Inland Ship (Stability) Rules, 2001

Index

Chapter 1 - Introduction

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1. Title Summary:

This Rule shall be termed as Inland Ship (Stability) Rule, 2001.

2. Definition:

(1) In this Rules, unless there is anything repugnant in the subject or context,-

a. Ordinance means The Inland Shipping Ordinance, 1976 (LXXII of 1976);

b. "Open Passenger Launch" means the Ship used for carrying passengers of more than 12.

c. "Ship" or "Inland Ship" means the "Inland Ship" defined in Sec 2 (e) of the Ordinance.

d. "Tanker" means the "Inland Ships" used for carrying liquid in bulk.

e. "Dumb Barge" means the Ship, vessel or floating equipment that is not self propelled and does not carry passengers.

f. "Length" means the distance at Load Water Line (Loaded Waterline) between forward of ship's stem to the after side of Rudder post, or if Rudder post is absent, the centre of Rudder stock.

g. "New Ship" means the ship that is registered after this Rule came into effect.

h. "Pontoon" means the Dumb Barge with a weather deck without having Manhole and Air pipe as passage/port for expulsion of air.

i. "Free Board" means the distance between the depth of a ship or floating equipment including watertight freeboard deck and the Draught.

j. "Free Board Deck" means the top most water or weather tight deck of the vessel.

k. "Present Ship" means the ships that are not new.

l. "Floating Equipment" means the equipment like dredger, floating crane etc. that are not self- propelled, yet used for various purposes at floating condition.

m. "Fishing Vessel" means the vessel used or constructed for the purpose of fishing.

n. "Passenger Ship" means the vessel with weather deck and or vessel with multiple decks used for carrying passenger of more than 12 persons.

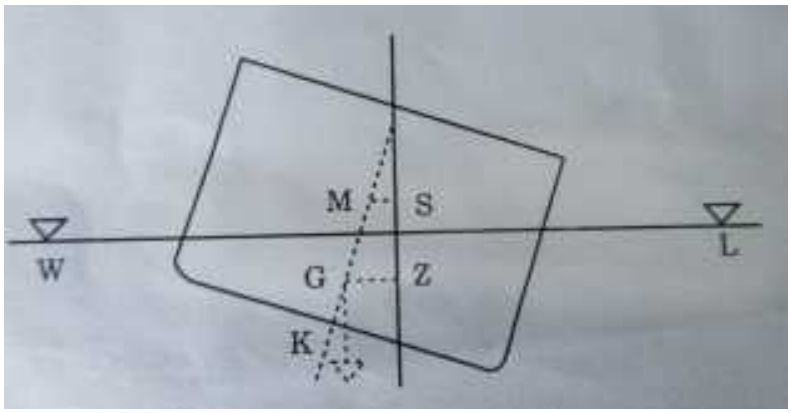
o. "Road Ferry" means the vessel with free flash deck engaged in carrying passengers of more than 12 persons and one or more vehicles.

p. "Service Vessel" means the self propelled vessel that are not passenger ship, cargo ship, tanker or fishing vessel but used for special purposes.

(2) Below information will be required for the Design and Stability of the vessel, eg. :

(a) G - Centre of Gravity

(b) M – Primary Meta Centre
(c) K - Ship's bottom
(d) S – The projection of M
(e) GM – Primary Meta-centric Height
(f) KG – The height of Centre of Gravity from Ship's bottom
(g) KM – The height of primary Meta Centre from Ship's bottom
(h) GZ – Righting lever to return back to up-right position.



(3) Application:

Notwithstanding with any other Rules, regardless of size and type, this Rule shall be applicable to all new ships.

(4) Design & Construction:

The design, drawing, draft, construction & decoration, upon surveyor's satisfaction good quality naval architectures, ability to ply, safety and Hull strength of all ships and floating installations shall be at the surveyor's satisfaction.

(5) Free Board:

All ship and floating equipment shall meet the Inland Ship (Free board) Rules requirements.

