assessment Requirements for UETTD RIS46 Install and maintain ESI network infrastructure electrical equipment

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
- installing and maintaining any three (3) of the following:
 - fuse switches
 - dropout fuses
 - sectionalisers
 - disconnectors
 - links
 - fuses
 - surge arrestors
- installing and maintaining any one (1) of the following:
 - reclosers
 - motorised switches
 - gas filled switches
 - ring main units
 - line fault indicators
 - oil filled switches
 - air break switches
- installing and maintaining any one (1) of the following:
 - transformers
 - reactors
 - regulators
 - capacitors
 - relays
 - line fault indicators

- with regards to the above incorporate any three (3) of the following:
 - voltage detectors
 - phasing equipment
 - clip-on ammeters
 - insulation resistance testers
 - recording meters
 - earth resistance tester
- 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:

- mathematics techniques encompassing:
 - calculations involving fractions, decimals, ratios and proportions
 - calculations involving area, volume, mass and density
 - calculations involving transposition and substitution of formulae
 - calculations involving simple trigonometric problems
- engineering mechanics encompassing:
 - identification of basic concepts, principles and applications - application of velocity, acceleration, force, density, torque and pressure
 - applications of the International System of Units (SI) units
 - the relationship between work, power and energy
 - behaviour of object under force - using a block and tackle under load, concept of mechanical advantage, determination of resultant forces, and determining the sag in a catenary conductor and the force applied at each end
 - fundamentals of the basic laws of fluid mechanics
- materials properties encompassing:
 - identification and classification of engineering materials material properties
 - types and applications - properties of tensile strength; effects of temperature on the expansion of metals; ductibility, malleability, work hardening and annealing and the conditions that lead to corrosion; and the properties of timbers
- basic rigging techniques encompassing:
 - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with rigging, including the operation of cranes, hoists and winches, and relevant certification and licensing (if required)
 - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
 - safe use of rigging equipment, tools and associated equipment - types, techniques and application
 - site inspection procedures - identifying hazards, assessing and controlling risks, and

- appropriate sequence of loading and unloading
- determining the mass and dimensions of load
- selection and inspection procedures - rigging equipment, materials and tools (natural and synthetic fibre ropes and chains, fittings, winch and capstan), ratings of wire ropes and slings, removing, repairing and replacing of damage parts
- techniques for assembling and erecting power winches and capstans
- checking the integrity of support structure - visual inspection of load connections
- techniques in moving, lifting, shifting, managing and placing loads - use of appropriate communication and signalling methods, codes of practice/compliance, enterprise and Commonwealth/state/territory legislative requirements, weather conditions, erection of safety nets and lines, methods of fixing and anchoring loads, and load stability
- procedures in providing store support encompassing:
 - classification and identification of equipment, components and tools
 - procedures for purchasing/ordering items, removing/dispatching items, stocktaking, security and bookkeeping/record keeping
 - material handling - warehouse/depot storage techniques, handling equipment, pallet lift trucks, forklifts and cable drum handling equipment
 - safety procedures - storage and care of safety equipment, handling hazardous materials, storage of hazardous substances and dangerous goods, and depot safety procedures
 - manufacturer and supplier information, including material safety data sheets (MSDS)
- generation systems encompassing:
 - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
 - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
 - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail systems encompassing:
 - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
 - characteristics of a transmission, a distribution and a rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
 - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
 - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- substations, power transformers and reactors encompassing:
 - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment

- characteristics of a power transformer - basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
- auxiliary equipment used on transformers - function and basic operation of equipment
- maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault-finding procedures
- description, purpose and characteristics of a reactors
- installation of overhead distribution conductors encompassing:
 - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
 - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length
 - constructions types and structures for distribution and sub transmission lines
 - types, sizes and characterises of overhead conductors
 - resources for the stringing and maintenance of conductors - types of low voltage (LV) and HV overhead electrical conductor connections; causes and effects of poor electrical connections; reasons for and methods used to maintain standard phase sequencing; removing, repairing and replacing damaged conductors; and minimum clearances between overhead conductors and LV and HV structures
 - techniques for conductor installation - types and application of tools, equipment and hardware, methods of stringing, tensioning and termination of LV and HV conductors
- safe working practices and procedures for the installation of overhead distribution conductors encompassing:
 - limits of approach for personnel, vehicles, mobile plant and elevated work platforms (EWP)
 - requirements of persons prior to making bare-hand contact with dead LV mains and apparatus
 - requirements of relevant electrical access permits necessary to allow work to be performed on LV and HV apparatus
 - safe working practices - requirements to enable safe working on conductive poles, procedure to attach an on-site earthing device to de-energised LV and HV overhead circuit
- installation of poles and/or structures and hardware encompassing:
 - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing poles and associated hardware
 - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
 - characteristics and applications of different types of poles and associated hardware
 - techniques for installing poles and associated hardware - types of installation equipment/tools, excavation methods, types of footings/foundations, types of attachments, earthing systems, clearances between conductors, safe methods of erecting and stabling poles and-or structures and cross-arms
 - techniques for maintenance of poles and associated hardware - stabilisation techniques for unstable poles, methods of strengthen poles, maintenance and replacement of HV

insulators and cross-arms

- installation of LV electrical services encompassing:
 - standards, codes, legislation, supply authority regulations and/or enterprise requirements
 - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings types of LV overhead services, methods of construction and installation, minimum clearances for overhead services to assets and structures, and types of installation equipment/tools
 - characteristics and applications of different types of cables - cable cross-sectional area of conductors, current rating and fuse type
 - techniques for maintenance of service installations - diagnosis and repair of faults
 - jointing and terminating methods - polymeric heat shrink materials, polymeric tape materials, energised and de-energised cables, connections to fuse boxes and pole top boxes
 - testing and commissioning procedures – inspection, polarity, voltage and phase sequence tests
 - construction types and structures for distribution and sub transmission lines
 - types, sizes and characteristics of overhead conductors
 - resources for the stringing and maintenance of conductors, - types of LV and HV overhead electrical conductor connections; causes and effects of poor electrical connections; reasons for and methods used to maintain standard phase sequencing; removing, repairing and replacing damaged conductors; and minimum clearances between overhead conductors and LV and HV structures
 - techniques for conductor installation - types and application of tools, equipment and hardware, methods of stringing, tensioning and termination of LV and HV conductors
- powerline safety practices encompassing:
 - protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel; and the types of protective apparatus and apparel used for the line worker
 - requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from overhead conductors
 - requirements for climbing and working aloft - methods used to identify a pole is safe to climb; methods used to inspect a line worker's body belt; application of knots and hitches appropriate to the requirements of a line worker; height safety principles, including personal fall protection, prevention and related requirements; and the practical procedures for climbing an overhead structure and fitting a pole chair
 - traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry (ESI) requirements, demonstration of the procedure used to provide an effective traffic management scheme, and the use of a two-way radio
 - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires; general fire prevention methods; and the precautions for personal protection when fighting small fires

- rescue victims from heights and confined spaces - planning and identifying procedures, establishing responses and developing techniques; involving external emergency services; and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)
- requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances; determining system requirements; aircrew familiarisation with network operations and equipment; and requirements for effective communications operations for aerial work.

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 personal protective equipment (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>