



Australian Government

MEM27002 Test and repair compression ignition systems

Release: 1

MEM27002 Test and repair compression ignition systems

Modification History

Release 1. Supersedes and is equivalent to MEM18026C Test compression ignition fuel systems

Application

This unit of competency defines the skills and knowledge required to assess the operation of compression ignition systems.

It covers the testing and repair of ignition systems used in large compression engines, including direct injection and common rail systems and repair and replacement of components.

Where interpretation of technical drawings is required unit MEM09002 Interpret technical drawing should also be selected.

Where the selection and use of power tools/hand held operations is required unit MEM18002 Use power tools/hand held operations should also be selected.

If the operation of plant and equipment is required, it must only be performed within the person's licensing limits or as determined by relevant regulations.

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

Band: A

Unit Weight: 4

Pre-requisite Unit

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

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.

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|---|---|-----|---|
| 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 appropriate personal protective equipment (PPE) in accordance with SOPs |
| | | 1.4 | Identify job requirements from specifications, drawings, job sheets or work instructions |
| | | | |
| 2 | Assess fuel system operation | 2.1 | Apply knowledge of fuel injection principles and component part functions/operation to assess fuel system operation |
| | | 2.2 | Start, operate and shut down diesel plant/equipment |
| | | 2.3 | Undertake checks safely to prescribed procedures |
| | | 2.4 | Determine and record flows, pressures and speeds |
| | | 2.5 | Interpret engine and plant operating characteristics and parameters |
| | | 2.6 | Interpret test results and operational data for faults and serviceability |
| | | | |
| 3 | Repair compression ignition system | 3.1 | Identify components to be repaired or replaced |
| | | 3.2 | Select appropriate tools, equipment and materials |
| | | 3.3 | Repair and replace components according to manufacturer specifications, WHS and environmental requirements |
| | | 3.4 | Time the high-pressure fuel pump or injectors to engine |
| | | 3.5 | Use test equipment to test ignition system and set to specifications |
| | | 3.6 | Record repair according to workplace procedures |

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.

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|---|--|
| Fuel system components include the following: | <ul style="list-style-type: none">• tank• filters• sensors, including:<ul style="list-style-type: none">• engine position• coolant temperature• engine mass airflow (MAF)• inlet air temperature• engine fuel pressure• boost pressure• fuel delivery• fuel rail pressure• common rail• electronic and hydraulic electronic injectors• solenoid and piezoelectric valves• pumps• engine control unit (ECU) and associated components |
| Final adjustment includes the setting of one (1) or more of the following: | <ul style="list-style-type: none">• low/high speed• no load/full load speed• droop• sensitivity• stability• promptness |

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM18026C Test compression ignition fuel 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 MEM27002 Test and repair compression ignition 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
- describing the function and operation of ignition system component parts through identification and interpretation of appropriate specifications, charts, lists, drawings, service documents and reference to fuel injection principles
- starting/operating and shutting down diesel plant/equipment
- conducting operational checks of the diesel fuel system in determining and recording fuel flows, pressures and engine speeds using appropriate test equipment in accordance with specifications and procedures
- interpreting faults from the test results and ignition system operating characteristics and parameters
- determining serviceability of the fuel system components, including:
 - engine control unit (ECU)
 - injectors
 - sensors
- removing, replacing and carrying out adjustment of ignition system components, including:
 - injectors
 - sensors, connectors and cables
 - tank
 - filters
 - fuel pumps
- undertaking calculations and numerical operations for testing compression ignition fuel systems
- timing the high-pressure fuel pump or injectors and carrying out final adjustments to engine in accordance with specifications
- recording/reporting service activities according to SOPs.

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 fuel injection and function/operation of each component in a fuel injection system
- types of fuels used in compression engines, air/fuel ratios, combustion process and combustion products
- compression ignition management systems, including:
 - electronic injectors
 - electronic control systems
 - common rail systems
 - exhaust management and treatment
- procedures for starting up, operating and shutting down diesel plant and equipment
- visual and aural checks to be made on the diesel fuel system and procedures for carrying out these checks
- use of appropriate test equipment, including use of oscilloscopes, multimeters and other electrical and electronic test equipment and methods for testing:
 - high and low pressure fuel pump performance
 - oil pressures
 - injectors
 - sensors and circuits
 - exhaust composition
 - engine performance against specifications
- plant operating characteristics and parameters
- indicators of ignition system faults, including:
 - engine knock
 - difficulty in starting
 - incomplete combustion and excessive smoke
 - warning lights and diagnostic trouble codes
- causes of ignition system faults, including:
 - dirty/worn injectors
 - incorrect timing
 - poor fuel
 - poor oil
 - low compression
 - worn engine components e.g. piston rings
 - incorrect timing
 - damaged dirty air, fuel and oil filters

- reasons for the decisions made with respect to serviceability and likely faults and causes for unserviceable systems.

Assessment Conditions

- Assessors must:
 - have vocational competency in testing and repairing compression ignition fuel 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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