



Australian Government

Department of Education, Employment and Workplace Relations

UEPMNT436A Test and Commission Wind Turbine Control Systems

Release: 1

UEPMNT436A Test and Commission Wind Turbine 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 conduct testing and commissioning of wind turbine 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 be have been completed.

Common Unit Group

Unit Code	Unit Title
UEPMNT362A	Maintain Wind Turbine Control Systems
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, cords and specifications
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic

Prerequisite Unit(s)	4)	
		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 3 Writing 3 Numeracy 3

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 and prepare for the work.	<p>1.1 Work requirements are identified from work orders or equivalent and clarified and 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, manufacturers' 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 Correct size, type and quantity of materials and components are determined, obtained and inspected for compliance with the job specifications.</p> <p>1.6 Commissioning 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>1.7 Coordination requirements, including requests for isolations where appropriate, are resolved with others involved, affected or required by the work.</p> <p>1.8 Potential hazards are identified and control measures are implemented.</p> <p>1.9 Work area is prepared in accordance with work requirements and site procedures.</p> <p>1.10 Where appropriate, the teams and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of the on-the-job training.</p>

ELEMENT	PERFORMANCE CRITERIA
2 Test systems equipment.	2.1 Required isolations are confirmed where appropriate in accordance with site requirements.
	2.2 System equipment is visually inspected to ensure absence of any damage, defects and/or signs of deterioration in accordance with the commissioning plan.
	2.3 System equipment is tested in conjunction with other related systems and equipment to ensure correct operation in accordance with the commissioning plan.
	2.4 Wiring systems are checked and tested in conjunction with other related systems and equipment in accordance with the commissioning plan.
3 Test the system.	3.1 Required isolations are confirmed where appropriate in accordance with site requirements.
	3.2 System is visually inspected to ensure absence of any damage, defects and/or signs of deterioration in accordance with the commissioning plan.
	3.3 System is tested using appropriate plans, drawings and texts in accordance with the commissioning plan.
	3.4 System is tested in conjunction with other related systems and equipment in accordance with the commissioning plan.
	3.5 System test results/observations are interpreted and documented to confirm compliance with commissioning plan.
4 Commission the system.	4.1 Required isolations are confirmed where appropriate in accordance with site requirements.
	4.2 System plant and equipment is set up in accordance with operational requirements/manufacture specifications.
	4.3 System is set up in accordance with operational requirements/manufacture specifications.

ELEMENT	PERFORMANCE CRITERIA
	4.4 System is commissioned using appropriate plans, drawings and texts in accordance with the commissioning plan.
	4.5 System is commissioned in conjunction with other related systems and equipment in accordance with the commissioning plan.
	4.6 Equipment is commissioned with due regard being paid to plant security and capacity in accordance with the commissioning plan.
	4.7 Faulty equipment is repaired or reported in accordance with site/enterprise procedures.
	4.8 Final job inspection is carried out and permits relinquished as required in accordance with the commissioning plan.
5 Complete the work.	5.1 Commissioning is completed and appropriate personnel notified in accordance with site/enterprise requirements.
	5.2 Work area is cleared of waste, cleaned, restored and secured in accordance with site/enterprise procedures.
	5.3 Plant, tools and equipment are maintained and stored in accordance with site/enterprise procedures.
	5.4 Work completion details are finalised in accordance with site/enterprise procedures.

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 testing and commissioning wind turbine control systems.

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

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T1 Evidence shall show that knowledge has been acquired for safe working practices of:

- Relevant Environmental, Occupational Health and Safety legislation and regulations.
- Relevant plant and equipment, and its location
- Technical drawings and manufacturers manuals.
- Introduction to and typical arrangements of wind farm power production plant.
- Relevant state and territory regulations.
- Relevant Australian standards.
- Equipment and material required to perform the work.
- Isolation procedures.
- Wind farm control systems principles and practices.
- Electronic principles and applications.
- Instrument calibration techniques.
- Wind farm control systems equipment.
- Generator control systems.
- Test and measurement of control system equipment.
- Layout of plant/work site and operation of its equipment.
- Testing and commissioning techniques and procedures.
- Operational requirements of the equipment.
- Electronic equipment types and characteristics.
- Electrical principles.
- Test and measurement instruments.
- Engineering and electronic workshop practices.

