



Australian Government

UETDRTS014 Maintain and test and metering schemes

Release: 1

UETDRTS014 Maintain and test and metering schemes

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package Release 2.0.

Application

This unit covers the testing of metering schemes and includes isolation, inspection, monitoring, testing, adjustment; and repair, refurbishment and/or overhaul and functional checks on schemes, including ammeters, voltmeters, wattmeters, volt-ampere reactive (VAR) meters and energy metering. It also includes the understanding of the purpose of the testing so as to prove accuracy and suitability of the metering for the required task.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEENEED104A Use engineering applications software on personal computers

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETDREL001 Apply environmental requirements

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRIS005 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETDRIS006 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETDRTS010 Develop power systems secondary isolation instructional documents

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Plan for the testing and maintenance of metering schemes

PERFORMANCE CRITERIA

Performance criteria describe the performance needed to demonstrate achievement of the element.

- 1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the testing and maintenance of metering schemes, are reviewed and determined
- 1.2** Purpose of the testing and maintenance of metering schemes is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
- 1.3** Organisational established procedures on policies and specifications for the testing and maintenance of metering schemes are obtained or established with appropriate personnel
- 1.4** Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
- 1.5** Testing parameters are established from organisational established procedures on policies and specifications
- 1.6** Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures

- 1.7** Work roles and tasks are allocated according to requirements and individual competencies
 - 1.8** Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
 - 1.9** Liaison and communication issues with others/authorised personnel, authorities, clients and landowners are resolved and activities coordinated to carry out work
 - 1.10** Risk control measures are identified, prioritised and evaluated against the work schedule
 - 1.11** Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
- 2 Carry out the testing and maintenance of metering schemes**
 - 2.1** Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
 - 2.2** WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
 - 2.3** Testing and maintenance of metering schemes decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
 - 2.4** Mathematical/engineering models of the testing and maintenance of metering schemes are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
 - 2.5** Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
 - 2.6** Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements

- 2.7 Testing and maintenance of metering schemes is undertaken according to requirements and established procedures
 - 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
 - 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
 - 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
 - 2.11 Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
- 3 Complete the testing and maintenance of metering schemes**
- 3.1 Final inspections of the testing and maintenance of metering schemes are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
 - 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
 - 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
 - 3.4 Approved copies of the testing and maintenance of metering schemes documents are issued and records are updated in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UET Transmission, Distribution and Rail Sector

Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS25 Maintain and test and metering schemes.

Links

Companion Volume Implementation Guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7>

Assessment Requirements for UETDRTS014 Maintain and test and metering schemes

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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
- demonstrating, on at least three (3) occasions, testing accuracy to established plans of at least three (3) schemes using the following equipment:
 - ammeter
 - voltmeter
 - wattmeter
 - volt-ampere reactive (VAR) meter
 - energy meter*
 - (*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:

- principles of statutory and safety considerations encompassing:
 - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on high voltage (HV)
 - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- procedure to undertake a visual inspection of a scheme encompassing:
 - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
 - requirements for the use of manuals, system diagrams/plans and drawings
 - identifying obvious deficiencies in operating to the standard functionality
 - techniques in determining device malfunction

- techniques in determining wiring defects
- procedures for the location and rectification of faults in electrical equipment up to 1000 volts alternating current (a.c.) and/or 1500 volts direct current (d.c.) encompassing:
 - relationship of WHS/OHS to the location and rectification of faults in electrical equipment - acts and regulations, identification of personal safety, workplace hazards, working with electrically operated tools and equipment, emergency first aid/resuscitation, rescue from a live electrical situation, and enterprise policies and procedures
 - types of drawings - differentiation between symptoms, faults and causes in malfunctioning equipment, and fault-finding techniques and procedures
 - fundamental electrical concepts - effects of current, practical resistors, sources of electromagnetic field, series, parallel and series-parallel circuits, electrical measurement, capacitors, inductors and magnetism
 - fundamentals of general appliances - basic principles of appliances (non-mathematical), appliance identification, appliance ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in appliances and fault-finding procedures (prescriptive)
 - fundamentals of single phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in phase splitting and universal type motors, and fault-finding procedures (prescriptive)
 - fundamentals of three phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, motor starter principles, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, safe testing procedures and fault-finding procedures (prescriptive)
 - fundamentals of single and three phase electrical heaters - basic principles of operation, types of electrical heaters, electrical heater identification, electrical heater ratings, basic principles of operation of control and protection devices, fault conditions and symptoms, safe testing procedures and fault-finding procedures (prescriptive)
- detailed operation of metering devices and principles encompassing:
 - common circuit configurations
 - meters and measurement principles
 - instrument transformer application
 - testing of metering systems and devices
 - implications of market operation
- detailed operation of metering test equipment encompassing:
 - care and safe use
 - operating principles
 - comparison of different operating principle meters used for the same purpose
 - accuracy and loading effects of meters - measurements of voltage, current, power, reactive power, phase angle, resistance, inductance, capacitance, impedance, frequency, harmonics and the use of transient and data logging devices

- disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts a.c. and/or 1500 volts d.c. encompassing:
 - safe electrical work practices and procedures according to standards such as AS/NZ 4836:2001 Safe working on low-voltage electrical installations and equipment, or equivalent
 - safe use of tools and plant
 - safe use of ladders and elevated work platforms (EWP)
 - safe use of personal protective equipment (PPE)
 - hazards in the (electrical) work environment - shock hazards, fire hazards, chemical hazards other hazardous areas
 - special situations
 - procedures for dealing with fires associated with electrical equipment
 - procedures for dealing with polychlorinated biphenyl (PCB)
 - electric shock victim rescue methods and procedures - basic first aid treatment for shock, burns and bleeding
 - purpose of each procedure and application - expired air resuscitation (EAR), external cardiac-compression (ECC), cardiopulmonary resuscitation (CPR) and combined application of EAR and ECC (purpose of each procedure and application)
 - components of a basic electrical circuit(s) – source, control, protection and load
 - types of circuit diagrams – symbols, conventions, interpretations and free sketches
 - types of circuit connections and functions - open circuit, closed circuit and short circuit
 - techniques in basic electrical measurement - use of multimeters; use of ammeter; use of voltage measuring and indicating devices; testing of measuring instruments; care of measuring instruments; voltage, current and resistance measurement; estimating values of voltage, current and resistance; and using Ohms law
 - fundamental principles of electrical concepts - effects of current; practical resistors; sources of Electromagnetic Field (EMF); simple practical circuit; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors and magnetism
 - techniques in insulation resistance measurement and requirements
 - earthing principles and systems
- disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts a.c. and/or 1500 volts d.c. encompassing:
 - methods for testing insulation resistance - continuity of prospective earthing conductor, and continuity between exposed conductive parts and the earthing system
 - methods of recognising acceptable test results for compliance with safety requirements
 - methods of recognising unacceptable test results requiring an appropriate qualified person to further investigate
 - cable types and conductor termination methods and techniques - conductors solid, stranded and flexible, and colour codes
 - single and three phase systems and loads - number of active and live conductors required, line and phase voltage and typical loads
 - identification and rating of general appliances
 - single phase induction motors - motor identification, motor ratings and direction of

rotation

- three phase induction motors - motor identification, motor ratings and direction of rotation
- single and three phase heaters - types of heaters, heater identification and heater ratings
- electrical distribution arrangement - power systems within premises, and purpose of switchboards/distribution boards (residual current devices and earth-leakage circuit breaker (ELCBs))
- circuit isolation and protection devices
- isolation procedures - work clearance, testing for voltage, lock-off and tagging, techniques in isolation and tagging, regulations, codes of practice and procedures
- disconnection procedures, practices and requirements
- types of replacement equipment
- methods of ensuring equipment is safe to connect to supply
- methods of reconnection procedures, practices and requirements
- methods of return equipment to service
- effects of harmonics encompassing:
 - characteristics and effects of harmonics on protection device functions/malfunction
 - effects of harmonics on transformers, generators, motors and quality of supply
- procedures for the systematic fault isolation through the application of diagnostic techniques encompassing:
 - principles of analytical questioning
 - techniques in drawing valid conclusions from first observations
 - concepts of broad first-line testing
 - consideration of/responsibility for, avoidance of further damage
 - interpretation of specific test results - cause/effect
 - techniques for isolation to appropriate level - half-split, module/function isolation (kernel technique), substitution; diagnostic software; requirements for the use of manuals, system diagrams/plans, drawings and handbooks; and specifications and fault pathways
 - software/firmware functions awareness
 - factors affecting field versus workshop repair costs
 - scheduling minor/major repair activities and downtime
 - implications of temporary repairs
 - use of system knowledge and history
 - data interpretation, expected versus actual
 - feedback to design/production/installation processes
 - subsystems and system structures
 - system signals/status indicators
 - known failure modes and trends
 - action threshold warnings versus catastrophic failure
 - component ratings/upgrades
 - disassembly/reassembly techniques and care

- relative costs of repair and replacement - remaining life, ongoing maintenance, and additional benefits of replacement equipment, e.g., improved productivity and quality.

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 and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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