



Australian Government

Department of Education, Employment and Workplace Relations

UETTDRSO47A Coordinate high voltage transmission network

Release: 1

UETTDRSO47A Coordinate high voltage transmission network

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the monitoring of HV transmission networks in real time. This includes power quality, alarm interpretation, facilitating and monitoring the status of access authorities and ensuring that the network is operated within design parameters at all times. It also includes dispatching and coordination of field repair crews to respond to and rectify abnormalities and liaise with other electrical authorities.

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. 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

License to practice**3)**

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):

Common Unit Group

Unit Code	Unit Title
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 problems

Prerequisite Unit(s)**4)**

UEENEEE126A	Provide solutions to basic engineering computational problems
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus
UETTDRI62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTDRI63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
UETTDRSO38A	Develop and evaluate power systems transmission switching programs

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 5 Writing 5 Numeracy 5

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 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 Plan for the coordination of HV Transmission networks	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the coordination of HV Transmission networks, are reviewed and determined. 1.2 Purpose of the coordination of the network 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 coordination of the network are obtained or established with the appropriate personnel. 1.4 Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief. 1.5 Testing parameters are established from organisational established procedures on policies and specifications.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the coordination of HV Transmission networks	1.6 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.7 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.
	1.8 Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.9 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.10 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	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 Coordination 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 coordination process are 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 actions 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

ELEMENT**PERFORMANCE CRITERIA**

		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 coordination process 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 coordination of HV Transmission networks	3.1 Final review of the coordination processes 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 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 coordination documents are issued and records are updated in accordance with established procedures.

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 coordinating HV Transmission networks.

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

KS01-TSO47A High voltage transmission network - coordination

Evidence shall show an understanding of high voltage transmission network - coordination to an extent indicated by the following aspects:

T1 High voltage fault switching principles encompassing:

- Primary causes, effects and types of HV electrical faults
- HV protection devices - main components, types, categories, applications, functions
- Basic principle of operation of HV system protection devices
- Protection co-ordination and protection “zoning”
- HV feeder auto-reclosing suppression encompassing – function, application
- Circuit condition requirements and switching considerations when paralleling and separating HV feeders.

T2 Coordinating and directing switching instructions encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching sheet instructions
- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the co-ordination and directing of switching schedules instructions
- Relationship between the operating authorities and HV customers, operating agreements
- Techniques in co-ordinating and directing HV and LV switching of electrical networks
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
- Responsibilities of the switching operator
- Techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in gathering, collating and confirming data on switching procedures

T3 AC transmission system components encompassing:

- Support structures and reasons for selection
- Insulators and reasons for selection
- Conductors and reasons for selection
- Vibration management systems and principles
- Line ratings based on voltage, span, tension and temperature

T4 AC transmission line models encompassing:

- Types of transmission line models based on line length
- Calculation of voltage drop, line regulation, and transmission efficiency
- Load sharing between lines

T5 Basic design features and characteristics of transmission structures and associated equipment and or components encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing of poles/structures and associated equipment and or components
- Transmission systems principles – terminologies, primary and secondary, voltage levels, types of lines
- Characteristics of structure - types of structure (towers and poles, concrete and steel), characteristics of types of structures, installation methods, maintenance techniques
- Characteristics of associated equipment used on structures – insulators, earthing (overhead earth and communication lines)

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.

**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 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	Item List

	demonstrated	
A	Demonstrate on at least three (3) occasions the coordination of system manipulations that encompass:	HV sub transmission and distribution network HV sub transmission and distribution network manipulation to control loading on equipment Transformers with HV windings (if applicable to enterprise equipment) HV busbars HV isolators HV switchgear (applicable to enterprise equipment).
B	All of the following:	Write switching instructions Check switching instructions Coordinate switching instructions Calculate plant loading Prepare and authorise HV sub transmission and distribution switching program Monitor switching progress Monitor the status of access permits/authorities on HV network equipment Ensure network plant operates within design and regulatory requirements on a real time basis Dispatch and communicate with field

		crews to respond/rectify system abnormalities Application and administration of SCADA (if applicable to enterprise equipment) Analyse and diagnose system failures Calculate and analyse paralleling conditions on the interconnected HV system
C	Monitor and manage switching to:	Manage load Manage voltage Minimise loss Maximise system reliability Allow safe network access for maintenance activities Allow safe network access for construction activities Validating fault reports arising from system disturbances
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

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 coordination of HV Transmission networks.

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 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:

UETTDRSO38A Develop and evaluate power systems
transmission switching programs

UETTDRSO41A Manage power systems transmission networks

Range Statement

RANGE STATEMENT

10) 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 be demonstrated in relation to the monitoring of HV Transmission networks, ensuring that the Transmission network is operated within design parameters at all times and shall be demonstrated using the following:

HV Transmission feeders/Transmission network; Transmission transformers with HV windings; HV busbars; HV isolators; HV switchgear (applicable to Transmission enterprise equipment); Switching instructions (applicable to Transmission enterprise equipment); computers (applicable to Transmission enterprise equipment); network diagrams (applicable to Transmission 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
- Assessing risk
- Assessment
- Authorisation
- 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
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
System Operation Units