



Australian Government

MARC053 Operate marine internal combustion engines and associated systems up to 1500 kW

Release: 2

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Modification History

Release 2. This is the second release of this unit of competency in the MAR Maritime Training Package.

- Minor statement changes in unit Application
- Minor MO505 statement changes in Knowledge Evidence
- Minor statement changes in Assessment Conditions.

Release 1. This is the first release of this unit of competency in the MAR Maritime Training Package.

Application

This unit involves the skills and knowledge required to operate a marine internal combustion engine and associated systems up to 1500 kW according to technical specifications and safe operating limits.

It includes operating marine internal combustion engines and associated systems and completing operations.

This unit applies to people working in the maritime industry in the capacity of Marine Engine Driver Grade 1 Near Coastal.

Licensing/Regulatory Information

Legislative and regulatory requirements are applicable to this unit.

This unit is one of the requirements to obtain Australian Maritime Safety Authority (AMSA) certification as a Marine Engine Driver Grade 1 Near Coastal, as specified in Marine Order 505.

Seafarers seeking certification should check with AMSA.

Pre-requisite Unit

Not applicable.

Competency Field

C - Equipment Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

PERFORMANCE CRITERIA

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

1 Prepare for operation

1.1 Risks to self, others and the environment are identified according to organisational procedures

1.2 Routine pre-operational checks of marine internal combustion engines and associated systems are completed prior to use according to manufacturer specifications and organisational procedures

2 Operate marine internal combustion engines and associated systems

2.1 Suitable personal protective equipment (PPE) is selected and used according to organisational procedures

2.2 Marine internal combustion engines and associated systems are operated in a safe and controlled manner

2.3 Performance of marine internal combustion engines and associated systems operations is monitored

2.4 Adverse sea and weather conditions that may impact on operating marine internal combustion engines and associated systems are identified and operational practices are adjusted to maintain safety of vessel and personnel

2.5 Faults or malfunctions are identified and recorded according to organisational procedures

2.6 Faults or malfunctions are rectified, where possible, and corrective actions are taken and recorded according to organisational procedures

2.7 Restrictions are applied to operations, as necessary, and are agreed to with the Master

2.8 Procedures to be undertaken in the event of an emergency are recognised and implemented

3 Complete operations

- 3.1** Shutdown procedures are conducted according to manufacturer instructions and organisational procedures
- 3.2** Operational records are completed according to organisational procedures

Foundation Skills

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

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Unit Mapping Information

This unit replaces and is equivalent to MARC015 Operate marine internal combustion engines and associated systems up to 1500 kW.

Links

Companion Volume Implementation Guides are found in VETNet -
<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=772efb7b-4cce-47fe-9bbd-ee3b1d1eb4c2>

Assessment Requirements for MARC053 Operate marine internal combustion engines and associated systems up to 1500 kW

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- carrying out necessary calculations associated with managing marine internal combustion engines and associated systems, including calculating:
 - areas and volumes of various shapes and circumference of circles
 - calibration tables
 - lubricating oil and fuel/oil consumption, rate of fuel consumption (RFC), specific fuel consumption (SFC), effects on RFC and fuel requirements due to change in vessel speed or voyage deviations
 - relationship between vessel speed and fuel consumption, including the meaning of economical revolutions per minute (r.p.m.) and its application
 - tank capacities and pumping capacities for filling and emptying
- maintaining records of operating and maintaining marine internal combustion engines and associated systems, and any related safety incidents, including:
 - logbooks
 - maintenance records
 - operational orders
- monitoring various gauges and instruments to evaluate the performance of marine internal combustion engines and associated systems
- operating marine internal combustion engines and associated systems in accordance with manufacturer instructions, maritime regulations, rules and instructions
- recognising problems that may occur with marine internal combustion engines and associated systems, responding to alarms and taking appropriate preventative and remedial actions
- recognising when performance of marine internal combustion engines and associated systems is unsatisfactory or outside of specified limits and taking appropriate actions.

Knowledge Evidence

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

- associated systems, including:
 - air start
 - control systems
 - cooling system
 - cooling water system and components
 - dual fuel systems
 - exhaust systems
 - fuel system, including pumps and injectors
 - lubricating oil systems and components
 - lubrication systems
- characteristics of marine internal combustion engines and associated systems, including operational limits
- control systems
- crankcase explosions and appropriate preventative and remedial actions and solutions
- dangers associated with operating shipboard marine internal combustion engines and associated systems, and related hazard prevention strategies
- emergency procedures, including:
 - explosion
 - failure or major fault in propulsion engines and associated control systems
 - fire
 - loss of:
 - bridge control
 - electrical supply
 - major breakdowns
 - propulsion power
 - steering
- engine protection arrangements
- methods for controlling and managing the operation of shipboard marine internal combustion engines and associated systems
- pollution control measures under relevant local, state, territory and commonwealth legislation
- problems associated with marine internal combustion engines and associated systems, and appropriate preventative and remedial actions and solutions
- procedures for monitoring and evaluating performance of marine internal combustion engines and associated systems
- relevant sections of state and territory maritime regulations and the Marine Order 505
- relevant work health and safety (WHS)/occupational health and safety (OHS) legislation and policies
- requirements for emission control from internal combustion engines under the International

Convention for the Prevention of Pollution from Ships (MARPOL)

- sequence of required actions when there is a major fault on main propulsion engine
- surroundings and changes to these surroundings
- technological changes in engine and control system designs
- turbocharging systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training current at the time of assessment.

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.

Practical assessment must occur in a workplace, or realistic simulated workplace, under the normal range of workplace conditions.

Simulations and scenarios may be used where situations cannot be provided in the workplace or may occur only rarely, in particular for situations relating to emergency procedures and adverse weather conditions where assessment would be unsafe, impractical or may lead to environmental damage.

Resources for assessment must include access to:

- a commercial vessel with inboard diesel propulsion power of greater than or equal to 375 kW or appropriate engine, propulsion plant and auxiliary system ashore
- applicable documentation, such as legislation, regulations, codes of practice, workplace procedures and operational manuals
- tools, equipment, machinery, materials and personal protective equipment (PPE) currently used in industry.

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