Australian Government

Assessment Requirements for MARC039 Operate marine internal combustion engines, and propulsion and auxiliary systems

Release: 1

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Modification History

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.

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:

- 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
- complying with work health and safety (WHS)/occupational health and safety (OHS) requirements and work practices
- 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 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
- preparing shutdown and supervising cooling down of engine according to vessel operating procedures and manufacturer recommendations
- undertaking pre-operational and start-up checks, including:
  - coolant levels
  - pressures and temperatures
  - filters
  - fuel level

- batteries and turning on isolator
- oil level
- starting system
- sufficient power available on switchboard before closing isolator or breaker
- inspecting for leaks and faults on engines, equipment, lines and connections
- inspecting safety guards and shafts
- operating valves as required
- visual check electrical leads.

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 and lubrication
- causes and effects of vibration and undue wear
- circulating pumps
- controllable pitch propellers
- cooling systems, including keel cooling or heat exchangers, circulating pumps, ship's side valves, coolant circulation and thermostats
- corrosion
- couplings types, fittings, keys and keyways
- cross connections between bilge/ballast/seawater and fire systems
- differences between two-stroke and four-stroke cycles of operation
- drive systems, belts, clutches and motors
- emergency procedures in the event of:
  - failure of main engine
  - fire
  - flooding
  - loss of steering
- engine watchkeeping
- environmental implications and control of:
  - excessive noise
  - exhaust emissions
  - loss of fuel and oil overside
- fault identification, maintenance and prevention of corrosion

- fuel system fault-finding, rectification and possible emergency operation
- fuel systems, including petrol or diesel, carburettors or fuel injectors, and common rail
- gear box fault identification, rectification and emergency operation
- glands and packing seals
- identification and rectification of basic operational faults, including:
  - failure of:
    - cooling systems
    - lubrication systems
    - pumping systems
    - refrigeration systems
    - steering systems
  - starting faults
- 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
- maintenance logs and running logs
- marine two-stroke and four-stroke:
  - diesel engines
  - petrol engines
- major parts of marine internal combustion engines
- operation of firefighting equipment in engine space
- outlining operation and servicing propulsion system within the technical and manufacturer specifications
- power transmission operation
- propeller shaft and intermediate shaft alignment
- pumping systems, including fire or bilge or tank circulating systems
- recognising and repairing basic operational faults including:
  - organising maintenance assistance
  - testing steering arrangements according to manufacturer instructions, operational procedures and regulations
- refrigeration systems, including hazards of refrigerant gases
- relevant environmental responsibilities, regulations and legislative requirements
- 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
- rudder and stock support bearings
- running checks
- start-up and shutdown procedures

- steering operation of hydraulic and cable, rod and gear
- steering systems, including rudder construction and rudder types
- sterndrive and water jet drive units
- strainers, mudboxes and foot valves
- testing of steering and hydraulic systems
- tiller arm attachment
- turbo charging and supercharging
- use of flexible materials and hoses
- valve types
- ways of arranging maintenance according to relevant technical and manufacturer specifications
- ways of identifying:
  - major parts of marine internal combustion engines
  - marine propulsion systems components and explaining their functions
- WHS/OHS requirements and work practices.

Assessment Conditions

Assessors must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment. As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations 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, safety management system (SMS), workplace procedures and operational manuals
- a commercial vessel with inboard diesel propulsion power of ≥150 kW or appropriate engine with propulsion and auxiliary systems ashore
- tools, equipment, machinery, materials and personal protective equipment (PPE) currently used in industry.

Links

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