



Australian Government

Department of Education, Employment and Workplace Relations

PMASUP341B Monitor and maintain instrument and control systems

Revision Number: 1

PMASUP341B Monitor and maintain instrument and control systems

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This competency covers the skills needed to monitor and maintain instrument/electrical systems used for process measurement and control of a process.
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Application of the Unit

Application of the unit	In a typical scenario, a process technician would be able to: • test, repair and recommission instrumentation and control systems used in the industry • monitor equipment operation • issue permits to allow work to be undertaken • verify equipment operation • calibrate instrumentation • prepare and analyse reports related to the equipment/systems. This competency covers any control system/instrumentation forming part of a control system, such as those for compressor systems, prime movers, valve systems and systems measuring/controlling flow, pressure or temperature. It also covers the use of relevant test equipment. Control systems can be pneumatic, electrical/electronic, electro-pneumatic, computer-based, etc. This competency includes responding to emergency situations, such as a leaks, fire or equipment failure. It also includes troubleshooting a range of problems which could include electrical faults, calibration errors or equipment failure. Persons performing this competency would also, as part of their job role, identify and control hazards in their work area and with equipment/systems.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units	<i>MSAPMPER300C</i>	<i>Issue work permits</i>
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Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Monitor equipment operation	1.1. Monitor equipment operation according to instrument/electrical equipment operating principles and parameters 1.2. Access and interpret relevant technical drawings and schematics to determine system faults 1.3. Issue permit to work to allow work to be undertaken 1.4. Verify equipment operation/performance through test procedures to ensure correct operation and to confirm identified problems from other sources 1.5. Correct operational variations through calibration and adjustment 1.6. Document operational variations.
2. Test/repair equipment	2.1. Verify equipment is operating correctly and document test results 2.2. Apply appropriate troubleshooting techniques to determine the cause of operational faults 2.3. Rectify operational faults through the application of relevant maintenance procedures 2.4. Isolate, remove and dispose of faulty equipment, and install new equipment 2.5. Verify the performance of newly installed equipment to ensure it meets required operational parameters and conditions 2.6. Record all repairs/installations to provide historical records of the condition of system equipment.
3. Recommission systems and equipment	3.1. Recommission repaired/installed equipment to on line operation in the correct sequence at the required operational parameters 3.2. Monitor or activate systems to ensure they are operating both safely and effectively 3.3. Close out permit to work and restore site/system to normal operation.
4. Compile and analyse reports	4.1. Collect information concerning deviations/repairs equipment and put into accepted reporting format 4.2. Compile reports ensuring they provide an accurate and ongoing record of deviations in pipeline processes and a current record of pipeline and equipment trends 4.3. Utilise information or reports for short and long term deviation control planning.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

A person undertaking this unit of competency would also be expected to demonstrate the knowledge and ability to:

- test, repair, recommission and monitor the operational condition of instrument control systems utilised within the industry
- communicate and report the operational condition and history of instrument control systems to other team members and company personnel
- coordinate own work and the work of others including on site contractors/operators.

It is essential that a person be able to apply the underlying skills and knowledge contained within this competency across a range of instrument and control systems.

Required knowledge

A demonstrated working knowledge and application of the company-specific work organisations and workflow.

Demonstrated knowledge and application of:

- process and plant schematic and instrumentation diagrams
- operations and functions of instrumentation and control devices
- control functions, control regimes, adjustments and tuning
- test and calibration methods
- test equipment typically used with control system repair/maintenance/calibration.

Evidence Guide

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Assessment of this unit should include demonstrated competence on actual plant and equipment in a work environment. The unit will be assessed in as holistic a manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations which will include disruptions to normal, smooth operation.

Simulation may be required to allow for assessment of parts of this unit. Simulation should be based on the actual plant and will include walk-throughs of the relevant competency components. Simulations may also include the use of case studies/scenarios and role plays.

This unit of competency requires a significant body of knowledge which will be assessed through questioning and the use of what-if scenarios both on the plant (during demonstration of normal operations and walk-throughs of abnormal operations) and off the plant.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Competence must be demonstrated in the ability to recognise and analyse potential situations requiring action and then in implementing appropriate corrective action. The emphasis should be on the ability to stay out of trouble rather than on recovery from a disaster.

