Australian Government

MARC3008A Operate engine equipment and associated propulsion plant

Release 1

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

MARC3008A Operate engine equipment and associated propulsion plant

Modification History

Release 1
This is the first release of this unit.

Unit Descriptor

This unit involves the skills and knowledge required to operate, monitor and evaluate engine performance and associated propulsion plant.

Application of the Unit

This unit applies to an Integrated Rating who assists in the operation engine equipment and associated propulsion plant as required on a range of vessels.

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 Plan and prepare work	1.1	***Safety issues*** are identified to comply with organisational procedures
	1.2	Work requirements of ***engine and plant*** are identified from relevant personnel and documentation
	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	Corrective actions are taken to rectify abnormalities according to manufacturer specifications and organisational procedures
	2.4	Faulty and worn engine equipment and components are identified and reported according to manufacturer specifications and organisational procedures
	2.5	Action is taken when an engine fails or ***emergencies*** occur to secure the engine or machinery and to maintain the safety of the 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	Cause of abnormal operating conditions are identified by analysing the technical and operational information in a logical and sequential manner
	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

Required Skills and Knowledge

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

Required Skills:

- Avoid polluting the environment
- Carry out calculations required when operating, monitoring and evaluating the performance of engines on vessels
- Identify problems that can occur during the operation of engines on vessels
- Interpret and follow procedures for the operation, monitoring and evaluation of the performance of engines on vessels
- Operate and maintain bilge and ballast systems according to manufacturer instructions and organisational procedures
- Read and interpret:
  - equipment performance readings and instrumentation
  - safety data sheets (SDS)/material safety data sheets (MSDS)
  - vessel and machinery specifications, machinery design drawings, machine drawings, operational manuals, specifications, and electrical and control circuit diagrams
- Recognise and report electrical hazards and unsafe equipment
- Select and use tools required for operating, monitoring and evaluating the performance of engines on vessels

Required Knowledge:

- 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
- National and international regulations, 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
- Principles and functions of machinery space monitoring and alarm systems
- Principles and operational characteristics of:

  - internal combustion engines
  - marine gas engines
  - steam turbines, gearing and associated equipment as they apply to auxiliary systems
  - auxiliary boilers and associated equipment
- Principles of:
  - fuel systems
  - engine cooling and lubrication
  - marine control systems
  - thermodynamics and heat and heat engines relevant to detection, identification and repair of faults
- Principles of operation of hydraulic and electronic governors and overspeed trips
- Relevant work health and safety (WHS)/occupational health and safety (OHS) legislation, policies and procedures
- 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
- Theory and preventative strategies for scavenge and uptake fires, and starting air-line, crankcase and gearbox explosions
- Typical SDS/MSDS, vessel and machinery specifications, machinery design drawings, machine drawings, operational manuals, specifications, and electrical and control circuit diagrams

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
- producing reliable documentation.

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 engine equipment and associated propulsion plant may be conducted or simulated
- 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 engine equipment and associated propulsion plant in actual or simulated emergency situations
- direct observation of candidate applying relevant WHS/OHS requirements and work practices.

Guidance information for

Holistic assessment with other units relevant to the industry

assessment	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.

Safety issues may include:	• 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
Engine and plant may include:	• 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
Engine and plant operational prerequisites may include:	• Anti-pollution rules and regulations • Bridge orders • Hazard control precautions and procedures • Safety rules and regulations • Survey requirements • Technical specifications
Emergencies may include:	• Scavenge and uptake fires • Starting air-line, crankcase and gearbox explosions
Tests may include:	• Auxiliary boiler water • Lubricating oil • Machinery cooling water

Unit Sector(s)

Not applicable.

Competency Field

Equipment Operations