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Directive (22/2015)

National Requirements of Load Line Assigning for the Vessels Serviced on Myanmar Coastal Waters

Applicable to: Ship owners, Recognized Organizations, Shipping Companies, Flag State Surveyors

1. The Department of Marine Administration circulated this National Standard in the exercise of the power of Section 294(B), paragraph (b) of Myanmar Merchant Shipping Act.

2 Pursuant to the provision of section 219 of Myanmar Merchant Shipping Act, the Department of Marine Administration provided this national requirements of load line assigning for the vessels service on Myanmar Coastal Waters.

3. The purpose of this directive is the load line assigning for the vessels service on Myanmar Coastal Waters to be complied with the requirements provided in the International Convention on Load Line, 1966 as amended.

Maung Maung Oo
Director General
Department of Marine Administration

THE REPUBLIC OF THE UNION OF MYNAMR

MINISTRY OF TRANSPORT AND COMMUNICATIONS

DEPARTMENT OF MARINE ADMINISTRATION

National Requirements of Load Line Assigning for the Vessels Serviced on Myanmar Coastal Waters

Date:

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National Requirements of Load Line Assigning for the Vessels Serviced on Myanmar Coastal Waters

1. ***Strength of Hull***

The Administration shall satisfy itself that the general structural strength of the hull is sufficient for the draught corresponding to the freeboard assigned. Ships built and maintained in conformity with the requirements of a classification society recognized by the Administration may be considered to possess adequate strength.

2. ***Application***

1) Ships with mechanical means of propulsion or lighters, barges or other ships without independent means of propulsion, shall be assigned freeboards in accordance with the provisions of Paragraph 1-40.

2) Ships designed to carry sail, whether as the sole means of propulsion or as a supplementary means, and tugs, shall be assigned freeboards in accordance with the provisions of Paragraph 1-40. Such additional freeboard shall be required as determined by the Administration.

3) Ships of wood or of composite construction, or of other materials the use of which the Administration has approved.

4) Paragraph 10-26 shall apply to every ship to which a minimum freeboard is assigned. Relaxations from these requirements may be granted to a ship to which a greater than minimum freeboard is assigned on condition that the Administration is satisfied with the safety conditions provided.

3. ***Definition of Terms***

1) *Length*. The length (L) shall be taken as 96 per cent of the total length on a waterline at 85 per cent of the least moulded depth measured from the top of the keel, or as the length from the fore side of the stem to the axis of the rudder stock on that waterline, if that be greater. In ships designed with a rake of keel the waterline on which this length is measured shall be parallel to the designed waterline.

2) *Perpendiculars*. The forward and after perpendiculars shall be taken at the forward and after ends of the length (L). The forward perpendicular shall coincide with the foreside of the stem on the waterline on which the length is measured.

3) *Amidships*. Amidships is at the middle of the length (L).

4) *Breadth*. Unless expressly provided otherwise, the breadth (B) is the maximum breadth of the ship, measured amidships to the moulded line of the frame in a ship with a metal shell and to the outer surface of the hull in a ship with a shell of any other material.

5) *Moulded Depth*

a) The moulded depth is the vertical distance measured from the top of the keel to the top of the freeboard deck beam at side. In wood and composite ships the distance is measured from the lower edge of the keel rabbet. Where the form at the lower part of the midship section is of a hollow character, or where thick garboards are fitted, the distance is measured from the point where the line of the flat of the bottom continued inwards cuts the side of the keel.

b) In ships having rounded gunwales, the moulded depth shall be measured to the point of intersection of the moulded lines of the deck and side shell plating, the lines extending as though the gunwale were of angular design.

c) Where the freeboard deck is stepped and the raised part of the deck extends over the point at which the moulded depth is to be determined, the moulded depth shall be measured to a line of reference extending from the lower part of the deck along a line parallel with the raised part.

6) *Depth for Freeboard (D)*

a) The depth for freeboard (D) is the moulded depth amidships, plus the thickness of

the freeboard deck stringer plate, where fitted, plus T(L-S)/L, if the exposed freeboard deck is sheathed, where T is the mean thickness of the exposed sheathing clear of openings, and S is the total length of superstructures as defined in sub-paragraph (10)(d) of this Paragraph.

b) The depth for freeboard (D) in a ship having a rounded gunwale with a radius greater than 4 percent of the breadth (B) or having topsides of unusual form is the depth for freeboard of a ship having a midship section with vertical topsides and with the same round of beam and area of topside section equal to that provided by the actual midship section.

7) *Block Coefficient*. The block coefficient (Cb) is given by:

$$C_b = \frac{\nabla}{L \times B \times d_1}$$; where,

∇ is the volume of the moulded displacement of the ship, excluding bossing, in a ship with a metal shell, and is the volume of displacement to the outer surface of the hull in a ship with a shell of any other material, both taken at a moulded draught of d_1; and where

d_1 is 85 per cent of the least moulded depth.

8) *Freeboard*. The freeboard assigned is the distance measured vertically downwards amidships from the upper edge of the deck line to the upper edge of the related load line.

9) *Freeboard Deck.* The freeboard deck is normally the uppermost complete deck exposed to weather and sea, which has permanent means of closing all openings in the weather part

thereof, and below which all openings in the sides of the ship are fitted with permanent means of watertight closing. In a ship having a discontinuous freeboard deck, the lowest line of the exposed deck and the continuation of that line parallel to the upper part of the deck is taken as the freeboard deck. At the option of the owner and subject to the approval of the Administration, a lower deck may be designated as the freeboard deck provided it is a complete and permanent deck continuous in a fore and aft direction at least between the machinery space and peak bulkheads and continuous athwartships. When this lower deck is stepped the lowest line of the deck and the continuation of that line parallel to the upper part of the deck is taken as the freeboard deck. When a lower deck is designated as the freeboard deck, that part of the hull which extends above the freeboard deck is treated as a superstructure so far as concerns the application of the conditions of assignment and the calculation of freeboard. It is from this deck that the freeboard is calculated.

