



**Australian Government**

# **MARA017 Maintain seaworthiness of the ship (ship stability)**

**Release: 2**

---

# MARA017 Maintain seaworthiness of the ship (ship stability)

## Modification History

**Release 2.** This is the second release of this unit of competency in the MAR Maritime Training Package.

- Minor statement changes in unit Application.

**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 determine the stability and trim of a ship to ensure that stability conditions of ship comply with intact stability criteria under all conditions of loading, discharge and transfer of cargo.

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

- Master of a commercial vessel up to 100 metres in length Near Coastal
- Master of a commercial vessel up to 500 gross tonnage (GT)
- Watchkeeper Deck.

## 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 a Master of a commercial vessel up to 100 metres Near Coastal as specified in Marine Order 505.

### Blue Waters Qualifications:

- This unit is one of the requirements to obtain AMSA certification as a Master of a commercial vessel up to 500 gross tonnage (GT) or as a Watchkeeper Deck 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).

Training providers seeking to offer this unit of competency must gain AMSA approval before the unit is offered.

Seafarers seeking certification should check with AMSA.

## Pre-requisite Unit

Not applicable.

## Competency Field

A – Handling Cargo and Vessel Stability

## Unit Sector

Not applicable.

## Elements and Performance Criteria

### ELEMENTS

Elements describe the essential outcomes.

### PERFORMANCE CRITERIA

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

#### 1 Calculate stability

- 1.1 Ship stability data book is accessed and checked for endorsement
- 1.2 Sample worked data is interpreted to determine ship safety parameters
- 1.3 Transverse and longitudinal stability is accurately calculated using data extracted from the body of ship stability data book
- 1.4 Stability calculations are checked to ensure they correlate with data set out in ship stability book
- 1.5 Spurious or incorrect information is recognised and recalculated
- 1.6 Trim, draughts and lists are adjusted, as required
- 1.7 Stability calculations are conducted at a time, frequency and scope appropriate to voyage

#### 2 Manage weight distribution

- 2.1 Stability calculations are used to plan weight distribution to ensure assigned load line conditions are not exceeded

- |          |                                                 |                                                                                                                                                    |
|----------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
|          | <b>2.2</b>                                      | Weight distribution is controlled to maintain ship within acceptable stability and stress limits for loading operation and at all stages of voyage |
|          | <b>2.3</b>                                      | Appropriate action is taken when weight distribution is compromising ship safety                                                                   |
| <b>3</b> | <b>Maintain records of stability management</b> |                                                                                                                                                    |
|          | <b>3.1</b>                                      | Data and information related to stability management is accurately recorded                                                                        |
|          | <b>3.2</b>                                      | Data and information related to stability management is filed and stored according to organisational procedures                                    |

## 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 MARA005 Maintain vessel stability.

## 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 MARAO17 Maintain seaworthiness of the ship (ship stability)

## Modification History

**Release 2.** This is the second release of this unit of competency in the MAR Maritime Training Package.

- Minor statement changes in unit Application.

**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:

- applying appropriate actions to correct weight distribution, including:
  - amending the ship loading plan
  - ballast management
  - reduction of free surface
- applying stability, trim and stress tables, diagrams and stress calculating equipment
- carrying out calculations required when determining ship stability, list and trim
- managing ship stability in a range of conditions
- managing the loading and weight distribution of a ship to ensure assigned load line conditions are not exceeded
- reading and interpreting ship specifications and design drawings
- recognising problems affecting ship stability and trim
- undertaking stability calculations, including:
  - calculation of areas under the curve
  - changes in draft and trim due to differing water densities
  - correction for free surface effect
  - dead weight
  - displacement
  - draft and trim
  - effect of slack tanks
  - metacentric height
  - moment of static stability at small angles of heel
  - movement of the centre of gravity
  - tonnes per centimetre (TPC)
  - transverse and longitudinal stability
  - values for righting levers and construction of the curve of stability.

## 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:

- buoyancy, including:
  - fundamental actions to be taken in the event of partial loss of intact buoyancy
- calculation of ships stability using the inclining experiment
- data and information related to stability management, including:
  - cargo stowage and loading plan
  - records of stability calculations
  - safety management system (SMS)
  - stability and trim booklet
- effects of angle of loll
- effects of beam and form coefficient on the stability of a ship
- effects of density of sea water on the draught and freeboard of a ship, including freshwater allowance and dock water allowance
- effects of free surface on the stability of a ship
- features of the load-line and draught marks of a ship and methods for performing related calculations
- fundamentals of watertight integrity
- principal stresses that act on the structure of a ship
- principal structural members of a ship and the proper names for various parts
- problems related to the control of trim, stability and stresses of ships and appropriate actions and solutions
- sections of the International Maritime Organization (IMO), International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and Australian Maritime Safety Authority (AMSA) Marine Orders related to intact stability criteria
- stability, trim and stress tables, diagrams and stress calculating equipment
- theory and calculations of ship stability and dynamics, including movement of weights
- use of computer programs in calculating stability.

## 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 Guides are found in VETNet -

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