



Australian Government

MARC045 Contribute to the operation of engine equipment and associated propulsion plant

Release: 1

MARC045 Contribute to the operation of engine equipment and associated propulsion plant

Modification History

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 contribute to the operation, monitoring and evaluation of engine performance and associated propulsion plant on a vessel.

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

- Able Seafarer - Engine
- Integrated Rating

who assist under the direction of the officer in charge of the engineering watch, with the operation of engine equipment and associated propulsion plant, as required, on a range of vessels.

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 an Able Seafarer - Engine or Integrated Rating and to meet regulatory requirements this unit must be delivered consistent with Marine Orders and with the relevant sections of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW).
- Those regulatory requirements include STCW International Maritime Organization (IMO) model course competencies and areas of knowledge, understanding and proficiency, together with the estimated total hours required for lectures and practical exercises. Teaching staff should note that timings are suggestions only and should be adapted to suit individual groups of trainees depending on their experience, ability, equipment and staff available for training.

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 Plan and prepare work

- 1.1 Safety issues are identified, and safe operational practices are applied to minimise risk and to control hazards
- 1.2 Work requirements of engine and plant are identified from the officer in charge of the engineering watch and relevant documentation
- 1.3 Localised engine and plant inspections are carried out according to manufacturer specifications and workplace procedures
- 1.4 Engine and plant operational prerequisites are established according to manufacturer specifications and workplace procedures
- 1.5 Sequence of recommissioning of plant is determined to suit existing circumstances according to manufacturer specifications and workplace procedures

2 Operate engines and associated propulsion plant

- 2.1 Engines and plant are operated according to manufacturer specifications and workplace procedures
- 2.2 Performance of engines and plant is monitored to detect deviations from normal operating conditions
- 2.3 Faulty and worn engine equipment and components are identified and reported to the officer in charge of the engineering watch
- 2.4 Action is taken when an engine fails or emergencies occur to secure the engine or machinery and to maintain

		the safety of vessel and persons involved according to workplace procedures
3	Test engines and associated propulsion plant	3.1 Tests are performed according to manufacturer specifications and workplace procedures 3.2 Engines and associated propulsion equipment are observed for correct operational response 3.3 Corrective actions are taken to rectify abnormalities according to manufacturer specifications and workplace procedures
4	Analyse engines and associated propulsion plant faults	4.1 Causes of abnormal operating conditions are identified by analysing technical and operational information in a logical and sequential manner 4.2 Corrective actions are taken to rectify abnormalities according to manufacturer specifications and workplace procedures 4.3 Plant integrity is maintained according to manufacturer specifications and workplace procedures
5	Complete documentation	5.1 Correct records are logged relating to the operation and performance of engines and associated propulsion equipment according to regulatory requirements and workplace procedures 5.2 Documentation is updated and engine and plant problems, abnormalities and status are reported according to regulatory requirements and workplace 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 MARC027 Contribute to the operation of engine equipment and associated propulsion plant.

Links

Companion Volume implementation guide can be found in VetNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=772efb7b-4cce-47fe-9bbd-ee3b1d1eb4c2>

Assessment Requirements for MARC045 Contribute to the operation of engine equipment and associated propulsion plant

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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 relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and work practices, including:
 - awareness of hazards involved in engines, propulsion plan and auxiliary equipment operation
 - pollution control practices
 - safe entry into pump room, fuel tanks and other confined spaces on a vessel
- attending to appropriate level of detail in recordkeeping
- avoiding polluting the environment
- identifying problems that occur during the operation of engines on vessels
- interpreting and following procedures for the operation, monitoring and evaluation of the performance of engines on vessels
- operating bilge and ballast systems, under the supervision of the officer in charge of the engineering watch, according to manufacturer instructions and workplace procedures
- producing reliable documentation
- reading and interpreting:
 - equipment performance readings and instrumentation
 - lock out and tagging procedures
 - safety data sheets (SDS)/material safety data sheets (MSDS)
- recognising and reporting electrical hazards and unsafe equipment
- selecting and using tools required for operating, monitoring and evaluating the performance of engines on vessels
- testing machinery, under the supervision of the officer in charge of the engineering watch, according to manufacturer instructions and workplace procedures.

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:

- accessing and understanding typical SDS/MSDS, vessel and machinery specifications, machine drawings, operation manuals, electrical and control circuit diagrams
- appropriate use and selection of personal protective equipment (PPE)
- causes of electric shock and precautions to be observed to prevent shock
- emergencies, including:
 - crankcase and gearbox explosions
 - gearbox failure
 - scavenge and uptake fires
 - starting air line
- hazards and problems that can occur during the operation and performance of engines, propulsion plant and auxiliary machinery and appropriate preventative and remedial actions and solutions
- methods of providing air for combustion in the vessel engine room
- national and international regulations, International Maritime Organization (IMO) conventions and codes, and class rules applicable to the operation and performance evaluation of engines, propulsion plant and auxiliary machinery on vessels
- nature and causes of typical malfunctions and/or poor performance of engines, propulsion plant and auxiliary machinery, and the available methods for their detection and rectification
- principles and functions of machinery space monitoring and alarm systems principles and operational characteristics of:
 - auxiliary boilers and associated equipment
 - controllable pitch propellers (CPP)
 - direct drive propulsion systems
 - internal combustion engines
 - jet propulsion
 - marine gas engines
 - reduction boxes
 - steam turbines, gearing and associated equipment as they apply to auxiliary systems
 - thrusters (Z pellers, azimuth, tunnel)
 - Voith Schneider Units
- principles of:
 - detection, identification and repair of faults
 - engine cooling and lubrication
 - fuel systems, including heavy fuel oil (HFO) and diesel
 - marine control systems
 - operation of hydraulic and electronic governors and overspeed trips
- procedures for:
 - carrying out performance evaluation of engines, propulsion plant and auxiliary machinery
 - testing and treating auxiliary boiler water, machinery cooling water and lubricating oil
- preventative strategies for scavenge and uptake fires, and starting air lines, crankcase and gearbox explosions
- relevant WHS/OHS requirements, work practices and pollution control regulations and

policies

- rights and responsibilities of individuals regarding lock out and tagging of plant and equipment
- safe function, operation and maintenance of bilge and ballast systems
- safe operation of equipment, including valves and pumps
- safe use and operation of electrical equipment, including safety precautions before commencing work or repair, isolation procedures, emergency procedures and different voltages on board
- safety, environmental and hazard control precautions and procedures relevant to the operation and performance of engines, propulsion plant and auxiliary machinery
- shafting systems, oil fill stern tube, pedestal bearings and thrust bearings
- the use of safe isolation systems and the application of lock out tags.

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 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, workplace procedures and operational manuals
- tools, equipment, machinery, materials and relevant personal protective equipment (PPE) currently used in industry.

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