Chapter 2- Minimum Requirement of Stability

(6) General:

Except Barge, Pontoon & Floating Equipment, at any loading conditions all ships of 24m and above shall have to meet any one of the following two standards, eg:

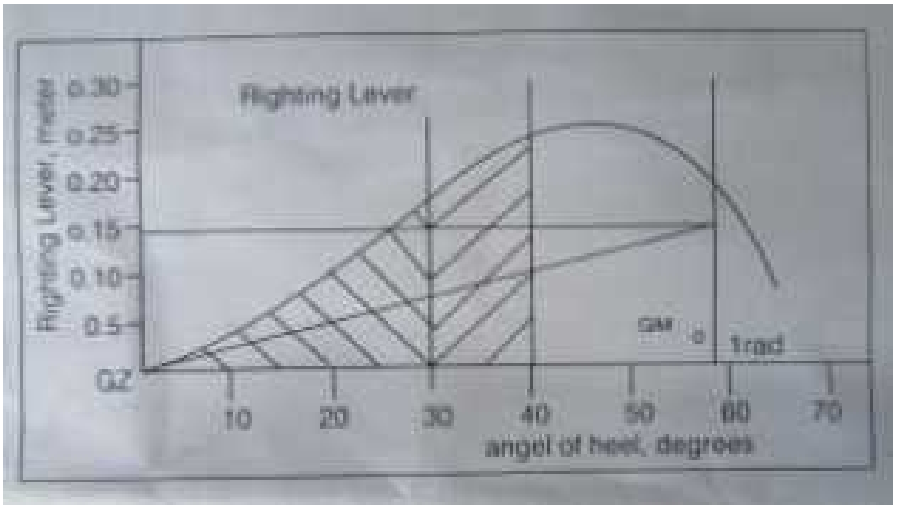
Standard – A

(a) The area under GZ curve up to 30 degree angle of heel is 0.055 meter-radian and area up to 40 degree angle of flooding whichever value is less, to that angle shall not be less than 0.09 meter-radian. Further, the area under GZ curve up to 30 to 40 degree angle of heel and 30 degree angle of flooding if less than 40 degree, the area must not be less than 0.03 meter-radian.
(b) The Righting lever at 30 degree Angle of Heel shall be of minimum 0.20m.
(c) The righting lever at the Angle of Heel shall be more than 30 degree, but must not be less than 25 degree.
(d) The height of preliminary Meta center GM must be 0.15m when L>=70m and 0.35m when L<70m.

Standard – B

(a) The area below righting arm curve shall not be less than 0.070m-rad.The highest GZ occurs at the angle of 15deg at 15m- rad and 0.055m-rad up to 30 deg when highest GZ occurs at 30 degree and above. When highest GZ occurs between 15~30 degree, the corresponding area under righting lever shall be 0.055+0.001 (30-0max) m-rad, where 0max is the highest lever angle
(b) 30deg and angle of flooding or flooding angle or 40deg whichever is less, the area below the righting lever curve shall not be less than 0.03m-rad.
(c) The righting lever (lever to return back in upright position) at 30 deg or above and at flooding angle shall be minimum 0.02m.
(d) The preliminary Meta centric height GM must be 0.15m when L>=70m. If L<70m GM must not be less than 0.35m.
(e) The highest righting lever should occur at 15deg.

Drawing II/1



(7) The Free liquid surface effect:

For carrying out the amendment to the preliminary Meta centric height and GZ curve due to free surface effect in the tanks below stated assumption shall be followed for all conditions:

(a) To determine the effect of liquid on the stability at all angles of inclination, every kind of liquid (including ballast tank) contained in the tank or tanks is to be considered for the free surface effect.
(b) The tanks must be empty or kept full as far as practicable.
(c) To determine the amendment to free surface, the presumptive tanks shall be of 50% full at 30 deg inclination that create “max free surface moment” mfs.
(d) For each tank the value of mfs can be calculated by below equation:
Mfs=vbplk_/d
Mfs=Free Surface Moment (meter-ton)
v= Total capacity of the tank (m3)
b= Total breadth of the tank (m)
p= Specific gravity of the liquid in the tank.
d1= Tank constant = V/blh
h= total height of the tank in meter
l= total length of the tank in meter
k= b/h at proportionately, from attached table, derived. Intermediate value can be determined by interpolation. The value of K may be derived from below table using alternative equation.

