



Australian Government

MARB3006A Maintain marine internal combustion engines, propulsion plant and auxiliary systems

Release 1

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Modification History

Release 1

This is the first release of this unit.

This unit replaces and is equivalent to TDMMB2907B Recognise and correct deteriorated fittings and machinery.

Unit Descriptor

This unit involves the skills and knowledge required to complete basic maintenance of marine internal combustion engines, propulsion plant and auxiliary systems.

Application of the Unit

This unit applies to engine workers in the maritime industry working as a Marine Engine Driver Grade 2 on vessels up to 750 kW.

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 maintenance activities | <ul style="list-style-type: none">1.1 Maintenance plan is accessed to determine <i>maintenance requirements</i> for <i>engines, propulsion plant and auxiliary systems</i>1.2 Inspections are conducted and additional non-routine maintenance requirements are determined1.3 Manufacturer specifications for machinery and equipment are obtained1.4 Tasks are planned and sequenced in conjunction with others involved in or affected by maintenance work1.5 <i>Consumables and equipment</i> are selected and checked for serviceability1.6 Maintenance plan is accessed to determine maintenance requirements for engines, propulsion plant and auxiliary systems |
| 2 Complete preventative maintenance | <ul style="list-style-type: none">2.1 Machinery and equipment is safely isolated according to work health and safety (WHS)/occupational health and safety (OHS) requirements and organisational practices2.2 WHS/OHS risk control measures and procedures for carrying out work are followed2.3 Work area is prepared2.4 Preventative maintenance is carried out in compliance with technical specifications2.5 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes2.6 Maintenance work is checked to verify that it conforms to technical specifications and complies with survey requirements where applicable |
| 3 Complete breakdown maintenance | <ul style="list-style-type: none">3.1 <i>Nature of breakdown</i> is confirmed using maintenance records and/or logbook entries related to reported breakdown3.2 Restrictions are applied to operations, where necessary, and Master is informed3.3 Machinery and equipment is safely isolated according to WHS/OHS requirements and organisational practices3.4 Repair work is carried out according to technical specifications |

- 3.5 Master is notified of completion of repair work and details are documented
- 4 **Complete hull maintenance**
 - 4.1 ***Checks of vessel hull, equipment and fittings*** are carried out according to maintenance schedules, survey requirements and vessel manufacturer instructions
 - 4.2 Deterioration in vessel structure, equipment and fittings is identified
 - 4.3 Checks on propeller, stern tube and rudder are carried out in accordance with organisational procedures, safety regulations and survey requirements
 - 4.4 WHS/OHS risk control measures and procedures for carrying out work are followed
 - 4.5 Work area is prepared
 - 4.6 Maintenance work is checked to verify it conforms to technical specifications and complies with survey requirements where applicable
- 5 **Clean up and complete documentation**
 - 5.1 Work area is cleared and cleaned
 - 5.2 ***Materials*** are disposed of or recycled according to legislative and workplace requirements
 - 5.3 Tools and equipment are cleaned, checked and stored according to workplace procedures
 - 5.4 Machinery and equipment is returned to service and monitored for correct operation according to organisational practices
 - 5.5 Maintenance report is completed according to workplace procedures

Required Skills and Knowledge

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

Required Skills:

- Apply safety requirements throughout the work sequence including the use of personal protective equipment (PPE)
- Complete:
 - all work to specification
 - basic user maintenance of marine internal combustion engine, propulsion plant and auxiliary systems to manufacturer specifications and survey requirements, so as to prevent pollution of the marine environment
 - maintenance records
- Implement safe and environmentally responsible work practices
- Plan maintenance activities according to technical, legislative, safety and procedural specifications
- Read and interpret manufacturer specifications and safety data sheets (SDS)/material safety data sheets (MSDS)
- Select and use appropriate processes, tools and equipment

Required Knowledge:

- Basic hydraulic systems and user maintenance requirements
- Basic vessel construction
- Bearing types, materials, installation and lubrication
- Common faults in:
 - steering gear
 - refrigeration systems
- Construction and maintenance of heat exchangers
- Correct pressure and flow conditions
- Corrosion prevention
- Coupling types, fitting, keys and keyways
- Cross connections between:
 - sea water systems and bilge systems
 - bilge/ballast/seawater systems and fire main
- Dangers associated with:
 - back-flooding and methods to prevent back-flooding
 - LPG and petrol vapours
- Dangers of refrigerant gas leaks in confined spaces
- Diesel engine

- construction
- fuel injection, timing and control equipment
- routine maintenance
- Engine:
 - fault finding techniques
 - performance and reasons for lack of performance
 - protection arrangements
- Electro-hydraulic steering gear
- Emergency steering systems
- Faults that can occur with firefighting equipment and systems
- Fire main system and components including pumps, hoses and nozzles
- Fixed firefighting systems and associated remote shut-offs and closing of appliances
- Heat exchanger, keel cooler and raw water cooling systems
- Glands, packing and seals
- Maintenance of watertight openings and hull fittings
- Marine gearbox faults and emergency operation
- Method of propulsion reversal including controllable pitch propeller construction
- Oil:
 - filter changing procedures
 - quality monitoring
- Planned maintenance
- Propeller types, fitting, keys and keyways, securing nuts , locking
- Pump capabilities and requirements for priming
- Refrigeration systems and components
- Relevant regulations and codes of practice relating to the maintenance of engineering equipment and systems such as firefighting
- Routine maintenance:
 - on steering systems
 - of refrigeration systems
- Rudder and stock bearing supports
- Rudder construction and rudder types
- Seawater circulating systems
- Shutting down machinery
- Statutory and organisational requirements for documentation relating to the maintenance of engineering equipment and systems such as firefighting
- Storage of LPG cylinders
- Testing of LPG detectors
- Tiller arm attachment

- Types of:
 - deck machinery
 - pumps and safety devices
- Wet sump lubrication systems

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:

- developing effective planning documents
- providing the required amount of detail in reports
- ensuring currency of relevant WHS/OHS skills and knowledge.

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 undertaking basic maintenance of marine internal combustion engines, propulsion plant and 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 undertaking basic maintenance of marine internal combustion engines, propulsion plant and 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.

Maintenance requirements may include:

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

Engines, propulsion plant and auxiliary systems may include:

- Auxiliary equipment and associated spaces
- Cooling systems
- Deck machinery
- Fixed firefighting systems
- Fuel systems
- Gearbox
- Hull fittings
- Lubricating systems
- Marine two- and four-stroke:
 - diesel engines
 - petrol engines
- Propeller and immediate shafting alignment
- Pumping systems
- Refrigeration systems
- Steering systems
- Sterndrive and water jet drive units

Consumables and equipment may include:

- Cleaning chemicals
- Coolants
- Hand and power tools
- Oils and grease
- Refrigerant gas
- Replacement parts
- Test equipment

Nature of breakdown may include:

- Cooling water system failure
- Engine failure

Checks of vessel hull, equipment and fittings may include:

Materials may include:

- Exhaust systems
- Fuel system failure
- Gearbox failure
- Lubricating systems failure
- Power plant failure
- Propeller and shafting arrangements
- Pumping systems failure
- Refrigeration plant failure
- Steering gear failure
- Anodes
- Intake grates
- Keel coolers
- Ship side valves
- Watertight hatches and openings
- Rags
- Spent oil

Unit Sector(s)

Not applicable.

Competency Field

Equipment Checking and Maintenance