



Australian Government

Department of Education, Employment and Workplace Relations

UETTDRSO07B Develop HV distribution and subtransmission switching programs

Release: 1

UETTDRSO07B Develop HV distribution and subtransmission switching programs

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This Competency Standard Unit covers the preparation and/or checking of activities required to place the HV distribution and sub transmission network in a state in which work can safely be performed whilst minimising customer outages. The format is typically a written sequence of switching items in a pre-defined format. It includes planning outages and taking into account loading of network components. It also includes planning the management of multiple outages on the HV distribution and sub transmission network and the calculation of network loading conditions to ensure the network is operating within designed parameters.

Application of the Unit

Application of the Unit 4)

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

1.2) License to practice

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. 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) 2)

2.1) Competencies

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

UEENEED004B	Use engineering application software
UEENEEE007B	Use drawings, diagrams, schedules and manuals
UEENEEE024B	Compile and produce electrotechnology report
UEENEEG049B	Solve problems in complex polyphase power circuits
UETTDRIS22B	Implement and monitor organisation's OHS policies, procedures and programs
UETTDRIS23B	Implement and monitor environmental and sustainable energy policies and procedures

Prerequisite Unit(s) 2)

For the full prerequisite chain details for this unit please refer to Table 3 in Volume 1, Part 2

Employability Skills Information**Employability Skills** 3)

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 will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements: 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 Plan for the preparation of HV Distribution and Sub transmission Switching programs

1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of HV Distribution and Sub transmission Switching system programs, are reviewed and determined.

1.2 Purpose for the preparation of HV Distribution and sub transmission switching programs is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.

1.3 Organisational established procedures on policies and specifications for the preparation of HV Distribution and sub transmission switching programs are obtained or established with the

ELEMENT	PERFORMANCE CRITERIA
	appropriate personnel.
	1.4 Testing/switching procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
	1.5 Testing/switching parameters are established from organisational established procedures on policies and specifications.
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' 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 other/authorised personnel, authorities, clients and land owners 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 preparation of HV Distribution and sub transmission switching programs	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 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 Preparation of HV Distribution and sub transmission switching program decisions are made on the basis of safety and effective outcomes according to requirements and/or

ELEMENT**PERFORMANCE CRITERIA**

		established procedures.
	2.4	Mathematical and/or engineering models of the program is used to analyse the effectiveness of the finished project as per 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 the program 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 as per established procedures.
3	Complete the preparation of HV Distribution and sub transmission switching programs	3.1 Final review of the switching program is 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

ELEMENT**PERFORMANCE CRITERIA**

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 prepared HV Distribution and sub transmission switching program documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) 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 HV distribution and sub transmission switching programs.

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

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- E2.18.1 Occupational Health and Safety principles
- E2.18.2 Electrical safe working practice
- T2.2.1 Generation power systems
- T2.2.2 Transmission, distribution and rail power systems
- T2.2.3 Substations, power transformers and reactors
- T2.2.31 Distribution overhead line component fundamentals
- T2.2.34 Generator control systems HV
- T2.2.35 Live line working up to 132KV with Hotstick
- T2.2.37 Live line working up to 33kV with glove and

REQUIRED SKILLS AND KNOWLEDGE

	barrier
T2.2.38	Working on live lines up to 33kV with glove and barrier/Hotstick combined
T2.2.39	Plant, equipment and tools used for HV live line work
T2.2.48	Electrical equipment HV and LV powerline
T2.2.49	Coordinating permit access authority procedures
T2.3.1	Powerline safety practices
T2.3.3	Statutory and safety considerations
T3.3.5	Discrete protection schemes isolation and tagging procedures
T2.4.1	Switchgear installation
T2.4.3	High voltage switching principles
T2.4.4	High voltage fault switching principles
T2.4.5	High voltage distribution transformer principles
T2.4.6	High voltage SWER system
T2.4.7	Feeder automation system
T2.4.8	System switching operations and authorisation procedures HV
T2.4.11	High voltage overhead and substation switching principles
T2.4.13	High voltage switching instruction preparation
T2.5.1	Ecological principles for vegetation control
T2.5.2	Vegetation control techniques
T2.8.1	Enterprises specific policies and procedure instructions