10) *Superstructure*

a) A superstructure is a decked structure on the freeboard deck, extending from side to side of the ship or with the side plating not being inboard of the shell plating more than 4 per cent of the breadth (B). A raised quarter deck is regarded as a superstructure.

b) An enclosed superstructure is a superstructure with:

i) enclosing bulkheads of efficient construction;

ii) access openings, if any, in these bulkheads fitted with doors complying with the requirements of Paragraph 12;

iii) all other openings in sides or ends of the superstructure fitted with efficient weathertight means of closing.

A bridge or poop shall not be regarded as enclosed unless access is provided for the crew to reach machinery and other working spaces inside these superstructures by alternative means which are available at all times when bulkhead openings are closed.

c) The height of a superstructure is the least vertical height measured at side from the top of the superstructure deck beams to the top of the freeboard deck beams.

d) The length of a superstructure (S) is the mean length of the part of the superstructure which lies within the length (L).

11) *Flush Deck Ship*. A flush deck ship is one which has no superstructure on the freeboard deck.

12) *Weathertight*. Weathertight means that in any sea conditions water will not penetrate into the ship.

4. ***Deck Line***

The deck line is a horizontal line 300 millimetres (12 inches) in length and 25 millimetres (1 inch) in breadth. It shall be marked amidships on each side of the ship, and its upper edge shall normally pass through the point where the continuation outwards of the upper surface of the freeboard deck intersects the outer surface of the shell (as illustrated in Figure 1), provided that the deck line may be placed with reference to another fixed point on the ship on condition that the freeboard is correspondingly corrected. The location of the reference point and the identification of the freeboard deck shall in all cases be indicated on the International Load Line Certificate (1966).

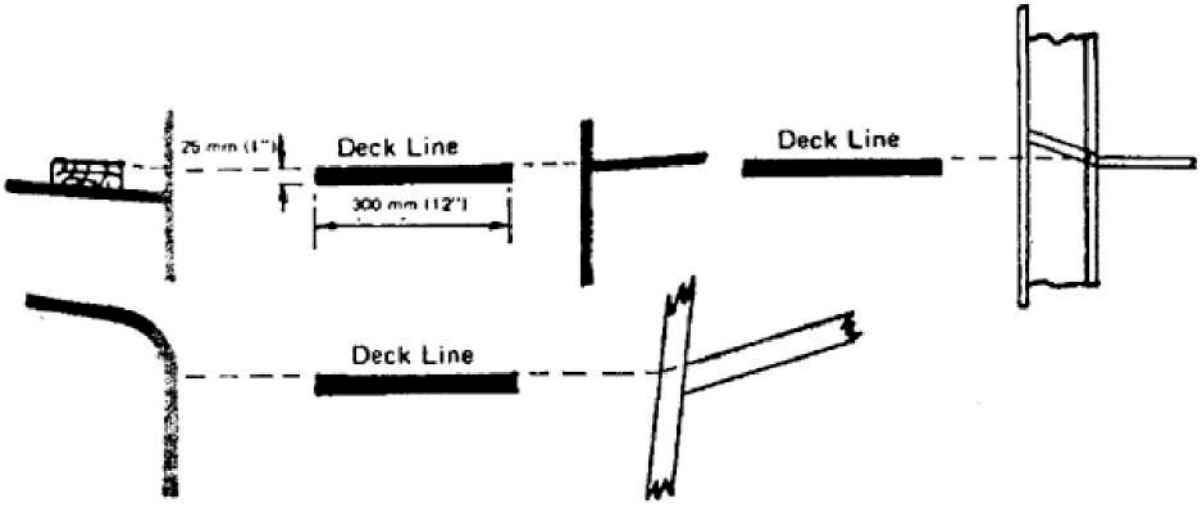

Fig. 1. Deck Line

5. ***Load Line Mark***

The Load Line Mark shall consist of a ring 300 millimetres (12 inches) in outside diameter and 25 millimetres (1 inch) wide which is intersected by a horizontal line 450 millimetres (18 inches) in length and 25 millimetres (1 inch) in breadth, the upper edge of which passes through the centre of the ring. The centre of the ring shall be placed amidships and at a distance equal to the assigned summer freeboard measured vertically below the upper edge of the deck line (as illustrated in Figure 2).

6. ***Lines to be used with the Load Line Mark***

1) The lines which indicate the load line assigned in accordance with these Paragraphs shall be horizontal lines 230 millimetres (9 inches) in length and 25 millimetres (1 inch) in breadth which extend forward of, unless expressly provided otherwise, and at right angles to, a vertical line 25 millimetres (1 inch) in breadth marked at a distance 540 millimetres (21 inches) forward of the centre of the ring (as illustrated in Figure 2)

