



Australian Government

UETTD RIS49A Develop low voltage switching schedule

Release: 2

UETTDRIS49A Develop low voltage switching schedule

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Amend performance criteria from 3.3 to 3.4 to continue sequential numbering.	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the preparation of a basic switching schedule for LV network. It includes planning basic outages and taking into account loading of network components. It also includes the calculation of network loading conditions to ensure the network is operating within design parameters.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

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

License to practice**3)**

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Electrical

Common Unit Group

Unit Code

Unit Title

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

UEENEEE105A

Fix and secure electrotechnology

Prerequisite Unit(s)**4)**

equipment

UEENEEE107A

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

UEENEEG101A

Solve problems in electromagnetic devices and related circuits

UEENEEG102A

Solve problems in low voltage a.c. Circuits

UETTDREL16A

Working safely near live electrical apparatus

UETTDNIS43A

Perform low voltage field switching operation to a given schedule.

Transmission Overhead Pathway Group

Unit Code

Unit Title

UETTDREL11A

Apply sustainable energy and environmental procedures

UETTDREL12A

Operate plant and equipment near live electrical conductors and apparatus

UETTDNIS54A

Install and maintain poles, structures, overhead conductors and cables

UETTDRTTP26A

Install transmission structures and associated hardware

UETTDRTTP27A

Maintain transmission structures and associated hardware

UETTDRTTP29A

Install and maintain transmission overhead conductors and cables

Distribution Overhead Pathway Group

Unit Code

Unit Title

UETTDREL11A

Apply sustainable energy and environmental procedures

Prerequisite Unit(s)**4)**

UETTDNDP12A	Maintain overhead energised low voltage conductors and cables
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDNIS41A	Install network infrastructure electrical equipment
UETTDNIS42A	Maintain network infrastructure electrical equipment
UETTDNIS52A	Install and maintain poles, structures and associated hardware
UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTDNIS56A	Install and maintain low voltage overhead services

Rail Traction Pathway Group

Unit Code	Unit Title
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDNIS52A	Install and maintain poles, structures and associated hardware
UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTDNRT21A	Install traction overhead wiring systems
UETTDNRT22A	Maintain traction overhead wiring systems

Prerequisite Unit(s)**4)**

UETTDRT23A	Install rail traction bonds
UETTDRT27A	Install overhead traction components and equipment
UETTDRT28A	Maintain overhead traction components and equipment

Distribution Cable Jointing Pathway Group

Unit Code	Unit Title
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDRCJ21A	Lay ESI electrical cables
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDNIS41A	Install network infrastructure electrical equipment
UETTDNIS42A	Maintain network infrastructure electrical equipment
UETTDNIS55A	Install and maintain low voltage underground services

Electrical Pathway Group

Unit Code	Unit Title
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines

Prerequisite Unit(s) 4)

UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits
UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
UETTDRI567A	Solve problems in energy supply network equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged

Employability Skills**5)**

will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1 Prepare/plan to develop LV switching schedules

- 1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination.
- 1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
- 1.3 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
- 1.4 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
- 1.5 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.

ELEMENT**PERFORMANCE CRITERIA**

- | | | |
|---|---|--|
| | 1.6 | Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order |
| | 1.7 | Clients/Customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements. |
| | 1.8 | Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures. |
| | 1.9 | Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work. |
| 2 | Carry out the development of LV switching schedules | <p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.</p> <p>2.2 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.3 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.</p> <p>2.4 Development of LV switching schedules is carried out, in accordance with the work schedule and requirements and/or established procedures.</p> <p>2.5 Essential knowledge and associated skills are applied in the safe development of LV switching schedules to ensure completion in an agreed timeframe and, to quality standards with</p> |

ELEMENT	PERFORMANCE CRITERIA
	a minimum of waste according to requirements.
	2.6 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
	2.7 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
3 Complete development of LV switching schedules	3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2 Relevant work permit(s) are signed off and, plant is returned to service and advised to client/customer in accordance with requirements.
	3.3 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
	3.4 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing LV switching schedule.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS49A Low voltage switching schedules

Evidence shall show an understanding of developing low voltage switching schedules to an extent indicated by the following aspects:

T1 Electrical equipment fundamentals used in the powerline industry encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of electrical equipment - HV and LV equipment
- Characteristics, capabilities and application of powerline electrical equipment
- Safety precautions with regards to using electrical equipment
- Techniques in pre-use inspection on the serviceability of electrical equipment
- Techniques in the general maintenance, and care and storage of electrical equipment
- Identifying hazards, assessing and controlling risks associated with their the use of electrical equipment

T2 Installation of switchgear and associated equipment encompassing:

- Types and function of various switchgear - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing, requirements and techniques
- Types of equipment - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
- Installation procedures for switchgear and equipment - standards, codes, legislation, supply authority regulations and or enterprise requirements, assembly and erecting procedures, earthing requirements and techniques, pole mounted locations
- Maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry standards and procedures,
- Testing and commissioning - electricity supply industry standards and procedures

T3 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types,

REQUIRED SKILLS AND KNOWLEDGE

characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, LV network interconnectors source of possible backfeed

- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
- Personnel protective equipment (PPE) for LV switching

T4 LV system switching principles including switching authorisation procedures encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of LV systems and equipment to be switched
- Procedures for obtaining correct LV switching authorisation - identification of OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching, procedures for coordination of operations.
- Techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures, energisation procedures

T5 Low voltage overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to low voltage overhead and 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 hazard/risk assessments associated with HV switching - types of operational forms, access authorities and hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments.
- Use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters, arc strangles.
- LV switchgear – types, categories, application, operating capabilities
- Operation of LV overhead switching or indicating devices - fuses; disconnect fuses; load switching; underslung links, air break switches; disconnects; live line clamps; phasing sticks; phasing tester.
- Operation of protection systems and substation equipment - fault levels and settings; types and applications, protection systems and substation equipment fault levels and settings; types and applications.
- Restrictions pertaining to LV switching equipment

REQUIRED SKILLS AND KNOWLEDGE

- Procedures for the isolation of LV distributions main and working earths
- Earthing LV electrical apparatus practices and procedures for access authority issuing
- Low voltage switching techniques
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T6 Preparation of a LV switching instruction encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching sheet schedules
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched, isolation points and earthing, responsibilities of the switching operator.
- Techniques in writing switching schedules - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures.

T7 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T8 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation

REQUIRED SKILLS AND KNOWLEDGE

- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records
- T9 Enterprises specific — technical drawing and documents encompassing:
- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
 - Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
 - Title box - description of parts and version control

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place,

access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a

- percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Approvals/clearances Access authorities
B	All of the following:	Development of LV switching schedule to enterprise requirements
C	All of the following	Planning of loading of network components, including standby generation. Evaluate load parameters and effects on system, including paralleling and off-loading. Identify unexpected sources of energisation, e.g. generators, UPS, solar, etc. Implementing earthing procedures to reduce induced voltages. Authorising issuance of work-permits.
D	At least one	Dealing with an

	occasion:	unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual development of LV switching schedules.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDNIS48A Develop high voltage switching schedule

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the development of a LV switching schedule and may include system diagram, system plant data and loading evaluation of network components.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Assessing risk
- Assessment
- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units