



Maritime &
Coastguard
Agency

MARINE GUIDANCE NOTE

MGN 503 Amendment No.1 (F) Procedure for Carrying out Small Fishing Vessel Stability Tests

Notice to all Owners and Operators of Fishing Vessels, Builders, Designers, Surveyors and Harbour Authorities.

This notice amends MGN 503 (F) and should be read in conjunction with MSN 1871 Amendment No.2 (F) The Code of Practice for the Safety of Small Fishing Vessels of less than 15m Length Overall and MGN 526 (F) Stability Guidance for Fishing Vessels - Using the Wolfson Method.

1. Summary

1.1 This MGN has been produced for owners and skippers of small fishing vessels as an aid to assess the stability of their vessels in accordance with [MSN 1871 Amendment No.2](#) The Code of Practice for the Safety of Small Fishing Vessels of less than 15m Length Overall (The Code of Practice).

2. Introduction

2.1 All fishing vessels are required to demonstrate satisfactory stability according to [Chapter 3 of the Code of Practice](#). At each subsequent renewal inspection the exact same test must be repeated under the exact same conditions. When any vessel modifications as defined within the Code of Practice take place, or the vessel changes fishing method to one that it has not previously been certificated, the owner must inform MCA to seek approval and comply with the relevant stability requirements applicable to New Vessels (2021) (meaning those Registered on or after 6 September 2021) employing the proposed category of fishing. The requirements of the Code of Practice should be followed.

2.2 New vessels (2021) and those previously tested according to [3.5 to 3.11 of the Code of Practice](#) (including those holding Stability Books) are required to maintain their stability to the aforementioned standards in order to be provided with a Small Fishing Vessel Certificate.

2.3 Existing vessels should follow the flow chart in this MGN in order to ascertain the test most suitable for their vessel. To be provided with a Small Fishing Vessel Certificate, an existing small fishing vessel must meet the acceptance criteria for the test as provided in this MGN.

2.4 Vessels will have their fishing method(s) recorded on their Small Fishing Vessel Certificate.

2.5 The Code of Practice requires all vessels to apply the Wolfson Stability Notice. Where the conditions on the Notice are exceeded, the owner should seek to take action to improve the stability / freeboard of the vessel.

2.6 The attending surveyor may impose operational restrictions on the vessel where the conditions on the Wolfson Stability Notice are not met. For example: where the Notice indicates operation:

- In the “Green” zone: the vessel may be considered “Safe” in all but extreme sea states;
- In the “Amber” zone: “Low level of safety” and should be restricted to low sea states – as indicated on the Notice;
- In the “Red” zone: “Unsafe, and danger of capsizing” unless restricted to calm conditions and with extreme caution – as indicated on the Notice.

2.7 The maximum recommended sea state provided in the Wolfson Stability Notice is defined as the significant wave height. This is the mean of the highest third of the waves and it corresponds closely with observers’ estimates of average wave height. The maximum wave height likely to be encountered by a vessel on a sheltered route is approximately twice the significant wave height.

3. The Tests

3.1 There are different stability assessments available for fishing vessels. It should be taken into consideration that not all stability tests are suitable for all vessel types. The stability assessments available for fishing vessels are:

- Roll Period Test - Simplified Method (See section 4 and **Annex A**)
- Roll Period Test – Minimum Metacentric Height (See section 5 and **Annex B**)
- Heel Test – Suspended Weight Method (See section 6 and **Annex C**)
- Heel Test – Offset Load test (See section 7 and **Annex D**)

3.2 It is recommended that tests are video recorded.

3.3 The flow chart below gives guidance as to the appropriateness of each test for each vessel type:

4. The Roll Period Test - Simplified Method

- 4.1 Acceptance criteria: One roll period (seconds) should be less than or equal to the beam (metres).
- 4.2 The process to be followed can be found at **Annex A**.
- 4.3 Where the roll period is greater than the beam then actions to improve the stability should be taken and the test repeated.

5. The Roll Period Test – Minimum Metacentric Height

- 5.1 Acceptance criteria: The stability is deemed satisfactory when the GM^1 is not less than GMr^1 .
- 5.2 The process to be followed can be found at **Annex B**.
- 5.3 Where the GM is less than GMr , then actions to improve the stability should be taken and the test repeated.

6. The Heel Test – Suspended Load Method

- 6.1 Acceptance criteria: Max 7 degrees; minimum heeled freeboard no less than 75mm. Up to 10 degrees may be accepted subject to meeting the freeboard requirements of [Chapter 3.12 \(of the Code of Practice\)](#) in the heeled condition.
- 6.2 The process to be followed can be found at **Annex C**.

