
Small Commercial Vessel Codes of Practice

Revision of Sections 4.4 and 11

Notice to all Small Commercial Vessel owners, managers, operators, skippers and Certifying Authorities

This notice replaces MIN 153 (M) and is to be read in conjunction with the MCA's existing Codes of Practice, namely:

The Safety of Small Commercial Motor Vessels - A Code of Practice;

The Safety of Small Commercial Sailing Vessels - A Code of Practice;

The Code of Practice for the Safety of Small Workboats and Pilot Boats; and

The Code of Practice for the Safety of Small Vessels in Commercial Use for Sport or Pleasure Operating from a Nominated Departure Point (NDP).

PLEASE NOTE:-

Where this document provides guidance on the law it should not be regarded as definitive. The way the law applies to any particular case can vary according to circumstances - for example, from vessel to vessel and you should consider seeking independent legal advice if you are unsure of your own legal position.

Summary

- This Note replaces MIN 153 (M). The text in Annexes 1 and 5 to this Note is identical to that published in the Annexes to MIN 153 (M).
- During the consultation process for the harmonisation of the Small Commercial Vessel Codes of Practice, section 11 "Intact Stability" was revised.
- The revised text in Annex 5 was publicly consulted upon and is now published as the current intact stability standard for the Codes.
- It was noted that as a result of the revised Section 11 that minor revisions to section 4.4 of the Motor Vessel, Sailing Vessel and Workboat Codes would also be required. The revised sections are produced in Annexes 2 to 4.

1. Guidance

1.1 Since 1990 the Maritime and Coastguard Agency and its predecessors have relied on Codes of Practice to set standards for various types of small commercial vessels.

1.2 The Codes of Practice which are specifically referenced by this Note are listed in Annex 1.

1.3 The MCA's Working Group on the harmonisation of the Small Commercial Vessel Codes of Practice reviewed the above codes with the view to providing a single Code which has

since been published as an alternative construction standard in the Annex to Marine Guidance Note 280 (M).

- 1.4 The text provided by Annexes 2, 3 and 4 to this Note should be used to replace the text of section 4.4 of the appropriate existing Small Commercial Vessel Code of Practice, in order to align the text of the Codes with the revised text of section 11.
- 1.5 The revised text of section 11 of the Small Commercial Vessel and Pilot Boat Code, published as the Annex to MGN 280 at the time of publication of this Note, has been reproduced at Annex 5. The text was publicly consulted upon during June 2003, but no critical comments were received.
- 1.6 In order that the industry could benefit from the revised requirements for subdivision, damage survivability and intact stability at the earliest opportunity, Marine Information Note (MIN)153 (M) was published which required that the text in Annex 2 to that Note should be used in place of the text in section 11 of the original Codes of Practice from October 2003.
- 1.7 This Note replaces MIN 153 (M). Annex 5 to this Note should be used in place of the text in section 11 of the original Codes of Practice from October 2003. The text of Annex 2 to MIN 153 (M) and Annex 5 to this Note is identical.
- 1.8 Vessels surveyed prior to October 2003 may continue to be surveyed against the stability requirements of the existing Codes of Practice until they voluntarily opt into the revised standards.

More Information

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Annex 1 – Details of Small Vessel “Codes of Practice” including Titles, Short Form, date of publication and enabling legislation.

Code Title and Short Form Reference	Published	Enabling Statutory Instrument
The Safety of Small Commercial Motor Vessels - A Code of Practice - The Yellow Code	1993	The Merchant Shipping (Vessels in Commercial Use for Sport and Pleasure) Regulations 1998, SI 1998 No. 2771, as amended.
The Safety of Small Commercial Sailing Vessels - A Code of Practice – The Blue Code	1993	The Merchant Shipping (Vessels in Commercial Use for Sport and Pleasure) Regulations 1998, SI 1998 No. 2771, as amended.
The Code of Practice for the Safety of Small Workboats and Pilot Boats – The Brown Code	1998	The Merchant Shipping (Small Workboats and Pilot Boats) Regulations 1998, SI 1998 No. 1609, as amended.
The Code of Practice for the Safety of Small Vessels in commercial Use for Sport or Pleasure Operating from a Nominated Departure Point (NDP) – The Red Code	1999	The Merchant Shipping (Vessels in Commercial Use for Sport and Pleasure) Regulations 1998, SI 1998 No. 2771, as amended.

Annex 2

Revised section 4.4 of The Safety of Small Commercial Sailing Vessels – A Code of Practice

4.4 Watertight Bulkheads

4.4.1 New monohull vessels

4.4.1.1 For new vessels to which 11.2 applies, watertight bulkheads should be fitted in accordance with the following requirements, except that consideration will be given to the continued acceptance of an existing design which does not meet the requirements in full but is part of a building programme in progress at the time when the Code comes into force for new vessels:-

4.4.1.2 The strength of a watertight bulkhead should be adequate for the intended purpose and to the satisfaction of the Certifying Authority.

4.4.1.3 When pipes, cables, etc penetrate watertight bulkheads, they should be provided with valves and/or watertight glands as appropriate.

4.4.1.4 A doorway fitted in a watertight bulkhead should be of watertight construction and be kept closed at sea, unless opened at the discretion of the skipper.

4.4.2 New multihull vessels

4.4.2.1 When flotation material is used, it should be adequately protected from accidental damage. When an air tank is used for flotation, it should be clearly marked:-

“AIR TANK – DO NOT PUNCTURE”

and should be provided with means of draining and checking for freedom from water.

4.4.3 Existing vessels

4.4.3.1 For existing vessels to which 11.2 applies, it is most strongly recommended that modifications which cause the vessel to meet the standard given by paragraph 4.4.1 be implemented when the vessel undergoes major structural alterations.

4.4.3.2 In the case of an existing multihull vessel, it is most strongly recommended that modifications which cause the vessel to meet the standard given by paragraph 4.4.2 be implemented when the vessel undergoes major structural alterations.

