



Australian Government

MARC009 Operate and monitor marine internal combustion engines, propulsion plant and auxiliary systems

Release: 2

MARC009 Operate and monitor marine internal combustion engines, propulsion plant and auxiliary systems

Modification History

Release 2. Range of Conditions updated to include relevant information.

Release 1. New unit of competency.

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 engine workers in the maritime industry working as a Marine Engine Driver Grade 2 Near Coastal on vessels up to 750 kW or as a Marine Engine Driver Grade 1 Near Coastal on vessels up to 1500 kW.

This unit has links to legislative and certification requirements.

Pre-requisite Unit

Not applicable.

Competency Field

C - Equipment Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

Elements describe the essential outcomes.

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

1 Prepare for sea	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/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	All damage and repairs requiring action are recorded according to organisational procedures

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are

essential to performance.

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

Range of Conditions

Specifies 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.

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

Spares and stores include one or more of the following:

- cleaning products and materials
- grease
- liquefied petroleum gas (LPG)
- machinery spare parts
- oils
- paint
- refrigeration gas
- tools, hand and power

Flammable/explosive materials must include:

- liquid fuels
- LPG
- refrigerant gas

Work health and safety (WHS)/occupational health and safety (OHS) hazards include one or more of the following:

- heavy objects securely lashed
- leaking fuel
- loose machinery guards
- slippery decks

Engines, propulsion plant and auxiliary systems include one or more of the following:

- auxiliary equipment and associated spaces
- cooling systems
- fuel systems
- gearbox
- lubricating systems
- marine two- and four-stroke:

- diesel engines
- petrol engines
- propeller and immediate shafting alignment
- pumping systems
- refrigeration systems
- steering systems
- stern drive and water jet drive units

Environmental implications include one or more of the following:

- accidental release of refrigeration gas
- excessive noise
- exhaust emissions
- loss of fuel and oil overboard
- pumping bilges

Polluting substances include one or more of the following:

- chemicals
- oils
- refrigeration gases
- sewage

Operational records include one or more of the following:

- ballast log
- maintenance logs
- oil record book
- running logs

Emergencies include one or more of the following:

- emergency steering
- failure of the main engine
- fire
- flooding

Unit Mapping Information

This is a new unit. This unit is equivalent to MARC3005A 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 MARC009 Operate and monitor marine internal combustion engines, propulsion plant and auxiliary systems

Modification History

Release 2. Performance Evidence and Knowledge Evidence amended to include correct information.

Release 1. New unit of competency.

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:

- explaining:
 - method of propulsion plant reversal
 - operation of marine gearboxes
 - two- and four-stroke cycles of operation
- identifying constructional parts of marine internal combustion engines
- keeping running and maintenance logs
- managing:
 - lubricating systems and preventing pollution of marine environment
 - cooling systems
 - pumping systems and preventing pollution of marine environment
 - stowage of flammable/explosive materials and refrigerant gases
- operating:
 - refrigeration system
 - marine internal combustion engines within technical specifications
- operating main propulsion plant and auxiliary systems within recommended parameters
- operating and maintaining steering systems
- preparing vessel and machinery for sea
- recognising and rectifying operational faults
- securing vessel and machinery after voyage.

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:

- bilge pumping for vessels with several compartments
- common faults:

- in steering gear
- of deck machinery
- construction of heat exchangers
- controllable pitch propellers (CPP) construction and operation
- coolant circulation and thermostats
- correct pressure and flow conditions
- corrosion prevention
- cross connections between:
 - bilge/ballast/seawater systems and fire main
 - seawater systems and bilge systems
- dangers associated with:
 - back-flooding and methods to prevent back-flooding
 - liquefied petroleum gas (LPG) and petrol vapours
 - refrigerant gas leaks in confined spaces
- diesel engine:
 - construction
 - operation
 - fuel injection, timing and control equipment
- dry sump and wet sump lubrication systems and components
- electrohydraulic steering gear
- emergency steering
- engine:
 - protection arrangements
 - performance and reasons for lack of performance
 - watchkeeping duties
- 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:
 - of gearboxes
 - effects
- lubricating oil system faults
- method of propulsion plant reversal including CPP
- own ability and limits to rectify irregularities and faults
- preparations and checks necessary before sailing
- pump capabilities and requirements for priming
- refrigeration system and components
- reverse/reduction gearbox operation
- routine for operating and maintaining steering systems

- seawater circulating systems
- securing vessel after voyage
- ship side valves
- shutting down machinery
- spares and stores required for proposed voyage
- storage of LPG cylinders
- testing:
 - steering gear
 - LPG detectors
- turbo charging and supercharging arrangements
- types and operation of deck machinery including basic hydraulic systems
- types of:
 - gear trains
 - pumps and safety devices.

Assessment Conditions

Assessors must satisfy National Vocational Education and Training Regulator (NVR)/Australian Quality Training Framework (AQTF) assessor requirements.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that reflect workplace conditions.

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.

Resources for assessment must include access to:

- tools, equipment, machinery, materials and personal protective equipment currently used in industry
- applicable documentation such as legislation, regulations, codes of practice, workplace procedures and operational manuals
- range of relevant exercises, case studies and/or simulations.

Links

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