



**Australian Government**

# **Assessment Requirements for MARL045**

## **Apply basic principles of naval architecture**

**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 criteria on at least one occasion and include:

- assessing own work outcomes and maintaining knowledge of current codes, standards, regulations and industry practices
- drawing load line mark and the load lines for a ship of a given summer moulded draught, displacement and tonnes per centimetre (TPC) immersion in saltwater
- explaining basic principles of naval architecture
- identifying actions to be taken in the event of partial loss of intake buoyancy
- identifying and applying relevant mathematical formulas and techniques to solve basic problems related to speed, fuel consumption and stability of commercial vessels
- identifying and interpreting numerical and graphical information, and performing mathematical calculations related to shipboard areas and volumes, vessel displacement, angle of loll, ship dimensions, centre of gravity (CG), vessel speed, fuel consumption and hydrostatic pressure
- identifying, collating and processing information required to perform calculations related to speed, fuel consumption and stability of commercial vessels
- imparting knowledge and ideas through verbal, written and visual means
- performing accurate and reliable calculations
- reading and interpreting written information needed to perform calculations related to the seaworthiness of commercial vessels
- solving problems using appropriate laws and principles
- using calculators to perform mathematical calculations.

## **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 structural members of a ship and the proper names of the various parts
- buoyancy
- calculations
- CG, longitudinal centre of gravity (LCG) and vertical centre of gravity (VCG)
- coefficients for areas, including:

- midships (CM)
- waterplane (CW)
- coefficients for underwater volumes, including:
  - block (Cb)
  - prismatic (Cp)
- curves of statistical stability
- density correction formula
- effects of slack tanks
- filling rates, including:
  - accidental flooding
  - tank testing
- fuel consumption calculations
- hydrostatic pressure
- movement of CG
- principle of displacement
- problems related to vessel displacement, including:
  - addition of mass
  - removal of mass
- ship:
  - displacement
  - measurements
  - stability calculations
  - stability including statistical and initial
  - types, including:
    - bulk carriers
    - combination carriers
    - container
    - general cargo
    - oil, chemical and gas tankers
    - passenger
    - roll-on and roll-off (ro-ro)
- ship construction, including:
  - bow and stern regions
  - fitting
  - hull structure
  - load line and draught marks, including:
    - chart of zones, areas and seasonal periods used to find the applicable load line
    - definition of ‘freeboard’
    - definition of ‘assigned summer freeboard’
    - freeboard, measured from the upper edge of the deck line to the water on each side,

- including checks that the ship is within its permitted limits of loading
- height of sill varies between different types of ships based on load line rules
- how to read draughts
- items in the conditions of assignment of freeboard
- load line mark and the load lines for a ship of a given summer moulded draught, displacement and TPC immersion in saltwater
- where the deck line is marked
- rudders and propellers
- ship dimensions and form
- ship stresses, including:
  - calculations for pressure at any depth below the liquid surface, given the density of the liquid
  - causes of corrosion onboard
  - ‘hogging’ and ‘sagging’ and distinguishing between them
  - hogging and sagging stresses caused by sea state
  - hogging and sagging stresses resulting in tensile or compressive forces in the deck and bottom structure
  - liquid pressure loading on the ship’s hull
  - loading conditions which give rise to hogging and sagging stresses
  - methods that are being used to minimise the effects of corrosion
  - ‘pounding’ or ‘slamming’ and which part of the ship is affected
  - stress set up by liquid sloshing in a partly filled tank
  - racking stress and it causes
  - shear force and bending moments
  - stresses caused by localised loading
  - water pressure loads on ship’s hull
- shipboard:
  - areas, including:
    - bulkheads/elemental areas
    - water planes
  - mass, including:
    - ballast
    - cargo
    - fuel
    - passengers
  - volumes, including:
    - transverse sectional areas
    - water plane areas
- Simpson’s Rules
- TPC immersion

- trim and stress tables, diagrams and stress calculating equipment
- vessel speed calculations
- watertight integrity.

## 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.

## Links

Companion Volume implementation guide can be found in VetNet -

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