



Australian Government

Assessment Requirements for UETTD RIS70 Diagnose and rectify faults in electrical energy distribution systems

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
- diagnosing and rectifying faults in electrical energy distribution systems including:
 - applying logical diagnostic methods
 - using fault scenarios to test the cause of system faults
 - identifying faults and competency needed to rectify them
 - rectifying faults in system controls
 - verifying that the system operates correctly
 - documenting fault rectification
 - dealing with unplanned events on at least one occasion.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases, the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

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:

- distribution system overview encompassing:
 - regulatory conditions of supply and utilisation
 - compliance with Australian Standards
 - reticulation system, including overhead/underground, urban/rural, high voltage (HV) customers and high-rise building systems
 - methods used to ensure continuity of supply

- types of substations in current use
- systems of distribution used, (primary and secondary)
- voltage levels, power factor, wave-form distortion and transient loading
- supply quality
- load curve profiles (residential/industrial/commercial)
- types of feeders
- distribution systems (urban, rural single-phase systems, single wire earth return (SWER), spur, parallel and ring systems)
- overhead lines and installation encompassing:
 - industry and safety regulations
 - overhead conductors
 - conductor material
 - current rating factors (heating, voltage drops and power losses)
 - aerial bundled cables (HV and low voltage (LV))
 - covered conductors - characteristics of lines and cables, including the calculation of R, X and B for different arrangements of conductor; typical values for actual lines; transposition; models based on line length; voltage and line regulation
 - overhead line poles
 - types (wood, concrete and steel)
 - installation of poles (tooling, rake, life, labelling and sinking)
 - maintenance of poles (above and below ground)
 - pole strength and loads
 - crossarms
 - types and standard sizes
 - insulators
 - insulation types
 - types (pin, suspension or disc and shackle)
 - creepage and necessary clearances
 - arcing horns and insulator mounting
 - structure types
 - mechanical properties (working strength, maximum tension and limiting size)
 - interpretation of stringing charts
 - determination of sag (by calculations or measurement and/or tension measurement)
 - sight and wave sagging, and sag correction
 - stays
 - components and anchorage
- use of design schedules encompassing:
 - sample design problems - common design practice line, voltage, structure types used, line deviation, span sag, cross-arms, insulators and stays, wind loading and line deviation loading basic surveying

- measurement of levels, deviation angle and compass bearings
- perform survey of short distribution line extension of produce field notes
- underground cables encompassing:
 - cable types, ratings, core material, design considerations, cable dielectrics, insulating materials and abbreviations, electric stress, cable voltage drop and voltage drop calculations, cable termination, joints and installation
 - induction and eddy currents
 - cable testing and cable fault location
 - cable drawing
- voltage regulations of feeders and associated equipment encompassing:
 - terminology used - distribution system, service line, customer's terminals, customer voltage, utilisation voltage, base voltage, voltage variation and bandwidth
 - voltage limits and effects of voltage variation
 - causes of variation - inductance, capacitance and reactance of distribution lines, and transformers
 - methods of voltage control - off-load, on-load tap changers, voltage regulating relays, line drop compensation and different types of voltage regulators
 - voltage profiles - principles, effect on voltage profiles, limits of voltage, voltage drops due to LV mains transformers, tap-settings feeder and service lines
 - determining voltage drops for components within the profile
- control of voltage - conditions leading to voltage collapse and system disintegration; effects on the system of HV/LV; and voltage control devices encompassing:
 - voltage regulators applied to generators and synchronous phase modifiers
 - electromagnetic voltage regulators
 - series and parallel capacitors
 - on-load tap changer (OLTC) transformers and static VAR compensations (SVCs)
- range of devices covered by SVCs encompassing:
 - saturated reactor (SR) compensations
 - thyristor controlled reactor (TCR) compensators
 - combined TCR/TSCs
 - production of wave-form distorting harmonics and control devices
- importance of the location in the system of voltage control devices
- types of communication systems encompassing:
 - telephone, power line carrier, dedicated cable, micro-wave links and fibre optics
 - quantities and signals to be communicated
 - advantages and disadvantages of the various systems
 - equipment requirements
- transient over-voltages in power systems encompassing:
 - switching and lightning over-voltages and their effect on different plant items
 - transient over-voltage control and reduction using surge diverters, shield wires and CB control

- insulation systems, insulation coordination, insulation grading in plant items, bushings and capacitor bushings
- the principles of operation, voltage and current range, breaking capacity and field of use of circuit breakers - bulk oil, small oil volume, air break, vacuum and SF6 (double pressure and puffer types)
- the types of isolators in use, such as duo-roll, blade and scissor type
- circuit breaker auxiliary systems encompassing:
 - direct current (d.c.) systems, including battery types, charging and protection systems and earth fault detection systems
 - SF6 conditioning, storage and handling systems.

Assessment Conditions

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>