Annex 3

Revised section 4.4 of The Safety of Small Commercial Motor Vessels – A Code of Practice

4.4 Watertight Bulkheads

4.4.1 New monohull vessels

4.4.1.1 For a new monohull vessel to which 11.2 applies, watertight bulkheads should be fitted in accordance with the following requirements, except that consideration will be given to the continued acceptance of an existing design which does not meet the requirements in full but is part of a building programme in progress at the time when the Code comes into force for new vessels:-

4.4.1.2 The strength of a watertight bulkhead should be adequate for the intended purpose and to the satisfaction of the Certifying Authority.

4.4.1.3 When pipes, cables, etc penetrate watertight bulkheads, they should be provided with valves and/or watertight glands as appropriate.

4.4.1.4 A doorway fitted in watertight bulkhead should be of watertight construction and be kept closed at sea, unless opened at the discretion of the skipper.

4.4.2 New multihull vessels

4.4.2.1 Generally, the requirements of 4.4.1 for a new monohull vessel should apply to a new multihull vessel to which 11.2 applies.

4.4.2.2 If a multihull vessel does not meet the damage criteria given in 11.2.1.2 and 11.2.1.3 the results of the calculations should be submitted to the Department of Transport for assessment.

4.4.3 Existing vessels

4.4.3.1 In the case of an existing vessel to which 11.2 applies, it is most strongly recommended that modifications, which cause the vessel to meet the standard given by 4.4.1 for a monohull or 4.4.2 for a multihull, be implemented when the vessel undergoes major structural alterations.

Annex 4

Revised section 4.4 of The Code of Practice for the Safety of Small Workboats & Pilot Boats.

4.4 Watertight Bulkheads

4.4.1 A vessel to which 11.2 applies should be provided with watertight bulkheads which are arranged such that the vessel will meet the damage stability requirements of 11.2.

4.4.1.1 The strength of a watertight bulkhead should be adequate to withstand the flooding damage condition, to the satisfaction of the Certifying Authority.

4.4.1.2 When pipes, cables, etc. penetrate watertight bulkheads, they should be provided with valves and/or watertight glands as appropriate.

4.4.1.3 A door fitted in a watertight bulkhead should be of watertight construction and be kept closed at sea, unless opened at the discretion of the skipper.

4.4.1.4 When a door fitted in a watertight bulkhead is required to be kept open when the vessel is at sea, the door should be of a power operated sliding watertight construction and be a type approved by the Maritime and Coastguard Agency. The door should have controls local to the door and from a location(s) above the bulkhead deck (at which location(s) open/closed indication should be provided). At the door, warning indication of door closure should be provided.

4.4.2 It is most strongly recommended that modifications which cause the vessel to meet the standards given in 4.4.1 and 11.1.4 be implemented when an existing vessel to which 11.2 applies undergoes major structural alterations.

4.4.3 For any other vessel the provision of watertight bulkheads is not mandatory but when such a bulkhead is fitted for the safety of the vessel it should satisfy at least the requirements of 4.4.1.1, 4.4.1.2 and 4.4.1.3.

Annex 5

Extract of Section 11 of The Small Commercial Vessel and Pilot Boat Code of Practice.

11 Intact Stability

11.1 All Vessels

11.1.1 General

11.1.1.1 The standard of stability to be achieved by a new vessel should be dependent on the maximum number of persons permitted to be carried and the intended area of operation.

11.1.1.2 The following vessels are required to be provided with a stability information booklet which is approved by the Certifying Authority:-

- .1 vessels operating in Category 0 or 1; or
- .2 vessels carrying 16 or more persons; or
- .3 vessels carrying Cargo greater than 1000kg; or
- .4 vessels fitted with a lifting device as defined in 11.6; or
- .5 vessel's towing where the towed object's displacement is greater than twice the displacement of the towing vessel. See Section 11.7; or
- .6 seagoing pilot boats.

Note: Motor vessels covered by .1 or .2 are not required to carry stability information booklets if the stability is assessed under section 11.3.8 using ISO 12217 'Small craft – Stability and buoyancy assessment and categorisation – Non-sailing boats of hull length greater than or equal to 6 metres'.

11.1.1.3 A vessel carrying 15 or less persons, carrying less than 1000kg of cargo, and operating in Area Categories other than 0 or 1 shall either comply with Section 11.1.1.2 or be subject to a simplified assessment of stability, and is not required to be provided with approved stability information.

11.1.1.4 If a vessel cannot meet the stability criteria given within Section 11, it should be specially considered by the Certifying Authority, and such cases should be reported to the Administration.

11.1.1.5 The stability of sailing vessels fitted with non-fore and aft rigs, or movable/variable ballast is to be specifically considered on application to the Administration.

11.1.1.6 Stability of a vessel which will operate in sea areas where ice accretion can occur should be specially considered by the Administration with regard to icing allowance and stability standard. (See also Section 6.10)

11.1.1.7 For stability requirements for an inflatable vessel or a vessel fitted with a buoyant collar, see Section 11.5. For stability requirements for a decked vessel fitted with

a lifting device, see Section 11.6 and for a decked vessel engaged in towing, see Section 11.7.

- 11.1.1.8 A sailing multihull over 6m in length should be provided with a Stability Information Booklet approved by the Certifying Authority.
- 11.1.1.9 Where a monohull vessel cannot comply with the specified criteria, due to its hullform displaying stability characteristics similar to that of a multihull vessel, the stability criteria for a multihull vessel may be applied, as appropriate for sailing or motor vessels.
- 11.1.1.10 A motor multihull type vessel failing to comply with the criteria of either Section 11.3.6 or 11.3.7 may be given special consideration. In such a case, calculations should be submitted to the Administration for assessment.
- 11.1.1.11 All vessels, other than those vessel's deemed unsuitable for carriage of the booklet by the Certifying Authority (i.e. vessels with no cabin or shelter), are required to carry the relevant copy of the MCA Stability Guidance Booklet (Motor or Sail). Where a booklet is not carried on board a copy is to be made available to crew ashore. These booklets are available free of charge from the MCA or Certifying Authority. Although they contain generic safety advice, the stability and freeboard data already generated during the survey process should be appended to the booklet in the relevant section. It is the responsibility of the Certifying Authority to supply this information, and the owner/managing agent is to ensure this data is included.

