



**Australian Government**

# **UEPMNT444A Maintain wind turbine generator mechanical systems**

**Release: 1**

# UEPMNT444A Maintain wind turbine generator mechanical 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 maintenance of wind turbine generator (WTG) mechanical 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 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
UEPMNT371A	Maintain large scale wind turbine generators
UEENEEE101A	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	<p>1.1 Work requirements are identified from request/work orders or equivalent and clarified/confirmed with appropriate parties or by site inspection</p> <p>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.</p> <p>1.3 Resources required to satisfy the work plan are identified, obtained and inspected for compliance with the job specifications</p> <p>1.4 Relevant plans, drawings and texts are selected and interpreted in accordance with the work plan</p> <p>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</p> <p>1.6 Coordination requirements, including requests for isolations where appropriate, are resolved with others involved, affected or required by the work</p> <p>1.7 Work area is prepared in accordance with work requirements and site procedures</p>

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
	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 Conduct maintenance on WTG mechanical systems	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 Follow documented service checklists (or similar documentation)
	2.3 Use diagnostic testing and data from monitoring systems 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.
	2.7 Equipment is tested, monitored and adjusted as required in accordance with manufacturer specifications and site/enterprise requirements.
3 Complete the work	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.

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4A

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

- T1. Principles of hydraulics
  - Hydraulic safety
  - Hydraulic valves
  - Hydraulic schematics
- T2. Oil sampling techniques
  - Sources of oil contamination
- T3. Gearbox fundamentals and principles as used in the wind generation industry
  - Planetary gears
  - Helical gears
  - Early signs of gearbox failure
  - Cooling systems
  - Oil heaters
- T4. Endoscopic inspection techniques
- T5. Grease and oil
  - grades and constituents
  - grease distribution systems and techniques
- T6. Backlash - cause and effect
- T7. Oil pumps, filters and breathers
- T8. Bearing fundamentals and types used in the wind generation industry
- T9. Oil and hydraulic sensors
- T10. Blade calibration techniques

## 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"> <li>• Change gearbox oil</li> <li>• Sample gearbox oil</li> <li>• Check the operating temperature of WTG gearbox</li> <li>• Change oil filters and breathers</li> </ul> |
| B All of the           | <ul style="list-style-type: none"> <li>• Confirm the correct operation of mechanical sensors through SCADA (or</li> </ul>  |

- |   |                      |   |
|---|----------------------|---|
|   | following            | similar) analysis   |
| C | All of the following | <ul style="list-style-type: none"> <li>• Read a hydraulic schematic and trace out a hydraulic pathway</li> </ul>  |
| D | All of the following | <ul style="list-style-type: none"> <li>• Confirm and calibrate the blades</li> <li>• Confirm and calibrate the positioning sensors</li> </ul>                   |
| E | All of the following | <ul style="list-style-type: none"> <li>• Deal with an unplanned event by drawing on essential knowledge and skills to provide appropriate solutions.</li> </ul> |

**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 mechanical 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:

UEPMNT443 Maintain wind turbine generator control systems  
A

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.

Maintenance tasks on wind turbine generators may include:

Climbing equipment, including personnel lifts, climb assist, elevators

Winches and Cranes

Ladders

Hydraulic equipment, gearboxes, yaw and pitch gear, turbine braking equipment.

Maintenance may include: visual inspections, replacement of mechanical components, checking the tension of bolts, replacing bearings, replacing seals and o-rings, condition monitoring, lubrication, testing of equipment for correct operation, and lubrication of equipment.

Oil sampling techniques

Testing includes visual, auditory and olfactory sensing

Checking of sensors through SCADA

Tools may include spanners, screwdrivers, side cutters, pliers, high torquing wrench, grease pump, endoscopic inspection tools

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

Consumables may include gearbox oils, hydraulic oil, bearing grease, paint, detergents, Loctite

Cleaning, including the following equipment and gear:

- Grease from bearings
- Oil spills
- Dust
- Water
- Salt

Hydraulic schematic diagrams

Wind turbine generator range is from 50kW and greater

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, acid and alkali spills and vapours.

**RANGE STATEMENT**

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 Package.

**Unit Sector(s)**

Not applicable.

**Competency Field**

**Competency Field**            11)  
Maintenance