Consistent performance should be demonstrated. In particular look to see that:

- early warning signs of equipment/processes needing attention or with potential problems are recognised
- the range of possible causes can be identified and analysed and the most likely cause determined
- appropriate action is taken to ensure a timely return to full performance
- obvious problems in related plant areas are recognised and an appropriate contribution made to their solution.

EVIDENCE GUIDE	
	Also confirm that the person undertaking this competency has the ability to: • implement all OHS and environmental procedures relevant to this unit • apply the permit to work system within the context of this unit • interpret a range of process and control system drawings and schematics in order to undertake required or identified repairs/modifications to electrical systems. These aspects may be best assessed using a range of scenarios/case studies/what-ifs as the stimulus with a walk-through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations which may have been generated from the past incident history of the plant, incidents on similar plants around the world, hazard analysis activities and similar sources.
Context of and specific resources for assessment	Assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating ability over a range of situations. A bank of scenarios/case studies/what-ifs will be required as will a bank of questions which will be used to probe the reasoning behind the observable actions.
Method of assessment	In all plants it may be appropriate to assess this unit concurrently with relevant teamwork and communication units. Consider co-assessment with relevant OPS units. In a major hazard facility, it may be appropriate to assess this unit concurrently with relevant OHS units.
Guidance information for assessment	Assessment processes and techniques must be culturally appropriate and appropriate to the oracy, language and literacy capacity of the assessee and the work being performed.

Range Statement

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the Performance Criteria, is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Codes of practice/ standards	Where reference is made to industry codes of practice, and/or Australian/international standards, the latest version must be used.
Context	Control systems for one or more of the following may be included: - compressor systems and equipment (compressors, monitoring systems, power supply systems, pumps, pumping systems and equipment, pressure vessels/filtration equipment, coolers, scrubbers, expanders, anti surge systems, safety systems and compressor control systems) - prime movers which may include turbine engines, reciprocating engines, electric motors (fuel and carburettion systems, ignition systems, lubrication systems, induction and exhaust systems, governing systems, power supply systems, safety and shutdown systems) - flow systems (piping systems, metering equipment, flow control equipment, pressure and temperature transmitters and transducers, telemetry equipment, PLCs, flow computers, electro-pneumatic process control equipment and their associated on-line analytical instrumentation such as gas chromatographs, moisture analysers, gas sampling and gas analysis equipment, pig) - valve systems (non-control valves, control and shut off valves, non-return or check valves and pressure relief valves, manual hand operated actuator, gas/hydraulic actuator and pneumatic valves).
Emergency responses	Emergency responses include: - leaks/loss of containment - fire - equipment failure - hazards and incidents. Relevant personnel may include: - supervisors - maintenance personnel - organisation employees - contractors - government bodies.

RANGE STATEMENT	
Procedures	Procedures may be written, verbal, computer-based or in some other form. They include: • all work instructions • standard operating procedures • formulas/recipes • batch sheets • temporary instructions • any similar instructions provided for the smooth running of the plant. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (eg Responsible Care) and government regulations.
Reports	Reports may include: • routine inspections (daily readings, monthly checks) • scheduled maintenance activities • mandatory or statutory inspections • hazard and incident reports • quality assurance system requirements/reports. • Instrument/electrical systems may include: • process analysing systems, eg gas analysis • emergency shutdown systems • fire systems • pressure and temperature control systems • metering systems, eg orifice, turbine, positive displacement • telemetry and SCADA systems • communications systems • solar systems • utility systems.
Types of faults	Types of faults may include: • material leaks • electrical problems • compressor or pump failure • out of current inspection status • gauge failure or hose rupture/leaks • instruments out of calibration • non-flow of material • instruments and equipment requiring cleaning.
Test equipment	Test equipment and tools may include:

RANGE STATEMENT	
	• dead weight tester • transmission unit • ice point tester • decade box • multimeter • RTD calibrator • chart recorders • data logging equipment • hand tools • valves, actuators and flanges. The use and operation of personal computers, other hardware mediums and associated software is required.
Health, safety and environment (HSE)	All operations to which this unit applies are subject to stringent health, safety and environment requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between Performance Criteria and HSE requirements, the HSE requirements take precedence. Persons are required to have skills in hazard identification, assessment and application of control measures.

Unit Sector(s)

Unit sector	Support/generic
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Competency field

Competency field	
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Co-requisite units

Co-requisite Units		
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