Annex 5

Approximate Determination of Stability by Simple Inclining Test

Simple Inclining Test

Part 1

1 General

1.1 The simple inclining test is to ascertain the angle of heel a vessel would occur when 2/3 of the persons distributed on one side of the vessel and 1/3 on the other side. The objective being that it should be ensured that no angle of heel exceeding 7° will arise as a result of the movement of persons from one side of the vessel to the other side.

2 Test Procedure

2.1 The vessel should be tested with weights to represent the fully laden service condition.

2.2 The weights should be disposed, as far as practicable, with their centres of gravity in the correct vertical and lateral positions having regard also to those vessels where persons should be taken as congregated at 0.3 m^2 each on the uppermost deck or decks to which they have access.

2.3 The test should be carried out in the following manner:

(1) The vessel is to be loaded with weights as described above,

(2) Calculate a heeling moment equal to the weight of the persons (W) multiplied by the extreme breadth (B) of the vessel and divided by 12 (=WB/12),

(3) Transfer weights from one side of the vessel to the other side in 3 equal increments such that the final heeling moment is equal to WB/12, the same vertical centre gravity of the whole being maintained.

The weights and the distance they are moved together with the angle of heel should be recorded for each of the 3 moves.

(4) Restore all the weights to their original positions and record angle of heel when they are restored,

(5) Repeat (3) moving weights from opposite side,

(6) Repeat (4),

(7) If the angle of heel exceeds 7° during the test, the owner might add ballast weight and to repeat the test procedures (3), (4), (5) and (6). The weight and position of such ballast should be recorded.

3 Acceptance of Stability

3.1 As a general rule, no vessel will be accepted where the angle of heel exceeds 7° as a result of a heeling moment of WB/12 or any greater heeling moment that could be expected to arise in service.

3.2 In any case where an angle of heel exceeding 4° has arisen as a result of a heeling moment of WB/12, the seating and other arrangements of the vessel should be examined to see whether a heeling moment greater than WB/12 could be expected to arise in service. If this is found to be so, proper measure should be taken to avoid an angle of heel greater than 7° would arise as a result of this heeling moment.

4 Determination of weight of passengers and crew

4.1 The following information should be used for the consideration of the effects of passenger and crew weight:

(1) The distribution of persons is 4 persons per square metre;

(2) Each person has a mass of 68 kg or <75 kg>;

(3) Vertical centre gravity of seated persons is 0.3 m above seat;

(4) Vertical centre gravity of standing persons is 1.0 m above deck;

(5) Persons and luggage should be considered to be in the space normally at their disposal

Note: < > applicable for new vessels calculation only.

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Part 2

According to the procedure of Part 1, with the value of the heeling moment equals WB, to ensure that the ship's heel angle will not exceed 10^{o} when all (100%) persons are distributed on one side of the ship. For safety’s sake, the test shall be carried out from one side of the vessel to the other side in three equal increments as described in paragraph 2.3(c) above, until the final heeling moment equals WB.

A rolling period test to derive the vertical center of gravity can replace the requirements in Part 1 or Part 2:

General

The rolling period is the duration for one complete oscillation, i.e. starting from the extreme end of a roll to one side of the vessel, i.e. moves right across to the other extreme side and returns to the original starting point.

Test Procedures

(a) The test should be conducted in a harbour, in smooth waters with the minimum interference from wind and tide.

(b) The mooring should be slack. A reasonable clearance at the sides of the vessel should be maintained to avoid making any contact with other objects during its rolling.

(c) Weights which are liable to swing or liable to move (e.g. a drum) should be secured against such movement. The free surface effects of slack tanks should be kept as small as practicable.

(d) The vessel is made to roll (e.g. by rhythmically lifting up and putting down a weight far off its middle line; by people running athwartships in unison; or by any other means). As soon as this forced rolling has commenced, the vessel is allowed to roll freely and naturally.

(e) By means of a stopwatch, the time is taken for not less than about five complete oscillations.

(f) After allowing the roll to completely fade away, repeat the operations in paragraphs (d) and (e) twice with the time recorded.

Determination of Metacentric Height (GM)

(a) From the total time for the total number of oscillations made, calculate the mean time (say T seconds) for one complete oscillation.

(b) The metacentric height GM_o is to be determined from the following formula:

$$GM_o = (0.77\ B/T)^2$$

where

B = extreme breadth of vessel in metres

(Note: The formula is valid for vessels with length not more than 24 metres.)