



Australian Government

MARL024 Demonstrate intermediate knowledge of marine auxiliary boilers

Release: 1

MARL024 Demonstrate intermediate knowledge of marine auxiliary boilers

Modification History

Release 1. New unit of competency.

Application

This unit involves the skills and knowledge required to operate and maintain marine auxiliary boilers on a commercial vessel. This includes analysing the responsibilities of an Engineer Class 2 in relation to auxiliary boiler and steam plant of a vessel, the design of marine auxiliary boilers, the operation of thermal fluid heating plants, the layout of marine stem systems and components, and procedures for inspecting marine auxiliary boilers and associated plant.

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 Outline responsibilities of an Engineer Class 2 in relation to auxiliary boiler and steam plant of a vessel

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| 1.1 | Commonwealth, state/territory and local legislation and regulations that relate to marine boilers and steam plant in terms of safety, repairs and pollution, including implementation, is identified |
| 1.2 | Safe operating practices for all steam plant are examined and standing orders as to their operation are prepared or modified |

	1.3	Procedure for establishing engine room staff who are fully conversant with safe practices for boiler operation is outlined
2 Evaluate design and construction of marine auxiliary boilers	2.1	Typical boiler types illustrating cross section, attachments and location of all fittings, mountings, scantlings and method of achieving circulation are examined
	2.2	Material requirements for boiler components are identified
	2.3	Construction of different types of boilers is analysed and difference recorded
3 Evaluate design and operation of thermal fluid heating plants	3.1	Different gauge glass types are compared
	3.2	Typical thermal fluid heating plant is explained and advantages and limitations of the system are identified
	3.3	Locations and functions of all fittings and safety devices in a typical thermal fluid system are explained
	3.4	Properties of thermal fluid, effects of contamination and methods of testing fluid are analysed
4 Evaluate layout and design of marine steam systems and components	4.1	Thermal fluid heating is compared to conventional steam plant
	4.2	Typical steam system layout showing location of all components on feed and heating side is detailed
	4.3	Material requirements for steam system components are identified
	4.4	Reasons for operating plant and systems at nominated temperatures and pressures, and effects of departing from these parameters are explained
5 Outline procedure for inspecting marine auxiliary boilers and associated plant	5.1	Symptoms of faults in steam traps, hot wells, de-aerators, condensers, evaporators and requirements for contamination prevention between systems, are analysed
	5.2	Procedure for shutting down, isolating and opening up a boiler for inspection or during an emergency is clarified
	5.3	Possible defects that may occur in a boiler, fire and water side, their location and effects are analysed
	5.4	Repair procedures commonly employed for damaged boilers are examined and limitations of such repairs are explained

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| | 5.5 | Procedures for leak detecting in boilers and steam equipment are clarified and remedial actions are explained |
| | 5.6 | Mechanism of economiser fires are analysed |
| 6 Differentiate between safety valves types | 6.1 | Procedure for detecting economiser fires, actions for controlling after occurrence and preventative measures are clarified |
| | 6.2 | Common types of boiler safety valves are analysed and sketched, and how they are classified in terms of valve lift is explained |
| | 6.3 | Materials used in safety valves are identified and operational problems that can occur are analysed |
| | 6.4 | Procedure for setting valve lift pressure is established and precautions necessary when testing valve on fired and non-fired boilers are examined |
| 7 Evaluate problems associated with feed and boiler water | 7.1 | Defects that may be found when dismantling a safety valve for survey are analysed |
| | 7.2 | Causes of scaling and corrosion of water side of a boiler and how these can be minimised are analysed |
| | 7.3 | Acceptable operational range and effects of contamination on boiler chemical reserves are identified |
| | 7.4 | Reliability of boiler water test results are analysed in relation to sampling procedure, testing equipment and shelving of test chemicals |
| | 7.5 | Different tests carried out on boiler water are explained and implications of out-of-range results are interpreted |
| | 7.6 | Use of different chemicals to treat and condition boiler water is assessed |
| 8 Evaluate marine fuel systems | 8.1 | Procedure to be adopted when boiler is severely contaminated from different sources is outlined |
| | 8.2 | Boiler fuel system, its components and maintenance procedure are detailed |
| | 8.3 | Combustion process, its monitoring system and requirements for good combustion are analysed |
| | 8.4 | Different types of burners are compared and contrasted and |

how atomisation is achieved is explained

- 8.5 Operation of a burner management system that incorporates pressure and level control is 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.

- Marine boilers and steam plant include one or more of the following:
- condensers
 - economiser
 - feed pumps
 - fired
 - high pressure
 - low pressure
 - medium pressure
 - steam – steam generators
 - unfired

Unit Mapping Information

This unit replaces and is equivalent to MARL6011A Demonstrate intermediate knowledge of marine auxiliary boilers.

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 MARL024 Demonstrate intermediate knowledge of marine auxiliary boilers

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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 related to marine auxiliary boilers
- 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
- identifying and applying relevant solutions for addressing problems associated with marine auxiliary boilers
- identifying and interpreting diagnostic information, and performing mathematical calculations related to operating, maintaining and repairing marine auxiliary boilers
- identifying methods, procedures and materials needed for operating, maintaining and repairing marine auxiliary boilers
- imparting knowledge and ideas through verbal, written and visual means
- reading and interpreting manuals, technical specifications, safety data sheets/material safety data sheets and manufacturer guides related to operating, maintaining and repairing marine auxiliary boilers.

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:

- basic principles of operation of boilers and steam systems
- combustion in boilers and related safety procedures, including importance of purging a boiler and other safety precautions taken when firing a boiler
- common boiler defects and repair procedures
- fittings mounted on boilers
- fuel oil system for an auxiliary boiler
- hazards associated with running boiler plant
- intermediate operation of marine auxiliary boilers
- marine boiler inspection procedures
- operating principles relating to steam generation in fired and unfired boilers
- principles of boiler operation in normal and emergency situations
- procedures for maintaining water level in boilers
- purpose of alarms and shut downs in marine boilers
- safety valves
- treatment, sampling and testing of feed and boiler water
- types of auxiliary boilers, and typical operating pressures and temperatures
- typical feed systems for marine boilers
- WHS/OHS legislation, policies and procedures.

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 intermediate knowledge of marine auxiliary boilers can be demonstrated.

Resources for assessment include access to:

- applicable documentation including workplace procedures, regulations, codes of practice and operation manuals
- diagrams, specifications and other information related to marine auxiliary boilers
- technical reference library with current publications on basic marine auxiliary boilers
- tools, equipment, materials and personal protective equipment currently used in industry required to operate and maintain marine auxiliary boilers.

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

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