DEUTSCHE FLAGGE

Bundesrepublik Deutschland

BG Verkehr – Dienststelle Schiffssicherheit

Flag State Information

FI S/004/IS/2021/Rev. 00

replaces FI 14/2018/rev. 00 **E**

Flag State Information are published by the Ship Safety Division of BG Verkehr, which is a part of the German Flag State Administration. Flag State Information are intended to provide a uniform interpretation of international and national rules and regulations for sea-going vessels under the German flag. Flag State Information are also published as guidance to certain current topics. They adapt to practical experience and are therefore under continuous development. New Flag State Information, as well as revisions of existing ones, is prioritized based on market demands towards rules, regulations and current topics. The period of validity results from the publication date. The German version of the Flag State Information prevails.

Unless otherwise specified below, the definitions of the FI S/-/000/2020 in the version valid at the time of completion this FI are applicable.
This FI is always to be applied together with the referenced regulations.

Types of ships:	**Passenger Vessel / Traditional Vessel / Recreational Craft / Fishing Vessel / Cargo Vessel**		
Section:	**Shipbuilding**		
Topic category:	**Intact Stability**		
Topic:	**Inclining test**		
Interpreted rule:	**Res. MSC.267(85) (2008 IS Code), Part B, Ch. 8**		
References:	**Res. MSC.267(85) (2008 IS Code), Part B, Annex 1**		
Date:	**27.10.2021**	**Valid from:**	**27.10.2021**

Introduction

Approval by the Ship Safety Division of inclining tests is primarily based on the 2008 IS Code, Chapter 8 "Determination of lightship parameters" as well as Annex 1 "Detailed guidance for the conduct of an inclining test".

Both Chapter 8 and Annex 1 leaves various passages open interpretations and acceptable limit values to be defined by the Administration.

This FI specifies the framework conditions that are considered binding by the Administration. Non-compliance thereof generally leads to termination of the inclining test or rejection of its evaluation. In justified cases, individual requirements may be deviated from, based on a written approval by the Shipbuilding Department.

Original text of regulation

- The quotation is omitted due to the volume. -

Information on the topic

1. General:

   1.1. Inclining tests, subject to approval by the Ship Safety Division, shall be carried out under the supervision of a surveyor of the Ship Safety Division or of a Recognised Organisation. If any of the following parameters are not complied with during the inclining test, the relevant steps are to be repeated, otherwise the test is to be terminated by the surveyor.

   1.2. If new stability documentation is to be prepared for an existing vessel, the vessel's lightweight used in the calculations shall be taken from the last approved inclining test, which is not to be older than 5 years. If vessel modifications, repairs or alterations have been carried out after the last inclining test, the Shipbuilding Department shall be consulted as to whether it is necessary to carry out a new inclining test, even if the last one was carried out less than 5 years ago.

   1.3. Equipment or gear which remain on board during the inclining test and which may shift due to the ship's movements (e.g. derricks, davits, fishing gear, etc.), shall be adequately lashed.

   1.4. In general, this FI is also applicable to pontoons, provided that FI S/005/IS/2021 is not applied.

2. Weather conditions:

   2.1. Maximum permissible wind force of 4 Bft. during the inclining test.

   2.2. Good weather, i.e. no heavy rain or snowfall during the inclining test.

   2.3. Water surface as calm as possible in the vincinity of the vessel during the inclining test. No swell, no current nor strong waves.

3. Determining the initial floating position

   3.1. At the beginning of the inclining test, the vessel shall float as upright as possible. In general, a heel of more than 0.5 degrees is not permissible.

   3.2. The position afloat shall be determined by means of 5 freeboard measurements along the vessel. For vessels with a length of 10 m and less, 3 freeboard measurements are sufficient. The measurements are to be taken on both sides of the vessel, portside and starboard. If the vessel has draught marks, each draught reading may substitute one freeboard measurement. Where freeboard measurements are not feasible due to excessive depth, draught readings only may be accepted.

   3.3. The freeboard measurements and/or the draught readings shall be taken from outside the vessel to be inclined (i.e. from a dinghy). The measurements/readings as well as

their positions in the ship's longitudinal direction shall be documented in a unambiguously and comprehensive manner.

