

# MSC/Circular.1159 - Guidelines on the Provision of Stability-Related Information for Bulk Carriers - (24 May 2005)

## Circular

1. The Maritime Safety Committee (MSC), at its seventy-sixth session (2 to 13 December 2002), having considered the results of various FSA studies on bulk carrier safety, agreed that the risk control option calling for the provision of detailed, comprehensive and user-friendly information covering stability and strength characteristics of the ship's hull during loading and unloading should be applied to new bulk carriers. Furthermore, MSC 76 noted that the above-mentioned risk control option was more relevant for smaller ships with respect to stability and for larger ships with respect to structural strength, and instructed the Sub-Committee on Stability and Load Lines and on Fishing Vessels Safety (SLF) and the Sub-Committee on Ship Design and Equipment (DE) to develop relevant guidelines.

2. Subsequently, the SLF Sub-Committee, at its forty-sixth session (8 to 12 September 2003), prepared draft SOLAS amendments to address the stability issues on bulk carriers of less than 150 m in length, and at its forty-seventh session (13 to 17 September 2004), prepared the Guidelines on the provision of stability-related information for bulk carriers, for all new bulk carriers.

3. The Maritime Safety Committee, at its eightieth session (11 to 20 May 2005), following the recommendation of SLF 47, approved the Guidelines on the provision of stability-related information for bulk carriers, as set out in the [annex](#).

4. Member Governments are invited to bring the annexed Guidelines to the attention of stability instrument manufacturers, related computer software developers, mariners, dry cargo terminal operators and other parties involved in cargo operations.

# 1 Purpose

. The aim of this document is to provide detailed, comprehensive and user-friendly guidance on provision of stability-related information and stability computing software supporting for the safe operation of bulk carriers and, in particular, those bulk carriers to which SOLAS [regulation XII/11.3](#) applies.

## 2 Definitions

### 2.1 Stability data

. Stability data is a set of data resulting from ship design process. It covers stability characteristics pertaining to a specific ship. Stability data is the base for ship stability calculation in operation, especially stability assessment, by means of hand made calculations or by stability instrument.

### 2.2 Stability instrument

2.2.1. A stability instrument is an instrument, either analogue or digital, provided for ships, by means of which all relevant stability information is provided and all calculations or checks can be easily and quickly performed, as necessary, to ensure compliance with the applicable stability requirements.

2.2.2. In this context, the stability instrument comprises the hardware and software.

## 3 Information to be Provided

### 3.1 Stability data and other information

. Stability data should include the data and information outlined here under.

3.1.1. General information:

- .1. ship's name;
- .2. type of ship (i.e. bulk carrier);
- .3. name of builders and new building number;
- .4. date of build (keel laying) or conversion;
- .5. class notation;
- .6. nationality, port of registry and IMO number;
- .7. principal dimensions (length, breadth and depth);
- .8. type of load line assigned (type A, B, B-60, etc);
- .9. maximum mean permissible draught corresponding to the summer freeboard assigned;
- .10. maximum mean permissible draught corresponding to the summer timber freeboard (if appropriate);
- .11. displacement in salt water (at stated density) corresponding to .9 and .10 at the designed (level) trim;
- .12. maximum permissible draught at the forward perpendicular for bow height considerations;
- .13. the minimum recommended draught at the forward perpendicular for any sailing condition;
- .14. stability limitations of the ship's design, both for loading operation and, where applicable, associated with undertaking ballast water exchange at sea; and
- .15. lightship particulars obtained from inclination test or lightship survey.

3.1.2. A scaled arrangement drawing showing clearly the use and distribution of the various cargo compartments, tanks, stores as well as machinery and accommodation spaces. Names of compartments used in the text of the document should be clearly indicated.

3.1.3. A table of capacities with centres of volume (longitudinal, vertical and transverse) for every compartment available for the carriage of cargo, fuel, stores, feed water, domestic water and water ballast. Where applicable, such as for cargo holds, tables or curves giving capacity and centre of volume as functions of compartment depth or ullage should be included. When ullage is used, the ullage reference point should be clearly stated. The reference planes and the positive direction in all six degrees of freedom for centres of volume should be the same as those used for any computer or other information provided as an aid to the safe loading of the ship.

3.1.4. Free surface effect tables and/or curves for every tank and cargo hold that may contain liquid, as a function of volume showing the effect on the stability of the ship of liquids in partially filled tanks. These tables/curves should give the free surface moments necessary to correct the initial metacentric height and those to correct the righting lever values when the ship is inclined. In the case of tanks containing liquids which may be consumed, discharged or transferred to and from other compartments while the ship is at sea, including anti-rolling tanks and/or heeling tanks, the maximum free surface moments which may be developed should be given. When holds or deep tanks containing liquids are maintained partially filled while the ship is at sea, the free surface moments used may be based on the actual quantity of fluid contained.

3.1.5. Hydrostatic particulars for the ship at designed trim, in curve or tabulated form, to a base of mean draught measured to the bottom of the keel over a range covering the lightship and maximum draughts. When tabulated, these should correspond to evenly-rounded units of draught at intervals appropriate to the size of ship. The particulars should include:

- .1. extreme displacement in salt water at stated density;
- .2. immersion (displacement per unit interval of draught);
- .3. moment to change trim one unit;
- .4. transverse metacentre height above baseline;
- .5. transverse centre of buoyancy;
- .6. vertical centre of buoyancy;
- .7. longitudinal centre of floatation; and
- .8. longitudinal centre of buoyancy.