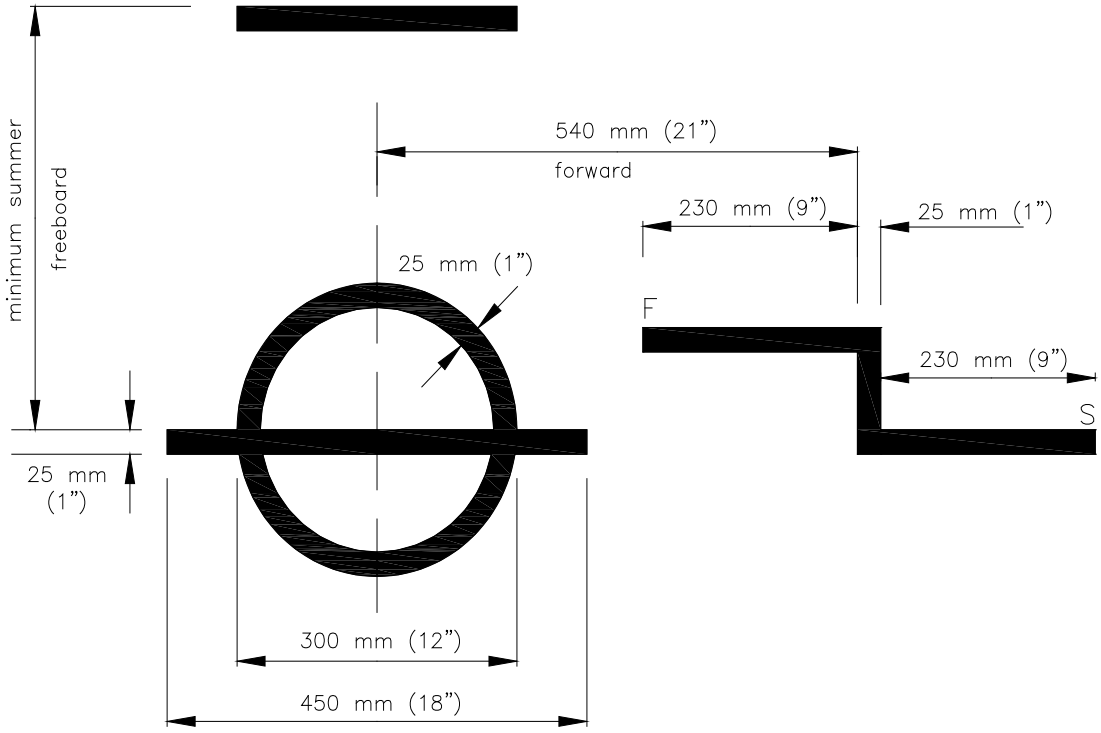

Figure 2 – Lines to be used with the Load Line Mark

2) The following load lines shall be used:

a) The Summer Load Line indicated by the upper edge of the line which passes through the centre of the ring and also by a line marked S.

b) The Fresh Water Load Line in summer indicated by the upper edge of a line marked F. The Fresh Water Load Line in summer is marked abaft the vertical line. The difference between the Fresh Water Load Line in summer and the Summer Load Line is the allowance to be made for loading in fresh water at the other load lines.

7. ***Mark of Assigning Authority***

The mark of the DMA by whom the load lines are assigned may be indicated alongside the load line ring above the horizontal line which passes through the centre of the ring, or above and below it. This mark shall consist of not more than four initials to identify the Authority's name, each measuring approximately 115 millimetres (4 1/2 inches) in height and 75 millimetres (3 inches) in width.

8. ***Details of Marking***

The ring, lines and letters shall be painted in white or yellow on a dark ground or in black on a light ground. They shall also be permanently marked on the sides of the ships to the satisfaction of the Administration. The marks shall be plainly visible and, if necessary, special arrangements shall be made for this purpose.

9. ***Verification of Marks***

The International Load Line Certificate (1966) shall not be delivered to the ship until the officer or surveyor has certified that the marks are correctly and permanently indicated on the ship's sides.

10. ***Information to be supplied to the Master***

1) The master of every new ship shall be supplied with sufficient information, in an approved form, to enable him to arrange for the loading and ballasting of his ship in such a way as to avoid the creation of any unacceptable stresses in the ship's structure, provided that this requirement need not apply to any particular length, design or class of ship where the Administration considers it to be unnecessary.

2) The master of every new ship which is not already provided with stability information under an international convention for the safety of life at sea in force shall be supplied with sufficient information in an approved form to give him guidance as to the stability of the ship under varying conditions of service, and a copy shall be furnished to the Administration.

11. ***Superstructure End Bulkheads***

Bulkheads at exposed ends of enclosed superstructures shall be of efficient construction and shall be to the satisfaction of the Administration.

12. ***Doors***

1) All access openings in bulkheads at ends of enclosed superstructures shall be fitted with doors of steel or other equivalent material, permanently and strongly attached to the bulkhead, and framed, stiffened and fitted so that the whole structure is of equivalent strength to the unpierced bulkhead and weathertight when closed. The means for securing these doors weathertight shall consist of gaskets and clamping devices or other equivalent means and shall be permanently attached to the bulkhead or to the doors themselves, and the doors shall be so arranged that they can be operated from both sides of the bulkhead.

2) Except as otherwise provided in these Paragraphs, the height of the sills of access openings in bulkheads at ends of enclosed superstructures shall be at least 380 millimetres (15 inches) above the deck.

13. ***Position of Hatchways, Doorways and Ventilators***

For the purpose of the Paragraphs, two positions of hatchways, doorways and ventilators are defined as follows:

Position 1 — Upon exposed freeboard and raised quarter decks, and upon exposed superstructure decks situated forward of a point located a quarter of the ship's length from the forward perpendicular.

Position 2 — Upon exposed superstructure decks situated abaft a quarter of the ship's length from the forward perpendicular.

14. ***Cargo and other Hatchways***

1) The construction and the means for securing the weathertightness of cargo and other hatchways in positions 1 and 2 shall be at least equivalent to the requirements of Paragraphs 15 and 16.

15. ***Hatchways closed by Portable Covers and secured Weathertight by Tarpaulins and Battening Devices***

Hatchway Coamings

1) The coamings of hatchways closed by portable covers secured weathertight by tarpaulins and battening devices shall be of substantial construction, and their height above the deck shall be at least as follows:

600 millimetres (23 1/2 inches) if in position 1.

450 millimetres (17 1/2 inches) if in position 2.

Hatchway Covers

2) The width of each bearing surface for hatchway covers shall be at least 65 millimetres (2 1/2 inches).

3) Where covers are made of wood, the finished thickness shall be at least 60 millimetres (2 3/8 inches) in association with a span of not more than 1.5 metres (4.9 feet).

