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## **Procedure for Carrying out a Roll or Heel Test to Assess Stability for Fishing Vessel Owners and Skippers.**

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

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### **Summary**

This MGN has been produced as a result of the need for owners and skippers of small fishing vessels (most appropriately those under 15m Length overall (LOA)) to make an assessment of the state of stability of their vessels. Although both tests do not provide accurate or absolute data, it will help owners and skippers assess whether or not their vessel is tender or stiff in a particular condition (i.e. laden or unladen).

### **Instructions to FV Skippers and Owners to carry out a basic Stability Check for small fishing vessels.**

This document and form are provided to help you assess the level of stability of your vessel. The period of roll of your vessel is directly related to the beam of the vessel in metres.

**A vessel could be defined as tender or stiff as below**

**Vessel Tender** = If the time for one roll in seconds is more than the beam in metres.

**Vessel Stiff** = If the time for one roll in seconds is less than the beam in metres.

***Essentially, a very slow roll is likely to indicate a problem with stability, and a fast roll is likely to suggest that the vessel has a good reserve of stability.***

***E.g.*** If the vessel has a beam of 3.5m, a roll period of more than 3.5 seconds would make the vessel tender. If the roll period is less than 3.5 seconds then the vessel could be said to be stiff.



This should give you a guide on which to base the operation of your vessel. If she is tender then you will need to be more aware of the limits of the vessel. If you have any cause for concern you must contact either a qualified naval architect or an MCA Surveyor for advice on potential modifications to improve stability.

These instructions are based on those developed for the Food and Agriculture Organisations (FAO), International Labour Organisations (ILO) and the International Maritime Organizations (IMO) Voluntary Guidelines for the Design, Construction and Equipment of Small Vessels, 2005.

The last two pages of this document are forms which can be used to record results of the roll test & heel tests. They also help with instruction.

**Before attempting to roll the boat you must first ensure the following conditions:**

### **Vessel-loading conditions**

Load your vessel with all the gear and supplies that would be aboard when you head for the fishing grounds. Place gear, equipment, and supplies at the locations on board where you would usually stow them.

Watch especially for heavy objects that are likely to swing or slide as the vessel rolls back and forth. Secure them against such movement. Minimise the free surface effects of slack tanks (fill the tanks full or pump them as dry as possible).

### **Space around vessel**

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 rolling period test.

### **Mooring conditions**

Ideally, your boat should be free of mooring lines during the rolling period test. If this isn't possible, attach the mooring lines on the centreline at the bow and stern. During the actual test, be sure to let the mooring lines go slack.



## Environmental conditions

**Wind** - Don't conduct the test on a very windy day when the wind could cause the boat to heel significantly during the test.

**Current** - Under ideal conditions, 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 the test during slack tides, or moor in a position so that any small current runs from dead ahead to dead astern.

**Waves** - The influence of naturally occurring waves or those caused by another boat can alter the test and make the results invalid. Ideally, the water should be flat calm. Wavelets that don't cause the vessel to roll are acceptable.

**Please note:** Before starting the test, you need to make a temporary mark on your hull at a point amidships. When your boat is rolling during the test, this mark should not go below the surface of the water. If it does, your boat is rolling too much and the test results will not be valid.

You determine where to place this temporary mark by dividing your 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.

## Conducting the Roll Test

1. Measure maximum beam at deck height of vessel (in metres).
2. Attach a rope to a secure part of the vessel, ideally at some height off the deck.
3. Have someone pull the rope to start the vessel rolling. Once the vessel is rolling sufficiently (but not so much as to submerge the temporary mark amidships) start timing after one roll has passed.
4. It is not important whether you decide to time from the top of the roll or either side of the roll provided that you stick with that point from thereon. Start timing the roll when the boat passes upright (or at lowest point of side), time 5 complete rolls (1 complete roll is from the start point all the way back to the start point i.e. if measuring from the top, rolling to one side, back through the top, over to the other side and back to the top again).
5. This process should be repeated 2 more times; eventually you should end up having timed 15 rolls (in 3 sets of 5). Take the time for the fifteen rolls and divide this by 15 = the time for one average roll in seconds.
6. 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. If the time in seconds is more than the beam of the vessel in metres then the vessel is said to be tender.



**Use the form on the back page to fill in your results.**

**Another useful method of determining the level of and change in stability of your vessel over time is the heeling test. This can be used instead of or in addition to the Roll test if required.**

## **THE HEEL TEST**

The aim of the heeling test is to indicate whether significant modifications have been made to the vessel, its gear or gear handling arrangement or if the changes you have made to the vessel have significantly changed the vessels stability.

It is preferable to use components of the actual gear, lifted from a block in its highest & or furthest outboard location, to give a measurable heel angle such that the heeling test will relate directly to the vessels typical fishing operation.

E.g. A beam trawler could lift one beam trawl from a horizontal derrick on one side, typically this will result in a heel angle of about 10 degrees. Any increase in the trawl weight or derrick length, or decrease in the stability, will result in a larger heel angle.

The heel test can be repeated to assess modifications to the vessel or to assess the effects of cumulative weight gain over time. It is essential that the repeat test is conducted with the vessel arrangement and test weight being as close as possible to the previous test.

