



Australian Government

MARB014 Maintain and repair shipboard machinery and equipment

Release: 1

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Modification History

Release 1. New unit of competency.

Application

This unit involves the skills and knowledge required to maintain and repair shipboard machinery and equipment on a vessel. This includes maintaining marine pumps, valves, air compressors, heat exchangers, diesel engines, turbochargers, marine lubricating systems and deck machinery as well as conducting inspections of marine boilers and marine refrigeration units.

This unit applies to the work of a Marine Engineer Class 3 Near Coastal.

This unit has links to legislative and certification requirements.

Pre-requisite Unit

Not applicable.

Competency Field

B – Equipment Checking and Maintenance

Unit Sector

Not applicable.

Elements and Performance Criteria

Elements describe the essential outcomes.

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

1 Follow safe work practices

- 1.1 Work health and safety (WHS)/occupational health and safety (OHS) procedures relevant to maintaining shipboard machinery and equipment are complied with
- 1.2 Safety hazards are identified and reported according to safety and vessel procedures
- 1.3 Prior to use, tools, equipment and testing devices needed to carry out maintenance activities for correct operation and safety are checked according to safety and vessel procedures

- 1.4 Before commencing maintenance activities, isolation precautions are implemented according to safety and vessel procedures
- 2 Maintain marine pumps**
- 2.1 Maintenance requirements for pump are determined according to safety, manufacturer and vessel procedures and documentation
- 2.2 Appropriate procedures, materials, tools and equipment for maintaining pump are selected according to safety, manufacturer and vessel procedures
- 2.3 Relevant information is extracted from drawings and technical specifications required to perform maintenance activities
- 2.4 Pump is disassembled, inspected and serviced according to safety, manufacturer and vessel procedures
- 2.5 Pump is reassembled and tested according to safety, manufacturer and vessel procedures
- 2.6 Performance of pump is confirmed against recommended performance specifications according to safety, manufacturer and vessel procedures
- 3 Maintain valves**
- 3.1 Maintenance requirements for valve are determined according to safety, manufacturer and vessel procedures and documentation
- 3.2 Appropriate procedures, materials, tools and equipment for maintaining valve are selected according to safety, manufacturer and vessel procedures
- 3.3 Relevant information is extracted from drawings and technical specifications required to perform maintenance activities
- 3.4 Valves are removed for maintenance according to safety, manufacturer and vessel procedures and documentation
- 3.5 Valve is disassembled and valve maintenance is performed according to safety, manufacturer and vessel procedures and documentation
- 3.6 Valves are reassembled and tested according to safety, manufacturer and vessel procedures and documentation
- 4 Maintain air**
- 4.1 Maintenance requirements for air compressor are determined

compressors	according to safety, manufacturer and vessel procedures and documentation
4.2	Appropriate procedures, materials, tools and equipment for maintaining air compressor are selected according to safety, manufacturer and vessel procedures
4.3	Relevant information is extracted from drawings and technical specifications required to perform maintenance activities
4.4	Air compressor is disassembled and inspected according to safety, manufacturer and vessel procedures
4.5	Air compressor is reassembled, tested and adjusted according to safety, manufacturer and vessel procedures
4.6	Performance of air compressor is confirmed against recommended performance specifications according to safety, manufacturer and vessel procedures
5 Maintain heat exchangers	5.1 Maintenance requirements for heat exchanger are determined according to safety, manufacturer and vessel procedures and documentation
5.2	Appropriate procedures, materials, tools and equipment for maintaining heat exchanger are selected according to safety, manufacturer and vessel procedures
5.3	Relevant information is extracted from drawings and technical specifications required to perform maintenance activities
5.4	Heat exchanger is disassembled and inspected according to safety, manufacturer and vessel procedures
5.5	Heat exchanger is reassembled, tested and adjusted according to safety, manufacturer and vessel procedures
5.6	Performance of heat exchanger is confirmed against recommended performance specifications according to safety, manufacturer and vessel procedures
6 Maintain diesel engines	6.1 Maintenance requirements for diesel engine are determined according to safety, manufacturer and vessel procedures and documentation
6.2	Appropriate procedures, materials, tools, measuring instruments and equipment for maintaining diesel engine are selected according to safety, manufacturer and vessel

procedures

- 6.3 Relevant information is extracted from drawings and technical specifications required to perform maintenance activities
- 6.4 Diesel engine components are disassembled and inspected for wear and deterioration according to safety, manufacturer and vessel procedures
- 6.5 Routine maintenance on diesel engines is performed according to manufacturer and vessel procedures
- 6.6 Diesel engine components are refurbished, as required, according to manufacturer and vessel procedures
- 6.7 Specialised tools and measuring instruments are used to maintain and refurbish diesel engines/components according to safety, manufacturer and vessel procedures
- 6.8 Diesel engine is reassembled, tested and adjusted according to safety, manufacturer and vessel procedures
- 6.9 Performance of diesel engine is confirmed against recommended performance specifications according to safety, manufacturer and vessel procedures

7 Maintain turbochargers

- 7.1 Maintenance requirements for turbocharger are determined according to safety, manufacturer and vessel procedures and documentation
- 7.2 Appropriate procedures, materials, tools and equipment for maintaining turbocharger are selected according to safety, manufacturer and vessel procedures
- 7.3 Relevant information is extracted from drawings and technical specifications required to perform maintenance activities
- 7.4 All components of turbocharger are disassembled and inspected for wear and deterioration according to safety, manufacturer and vessel procedures
- 7.5 Turbocharger is reassembled, tested and adjusted according to safety, manufacturer and vessel procedures
- 7.6 Performance of turbocharger is confirmed against recommended performance specifications according to safety, manufacturer and vessel procedures

