



Australian Government

Assessment Requirements for UETTD RTP34 Install/maintain overhead transmission network infrastructure

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 at least one (1) of the following:
 - wood pole/structure
 - steel pole/structure
 - concrete pole/structure
 - composite pole/structure
- incorporating at least three (3) of the following hardware:
 - insulators
 - cross-arm braces
 - crossarms
 - pole steps
 - shackle straps
 - earth leads
 - traction supports
 - traction registration
 - bonding
- incorporating at least one (1) of the following xxx:
 - baulking
 - stays
 - concreting including foundation
- incorporating at least one (1) of the following xxx:
 - crane
 - auger/erector
 - 'A' frame

- lifting beam
- pole pikes
- helicopter lift
- erecting any one (1) of the following towers:
 - pyramid
 - delta pi
 - enterprise-specific type
- incorporating at least two (2) of the following:
 - insulators
 - clamps
 - bolts
 - structural components
- using at least one (1) of the following methods:
 - welding
 - cleaning
- installing and maintaining at least one (1) of the following conductor types:
 - copper
 - aluminium
 - steel
 - composite
 - aluminium/steel reinforced
 - pilot
- incorporating at least two (2) of the following access equipment:
 - elevated work platform (EWP)
 - portable platform
 - gondola
 - hook ladder*
 - elevated work box
 - (*must do)
- incorporating at least five (5) of the following:
 - winches*
 - tension equipment*
 - stringing equipment
 - cable trailers
 - crimping equipment *
 - pre-formed splices
 - hardware
 - cable drum stands
 - ropes

- rollers/ sheaves
- comealongs
- swivels
- (*must do)
- incorporating at least two (2) of the following:
 - voltage/de-energised indicating device
 - field intensity meter
 - operating rods
 - (*must do)
- incorporating at least one (1) of the following methods to tension overhead conductors:
 - dynamometer
 - site board
 - abney level
 - sag chart*
 - theodolite
 - (*must do)
- 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, 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 damaged 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 and 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; how they correlate and their functions
 - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems; and 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 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, and testing and fault-finding procedures
 - description, purpose and characteristics of a reactors
- 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, and 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 high voltage (HV) insulators and cross-arms
- transmission structures and hardware encompassing:
 - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
 - types of structures
 - types and function of associated hardware/equipment and insulators
 - types of conductors
 - location of transmissions structures
 - other equipment used on transmission structures, e.g. aircraft warning devices
- procedures for routine maintenance on transmission structures and hardware encompassing:
 - procedures for gaining access permits
 - reasons for gaining access

- types of maintenance procedures on transmission structures - procedure to follow for inspection/patrols according to the transmission supply authority
- erecting and removing of transmission equipment and hardware from a tower - climbing procedures, square rigging principles, calculation of forces at work within a given square rigging system, and construction of a square rigging system
- procedures for changing insulators - vertical angle suspension, strain insulator, post insulator (horizontal or vertical) and bridge insulator, and calculation of conductor forces
- installation of temporary work platforms - types and function of installation tools and equipment, precautions and work methods to follow, and procedures for installations of temporary work platforms
- installation of conductor protective hardware - types and selection of common dampers, tools and equipment, control of Aeolian vibration and procedures for the installation of dampers onto conductors
- dead line insulator washing - supply authority regulations, and procedures for washing de-energised transmission lines
- procedures for installation and maintenance on transmission lines, structures and hardware encompassing:
 - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of transmission lines and associated equipment
 - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings - minimum construction clearances for transmission lines and sag/tension requirements
 - construction types and structures used in transmission lines
 - types, sizes and characteristics of transmission conductors - aluminium conductors, steel reinforced and earthing conductors
 - types of electrical connections used to connect transmission conductors - compression termination and bolted termination
 - causes and effects of poor electrical connections
 - types and application of specialised tools, equipment and hardware for the stringing of transmission conductors
 - techniques for stringing, tensioning and terminating transmission conductors
 - techniques for installation of associated hardware used on transmission towers
 - techniques for maintenance of damaged transmission conductors - repair and replacement
- safe working practices and procedures for the installation of overhead transmission conductors encompassing:
 - limits of approach for personnel, vehicles, mobile plant and EWP
 - requirements of persons prior to making bare hand contact with dead low voltage (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; procedures to attach an on-site earthing device to de-energised LV and HV overhead circuit; safe working practices when working with associated hardware/equipment and

- insulators; precautions of voltages on transmission structures; dangers when working at heights; identification of hazards; assessing and controlling risks; types, selection, maintenance and uses of personnel protective equipment (PPE); permit to work systems and isolation procedures; and safe working practices when using specialised equipment
- emergency response and rescue, including first aid
- 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 of 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 procedures 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; developing techniques; involvement of external emergency services; and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces 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 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>