



Australian Government

MARC027 Contribute to the operation of engine equipment and associated propulsion plant

Release: 1

MARC027 Contribute to the operation of engine equipment and associated propulsion plant

Modification History

Release 1. New unit of competency.

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 an Integrated Rating or Able Seafarer-Engine, who assists 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.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

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 Plan and prepare work

PERFORMANCE CRITERIA

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

- 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

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| | 1.3 | Localised engine and plant inspection is carried out according to manufacturer specifications and organisational procedures |
| | 1.4 | Engine and plant operational prerequisites are established according to manufacturer specifications and organisational procedures |
| | 1.5 | Sequence of recommissioning of plant is determined to suit existing circumstances according to manufacturer specifications and organisational procedures |
| 2 Operate engines and associated propulsion plant | 2.1 | Engines and plant are operated according to manufacturer specifications and organisational 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 organisational procedures |
| 3 Test engines and associated propulsion plant | 3.1 | Tests are performed according to manufacturer specifications and organisational 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 organisational 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 |

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| | 4.2 | Corrective actions are taken to rectify abnormalities according to manufacturer specifications and organisational procedures |
| | 4.3 | Plant integrity is maintained according to manufacturer specifications and organisational 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 organisational procedures |
| | 5.2 | Documentation is updated, and engine and plant problems, abnormalities and status are reported, according to regulatory requirements and 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.

Non-essential conditions can be found in the Companion Volume Implementation Guide.

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| Engine and plant operational prerequisites include one or more of the following: | <ul style="list-style-type: none"> • anti-pollution rules and regulations • bridge orders • hazard control precautions and procedures • safety rules and regulations • survey requirements • technical specifications |
| Emergencies include one or more of the following: | <ul style="list-style-type: none"> • crankcase and gearbox explosions • gearbox failure • scavenge and uptake fires • starting air-line |
| Tests include one or more | <ul style="list-style-type: none"> • auxiliary boiler water |

of the following:

- lubricating oil
- machinery cooling water

Unit Mapping Information

This unit replaces and is equivalent to MARC3008A Operate engine equipment and associated propulsion plant.

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 MARC027 Contribute to the operation of engine equipment and associated propulsion plant

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, performance criteria and range of conditions on at least one occasion and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and work practices, including:
 - entry into pump-room, fuel tanks and other confined spaces on a vessel
 - hazards involved in engines, propulsion plan and auxiliary equipment operation
 - pollution control
- 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 organisational procedures
- producing reliable documentation
- reading and interpreting:
 - equipment performance readings and instrumentation
 - lock out and tagging procedures
 - safety data sheets (SDSs)/material safety data sheets (MSDSs)
- recognising and reporting electrical hazards and unsafe equipment
- selecting and using tools required for operating, monitoring and evaluating the performance of engines on vessels.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- basic principles and functions of machinery space monitoring and alarm systems

- basic 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
- basic principles of:
 - detection, identification and repair of faults
 - engine cooling and lubrication
 - fuel systems including heavy fuel oil (HFO) and diesel
 - marine control systems
- basic principles of operation of hydraulic and electronic governors and overspeed trips
- causes of electric shock and precautions to be observed to prevent shock
- 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, 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
- 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
- purpose of safe isolation procedures and application of lock out tags
- relevant WHS/ OHS requirements, work practices and pollution control regulations and policies
- rights and responsibilities of individuals about 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, thrust bearings

- preventative strategies for scavenge and uptake fires, and starting air-line, crankcase and gearbox explosions
- typical SDSs/MSDSs, vessel and machinery specifications, machine drawings, operation manuals, electrical and control circuit diagrams.

Assessment Conditions

As a minimum, 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.

Assessment must occur in workplace operational situations where the operation of engine equipment and associated propulsion plant under the direction of the officer in charge of the engineering watch can be demonstrated. Where this is not available, in simulated workplace operational situations that replicate workplace conditions.

Resources for assessment include access to:

- relevant documentation including workplace procedures, regulations, codes of practice and operation manuals
- tools, materials, plant and equipment that replicate and are currently used in industry including:
 - alarm systems
 - auxiliary boilers and associated equipment
 - auxiliary machinery
 - fuel systems
 - gas turbines
 - hydraulic and electronic governors
 - internal combustion engines
 - marine control systems
 - overspeed trips
- personal protective equipment currently used in industry.

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