Australian Government

Assessment Requirements for UETTDRSB21 Diagnose and rectify faults in substation environment

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 on at least two (2) of the following system faults:
  - high voltage (HV) circuit breaker control system fault
  - transformer control system fault
  - direct current (d.c.) supply systems fault
  - d.c. switchgear and equipment fault
- diagnosing faults using at least three (3) of the following testers:
  - multimeters
  - tong testers
  - insulation resistance/continuity tester
  - low resistance high current tester
  - overload injection tester
  - specialist test equipment
- 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:

- safe working on energised low voltage (LV0 equipment, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - safety precautions specific to working on or near energised LV conductors - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; and types, selection, maintenance and use of personal protective equipment (PPE)

- work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, and release and rescue procedures for work on or near exposed energised LV conductors

- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records -audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control
- enterprise-specific switching diagrams and drawing, including:
  - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - LV system switching diagrams,

d.c. traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans
    - processes of updating switching diagrams
- enterprise-specific specialised tools, including:
    - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers and phase rotation)
    - characteristics, capabilities and application of specialised tools for a particular job
    - safety policies, procedures and precautions with regards to using, transporting and storing specialised tools
    - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and/or hiring arrangements
    - techniques in pre-use inspection on the serviceability of specialised tools
    - techniques in the selection, use, maintenance, care and storage of specialised tools
    - identifying WHS/OHS hazards, and assessing and controlling risks associated with their use
    - techniques for the safe use of specialised power tools
- enterprise-specific equipment installation procedures, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation equipment to be installed
    - identification of components within the equipment to be installed and associated control housings
    - use, characteristics and capabilities of specialised tools and equipment
    - enterprise-specific policies and procedures for equipment to be installed
    - control equipment and auxiliary relays, flags and alarms
    - techniques in evaluating serviceability of equipment to be installed
    - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and safe working clearances
    - remote and local operating principles and conventions
- enterprise-specific data management processes, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to data management
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types of enterprise-specific computer software
    - techniques in storing and retrieving data and reports from the computer
    - techniques in using the data management systems in following necessary commands and protocols in accordance with enterprise-specific procedures
    - calculation of results and data measurements using the computer

- techniques in the preparation of preliminary works creation and closure
- fault conditions and symptoms related to the plant and/or equipment type, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to typical fault conditions and systems
  - interpretation of faults in operating mechanisms, such as drive trains and mechanical power drives; stored energy systems, including hydraulic systems, pneumatic systems and mechanical storage systems, and accumulators
  - interpretation of faults in electrical control systems, such as electromechanical relay systems, micro-processor-based systems, programmable logic controller (PLC) systems, integrated control systems or combinations of electrical/mechanical systems
  - types of electrical systems, including alternating current (a.c.), d.c. and combinations of both
  - types of fault conditions - failure to operate, failure in service, = including the appropriate procedures for work on or in service plant/equipment
  - types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over pressure, under pressure, out of tolerance measurements and checks
- substation equipment components and materials related to the plant and/or equipment type, including:
  - types of components - complete unit of plant and/or equipment; replacement components or appropriate substitutes; their dimensions, suitability and serviceability; also, the components associated with the local control systems of the equipment, including indication of levels, quantities, volumes, pressures and temperatures; and the operating principles of these devices and components
  - types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
  - techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present WHS/OHS hazards to persons in the workplace
- substation safety practices, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to substation safety practices
  - techniques in the use of protective apparatus and apparel for substation work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
  - requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures plant and equipment; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from energised conductors
  - requirements for climbing and working at heights in substations - attached climbing principles; selection, use and operation of elevated work platforms (EWP) and any WHS/OHS requirements associated with the use of EWP

- control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires; and the precautions for personal protection when fighting small fires
- control of oil spills - identification, use and maintenance of spill oil control equipment and materials; and oil containment facilities and systems
- rescue and release procedures - the rescue of personnel from energised conductors, emergency descent from an EWP, and/or rescue from confined spaces
- enterprise requirements - safe access and authorisation to work procedures, use of mobile extendable equipment on or near energised HV conductors, and emergency response procedures
- hazards associated with work in substations, including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, and dangers of near approach to energised conductors

- design principles of substation LV a.c. and d.c. supply systems, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - wiring conventions, systems and labelling conventions
  - substation equipment identification and layout, wiring and schematic diagrams and other appropriate diagrammatic representations
  - LV design specifications, supply requirements, electrical load assessments
  - substation LV system distribution requirements - substation batteries, isolation requirements, paralleling requirements, battery chargers, d.c. distribution panels and control systems, a.c. distribution panels and control systems, and auto change-over requirements
  - control equipment and auxiliary relays, flags and alarms
  - common panel layouts
- LV substation switching principles, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to LV substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
  - role and responsibilities of the LV switching operator
  - operational forms, access authorities and permits associated with LV switching - types of operational forms, access authorities and permits, and purpose and procedures for operational forms
  - use, care and operation of equipment associated with LV substation switching
  - LV switchgear – types, categories, application and operating capabilities
  - operation of LV substation switching or indicating devices
  - operation of protection systems and substation equipment
  - restrictions pertaining to LV switching equipment
  - earthing LV electrical apparatus practices and procedures for access
  - LV switching techniques

- restrictions pertaining to enterprise-specific procedures.

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