



**Australian Government**

# **UETTD RIS44A Perform HV field switching operation to a given schedule**

**Release: 2**

## **UETTDRIS44A Perform HV field switching operation to a given schedule**

### **Modification History**

Not applicable.

### **Unit Descriptor**

#### **Unit Descriptor**

#### **1) Scope:**

##### **1.1) Descriptor**

This Competency Standard Unit covers the carrying out of high voltage switching operations involving the operation of circuit breaking and isolation devices from a given switching schedule and according to enterprise procedures. It also encompasses the process of; communicating with the Switching Control Officer or Electrical Control Officer, isolating the electrical equipment and the line or work site, as well as proving that the area is de-energised and earthed, issuing/accepting electrical permits and the returning of the affected circuits to service.

### **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

**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
UETTDRLS54A	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**

**Prerequisite Unit(s)****4)**

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
UETTDNRT23A	Install rail traction bonds
UETTDNRT27A	Install overhead traction components and equipment
UETTDNRT28A	Maintain overhead traction components and equipment

**Distribution Cable Jointing Pathway Group**

Unit Code	Unit Title
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**Prerequisite Unit(s)****4)**

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.
UETTDREL11A	Apply sustainable energy and environmental procedures
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
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

**Prerequisite Unit(s) 4)**

UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
UETTDNIS67A	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	3	Writing	3	Numeracy	3
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**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**

<b>6)</b> 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.
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## Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to undertake HV switching procedures to a given schedule	<p>1.1 Switching and work schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for HV switching are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant authority is obtained to perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p> <p>1.8 Relevant personnel at worksite are confirmed current in First Aid and other related work procedures according to requirements.</p> <p>1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.</p> <p>1.10 Site is prepared according to the work schedule</p>



**ELEMENT****PERFORMANCE CRITERIA**

- and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.12 Road signs, barriers and warning devices are positioned in accordance with requirements.
- 2 Carry out HV switching procedures to a given schedule
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
- 2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
- 2.3 Essential knowledge and associated skills are applied for the safe undertaking of HV switching procedures to a given schedule to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.4 Communications with Switching Control Officer are established and maintained throughout the isolation operation according to established procedures.
- 2.5 Electrical equipment and associated circuits line/network or work site to be switched including paralleling is isolated and proved de-energised using appropriate devices and earthed where required according to requirements and established procedures.
- 2.6 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.

**ELEMENT****PERFORMANCE CRITERIA**

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|--|--|
| 3 Complete HV switching procedures to a given schedule | 2.7 Unplanned events occurring during HV switching procedures to a given schedule are responded to and undertaken within the scope of established procedures.                            |
|  | 2.8 Relevant permits are prepared and issued in accordance with established procedures.  |
|  | 2.9 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.   |
|  | 2.10 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.  |
|  | 3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.                                |
|  | 3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.   |
|  | 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.  |
|  | 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.                 |
|  | 3.5 Relevant permit(s) are signed off, safety devices are removed, and the system is re-energised and returned to service in accordance with requirements/established procedures.        |
|  | 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel and authority 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 performing high voltage field switching to a given schedule.

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

**KS01-TIS44A**            High voltage switching

Evidence shall show an understanding of high voltage switching principles to an extent indicated by the following aspects:

**T1**     Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule

**T2**     Requirements for the use of manuals, system diagrams/plans and drawings encompassing:

- Types, characteristics and capabilities of electrical apparatus
- Use, characteristics and capabilities of specialised tools and testing equipment
- Network interconnectors source of possible backfeed

**T3**     Role of the HV switching operator

**T4**     Procedures for obtaining correct HV switching authorisation encompassing:

- 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

**T5**     Use and operation of equipment associated with HV overhead and substation equipment encompassing:

- Test instruments
- Sticks
- Interrupters
- Arc strangles

**T6**     Operation of protection systems and substation equipment

## REQUIRED SKILLS AND KNOWLEDGE

- Note: Examples include fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications

T7 Types and categories of HV switchgear

T8 Application, function and operating capabilities of switchgear

T9 Restrictions pertaining to HV switching equipment

T10 Procedures for the isolation of HV transmission main and working earths

T11 Earthing HV electrical apparatus practices and procedures for access encompassing:

- Purposes of Operational and additional work part - on-site earths
- Factors determining the location and effectiveness of Operational earthing
- Acceptable industry procedures
- Personal protective equipment

