

DMA RO Circular no. 011

Guidelines for demonstrating the buoyancy of open fishing vessels

1. Rule reference

- Guidelines on open vessels (viking ships) of 20 June 1994, item 5.2: "... that the vessel, when filled with water and fully loaded, floats without considerable trim and with a freeboard of a minimum of 50 mm."

2. Purpose

To document that the vessel is capable of keeping afloat with a freeboard of a minimum of 50 mm when filled with water.

3. Method for demonstrating buoyancy

Documentation of buoyancy can be made either through a calculation or through a practical test.

Calculations of buoyancy must be carried out using a stability program approved by the Danish Maritime Authority (DMA). Consideration must be paid to both the longitudinal and the transversal trim caused by asymmetrical filling. When making the calculations, the same densities must be used as in connection with normal stability calculations.

The practical test must be carried out as described below in these guidelines.

Irrespective of the choice of method, the buoyancy of the vessel must be documented. As regards the practical buoyancy test, the result is to be documented through a certificate as described in section 7. Demonstration of buoyancy through calculations is to be documented in report form.

4. Condition

As regards type-approved vessels, it is evident from the approval how much deadweight, including how many persons, the vessel is approved for. The buoyancy must be demonstrated by means of the maximum permissible deadweight on board. The deadweight includes all loose objects such as the crew, outboard motor, fuel, fishing gear, catch and the like.

If the buoyancy is documented by means of a weight smaller than the one evident from the vessel's type approval, this reduced weight will in the future constitute the vessel's maximum permissible deadweight.

5. Preparation for practical buoyancy test

The weight of the fishing gear on board is decided. If there is no fishing gear on board, steel/lead is instead placed in the locations on board the vessel where the gear is normally stored – typically at the bottom. The weight of steel/lead must amount to at least 60% of the weight of the gear.

The weight of the expected catch is decided. If there is no catch on board, steel/lead is instead placed in the locations on board the vessel where the catch is normally stored. The weight of steel/lead must amount to at least 60% of the weight of the catch.

The weight of an outboard motor, fuel tank, instruments and the like is decided. The outboard motor, instruments and similar equipment can be dismantled before carrying out the practical buoyancy test. If this equipment is fully or partly taken ashore, steel/lead is instead placed in the locations on board the vessel from where the equipment is taken ashore. The weight of steel/lead must amount to at least 100% of the weight of the equipment taken ashore.

The weight of a person is normally considered as 75 kg. When the vessel is swamped, a part of the person's body will be lowered in the water aboard the vessel. During the test, 40 kg weight will be distributed on the thwarts instead of each person.

See also annex 1 with examples of calculations.

6. Carrying out a practical buoyancy test

The vessel must be afloat with slack moorings.

The test is carried out in the following way:

1. Deadweights placed in the vessel are noted as regards their location, weight and material.
2. The vessel is filled with water by means of a pump.
3. The filling of water is stopped when the water starts running out of the vessel.
4. When the vessel has found an equilibrium where water no longer runs out of the vessel, the freeboard is measured at the lowest point.
5. The vessel remains lying filled with water for ten minutes to ensure that water does not penetrate into the watertight sections of the hull. The vessel must remain lying for the said ten minutes with unchanged freeboard and trim.
6. Following the ten minutes' with water, the filling of water is repeated twice as described in items 2-4 to ensure that the vessel stabilizes immediately with the same freeboard and trim each time.

The three measured freeboards must all be of more than 50 mm in order for the test to be approved.

7. Documentation

After the practical buoyancy test, a certificate is issued documenting that the vessel has been subject to a buoyancy test with a satisfactory result (an example is given in annex 2).

The following must be evident from the certificate:

1. The vessel's identification (name, port of registry, port registration number, call sign).
2. Type, construction material.
3. Place and date of the test.
4. Maximum deadweight, cf. the vessel manufacturer.
5. List of deadweights and their location during the test.
6. Measured freeboard at water-fillings nos. 1 + 2 +3.
7. Average freeboard of the three water-fillings.
8. Position of the freeboard measured.
9. Other remarks.

The certificate is issued and signed by a person authorised for this by the DMA. The original certificate is handed out to the owner of the vessel and a copy of the certificate is sent to the DMA.

Annex 1

Examples of how the deadweight is decided at the test

Example 1:

The gear and the catch amount to 300 kg at present.