4) Where covers are made of mild steel the strength shall be calculated with assumed loads not less than 1.75 metric tons per square metre (358 pounds per square foot) on hatchways in position 1, and not less than 1.30 metric tons per square metre (266 pounds per square foot) on hatchways in position 2, and the product of the maximum stress thus calculated and the factor 4.25 shall not exceed the minimum ultimate strength of the material. They shall be so designed as to limit the deflection to not more than 0.0028 times the span under these loads.

5) The assumed loads on hatchways in position 1 may be reduced to 1 metric ton per square metre (205 pounds per square foot) for ships of 24 metres (79 feet) in length and shall be not less than 1.75 metric tons per square metre (358 pounds per square foot) for ships of 100 metres (328 feet) in length. The corresponding loads on hatchways in position 2 may be reduced to 0.75 metric tons per square metre (154 pounds per square foot) and 1.30 metric tons per square metre (266 pounds per square foot) respectively. In all cases values at intermediate lengths shall be obtained by interpolation.

Portable Beams

6) Where portable beams for supporting hatchway covers are made of mild steel the strength shall be calculated with assumed loads not less than 1.75 metric tons per square metre (358 pounds per square foot) on hatchways in position 1 and not less than 1.30 metric tons per square metre (266 pounds per square foot) on hatchways in position 2 and the product of the maximum stress thus calculated and the factor 5 shall not exceed the minimum ultimate

strength of the material. For ships of not more than 100 metres (328 feet) in length the requirements of sub-paragraph (5) of this Paragraph are applicable.

Pontoon Covers

7) Where pontoon covers used in place of portable beams and covers are made of mild steel the strength shall be calculated with the assumed loads given in sub-paragraph (4) of this Paragraph, and the product of the maximum stress thus calculated and the factor 5 shall not exceed the minimum ultimate strength of the material. They shall be so designed as to limit the deflection to not more than 0.0022 times the span. Mild steel plating forming the tops of covers shall be not less in thickness than one per cent of the spacing of stiffeners or 6 millimetres (0.24 inches) if that be greater. For ships of not more than 100 metres (328 feet) in length the requirements of sub-paragraph (5) of this Paragraph are applicable.

8) The strength and stiffness of covers made of materials other than mild steel shall be equivalent to those of mild steel.

Carriers or Sockets

9) Carriers or sockets for portable beams shall be of substantial construction, and shall provide means for the efficient fitting and securing of the beams. Where rolling types of beams are used, the arrangements shall ensure that the beams remain properly in position when the hatchway is closed.

Cleats

10) Cleats shall be set to fit the taper of the wedges. They shall be at least 65 millimetres (2 1/2 inches) wide and spaced not more than 600 millimetres (23 1/2 inches) centre to centre; the cleats along each side or end shall be not more than 150 millimetres (6 inches) from the hatch corners.

Battens and Wedges

11) Battens and wedges shall be efficient and in good condition. Wedges shall be of tough wood or other equivalent material. They shall have a taper of not more than 1 in 6 and shall be not less than 13 millimetres (1/2 inch) thick at the toes.

Tarpaulins

12) At least two layers of tarpaulin in good condition shall be provided for each hatchway in position 1 or 2. The tarpaulins shall be waterproof and of ample strength. They shall be of a material of at least an approved standard weight and quality.

Security of Hatchway Covers

13) For all hatchways in position 1 or 2 steel bars or other equivalent means shall be provided in order efficiently and independently to secure each section of hatchway covers after the tarpaulins are battened down. Hatchway covers of more than 1.5 metres (4.9 feet) in length shall be secured by at least two such securing appliances.

16. ***Hatchways closed by Weathertight Covers of Steel or other equivalent material fitted with Gaskets and Clamping Devices***

Hatchway Coamings

1) At positions 1 and 2 the height above the deck of hatchway coamings fitted with weathertight hatch covers of steel or other equivalent material fitted with gaskets and clamping devices shall be as specified in Paragraph 15(1). Where coamings are provided they shall be of substantial construction.

Weathertight Cover

2) Where weathertight covers are of mild steel the strength shall be calculated with assumed loads not less than 1.75 metric tons per square metre (358 pounds per square foot) on hatchways in position 1, and not less than 1.30 metric tons per square metre (266 pounds per square foot) on hatchways in position 2, and the product of the maximum stress thus calculated and the factor of 4.25 shall not exceed the minimum ultimate strength of the material. They shall be so designed as to limit the deflection to not more than 0.0028 times the span under these loads. Mild steel plating forming the tops of covers shall be not less in thickness than one per cent of the spacing of stiffeners or 6 millimetres (0.24 inches) if that be greater. The provisions of Paragraph 15(5) are applicable for ships of not more than 100 metres (328 feet) in length.

3) The strength and stiffness of covers made of materials other than mild steel shall be equivalent to those of mild steel.

Means for Securing Weathertightness

4) The means for securing and maintaining weathertightness shall be to the satisfaction of the Administration. The arrangements shall ensure that the tightness can be maintained in any sea conditions, and for this purpose tests for tightness shall be required at the initial survey, and may be required at periodical surveys and at annual inspections or at more frequent intervals.

17. ***Machinery Space Openings***

1) Machinery space openings in position 1 or 2 shall be properly framed and efficiently enclosed by steel casings of ample strength, and where the casings are not protected by other structures their strength shall be specially considered. Access openings in such casings shall be fitted with doors complying with the requirements of Paragraph 12(1), the sills of which shall be at least 600 millimetres (23 1/2 inches) above the deck if in position 1, and at least 380 millimetres (15 inches) above the deck if in position 2. Other openings in such casings shall be fitted with equivalent covers, permanently attached in their proper positions.

2) Coamings of any fiddley, funnel or machinery space ventilator in an exposed position on the freeboard or superstructure deck shall be as high above the deck as is reasonable and practicable. Fiddley openings shall be fitted with strong covers of steel or other equivalent material permanently attached in their proper positions and capable of being secured

weathertight.