T12 High voltage switching techniques

- Pre-switching checks
- Switching operational procedures
- Isolation procedures and proving dead/de-energised
- Earthing procedures
- Pre-switching checks
- Switching operational procedures
- Emergency fault procedures
- Energisation procedures

T13 Application and function of SWER system components

- Circuit arrangement
- Principle of operation
- Hazards and procedures associated with faulty SWER earth systems
- Procedure to isolate, energise and commission SWER substations

T14 Operation of HV overhead switching or indicating devices encompassing:

- Identifying hazards, assessing and controlling risks associated with HV switchgear operation
- Systematic and defensive techniques
- Mobile radio procedures
- Double isolation procedures
- Note: Examples include fuses; disconnect fuses; load switching; live line

## REQUIRED SKILLS AND KNOWLEDGE

indicators; capacitors; reclosers; sectionalisers, underslung links, airbreaks; switches, disconnects; live line clamps; phasing sticks; phasing tester

### KS02-TIS44A High voltage fault switching principles

Evidence shall show an understanding of high voltage fault switching principles to an extent indicated by the following aspects:

T1 Primary causes, effects and types of HV electrical faults

T2 HV protection devices encompassing:

- Main components
- Types
- Categories
- Applications
- Functions

T3 Basic principle of operation of HV system protection devices

T4 Protection co-ordination and protection —zoning

T5 HV feeder auto-reclosing suppression encompassing:

- Function
- Application

T6 Circuit condition requirements and switching considerations when paralleling and separating HV feeders

### KS03-TIS44A High voltage distribution transformer principles

Evidence shall show an understanding of high voltage distribution transformer principles to an extent indicated by the following aspects:

T1 Operation of HV distribution transformers encompassing:

- Principle governing factors for transformer ratings
- Protection and alarms
- Operating limitations and the relationship between transformer and HV fuse rating
- Purpose and principle operation of HV distribution transformer tap changers
- HV distribution transformer and transformer — cable combination switching practices
- Paralleling requirements
- Isolation and earthing procedures for access
- Common distribution transformer and associated electrical apparatus faults

T2 HV underground switching equipment

- Note: Examples include arc strangles, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers

## REQUIRED SKILLS AND KNOWLEDGE

KS04-TIS44A Feeder automation system

Evidence shall show an understanding of feeder automation system to an extent indicated by the following aspects:

- T1 Function of feeder automation system and the main components
- T2 Operation procedure for a remote field device from a local control station
- T3 Functions of—System Control and Data Acquisition (SCADA) (or any other relevant Data Acquisition and Control) systems and its main components
- T4 SCADA system security interlocks and access restrictions
- T5 SCADA system operation when switching apparatus or retrieving data via a remote access device such as; Remote Access Terminal (RAT), Dial Up Voice Annunciate System and Local Control Station
- T6 Function of the main components of a local/remote control system
- T7 Operation of a field devices using SCADA systems via a Remote Access Terminal (RAT), Dial Up Annunciate System and Local Control Station

## 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:

<b>Range of tools/equipment/materials/procedures/workplaces/other variables</b>		
<b>Group No</b>	<b>The minimum number of items on which skill is to be demonstrated</b>	<b>Item List</b>
A	All of the following:	Approvals/clearances Access permits
B	All of the following:	HV operating sticks HV operating earths HV detectors
C	At least one of the following:	HV phasing sticks HV ground mounted equipment isolating handles and earths
D	At least two of the following:	HV links Air break switches Fuses
E	At least three of the following:	Reclosers Ring main units



		Circuit breakers Isolators Earth switches Sectionalisers
F	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 performance of HV field switching to a given schedule.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, 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)**

There are no concurrent assessment recommendations for this unit.

## 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 carrying out of high voltage switching operations involving the operation of circuit breaking and isolation devices from a given switching schedule.

Switching operations are confined to those performed in field situations, not in system control rooms or substations and may include electrical load transfer.

Switchgear includes reclosers, ring main units, circuit breakers, isolators, earth switches, sectionalisers, HV links, air break switches, live line clamps, and fuses.

Specialist tools may include HV phasing sticks, HV link sticks, HV live-line clamp operating sticks, HV ground transformer isolating handles and associated earths, HV overhead operating earths and HV detectors.

Switching program/schedule including necessary detail, e.g. structure, switch or equipment number; locations; HV feeder; outage times; works plan/order;

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.

**Competency Field**

**Competency Field**                      11)

Industry Specific Cross-Discipline Units