



Australian Government

MARC007 Operate marine internal combustion engines, and propulsion and auxiliary systems

Release: 1

MARC007 Operate marine internal combustion engines, and propulsion and auxiliary systems

Modification History

Release 1. New unit of competency.

Application

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

This unit applies to engine workers in the maritime industry working as a Marine Engine Driver Grade 3 Near Coastal on vessels up to 500 kW or 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.

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|---|---|
| 1 Prepare engine, and propulsion and auxiliary systems for use | 1.1 Appropriate personal protective equipment is selected, used, maintained and stored according to work health and safety (WHS)/occupational health and safety (OHS) requirements |
| | 1.2 Routine pre-operational checks are carried out on equipment according to manufacturer specifications and workplace requirements |
| | 1.3 Engine is started according to manufacturer specifications and organisational requirements |

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| | 1.4 | Deviations from the norm are promptly identified and rectified |
| | 1.5 | Adjustments are made to achieve a safe and efficient operation |
| | 1.6 | Inability to start equipment is reported, and logged promptly and accurately to appropriate personnel |
| 2 Operate engine, and propulsion and auxiliary systems | 2.1 | Engine, and propulsion and auxiliary systems are operated in a safe and controlled manner |
| | 2.2 | Performance and efficiency of engine, and propulsion and auxiliary systems are monitored according manufacturer instructions |
| | 2.3 | Engine, and propulsion and auxiliary systems are operated within defined operating limits when running, to achieve optimum safety and efficiency |
| | 2.4 | Environmental implications associated with operation of engine, and propulsion and auxiliary systems are identified and controlled |
| | 2.5 | Deviations from normal operations are promptly identified |
| | 2.6 | Action is taken to identify and rectify basic operational faults to maintain optimum safety and efficiency |
| | 2.7 | Appropriate action is taken in the event of a malfunction or emergency |
| 3 Complete operations | 3.1 | Equipment shut-down procedures are carried out according to manufacturer specifications and workplace procedures |
| | 3.2 | Engine, propulsion and auxiliary system operational records are maintained according to workplace procedures |
| | 3.3 | Equipment damage, malfunctions or irregular performance is recorded and reported according to workplace 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.

Pre-operational checks include one or more of the following:

- checking coolants levels
- checking:
 - filters
 - fuel level
 - starting system
 - there is enough power available on switchboard and close isolator
- confirming correct pressures of auxiliary systems
- connections
- dip oil
- inspecting batteries and turning on isolator
- inspecting for leaks and faults
- inspecting safety guards, power take off stubs and shafts
- leads
- lines
- opening valves as appropriate

Equipment includes one or more of the following:

- auxiliary equipment and associated spaces
- cooling systems
- firefighting equipment
- 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
- sterndrive and water jet drive units

Environmental implications must include:

- excessive noise and exhaust emissions
- loss of fuel and oil overside

Basic operational faults include one or more of the following:

- starting faults
- failure of:
 - cooling systems
 - fuel system
 - lubrication systems
- gearbox faults
- pumping systems failure
- refrigeration systems failure
- steering failure

Emergencies include one or more of the following:

- failure of main engine
- fire
- flooding
- loss of steering

Operational records include one or more of the following:

- maintenance logs
- running logs

Unit Mapping Information

This is a new unit. This unit is equivalent to MARC2007A Operate marine internal combustion engines, and propulsion 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 MARC007 Operate marine internal combustion engines, and propulsion and auxiliary systems

Modification History

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:

- arranging maintenance according to technical specifications
- checking pressures, temperatures and revolutions during start-up and warm-up periods according to technical specifications
- complying with vessel operating procedures and manufacturer recommendations for start-up and making available fuel, lubricants, cooling water and air
- identifying:
 - main difference between two- and four-stroke cycles of operation
 - major parts of marine internal combustion engines
 - marine propulsion systems components and explaining their functions
- implementing safe and environmentally responsible work practices
- initiating timely action in response to defects or damage
- managing fuel systems safely according to regulations, manufacturer instructions and vessel procedures, so as to prevent pollution of the marine environment
- operating:
 - lubricating systems according to established procedures and so as to prevent pollution of the marine environment
 - main propulsion plant auxiliary systems to ensure safe operating conditions
 - marine internal combustion engines within technical specifications
 - pumping systems according to manufacturer instructions, operational procedures and regulations to ensure safety of operation and prevention of pollution of the marine environment
 - refrigeration system according to manufacturer instructions, operational procedures and regulations to ensure safety of operation and prevention of pollution of the marine environment
- outlining operation and servicing propulsion system within the technical specifications
- preparing shut-down and supervising cooling down of engine according to vessel operating procedures and manufacturer recommendations
- reading and interpreting manufacturer specifications
- recognising and repairing basic operational faults or organising maintenance assistance
- testing steering arrangements according to manufacturer instructions, operational procedures and regulations.

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:

- air filters
- back-flooding prevention
- basic:
 - combustion process
 - governor operation
 - timing diagrams
- bearing types, materials, installation, lubrication
- causes of vibration and undue wear
- circulating pumps
- controllable pitch propellers
- cooling systems including keel cooling/heat exchangers, circulating pumps, ship's side valves, coolant circulation and thermostats
- corrosion
- couplings types, fittings, keys and keyways
- drive systems, belts, clutches, motors, etc. of pumping systems
- dual duty systems/cross connection
- emergency procedures
- engine watchkeeping
- fault identification, maintenance, prevention of corrosion
- fuel system fault-finding and possible emergency operation
- fuel systems including petrol/diesel, carburettors/fuel injectors, common rail
- gear box fault identification and emergency operation
- glands, packing, seals
- identification of components of refrigeration systems
- injection pumps
- inspection and checks of main and auxiliary machinery and associated spaces
- instrumentation
- keeping running and maintenance logs
- lubricating systems including lube oil circulating systems, lube oil system components, general lubrication, cooling effects and lubrication system problems
- main differences between two- and four-stroke cycles of operation
- maintenance and inspection
- marine two- and four-stroke:
 - diesel engines
 - petrol engines
- major parts of marine internal combustion engines
- operation of firefighting equipment in engine space
- own ability and limits to rectify irregularities

- power transmission operation
- propeller and intermediate shafting alignment
- pumping systems including fire/bilge/tank circulating systems
- refrigeration systems including hazards of refrigerant gases
- relevant environmental responsibilities, regulations and legislative requirements
- rudder and stock support bearings
- running checks
- shaft seals and glands, packings
- start-up and shut-down procedures
- steering operation of hydraulic, cable, rod and gear
- steering systems including rudder construction and rudder types
- sterndrive and water jet drive units
- strainers, mudboxes, foot valves
- testing of steering and hydraulic systems
- tiller arm attachment
- turbo/supercharging
- use of flexible materials, hoses
- valve types:
 - construction and routine servicing
- work health and safety (WHS)/occupational health and safety (OHS) requirements and work practices.

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 including:
 - boots
 - gloves
 - hard hat
 - hearing protection
 - overalls
 - protective eyewear
- respirator or face mask

- 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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