



Australian Government

MEM27001 Maintain and repair stationary and mobile plant engine cooling systems

Release: 1

MEM27001 Maintain and repair stationary and mobile plant engine cooling systems

Modification History

Release 1. Supersedes and is equivalent to MEM18024B Maintain engine cooling systems

Application

This unit of competency defines the skills and knowledge required to maintain and repair the cooling systems of combustion engines used in mobile and stationary plant and equipment.

It covers servicing, preventative maintenance, diagnosis and repair of combustion engine cooling systems and components in vehicles and plant used to support manufacturing, maintenance and engineering related operations.

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

Band: A

Unit Weight: 2

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

Competency Field

Fixed and mobile plant

Elements and Performance Criteria

Elements describe the essential outcomes.

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

- | | | | |
|---|--|-----|---|
| 1 | Determine job requirements | 1.1 | Follow standard operating procedures (SOPs) |
| | | 1.2 | Comply with work health and safety (WHS) requirements at all times |
| | | 1.3 | Use personal protective equipment (PPE) in accordance with SOPs |
| | | 1.4 | Identify job requirements from specifications, drawings, job sheets or work instructions |
| | | 1.5 | Identify required test equipment |
| | | | |
| 2 | Assess cooling system operation | 2.1 | Identify normal cooling system operational performance from manufacturer specifications and work procedures |
| | | 2.2 | Undertake system checks using specified test procedures and equipment |
| | | 2.3 | Determine and record water/air flows, pressures and temperatures |
| | | 2.4 | Isolate faults to component level and determine appropriate corrective action |
| | | 2.5 | Obtain and evaluate coolant samples |
| | | 2.6 | Assess component parts for reuse, repair or replacement |
| | | | |
| 3 | Rectify faulty components | 3.1 | Determine component wear and clearances using appropriate test equipment and manufacturer recommendations |
| | | 3.2 | Remove components selected for repair or replacement |
| | | 3.3 | Repair components to manufacturer specifications where required |
| | | 3.4 | Select replacement components using manufacturers' data where required |

Elements describe the essential outcomes.

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

- 3.5 Refit repaired or replacement components to engine
- 3.6 Record test, repair and replacement activities as required
- 3.7 Ensure engine is free of coolant leaks and the cooling system contains the correct level of additive/inhibitor after repair work is carried out

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.

- Cooling systems include one (1) or more of the following:**
- engine or vehicle cooling
 - large stationary plant combustion engine cooling
 - cooling towers
 - shutter type systems or fan drive
 - water type inter/after coolers
 - oil coolers

- Cooling system testing includes one (1) or more of the following:**
- air and/or water flows
 - temperatures
 - pressures
 - assess serviceability and repair on a range of:
 - flow/pressure actuators
 - sensors
 - actuators and solenoids

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Typical system faults include one (1) or more of the following:

- coolant pressures
- the presence of:
 - steam
 - gases
 - oil
 - fuel
 - air
- corrosion
- contamination

Testing coolant condition includes testing for one (1) or more of the following:

- correct additives including anti-corrosion and anti-freeze
- contamination, including:
 - oil
 - metal
 - other particles

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

- sensors
- caps
- gauges
- pumps
- fan drives and motors

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM18024B Maintain engine cooling systems

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 MEM27001 Maintain and repair stationary and mobile plant engine cooling systems

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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 service documents to maintain engine cooling systems
- checking cooling system safely in accordance with specifications and procedures and measuring and recording water/air flows, pressures and temperature of the cooling system using test equipment
- fault finding cooling system down to component level and determining applicable corrective action
- obtaining coolant samples and carrying out testing on coolant condition
- checking cooling system components for wear and clearances using appropriate test equipment to manufacturers' specifications
- undertaking numerical operations, calculations and formulae for maintaining engine coolant systems
- interpreting relevant specifications, parts lists and catalogues for replacement components
- removing, repairing and re-fitting cooling system components to engine in accordance with prescribed procedures
- testing engine for coolant performance and leaks after repairs
- reporting and documenting service, repair/replacement activities.

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)
- principles of heat transfer as applied to cooling systems
- effect of water treatment, contamination and corrosion on the effectiveness of cooling system operation
- components of the cooling system and their function, including:
 - engine coolant composition
 - water pumps

- thermostats
- fan systems and drives
- radiators and radiator caps
- expansion tanks
- hoses
- temperature sensors and gauges
- checks and procedures to be carried out on cooling systems, including tests for:
 - corrosion
 - pressure and temperature
 - leaks
 - performance of pumps, thermostats, fans, cooling system sensors and instruments
- procedures for:
 - measuring water/air flows, pressures and temperatures in cooling systems and tools, techniques and equipment
 - testing coolant test samples and tools and equipment
 - testing components for wear and clearances and the appropriate measuring/test equipment
 - obtaining replacement parts
 - removing/replacing cooling system components from the engine
 - checking coolant levels and engine coolant leaks
 - handling hot pressurised cooling systems
 - containing and disposing of cooling system fluids released from the system
 - recording test and rectification
- variations of test results from specifications and the likely causes of those variations and appropriate corrective action to be taken
- precautions to be taken when using test equipment
- reasons for identifying faulty components for repair or replacement
- correct amount of additive/inhibitor to be added to the coolant.

Assessment Conditions

- Assessors must:
 - have vocational competency in maintaining engine cooling systems 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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