7. The Heel Test - Offset load Test

- 7.1 Acceptance criteria: Max 15 degrees; minimum heeled freeboard no less than 75mm.
- 7.2 The process to be followed can be found at **Annex D**.

8. The Result and Action to Take

- 8.1 Taking into account the Wolfson Stability notice and where a vessel is within the acceptance criteria, then the vessel is deemed to have met the stability standard.
- 8.2 If the vessel does not meet the acceptance criteria, the vessel has not passed the stability standard, and the result should be discussed with the attending surveyor.

¹ GM is Actual Metacentric Height
 GMr is Required Metacentric Height

8.3 The vessel owner should have the opportunity to re-test the vessel.

8.4 Considerations may include whether the tested condition was representative, how top weight may be reduced, or other remedial action. The attending surveyor may require a vessel with a marginal result and / or with minimum freeboard to operate within a restriction (see Conditions on Small Fishing Vessel Certificate below). The surveyor may make a recommendation to undertake a heel test (if not already undertaken) – which may be completed at the same visit.

8.5 Where remedial action involves modification, the MCA always advises the owner to seek the advice of a competent person.

8.6 Major modifications or addition of ballast shall be approved by the MCA.

8.7 These actions, along with the minimum freeboard, which may subsequently allow the vessel to pass the test, shall be recorded. Owners can use [Forms MSF1378 \(Roll Test Simplified Method\)](#), [MSF1380 \(Heel Test - Offset Load\)](#) or [MSF1382 \(Heel Test – Suspended Load\)](#) to record the test. Owners should seek the assistance of a competent person to undertake the Roll Test (Minimum Metacentric Height Test). Surveyors should use Forms MSF 1377 (Roll Test – Simplified Method), MSF1379 (Heel Test – Offset Load) or MSF1382 (Heel Test – Suspended Load).

8.8 Where the vessel does not meet the acceptance criteria on a repeated test, the owner is advised to seek advice from a competent person as to achieving compliance.

8.9 A competent person would be an individual of good standing and experience in assessing the construction standards, freeboard, stability criteria etc. for a small fishing vessel and is appropriately qualified holding a relevant qualification.

9. Preparation – all tests

9.1 Vessel-Loading condition

9.1.1 Preparation is key. The test(s) should be able to be completed in a single visit.

9.1.2 Tests should be conducted when the vessel is loaded in the depart port condition with full fuel, stores, fishing gear, empty hold etc. Place gear, equipment, and supplies at the locations on board where they would usually be stowed.

9.1.3 If ice is normally carried, then this (or an equivalent weight in the same location) should be on board the vessel when carrying out the test.

9.1.4 The owner should take care to ensure that the test is repeatable for comparison at each 5-year renewal survey.

9.1.5 Be aware of heavy objects that are likely to swing or slide as the vessel shifts. Secure them against such movement. Minimise the free surface effects of slack tanks (fill the tanks full or pump them as dry as possible) or the vessel will appear more tender than it is. Bilges should be dry.

9.1.6 The vessel should be trimmed upright. Persons on board during the test must return to / remain in the same position throughout.

9.2 Vessel Clearance

9.2.1 There must be no physical contact between the boat and the dock or the bottom. We recommend a minimum distance of 0.6m between the side of the boat and the dock, and also between the keel and the bottom. Any contact with the dock or the bottom would affect the validity of the test.

9.3 Moorings

9.3.1 The vessel should have slack lines during the tests.

9.4 Environmental Conditions

9.4.1 Wind – Excessive wind will affect the results of all tests. Sheltered or calm conditions are required. Generally, the wind should be less than 4 knots. A relatively strong wind is acceptable if it is blowing from dead ahead or dead astern.

9.4.2 Current – The test should take place in a basin free from the effects of current. Conduct the test in areas that have no or very little current. To avoid the effect of tidal currents, conduct tests during slack tides, or moor in a position so that any small current runs from dead ahead to dead astern.

9.4.3 Waves – Waves may invalidate the test results. Ideally, the water should be flat calm. Wavelets that do not cause the vessel to roll are acceptable.

9.4.4 Owners are advised should the chosen location not be suitable, there may be a requirement to postpone the test or to move the vessel to a more suitable location.

10. Tests to be repeatable

10.1 5 years from the point of stability assessment, the owner or skipper will be expected to repeat the tests applicable to their vessel. The vessel should be in the same condition as the latest accepted test using the same quantity of weights.