11.2 Damage Survivability

- 11.2.1 This applies to all monohull vessels carrying 16 or more persons and those operating in Area Category 0 or 1, with 7 or more persons, subject to minimum safe manning levels being agreed by the Certifying Authority.
- 11.2.1.1 Vessels should be so arranged that after minor hull damage or failure of any one hull fitting in any one watertight compartment, it will satisfy the residual stability criteria below. This may be achieved by fitting water-tight subdivision or alternative methods to the satisfaction of the Certifying Authority. Minor damage should be assumed to occur anywhere in the length of the vessel but not on a watertight subdivision.
- 11.2.1.2 In assessing survivability, the following standard permeabilities should be used:-

Space	Permeability %
Appropriated for stores	60
Appropriated for stores but not by a substantial quantity thereof	95
Appropriated for accommodation	95
Appropriated for machinery	85
Appropriated for liquids	0 or 95 whichever results in the more onerous requirements

Other methods of assessing floodable volume may be considered, to the satisfaction of the Certifying Authority.

11.2.1.3 In the damaged condition, the residual stability should be such that the angle of equilibrium does not exceed 7 degrees from the upright, the resulting righting lever curve has a range to the downflooding angle of at least 15 degrees beyond the angle of equilibrium, the maximum righting lever within that range is not less than 100mm and the area under the curve is not less than 0.015 metre radians. This damage should not cause the vessel to float at a waterline less than 75mm from the weatherdeck at any point. Proposals to accept reduced freeboard or immersion of the margin line may be accepted subject to special consideration.

11.2.2 **Multihull vessels**

Generally, the requirements of Section 11.2.1 for a monohull vessel should apply to a multihull vessel carrying 16 or more persons or operating in Area Category 0 and 1, with 7 or more persons. Damage and inverted stability requirements for multihull sailing vessels are contained in Section 11.10. If a multihull vessel is of unconventional design or cannot meet the damage criteria given in Sections 11.2.1.1 and 11.2.1.2, the results of the calculations should be submitted to the Administration for assessment.

11.3 **Motor Vessels Complying with Section 11.1.1.2**

11.3.1 The lightship weight, vertical centre of gravity (KG) and longitudinal centre of gravity (LCG) of a monohull vessel should be determined from the results of an inclining experiment.

11.3.2 The LCG of a multihull vessel should be obtained by a displacement check or by weighing. The KG should be determined either by calculation or by experimental means, noting however that a conventional inclining experiment may not produce satisfactory results.

11.3.3 The lightship weight may include a margin for growth, up to 5% of the lightship weight at the discretion of the Certifying Authority, positioned at the LCG and vertical centre of the weather deck amidships or KG, whichever is the higher. (The lightweight margin should not be used in practice to increase maximum cargo-deadweight.)

11.3.4 Curves of statical stability (GZ curves) should be produced for:-

- .1 Loaded departure, 100% consumables;
- .2 Loaded arrival, 10% consumables;
- .3 Anticipated service conditions; and
- .4 Conditions involving lifting appliances (when appropriate).

In addition, simplified stability information in the form of a Maximum KG Curve should be provided, including a worked example to illustrate its use.

Maximum free surface moments should be included within the Loaded Departure condition, and as a minimum, factored according to tank percentage fill for all other conditions.

11.3.5 Generally, buoyant structures intended to increase the range of positive stability should not be provided by fixtures to superstructures, deckhouse, masts or rigging.

11.3.6 The curves of statical stability for the loaded conditions should meet the following criteria:-

- .1 the area under the righting lever curve (GZ curve) should be not less than 0.055 metre – radians up to 30 degrees angle of heel and not less than 0.09 metre – radians up to 40 degrees angle of heel or the angle of downflooding if this angle is less;
- .2 the area under the GZ curve between the angles of heel of 30 and 40 degrees or between 30 degrees and the angle of downflooding if this less than 40 degrees, should be not less than 0.03 metre – radians;
- .3 the righting lever (GZ) should be at least 0.20 metres at an angle of heel equal to or greater than 30 degrees;
- .4 the maximum GZ should occur at an angle of heel of not less than 25 degrees; and
- .5 after correction for free surface effects, the initial metacentric height (GM) should not be less than 0.35 metres.

11.3.7 If a vessel of catamaran or multihull type does not meet the stability criteria given in Section 11.3.6, the vessel should meet the following criteria:-

- .1 the area under the righting lever curve (GZ Curve) should not be less than 0.085 metre-radians up to $B_{GZ_{max}}$ when $B_{GZ_{max}} = 15^\circ$ and 0.055 metre-radians up to $B_{GZ_{max}}$ when $B_{GZ_{max}} = 30^\circ$.

When the maximum righting lever, GZ_{max} , occurs between $B = 15^\circ$ and $B = 30^\circ$ the required area under the GZ Curve up to $B_{GZ_{max}}$ should not be less than:

$$A = 0.055 + 0.002(30^\circ - B_{GZ_{max}}) \text{ metre-radians}$$

where: $B_{GZ_{max}}$ is the angle of heel in degrees at which the righting lever curve reaches its maximum.

- .2 the area under the righting lever curve between $B = 30^\circ$ and $B = 40^\circ$ or between $B = 30^\circ$ and the angle of downflooding B_f , if this angle is less than 40° , should not be less than 0.03 metre-radians;
- .3 the righting lever GZ should not be less than 0.2 metre at an angle of heel of 30 degrees;
- .4 the maximum righting lever should occur at an a angle not less than 15 degrees; and

.5 the initial metacentric height GM₀ should not be less than 0.35 metre.

11.3.8 Vessels complying with ISO 12217 Part 1 'Small craft - Stability and buoyancy assessment and categorisation - Non-sailing boats of hull length greater than or equal to 6 metres', assessed using Options 1 or 2 of Section 5.3 – 'Test and calculations to be applied', may as an alternative, after verification of the stability assessment by the Certifying Authority, be assigned an area of operation in accordance with Section 11.3.9.