Position of reference planes should be stated in the case of items specified in paragraphs 3.1.5.4 to 3.1.5.8 and should be the same as the corresponding reference planes for centres of gravity.

3.1.6. Details of load line, draught marks and deadweight particulars. A diagram should be provided showing the load line marks including:

- .1. position of the deck line relative to the upper extreme of the ship's depth;
- .2. draught to the summer load waterline;
- .3. draught to the summer timber load waterline (if appropriate);
- .4. corresponding freeboards,

this or other diagram or tabular presentation should also give the relationships between:

- .5. mean draught;
- .6. extreme displacement;
- .7. immersion (displacement per unit interval of draught); and
- .8. deadweight.

The positions of the draught marks should be defined in relation to both the ship's perpendiculars and the longitudinal reference plane mentioned above.

3.1.7. Form stability particulars (Cross curves of stability). Data in the form of curves or tables showing the relationship between form righting lever, angle of heel and displacement at the designed trim over the full operational range of displacement. Where the operating trim or form and arrangement of the ship are such that a change in trim has an appreciable effect on righting arms, additional form stability data should be included for a suitable range of trim. The form stability information should be presented in a form that enables righting arms to be readily determined to the nearest centimetre.

3.1.8. Set of stability criteria required by the Administration.

3.1.9. Limiting envelope curves resulting from intact stability and damage stability, when appropriate. These curves should be clearly stated as being GM required curves or KG maximum curves.

3.1.10. Auxiliary data which are necessary to prove compliance with the relevant stability criteria and, when appropriate, icing data.

3.1.11. Master's instructions should precisely and unambiguously detail how the information provided in the stability data and elsewhere is to be used to obtain the draught, trim and stability characteristics of a new loading condition and determine whether that condition fulfils the relevant stability criteria.

3.1.12. Loading conditions

3.1.12.1. The loading conditions covered by the stability data should include:

- .1. lightship;
- .2. docking;
- .3. fully loaded departure, with cargo homogeneously distributed throughout all cargo spaces and with full stores and fuel;
- .4. fully loaded arrival, with cargo homogeneously distributed throughout all cargo spaces and with 10% stores and fuel remaining;
- .5. ballast departure, without cargo but with full stores and fuel;
- .6. ballast arrival, without cargo but with 10% stores and fuel remaining;
- .7. other departure and arrival conditions typical of the ship's intended service, such as alternate hold loading, ore loading, deep ballast, etc. as applicable; and
- .8. where appropriate, other conditions used for ballast water exchange.

3.1.12.2. For each loading condition, the following should be shown:

- .1. a sketch of the ship indicating, pictorially, the main items of deadweight included in the displacement;
- .2. a table showing the lightship particulars, the distribution of all components of the deadweight, the positions of their centres relative to the defined reference planes, corresponding static moments and a summation giving the result which should show the full displacement mass and the position of its centre;
- .3. a table listing the free surface effects of liquids in all compartments which may be partially filled;
- .4. a diagram showing the curve of righting levers (GZ), corrected for free surface effects, plotted against angle of inclination. The scales used should be the same for each loading condition; and
- .5. a summary of the condition giving:
  - .5.1. displacement and related sea water density;
  - .5.2. corresponding draught at longitudinal centre of floatation;

- .5.3. corresponding draught at freeboard mark;
- .5.4. moment to change trim one unit;
- .5.5. longitudinal and transverse positions of centre of buoyancy;
- .5.6. longitudinal and transverse positions of centre of gravity;
- .5.7. trimming lever;
- .5.8. total trim over perpendiculars;
- .5.9. longitudinal position of centre of floatation;
- .5.10. trim at forward perpendicular;
- .5.11. trim at aft perpendicular;
- .5.12. draught at forward perpendicular;
- .5.13. draught at aft perpendicular;
- .5.14. draught at forward draught mark;
- .5.15. draught at aft draught mark;
- .5.16. mean draught amidships;
- .5.17. total free surface moment for initial stability;
- .5.18. vertical position of the transverse metacentre;
- .5.19. vertical position of the ship's centre of gravity, both uncorrected and corrected for free surface effects; and
- .5.20. a statement giving the limiting value or values of stability parameters for each stability criterion together with corresponding values achieved.

## **3.2 Stability instrument**

. A stability instrument installed onboard should cover all stability requirements applicable to the ships as follows:

3.2.1. The input/output format of the stability instrument should, as far as practicable, be easily comparable in information and format to the stability booklet so that the operators will easily gain familiarity with the loading calculations.

3.2.2. The stability instrument should readily provide any information that may be obtained from the stability booklet by incremented calculation, reflecting the operation scenario in a clearly presented format.

3.2.3. A simple and straightforward user manual written in the same language as the stability booklet should be provided. The user manual should contain the approved test conditions and be written in a language with which the ship's officers responsible for cargo operations are familiar. If this language is not English, the ship should be provided with a manual written also in the English language.

3.2.4. The calculation program should present relevant parameters of each loading condition in order to assist the master in his judgement on whether the ship is loaded within the approved limits (refer to paragraphs 3.1.8, 3.1.9 and 3.1.11).