



Australian Government

UEPMNT443A Maintain wind turbine generator control systems

Release: 1

UEPMNT443A Maintain 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 undertake the scheduled maintenance of the control systems in large scale wind turbine generators (WTGs).

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 do not require a licence to practise in the workplace. However, 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.

Common Unit Group

Unit Code	Unit Title
UEPMNT371 A	Maintain large scale wind turbine generators
UEENEEE101 A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

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	3	Writing	3	Numeracy	3
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Employability Skills Information

Employability Skills 5)

This unit contains Employability Skills.

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 and prepare for the work	1.1 Work requirements are identified from request/work orders or equivalent and clarified/confirmed with appropriate parties or by site inspection 1.2 Occupational Health and Safety standards, statutory requirements, relevant Australian standards, codes of practice, manufacturer specifications, environmental requirements and enterprise procedures are identified, applied and monitored throughout the work procedure. 1.3 Resources required to satisfy the work plan are identified, obtained and inspected for compliance with the job specifications 1.4 Relevant plans, drawings and texts are selected and interpreted in accordance with the work plan 1.5 Work is planned in detail including sequencing and prioritising and considerations made, where appropriate, for the maintenance of plant security and capacity in accordance with system/site requirements 1.6 Coordination requirements, including requests for isolations where appropriate, are resolved with others involved, affected or required by the work 1.7 Work area is prepared in accordance with work requirements and site procedures

ELEMENT	PERFORMANCE CRITERIA
2 Conduct maintenance on WTG control systems	1.8 Where appropriate, the teams and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of on-the-job training
	2.1 If required, equipment is replaced due to faulty operation or maintenance plan requirements in accordance with manufacturer specifications and site procedures
	2.2 Documented service checklists (or similar documentation) are followed
	2.3 Diagnostic testing and data from monitoring systems are used to identify those components requiring maintenance
	2.4 If required equipment is dismantled for maintenance in accordance with manufacturer specifications and site procedures.
	2.5 Techniques are used to enable identification and/or re-assembly in accordance with job requirements and site procedures.
	2.6 If required, new components are obtained and inspected for compliance with manufacturer specifications.
3 Complete the work	2.7 Equipment is tested, monitored and adjusted as required in accordance with manufacturer specifications and site/enterprise requirements.
	3.1 Work is completed and appropriate personnel notified in accordance with site/enterprise requirements
	3.2 Work area is cleared of waste, cleaned, restored and secured in accordance with site/enterprise procedures
	3.3 Plant, tools and equipment are maintained and stored in accordance with site/enterprise procedures
	3.4 Work completion details are finalised in accordance with site/enterprise procedures

ELEMENT**PERFORMANCE CRITERIA**

- 3.5 Lessons learnt from the activity or experience are shared with other team members and recorded for future reference.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

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

KS01-PM443A Maintain wind turbine generator control systems

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

T1. Principles of programmable logic controllers (PLC), digital control systems (DCS) and similar technology

T2. Sensors used in wind turbine generators

- Current transformers and current sensors
- Voltage transformers and voltage sensors
- Temperature sensors
- Proximity sensors
- Vibration sensors
- Resolvers and encoders
- Wind direction and velocity sensors
- Intrusion sensors
- Position sensors
- Pressure sensors

T3. Analog and digital signals

T4. Overview of data communications techniques applicable to the wind generation industry:

- Ethernet TCP/IP
- Optic fibre
- 'Fast bus'
- Data security techniques and protocols

T5. Principles of software and firmware upgrades

T6. Integration with SCADA, DCS and similar remote operation systems

- Monitoring sensors using SCADA, DCS and similar remote monitoring technology

Evidence Guide

EVIDENCE GUIDE

9) The Evidence Guide forms an integral part of this 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-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 accordance 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. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday 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 practised. 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, Section 3.1 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 | All of the following | <ul style="list-style-type: none"> • Perform a firmware upgrade • Perform a software re-load |
| B | All of the following | <ul style="list-style-type: none"> • Interpret fault code (and similar) data produced by monitoring systems |
| C | All of the following | <ul style="list-style-type: none"> • Connect data communications cables to control systems and equipment |

following

- | | | |
|---|----------------------|---|
| D | All of the following | <ul style="list-style-type: none"> • Confirm correct output signals from sensors and encoders |
| E | All of the following | <ul style="list-style-type: none"> • 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:

Maintain wind turbine generator control systems

Method of assessment

9.4)

This unit shall be assessed by methods given in the Assessment Guidelines, Section 1.3 of this Training Package.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment 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)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units:

UEPMNT444 Maintain wind turbine generator mechanical
A systems

UEPMNT442 Maintain wind turbine generator electrical systems
A

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 includes turbine braking equipment.

Maintenance may include: visual inspections, checking the tension of bolts, condition monitoring, testing of equipment for correct operation, software upgrades, testing and calibrating equipment, ELV wiring inspections, cleaning, adjusting software parameters, hardware upgrades.

Tools may include spanners, screwdrivers, side cutters, pliers, high torquing wrench

Diagrams and plans include Electrical schematics, hydraulic schematics, low-voltage schematics

Test equipment may include multimeters, laptop computers, PC tablet, smart phones and other data acquisition tools and equipment, continuity checkers, cable testers

Sensors include temperature, proximity, vibration, resolvers and encoders, wind direction and velocity, intrusion, voltage, current, position sensor, pressure sensors

Cleaning, including the following equipment and gear:

- Oil spills
- Dust
- Salt
- Water

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, sea spray, spills and vapours of acids and alkali, hydrogen gas.

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

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

RANGE STATEMENT

Package.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Maintenance