11.3.9 Permitted areas of operation.

Permitted Area of Operation	MCA Code Category	ISO 12217 Design Category
Unrestricted	0	A
Up to 150 miles from a safe haven	1	A
Up to 60 miles from a safe haven	2	B
Up to 20 miles from a safe haven	3	B
Up to 20 miles from a safe haven in favourable weather and daylight	4	C
Up to 20 miles from a nominated departure point in favourable weather and daylight	5	C
Up to 3 miles from a nominated departure point in favourable weather and daylight	6	C

11.4 Motor Vessels Complying with Section 11.1.1.3

11.4.1 A vessel should be tested in the fully loaded conditions (which should correspond to the freeboard assigned) to ascertain the angle of heel and the position of the waterline which results when all persons which the vessel is to be certificated to carry are assembled along one side of the vessel. (The helmsman may be assumed to be at the helm.) Each person may be substituted by a mass of 75kg for the purpose of the test.

The vessel will be judged to have an acceptable standard of stability if the test shows that:-

- .1 the angle of heel does not exceed 7 degrees; and
- .2 in the case of a vessel with a watertight weather deck extending from stem to stern, as described in Section 4.1.1, the freeboard to deck is not less than 75mm at any point.
- .3 The angle of heel may exceed 7 degrees, but should not exceed 10 degrees, if the freeboard to downflooding is in accordance with that required by Section 12 in the upright condition.

11.4.2 Additionally, for vessels over 15 metres in length, the heeling moment applied during the test described in 11.4.1 should be calculated. Using the formula below, the vessel should attain a value of initial GM not less than 0.5m if using an estimated displacement, or 0.35m if the displacement of the vessel is known and can be verified by the Certifying Authority.

$$GM = \frac{57.3 \times HM}{\theta \times \Delta}$$

where: HM = Heeling moment in kilogramme-metres

θ = angle of heel in degrees obtained from the \square test as defined in 11.4.1

Δ = the displacement of the vessel in \square kilogrammes, either estimated, or measured and verified by the Certifying Authority

- 11.4.3 For vessels carrying a combination of passengers and cargo, for which the cargo element does not exceed 1000kg (see definitions), the test defined in Section 11.4.1 should be carried out with the full complement of passengers and cargo, and additionally with passengers only. For the purposes of these tests the cargo may be assumed to retained at its normal stowage position.
- 11.4.3.1 In all cases, the maximum permissible weights of passengers and/or cargo derived from the tests conducted shall be recorded on the certificate. Vessel loading will be restricted by the position freeboard mark and maximum permissible weight, and thus for the purposes of this test, attention should be paid to any activity related equipment where this may be significant, e.g. diving equipment.
- 11.4.4 It should be demonstrated by test or by calculation that an open boat, when fully swamped, is capable of supporting its full outfit of equipment, the total number of persons for which it is to be certificated and a mass equivalent to its engine and full tank of fuel.
- 11.4.5 Vessels complying with ISO 12217 Part 1 'Small craft - Stability and buoyancy assessment and categorisation - Non-sailing boats of hull length greater than or equal to 6 metres', assessed using any Option of Section 5.3 – 'Test and calculations to be applied', may as an alternative, after verification of the stability assessment by the Certifying Authority, be assigned an area of operation in accordance with Section 11.3.9.

11.5 Inflatable Boats or Boats Fitted With a Buoyant Collar

These requirements apply to an inflatable boat, rigid inflatable boat or those vessels with a buoyant collar. Unless a boat to which the Code applies is completely in accordance with a standard production type, for which the Certifying Authority is provided with a certificate of approval for the tests which are detailed below. In all cases, the maximum permissible weights of passengers and/or cargo derived from the tests conducted shall be recorded on the certificate. Vessel loading will be restricted by the position freeboard mark and maximum permissible weight, and this for the purposes of this test, attention should be paid to any activity related equipment where this may be significant, e.g. diving equipment.

11.5.1 Stability Tests

- 11.5.1.1 The tests should be carried out with all the vessels' equipment, fuel, cargo, activity related equipment (e.g diving equipment) and number of persons for which it is to be certificated, on-board. The engine, equipment and cargo may be replaced by an equivalent mass. Each person may be substituted by a mass of 75kg for the purpose of the tests:-
- 11.5.1.2 The maximum number of persons for which a boat is certified should be crowded to one side, with half this number seated on the buoyancy tube. This

procedure should be repeated with the persons seated on the other side and at each end of the inflatable boat, rigid inflatable boat or vessel with a buoyant collar. For the purposes of these tests the cargo, or equivalent alternative mass, should be retained at its normal stowage position. In each case the freeboard to the top of the buoyancy tube should be recorded. Under these conditions the freeboard should be positive around the entire periphery of the boat.

11.5.2 Damage tests – inflatable boats

11.5.2.1 The tests should be carried out with all the vessels' equipment, fuel, cargo, activity related equipment (e.g diving equipment) and number of persons for which it is to be certificated, on-board. The engine, equipment and cargo may be replaced by an equivalent mass. Each person may be substituted by a mass of 75kg for the purpose of the tests:-

The tests will be successful if, for each condition of simulated damage, the persons for which the inflatable boat or rigid inflatable boat is to be certificated are supported within the inflatable boat or rigid inflatable. The conditions are:-

- .1 with forward buoyancy compartment deflated (both sides if appropriate);
- .2 with the entire buoyancy, from the centreline at the stem to the transom, on one side of the inflatable boat or rigid inflatable boat deflated.

11.5.2.2 Purely inflatable boats failing to meet Section 11.5.2.1 may be specially considered by the Certifying Authority, taking into account operational service limitations.

11.5.3 Swamp test

11.5.3.1 It should be demonstrated that, when fully swamped, the vessel is capable of supporting its full outfit of equipment, the total number of persons and equivalent mass of cargo for which it is to be certificated, and a mass equivalent to its engine and full tank of fuel.

11.5.3.2 In the swamped condition the inflatable boat, rigid inflatable boat or vessel with a buoyant collar, should not be seriously deformed.

