



Australian Government

MARC3004A Operate and maintain engines for auxiliary systems other than steam auxiliary systems

Release 1

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Modification History

Release 1

This is the first release of this unit.

Unit Descriptor

This unit involves the skills and knowledge required to operate and perform basic maintenance on non steam driven auxiliary systems according to relevant workplace practices and codes of practice. It includes operating controls, monitoring performance and maintaining operational condition of auxiliary equipment during use.

Application of the Unit

This unit applies to engine workers working in the maritime industry as a Marine Engine Driver Steam.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

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|--|--|
| 1 Prepare for sea | <ul style="list-style-type: none">1.1 Spares and stores required for proposed voyage are acquired1.2 Preparations and checks are completed prior to sailing1.3 Flammable/explosive materials are stowed and managed according to regulatory and organisational requirements1.4 Engines are started according to manufacturer specifications and organisational requirements1.5 Deviations from norm are promptly identified and rectified or referred1.6 Adjustments are made to achieve a safe and efficient operation1.7 Inability to start engine is reported, and logged promptly and accurately to appropriate personnel |
| 2 Operate internal combustion engines and auxiliary systems | <ul style="list-style-type: none">2.1 Engines and auxiliary systems are operated within technical specifications2.2 Engines and auxiliary systems are operated and monitored to ensure they are within operating limits specified by organisational procedures and manufacturer recommendations2.3 Environmental implications associated with operating engines and auxiliary systems are identified and controlled2.4 Operational faults are recognised and rectified according to manufacturer specifications and fault-finding methods2.5 Appropriate action is taken in a malfunction or emergency |
| 3 Secure machinery after voyage | <ul style="list-style-type: none">3.1 Vessel, equipment and machinery are locked down according to manufacturer specifications and organisational procedures3.2 Operational records are completed according to workplace procedures3.3 Damage and repairs requiring action are reported according to workplace procedures |
| 4 Plan maintenance activities | <ul style="list-style-type: none">4.1 Maintenance plan is accessed to determine maintenance requirements for engines and auxiliary systems4.2 Inspections are conducted and additional non-routine maintenance requirements are determined |

- 4.3 Tasks are planned and sequenced in conjunction with others involved in or affected by maintenance work

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required Skills:

- Explain two- and four-stroke cycles of operation
- Identify basic constructional parts of marine auxiliary internal combustion engines
- Manage:
 - refrigerant gases
 - lubricating systems and prevent pollution of marine environment
 - cooling systems
 - pumping systems and prevent pollution of marine environment
- Operate and maintain steering systems
- Operate marine auxiliary internal combustion engines within technical specifications
- Prepare machinery for sea
- Recognise and rectify operational faults
- Secure machinery after voyage

Required Knowledge:

- Bilge pumping for vessels with several compartments
- Common faults in steering gear
- Construction and maintenance of heat exchangers
- Corrosion prevention
- Cross connections between bilge/ballast/seawater systems and fire main
- Dangers associated with:
 - back-flooding and methods to prevent back-flooding
 - LPG and petrol vapour
- Dangers of refrigerant gas leaks in confined spaces
- Diesel engine:
 - construction
 - fuel injection, timing and control equipment
 - operation and routine maintenance
- Dry sump and wet sump lubrication systems
- Electro-hydraulic steering gear
- Emergency steering
- Engine:
 - performance and reasons for lack of performance
 - protection arrangements

- Heat exchanger, keel cooler and raw water cooling systems
- Oil:
 - quality monitoring
 - filter changing procedures
- Planned maintenance
- Preparations and checks necessary before sailing
- Pump capabilities and requirements for priming
- Relevant licensing, legislative, regulatory or certification requirements
- Routine maintenance on steering systems
- Seawater circulating systems
- Securing machinery after voyage
- Shutting down machinery
- Storage and testing of LPG cylinders
- Testing of steering gear
- Types of pumps and safety devices

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, the required skills and knowledge, the range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

The evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the Elements, Performance Criteria, Required Skills, Required Knowledge and include:

- attention to appropriate level of detail in recordkeeping
- being aware of own ability and limits to rectify irregularities and faults.

Context of and specific resources for assessment

Performance is demonstrated consistently over time and in a suitable range of contexts.

Resources for assessment include access to:

- industry-approved marine operations site where operating and maintaining engines for auxiliary systems other than steam auxiliary systems can be conducted
- tools, equipment and personal protective equipment currently used in industry
- relevant regulatory and equipment documentation that impacts on work activities
- range of relevant exercises, case studies and/or other simulated practical and knowledge assessments
- appropriate range of relevant operational situations in the workplace.

In both real and simulated environments, access is required to:

- relevant and appropriate materials and equipment
- applicable documentation including workplace procedures, regulations, codes of practice and operation manuals.

Method of assessment

Practical assessment must occur in an:

- appropriately simulated workplace environment and/or
- appropriate range of situations in the workplace.

A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate to this unit:

- direct observation of the candidate operating and maintaining engines for auxiliary systems other than steam auxiliary systems
- direct observation of the candidate applying relevant WHS/OHS requirements and work practices.

Guidance information for assessment

Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

In all cases where practical assessment is used it should be combined with targeted questioning to assess Required Knowledge.

Assessment processes and techniques must be appropriate to the language and literacy requirements of the work being performed and the capacity of the candidate.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below.

Spares and stores may include:

- Appropriate oils and grease
- Cleaning material
- Machinery spare parts
- Shackles and other lifting equipment
- Tools, hand and power

Preparations and checks may include:

- Checking:
 - coolants levels
 - fuel level
 - filters
- Confirming correct pressures of auxiliary systems
- Dip oil
- Inspecting:
 - batteries and turn on isolator
 - for leaks and faults
 - safety guards, power take off stubs and shafts
- Lubrication
- Opening valves as appropriate
- Power leads
- Spares and stores
- Stowage of LPG cylinders

Flammable/explosive materials may include:

- Liquid fuels
- LPG
- Refrigerant gas

Engines and auxiliary systems may include:

- Auxiliary equipment and associated spaces
- Cooling systems
- Lubricating systems
- Marine two- and four-stroke diesel engines
- Paddle and shafting arrangements
- Propeller and immediate shafting alignment
- Pumping systems
- Refrigeration systems
- Steering systems

Environmental implications may include:

- Excessive noise and exhaust emissions
- Loss of fuel and oil overside

Emergency may include:

- Failure of the auxiliary engines
- Fire
- Flooding
- Loss of steering

Operational records may include:

- Maintenance logs
- Running logs

Maintenance requirements may include:

- Cleaning:
 - coolers
 - filters
- Greasing
- Maintaining emergency equipment
- Oiling
- Oily water separator
- Overhauling and repairing pumps
- Scheduled survey inspections
- Topping up oils

Unit Sector(s)

Not applicable.

Competency Field

Equipment Operations