18. ***Miscellaneous Openings in Freeboard and Superstructure Decks***

1) Manholes and flush scuttles in position 1 or 2 or within superstructures other than enclosed superstructures shall be closed by substantial covers capable of being made watertight. Unless secured by closely spaced bolts, the covers shall be permanently attached.

2) Openings in freeboard decks other than hatchways, machinery space openings, manholes and flush scuttles shall be protected by an enclosed superstructure, or by a deckhouse or companionway of equivalent strength and weathertightness. Any such opening in an exposed superstructure deck or in the top of a deckhouse on the freeboard deck which gives access to a space below the freeboard deck or a space within an enclosed superstructure shall be protected by an efficient deckhouse or companionway. Doorways in such deckhouses or companionways shall be fitted with doors complying with the requirements of Paragraph 12(1).

3) In position 1 the height above the deck of sills to the doorways in companionways shall be at least 600 millimetres (23 1/2 inches). In position 2 it shall be at least 380 millimetres (15 inches).

19. ***Ventilators***

1) Ventilators in position 1 or 2 to spaces below freeboard decks or decks of enclosed superstructures shall have coamings of steel or other equivalent material, substantially constructed and efficiently connected to the deck. Where the coaming of any ventilator exceeds 900 millimetres (35 1/2 inches) in height it shall be specially supported.

2) Ventilators passing through superstructures other than enclosed superstructures shall have substantially constructed coamings of steel or other equivalent material at the freeboard deck.

3) Ventilators in position 1 the coamings of which extend to more than 4.5 metres (14.8 feet) above the deck, and in position 2 the coamings of which extend to more than 2.3 metres (7.5 feet) above the deck, need not be fitted with closing arrangements unless specifically required by the Administration.

4) Except as provided in sub-paragraph (3) of this paragraph ventilator openings shall be provided with efficient weathertight closing appliances. In ships of not more than 100 metres (328 feet) in length the closing appliances shall be permanently attached; where not so provided in other ships, they shall be conveniently stowed near the ventilators to which they are to be fitted. Ventilators in position 1 shall have coamings of a height of at least 900 millimetres (35 1/2 inches) above the deck; in position 2 the coamings shall be of a height at least 760 millimetres (30 inches) above the deck.

5) In exposed positions, the height of coamings may be required to be increased to the satisfaction of the Administration.

20. ***Air pipes***

Where air pipes to ballast and other tanks extend above the freeboard or superstructure decks, the exposed parts of the pipes shall be of substantial construction; the height from the deck to the point where water may have access below shall be at least 760 millimetres (30 inches) on the freeboard deck and 450 millimetres (17 1/2 inches) on the superstructure deck. Where these heights may interfere with the working of the ship, a lower height may be approved, provided the Administration is satisfied that the closing arrangements and other circumstances justify a lower height. Satisfactory means permanently attached, shall be provided for closing the openings of the air pipes.

21. ***Cargo Ports and other similar Openings***

1) Cargo ports and other similar openings in the sides of ships below the freeboard deck shall be fitted with doors so designed as to ensure watertightness and structural integrity commensurate with the surrounding shell plating. The number of such openings shall be the minimum compatible with the design and proper working of the ship.

2) Unless permitted by the Administration, the lower edge of such openings shall not be below a line drawn parallel to the freeboard deck at side, which has at its lowest point the upper edge of the uppermost load line.

22. ***Scuppers, Inlets and Discharges***

1) Discharges led through the shell either from spaces below the freeboard deck or from within superstructures and deckhouses on the freeboard deck fitted with doors complying with the requirements of Paragraph 12 shall be fitted with efficient and accessible means for preventing water from passing inboard. Normally each separate discharge shall have one automatic non-return valve with a positive means of closing it from a position above the freeboard deck. Where, however, the vertical distance from the summer load waterline to the inboard end of the discharge pipe exceeds 0.01 L, the discharge may have two automatic non-return valves without positive means of closing, provided that the inboard valve is always accessible for examination under service conditions; where that vertical distance exceeds 0.02 L a single automatic non-return valve without positive means of closing may be accepted subject to the approval of the Administration. The means for operating the positive action valve shall be readily accessible and provided with an indicator showing whether the valve is open or closed.

2) In manned machinery spaces main and auxiliary sea inlets and discharges in connection with the operation of machinery may be controlled locally. The controls shall be readily accessible and shall be provided with indicators showing whether are open or closed.

3) Scuppers and discharge pipes originating at any level and penetrating the shell either more than 450 millimetres (17 1/2 inches) below the freeboard deck or less than 600 millimetres (23 1/2 inches) above the summer load waterline shall be provided with a non-return valve at

the shell. This valve, unless required by sub-paragraph (1) of this Paragraph, may be omitted if the piping is of substantial thickness.

4) Scuppers leading from superstructures or deckhouses not fitted with doors complying with the requirements of Paragraph 12 shall be led overboard.

5) All valves and shell fittings required by this Paragraph shall be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable. All pipes to which this Paragraph refers shall be of steel or other equivalent material.

23. ***Side Scuttles***

1) Side scuttles to spaces below the freeboard deck or to spaces within enclosed superstructures shall be fitted with efficient hinged inside deadlights arranged so that they can be effectively closed and secured watertight.

2) No side scuttle shall be fitted in a position so that its sill is below a line drawn parallel to the freeboard deck at side and having its lowest point 2.5 per cent of the breadth (B) above the load waterline, or 500 millimetres (19 1/2 inches), whichever is the greater distance.

3) The side scuttles, together with their glasses, if fitted, and deadlights, shall be of substantial and approved construction.

24. ***Freeing Ports***

1) Where bulwarks on the weather portions of freeboard or superstructure decks form wells, ample provision shall be made for rapidly freeing the decks of water and for draining them. Except as provided in sub-paragraphs (2) and (3) of this Paragraph, the minimum freeing port area (A) on each side of the ship for each well on the freeboard deck shall be that given by the following formulae in cases where the sheer in way of the well is standard or greater than standard. The minimum area for each well on superstructure decks shall be one-half of the area given by the formulae.

