



Australian Government

UETDRTS015 Maintain complex network protection and control systems

Release: 1

UETDRTS015 Maintain complex network protection and control systems

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 maintenance of network protection and control systems in complex situations and includes isolation, inspection, monitoring, testing, adjustment and repair, refurbishment and/or overhaul and functional checks. It includes schemes from discrete and interdependent schemes, such as distance, differential, transformer differential, bus zone, bus overcurrent, revenue metering, supervisory control and data acquisition (SCADA), communications, harmonic control and point on wave.

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

UEENEE104A Use engineering applications software on personal computers

UEENEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEE102A Fabricate, assemble and dismantle utilities industry components

UEENEE104A Solve problems in d.c. circuits

UEENEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEE124A Compile and produce an energy sector detailed report

UEENEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEE126A Provide solutions to basic engineering computational problems

UEENEE101A Solve problems in electromagnetic devices and related circuits

UEENEE102A Solve problems in low voltage a.c. circuits

UEENEE149A 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

UETDRTS017 Maintain interdependent network protection and control systems

Competency Field

Testing

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Plan for the maintenance of network protection and control systems (complex)

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 maintenance of network protection and control systems (complex), are reviewed and determined
- 1.2** Purpose of the maintenance of network protection and control systems (complex) 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 maintenance of network protection and control systems (complex) are obtained or established with appropriate personnel
- 1.4** Testing procedures are discussed with and/or directed to appropriate personnel in order to ascertain the project brief
- 1.5** Testing parameters are ascertained from organisational established procedures, 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 maintenance of network protection and control systems (complex)**
 - 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 Maintenance of network protection and control systems (complex) decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
 - 2.4 Mathematical and/or engineering models of the scheme 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 of network protection and control systems (complex) 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 maintenance of network protection and control systems (complex)

- 3.1** Final inspections of the network protection and control systems (complex) are undertaken to ensure they comply with all requirements and include all specifications and documentation 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 maintenance of network protection and control systems (complex) 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 UETTDRTS35 Maintain complex network protection and control systems.

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 UETDRTS015 Maintain complex network protection and control systems

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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
- completing all of the following
 - isolating protection, control and alarms associated with complex protection and control schemes
 - calibrating complex protection and control relays
 - carrying out function tests (trips and alarms) on complex protection and control schemes
 - writing reports on performance of complex protection and control schemes
 - isolating 'in service' current transformers
- completing all of the following:
 - activities that address the correction of errors in network protection and control systems
- 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 power transformer construction and operations encompassing:
 - applications of static reactive plant in high voltage (HV) networks, including voltage control, volt-ampere reactive (VAR) control and transient response capacity
 - types of static reactive plant, including HV capacitors, HV reactors, static VAR compensators and combinations of these
 - operating characteristics and operational constraints, including point on wave switching issues
 - ratings, cooling systems and control systems and ancillary equipment used
 - configurations and system layout, including single star, double star and bridge type
 - typical protection systems used, including neutral unbalance current and neutral

- unbalance voltage
- techniques used when balancing elements within static reactive plant
- safety precautions when testing and maintaining HV static reactive plant - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE)
- detailed operation of complex protection systems encompassing:
 - distance - characteristics, electromechanical, electronic, impedance, mho, offset mho, switched schemes, non-switched schemes, blocking schemes and bus zone
 - differential, transformer differential and bus overcurrent - principles, feeder protection, transformer protection, bias systems, harmonic restraint, current transformer connections, bus protection, low impedance schemes, high impedance schemes, bus overcurrent schemes, generator protection, special considerations and digital systems
 - types of revenue metering
 - applications of supervisory control and data acquisition (SCADA)
 - complex protection systems for communications
 - harmonic control
 - point on wave switching.

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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