



**Australian Government**

# **MEM18054 Fault find, test and calibrate instrumentation systems and equipment**

**Release: 1**

# MEM18054 Fault find, test and calibrate instrumentation systems and equipment

## Modification History

Release 1. Supersedes and is equivalent to MEM18054B Fault find, test and calibrate instrumentation systems and equipment

## Application

This unit of competency defines the skills and knowledge required to test instrumentation systems and equipment, apply data collection techniques and pinpoint fault conditions, analyse and report test results, and calibrate instrumentation systems and components.

Where soldering/desoldering of electrical/electronic components is required unit MEM05001 Perform manual soldering/desoldering – electrical/electronic components and unit MEM05002 Perform high reliability soldering and desoldering, should also be selected as appropriate.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Band:

This unit has dual status and is to be regarded as both a Specialisation Band A unit and Specialisation Band B unit for progression to C7 (AQF level IV).

Unit Weight: 8

## Pre-requisite Unit

|          |                                                              |
|----------|--------------------------------------------------------------|
| MEM09002 | Interpret technical drawing                                  |
| MEM11011 | Undertake manual handling                                    |
| MEM12023 | Perform engineering measurements                             |
| MEM13015 | Work safely and effectively in manufacturing and engineering |
| MEM16006 | Organise and communicate information                         |
| MEM18001 | Use hand tools                                               |
| MEM18002 | Use power tools/hand held operations                         |
| MEM18055 | Dismantle, replace and assemble engineering components       |

**Plus, one or more of the following, including their prerequisites:**

MEM18057 Maintain/service analog/digital electronic equipment

MEM18064 Maintain instrumentation system components

## Competency Field

Maintenance and diagnostics

## Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

- |   |                                                   |                                                                                                                                                    |
|---|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <b>Determine job requirements</b>                 | 1.1 Follow standard operating procedures (SOPs)                                                                                                    |
|   |                                                   | 1.2 Comply with work health and safety (WHS) requirements at all times                                                                             |
|   |                                                   | 1.3 Use appropriate personal protective equipment (PPE) in accordance with SOPs                                                                    |
|   |                                                   | 1.4 Identify job requirements from specifications, drawings, job sheets or work instructions                                                       |
|   |                                                   |                                                                                                                                                    |
| 2 | <b>Test instrumentation systems and equipment</b> | 2.1 Identify and define work/test requirements                                                                                                     |
|   |                                                   | 2.2 Observe and pinpoint device isolation methods/requirements                                                                                     |
|   |                                                   | 2.3 Apply appropriate test procedures and application principles in assessing operation of instrumentation systems, equipment and components       |
|   |                                                   | 2.4 Apply normal operating characteristics of instrumentation systems, equipment/components to the level necessary to identify and pinpoint faults |
|   |                                                   | 2.5 Apply characteristics/operational function assessment procedures according to safety and regulatory/site specifications                        |
|   |                                                   | 2.6 Check and verify characteristics and operational function                                                                                      |

| Elements describe the essential outcomes. |                                                                       | Performance criteria describe the performance needed to demonstrate achievement of the element. |                                                                                                                                                |
|-------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 3                                         | <b>Apply data collection techniques and pinpoint fault conditions</b> | 3.1                                                                                             | Utilise drawings/diagrams and operational specifications in identifying and pinpointing fault conditions                                       |
|                                           |                                                                       | 3.2                                                                                             | Examine and interpret built-in fault indicators and error codes and record results, where appropriate                                          |
|                                           |                                                                       | 3.3                                                                                             | Pinpoint fault condition down to major component level using appropriate test equipment, procedures and techniques                             |
| 4                                         | <b>Analyse and report test results</b>                                | 4.1                                                                                             | Analyse/verify test results against operational specifications and confirm faults                                                              |
|                                           |                                                                       | 4.2                                                                                             | Report potential and real faults in accordance with SOPs                                                                                       |
|                                           |                                                                       | 4.3                                                                                             | Evaluate faulty conditions and plan corrective action                                                                                          |
|                                           |                                                                       | 4.4                                                                                             | Record and document action plan in accordance with SOPs                                                                                        |
| 5                                         | <b>Install replacement parts</b>                                      | 5.1                                                                                             | Select replacement parts from catalogues                                                                                                       |
|                                           |                                                                       | 5.2                                                                                             | Install replacement parts                                                                                                                      |
|                                           |                                                                       | 5.3                                                                                             | Check replacement parts for correct operation                                                                                                  |
| 6                                         | <b>Calibrate instrumentation equipment/components</b>                 | 6.1                                                                                             | Undertake zero, span and range checks on indicators/controllers using appropriate configuration                                                |
|                                           |                                                                       | 6.2                                                                                             | Perform and document methods of adjustment using calibration devices to prescribed procedures and operational specifications, where applicable |