Where the length of bulwark (l) in the well is 20 metres or less

$A = 0.7 + 0.035\ l\ m^2$,

where l exceeds 20 metres

$A = 0.07\ l\ m^2$.

l need in no case be taken as greater than 0.7 L.

If the bulwark is more than 1.2 metres in average height the required area shall be increased by 0.004 square metres per metre of length of well for each 0.1 metre difference in height. If the bulwark is less than 0.9 metre in average height, the required area may be decreased by 0.004 square metres per metre of length of well for each 0.1 metre difference in height.

Or,

where the length of bulwark (*l*) in the well is 66 feet or less

A = 7.6 + 0.115 l (square feet),

where *l* exceeds 66 feet

A = 0.23 l (square feet).

l need in no case be taken as greater than 0.7 L.

If the bulwark is more than 3.9 feet in average height the required area shall be increased by 0.04 square feet per foot of length of well for each foot difference in height. If the bulwark is less than 3 feet in average height, the required area may be decreased by 0.04 square feet per foot of length for each foot difference in height.

2) In ships with no sheer the calculated area shall be increased by 50 per cent. Where the sheer is less than the standard the percentage shall be obtained by interpolation.

3) Where a ship is fitted with a trunk which does not comply with the requirements of Paragraph 36 (1) (e) or where continuous or substantially continuous hatchway side coamings are fitted between detached superstructures the minimum area of the freeing port openings shall be calculated from the following table:

Breadth of hatchway or trunk in relation to the breadth of ship	Area of freeing ports in relation to the total area of the bulwarks
40 % or less	20%
75 % or more	10%

The area of freeing ports at intermediate breadths shall be obtained by linear interpolation.

4) In ships having superstructures which are open at either or both ends, adequate provision for freeing the space within such superstructures shall be provided to the satisfaction of the Administration.

5) The lower edges of the freeing ports shall be as near the deck as practicable. Two-thirds of the freeing port area required shall be provided in the half of the well nearest the lowest point of the sheer curve.

6) All such openings in the bulwarks shall be protected by rails or bars spaced approximately 230 millimetres (9 inches) apart. If shutters are fitted to freeing ports, ample clearance shall be provided to prevent jamming. Hinges shall have pins or bearings of non-corrodible material. If shutters are fitted with securing appliances, these appliances shall be of approved construction.

25. ***Protection of the Crew***

1) The strength of the deckhouses used for the accommodation of the crew shall be to the satisfaction of the Administration.

2) Efficient guard rails or bulwarks shall be fitted on all exposed parts of the freeboard and superstructure decks. The height of the bulwarks or guard rails shall be at least 1 metre (39 1/2 inches) from the deck, provided that where this height would interfere with the normal operation of the ship, a lesser height may be approved if the Administration is satisfied that adequate protection is provided.

3) The opening below the lowest course of the guard rails shall not exceed 230 millimetres (9 inches). The other courses shall be not more than 380 millimetres (15 inches) apart. In the case of ships with rounded gunwales the guard rail supports shall be placed on the flat of the deck.

4) Satisfactory means (in the form of guard rails, life lines, gangways or underdeck passages etc.) shall be provided for the protection of the crew in getting to and from their quarters, the machinery space and all other parts used in the necessary work of the ship.

5) Deck cargo carried on any ship shall be so stowed that an opening which is in way of the cargo and which gives access to and from the crew's quarters, the machinery space and all other parts used in the necessary work of the ship, can be properly closed and secured against the admission of water. Effective protection for the crew in the form of guard rails or life lines shall be provided above the deck cargo if there is no convenient passage on or below the deck of the ship.

26. ***Special Conditions of Assignment for Type "A" Ships***

Machinery Casings

1) Machinery casings on Type "A" ships as defined in Paragraph 27 shall be protected by an enclosed poop or bridge of at least standard height, or by a deckhouse of equal height and equivalent strength, provided that machinery casings may be exposed if there are no openings giving direct access from the freeboard deck to the machinery space. A door complying with the requirements of Paragraph 12 may, however, be permitted in the machinery casing, provided that it leads to a space or passageway which is as strongly constructed as the casing and is separated from the stairway to the engine room by a second weathertight door of steel or other equivalent material.

Gangway and Access

2) An efficiently constructed fore and aft permanent gangway of sufficient strength shall be fitted on Type "A" ships at the level of the superstructure deck between the poop and the midship bridge or deckhouse where fitted, or equivalent means of access shall be provided to carry out the purpose of the gangway, such as passages below deck. Elsewhere, and on Type "A" ships without a midship bridge, arrangements to the satisfaction of the Administration shall be provided to safeguard the crew in reaching all parts used in the necessary work of the

ship.

3) Safe and satisfactory access from the gangway level shall be available between separate crew accommodations and also between crew accommodations and the machinery space.

Hatchways

4) Exposed hatchways on the freeboard and forecastle decks or on the tops of expansion trunks on Type "A" ships shall be provided with efficient watertight covers of steel or other equivalent material.

Freeing Arrangements

5) Type "A" ships with bulwarks shall have open rails fitted for at least half the length of the exposed parts of the weather deck or other effective freeing arrangements. The upper edge of the sheer strake shall be kept as low as practicable.

6) Where superstructures are connected by trunks, open rails shall be fitted for the whole length of the exposed parts of the freeboard deck.

27. *Types of Ships*

1) For the purposes of freeboard computation ships shall be divided into Type "A" and Type "B".

Type "A" ships

2) A Type "A" ship is one which is designed to carry only liquid cargoes in bulk, and in which cargo tanks have only small access openings closed by watertight gasketed covers of steel or equivalent material.

