



Australian Government

MARA5001A Maintain vessel stability

Release 1

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Modification History

Release 1

This is the first release of this unit.

This unit replaces and is equivalent to TDMMA1707A Determine the stability and trim of the vessel.

Unit Descriptor

This unit involves the skills and knowledge required to determine the stability and trim of a vessel to ensure that stability conditions of vessel comply with intact stability criteria under all conditions of loading.

Application of the Unit

This unit has application for a Watchkeeper Deck and Master < 500 GT.

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 Calculate stability | <ul style="list-style-type: none">1.1 Vessel stability data book is accessed and checked for endorsement1.2 Data is interpreted to determine vessel safety parameters1.3 Stability is accurately calculated using data extracted from vessel stability data book1.4 <i>Stability calculations</i> are checked to ensure they correlate with data set out in vessel stability book1.5 Spurious or incorrect information is recognised and recalculated1.6 Trim, draughts and list are adjusted as required1.7 Stability calculations are conducted at a time, frequency and scope appropriate to voyage |
| 2 Manage weight distribution | <ul style="list-style-type: none">2.1 Stability calculations are used to plan weight distribution to ensure assigned load line conditions are not exceeded2.2 Weight distribution is controlled to maintain vessel within acceptable stability and stress limits for loading operation and at all stages of voyage2.3 <i>Appropriate</i> action is taken when weight distribution is compromising vessel safety |
| 3 Maintain records of stability management | <ul style="list-style-type: none">3.1 <i>Data and information related to stability management</i> is accurately recorded3.2 Data and information related to stability management is filed and stored according to organisational procedures |

Required Skills and Knowledge

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

Required Skills:

- Apply knowledge of stability, trim and stress tables, diagrams and stress calculating equipment
- Carry out calculations required when determining vessel stability and trim
- Manage the loading and weight distribution of a vessel to ensure assigned load line conditions are not exceeded
- Manage vessel stability in a range of conditions
- Read and interpret vessel specifications and design drawings
- Recognise problems affecting vessel stability and trim

Required Knowledge:

- Calculation of vessels stability using the inclining experiment
- Effects of angle of loll
- Effects of beam and form coefficient on the stability of a vessel
- Effects of density of sea water on the draught and freeboard of a vessel
- Effects of free surface on the stability of a vessel
- Features of the load-line and draught marks of a vessel and methods for performing related calculations
- Fundamental actions to be taken in the event of partial loss of intact buoyancy
- Fundamentals of watertight integrity
- Principal stresses that act on the structure of a vessel
- Principal structural members of a vessel and the proper names for various parts
- Problems related to the control of trim, stability and stresses of vessels and appropriate action and solutions
- Sections of the IMO, STCW and AMSA Marine Orders related to intact stability criteria
- Stability, trim and stress tables, diagrams and stress calculating equipment
- Theory and calculations of vessel stability and dynamics
- Use of computer programs in calculating stability
- Work health and safety (WHS)/occupational health and safety (OHS) requirements and work practices

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:

- ensuring accuracy of calculations
- attention to appropriate level of detail in recordkeeping.

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 or simulation where maintaining vessel stability can be demonstrated
- 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 maintaining vessel stability
- 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.

Stability calculations must include:

- Calculation of areas under the curve
- Changes in draft and trim due to differing water densities
- Correction for free surface effect
- Draft and trim
- Metacentric height
- Moment of statical stability at small angles of heel
- Transverse and longitudinal stability
- Values for righting levers and construction of the curve of stability

Appropriate action may include:

- Amending the vessel loading plan
- Ballast management
- Reduction of free surface
- Cargo stowage and loading plan
- Records of stability calculations
- Safety management system
- Stability and trim booklet

Data and information related to stability management may include:

Unit Sector(s)

Not applicable.

Competency Field

Handling Cargo and Vessel Stability