3.4. Draughts readings and/or freeboard measurements shall be taken for the load case as inclined, i.e. all weights required during the test shall be on board and in place (e.g. heel weights, balance weights, measuring instruments, persons carrying out the test).

4. Inclining measuring devices

4.1. The IS Code specifies in regulation 8.2.2.9 how the emerging heel angles are to be measured during the inclining test. Paragraph 4.2 of this FI specifies the Administration's minimum requirements and general conditions concerning the measuring devices.

4.2. At least 2 measuring devices are to be used, of which at least one shall be a pendulum. The pendulum's length shall be chosen such that the pendulum deflections required in paragraph 6.9 of this FI are complied with. In the case of very slender vessels (CB ≤ 0.3), an adequate U tube (hose level) may be used as a substitute for the compulsory pendulum, subject to prior written approval by the Shipbuilding Department.

4.3. Various mechanical and digital inclinometers are permissible as long as paragraph 4.2 is complied with.

5. Inclining weights

5.1. Inclining weights shall be chosen so that the heel angles required in paragraph 6.8 of this FI are achieved.

5.2. In general, certified inclining test weights are to be used. The certificates are to be presented during the inclining test. Otherwise, each weight shall be weighed and documented in the presence of the surveyor. The inclining weights shall be of such a form and nature that their centre of gravity can be unambiguously determined. Weights which could change their mass during the inclining test, e.g. due to moisture absorption, are not permitted.
The use of persons as inclining weights is not permitted either.

6. Inclining test conduction

6.1. Water density shall be measured and documented immediately before or immediately after the inclining test in the presence of the surveyor.

6.2. Tanks are to be sounded and fillings documented immediately prior to the inclining test in the presence of the surveyor.

6.3. Masses that do not belong to the vessel's lightweight, but still remain on board during the experiment (**weights to be deducted**), shall be determined in the presence of the surveyor. The weight of each individual mass as well as the corresponding coordinates of the longitudinal, transverse and vertical centre of gravity are to be documented. The number of persons on board during the inclining test shall be reduced to an absolute minimum. Only persons who are necessary for the direct execution of the test are permitted on board.

6.4. Masses belonging to the vessel's lightweight, but which cannot be taken on board prior to the test (**weights to be added**), are to be determined in the presence of the

surveyor. The weight of each individual mass as well as the corresponding coordinates of the longitudinal, transverse and vertical centre of gravity are to be documented.

6.5. **Masses to be relocated**, i.e. masses that belong to the vessel's lightweight and are on board during the test but not in their usual position, are to be determined in the presence of the surveyor. The weight of each individual mass as well as the corresponding coordinates of the longitudinal, transverse and vertical centre of gravity, are to be documented. In the inclining test evaluation, these masses shall be calculated taking their actual position on board into account.

6.6. The vessel shall be able to float free during the entire inclining test. Mooring lines shall hang loosely. Sufficient distance from fixed structures, such as quay walls, shall be maintained. Water depth shall be deep enough to prevent the vessel from touching the ground.

6.7. Trim change during the inclining test is not permissible.

6.8. Shifts of the heeling weights are to be carried out in such a way that heel angles to both sides of the vessel are established. Intermediate values shall be generated (see example under "Additional Information" below). The heel angles are to be in the range between 1 and 4 degrees to either side.

6.9. Taking into account paragraph 6.8 and subject to paragraph 4.2 (U tube) minimum pendulum deflections of at least one pendulum shall be 150 mm to each side. For vessels less than 24 m in length, minimum pendulum deflections of at least one pendulum shall be 100 mm to each side.
It suffices for the maximum deflection to reach the required minimum value.

6.10. The data sheets (e. g. weights to be added/deducted, tank fillings, water density, etc.) of person responsible for conducting the inclining test are to be authenticated with signature and stamp by the attending surveyor. Should the surveyor prepare data sheets containing all relevant information her-/himself, these sheets may replace the sheets of the person conducting the inclining test.

