



Australian Government

MARL054 Demonstrate basic knowledge of marine auxiliary boilers

Release: 1

MARL054 Demonstrate basic knowledge of marine auxiliary boilers

Modification History

Release 1. This is the first release of this unit of competency in the MAR Maritime Training Package.

Application

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

This unit applies to people working in the maritime industry in the capacity of:

- Electro-Technical Officer (STCW Electro-Technical Officer Unlimited)
- Engineer Class 3 Near Coastal
- Engineer Watchkeeper (STCW Engineer Watchkeeper Unlimited).

Licensing/Regulatory Information

Legislative and regulatory requirements are applicable to this unit.

- Regulatory requirements include STCW International Maritime Organization (IMO) model course competencies and areas of knowledge, understanding and proficiency, together with the estimated total hours required for lectures and practical exercises. Teaching staff should note that timings are suggestions only and should be adapted to suit individual groups of trainees depending on their experience, ability, equipment and staff available for training.

Near Coastal Qualifications:

- This unit is one of the requirements to obtain Australian Maritime Safety Authority (AMSA) certification as an Engineer Class 3 Near Coastal as defined in the Marine Order 505 (Certificates of competency - National Law) 2013.

Blue Waters Qualifications:

- This unit is one of the requirements to obtain Australian Maritime Safety Authority (AMSA) certification as an Electro-Technical Officer (STCW Electro-Technical Officer Unlimited) or Engineer Watchkeeper (STCW Engineer Watchkeeper Unlimited) and to meet regulatory requirements this unit must be delivered consistent with Marine Orders and with the relevant sections of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW).

Pre-requisite Unit

Not applicable.

Competency Field

L - Engineering

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Distinguish between different types of auxiliary boilers

PERFORMANCE CRITERIA

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

1.1 Design and use of water tube and fire tube auxiliary boilers are compared and contrasted

1.2 Movement of water and gas in an operating boiler is sketched

1.3 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

2.1 Key features of steam and other heating systems are compared and contrasted

2.2 Steam side requirements of an auxiliary steam turbo alternator are compared and contrasted with other steam-powered machinery

2.3 Typical steam and condensate system are outlined

3 Explain fuel oil system of auxiliary boilers

3.1 Combustion process is explained and factors that affect combustion in a boiler are outlined

3.2 Differentiation is made between different burner types

	3.3	Operation of a complete fuel oil system for an auxiliary boiler, including the functions of components for automatic combustion control, is outlined
4 Explain procedures for operating fired and unfired boilers	4.1	Locations of all mountings and fittings on auxiliary boilers are identified and their functions are outlined
	4.2	Purpose of all alarms and shutdowns incorporated in auxiliary boilers is clarified
	4.3	Types and operation of safety valves are outlined
	4.4	Procedure for lighting off a boiler from cold is clarified
	4.5	Procedure for laying up for short and long periods, including full blow down and shutdown procedures, is clarified
	4.6	Procedure for isolating an auxiliary boiler after shutdown is clarified
5 Explain procedures for sampling and testing boiler water	5.1	Effects of poor water treatment practices on safety and boiler function are identified
	5.2	Correct procedure for taking boiler and feed water sample and possible errors that might occur are clarified
	5.3	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	7.1	Hazards and defects associated with auxiliary boilers are identified

procedures

- 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

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.

Unit Mapping Information

This unit replaces and is equivalent to MARL003 Demonstrate basic knowledge of marine auxiliary boilers.

Links

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

Assessment Requirements for MARL054 Demonstrate basic 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 and performance criteria on at least one occasion and include:

- accessing information related to marine auxiliary boilers
- adjusting excess air proportional relating to combustion processes and fuel atomisation process
- assessing own work outcomes and maintaining knowledge of current codes, standards, regulations and industry practices
- explaining basic operation of marine auxiliary boilers
- 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
- monitoring exhausted gas
- providing accurate and reliable information
- providing appropriate level of detail in responses
- reading and interpreting manuals, technical specifications, safety data sheets (SDS)/material safety data sheets (MSDS) 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 and performance criteria 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
- combustion processes, including carbon dioxide, oxygen, nitrogen, sulphur dioxide and water vapor
- common boiler defects and repair procedures

- construction and operation of boilers, including fire tube and water tube, including:
 - general construction details of a fire tube boiler
 - material used commonly for construction
- corrugated furnaces, including:
 - higher strength and flexibility in comparison to plain furnaces
- fittings mounted on boilers
- fuel atomisation process, including atomiser design, air register design and viscosity of fuel and burners
- fuel oil system for an auxiliary boiler
- hazards and defects, including:
 - chemical hazards
 - enclosed space
 - illumination of work area
 - machine guarding
 - manual handling
 - materials
 - rubbish and combustible
 - steam and fuel leaks
 - thermal hazards
 - trips
- 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 shutdowns in marine boilers
- shells of cylindrical form, including:
 - higher strength and weight ratios
 - sited vertically or horizontally
- stays, including forms of solid bars, thick tubes or plate girders
- 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

time of assessment.

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.

Practical assessment must occur in a workplace, or realistic simulated workplace, under the normal range of workplace conditions.

Simulations and scenarios may be used where situations cannot be provided in the workplace or may occur only rarely, in particular for situations relating to emergency procedures and adverse weather conditions where assessment would be unsafe, impractical or may lead to environmental damage.

Resources for assessment must include access to:

- applicable documentation, such as legislation, regulations, codes of practice, workplace procedures and operational manuals
- tools, equipment, machinery, materials and relevant personal protective equipment (PPE) currently used in industry, including:
 - mountings and fittings on auxiliary boilers, including:
 - 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.

Links

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