



Australian Government

MARC3003A Operate and maintain a steam engine up to 750 kW and steam auxiliary equipment

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 a reciprocating steam engine up to 750 kW nominal propulsion power according to relevant workplace practices and codes of practice. It includes operating controls, monitoring performance and maintaining operational condition of reciprocating steam engines and steam 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

- | | |
|---|---|
| 1 Prepare vessel for sea | <ul style="list-style-type: none">1.1 Spares and stores on board are checked to ensure those required for proposed voyage are available1.2 Personal protective equipment (PPE) is selected for use1.3 Hazardous materials are stowed and managed according to regulatory and organisational requirements1.4 Work health and safety (WHS)/occupational health and safety (OHS) hazards and potential hazards in engine room are identified and corrective action is taken according to organisational practices1.5 Pre-start checks are conducted on machinery and equipment according to organisational procedures1.6 Means of communication between bridge and engine room are tested1.7 Engines are started according to vessel procedures and organisation safety management systems (SMS) |
| 2 Operate and monitor steam engine and steam auxiliary machinery | <ul style="list-style-type: none">2.1 Marine steam plant components are identified and operated according to organisational operating procedures2.2 Steam engine handling techniques are interpreted and applied to eliminate or minimise risk of injury to personnel or damage to equipment2.3 Steam plant controls are identified and operated safely according to organisational procedures and technical specifications2.4 Steam engine auxiliary equipment is monitored and operated to maintain optimum running conditions2.5 Operational faults are recognised, assessed and rectified according to organisational procedures2.6 Hazards and potential hazards are recognised and interpreted, and appropriate initiatives and action is taken to minimise risk to personnel and equipment according to workplace procedures and applicable regulatory requirements2.7 Operating log is maintained clearly and accurately according to statutory requirements |
| 3 Shut down steam engine | <ul style="list-style-type: none">3.1 Engine is shut down according to vessel procedures and organisation SMS3.2 Steam auxiliary systems are shut down according to vessel |

procedures and organisation SMS

3.3 **Documentation** is maintained according to workplace and organisational requirements

4 Carry out maintenance of steam plant

4.1 **Maintenance requirements** are identified, repairs are carried out and reported according to workplace procedures

4.2 Engine and auxiliary equipment is regularly inspected and maintained for maintenance according to statutory requirements and workplace procedures

4.3 Steam plant maintenance schedule is developed and implemented according to organisational planned maintenance system

Required Skills and Knowledge

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

Required Skills:

- Carry out lubrication processes on an item of steam plant
- Communicate effectively with others when operating and monitoring performance of an item of steam plant
- Complete documentation related to operating and monitoring performance of an item of steam plant
- Identify and assess steam plant defects and deficiencies, and take appropriate action to report, isolate, repair or replace identified defective equipment according to workplace procedures
- Implement contingency plans for emergency situations
- Monitor performance of an item of steam plant
- Operate an item of steam plant
- Read and interpret instructions, procedures, information and signs relevant to operating and monitoring an item of steam plant
- Recognise problems that may arise when operating and monitoring an item of steam plant and take appropriate action
- Select and use required PPE conforming to industry and WHS/OHS standards

Required Knowledge:

- Applicable legislation relating to steam plant and nationally approved compliance codes and/or guidelines and codes of practice
- Basic principles of steam plant operation, monitoring devices and auxiliary systems
- Methods for:
 - adjusting controls to maximise efficient and safe running
 - operating and monitoring performance of auxiliary steam plant equipment
 - identifying equipment defects and assessing them for appropriate action
- PPE required when operating an item of steam plant and procedures for its use
- Procedures for:
 - operating and monitoring an item of steam plant
 - managing safety incidents and hazardous situations that may arise when operating and monitoring performance of an item of steam plant
 - maintaining, cleaning, lubricating and servicing an item of steam plant
- Procedures to be followed in event of an emergency when operating an item of steam plant
- Relevant licensing, legislative, regulatory or certification requirements
- Relevant WHS/OHS and environmental procedures and regulations
- Requirements for completing relevant documentation during and after operation and monitoring of performance of an item of steam plant

- Steam plant controls, instruments and indicators and their purpose, location and use
- Typical problems that can occur with an item of steam plant and related action that should be taken to repair, isolate, replace, report and record faulty equipment

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
- providing required amount of detail in reports
- ensuring behaviour reflects relevant current legislative and regulatory requirements.

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 a steam engine up to 750 kW and steam auxiliary equipment 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 a steam engine up to 750 kW and steam auxiliary equipment
- 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.

Personal protective equipment may include:

- Chemical resistant gloves and apron
- Ear protection (muffs or plugs)
- Eye protection
- Fire-resistant clothing
- Hard hat head protection
- Respiratory devices
- Thermally insulated gloves
- Working protective gloves

Hazards and potential hazards may include:

- Chemical hazards
- Excessive noise
- Hot exposed pipes
- Lack of machinery guards
- Leakage of:
 - fuel
 - gas
- Manual handling hazards
- Obstructions and defects in work area
- Poor illumination of work area
- Rubbish and combustibles in work area
- Thermal hazards

Pre-start checks may include:

- Checks of cooling water supply and system
- Essential fittings
- Firefighting equipment
- Fuel supply/heat source system
- Identifying and managing hazards and maintenance problems
- Operation and position of steam engine valves
- Selecting PPE

Means of communication may include:

- Bell systems
- Telegraphs
- Voice pipe

Marine steam plant components may include:

- Boiler controls and safety devices
- Condensers
- Cylinder cocks
- Economisers
- Feed water controls
- Lubricators

Steam engine auxiliary equipment may include:	• Operational controls • Short stroke pump • Steam plant instrumentation (gauges) • Vacuum pumps • Valve gear • Blower • Feed water pump • Generator • Injectors • Valves • Water treatment systems • Whistle
Operating log may include:	• Chemical treatment • Maintenance/repair requirements • Status and operation • Test results • Time in use
Documentation may include:	• Emergency procedures instructions • Maintenance notices, records and requests • Operational: • instructions, policies and procedures • records and user log books
Maintenance requirements may include:	• Bilge pumps • Cooling water valves • Gauge glasses • Safety valves

Unit Sector(s)

Not applicable.

Competency Field

Equipment Operations