7. <u>Test evaluation</u>

7.1. All documentation necessary for the comprehensibility of the inclining test evaluation shall be attached to the evaluation. This includes at least the following documents or information:

- authenticated protocol (subject to paragraph 6.10)
- general arrangement plan
- linesplan
- hydrostatic curves and data
- plan of position of the draught marks (if applicable)
- tank tables including information about free surface moments of partly filled tanks
- copies of the inclining weights certificates (if applicable)

7.2. The individual freeboard measurements, the resulting draughts and the positions thereof in the ship's longitudinal direction shall be indicated in the evaluation in a comprehensible manner (e.g. by means of a sketch).

7.3. The Positions of the inclining weights on deck and their shifting distances shall be indicated in a comprehensible manner.

7.4. The GM values determined from the individual shifts shall be listed individually, while it is not sufficient just to indicate the final average GM value. When determining the average GM value in the position afloat during the test, the least squares method is not to be used. Obviously faulty measurements shall be identified and deleted from the evaluation.

8. Alternative Arrangement

8.1. The above standardisation requirements serve to ensure that, when adhered to, a usable and thus approvable result can be expected. Notwithstanding this, other arrangements or procedures may also lead to usable results. If **for a valid reason** it is not possible to implement parts of the requirements described above, alternative solutions may be proposed to the Shipbuilding Department.

8.2. Deviations to this FI are to be approved by the Shipbuilding Department. In that case, an inclining test procedure shall be submitted for approval in written form at least 3 weeks before the planned inclining test date. The information shall contain at least a detailed description of the alternative planned steps as well as a justification why these are necessary. This also applies when using ballast tanks as inclining weights (paragraph 2.3.4 of Annex 1 to the IS Code, Part B).

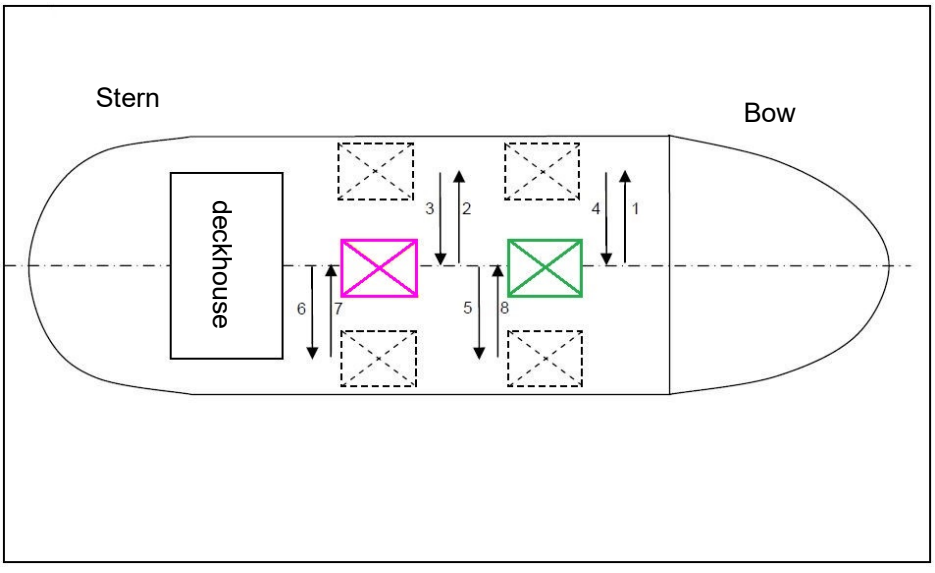
8.3. Alternative steps can only be implemented during an inclining test if written confirmation has been obtained from the Shipbuilding Department. The written confirmation shall be presented to the surveyor during the test.

Additional Information

Example for weight shifting:

	Pos. Inclining weights			Pendulum Deflection	
Shift	Port Side	Centreline	Starboard Side	Port Side	Starboard
0		weight A weight B		zero position	
1	weight A	weight B		75 mm*	
2	weight A weight B			150 mm†	
3	weight B	weight A		75 mm*	
4		weight A weight B		zero position	
5		weight B	weight A		75 mm*
6			weight A weight B		150 mm†
7		weight B	weight A		75 mm*
8		weight A weight B		zero position	

*mid value †extreme value



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