T2 Specific skills needed to achieve the Performance Criteria:

- Interpret technical drawings and manufacturers manuals.
- Apply relevant state and territory regulations.
- Apply relevant Australian standards.
- Use tools and relevant equipment.
- Use test and measurement instruments.
- Inspect and test the wiring systems.
- Inspect, test and monitor equipment.
- Commission wind turbine control systems.

REQUIRED SKILLS AND KNOWLEDGE

- Select materials for the job.
- Apply electrical principles.
- Apply electronic principles.
- Communicate effectively.
- Apply data analysis techniques and tools.
- Apply engineering and electronic workshop practices.

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 the competency standard unit and the Training Package Assessment Guidelines. 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 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 practised. 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)

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 – UEP12". Evidence shall also comprise:

- A representative body of work performance 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 Statement
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in 6) Essential Knowledge and Associated Skills of this unit
 - Demonstrate an appropriate level of employability skills
Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - The knowledge and application of relevant sections of:
Occupational Health and Safety legislation; Statutory legislation; Enterprise/site safety procedures;

- Enterprise/site emergency procedures
- Plan and prepare for the work
 - Test wiring systems
 - Test the system
 - Commission the system
 - Complete the work Dealing with an unplanned event by drawing on essential knowledge and 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 work as prescribed by this unit.

Competency Standards should be assessed in the workplace or simulated workplace and under the normal range of workplace conditions.

Assessment of this unit will be supported with documentary evidence, by means of endorsement stating type and application of work.

In addition to the resources listed above in Context of assessment', evidence should show competency working, in limited spaces, with different types of plant and equipment as well as different structural/construction types and method and in a variety of environments.

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.

Nil

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.

Inspection should be planned with the appropriate parties to determine access, conditions and work requirements.

Wind farm control systems may include: generator excitation systems, inverter systems, speed control systems, rectifier systems, blade pitch systems, wind direction sensing systems and yaw control systems.

Wind farm control systems communication systems may include: TCP/IP network, ethernet, fibre optic, wireless, fieldbus, hart protocol, profibus, internet and hard wired.

Wind farm control systems may include one or a combination of: electronic systems, distributive control systems, SCADA, electrical systems, pneumatic systems, hydraulic systems, mechanical systems and PLC systems.

Equipment may include: circuit boards, circuit breakers, transformers, rectifiers, inverters, pressure gauges, electric motors, control cabinets, protection equipment, transmitters, switches, temperature sensors, indicators, meters, proximity probes, fire detectors, smoke detectors and vibration detectors, fibre optic cables, Category 5 cables, wireless transmitters and receivers.

Components may include: fuses, circuit breakers, timers, contactors, contacts, coils, relays, resistors, inductors, capacitors, bridge rectifiers, diodes, heat sinks, solenoids, overloads, plug in printed circuit boards, switches, plugs, cables and thermistors.

Fixed wiring tests can refer to: polarity, loop impedance, insulation resistance and continuity tests.

Materials may refer to: insulation tapes, heat shrink, sleeving, spiral binding, cable ties, solder, lubricants, oil, greases, sealants, lugs, connectors, terminal blocks, cable markers and identification labels.

Tools, equipment and test and measurement instruments may include: multimeter, decade box, d.c., I/V standard, potentiometer, radiation meter, hand-held communicator, frequency counter, frequency generator, CRO, variac, hand tools, power tools lifting equipment and specialised test equipment.

Fault find and diagnostic techniques may include: linear approach, half split rule, sensory detection/insulation/resistance and continuity test.

Fault indicators may include: self test systems, DCS logs, indication lamps, alarms and flag relays.

Work may be performed in service or out of service.

Work completion details may include: plant and maintenance records, job cards, check sheets and on device labelling updates.

Work site environment may be affected by nearby plant or processes, e.g. heat, noise, dust, oil, water height and chemicals.

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

Generic terms are used throughout this Training Package for vocational standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms are given in Section 2.1 Preliminary Information

RANGE STATEMENT

and Glossaries.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Maintenance