



Australian Government

MARL023 Demonstrate basic knowledge of ship operation and maintenance

Release: 1

MARL023 Demonstrate basic knowledge of ship operation and maintenance

Modification History

Release 1. New unit of competency.

Application

This unit involves the skills and knowledge required to ensure that vessels comply with regulatory and survey requirements as well as maintenance and repair procedures associated with satisfying maintenance of Class.

This unit applies to the work of a Marine Engineer Class 2 on commercial vessels greater than 3000 kW and forms part of the requirements for the Certificate of Competency Marine Engineer Class 2 issued by the Australian Maritime Safety Authority (AMSA).

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

L – Marine Engineering

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 Identify regulatory environment for shipping operations

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| 1.1 | Function of the International Maritime Organization (IMO) is outlined, how recommendations are adopted through maritime legislation is explained and areas of exemption for local and international shipping are identified |
| 1.2 | International maritime law embodied in international agreements and conventions is identified |
| 1.3 | Application of the International Labour Organization (ILO) Convention to dockyard and shipboard practices is explained |

- 1.4 Flag State responsibilities are explained
- 1.5 Purpose of the Navigation Act, Marine Notices, Marine Orders, Port State Control and other methods of implementing international agreements and conventions is clarified
- 1.6 Purpose of insurance underwriters and Protection and Indemnity (P & I) Clubs is clarified
- 1.7 Function of Classification Societies and their involvement with Flag States with Memorandum of Agreement is outlined
- 1.8 ISM Code is applied to ship operation and maintenance
- 1.9 Requirement for crew training for emergency response, administration, operation and maintenance to Standards of Training Certification and Watchkeeping (STCW) requirements is explained
- 2 Prepare for surveys**
 - 2.1 Areas covered by classification surveys are identified
 - 2.2 Reasons for class withdrawal are clarified and condition of class are explained
 - 2.3 Continuous, alternative and special surveys, terms of survey and survey frequency are outlined
 - 2.4 Differentiation is made between planned maintenance and condition monitoring for machinery
 - 2.5 Safe practices for preparing compartments for survey, including pressure testing are identified
 - 2.6 Tail shaft surveys are outlined and planned
 - 2.7 Pressure vessels and boiler surveys outlined and planned
 - 2.8 Machinery and hull layup methods are specified
- 3 Explain survey requirements**
 - 3.1 Statutory survey requirements for convention and non-convention vessels are identified
 - 3.2 Documentation and records essential for compliance with statutory surveys, legislation and measures are identified to ensure protection of the marine environment and safety of life at sea
 - 3.3 Load line measurements and freeboard assignment are

explained

- 3.4 Conditions of freeboard assignment, tests, common faults and repairs are identified
 - 3.5 Maintenance and repair responsibilities are identified to satisfy safety construction surveys
 - 3.6 Common defects, tests and preparations are identified to satisfy safety equipment surveys
 - 3.7 International Convention for the Prevention of Pollution from Ships (MARPOL) survey requirements, including precautions to be taken to prevent pollution of the marine environment are clarified and how compliance with MARPOL is fully observed is explained
 - 3.8 Survey requirements for cargo ship safety construction, safety equipment and safety radio certificates; passenger ship safety certificates; chemical tanker and gas carrier certificates of fitness are clarified
 - 3.9 Port State Control is explained
 - 3.10 Substandard ship and factors causing ship detention are identified
- 4 Assess influences on vessel stability**
- 4.1 Basic theories and factors affecting trim and stability as well as measures necessary to preserve trim and stability are explained
 - 4.2 IMO recommendations concerning ship stability are identified
 - 4.3 Influences causing change of centre of gravity are explained and action to be taken in the event of partial loss of intact buoyancy, free surface and Angle of Loll is specified
 - 4.4 Consequences of cargo movement, including bulk and deck cargo is outlined
 - 4.5 Stability documentation required for different ship types to satisfy safety of life at sea (SOLAS) is identified
 - 4.6 Intact and damage stability criteria are explained
 - 4.7 Damage control procedures and assessment following collision or grounding are specified to ensure watertight integrity of a ship is according to accepted practice