REQUIRED SKILLS AND KNOWLEDGE

- T2.8.2 Enterprises specific OHS instructions
- T2.8.3 Enterprises specific technical drawing and documents
- T2.9.1 Interpretation of power distribution network drawings and documentation
- T2.10.9 Analyse and interpret results and measurements substations
- T2.10.11 Substation safety practices
- T2.10.15 High voltage insulation system principles substations
- T2.10.19 Substation switching practices
- T2.11.11 Control of transient overvoltages
- T2.11.14 Fault calculation techniques
- T2.11.15 Visual inspection procedures
- T2.11.16 Commissioning procedures
- T2.11.18 Discrete protection systems
- T2.11.19 Interdependent protection systems
- T2.11.20 Complex protection systems
- T2.11.31 Primary plant testing
- T2.11.40 Harmonics
- T2.11.58 Distribution UG line component fundamentals
- T2.11.65 HV system load calculation principles

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit 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.

EVIDENCE GUIDE

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 - UET09". 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 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	Demonstrate at	A transformer with a HV

EVIDENCE GUIDE

	least three (3) switching programs that between them encompass the following:	winding and fixed tap A transformer with a HV winding and on-load tap changer HV busbars HV isolators HV switchgear (applicable to enterprise equipment) Phasing and phase rotation Commissioning an item of HV plant A planned interruption to a HV customer/s Installation of a mobile generators (if applicable to enterprise equipment) Placing distribution feeders in parallel where special considerations are required to cope with capacitors, phase shifts between different bulk supply systems, sensitive earth fault protection, single phase switching.
B	Prepare switching instructions to isolate, test and earth all of the following	All enterprise transformer types All enterprise busbar types All enterprise feeder types All enterprise circuit breakers, isolators or switches
C	Prepare, write and check switching sheets to do all of the following:	Manage load Manage voltage Minimise losses Maximise network reliability
D	Do all of the following:	Check all above types of switching instructions Coordinate all above types of switching instructions Calculation of plant loading
E	At least one	Dealing with an unplanned

EVIDENCE GUIDE

	occasion	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 the preparation of HV Distribution and Sub transmission Switching programs.

Note:

Access will be needed to: relevant protection, control, metering, and alarm equipment, network drawings, computerised electrical plant control and monitoring facilities, operational event data, enterprise operational policies, procedures and work practices and enterprise crisis management procedures.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

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 Transmission, Distribution and Rail Traction Industry. 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 units:

UETTDRSO06B Develop LV distribution switching programs

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UETTDRSO08B Develop and evaluate Transmission
switching programs

Range Statement

RANGE STATEMENT

8) This relates to the competency standard unit 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/may be demonstrated in relation to the preparation and/or checking of activities required to place the HV distribution and sub transmission network (may also be applied to include rail/tram networks) in a state in which work can safely be performed whilst minimising customer outages and shall/may be demonstrated using the following:

HV distribution feeders/distribution network -radial or loop; HV sub transmission feeders/network -radial or loop; transformers with HV windings and fixed tap; transformers with HV windings and on-load tap changers; HV busbars - indoor and/or outdoor as applicable to enterprise; HV isolators; HV switchgear (applicable to enterprise equipment); switching instructions (applicable to enterprise equipment); computers (applicable to enterprise equipment); network diagrams (applicable to enterprise equipment); access authorities; regulatory requirements

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
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- 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
- Fall prevention
- Hazards
- Identifying hazards

RANGE STATEMENT

- Inspect
- Legislation
- MSDS
- 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

2.2) Literacy and numeracy skills**2.2) Literacy and numeracy skills**

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	5	Writing	5	Numeracy	5
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Competency Field

Competency Field	5)
	System Operation Units