11. Conditions on Small Fishing Vessel Certificate

11.1 As a result of the stability tests, assessment of freeboard and / or water-freeing arrangements, the attending surveyor will take into consideration the Wolfson Stability Notice and may propose that conditions be placed on the fishing vessel certificate. The intention of these conditions is to allow the vessel to operate in a controlled manner within a geographical / distance from safe haven / weather orientated allowance.

11.2 All open vessels and decked vessels with freeboard less than 300mm are currently limited in their area of operation to 20 miles from a safe-haven and in favourable weather conditions.

12. Requirement to maintain freeboard / clear height at side

12.1 The freeboard and positive clear height at side will be measured at every renewal inspection.

12.2 Vessels which are accepted by the MCA but do not meet the minimum freeboard or clear height at side must meet the requirements of chapter 3 of the Code of Practice and any conditions placed on certification at all times.

12.3 All vessels shall have a notice available at the helm position stating the limited area of operation (if applicable), alongside the Wolfson Stability Guidance Notice.

12.4 It is essential to the safe operation of the vessel that freeboard is maintained. It is the reserve freeboard that provides the vessel the ability to remain upright and afloat.

13. Home and Dry

13.1 Further details on the tests, can be found in the Vessel Stability section of the Home and Dry website [Home and Dry: Stability \(https://www.homeanddry.uk/vessel-stability/\)](https://www.homeanddry.uk/vessel-stability/).

14. Standards

14.1 These instructions are based on those developed for the Food and Agriculture Organisation (FAO), International Labour Organisation (ILO) and the International Maritime Organization (IMO) Safety Recommendations for Decked Fishing Vessels of Less than 12 metres in Length and Undecked Fishing Vessels, 2012.

15. More information

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Annex A - The Roll Period Test - Simplified Method

1. Conducting the Roll Test

1.1. Measure maximum beam at deck height of vessel (in metres).

1.2. Make a temporary mark on your hull at a point amidships. When the boat is rolling during the test, this mark should not go below the surface of the water. If it does, the boat is rolling too much and the test results will not be valid.

1.3. Determine where to place this temporary mark by dividing the vessel's maximum beam in metres by 8. Using the value obtained from this calculation, measure at a point amidships from the waterline up the side of the hull and make a temporary mark (coloured chalk or a piece of tape is recommended). For example, if the maximum beam is 3 metres, divide 3 by 8, which equals 0.375m. In this case, you would make a mark on your hull 0.375m above the water-line.

1.4. Measure the minimum freeboards on each side.

1.5. A rope should be tied to the mast or some other substantial structure as high above the waterline as possible. Other practical methods to induce a roll may be considered.

1.6. The vessel should be rolled by pulling rhythmically (in time with the vessel's rolling), with the rope.

1.7. Once the vessel is rolling sufficiently, stop pulling on the rope and have someone start timing.

1.8. The roll period should be timed over as many oscillations - minimum three but preferably five. The person timing the roll should ensure that the timing of each complete set of rolls is as accurate as possible by aligning with a structure, wall, etc. A video recording may be useful to provide confirmation.

1.9. This process should be repeated at least three times or until consistent measurements are obtained. On each occasion the time for at least three (but preferably five) oscillations should be measured.

1.10. An average (mean) time (T) for one oscillation (i.e. the roll period) can then be calculated from the timings taken.

1.11. If the time for one average roll in seconds is less than the beam of the vessel in metres the vessel can be said to be stiff and passes the test. If the time in seconds is more than the beam of the vessel in metres then the vessel is said to be tender and does not meet the criteria of the test.

2. Tender Vessels

2.1 If the vessel is found to be "tender", remedial action will be required.

Such action may include the removal of redundant items, re-examining stowage locations of loose equipment (i.e. stow at in a lower position in the vessel) or if equipment is required onboard.

2.2 Remedial action, for example, may also involve removing top weight. The addition of ballast may assist in the vessel meeting the criteria, but this should not be attempted without first seeking appropriate advice. If remedial action does require modification, you must advise the MCA in line with the Code of Practice.

2.3 A further roll test with an MCA surveyor will be required to be witnessed in order for the certificate to be issued.

3. Suitability of test

3.1 The Roll Period Test – Simplified Method is the first choice for round bilge single hull vessels without large underwater appendages, there is no lower vessel size limit. It is expected that large keel or bilge keels, hard chines or other large underwater appendages or of an unconventional design (such as high-speed vessels), may dampen the rolling and will affect the result of the roll test. Vessels outwith of the above should consider the Roll Period Test – Required Metacentric Height or Heel Test.