11.5.3.3 An adequate means of draining the boat should be demonstrated at the conclusion of this test.

11.5.4 Person recovery stability test

Two persons should recover a third person from the water into the vessel. The third person should feign to be unconscious and be back towards the inflatable boat or rigid inflatable boat so as not to assist the rescuers. Each person involved should wear an approved lifejacket. The vessel should remain stable throughout the operation, and should not capsize.

11.6 Vessel Fitted with a Deck Crane or other Lifting Device

11.6.1 For the purposes of Section 11 only, a lifting device does not include a person retrieval system, the vessel's own anchor handling equipment, or davits for tenders, where judged by the Certifying Authority not to have a detrimental effect on the stability of the vessel.

11.6.2 Reference should be made to Section 25.4 for requirements for safety standards other than stability for a vessel fitted with a deck crane or other lifting device.

11.6.3 A vessel fitted with a deck crane or other lifting device should be a decked vessel (or assessed in accordance with Section 4.1.3.2) and comply with the general requirements of Section 11, which are appropriate to it.

In addition, with the vessel in the worst anticipated service condition for lifting operations, compliance with the following criteria should be demonstrated by a practical test or by calculations.

.1 With the crane or other lifting device operating at its maximum load moment, with respect to the vessel, the angle of heel generally should not exceed 7 degrees or that angle of heel which results in a freeboard to deck edge anywhere on the periphery of the vessel of 250mm, whichever is the lesser angle. (Consideration should be given to the operating performance of cranes or other lifting devices of the variable load-radius type and the load moment with respect to the vessel for lifting devices situated off centreline).

.2 When an angle of heel greater than 7 degrees but not exceeding 10 degrees occurs, the Certifying Authority may accept the lifting condition providing that all the following criteria are satisfied when the crane or other lifting device is operating at its maximum load moment:-

.1 the range of stability from the angle of static equilibrium to downflooding or angle of vanishing stability, whichever is the lesser, is equal to or greater than 20 degrees;

.2 the area under the curve of residual righting lever, up to 40 degrees from the angle of static equilibrium or the downflooding angle, if this is less than 40 degrees, is equal to or greater than 0.1 metre-radians; and

.3 the minimum freeboard to deck edge fore and aft throughout the lifting operations should not be less than half the assigned freeboard to deck edge at amidships. For vessels with less than 1000mm assigned freeboard to deck edge amidships the freeboard fore or aft should not be less than 500mm.

.4 The freeboard to deck edge anywhere on the periphery of the vessel is at least 250mm.

11.6.4 Information and instructions to the skipper on vessel safety when using a deck crane or other lifting device should be included in the Stability Information Booklet. The information and instructions should include:-

.1 the maximum permitted load and outreach which satisfy the requirements of Section 11.6.2, or the Safe Working Load (SWL), whichever is the lesser

(operating performance data for a crane or other lifting device of variable load-radius type should be included as appropriate);

- .2 details of all openings leading below deck which should be secured weathertight; and
- .3 the need for all personnel to be above deck before lifting operations commence.

11.6.5 Requirements for a lifting system which incorporates counterbalance weight(s) or vessels that cannot comply with the requirements of Section 11.6.2 but is deemed to have adequate residual stability should be specially considered by the MCA.

11.7 Vessel Engaged in Towing

11.7.1 Reference should be made to Section 25.2 for requirements for safety standards other than stability for a vessel engaged in towing.

11.7.2 Generally, a vessel engaged in towing should be a decked vessel (or assessed in accordance with Section 4.1.3.2) and comply with the general requirements of Section 11 which are appropriate to the vessel.

11.7.3 The danger to safety of deck edge immersion makes an open boat (other than those assessed in accordance with Section 4.1.3.2) unsuitable for towing other vessels or floating objects.

11.8 Sailing Monohull Vessels Complying with Section 11.1.1.2

11.8.1 The centre of gravity (KG) of a vessel should be established by an inclining experiment and curves of statical stability (GZ curve) for the loaded departure 100% consumables and loaded arrival 10% consumables should be produced.

Notes:-

1. The above condition may include a margin for growth up to 5% of the lightweight, at the discretion of the Certifying Authority, with the VCG positioned at the upper deck amidships.
2. Buoyant structures intended to increase the range of positive stability should not be provided by fixtures to either a mast, rigging, or superstructure.
3. For standard production series built vessels, the statical stability (GZ) may be derived from an inclining experiment conducted on another vessel of the series, subject to corrections for differences in outfit, to the satisfaction of the Certifying Authority.
4. Maximum free surface moments should be included within the loaded departure condition, and as a minimum, factored according to tank percentage fill for the loaded arrival condition.

11.8.2 The GZ curves required by Section 11.8.1 should have a positive range of not less than the angle determined by the formula in the table in Section 11.9.5, or 90°, whichever is the greater.

11.8.3

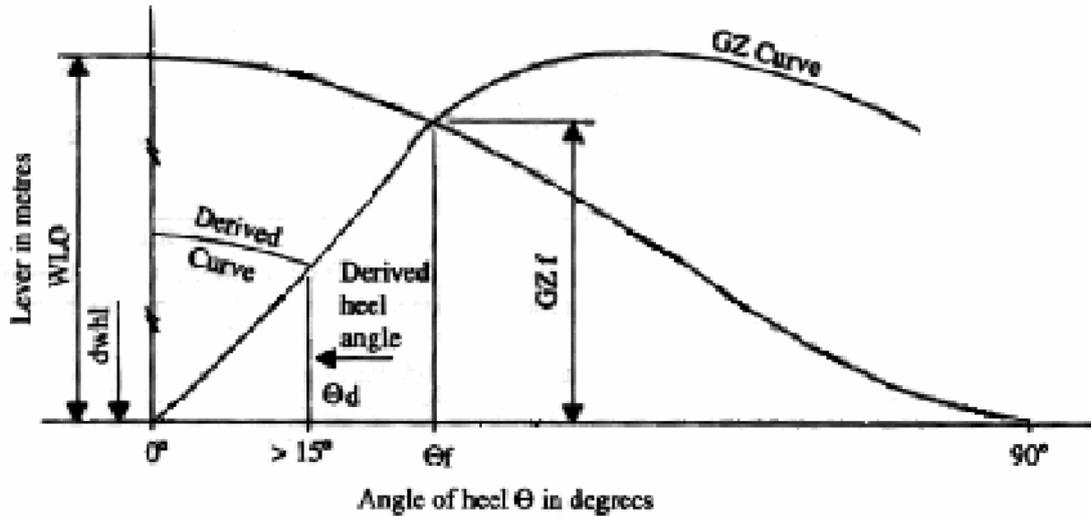
In addition to the requirements of Section 11.8.2, the angle of steady heel obtained from the intersection of a “derived wind heeling lever” curve with the GZ curves referred to in Section 11.8.1 above should be greater than 15 degrees (see Figure 11.1).

