



Australian Government

Assessment Requirements for MARL041

Apply advanced principles of trim, stability and stress

Release: 1

Assessment Requirements for MARL041 Apply advanced principles of trim, stability and stress

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 relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and work practices
- assessing own work outcomes and maintaining knowledge of current codes, standards, regulations and industry practices
- identifying and applying relevant mathematical formulas and techniques to solve complex 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, 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
- reading and interpreting written information needed to perform calculations related to seaworthiness of commercial vessels
- solving problems using appropriate laws and principles
- using calculators to perform accurate, reliable and complex 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, performance criteria and include knowledge of:

- admiralty and fuel coefficients
- advanced principles of naval architecture
- adverse effects, including:
 - discomfort to passengers and crew
 - failure of equipment
 - structural failure
- buoyancy
- causes of ship vibration, including:

- action of the sea
- fluctuating forces on propeller
- operation of deck machinery
- out-of-balance forces in main or auxiliary machinery
- propeller-hull interaction
- CG, vertical centre of gravity (VCG) and linear congruential generator (LCG)
- CG calculations
- density correction formula
- displacement
- draught alterations
- dynamical stability
- fuel consumption calculations
- hydrostatic pressure
- hull resistance:
 - frictional
 - residuary
 - total
- key points, including:
 - maximum GZ value and angle of occurrence
 - points of vanishing stability
 - range of positive stability
- metacentre
- principle of displacement
- principle structural members of a ship and the proper names of the various parts
- propellers and powering
- propulsive characteristics, including:
 - propeller and load diagrams
 - propulsive characteristics diesel
 - propulsive characteristics gas turbines
 - propulsive characteristics steam plant
 - propulsive characteristics steam plant
 - resistance and fuel consumption
- rudders
- ship:
 - displacement
 - measurements
 - resistance
 - stability
 - stability calculations
- shipboard:

- areas, including bulkheads, elemental areas and water plans
- volumes
- ship form coefficients, including:
 - block coefficient
 - midship section area coefficient
 - prismatic coefficient
 - waterplane area coefficient
- Simpson's Rules
- speed of advance, including:
 - apparent and true slips
 - Taylor wake fraction
 - theoretical, apparent and true speeds
 - wake speed
- stability, including:
 - approximate calculation of area and volume
 - approximate metacentric height (GM) by means of rolling period test
 - dry-docking and grounding
 - dynamical stability
 - intact stability code
 - rolling of ship
 - shear force, bending moments and torsional stress
 - simplified stability data
 - stability at moderate and large angles of heel
 - trim and list
- structural members of a ship and proper names of various parts
- tonnes per centimetre immersion (TPC)
- traverse stability
- trim and stress tables, diagrams and stress calculating equipment
- vessel speed calculations
- vibration
- watertight integrity
- 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 industry approved marine operations site or 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
- vessel diagrams, specifications and other information required for mathematical calculations.

Links

Companion Volume implementation guide can be found in VetNet -

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