



Australian Government

Assessment Requirements for MARA023 Manage trim, stability and stress of a vessel

Release: 1

Assessment Requirements for MARA023 Manage trim, stability and stress of a vessel

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:

- applying International Maritime Organization (IMO) recommendations concerning vessel stability
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and work practices
- attending to appropriate level of detail in recordkeeping
- determining stability and trim requirements for docking or slipping the vessel
- determining the effect on trim and stability of vessel in the event of damage to and consequent flooding of a compartment, and countermeasures to be taken
- identifying vessels trim and stability factors
- interpreting and applying information on the fundamental principles of vessel construction and the theories and factors affecting trim and stability, and measures necessary to preserve trim and stability
- maintaining stability and stress conditions within safe limits at all times
- producing accurate and reliable documentation
- undertaking stability calculations, including:
 - 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 (CG) 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 CG for free surface effect
 - determining values of righting lever and construction of righting lever curves
 - displacement, wetted surface, form coefficients, tonne per centimetre (TPC) 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

- permeability
- shear force and bending moment calculations
- transverse and longitudinal stability using hydrostatic data
- vessel CG, centre of buoyancy and metacentre
- using automatic data-based equipment.

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:

- causes and repercussions of a heeling vessel
- data and information related to stability management, including:
 - 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 WHS/OHS legislation
 - vessel and shore safety checklists
 - vessel cargo securing manual
 - vessel log
 - vessel register of materials handling equipment
- effects of angle of loll, including centre of buoyancy, how a ship behaves at the angle of loll, inherent dangers, corrective action and the difference between a loll and a list
- effects of density of sea water on the draught and freeboard of a vessel
- effects of flooding on transverse stability and trim, including:
 - calculation of vessel after flooding
 - cargo vessels
 - passenger ships
- features of the load-line and draught marks of a vessel and procedures for carrying out related calculations
- fundamental theories and principles of ship construction and the theories and factors that impact on trim and stability, and measures necessary to preserve trim and stability
- IMO recommendations concerning vessel stability
- levelling arrangements for damaged side compartments
- nature of flooding, including:
 - flooding due to collision or grounding
 - ingress of sea water through hatch covers or ruptured pipes
- principle stresses that act on the structure of a vessel, including panting and pounding, shear force, bending moments and torsional stress
- principles of parametric rolling and control methods

- principles of synchronous rolling and methods for its control
- procedures for calculating the required load distribution to achieve the desired trim
- responsibilities under international conventions and codes, including:
 - IMO grain regulations and grain heeling moment information
 - minimum stability requirements required by Load Line Rules and Intact Stability Code
 - passenger ship stability after damage
 - use of weather criterion
- stability, including:
 - dynamical
 - intact, including grain
 - statical
- suitable strategies for stabilising vessels
- survey and dry dock requirements
- trim and list
- typical problems related to the control of trim and stability for vessels of 500 gross tonnage (GT) and more
- vessels trim and stability factors for:
 - dry docking
 - excessive trim
 - free surface of a liquid
 - grounding
 - handling of heavy weights
 - large swell conditions
 - shift of cargo
 - wind heel
- 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
- 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>