In Figure 11.1

‘DWHL’ = the “derived wind heeling lever” at any angle B degrees
 $= 0.5 \times WLO \times \text{Cos}^{1.3}B$

where $WLO = \frac{GZ_f}{\text{Cos}^{1.3}B_f}$

FIGURE 11.1



Noting that, when using this method:-

WLO- is the magnitude of the actual wind heeling lever at 0 degrees which would cause the vessel to heel to the ‘down flooding angle’ (Bf) or 60 degrees whichever is least.

GZf is the lever of the vessel’s GZ at the ‘down flooding angle’ (Bf) or 60 degrees whichever is least.

Bd- is the angle at which the ‘derived wind heeling’ curve intersects the GZ curve. (If Bd is less than 15 degrees the vessel will be considered as having insufficient stability for the purpose of the Code).

Bf- is the ‘critical down flooding angle’ and is deemed to occur when openings having an aggregate area, in square metres, greater than:-

$$\frac{\text{vessel's displacement in tonnes}}{1500}$$

are immersed.

Moreover, it is the angle at which the lower edge of the actual opening which results in critical flooding becomes immersed. All openings regularly used for crew access and for ventilation should be considered when determining the downflooding angle. No opening regardless of size which may lead to progressive flooding should be immersed at an angle of heel of less than 40 degrees. Air pipes to tanks can, however, be disregarded.

If as a result of immersion of openings in a deckhouse a vessel cannot meet the required standard those deckhouse openings may be ignored and the openings in the weather deck used instead to determine θ_f . In such cases the GZ curve should be derived without the benefit of the buoyancy of the deckhouse.

It might be noted that provided the vessel complies with the requirements of Section 11.8.1, 11.8.2 and 11.8.3 and it is sailed with an angle of heel which is no greater than the 'derived angle of heel', it should be capable of withstanding a wind gust equal to 1.4 times the actual wind velocity (i.e. twice the actual wind pressure) without immersing the 'down flooding openings', or heeling to an angle greater than 60 degrees.

11.8.4 Vessels complying with ISO 12217 Part 2 'Small craft - Stability and buoyancy assessment and categorisation - Sailing boats of hull length greater than or equal to 6 metres', assessed using Options 1 and 2 of Section 6.1 – 'Requirements to be applied', may as an alternative and in lieu of 11.8.2, be assigned a permitted area of operation in accordance with section 11.9.5, provided that the righting lever curve produced for this standard, is verified and corrected in accordance with Annex 12 before performing the calculations. In this case the calculated steady heel angle required by 11.8.3 is to be reduced by 10%.

11.8.5 A Stability Information Booklet, based on the Administration's model booklet, should be submitted to and approved by the Certifying Authority and placed onboard the vessel. The booklet should include details of the maximum steady angle of heel for the worst sailing condition. The steady angle of heel is to be calculated in accordance with Section 11.8.3 or 11.8.4. The booklet should also include curves of maximum recommended steady angle of heel for the prevention of down flooding in the event of squall conditions. Details of the development of such curves are given in the Model Stability Information Booklet.

11.9 Sailing Monohull Vessels Complying with Section 11.1.1.3

11.9.1 General

The stability of a vessel should be determined by one of the methods discussed below and its area of operation should be dependent upon the standard which it is shown to achieve.

11.9.2 Vessels without external ballast keels

Method 1

.1 The centre of gravity (KG) of a vessel should be established by an inclining experiment and a curves of statical stability (GZ curves) for the loaded departure with 100% consumables and loaded arrival 10% consumables, should be produced.

- Notes:-
1. The above conditions may include a margin for growth up to 5% of the lightweight, at the discretion of the Certifying Authority, with the VCG positioned at the upper deck amidships.
 2. Buoyant structures intended to increase the range of positive stability should not be provided by fixtures to either a mast, rigging, or superstructure.
 3. For standard production series built vessels, the statical stability (GZ) may be derived from an inclining experiment conducted on another vessel of the series, subject to corrections for differences in outfit, to the satisfaction of the Certifying Authority.

.2 Permitted area of operation

The permitted area of operation is dependent upon a vessel's range of stability as indicated in the table in Section 11.9.5. (The range of stability is to be at least 90° in all cases)

.3 For Category 6 vessels, it may be demonstrated by test or calculation, that an open sailing boat when fully swamped is capable of supporting its full outfit of equipment and the total number of persons for which it is to be certificated. Sailing dinghies (small non-decked boats generally in the range of 2.5 to 6 metres in length which are not mechanically propelled) and small un-ballasted sailing dayboats are to be capable of being righted by their crew after inversion.

Method 2

- .1 By the full application verified or performed by a Certifying Authority as required, of ISO12217 Part 2 'Small craft – Stability and buoyancy assessment and categorisation – Sailing boats of hull length greater than or equal to 6 metres', in accordance with Section 11.9.5. Vessels under 6 metres in length may not be considered by this method.
- .2 The permitted area of operation is dependent upon a vessel's assigned Design Category as indicated in the table in Section 11.9.5.

