

Stability Information

General

The stability criteria for survey vessel is based on the type of vessel, area of operation and number of passengers that the vessel is design for. For Australian waters these area of operation are set pot in the Uniform Shipping (USL) Code. The information bellow has been extracted from the USL code, Transport Operations (Marine Safety) legislation. For the full text and exact wording of all definitions please refer to the current version of these documents or consult your local Marine Authority.

General definitions

Commercial Vessel:	A vessel that is not solely used for pleasure or recreation and the use of which is in connection with any business or commercial transaction.
Passenger Vessel	any vessel that is certified to carry more than 12 passengers
Non-Passenger Vessel	any vessel that is certified to carry less than 12 passengers
Passenger	Any person other than: (a) The Master or crew of the vessel, including any person employed or engaged in any capacity on board a vessel in the business of that vessel (b) a child under one (1) year of age

Operational areas

Unlimited Operations	All overseas, ocean going and Australian coastal voyages without limitation as to geographical range
Australian Coastal and Middle-water Operations	Within 600nm of the coast or such lesser limit as specified by the Authority
Offshore Operations	Within 200nm of the coast or such lesser limit as specified by the Authority
Restricted Offshore Operations	Within 50nm from the seaward limit of a designated smooth or partially smooth water area or of a safe haven; or such lesser limit as specified by the Authority

Inshore Operations	Within 15nm from the seaward limit of a designated smooth or partially smooth water area or of a safe haven; or such lesser limit as specified by the Authority
Partially Smooth Water Operations	Operation within specified geographical limits designated by the Authority as 'partially smooth'. As a guide, such areas under normal conditions would have wave heights not exceeding 1.5m from trough to crest.
Smooth Water Operations	Operation within specified geographical limits designated by the Authority as 'smooth'. As a guide, such areas under normal conditions would have wave heights not exceeding 0.5m from trough to crest.
Nautical Mile (nm)	1852 meters

Vessels class

Class 1	Passenger Vessel
<ul style="list-style-type: none"> • 1A • 1B • 1C • 1D • 1E • 1F 	<ul style="list-style-type: none"> • Seagoing Passenger Vessel for use in all operational areas up to and including Unlimited Operations • Seagoing Passenger Vessel for use in all operational areas up to and including Offshore Operations • Seagoing Passenger Vessel for use in all operational areas up to and including Offshore Operations • Sheltered Waters Passenger Vessel for use in Partially Smooth and Smooth Waters only Sheltered Waters • Passenger Vessel for use in Smooth • Waters only 'Hire and Drive' Vessels
Class 2	Non – Passenger
<ul style="list-style-type: none"> • 2A • 2B • 2C • 2D • 2E 	<ul style="list-style-type: none"> • Vessel Seagoing Non-Passenger Vessel for use in all operational areas up to and including Unlimited Operations • Seagoing Non-Passenger Vessel for use in all operational areas up to and including Offshore Operations • Seagoing Non-Passenger Vessel for use in all operational areas up to and including Offshore Operations • Sheltered Waters Non-Passenger Vessel for use in Partially Smooth and Smooth Waters only • Sheltered Waters Non-Passenger Vessel for use in Smooth Waters only

Class 3	Fishing Vessel
<ul style="list-style-type: none"> • 3A • 3B • 3C • 3D • 3E 	<ul style="list-style-type: none"> • Seagoing Fishing Vessel for use in all operational areas up to and including Unlimited Operations • Seagoing Fishing Vessel for use in all operational areas up to and including Offshore Operations • Seagoing Fishing Vessel for use in all operational areas up to and including Offshore Operations • Sheltered Waters Fishing Vessel for use in Partially Smooth and Smooth Waters only • Sheltered Waters Fishing Vessel for use in Smooth Waters only

Stability documentation

Although the stability criteria for individual vessels may vary depending on their survey class, the procedure and documentation for checking that a vessel will pass the set criteria follows a similar path for most vessels. As a guide the following steps will be required for most stability assessments:

1	Hull shape	In order to assess the vessels stability characteristics we will to determine the exact shape of the hull. This can be done by two principal methods: (a) Using the vessel's lines plan if available, or (b) By direct measurement. Direct measurements can be taken in a variety of ways from simply measuring with a tape measure, to using sophisticated surveying equipment or more recently photogrametry.
2	Hull Model	After determining the hull shape a 3-dimensional computer model will be made in order to calculate the stability characteristics.
3	Hydrostatic Particulars	From the 3D computer model it is possible to calculate the hydrostatic particulars for the hull shape at various waterlines. This data is typically calculated for a range of drafts covering at minimum the expected weight range of the vessel from its lightest condition to its heaviest condition. The hydrostatic details calculated for a given waterline usually include displacement, centre of buoyancy, centre of flotation, waterplane area, wetted surface area etc. These particulars are calculated for the vessel in the upright position (i.e. level trim and no heel).

4	Cross Curves of stability	Cross curves of stability are a measure of the restoring force (tendency for the vessel to return to the upright position) from an angle of heel. These curves are a measure of the vessel stability while heeling and are typically calculated for a range of operating displacements, trim angles and heel angles.
5	Lightship	Once the model has been made and the necessary hydrostatic data and stability curves calculated it is necessary to obtain an accurate weight for the vessel in each condition. This is normally achieved by measuring the draft of the vessel in a known condition (ie. known tank contents and consumables). From this draft reading the displacement and longitudinal centre of gravity can be calculated from the hydrostatic particulars.
6	Vertical Centre of Gravity	Calculating the vertical centre of gravity requires a practical stability test commonly called an inclining experiment. As the name implies the vessel is inclined to both port and starboard by moving weights across the deck. The angle of inclination is measured, usually with a pendulum, for each weight movement. Using this data and the hydrostatic particulars for the vessel it is possible to calculate the vertical centre of gravity.
7	Stability Conditions	Once the displacement and centre of gravity (vertical and longitudinal) are known for the reference condition they can then be calculated for all other expected conditions of loading. Each expected condition is then simulated in a computer program and the upright and inclined stability calculated. The values obtained are checked against the criteria for the vessel's operational class.
8	Report	<p>The results of the above calculations will be collated into a booklet called a Trim and Stability Report. This report should include some or all of the following:</p> <ul style="list-style-type: none"> • Vessel Particulars • Vessel profile drawing • Tank plan and tank capacity tables • Hydrostatic data table • Loading conditions (lightship, Departure, Typical working, Crew only, Arrival etc.) • Stability Criteria and associated calculations to ensure compliance • Damage stability conditions • Details of the inclining experiment or lightship measurement