



Australian Government

MARC041 Operate and monitor marine internal combustion engines, propulsion plant and auxiliary systems

Release: 2

MARC041 Operate and monitor marine internal combustion engines, propulsion plant and auxiliary systems

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 statement changes in Assessment Conditions.

Release 1. New unit of competency. Licensing/regulatory information has been incorporated in accordance with Regulatory requirements. Assessment Requirements have been strengthened in accordance with Regulatory requirements.

Application

This unit involves the skills and knowledge required to safely operate marine internal combustion engines, propulsion plant and auxiliary systems on a vessel up to 750 kW.

This unit applies to people working in the maritime industry in the capacity of:

- Marine Engine Driver Grade 1 Near Coastal
- Marine Engine Driver Grade 2 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 2 NC and a Marine Engine Driver Grade 1 NC as specified in Marine Order 505.

Note: Relevant state/territory training and qualification requirements need to be fulfilled by any persons carrying out installation, maintenance and/or repair of refrigeration equipment especially with regard to preventing the escape of refrigerants into the atmosphere.

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.

1 Prepare for sea

PERFORMANCE CRITERIA

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

- 1.1** Fuels and lubricating fluids required for proposed voyage are acquired
- 1.2** Spares and stores required for proposed voyage are acquired
- 1.3** Flammable or explosive materials are stowed and managed according to regulatory and organisational requirements
- 1.4** Work health and safety (WHS)/occupational health and safety (OHS) hazards in engine room are identified, risk assessed and corrective actions taken according to organisational practices
- 1.5** Pre-start checks are conducted on machinery and equipment according to organisational procedures and manufacturer specifications
- 1.6** Engines are started according to manufacturer specifications and vessel procedures
- 1.7** Starting faults are recognised and rectified according to manufacturer specifications and fault-finding procedures

2 Operate engines, propulsion plant and auxiliary systems

- 2.1** Engines, propulsion plant and auxiliary systems are operated within technical specifications
- 2.2** Main propulsion plant and auxiliary systems are operated and monitored to ensure they are within operating limits specified by vessel procedures and manufacturer recommendations
- 2.3** Environmental implications associated with operation of engine, propulsion plant and auxiliary systems are

identified and controlled where possible

- 2.4 Accidental or operational discharge of polluting substances are recorded according to regulatory requirements and organisational procedures
- 2.5 Operational faults are recognised and rectified in accordance with manufacturer specifications and fault-finding procedures
- 2.6 Operational records are kept according to regulatory requirements and organisational procedures
- 2.7 Appropriate action is taken when a malfunction or emergency occurs

- 3 **Secure vessel after voyage**
 - 3.1 Engines, propulsion plant and auxiliary systems are shut down according to manufacturer specifications and vessel procedures
 - 3.2 Damage and repairs requiring action are recorded 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 MARC009 Operate and monitor marine internal combustion engines, propulsion plant and auxiliary systems.

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 MARC041 Operate and monitor marine internal combustion engines, propulsion plant and auxiliary systems

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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:

- applying work health and safety (WHS)/occupational health and safety (OHS) and pollution control, legislation and policies
- identifying constructional parts of marine internal combustion engines
- maintaining logs, including:
 - maintenance logs
 - oil record book
 - running logs
- managing:
 - cooling systems
 - lubricating systems and preventing pollution of marine environment
 - pumping systems and preventing pollution of marine environment
 - stowage of flammable or explosive materials and refrigerant gases
- operating main propulsion plant and auxiliary systems within recommended parameters
- preparing vessel and machinery for sea
- recognising and rectifying operational faults
- securing vessel and machinery after voyage
- taking actions in the event of malfunction or emergency.

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:

- actions taken in the event of malfunction or emergency, including:
 - fire
 - flooding
 - main engine failure
 - steering failure
- bilge pumping for vessels with several compartments
- causes and effects of vibration and undue wear
- characteristics of flammable/explosive materials, including:
 - liquefied petroleum gas (LPG)/industrial gases
 - liquid fuels
 - refrigerant gases
 - other flammable gases
- common faults:
 - in steering gear
 - of deck machinery
- construction of heat exchangers
- controllable pitch propellers (CPP) operation
- coolant circulation and thermostats
- corrosion prevention
- cross connections between:
 - bilge or ballast or seawater systems and fire main
 - seawater systems and bilge systems
- dangers associated with:
 - back-flooding and methods to prevent back-flooding
 - LPG/industrial gases and petrol vapours
 - refrigerant gas leaks in confined spaces
- diesel engine:
 - construction
 - fuel injection, timing and control equipment
 - operation
- dry sump and wet sump lubrication systems and components
- electrohydraulic steering gear
- engine:
 - protection arrangements
 - performance and reasons for lack of performance
- engine room hazards and their minimisation
- environmental responsibilities, regulations and legislative requirements
- gearbox fault identification and emergency operation
- governor operation
- hazards of refrigerants

- heat exchanger, keel cooler and raw water cooling systems
- lubrication and cooling:
 - effects of gearboxes
 - lubricating oil system faults
- marine two-stroke and four-stroke engines
- method of propulsion plant reversal including CPP
- operation of marine gearboxes
- polluting substances and their effect on the environment, including:
 - chemicals
 - excessive noise
 - exhaust emissions
 - fuel and oil overboard
 - pumping bilges
 - refrigerant gas
 - sewage
- preparations and checks necessary before sailing
- pressure and flow regulators
- procedures and requirement for operating main propulsion plant and auxiliary systems within recommended parameters, including:
 - cooling systems
 - fuel systems
 - gearbox
 - lubricating systems
 - pumping systems
 - refrigeration systems
 - steering systems
- pump capabilities and requirements for priming
- refrigeration system and components
- relevant state/territory training and qualification requirements for carrying out installation, maintenance and/or repair of refrigeration equipment especially with regard to preventing the escape of refrigerants into the atmosphere
- routine for operating and maintaining steering systems
- seawater circulating systems
- securing vessel after voyage
- ship side valves
- shutting down machinery
- sterndrive and water jet drive units
- storage of LPG/industrial gases cylinders
- testing:
 - LPG/industrial gases detectors
 - steering gear

- turbo charging and supercharging arrangements
- two- and four-stroke cycles of operation
- types and operation of deck machinery, including basic hydraulic systems
- types of:
 - gear trains
 - pumps and safety devices
- watchkeeping duties
- WHS/OHS and pollution control, legislation and policies.

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:

- applicable documentation, such as legislation, regulations, codes of practice, workplace procedures and operational manuals
- a commercial vessel with inboard diesel propulsion power of greater than or equal to 150 kW or an appropriate internal combustion engine, propulsion plant and auxiliary systems ashore
- tools, equipment, machinery, materials and relevant personal protective equipment (PPE) currently used in industry.

Links

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