11.9.3 Vessels fitted with external ballast keels

.1 The stability assessment of a vessel may be made by any one of the following methods:-

Method 1 - as for vessels without external ballast keels, see 11.9.2 above;

Method 2 - by the full application verified or performed by a Certifying Authority as required, of ISO12217 Part 2 'Small Craft – Stability and Buoyancy Assessment and Categorisation – Sailing Boats of hull length greater than or equal to 6m' in accordance with 11.9.5. Vessels under 6m in length may not be considered by this method.

Method 3 - by the 'STOPS' Numeral developed by the Royal Yachting Association (RYA) and discussed in Section 11.9.4.

Notes:- For vessels fitted with one or more top-weight items, examples of which are given below, the ballast ratio should be modified as follows:-

Moments are to be taken about the vertical centre of gravity (KG) of the vessel, which is assumed to be at the waterline. The heeling moments attributed to the top-weight items are resolved, and the ballast weight is reduced, using the formula below.

$$CBW = \frac{TW \times H}{(DCB + DK/2)}$$

Noting that:-

CBW is the correction to the ballast weight

TW is the weight of the top-weight items being considered

H is the height of the vertical centre of gravity above the waterline.

DCB is the draught of the canoe body, taken by measuring the maximum draught at $\frac{1}{8}$ of the full beam from the centreline in way of the transverse section, at greatest beam.

DK is the depth of the keel, taken as the distance between the draught of the canoe body and the bottom of the keel.

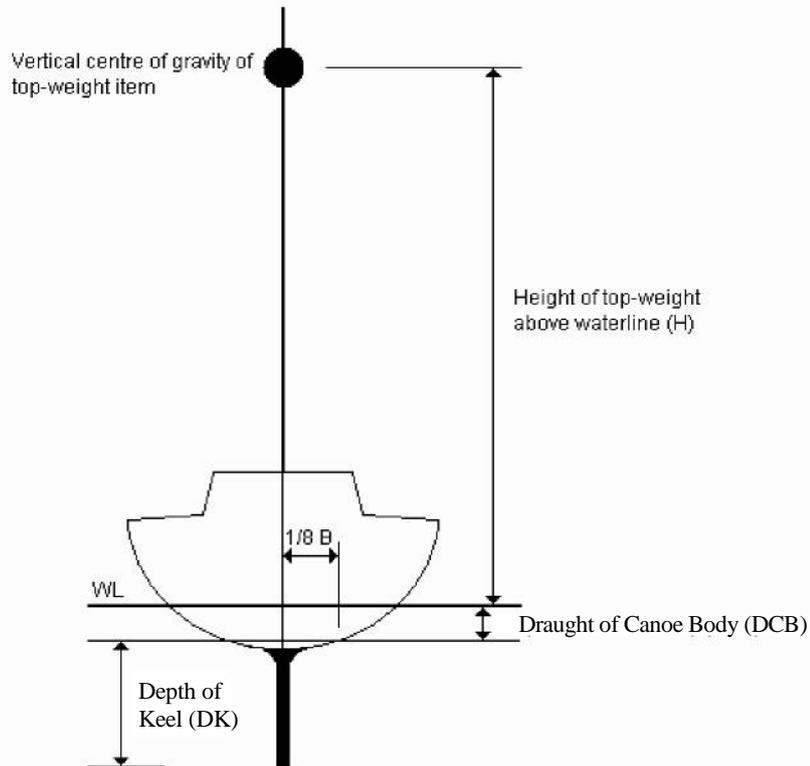


Figure 11.2

The dimensions above are illustrated in Figure 11.2 above.

Examples of top-weight items are given below:-

roller furling headsail;

in-mast or behind-mast roller furling mainsail;

a radar antenna mounted higher than 30% of the length of the vessel above the waterline.

Ballast weight reductions are to be conducted to the satisfaction of the Certifying Authority.

.2 Permitted area of operation

The permitted area of operation is dependent upon a vessel's range of stability, STOPS Numeral, or Design Category as indicated in the table in 11.9.5.

11.9.4 Assessment using the RYA 'STOPS' numeral or use of SSS numeral calculated by the Royal Ocean Racing Club.

- .1 A vessel can have its area of operation based upon the RYA STOPS Numeral.

Information on the derivation of the STOPS numeral may be obtained from the Certifying Authority.

Once the STOPS Numeral has been determined, it is necessary to study the table in Section 11.9.4 to ascertain the permitted area of operation.

- .2 A SSS numeral calculated by the RORC will be accepted in place of a STOPS numeral, provided that it includes a self righting factor based on an inclining experiment and shown on a valid IRC or IMS rating certificate.

11.9.5 Table showing permitted areas of operation, STOPS Numerals and Design Categories for a vessel operating in area categories other than 0 or 1 and carrying 15 or less persons.

Permitted Area of Operation	MCA Code Categor	Minimum Required Standard			Permitted ISO Stability Assessment Options
		Range of Stability	Stops Numeral	ISO 12217 Design Category	
Unrestricted	0	90+60x(24-LOA)/17	N/A	A	1
Up to 150 miles from a safe haven	1	90+60x(24-LOA)/17	N/A	A	1
Up to 60 miles from a safe haven	2	90+60x(24-LOA)/20	30	B	1
Up to 20 miles from a safe haven	3	90+60x(24-LOA)/25	20	B	1
Up to 20 miles from a safe haven in favourable weather and daylight	4	90+60x(24-LOA)/25	20	C	1 and 2
Up to 20 miles from a nominated departure point in favourable weather and daylight	5	90+60x(24-LOA)/25	20	C	1 and 2
Up to 3 miles from a nominated departure point in favourable weather and daylight	6	90+60x(24-LOA)/25	14	C	1,2,5 and 6

11.10 Sailing Multihull Vessels

The stability of multihull sailing vessels over 6m in length should be assessed using ISO 12217 – Part 2, which includes a requirement that the vessel shall float after an inversion without the benefit of any trapped air pockets other than dedicated air tanks or watertight compartments. Vessels under 6m are to be specially considered by the Administration.

