



**Australian Government**

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

# **UETTDRTS32A Conduct evaluation of power systems primary plant**

**Release: 1**

## UETTDRTS32A Conduct evaluation of power systems primary plant

### Modification History

Not applicable.

### Unit Descriptor

#### Unit Descriptor

#### 1) Scope:

##### 1.1) Descriptor

This Competency Standard Unit covers the commissioning and maintenance testing requirements for primary plant and equipment. It includes both the practical application of the tests and analysis of results, covering, but is not limited to; applied HV testing and induced HV testing, ratio, polarity, winding resistance, impedance, dielectric loss angle, partial discharge and watts loss insulation resistance and transformer vector group. It encompasses a complete understanding of the nature of the tests being conducted and the ability to conduct the tests in a safe manner.

### Application of the Unit

#### Application of the Unit 2)

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 6.

### 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

**License to practice****3)**

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):

**Common Unit Group**

Unit Code	Unit Title
UEENEEED104A	Use engineering applications software on personal computers
UEENEEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEEE104A	Solve problems in d.c. Circuits
UEENEEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEEE124A	Compile and produce an energy sector detailed report
UEENEEEE125A	Provide engineering solutions for problems in complex multiple path

<b>Prerequisite Unit(s)</b>	<b>4)</b>	circuits problems
	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
	UETTDRTS29A	Develop power systems secondary isolation instructional documents

**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 testing of primary plant	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the testing of primary plant systems, are reviewed and determined.
		1.2	Purpose of the testing of primary plant 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 testing of primary plant 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
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 testing of primary plant	<p data-bbox="549 1171 1305 1283">2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.</p> <p data-bbox="549 1317 1305 1496">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.</p> <p data-bbox="549 1529 1305 1675">2.3 Testing of primary plant decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.</p> <p data-bbox="549 1709 1305 1854">2.4 Mathematical/engineering models of the testing of primary plant are used to analyse the effectiveness of the finished project as per requirements and established procedures.</p> <p data-bbox="549 1888 1305 1984">2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be</p>

ELEMENT	PERFORMANCE CRITERIA
	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 primary plant 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 testing of primary plant	<p>3.1 Final inspections of the primary plant are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.</p> <p>3.4 Approved copies of the testing of primary plant documents are issues and records are updated in accordance with established procedures.</p>

## 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 conducting evaluation of primary plant.

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

KS01-TTS32A          Power systems primary plant

Evidence shall show an understanding of power systems primary plant to an extent indicated by the following aspects:

T1      Detailed operation of fundamental test equipment encompassing:

- Care and safe use
- Operating principles
- Comparison of different operating principle meters used for the same purpose
- Accuracy and loading effects of meters - measurement of voltage, current, power, resistance, insulation resistance, impedance and phase sequence and the use of oscilloscopes.

T2      Primary Plant testing encompassing:

- Transformers - DC high voltage tests, AC high voltage tests, induced high voltage tests, ratio tests, polarity tests, winding resistance tests, impedance tests, insulation resistance tests, transformer vector group test, winding temperature indicator test, alarm tests, neutral ct tests
- Circuit breakers - DC high voltage tests, AC high voltage tests, induced high voltage tests, function tests, operation timing, minimum voltage operation test, insulation resistance test, contact resistance test, auxiliary contact test, alarm tests
- Capacitor banks - DC high voltage tests, AC high voltage tests, induced high voltage tests, neutral ct tests, balance tests, insulation resistance.



# 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</b>	<b>Item List</b>

	<b>demonstrated</b>	
A	<p>Do five (5) of the following tests on primary plant – Transformers.</p> <p>Note: At least two (2) (*) must be included:</p>	<p>*DC high voltage tests,                      *AC high voltage tests,                      *induced high voltage tests,                      Ratio tests                      Polarity tests                      Winding resistance tests                      Impedance tests                      Insulation resistance tests                      Transformer vector group test                      Winding temperature indicator test                      Alarm tests                      Neutral CT tests</p>
B	<p>Do five (5) of the following tests on primary plant – Circuit breakers.</p> <p>Note: At least two (2) (*) must be included:</p>	<p>Profiling and contact timing                      *AC high voltage tests                      function tests                      minimum voltage operation test                      insulation resistance test                      contact resistance test                      auxiliary contact test                      alarm tests</p>
C	<p>Do three (3) of the following tests on primary plant – Capacitor banks.</p>	<p>Cell capacitance measurement                      Neutral CT tests                      Balance tests</p>

		Insulation resistance
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 the testing of primary plant.
- 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.

**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

**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 testing the primary plant and may include the following: transformers, circuit breakers, capacitor banks, DC supplies, remote operated isolators (ROIs), CT's, VTs, oil and winding temperature indicators.

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
- 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)**  
   Testing Units