b/h	5	10	15	20	30	40	50	60	70	b/h
10	0.001	0.11	0.12	0.12	0.11	0.10	0.09	0.07	0.05	10
5	0.04	0.07	0.01	0.11	0.11	0.11	0.10	0.08	0.07	5
3	0.02	0.04	0.07	0.09	0.11	0.11	0.10	0.09	0.08	3
2	0.01	0.03	0.04	0.06	0.09	0.11	0.11	0.10	0.09	2
1.5	0.01	0.02	0.03	0.05	0.07	0.10	0.11	0.11	0.11	1.5
1	0.01	0.01	0.02	0.03	0.05	0.07	0.10	0.12	0.13	1
0.75	0.01	0.01	0.02	0.02	0.04	0.05	0.08	0.12	0.15	0.75
0.5	0.00	0.01	0.01	0.02	0.02	0.04	0.05	0.09	0.16	0.5

(8) Passenger Ships:

(1) This Rule is applicable to all old and new passenger ships and launches.

(2) Stability must be such that the requirement of free board is always met.

(3) The vessel shall not least (incline) more than 10 degrees when all passengers gathered in one side and sufficient free board shall be provided to defend against rolling waves in motion, wind and centrifugal forces created at the turning circle.

(4) The change in meta centric height due to assembly of passengers on one side can be stated as below:

GM>0.85XBXWP/D

Where,

B= Moulded Breath in m

WP= Total weight of passengers in mt

D= Displacement of water in mt

GM= Meta centric height in m

(Passenger's weight has been calculated as 75 kg including luggage)

(5) Passenger ships and launches shall not be allowed to ply, when wind speed is more than 10m/sec (36km/hr)

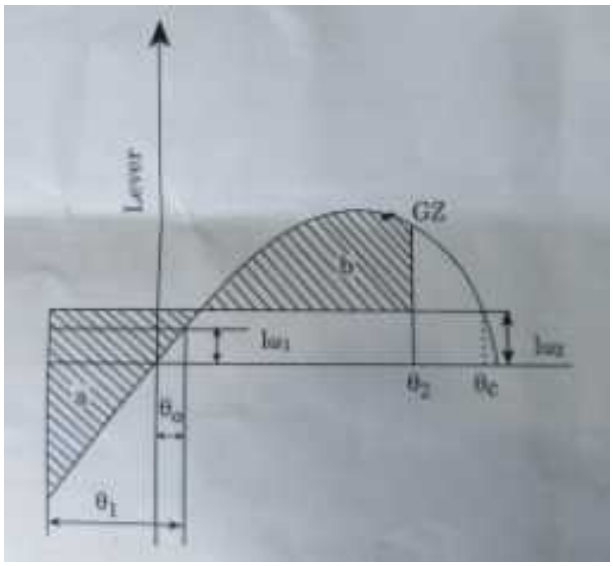
(6) During sea passage if the wind speed exceeds more than 10m/s (36km/hr), the passenger ships and the launches must at once proceed to nearest shore, canals or sheltered water.

(7) For any ship, if angle of heel appears to be not more than 3 deg, then it may be allowed to ply in higher wind speed.

(8) It must be ensured that in no circumstances the total momentary angle of heel must not exceed more than 12 deg may be caused by wind, vessel's turning or all passengers gathered on side.

(9) For the calculation of intact stability below assumptions are taken into consideration:
   (a) The total weight of each passenger including baggage must not exceed 75kg
   (b) The centre of gravity of the total average weight of each passenger including luggage shall be considered as 0.8m above the corresponding deck.
   (c) Vessel's ability to withstand combined effect of beam wind and rolling in each standard loading condition must be according to prescribed design by the authority.

