



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **UETDRTS11B Maintain, test and commission voltage regulating equipment**

**Release: 1**

## **UETTDRTS11B Maintain, test and commission voltage regulating equipment**

### **Modification History**

Not Applicable

### **Unit Descriptor**

#### **Unit Descriptor**

1)

#### **1.1) Descriptor**

This Competency Standard Unit covers the maintenance, testing and commissioning of Distribution field devices to relevant standards, including voltage regulators, automatic circuit reclosers control boxes, line capacitors, and associated communication devices. It includes communicating with the Operating Authority, testing, clearing after test and energisation using techniques that are acceptable to the Operating Authority

### **Application of the Unit**

#### **Application of the Unit 4)**

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

## 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 an electrotechnology report
UEENEED049B	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 management 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 unit of competency

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 and coordinate the maintenance, testing and commissioning of Distribution field devices	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the maintenance testing and commissioning of distribution field devices, are reviewed and determined.
		1.2	Purpose of the work is established and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Established organisational procedures, policies and specifications for the work are obtained or

ELEMENT	PERFORMANCE CRITERIA
	established with the appropriate personnel.
	1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures
	1.5 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.
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	1.8 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.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
2 Carry out and coordinate the maintenance, testing and commissioning of Distribution field devices	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 avoid the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.

ELEMENT	PERFORMANCE CRITERIA
2.3	Maintenance, testing and commissioning decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
2.4	Mathematical models of the distribution system 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 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	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
3 Complete and coordinate the maintenance, testing and commissioning of Distribution field devices	3.1 Final inspections of the work are undertaken to ensure it complies with all requirements and includes all specifications and documentation needed to complete the brief.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
	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 test documents are issued

**ELEMENT****PERFORMANCE CRITERIA**

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 maintaining, testing and commissioning voltage regulating equipment.

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 practices
E2.18.8.2	Occupational Health and Safety , enterprise responsibilities
T2.2.1	Generation power systems
T2.2.2	Transmission, distribution and rail power systems
T2.2.3	Substations, power transmission and reactors
T2.2.49	Coordinating permit access authority procedures
T2.3.1	Powerline safety practices
T2.3.2	Powerline safety implementation and monitoring
T2.3.3	Statutory and safety considerations
T2.4.8	System switching operations and authorisation procedures - HV

## REQUIRED SKILLS AND KNOWLEDGE

T2.4.9	System switching operations and authorisation procedures - LV
T2.8.7	Enterprise specific - equipment installation procedures
T2.10.16	Power transformer and reactor principles - substations
T2.10.17	Static reactive plant principles - substations
T2.10.18	On load tap changer principles - substations
T2.10.21	Circuit breaker construction principles - substations
T2.10.24	Rotating reactive plant principles - substations
T2.10.26	Voltage regulation scheme principles - substations
T2.10.28	Electrical equipment - Distribution field device protection and control schemes - substations
T2.11.8	Voltage control devices on interconnected transmission. systems
T2.11.9	Calculation of rating of voltage control devices
T2.11.11	Control of transient overvoltages
T2.11.16	Commissioning procedures
T2.11.23	Locate and rectify faults in electrical equipment
T2.11.36	Disconnect and reconnect fixed wiring electrical equipment fundamentals
T2.11.38	Disconnect and reconnect fixed wiring electrical equipment procedures
T2.11.40	Harmonics
T2.11.41	Fault finding and diagnostic techniques
T2.11.53	Protection schemes



## **REQUIRED SKILLS AND KNOWLEDGE**

T2.11.59 Generator control systems - EHV

## 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.

## 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 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	Test, on two (2) occasions, at least	ACR control box and recloser functions.

**EVIDENCE GUIDE**

	two (2) of the following:	Line capacitor controller Voltage regulating relay and voltage regulator
B	Commission, on two (2) occasions, at least two (2) of the following.	ACR control box and recloser. Line capacitors. Voltage regulating relay and voltage regulator
C	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 maintenance, testing and commissioning of Distribution field devices
- Operational access to relevant plant, protection or metering equipment, scheme drawings, manufacture's specifications/manuals and testing equipment.

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.

## EVIDENCE GUIDE

### 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)

There are no concurrent assessment recommendations for this unit.

## Range Statement

### RANGE STATEMENT

8) 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/may be demonstrated in relation to the maintenance testing and commissioning of distribution field devices and may include the following equipment:

Voltage regulator, voltage regulating relays, line drop compensators, tap changers, automatic reclosers, gas switches, line capacitors, control boxes, TMR Radio, mobile phones, communications, settings, downloads, min ops, timing tests, energisation, testing, commissioning, primary injection tests, secondary injection tests, SCADA, overcurrent, earth fault. Inverse times, DC supplies, batteries.

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
- Inspect
- Legislation
- MSDS

## RANGE STATEMENT

- 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

## Custom Content Section

### 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)

Testing Units