



Australian Government

UETDRSO011 Respond to discrete and interdependent protection operations

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 Release 2.0.

Application

This unit covers the coordination of response to discrete and interdependent protection operations due to system faults.

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

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

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

Distribution and Sub-transmission Pathway Unit Group

UETDRSO001 Coordinate high voltage distribution and sub-transmission networks

UETDRSO005 Develop high voltage distribution and sub-transmission switching programs

Transmission Pathway Unit Group

UETDRSO002 Coordinate high voltage transmission network

UETDRSO004 Develop and evaluate power systems transmission switching programs

Competency Field

System Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Plan response to discrete/interdependent protection operations

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 preparation of the switching program, are reviewed and determined
- 1.2** Purpose of the response is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
- 1.3** Established policies, procedures and specifications for the response are obtained or established with appropriate personnel
- 1.4** Response to discrete/interdependent protection operations are discussed with and/or directed to appropriate personnel in order to ascertain the scope of

the work/testing required

- 1.5** Testing parameters are ascertained from established policies, procedures 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 and clients 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** Need for relevant work permits is identified to coordinate the performance of work according to requirements and/or established procedures
- 1.12** Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
- 1.13** Strategic plans are developed incorporating organisational initiatives in accordance with established procedures

2 Carry out response to discrete/interdependent protection operations

- 2.1** 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
- 2.2** Decisions concerning the response to protection operations are made on the basis of safety and effective outcomes according to requirements and/or established procedures
- 2.3** Stakeholders/customers are kept informed of current status regarding plan progress and recent developments

- 2.4 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
 - 2.5 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the work within an agreed timeframe according to requirements
 - 2.6 Testing of the decision to be implemented is undertaken according to requirements and established procedures
 - 2.7 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
 - 2.8 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
 - 2.9 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
- 3 **Complete the response to discrete/interdependent protection operations**
 - 3.1 Final review of the switching program is undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the work
 - 3.2 Appropriate personnel are notified of completion and reports and/or completion documents (electronic/paper) are finalised/commissioned
 - 3.3 Reports and/or completion documents (electronic/paper) are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
 - 3.4 Approved copies of switching program documents (electronic/paper) 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 UETTDRSO48 Respond to discrete and interdependent protection operations.

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 UETDRSO011 Respond to discrete and interdependent protection operations

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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
- developing and evaluating, on at least three (3) occasions:
 - identifying discrete/interdependent relay operations by interpreting available alarms and event data
 - analysing and diagnosing system failures
 - evaluating responses to discrete/interdependent relay operations
- describing control and alarms associated with discrete/interdependent protection 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:

- transmission, distribution and rail systems encompassing:
 - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
 - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
 - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
 - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- substations and power transformers encompassing:

- relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
- characteristics of a power transformer - basic construction of distribution transformers; operation under load/no-load conditions; types and basic operation of tap changing switches, including solid state types; and efficiency and cooling
- auxiliary equipment used on transformers - function and basic operation
- maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, and testing and fault-finding procedures
- characteristics of a reactors - description and purpose
- HV fault switching principles encompassing:
 - primary causes, effects and types of HV electrical faults
 - HV protection devices - main components, types, categories, applications and functions
 - basic principle of operation of HV system protection devices
 - protection coordination and protection zoning
 - HV feeder auto-reclosing suppression encompassing – function and application
 - circuit condition requirements and switching considerations when paralleling and separating HV feeders
- detailed operation and setting of discrete protection systems encompassing:
 - earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination and backup protection
 - overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, CT summation, time graded discrimination and backup protection
 - alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, and over temperature schemes
- detailed operation of interdependent protection systems encompassing:
 - overcurrent and earth leakage schemes, including intertripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic and shading coils
 - pilot wire and phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme and pilot supervisory techniques
 - load shedding, voltage control, parallel operation and load rejection
 - busbar protection and circuit breaker failure protection
 - reclose systems - applications, single shot, multi-shot, blocking schemes and synchronisation checking.

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

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