With a density of 2 kg/litres, the deadweights will amount to a volume of 150 litres.

Steel has a density of 8 kg/litre. Consequently, the 300 kg deadweights can be replaced by 180 kg iron (22.5 litre) + $150 - 22.5 = 127.5$ litre = 127.5 kg water.

Thus, the contribution from iron and water will give the necessary volume of 150 litres and the weight will amount to $180 \text{ kg} + 127.50 = 307.50 \text{ kg}$.

Example 2:

A vessel is approved for seven persons and a maximum in total of 630 kg deadweight.

The seven persons of 75 kg, corresponding to 525 kg, will when seated on the thwarts be partly submerged when the vessel is filled with water. Consequently, these seven persons can instead be replaced by 7 X 40 kg weight on the thwarts.

If the outboard motor and the tank weigh 50 kg, iron is placed instead of this weight. Then, the residual weight for gear and catch will amount to $630 - 525 - 50 = 55 \text{ kg}$. These 55 kg can be replaced by $0.6 \times 55 = 33 \text{ kg}$ iron placed at the bottom.

The 630 kg for which the vessel is approved are thus converted into steel with the following weight:

7 persons x 40 kg, 280 kg placed on thwarts.

Outboard motor, 1 x 50 kg, 50 kg located astern.

Gear/catch $0.6 \times 55 \text{ kg}$, 33 kg located at the bottom.

A total of 363 kg iron/steel.

Example 3:

The point of departure is the same vessel as the one used in example 2, but during fishing activities the vessel will, in practice, often carry a maximum of 2 persons corresponding to 150 kg, whereby the vessel's proportion for fishing gear and catch can be increased to $630 - 150 - 50 = 430 \text{ kg}$. In order to reflect this condition, the deadweights during the test are compounded thus:

2 persons x 40 kg, 80 kg located on the thwarts.

Outboard motor, 1 x 50 kg, 50 kg located astern.

Gear/catch $0.6 \times 430 \text{ kg}$, 258 kg located at the bottom.

A total of 388 kg iron/steel

Annex 2
Certificate of buoyancy at practical buoyancy test
For open fishing vessels below 15 metres

Name of ship	Distinctive number or letters	Port registration number	Port of registry

DIMENSIONS AND TONNAGES

Length overall	Breadth	Depth	GT	NT	Scantlings

FREEBOARD MEASUREMENTS

Freeboard measurement no. 1	Freeboard measurement no. 2	Freeboard measurement no. 3	Freeboard average
Position for freeboard measurement			
Date and place of the buoyancy test			

DEADWEIGHTS

	Persons		Other deadweights (kg)	Total deadweight (kg)
	No.	Weight		
Deadweights according to type approval				
Deadweights at buoyancy test				
Vessel's max. permissible deadweight				

Certificate issued at date201X.

It is hereby certified that this buoyancy test is carried out in accordance with the guidelines for documenting the buoyancy of open fishing vessels.

The signatory is authorised by the Danish Maritime Authority to issue this document.

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 (Underskrift og stempel) (*Signature and Stamp*)

DEADWEIGHTS AT BUOYANCY TEST				
	Number	Position	Substitute weight at test (kg)	Actual weight (kg)
Persons				
Motor and fuel tanks, etc. (Substitute weights are equal to 100% of the actual weights)				
Gear, catch and the like (Substitute weights are equal to 60% of the actual weights)				
Sum of substitute weights used during the test				
Vessel's max. permissible deadweight (to be transferred to the front page)				
<p>Conversion between the actual weight and the substitute weight:</p> <p>The actual weight of one person is 75 kg. The substitute weight during the test is for one person 40 kg when placed on the thwarts.</p> <p>The substitute weight during the test for motor and fuel tank is the similar weight in steel/lead.</p> <p>The substitute weight during the test for gear and catch is 60% of the actual weight when the substitute weight consists of steel/lead.</p>				
<p>Other conditions:</p> <p>After water-filling no. 1, the vessel must remain lying for ten minutes filled with water without any change to the trim/freeboard.</p> <p>The freeboard must be measured to the lowest point, for example at the gunwale in the side, at the upper edge of the well hatchway, at the stern, at the upper edge of the motor trunk.</p>				
Supplementary vessel information:				
Construction yard	Hull no.	Construction material	Model, if relevant	
Remarks:				