3.2 Where the above limitations can no longer be complied with, this roll test should not be used.

3.3 This test is not suitable for multihulls.

3.4 The minimum upright freeboard should comply with the requirements of Chapter 3 of the Code of Practice.

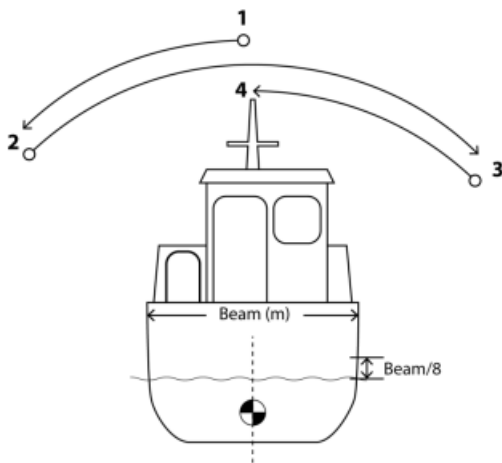


Figure 1 Roll Test

Time for one complete roll is as per above diagram, starting at position 1 through to position 4. Alternatively, one can start from another point if preferred.

If the average roll period in seconds is longer than the beam in metres, then you must contact your local MCA surveyor. You could contact a qualified Naval Architect if necessary.

The freeboard during the test should not reduce below $\text{Beam} / 8$.

Annex B – The Roll Period Test – Required Metacentric Height GMr

1. Conduct of the test

- 1.1. The test shall be conducted in the same manner as Annex A above - paragraphs 1.1 to 1.9.
- 1.2. An average (mean) time (RP) for one oscillation (i.e. the roll period) can then be calculated from the timings taken.

2. Application of average roll period:

- 2.1. The following approximate formulae for minimum metacentric height GM_{min} , in metres, should be used for all operating conditions as the criterion:

$$GM_{min} = 0.53 + 2B \left[0.075 - 0.37 \left(\frac{f}{B} \right) + 0.82 \left(\frac{f}{B} \right)^2 - 0.014 \left(\frac{B}{D} \right) - 0.032 \left(\frac{L_s}{Lwl} \right) \right]$$

Where:

L_s is the length of enclosed superstructure extending from side to side of the vessel, in metres and

Lwl is the length of the vessel on the waterline in maximum load condition in metres, and

B is the maximum beam of the vessel, in metres and

D is the moulded depth amidships, in metres and

F is the actual minimum freeboard or clear height at side or down flooding point.

- 2.2. Vessels should have their dimensions checked against the following criteria:

$$0.02 \leq \left(\frac{F_{min}}{B} \right) \leq 0.2$$

For example:

If Min Freeboard ÷ Beam is less than or equal to 0.02 then do not use the roll test.

If Min Freeboard ÷ Beam is greater than or equal to 0.2 do not use the roll test.

$$\frac{l_s}{Lwl} < 0.60$$

For example:

If length of enclosed superstructure ÷ waterline length is more than 0.6 then do not use the roll test.

$$1.75 \leq \left(\frac{B}{D}\right) \leq 2.15$$

For example:

If the Beam ÷ Depth is less than or equal to 1.75 then do not use the roll test.

If the Beam ÷ Depth is more than or equal to 2.15 then do not use the roll test.

2.3 Where the above limitations can no longer be complied with, the roll test should be used with caution as the result may not be valid, and the vessel should be assessed against the Heel Test.

3. Calculation of the actual metacentric height GM

3.1. The actual metacentric height GM, in metres, should be calculated according to the following formula:

$$GM = \left(\frac{0.80 \cdot B}{RP}\right)^2$$

where:

RP, in seconds, is the rolling period.

4. Test Result:

- 4.1. The initial stability is deemed satisfactory when the actual GM is not less than GM_{min} based upon the equation at 2.2 above.

5. Suitability of test

- 5.1. The Roll Period Test – Minimum Metacentric Height maybe suitable for single hull vessels with larger underwater appendages, there is no lower vessel size limit. The hull may have a large keel or bilge keels, hard chines or other large underwater appendages. However, vessels of an unconventional design (such as high-speed vessels), may still exceed the limitations of the test. In those instances, a Heel Test may be necessary.
- 5.2. Where the above limitations can no longer be complied with (as indicated above) the roll test should not be used, and the vessel should be assessed against the Heel Test.
- 5.3. This test is not suitable for multihulls.
- 5.4. The minimum upright freeboard should comply with the requirements of Chapter 3 of the Code of Practice.

Annex C - Heel Test – Suspended Weight

1. Conducting the Heel Test – Suspended Weight

1.1 This test is suitable for those vessels that routinely fish with gear extended transversely and where the weight used is known and repeatable.

