



Australian Government

Assessment Requirements for UETTDRSO51 Manage network systems power flows

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
- developing and evaluating, on at least three (3) occasions, network manipulations that encompass the following:
 - maximising system reliability
 - managing voltage
 - minimising loss
 - controlling load
 - dispatching of static/synchronous Volt Ampere Reactive (VAR) compensation (if applicable to enterprise)
 - dispatching of generation (if applicable to enterprise)
- applying calculations and analysing the following:
 - transmission line conditions on the interconnected extra high voltage (EHV) system
 - distribution and sub-transmission line conditions on an interconnected system
- 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:

- enterprise-specific procedures and work practices relating to managing network demand encompassing:
 - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the procedures and work practices relating to managing network demand
 - requirements for the use of network demand management manuals, system diagrams/plans and drawings

- identifying and interpreting enterprise demand management procedures
- techniques in applying enterprise demand management procedures
- voltage control techniques encompassing:
 - conditions leading to voltage collapse
 - effects on system of high voltage (HV) and low voltage (LV)
 - voltage control devices - 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 compensators (SVC), such as SVC saturated reactor compensators, thyristor controlled reactor compensators and combined systems
 - production of harmonics and methods of harmonic control
 - location of voltage control devices within the system
- power flow control encompassing:
 - use of system components to control power flow patterns - base load, spinning reserve, regulating machines, rapid start plant, phase shifting transformers and load shedding
 - principles of automated control
 - synchronising power
 - relationship of power and frequency
 - machine stabilisation techniques
 - system oscillations and stability - damped and undamped oscillation, relationship of fault clearance times and system stability, and critical clearance times
- alternator operation and control encompassing:
 - constructional features of alternators - weights, lengths, lengths, cooling mediums, cooling systems, prime mover types, prime mover attachment, types of windings and core arrangements
 - principle of operation - induction machines and synchronous machines
 - modes of operation - island and infinite bus operation, running up of prime movers, loading the alternator, requirements for synchronising and methods of synchronising
 - use of reactive capability diagram - related diagram types, current circle diagram, performance chart, capability diagram, values represented, per unit representation, and limits representation and meaning
 - automatic voltage regulators - need for voltage control, required attributes of an AVR, range, response time, constraints on AVR capability, desirable attributes of an AVR, power consumption, compensation, rotor stabilisation, automatic changeover systems, and input and output requirements and components
 - operation on an infinite bus - definition of infinite bus, power/angle dependence, reactive flow/voltage dependence, power/angle diagram, effect of saliency, transient conditions, practical and theoretical stability limits, voltage dependence of stability, control of reactive flow using AVR and generator transformer tap changer
- EHV generator control systems encompassing:
 - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator
 - safety precautions specific to the synchronisation of generator sets - safe working

policies, practices and procedures; and synchronising procedures

- techniques in the installation of generator set control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load and assessing the appropriateness of the generator
- operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations and kiosk substations
- EHV generator set and control system to EHV distribution assets.

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, modelling tools, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, relevant drawings, 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>