



Australian Government

MARL5005A Demonstrate basic knowledge of marine auxiliary boilers

Release 1

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Modification History

Release 1

This is the first release of this unit.

Unit Descriptor

This unit involves the knowledge required to operate and maintain marine auxiliary boilers on a commercial vessel.

Application of the Unit

This unit applies to the work of Marine Engineering Watchkeepers on commercial vessels greater than 750 kW and forms part of the requirements for the Certificate of Competency Marine Engineer Watchkeeper issued by the Australian Maritime Safety Authority (AMSA).

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

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| 1 Distinguish between different types of auxiliary boilers | <ul style="list-style-type: none">1.1 Design and use of water tube and fire tube auxiliary boilers are compared and contrasted1.2 Movement of water and gas in an operating boiler is sketched1.3 How variations to operating pressure and saturation temperature in an auxiliary boiler can be used to get wet, dry or superheated steam is explained |
| 2 Recognise different functions of steam and different components of steam systems | <ul style="list-style-type: none">2.1 Key features of steam and other heating systems are compared and contrasted2.2 Steam side requirements of an auxiliary steam turbo alternator are compared and contrasted with other steam-powered machinery2.3 Typical steam and condensate system is outlined |
| 3 Explain fuel oil system of auxiliary boilers | <ul style="list-style-type: none">3.1 Combustion process is explained and factors that affect combustion in a boiler are outlined3.2 Differentiation is made between different burner types3.3 Operation of a complete fuel oil system for an auxiliary boiler including the functions of components for automatic combustion control is outlined |
| 4 Explain procedure for operating fired and unfired boilers | <ul style="list-style-type: none">4.1 Locations of all <i>mountings and fittings on auxiliary boilers</i> are identified and their functions are outlined4.2 Purpose of all alarms and shut downs incorporated in auxiliary boilers is clarified4.3 Types and operation of safety valves are outlined4.4 Procedure for lighting off a boiler from cold is clarified4.5 Procedure for laying up for short and long periods including full blow down and shut down procedures is clarified4.6 Procedure for isolating an auxiliary boiler after shut down is clarified |
| 5 Explain procedure for sampling and testing boiler water | <ul style="list-style-type: none">5.1 Effects of poor water treatment practices on safety and boiler function are identified5.2 Correct procedure for taking boiler and feed water sample and possible errors that might occur are clarified5.3 Common water tests carried out are outlined and typical results are |

- stated
- 5.4 Chemicals used for treatment of boiler water are named and acceptable range of chemical reserves found in boiler waters are confirmed
- 6 Explain procedure for maintaining water level in the boiler**
- 6.1 Method of testing and changing a gauge glass is outlined
- 6.2 Effects of blockages in water, steam and drain cocks on levels in gauge glass are outlined
- 6.3 Procedure for when a gauge glass apparently shows no water is clarified
- 7 Explain common hazards and defects and relevant prevention/control procedures**
- 7.1 ***Hazards and defects*** associated with auxiliary boilers are identified
- 7.2 How water hammer can be prevented in auxiliary boilers is outlined
- 7.3 Symptoms, causes, effects and actions to be taken in the event of oil contamination of boiler water are determined
- 7.4 Difference between and measures taken to avoid, fire and water side explosions, are clarified
- 7.5 Causes, mechanism, prevention and control of economiser fires are detailed

Required Skills and Knowledge

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

Required Skills:

- Access information related to marine auxiliary boilers
- Assess own work outcomes and maintain knowledge of current codes, standards, regulations and industry practices
- Explain basic operation of marine auxiliary boilers
- Identify and apply relevant solutions for addressing problems associated with marine auxiliary boilers
- Identify and interpret diagnostic information and perform mathematical calculations related to operating, maintaining and repairing marine auxiliary boilers
- Identify methods, procedures and materials needed for operating, maintaining and repairing marine auxiliary boilers
- Impart knowledge and ideas through verbal, written and visual means
- Read and interpret manuals, technical specifications, safety data sheets/material safety data sheets and manufacturer guides related to operating, maintaining and repairing marine auxiliary boilers

Required Knowledge:

- 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
- Fuel oil system for an auxiliary boiler
- Fittings mounted on boilers
- Hazards associated with running boiler plant
- 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
- Treatment, sampling and testing of boiler water
- Types of auxiliary boilers and typical operating pressures and temperatures
- Typical feed systems for marine boilers
- Work health and safety (WHS)/occupational health and safety (OHS) legislation, policies and procedures

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:

- providing accurate and reliable information
- providing appropriate level of detail in responses.

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 basic knowledge of marine auxiliary boilers can be demonstrated
- diagrams, specifications and other information required for performing basic calculations related to marine auxiliary boilers
- technical reference library with current publications on basic marine auxiliary boilers
- 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 demonstrating basic

knowledge of marine auxiliary boilers

- 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.

Mountings and fittings on auxiliary boilers may include:

- Air release cock
- Auxiliary steam stop valve
- Blow down valve
- Feed check or control valve
- Main steam stop valve
- Pressure gauge connection
- Safety valves
- Sampling connection
- Scum valve
- Water level gauge
- Whistle stop valve

Hazards and defects may include:

- Chemical hazards
- Enclosed space
- Illumination of work area
- Machine guarding
- Manual handling
- Materials
- Rubbish and combustible
- Steam and fuel leaks
- Thermal hazards
- Trips

Unit Sector(s)

Not applicable.

Competency Field

Marine Engineering