



Australian Government

MEM27020 Apply knowledge of large combustion engine operations to service and maintenance tasks

Release: 1

MEM27020 Apply knowledge of large combustion engine operations to service and maintenance tasks

Modification History

Release 1: New unit

Application

This unit of competency defines the skills and knowledge required to identify engine features and operations essential for large engine servicing and maintenance tasks.

It includes identifying and assessing large combustion engines, the equipment powered by the engines, and the operations the equipment is required to perform and applying this information to engine service and maintenance tasks.

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
MEM13015	Work safely and effectively in manufacturing and engineering
MEM16006	Organise and communicate information

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	Prepare for service and maintenance task	1.1	Follow standard operating procedures (SOPs)
		1.2	Comply with work health and safety (WHS) requirements at all times

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
		1.3	Use appropriate personal protective equipment (PPE) in accordance with SOPs
		1.4	Identify job requirements from specifications, job sheets or work instructions
2	Identify engine type and any special features for relevance to service and maintenance task	2.1	Locate sources of information on equipment, engine, systems and components
		2.2	Identify engine type and configuration
		2.3	Locate and identify ignition, starting, air, fuel, coolant, exhaust and lubrication system components
		2.4	Identify engine components and sensors
		2.5	Identify fuel, oil and coolant specifications for engine and check against service records
		2.6	Identify environmental controls and features
3	Review equipment systems and accessories for relevance to service and maintenance task	3.1	Identify equipment systems requiring engine power
		3.2	Identify other equipment systems and accessories
		3.3	Review operator records and service history for information relevant to engine service and maintenance
		3.4	Review manufacturer instructions for recommended engine operation
		3.5	Assess contamination risk to oil, fuel, coolant and lubrication systems
4	Confirm or adjust service and maintenance job requirement	4.1	Review original job specification against results of checks of engine and equipment specifications, service and operator records
		4.2	Confirm job specification or recommend adjustments

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.

The large diesel engines covered by this unit are used in one or more of the following:

- mobile plant
- agriculture
- forestry
- rail
- marine
- other transport operations
- power generation
- air and gas compression
- stand by power
- other industry sectors using large combustion engines

Engine powered equipment systems include one (1) or more of the following:

- hydraulic and pneumatic systems for accessories
- mechanical and traction drives
- alternators and generators
- heating, ventilation, air conditioning and refrigeration HVAC/R equipment
- air compressors

Environmental controls and features include the following:

- components and systems designed to minimise noise pollution or visual impact of mobile and stationary equipment and engines

Engine consumables include one (1) or more of the following:

- filters
- coolants
- lubricants
- hydraulic and other fluids
- additives
- simple drive belts
- coolant hoses

Unit Mapping Information

No equivalent unit.

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 MEM27020 Apply knowledge of large combustion engine operations to service and maintenance tasks

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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 manufacturer and work instructions, standard operating procedures (SOPs) and safe work practices
- identifying appropriate sources of information on engine and equipment
- carrying out classification of large combustion engines from observation, manufacturer instructions and manuals and workplace records, including classification of:
 - engine type
 - engine features
 - engine systems
 - engine components
 - fuel type and fuel system
- assessing implications of engine and equipment service history and equipment operational records for service and maintenance tasks
- recording and reporting service activities in accordance with 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)
- classification of combustion engines, including:
 - internal and external combustion
 - reciprocating and rotary engines
 - two and four stroke cycles
 - spark ignition and compression ignition
 - turbines
- engine features, including:
 - number and arrangement of cylinders
 - materials used for major components (e.g. steel, aluminium and ceramic)

- fuel types and implications for engine operation and maintenance (e.g. petrol, diesel, diesel/gas, gas (natural gas, biogases and special gases))
 - engine location:
 - front, mid or rear engine
 - longitudinal or transverse engine
 - ignition system, components and firing order
 - operational parameters, including:
 - bore and stroke
 - displacement
 - compression ratio
 - efficiency
 - torque, horsepower and brake horsepower
 - cycles of engine operation:
 - intake stroke
 - compression stroke
 - power stroke
 - exhaust stroke
- principles of operation of engine oil, fuel, lubrication and cooling systems, including:
 - function of filters
 - purpose of additives and correct proportions to be used
 - symptoms and effects of contamination, abnormal engine operation and extremes of weather
- role and operation of major engine components, including:
 - timing belt or chain
 - camshaft timing pulley
 - camshaft single and dual
 - rocker arms and shafts
 - intake valves and springs
 - exhaust valves and springs
 - cylinder head
 - crankshaft and crankshaft pulleys, balancer and balance weights and bearing journals
 - flywheels
 - starter ring gear
 - engine block
 - pistons
 - connecting rods
- exhaust system and components.

Assessment Conditions

- Assessors must:

- have vocational competency in applying knowledge of large combustion engine operations to service and maintenance tasks 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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