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| 8 Inspect marine boilers | <p>8.1 Inspection requirements for marine boiler are determined according to safety, manufacturer and vessel procedures and documentation</p> <p>8.2 Appropriate procedures for inspecting marine boiler are selected according to safety, manufacturer and vessel procedures</p> <p>8.3 Relevant information is extracted from drawings and technical specifications required to perform inspection activities</p> <p>8.4 Marine boiler is inspected for repair or general maintenance according to safety, manufacturer and vessel procedures</p> <p>8.5 Performance of marine boiler is confirmed against recommended performance specifications according to safety, manufacturer and vessel procedures</p> |
| 9 Inspect marine refrigeration units | <p>9.1 Inspection requirements for marine refrigeration unit are determined according to safety, manufacturer and vessel procedures and documentation</p> <p>9.2 Appropriate procedures for inspecting marine refrigeration unit are selected according to safety, manufacturer and vessel procedures</p> <p>9.3 Relevant information is extracted from drawings and technical specifications required to perform inspection activities</p> <p>9.4 Marine refrigeration unit is inspected for repair or general maintenance according to safety, manufacturer and vessel procedures</p> <p>9.5 Performance of marine refrigeration unit is confirmed against recommended performance specifications according to safety, manufacturer and vessel procedures</p> |
| 10 Maintain marine lubricating systems | <p>10.1 Inspection and maintenance requirements for lubricating systems are determined according to safety, manufacturer and vessel procedures and documentation</p> <p>10.2 Relevant information is extracted from drawings and technical specifications required to perform inspection and maintenance activities</p> <p>10.3 Purifier maintenance procedures are applied according to safety, manufacturer and vessel procedures</p> |

- 10.4 Components of lubricating system are inspected according to safety, manufacturer and vessel procedures
- 11 Maintain and repair deck machinery**
- 11.1 Maintenance and/or repair requirements for deck machinery are determined according to safety, manufacturer and vessel procedures and documentation
- 11.2 Appropriate procedures, materials, tools and equipment for maintaining and/or repairing deck machinery are selected according to safety, manufacturer and vessel procedures
- 11.3 Relevant information is extracted from drawings and technical specifications required to perform maintenance activities
- 11.4 Deck machinery maintenance and/or repair procedures are implemented according to safety, manufacturer and vessel procedures
- 11.5 Deck machinery is tested and adjusted according to safety, manufacturer and vessel procedures
- 11.6 Performance of deck machinery is confirmed against recommended performance specifications according to safety, manufacturer and vessel procedures

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Specifies different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Pumps include one or more of the following:	• axial • centrifugal • gear • reciprocating • screw
Serviced includes one or more of the following:	• dismantling rod and gears, seals, bearings and relief valve • identifying wear and deterioration • measuring wear in cylinders, neck rings and rods • protecting finished surfaces • removing: • gland packing • studs, intact and broken • replacing and adjusting seals
Valves include one or more of the following:	• ball • butterfly • check • diaphragm • gate • globe: • screw down non return • screw lift
Valve maintenance include one or more of the following :	• examining seats, valves, spindles and glands • gland packing: • selection • removal • repacking • lapping valves and seats • machining valves and seats
Air compressor is disassembled and inspected include one or more of the following:	• coolers and cooling passages • lubricating systems • piston and rings • suction and delivery valves and seats
Heat exchanger is	• corrosion

disassembled and inspected include one or more of the following:

- erosion
- fouling
- leakage
- provision for tube expansion

Diesel engine components are disassembled and inspected include one or more of the following:

- bearings
- cooling system
- crankshaft alignment
- liners
- lubrication system
- pistons
- rings
- valves

Routine maintenance on diesel engines include one or more of the following:

- air intake system:
 - inspecting and changing air filters
 - inspecting turbocharger to make sure there is no fouling of compressor blades from crankcase gases
- cooling system
 - fluid level checks
 - coolant sampling for trending analysis
 - draining, flushing and refilling system when required
- emissions systems:
 - inspecting crankcase ventilation systems, selective catalytic reduction (SCR) systems and diesel particulate filters (if so equipped)
- exhaust system:
 - inspecting for leaks, corrosion, wet stacking
- fuel system:
 - changing fuel filters, fuel injectors
 - checking water separators
- lubrication:
 - checking levels
 - changing oil, oil filters
 - taking oil samples for trending analysis to optimise oil change intervals and to detect engine wear
- mechanical systems:
 - inspecting resilient engine mounts and torsional couplings
 - generally inspecting for leaks, wear or deterioration
- operating systems:

- downloading data from digital engine management system to note and review alarm conditions
- valves and heads:
 - inspecting, adjusting and recording valve train wear for trending analysis
 - inspecting and recording cylinder head wear for trending analysis

Diesel engine components are refurbished include one or more of the following:

- air start valves
- cylinder heads
- exhaust valves
- fuel injectors
- relief valves

Components of turbocharger include one or more of the following:

- air casing
- air filters
- bearings
- diffuser
- gas inlet grid
- impeller
- inducer
- nozzle ring
- rotor
- volute

Inspection requirements for marine boiler include one or more of the following:

- fire side
- water side

Inspection requirements for marine refrigeration unit include one or more of the following:

- compressors
- condensers
- evaporators
- expansion valves
- oil separators

Components of lubricating system include one or

- settling tank
- system bearings

more of the following:

- system filters

Deck machinery includes
one or more of the
following:

- cranes
- lifeboat davits and gear
- mooring winch
- winch
- windlass

Unit Mapping Information

This is a new unit. This unit is equivalent to MARB5002A Maintain and repair shipboard machinery and equipment.

Links

Companion Volume implementation guides are found in VETNet -
<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=772efb7b-4cce-47fe-9bbd-ee3b1d1eb4c2>