



Australian Government

MARA009 Manage stability of a vessel 500 gross tonnage or more

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 Release 3.0.

Application

This unit involves the skills and knowledge required to control trim, stability and stress within safe limits at all times on a vessel 500 gross tonnage or more.

This unit applies to people working in the maritime industry as a Master Unlimited.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

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.

1 Manage vessel trim under normal operating conditions

PERFORMANCE CRITERIA

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

- 1.1 Stability analysis and weight distribution planning are conducted at a time frequency and scope appropriate to the proposed nature of the voyage and vessel operation
- 1.2 Weight distribution is arranged to maintain vessel within acceptable stability limits for the anticipated operational situations likely to be experienced during the voyage
- 1.3 Calculations are made to determine the draught and centre of gravity of vessel after adding, removing or shifting weight

- 1.4 Factors affecting the stability and trim of vessel are identified and allowances are made in calculations
- 1.5 Trim, draughts and list of vessel are controlled as required to ensure they are suitable to progress all anticipated vessel operations
- 2 Control vessel stability when compartment is flooded**
 - 2.1 Damage to vessel and nature of flooding of compartments is assessed
 - 2.2 Effect upon vessel stability of flooded and flooding compartments is evaluated
 - 2.3 Suitable strategy for maintaining or restoring trim and stability is devised
 - 2.4 Where stress limits of the vessel are exceeded as a consequence of damage and/or flooding, appropriate action is initiated to ensure safety of personnel, including abandoning the vessel as required
- 3 Manage stress conditions of the vessel**
 - 3.1 Stress levels of the vessel are assessed according to manufacturer specifications
 - 3.2 Stability of the vessel is monitored at a frequency and scope relevant to vessel operations, sufficient to enable stress and stability to be maintained within acceptable limits at all times
 - 3.3 Appropriate action is taken where weight distribution has or could exceed acceptable safety limits
- 4 Maintain records of stability management**
 - 4.1 Data and information related to stability management is accurately recorded
 - 4.2 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.

- Calculations include:
- calculating required load distribution to achieve desired trim
 - calculations for change of draught, trim and heel when entering different water densities and to bilging of compartments
 - centre of gravity of a vessel using an inclining experiment and effect of suspended weights
 - changes to draught, trim and heel due to adding or removing fuel, ballast or cargo
 - determining required correction for height of centre of gravity (kg) for free surface effect
 - determining values of righting lever and construction of righting lever curves
 - displacement, wetted surface, form coefficients, tonne per centimetre immersion, application of Simpson's rules to first and second moments of area, centroids and centres of pressure
 - effect on stability of dry docking and grounding
 - hydrostatic stability of a vessel
 - moment of statistical stability at small angles of heel
 - shear force and bending moment calculations
 - transverse and longitudinal stability using hydrostatic data
 - vessel centre of gravity, centre of buoyancy and metacentre
- Factors include one or more of the following:
- dry docking
 - excessive trim
 - free surface of a liquid
 - grounding
 - handling of heavy weights
 - large swell conditions
 - shift of cargo
 - wind heel
- Damage to vessel includes one or more of the following:
- damage caused by incorrectly lashed or secured cargo
 - damage caused by incorrectly stowed cargo
 - damage to cargo handling equipment by exceeding safe working limits
- Nature of flooding includes one or more of the following:
- flooding due to collision or grounding
 - ingress of sea water through hatch covers
- Suitable strategy includes one of the following:
- addition of ballast
 - temporary damage repairs

Data and information includes one or more of the following:

- cargo handling equipment
- instructions of relevant maritime authorities
- manufacturer instructions and procedures
- organisational cargo handling procedures
- relevant Australian and international standards and regulatory requirements
- relevant work health and safety (WHS)/occupational health and safety (OHS) legislation
- vessel and shore safety checklists
- vessel Cargo Securing Manual
- vessel log
- vessel Register of Materials Handling Equipment

Unit Mapping Information

This unit replaces and is equivalent to MARA6001A Manage stability of a vessel 500 gross tonnage or more.

MARA6001A replaces and is equivalent to TDMMA1007B Control trim, stability and stress.

Links

Companion Volume implementation guides are found in VETNet -

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