Such a ship necessarily has the following inherent features:

a) high integrity of the exposed deck; and

b) high degree of safety against flooding, resulting from the low permeability of loaded cargo spaces and the degree of subdivision usually provided.

3) A Type "A" ship, if over 150 metres (492 feet) in length, and designed to have empty compartments when loaded to its summer load water-line, shall be able to withstand the flooding of any one of these empty compartments at an assumed permeability of 0.95, and remain afloat in a condition of equilibrium considered to be satisfactory by the Administration. In such a ship, if over 225 metres (738 feet) in length, the machinery space shall be treated as a floodable compartment but with a permeability of 0.85.

For the guidance of Administrations the following limits may be regarded as satisfactory:

a) the final waterline after flooding is below the lower edge of any opening through which progressive flooding may take place;

b) the maximum angle of heel due to unsymmetrical flooding is of the order of

15 degrees;

c) the metacentric height in the flooded condition is positive.

4) A Type “A” ship shall be assigned a freeboard not less than that based on Table A of Paragraph 28.

Type “B " ships

5) All ships which do not come within the provisions regarding Type “A” ships in sub-paragraphs (2) and (3) of this Paragraph shall be considered as Type “B” ships.

6) Type “B” ships, which in position 1 have hatchways fitted with hatch covers complying with the requirements of Paragraph 15(7) or 16 shall, except as provided in sub-paragraphs (7) to (10) inclusive of this Paragraph, be assigned freeboards based on Table B of Paragraph 28.

7) Any Type “B” ships of over 100 metres (328 feet) in length may be assigned freeboards less than those required under sub-paragraph (6) of this Paragraph provided that, in relation to the amount of reduction granted, the Administration is satisfied that:

a) the measures provided for the protection of the crew are adequate;

b) the freeing arrangements are adequate;

c) the covers in positions 1 and 2 comply with the provisions of Paragraph 16 and have adequate strength, special care being given to their sealing and securing arrangements;

d) the ship, when loaded to its summer load waterline, will remain afloat in a satisfactory condition of equilibrium after flooding of any single damaged compartment at an assumed permeability of 0.95 excluding the machinery space; and

e) in such a ship, if over 225 metres (738 feet) in length the machinery space shall be treated as a floodable compartment but with a permeability of 0.85.

For the guidance of Administrations in applying sub-paragraphs 7(d) and (e) of this Paragraph the limits given in sub-paragraphs (3)(a), (b) and (c) may be regarded as satisfactory.

The relevant calculations may be based upon the following main assumptions:

— the vertical extent of damage is equal to the depth of the ship;

— the penetration of damage is not more than B/5;

— no main transverse bulkhead is damaged;

— the height of the centre of gravity above the base line is assessed allowing for

homogeneous loading of cargo holds, and for 50 per cent of the designed capacity of consumable fluids and stores, etc.

8) In calculating the freeboards for Type "B" ships which comply with the requirements of sub-paragraph (7) of this Paragraph, the values from Table B of Paragraph 28 shall not be reduced by more than 60 per cent of the difference between the "B" and "A" tabular values for the appropriate ship lengths.

9) The reduction in tabular freeboard allowed under sub-paragraph (8) of this Paragraph may be increased up to the total difference between the values in Table A and those in Table B of Paragraph 28 on condition that the ship complies with the requirements of Paragraph 26(1), (2), (3), (5) and (6), as if it were a Type "A" ship, and further complies with the provisions of sub-paragraph (7)(a) to (d) inclusive of this Paragraph except that the reference in sub-paragraph 7(d) to the flooding of any single damaged compartment shall be to the flooding of any two adjacent fore and aft compartments, neither of which is the machinery space. Also any such ship of over 225 metres (738 feet) in length, when loaded to its summer load waterline, shall remain afloat in a satisfactory condition of equilibrium after flooding of the machinery space, taken alone, at an assumed permeability of 0.85.

10) Type "B" ships, which in position 1 have hatchways fitted with hatch covers which comply with the requirements of Paragraph 15, other than sub-paragraph (7) of this Paragraph, shall be assigned freeboards based upon the values given in Table B of Paragraph 28 increased by the values given in the following table:

Freeboard increase over tabular freeboard for Type "B" ships, for ships with hatch covers not complying with Paragraph 15(7) or 16.

Length of ship (metres)	Freeboard increase (millimetres)	Length of ship (metres)	Freeboard increase (millimetres)	Length of ship (metres)	Freeboard increase (millimetres)
108 and below	50	139	175	170	290
109	52	140	181	171	292
110	55	141	186	172	294
111	57	142	191	173	297
112	59	143	196	174	299
113	62	144	201	175	301
114	64	145	206	176	304
115	68	146	210	177	306
116	70	147	215	178	308
117	73	148	219	179	311
118	76	149	224	180	313
119	80	150	228	181	315

120	84	151	232	182	318
121	87	152	236	183	320
122	91	153	240	184	322
123	95	154	244	185	325
124	99	155	247	186	327
125	103	156	251	187	329
126	108	157	254	188	332
127	112	158	258	189	334
128	116	159	261	190	336
129	121	160	264	191	339
130	126	161	267	192	341
131	131	162	270	193	343
132	136	163	272	194	346
133	142	164	275	195	348
134	147	165	278	196	350
135	153	166	280	197	353
136	159	167	283	198	355
137	164	168	285	199	357
138	170	169	287	200	358

Freeboards at intermediate lengths of ship shall be obtained by linear interpolation. Ships above 200 metres in length shall be dealt with by the Administration.

Freeboard increase over tabular freeboard for Type “B” ships, for ships with hatch covers not complying with Paragraph 15(7) or 16.