	4.8	Stability requirements for routine dry-docking are identified
5 Outline procedures for maintenance and repairs of hull, pumping systems, propellers, machinery and other items satisfying maintenance of Class	5.1	Properties and repair techniques are identified for ordinary and high tensile hull grades of steel including underwater repair work
	5.2	Means of minimising and controlling both internal and external hull corrosion are identified
	5.3	Repair techniques for various propeller materials are outlined
	5.4	Drainage arrangements and connections to other systems of spaces outside the engine room are explained
	5.5	Ballast main connections to fore and after peak tanks are outlined and procedure for filling and emptying tanks is clarified
	5.6	Means of testing performance of shipboard pumping systems is identified
	5.7	Common faults and ways of assessing condition of shipboard pumping systems are determined
	5.8	Machinery condition monitoring and planned maintenance systems are identified
	5.9	Hull life extension surveys and enhanced survey requirements for tankers and bulkships are outlined
6 Explain function of International Maritime Dangerous Goods (IMDG) Code	6.1	IMDG Code is applied to prepare action plans for emergency situations
	6.2	Common hazards of shipboard enclosed spaces are identified and suitable strategies, including compartment re-entry, following extinction of fire, are planned
	6.3	Methods of testing enclosed space atmospheres are identified and limits of exposure to common hazards confirmed
	6.4	Requirements of ordering and taking bunkers as well as discharging to shore side reception facilities, are specified
7 Outline dry-dock and in-water bottom survey responsibilities of engineering staff	7.1	Procedures for planning and implementing dry-docking and in-water bottom surveys are clarified
	7.2	Responsibilities for engineering personnel associated with planning and implementing dry-docking and in-water bottom surveys are detailed

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| | 7.3 | Dry-dock and in-water hull cleaning methods are compared and contrasted |
| | 7.4 | Dry-dock refloating criteria and responsibilities of engineering staff are outlined |
| | 7.5 | Preservation and maintenance requirements for extended layup of vessel, and inspection and tests required on reactivation are outlined |
| 8 Outline maintenance, repair and safe working practices associated with lifting and life saving equipment | 8.1 | Safe working practices applicable to cranes, chain blocks, items of loose gear and other lifting equipment are identified |
| | 8.2 | Safety and protective devices used in conjunction with lifting gear are identified |
| | 8.3 | Means of testing and adjusting lifting gear are confirmed |
| | 8.4 | Legislative and regulatory requirements for inspection, storage and maintenance of lifting gear are outlined |
| | 8.5 | Purposes and procedures involved in annual and quadrennial surveys of cargo gear are clarified |
| | 8.6 | Procedures for safe working load (SWL) and proof load tests, including lifeboat launching gear are clarified |
| | 8.7 | Safe working practices applicable to rigging and lifting heavy items during maintenance and repair are identified |
| | 8.8 | Installation, operation, maintenance of lifesaving appliances and launching equipment is outlined |
| | 8.9 | Safety and protective devices associated with lifesaving appliances and launching equipment are confirmed |
| 9 Outline operation of an inert gas system for a tanker | 9.1 | Construction, operation and maintenance of individual components of inert gas system (IGS) are explained |
| | 9.2 | Mandatory controls, alarms and cut-outs are identified |
| 10 Apply leadership and management skills | 10.1 | Shipboard personnel management and training requirements are explained in relation to engineering operations |
| | 10.2 | Procedures for managing personal and crew workload in relation to marine engineering functions are clarified |
| | 10.3 | Effectiveness of resource management in relation to engineering functions is assessed |

- 10.4 Decision-making techniques appropriate to engineering functions are explained
- 10.5 Processes for developing, implementing and maintaining standard operating procedures relevant to marine engineering functions are explained

