



Australian Government

UEPMNT448A Diagnose and repair faults in wind turbine generator control systems

Release: 1

UEPMNT448A Diagnose and repair faults in wind turbine generator control systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit deals with the skills and knowledge required to diagnose and repair faults in large scale wind turbine generator (WTG) control systems.

Application of the Unit

Application of the Unit 2)

This 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 an electrical licence to practise in the workplace.

Practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships and the like.

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 have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEPMNT371A	Maintain large scale wind turbine generators
UEPMNT443A	Maintain wind turbine generator control systems
UEPMNT445A	Diagnose and repair faults in large scale wind turbine generators
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components
UEENEEE104A	Solve problems in d.c. circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three

Prerequisite Unit(s) 4)

phase low voltage electrical
apparatus and circuits

UEENEEG063A

Arrange circuits, control and
protection for general electrical
installations

UEENEEG101A

Solve problems in electromagnetic
devices and related circuits

UEENEEG102A

Solve problems in low voltage a.c.
circuits

UEENEEG106A

Terminate cables, cords and
accessories for low voltage circuits

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 levels. A description of what each level entails is provided in Section 2.3.1 Language, Literacy and Numeracy.

Reading 4

Writing 4

Numeracy 4

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 Gather data	1.1 Data logging information and error codes are accessed 1.2 Sensory data on fault or problem (auditory, visual, smell, touch) is gathered 1.3 Relevant hard copy or online documentation is accessed to support fault finding process 1.4 Built-in fault indicators and error codes are, where appropriate, examined and correctly interpreted 1.5 Reference to circuit diagrams, specifications, schematics and/or consultation with technical adviser is used to determine circuit/system function and characteristics
2 Interpret data to establish hypothesis in regards to WTG control system fault	2.1 Knowledge of WTG control systems and performance parameters is applied to interpretation of fault data 2.2 Faults are verified or localised using correct and appropriate techniques, procedures, tools and test equipment. 2.3 Priorities are set for testing / replacement of specific components, wiring, and connections in the WTG
3 Repair WTG control system fault	3.1 Risk analysis of the job is undertaken, and communicated among the work team. 3.2 Safety precautions such as circuit isolations, physical barriers, and other protective devices or

ELEMENT**PERFORMANCE CRITERIA**

		systems are used, where appropriate, to ensure safety
	3.3	Tests are conducted to ensure fault has been correctly repaired or isolated
	3.4	Faulty components that have been removed from service, where possible, are examined and cause of problem is identified
	3.5	Loose connections or wiring are repaired
	3.6	Parts likely to be cause of fault are removed and replaced with tested and operational parts
	3.7	Systems are tested to ensure correct operation
	3.8	Fault finding processes are effectively escalated and, if required, work with technical adviser is undertaken to repair complex fault
4 Record WTG control system fault	4.1	Faulty components and parts are correctly tagged, identified and stored or shipped as per enterprise requirements
	4.2	Faults are recorded to standard operating procedures.
	4.3	Cause of complex fault and process of repair is discussed with the team and other personnel using an appropriate forum.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the Essential Skills and Knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired diagnosing and repairing faults in wind turbine generator control systems.

The extent of the Essential Knowledge and Associated Skills required follows:

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Evidence shall show that knowledge has been acquired of diagnosing and repairing wind turbine generator control systems to the extent indicated by the following aspects:

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- T1. Programmable logic controllers (PLCs), digital control systems (DCS) and similar technology
 - Firmware and software upgrades
 - Reading data
 - Addressing controllers
 - Binary and hexadecimal numerical conversion
 - Parameter entry
 - Interfacing to other computers and peripheral devices
- T2. Reading fault codes and indicators directly from WTG control equipment
- T3. Software reloading techniques
- T4. Data communications analysis units
- T5. Sensor data analysis

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 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 components 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 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.

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 in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit****9.2)**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated:

- On at least two (2) occasions, In accordance with the

"Assessment Guidelines" for the UEP12 Training Package.

Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframe 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 required skills and knowledge 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:

- | | |
|---|---|
| A | Perform a firmware upgrade
Perform a software re-load |
| B | Interpret fault code (and similar) data produced by monitoring systems |
| C | Connect data communications cables to control systems and equipment
Interrogate control systems using 3rd party software systems |
| D | Confirm correct output signals from sensors and encoders |
| E | Deal with an unplanned event by drawing on essential knowledge and skills to provide appropriate solutions. |

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 work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to:

- Diagnose and repair faults in wind turbine generator control systems

Method of assessment **9.4)**

This unit shall be assessed by methods given in 1.3.00 Assessment Guidelines.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this 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 skills described in this unit.

**Concurrent
assessment and
relationship with
other units****9.5)**

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed with allied competency standard units where listed.

Unit Code	Unit Title
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UEPMNT4 49A	Diagnose and repair mechanical systems faults in wind turbine generators
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UEPMNT4 47A	Diagnose and repair faults in wind turbine generator electrical systems
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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.

Climbing equipment, including personnel lifts, climb assist, elevators, ladders

Lifting Apparatus includes winches and cranes

Hydraulic equipment including turbine braking equipment.

Diagnosis and repair may include: visual inspections, replacement, loose wiring, checking the tension of bolts, replacing sensors, testing of equipment for correct operation, software and firmware upgrades and reinstallation.

Tools may include spanners, screwdrivers, side cutters, pliers

Test equipment may include laser, multimeters, laptop computers, PC tablet, smart phones and other data acquisition tools and equipment.

Large Scale Wind Generators (WTGs) include systems having a rating of greater than 10 kW

Work completion details may include plant and maintenance records, job cards, check sheets, on device labelling updates and reporting and/or documenting equipment defects.

Work site environment may be affected by nearby plant or processes and climatic conditions e.g. wind speed, chemical, heat, dust, noise, height and oil.

Location of wind turbine generators may be in urban, suburban, regional or rural locales and environments.

Documentation may be either paper-based or electronic format.

Isolations can refer to electrical/mechanical or other associated processes.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in the Glossaries, Section 2.1 of this Training Package.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Maintenance.