Drawing II/2



O0= Angle of Heel caused by constant speed wind is usually 16 degree or 80% of the angle created to sink the edge of the deck, whichever is less.
O1= Angle of Loll created by the wave towards the wind direction may be calculated by below stated equation.
O2= Leeward Angle (Angle created at the same direction as the wind), minimum down flooding angle or 50 degree or the angle that is created at the meeting point of GZ and lw2 by Oc.

(10) For the combined result of wind and rolling the percentage lever by air (lw1) and Gusty wind lever can be calculated from below equation:

(lw1) = PXAXZ/D

Lw2 = 1.5 lw1

Where P = 0.0322(ton/m)

A = Area of wind acting

Z = Centre of A and middle of draught height (m)

D = Displaced water (mt)

In above circumstances, if a vessel is to be considered as stable, the area of 'b' shall be equal to area of 'a'.

(11) Heeling moment created due to healing angle caused by turning may be calculated as below:

$M_R = 0.02XV2S/L$ X a(-KG-T/2)

Where,

Mr = Heeling moment, m;

Vs = Designed speed, m/s

a = Vessel's travel, t

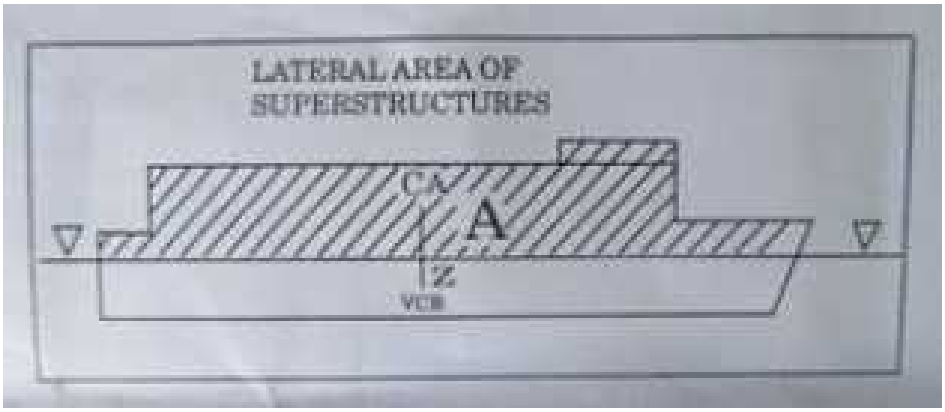
KG = Height of centre of gravity above keel

T = Vertical distance from top of vessel keel to load water line.

L = Length of the vessel

Drawing-2 Lateral area of superstructure

Drawing II/3



(9) For open launch the required GM shall be no more than 0.8m and for passenger ship no more than 0.6m.

(10) Below conditions are only applicable for new ships:

(a) The watertight sub-division of ship's over 36m length shall be such that it complies with SOLAS 1974/78 requirement of one compartment ship and having minimum 75mm of margin line. Sub-division shall be calculated as stated in "SOLAS CHAPTER II-1 PART B"

(b) This Rule shall also be applicable to Passenger ships, car ferries and road ferries.

(9) Passenger ship and Tanker:

The ships not complying with the requirements of Rule 6, the GM of those ships shall be no more than 0.6m and the range of minimum stability shall be no more than 40 deg.

(10) Tug & Service vessel:

The value of GM of the Tug and Service vessel of up to 15 m length or 250 BHP shall be no more than 0.6m and for above 15m length and above 250 BHP the value of GM shall be no more than 0.75m

(11) Barge & Pontoon:

The GM value of Barge and Pontoon shall be no more than 0.3m and range of Stability shall be no more than 20 deg.

(12) Floating Equipment:

The minimum Stability shall be determined on case by case basis.

Chapter 3- Payable Information

(13). Loading:

(a) The Stability calculation shall performed for all the Primary loading conditions that may be expected to encounter often in relation with ship operation.