- 11.10.1 A multihull vessel should be provided with a Stability Information Booklet based on the Administration's model booklet, giving details of the maximum advised mean apparent windspeeds for each expected combination of sails that may be

set, as derived from ISO 12217 – 'Part 2 - Small craft - Sailing and buoyancy assessment and Categorisation sailing boats of hull length greater than or equal to 6 metres'. These windspeeds should be presented in knots, and be accompanied by the note, "In the following winds, the tabulated safe windspeed for each sail combination should be reduced by the boat speed."

11.10.2

For the purposes of the application of ISO 12217 to coded vessels, the maximum safe wind speed shall be taken as the lesser of the values calculated by the formulae below, instead of those given in G.1 of the ISO standard. Both pitch and roll moments shall be calculated for all vessels

$$v_w = 1.5 \sqrt{\frac{LM_R}{A_s h \cos \phi_R + A_D b}}$$

or

$$v_w = 1.5 \sqrt{\frac{LM_P}{A_s h \cos \phi_P + A_D b}}$$

- where:
- v_w = maximum safe apparent wind speed (knots)
 - LM_R = limiting restoring moment in roll (newton-metres)
 - LM_P = limiting restoring moment in pitch (newton-metres)
 - A_s = area of sails set including mast and boom (square metres)
 - h = height between the geometric centre of area of A_s and the below-water profile of the hull, with centre/dagger boards lowered and the boat upright (metres)
 - ϕ_R = heel angle at maximum roll righting moment (in conjunction with LM_R)
 - ϕ_P = limiting pitch angle used when calculating LM_P (in conjunction with LM_P)
 - A_D = plan area of the hulls and deck (square metres)
 - b = distance from centroid of A_D to the centreline of the leeward hull

Derivation of the maximum advised apparent windspeeds, and the Stability Information Booklet, is to be submitted to the Certifying Authority for approval. Evidence should be provided as to the derivation of the stability data.

The permitted area of operation should be determined with reference to the following table, including the maximum safe apparent wind speed with no sails set (bare poles condition):-

Permitted Area of Operation	MCA Code Category	ISO 12217 Design Category	"Bare Poles" safe windspeed should exceed
Unrestricted	0	A	36 knots
Up to 150 miles from a safe haven	1	A	36 knots
Up to 60 miles from a safe haven	2	B	32 knots
Up to 20 miles from a safe haven	3	B	28 knots
Up to 20 miles from a safe haven in	4	C	25 knots
Up to 20 miles from a nominated departure point in favourable weather and daylight	5	C	25 knots
Up to 3 miles from a nominated departure point in favourable weather and daylight	6	C	25 knots

11.10.3 Trimarans operating in Areas 0 or 1 shall have sidehulls each having a total buoyant volume of at least 200% of the displacement volume in the fully loaded condition. Trimarans operating in Area 2 shall have sidehulls each having a total buoyant volume of at least 150% of the displacement volume in the fully loaded condition."

11.11 Approval of Intact and Damage Stability

11.11.1 A vessel not required to have an approved Stability Information Booklet.

A vessel for which stability is assessed on the basis of practical tests or simplified methods, defined in Section 11 of the Code, conducted by a competent person(s), should be approved by the Certifying Authority. In order to give approval, the Certifying Authority should be satisfied that the requirements have been met, accepting the results obtained and keeping a detailed record of the procedure of the tests or calculations and the results which were accepted.

The Certifying Authority should file the details in the records retained for the vessel, and these details are to be entered on the certificate. See section 11.1.1.10 for requirements for the carriage of a Stability Guidance Booklet.

11.11.2 A vessel required to have an approved Stability Information Booklet.

11.11.2.1 The owner(s) should be responsible for the inclining test of a vessel to be undertaken by competent persons and for the calculation of the lightship particulars, which are used in the stability calculations.

11.11.2.2 A person competent to the satisfaction of the Certifying Authority should witness the inclining test of a vessel and be satisfied as to conditions and the manner in which the test is conducted.

11.11.2.3 The owner(s) of a vessel should be responsible for the submission of the Stability Information Booklet, based on the Administration's model booklet prepared by a competent person(s), the content and form in which stability information is presented, its accuracy and its compliance with the requirements of Section 11 for the standard required for the vessel. The owner(s) should submit three (3) copies of the booklet to the Certifying Authority for approval.

11.11.2.4 When satisfied with the form and content of the Stability Information Booklet (including satisfaction with the competency of the person(s) who produced the booklet, methods and procedures used for calculations, the stability standard achieved and instructions which may be given to the skipper but excluding accuracy of hull form data), the Certifying Authority should stamp the booklet with an official stamp which contains the name of the Certifying Authority, the date of approval, a file (or record) reference, number of pages in the booklet and "APPROVED FORM AND CONTENT".

Two (2) copies of the approved booklet should be returned to the owner(s). The owners should be instructed to confirm that one (1) copy has been placed on the vessel and will be retained on the vessel at all times for use by the skipper. The second booklet is for the record of the owner(s).

The Certifying Authority should retain the third copy of the approved booklet in the records kept for the vessel.

11.11.3 A vessel required to have approved damage stability information

11.11.3.1 The owner(s) of a vessel should be responsible for the submission of the damage stability calculations prepared by a competent person(s), their accuracy (including methods and procedures used for calculations) and compliance with the requirements of Section 11.2.

The owner(s) should submit two (2) copies of the calculations to the Certifying Authority for approval.

11.11.3.2 The Certifying Authority should approve the results of the damage stability cases provided the results meet the standard defined in Section 11.2.

Approval (of the results but not the accuracy of the calculations) should be given in a formal letter from the Certifying Authority to the owner(s) and a copy of the calculations returned marked with the name of the Certifying Authority, the date and "RESULTS APPROVED".

11.11.4 Guidance on stability assessment

It should be noted that the Certifying Authority may require a full stability analysis for a vessel which has been modified from the original design, particularly if the freeboard has been significantly reduced or the modification has involved the addition of, for example, a mast-furled main sail, a roller-reefing headsail, a radar antenna or any other item of equipment which may have caused the position of the vertical centre of gravity to be situated at a higher level than that intended by the designer.