



**Australian Government**

# **Assessment Requirements for MARL047 Demonstrate advanced knowledge of marine auxiliary boilers**

**Release: 1**

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## **Modification History**

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

## **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 on at least one occasion and include:

- accessing information related to marine auxiliary boilers
- applying relevant work health and safety (WHS)/occupational health and safety (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 complex problems associated with marine auxiliary boilers, such as maintaining the operation of marine auxiliary boilers under adverse conditions
- identifying and interpreting diagnostic information and performing complex mathematical calculations related to operating, repairing and maintaining 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 (SDS)/material safety data sheets (MSDS) and manufacturer guides related to operating, repairing and maintaining 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
- boilers and steam plant, including:
  - condensers
  - economiser
  - feed pumps
  - fired
  - high pressure
  - low pressure

- medium pressure
- steam generators
- unfired
- boiler and steam plant repairs/defects
- boiler water levels
- boiler water testing
- boiler water treatment
- combustion efficiency
- 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
- constraints, including:
  - class requirements
  - location
  - reliability
  - time
  - type of materials
- design features and operative mechanism of marine steam boiler and associated auxiliary, including:
  - material selection and design features of marine steam boiler
  - material selection and design features of marine steam boiler feed water systems
- failures, including:
  - acid dew point corrosion
  - caustic gouging
  - corrosion cracking
  - corrosion fatigue
  - distortion
  - erosion
  - fatigue
  - hydrogen damage
  - maintenance damage
  - material flaws
  - over temperature
  - pitting
  - rupture
  - stress:
    - thermal fatigue
    - vibration
- fittings mounted on boilers
- fuel oil system for an auxiliary boiler

- hazards:
  - associated with running boilers and steam plant
  - of operating steam plant under adverse or faulty operating conditions
- heat transfer oil systems
- intermediate operation of marine auxiliary boilers
- marine boilers and steam, including:
  - condensers
  - economiser
  - fired feed pumps
  - high pressure
  - low pressure
  - medium pressure
  - steam – steam generators
  - unfired
- marine boiler inspection procedures
- methods of auxiliary steam plant operation and control under variable conditions
- operating principles relating to steam generation in fired and unfired boilers
- operation of marine auxiliary boilers
- principles of boiler operation in normal and emergency situations
- procedures for:
  - maintaining water level in boilers
  - protecting steam plant during off-load conditions
  - surveying boilers
- purpose of alarms and shutdowns in marine boilers
- safety valves, including:
  - boiler drum
  - economiser
  - superheater
  - WHU
- steam plant:
  - cycles
  - efficiency and causes of loss of steam, including:
    - combustion
    - conduction-heat loss (such as fouled tubes)
    - controls/instrumentation
    - high flue-gas temperature
    - low combustion air supply temperature
    - low feed water supply temperature
    - low quality fuel
    - operation at low or cyclic loads

- poor radiant-heat loss
- too much excess air (i.e. high oxygen [O<sub>2</sub>])
- water treatment
- 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 requirements and work practices.

## 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
- diagrams, specifications and other information required for performing advanced calculations related to marine auxiliary boilers
- tools, equipment, machinery, materials and relevant personal protective equipment (PPE) currently used in industry.

## Links

Companion Volume implementation guide can be found in VetNet -

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