1.2 Where a vessel has no haulers or beams etc, and does not lift any loads it will be difficult to conduct a representative test using this Heel Test. In these instances, the Offset Load Test may be more suitable. It is preferable to use components of the actual gear, lifted from a block at its highest and/or furthest outboard location, to give a measurable heel angle such that the heeling test will relate directly to the vessel's typical fishing operation.

2 Conducting the Heel Test

2.1 Measure upright freeboard port and starboard.

2.2 Use an outboard derrick to lift a typical fishing operation weight from the derrick. See Figure 2 below. The opposite derrick should be in the normal depart port position.

2.3 Measure the heel freeboard port and starboard.

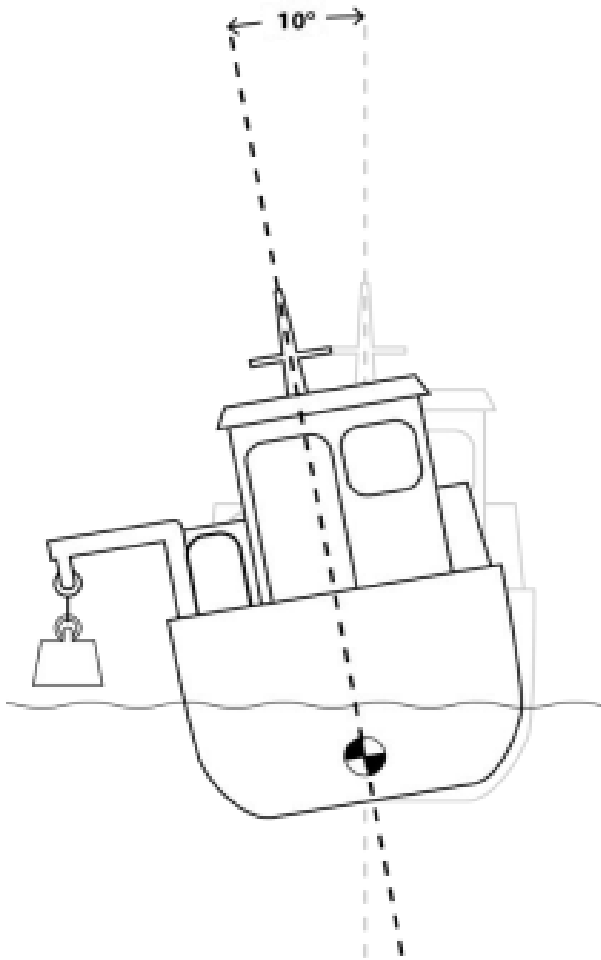
2.4 The vessel will be judged to have an acceptable standard of stability if the test shows that:

- i. the angle of heel does not exceed 7 degrees and in the case of a vessel with a watertight weather deck extending from stem to stern, the freeboard to deck is not less than 75mm in the heeled condition at any point; or
- ii. if unable to meet the criteria above, the angle of heel may exceed 7 degrees, but should not exceed 10 degrees, if the freeboard in the heeled condition is in accordance with that required by Chapter 3 of the Code of Practice in the upright condition.

2.5 The minimum upright freeboard should be as stated in Chapter 3 of the Code of Practice.

3 Suitability of test

3.1 The Heel Test – Suspended Weight is suitable for those vessels able to suspend a weight transversely i.e. Beam Trawlers



The weight should be held transversely, using a known weight.

Figure 2 Indication of vessel undertaking heel test with suspended weight.

Annex D – The Heel Test - The Offset load Test

1. Conducting the Offset Load Test

1.1 An offset load test should be conducted when the vessel is loaded according to the operating conditions as specified in Annex 6A 1.4.1 of the Code of Practice. A weight equivalent to $25 \times \text{LOA} \times \text{B}$ (kg) should be distributed along one side of the vessel.

1.2 The test should be conducted in three stages.

Move 1

A weight equivalent to one third of $25 \times \text{LOA} \times \text{B}$ (kgs) should be distributed along one side of the vessel. LOA is length overall and B is beam. Both should be measured in metres.

Move 2

A weight equivalent to two thirds of $25 \times \text{LOA} \times \text{B}$ (kgs) should be distributed along one side of the vessel.

Move 3

A weight equivalent to $25 \times \text{LOA} \times \text{B}$ (kgs) should be distributed along one side of the vessel.

1.3 The vessel's stability is deemed satisfactory when the angle of heel does not exceed 15° and the freeboard to the deck is not less than 75 mm at any point.

2. Suitability of test

2.1 This test is suitable for those vessels where weight is applied at deck level, within the boundary of the boat. Such vessels may include potters, netters, trawlers (where cod end and catch are lifted transversely)