## Foundation Skills

This section describes those required skills (reading, writing, oral communication and numeracy) that are essential to workplace performance in this unit of competency.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

## Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

**Instrumentation systems include the following:**

- those made up of more than one interdependent component controlling and processing multiple inputs and/or outputs

**Tasks are undertaken include one (1) or more of the following:**

- workshop/site
- laboratory environments

**Correct operational function determination includes the operational function of one (1) or more of the following:**

- systems
- equipment
- components
- associated equipment

**Systems, components, equipment and associated items include one (1) or more of the following:**

- electrical
- electronic
- mechanical
- fluid power

**Equipment includes one (1) or more of the following:**

- process machines
- temperature control systems
- sterilisation units
- water cooling/filtration systems
- equipment utilising mechanical, pneumatic/electro-pneumatic or electronic (analog/digital) principles
- associated instruments measuring variables including level, pressure, light, flow, current, resistance, voltage, density and temperature

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

**Components include one (1) or more of the following:**

- sensors
- transmitters
- converters
- indicators
- analysers
- controllers
- transducers
- power supplies
- removable circuit boards
- sensor units associated with determining/controlling density, level, flow, temperature and composition of a range of materials

**Test equipment includes one (1) or more of the following:**

- system calibrators
- manometers
- dead weight testers
- wheatstone bridge
- potentiometers
- frequency/signal generators
- logic probes
- multimeters (analog/digital)
- test gauges
- cathode ray oscilloscopes
- other associated equipment

## Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM18054B Fault find, test and calibrate instrumentation systems and equipment

## Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

# **Assessment Requirements for MEM18054 Fault find, test and calibrate instrumentation systems and equipment**

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## **Performance Evidence**

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria on at least two (2) occasions and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- identifying and interpreting specifications, charts, lists, drawings and other applicable reference documents and obtain relevant data with respect to the operation of the instrumentation systems/equipment
- locating, inspecting and testing a range of instrumentation system components
- isolating instrumentation system/equipment in accordance with procedures
- checking the individual components for correct operation using applicable test equipment
- reporting faults and developing a corrective action plan in accordance with SOPs
- recording and documenting the action plan in accordance with SOPs
- dismantling, repairing and reassembling faulty components by selecting replacement parts from manufacturer/supplier catalogues
- checking repaired/replaced instrumentation system components for correct operation and completing all service reports
- checking and verifying the operational functions of the instrumentation system/equipment including reading/recording and interpreting built-in fault indicators and error codes
- undertaking zero, span and range checks on instrumentation system/equipment in accordance with SOPs
- calibrating instrumentation system/equipment to prescribed procedures and operational specifications.

## **Knowledge Evidence**

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- safe work practices and procedures and use of personal protective equipment (PPE)
- instrumentation principles controlling density, level, flow, temperature and composition of a range of materials
- effects of resistance, capacitance, inductance and impedance (R, L, C) upon an electrical circuit
- interpretation requirements of schematic, wiring and block diagrams and circuits

- principles of hydraulic, pneumatic and electrical flow
- calibration procedures of instrumentation systems and equipment/components
- purpose/operational function of instrumentation system
- procedures for:
  - inspecting and testing instrumentation system and equipment to be used
  - repairing faulty instrumentation system
  - dismantling, reassembly and testing techniques
  - checking and verifying the operational function of the instrumentation system/equipment and operational specifications
  - recording and completing service reports and reporting faults
  - recording/documenting test and calibration results
- specifications of each instrumentation system and acceptable deviations from specifications
- correct operation of the instrumentation system, including the procedures for isolating instrumentation systems
- range of faults in instrumentation system/equipment components
- variations between test results and operational specifications
- probable causes of faults in instrumentation system/equipment components and action to be taken to rectify the causes of faults
- sequence of events to be undertaken to correct faults in the instrumentation system/equipment components
- errors indicated by built-in devices
- methods of determining procedures
- difference between real and potential faults
- function and procedures for zero, span and range checks on instrumentation systems/equipment
- equipment required to carry out the calibration of instrumentation systems/equipment.

## Assessment Conditions

- Assessors must:
  - have vocational competency in fault finding, testing and calibrating instrumentation systems and equipment at least to the level being assessed with relevant industry knowledge and experience
  - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires
- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills

- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>