Foundation Skills

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

Range of Conditions

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

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| International maritime law includes one or more of the following: | <ul style="list-style-type: none">• ASM Code• certificates and other documents to be carried on board ships by international conventions• International Convention for the Prevention of Pollution from Ships• International Convention for the Safety of Life at Sea 1974• International Convention on Load Lines 1966• International Health Regulations• international instruments affecting safety of ships, passengers, crew or cargo• STCW |
| Areas covered by classification surveys include one or more of the following: | <ul style="list-style-type: none">• automation• boilers/pressure vessels• cargo gear• hull• machinery• specific notations• tail shaft |
| Minimising and controlling both internal and external hull corrosion includes one or more of the following: | <ul style="list-style-type: none">• cathodic protection• coating systems• surface preparation techniques |

Other systems of spaces outside the engine room include one or more of the following:

- holds
- pump rooms
- spaces forward of the collision bulkhead

Shipboard pumping systems include one or more of the following:

- ballast systems
- bilge systems

Heavy items include one or more of the following:

- hatches
- stern doors
- other large movable structures

Unit Mapping Information

This unit replaces and is equivalent to MARL6010A Demonstrate basic knowledge of ship operation and maintenance.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=772efb7b-4cce-47fe-9bbd-ee3b1d1eb4c2>

Assessment Requirements for MARL023 Demonstrate basic knowledge of ship operation and maintenance

Modification History

Release 1. New unit of competency.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- accessing information required to undertake duties in routine and emergency situations
- applying relevant work health and safety/occupational health and safety (WHS/OHS) requirements and work practices
- assessing own work outcomes and maintaining knowledge of current codes, standards, regulations and industry practices
- ensuring currency of relevant legislative and regulatory knowledge
- identifying and determining appropriate ways of responding to malfunctions and emergency situations in daily operations
- identifying methods and procedures needed to implement dry-docking and other duties on commercial vessels
- identifying, interpreting and processing numerical and graphical information required to undertake duties in routine and emergency situations
- imparting knowledge and ideas through verbal, written and visual means
- planning and organising resources needed to establish and maintain safety management systems on a tanker or gas carrier
- reading and interpreting written instructions, procedures and information relevant to duties of a Marine Engineer Class 2.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- centre of gravity
- classification societies
- dry-dock and in-water bottom surveys
- enclosed spaces
- flag State responsibilities
- IMDG code
- inert gas system for tankers
- key international and Australian standards relating to shipping
- key shipping authorities and organisations
- maintenance and repairs of lifting and life saving equipment
- maintenance and repairs of hull, pumping systems, propellers, machinery and other items satisfying maintenance of class
- maintenance, repair and safe working practices associated with lifting and life saving equipment
- maritime communication techniques
- Port State Control
- regulatory environment for shipping operations
- relevant sections of maritime regulations, codes and conventions related to tankers and gas carriers
- safety of life at sea (SOLAS)
- survey requirements
- terminology relating to the structure, capacities and operations of various types of tankers and gas carriers
- types of ships and key features of ships
- vessel stability
- WHS/OHS legislation and policies.

Assessment Conditions

Assessors must satisfy National Vocational Education and Training Regulator (NVR)/Australian Quality Training Framework (AQTF) assessor requirements.

Assessment must satisfy the National Vocational Education and Training Regulator (NVR)/Australian Quality Training Framework (AQTF) standards.

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

Assessment must occur in workplace operational situations or where these are not available, in simulated workplace operational situations or an industry-approved marine operations site that replicates workplace conditions where basic knowledge of ship operation and maintenance can be demonstrated.

Resources for assessment include access to:

- applicable documentation including workplace procedures, regulations, codes of practice and operation manuals
- appropriate range of relevant operational situations in the workplace
- technical reference library with current publications on ship operation and maintenance
- tools, equipment, materials and personal protective equipment currently used in industry.

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

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