Australian Government

Department of Education, Employment and Workplace Relations

UEPMNT504B Test and commission instrumentation systems

Release: 1

UEPMNT504B Test and commission instrumentation 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 instrumentation systems and all ancillary equipment including, but not limited to, PC operating systems, distributive control systems, programmable logic control systems, process 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 practice 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
UEPMNT430B	Test and Commission Complex Instrumentation Equipment
UEPMNT359B	Test and Commission Instrumentation Systems
UEENEEI001B	Install and set up transducers and sensing devices
UEENEEE002B	Dismantle, assemble and fabricate electrotechnology components
UEENEEE005B	Fix and secure equipment
UEENEEE007B	Use drawings, diagrams, schedules and manuals

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 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 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, manufacturers' 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	Correct size, type and quantity of materials/components are determined, obtained and inspected for compliance with the job specifications

ELEMENT	PERFORMANCE CRITERIA	
	1.6	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
	1.7	Coordination requirements, including requests for isolations where appropriate, are resolved with others involved, affected or required by the work
	1.8	Potential hazards are identified and prevention and/or control measures are selected in accordance with the work plan and site procedures
	1.9	Work area is prepared in accordance with work requirements and site procedures
	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
2 Test wiring systems	2.1	Required isolations are confirmed where appropriate in accordance with site requirements
	2.2	Wiring systems are tested using appropriate plans, drawings and texts in accordance with the work plan
	2.3	Wiring systems are tested in conjunction with others involved in, or affected by, the work in accordance with the work plan
	2.4	Wiring systems, including enclosures/ supports, are inspected prior to testing to ensure absence of any damage, defects and/or signs of deterioration in accordance with the work plan
	2.5	Fixed wiring is tested as appropriate and results/observations are interpreted and documented to confirm compliance with job specifications

ELEMENT	PERFORMANCE CRITERIA	
3 Test piping and tubing systems	3.1	Required isolations are confirmed where appropriate in accordance with site requirements
	3.2	Piping and tubing systems are tested using appropriate plans, drawings and text in accordance with the work plan
	3.3	Piping and tubing systems are tested in conjunction with other involved in or affected by the work in accordance with the work plan
	3.4	Piping and tubing systems, including enclosures/supports, are inspected prior to testing to ensure absence of any damage, defects and/or signs of deterioration in accordance with the work plan
	3.5	Fixed piping and tubing is tested as appropriate and results/observations are interpreted and documented to confirm compliance with job specifications and the work plan
4 Test the system	4.1	Required isolations are confirmed where appropriate in accordance with site requirements
	4.2	System is tested using appropriate plans, drawings and text in accordance with the work plan
	4.3	System is tested in conjunction with other involved in or affected by the work in accordance with the work plan
	4.4	Required test conditions are confirmed and the System is inspected to ensure absence of any damage, defects and/or signs of deterioration in accordance with the work plan
	4.5	System is tested using appropriate test techniques in accordance with the work plan
	4.6	System test results/observations are interpreted and documented to confirm compliance with job specifications.

ELEMENT	PERFORMANCE CRITERIA
5 Commission the equipment	5.1 Required isolations are confirmed where appropriate in accordance with site requirements
	5.2 System is commissioned using appropriate plans, drawings and text in accordance with the work plan
	5.3 System is commissioned in conjunction with others involved in, or affected by, the work in accordance with the work plan
	5.4 System is set up in accordance with operational requirements/manufacturer's specifications
	5.5 Testing and monitoring procedures are followed and results monitored, interpreted and documented to ensure equipment operates/functions within specifications

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 instrumentation systems.
All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.
The extent of the Essential Knowledge and Associated Skills required follows:
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Evidence shall show that knowledge has been acquired for safe working practices of:
T1 Relevant Environmental, Occupational Health and Safety legislation and regulations
T2 Relevant plant and equipment, its location and operation
T3 Technical drawings and manufacturers manuals
T4 Introduction to and typical arrangements of power production plant
T5 Relevant state and territory regulations
T6 Instrumentation principles and practices
T7 Instrument calibration techniques
T8 Electronic principles
T9 Relevant Australian standards
T10 Equipment and material required to perform the work
T11 Isolation procedures
T12 General layout of plant/work site and operation of its equipment
T13 Operating principles of the equipment
T14 Testing and commissioning procedures and techniques
T15 Operational requirements of the equipment
T16 Plant Instrumentation systems
T17 Regulatory aspects
T18 Electrical fundamentals
T19 Test and measurement instruments
T20 Distributed control systems
T21 Programmable logic controller
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Specific skills needed to achieve the Performance Criteria:
T1 Apply Relevant Environmental, Occupational Health and Safety legislation and regulations
T2 Interpret Technical drawings and manufacturers manuals
T3 Apply relevant state and territory regulations
T4 Apply electronic principles
T5 Apply instrumentation principles and practices
T6 Apply instrument calibration techniques
T7 Apply relevant Australian standards
T8 Use tools and relevant equipment
T9 Use test and measurement instruments
T10 Inspect and test the wiring systems

REQUIRED SKILLS AND KNOWLEDGE

T11 Inspect and test piping and tubing systems
T12 Inspect, test and monitor equipment
T13 Commission the system
T14Identify and select materials for the job
T15 Apply electrical fundamentals
T16 Carry out work completion details
T17 Update plans, drawings and text
T18 Communicate effectively
T19Apply data analysis techniques and tools.

Evidence Guide

EVIDENCE GUIDE

9) Evidence Guide: 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 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)**

Longitude 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 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 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 pre-requisites 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, polices and workplace procedures
- Demonstrated performance across a representative range of

contexts from the prescribed items below:

- Knowledge and application of relevant sections of: Occupational Health and Safety legislation; Statutory legislation; Enterprise/site safety procedures; Enterprise/site emergency procedures
- Preparation and planning of work
- Testing techniques associated with electrical work
- Commissioning techniques and procedures
- Completion of work procedures
- 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 Section 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.
Systems can refer to boiler automatic control systems, furnace safeguard supervision system, gas turbine control system, water ingress protection system, ashing system, water treatment plant control system, conveyor systems, sootblower system, generator cooling system, generator excitation system, annunciator system and flame surveillance system, emergency shutdown systems, turbine compressor set control systems, compressor station control systems, gas turbine generator control systems, bore control systems, distributive control systems and complex fire/security systems.
Wiring systems can refer to cords and cables such as flexible multi-core, thermocouple, coxial, ribbon and hook up cable, signal and data cable, ducts such as PVC and metal, trunking, condults and fittings such as PVC and metal (rigid and flexible) pipes, elbows, bends, tees, junction boxes, hose terminators, saddles, spacers, bushes, adaptors and locknuts, wire loom support, cable ties, unistrut, trays and ladder racks.
Piping and tubing systems may refer to piping/tubing, piping/tubing enclosures, fittings and support systems.
Components may include power supplies, relays, PLC input/output blocks, printed circuit boards, protection devices, switches, transformers, servo valves, positioners, converters, controllers, function cards and transmitters.
Test and measurement instruments may include multimeter, standard gases, decade box, d.c., I/V standard, potentiometer, radiation meter, hand-held communicator/programmer, frequency counter, function generator, CRO, LCR bridge, logic analyser and specialised test equipment.
Fixed wiring tests can refer to polarity, loop impedance and continuity.
Fixed piping and tubing tests can refer to leak and continuity.
Monitoring equipment can refer to test recorder/data logger.
Work may be performed with equipment on-line.
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 and chemical.
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 and Glossaries.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Maintenance.