(b) Below stated conditions shall be followed to perform the Stability calculation in loaded condition, when ship, as described in sub-regulation (a) above, owner does not provide sufficient detailed information relating to primary loading condition that are often likely to happen:

(I) Cargo Ship & Tanker:

1. Departure condition, dedicated cargo space detailed evenly for carrying total cargo and full equipment & fuel.
2. Arrival condition is same as above 1, but including 10% equipment and fuel.
3. Departure in Ballast conditions are total goods & equipment and fuel.
4. Arrival condition in ballast is 10% goods & equipment and fuel.

(II) For ships that can carry additional deck cargo:

(1) Departure condition, all cargo, all equipment and fuel stored on deck and ship's Hull, weight and height of deck and cargo to be stated.
(2) Arrival condition is as item (1) above, but includes 10% goods and equipment and fuel. The weight of water may be added to the weight absorbed by deck cargo during voyage.

(III) Passenger Ship:

(1) Departure condition, Full Cargo, full equipment and fuel, complete number of passenger and their luggage.
(2) Arrival condition is as item no (1) above, but 10% goods, equipment and fuel.
(3) Departure condition, without Cargo, but full goods & equipment and fuel, complete list of passenger and their luggage.
(4) Arrival condition as item no (3) above, but includes 10% goods and equipment and fuel.

14. Inland ship safety & administration and payable information:

(1) For new vessel of length 24m and above, below stated 3 information shall be provided to inland ship safety administration:
- Line Plan
- General arrangement Plan
- Capacity plan or weight and places of centre of gravity of the weight, hull, tank volume, weight and centre of gravity.
- Hydrostatic curves and data
- Cross curve and accompanying data
- Flooding angle as a function of draught
- Amendment of GM and KN because of free surface effect in the tanks

- As a function of Draft and trim, if KM together with trim the number changes inevitably as diagram and data.
- Inclining test report
- Aforementioned loading condition regulation 14(1) for GZ curve and calculation
- Minimum GZ curves as a function of Draught and trim or data if the numbers are altered inevitably with the trim.
- Ship of less than 24m of length or used old method in construction need not to submit General Arrangement plan and inclining test report.
- When it seems that some of the information mentioned in above rules and regulation are apparently not necessary for the size, construction and desired services of the vessel, then inland ship safety administration may exempt the ship from providing same.

Chapter 4 -Tests

15. Inclining Test:

(1) Inclining test shall be performed meticulously and all measured data and a report must be prepared explaining the test procedure.

(2) Inland ship safety administration shall be advised beforehand through application about the time & place of test. During the test the ship shall be anchored loosely outside jetty. Persons present on board shall be as minimum as possible. The test must be performed in calm weather and still water. No substantial list is allowed during the test.

(3) Inclining measuring equipment or if practicable two pendulums should be used for readings. All the draft readings are to taken with the help of reliable markings. The distance at which the heeling weights are to be shifted, must be done in such a way that the heeling angle on both sides does not exceed more than 1 degree.

(4) During the test while calculating the hydrostatic data corresponding to the inclining letter, the draft readings are used taking into consideration the required amendments due to the inclining position of the main wooden post at the aft side (stem) and forward side (stem) of the ship and position of draft. In such case where the test result is affected by the trim, then hydrostatic data is to be calculated taking into account the trim. The Meta centric heights are to be amended for the free surface effect.

(16) Passenger Ships of length less than 24m:

When performing the inclining test on a passenger ship of length less than 24m, the heel angle of the ship with all the passengers assembled on one side must not exceed more than 10 degree; at the same time remaining freeboard must not be less than 0.02m.

(17) Requirement for existing passenger ships:

Under this Rule and the Free Board Rule, in order to determine the maximum allowable number of passengers, all the passenger ships and launches registered before the limit date as decided by the government shall comply with below:

(a) The Inclining test to be performed.
(b) The weights of the total passengers are to be placed in half the distance between the centre line and one side of the ship, taking into account each passenger's weight in an average is 75kg.
(c) Shall ensure that the angle of heel must not exceed more than 10 degree
(d) Taking into consideration the seating arrangement or required space, if the allowable angle of heel for total number of passenger exceeds 10 degree, arrangement is to be made for the reduction of the number of passengers until the angle of heel reduced to maximum 10 degree.