1. Arrange the vessel in the depart port condition, an empty hold, no ice and full tanks are advised.
2. The vessel should be trimmed upright by movement of loose gear or tank contents.
3. The heel angle can be measured with a simple inclinometer, provided it enables a suitable level of accuracy.
4. Use an outboard derrick to lift a typical to normal fishing operation weight from the derrick.
5. Measure and record the result from the inclinometer, if it is the first heel test make sure you record this for comparison with subsequent tests.

Each subsequent test should be within 10% of the original heel test, this figure allows for the slight variation in conditions of test, if the figure is greater the 10% of the original heel test then professional advice should be sought.

Whilst conducting either of these tests it may be useful to run the Vessel Roll Test App which is available free from Google Play or any android store on the internet.

## **Minimum Operational Freeboard**

For open boats the recommended Minimum Operational Freeboard is 400mm and they should be restricted to operations no more than 20 miles from a safe haven in favourable weather conditions.



For decked vessels (with watertight deck) the recommended Minimum Operational Freeboard is 300mm. Decked vessels that do not meet 300mm minimum should limit operations to 20 miles from a safe haven in favourable weather conditions.

It is essential to the safe operation of your vessel that you maintain this reserve freeboard. It is the reserve freeboard that provides the vessel the ability to remain upright and afloat.

### More Information

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## FV Roll Test Form

Vessel Beam @ deck (m) = .....

Mark on side (m) above waterline = Beam in metres / 8 = .....

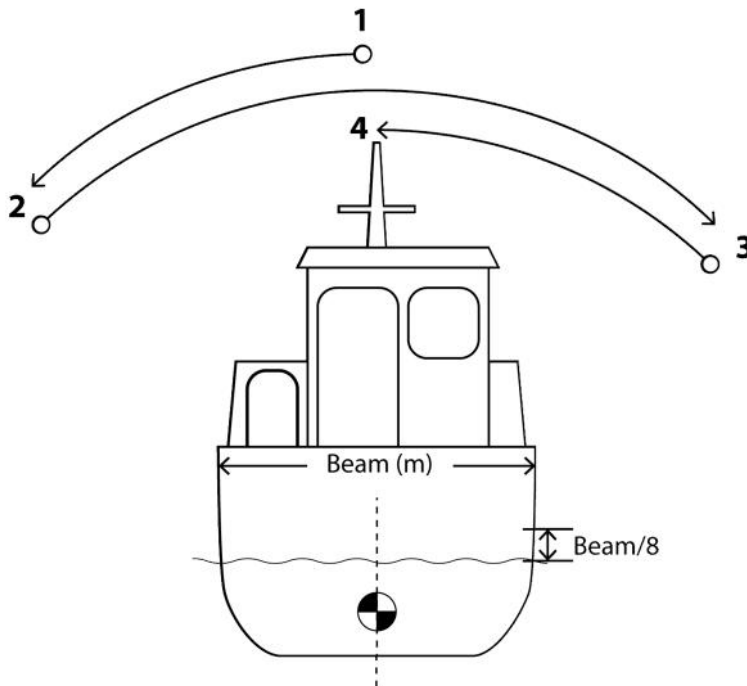
First 5 rolls (secs) = .....

Second 5 rolls (secs) = .....

Third 5 rolls (secs) = .....

Total time in secs for 15 rolls = ..... / 15 = Time for one average roll

(secs) .....



Time for 1 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 or Seafish Services for free advice and assistance. The MCA or Seafish Services may direct you to a qualified Naval Architect if necessary, or you could contact them directly in the first instance.



# FV Heel Test Form

## Vessel Loading Condition

Fishhold empty

No Ice

Fuel tanks full

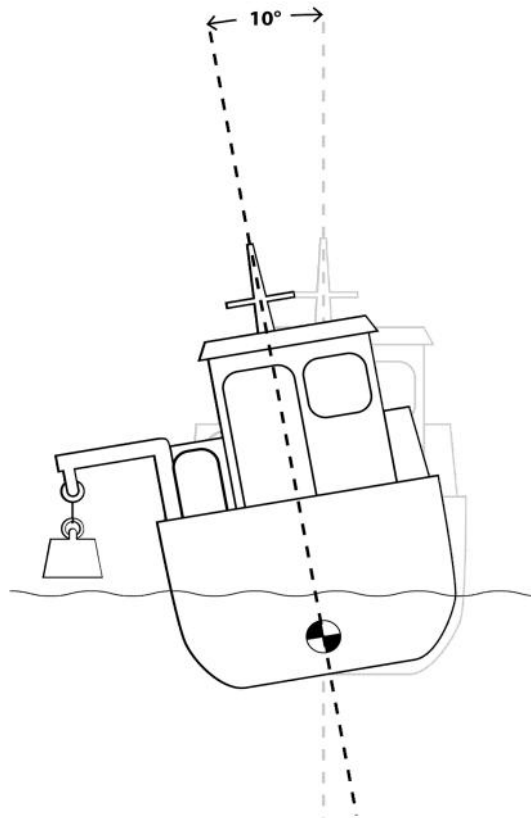
Deck cargo secure

Weight used for test (remember this should be repeatable with the same weight)

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.....

Date: ..... Angle: .....



## Repeat Tests

The repeat tests should be no more than 10% different to the original test above, if percentage of change is greater seek professional advice:

Date: ..... Angle: .....

Date: ..... Angle: .....

Date: ..... Angle: .....