Length of ship (feet)	Freeboard increase (inches)	Length of ship (feet)	Freeboard increase (inches)
350 and below	2,0	510	9,6
360	2,3	520	10,0
370	2,6	530	10,4
380	2,9	540	10,7
390	3,3	550	11,0
400	3,7	560	11,4
410	4,2	570	11,8
420	4,7	580	12,1
430	5,2	590	12,5
440	5,8	600	12,8
450	6,4	610	13,1
460	7,0	620	13,4
470	7,6	630	13,6
480	8,2	640	13,9
490	8,7	650	14,1
500	9,2	660	14,3

Freeboards at intermediate lengths of ship shall be obtained by linear interpolation. Ships above 660 feet in length shall be dealt with by the Administration.

11) A lighter, barge or other ship without independent means of propulsion shall be assigned a freeboard in accordance with the provisions of these Paragraphs. However, in the case of barges which are unmanned the requirements of Paragraphs 25, 26(2) and (3) and 39 shall not apply. Such unmanned barges which have on the freeboard deck only small access openings closed by weathertight gasketed covers of steel or equivalent material may be assigned freeboards 25 per cent less than those calculated in accordance with these Paragraphs.

28. ***Freeboard tables***

Type ‘A’ ships

1) The tabular freeboard for type ‘A’ ships shall be determined from the following tables:

Table 28.1 – Freeboard table for type ‘A’ ships

Length of ship (m)	Freeboard increase (mm)	Length of ship (m)	Freeboard increase (mm)	Length of ship (m)	Freeboard increase (mm)
24	200	51	455	78	814
25	208	52	467	79	828
26	217	53	478	80	841
27	225	54	490	81	855
28	233	55	503	82	869
29	242	56	516	83	883
30	250	57	530	84	897
31	258	58	544	85	911
32	267	59	559	86	926
33	275	60	573	87	940
34	283	61	587	88	955
35	292	62	600	89	969
36	300	63	613	90	984
37	308	64	626	91	999
38	316	65	639	92	1014
39	325	66	653	93	1029
40	334	67	666	94	1044
41	344	68	680	95	1059
42	354	69	693	96	1074
43	364	70	706	97	1089
44	374	71	720	98	1105
45	385	72	733	99	1120
46	396	73	746	100	1135
47	408	74	760	101	1151
48	420	75	773	102	1166
50	443	77	800	104	1196
105	1212	168	2240	231	2880
106	1228	169	2254	232	2888
107	1244	170	2268	233	2895
108	1260	171	2281	234	2903
109	1276	172	2294	235	2910
110	1293	173	2307	236	2918
111	1309	174	2320	237	2925
112	1326	175	2332	238	2932
113	1342	176	2345	239	2939
114	4359	177	2357	240	2946
115	1376	178	2369	241	2953
116	1392	179	2381	242	2959
117	1409	180	2393	243	2966
118	1426	181	2405	244	2973
119	1442	182	2416	245	2979

120	1459	183	2428	246	2986
121	1476	184	2440	247	2993
122	1494	185	2451	248	3000
123	1511	186	2463	249	3006
124	1528	187	2474	250	3012
125	1546	188	2486	251	3018
126	1563	189	2497	252	3024
127	1580	190	2508	253	3030
128	1598	191	2519	254	3036
129	1615	192	2530	255	3042
130	1632	193	2541	256	3048
131	1650	194	2552	257	3054
132	1667	195	2562	258	3060
133	1684	196	2572	259	3066
134	1702	197	2582	260	3072
135	1719	198	2592	261	3078
136	1736	199	2602	262	3084
137	1753	200	2612	263	3089
138	1770	201	2622	264	3095
139	1787	202	2632	265	3101
140	1803	203	2641	266	3106
141	1820	204	2650	267	3112
142	1837	205	2659	268	3117
143	1853	206	2669	269	3123
144	1870	207	2678	270	3128
145	1886	208	2687	271	3133
146	1903	209	2696	272	3138
147	1919	210	2705	273	3143
148	1935	211	2714	274	3148
149	1952	212	2723	275	3153
150	1968	213	2732	276	3158
151	1984	214	2741	277	3163
152	2000	215	2749	278	3167
153	2016	216	2758	279	3172
154	2032	217	2767	280	3176
155	2048	218	2775	281	3181
156	2064	219	2784	282	3185
157	2080	220	2792	283	3189
158	2096	221	2801	284	3194
159	2111	222	2809	285	3198
160	2126	223	2817	286	3202
161	2141	224	2825	287	3207
162	2155	225	2833	288	3211
163	2169	226	2841	289	3215
164	2184	227	2849	290	3220
165	2198	228	2857	291	3224
166	2212	229	2865	292	3228
167	2226	230	2872	293	3233
294	3237	318	3325	342	3387
295	3241	319	3328	343	3389
296	3246	320	3331	344	3392

297	3250	321	3334	345	3394
298	3254	322	3337	346	3396
299	3258	323	3339	347	3399
300	3262	324	3342	348	3401
301	3266	325	3345	349	3403
302	3270	326	3347	350	3406
303	3274	327	3350	351	3408
304	3278	328	3353	352	3410
305	3281	329	3355	353	3412
306	3285	330	3358	354	3414
307	3288	331	3361	355	3416
308	3292	332	3363	356	3418
309	3295	333	3366	357	3420
310	3298	334	3368	358	3422
311	3302	335	3371	359	3423
312	3305	336	3373	360	3425
313	3308	337	3375	361	3427
314	3312	338	3378	362	3428
315	3315	339	3380	363	3430
316	3318	340	3382	364	3432
317	3322	341	3385	365	3433

Freeboards at intermediate lengths of ship shall be obtained by linear interpolation.
Ships above 200 m in length shall be dealt with by the Administration.

Type ‘B’ ships

2) The tabular freeboard for Type ‘B’ ships shall be determined from the following table:

Table 28.2 – Freeboard table for type ‘B’ ships

Length of ship (m)	Freeboard increase (mm)	Length of ship (m)	Freeboard increase (mm)	Length of ship (m)	Freeboard increase (mm)
24	200	70	721	116	1609
25	208	71	738	117	1630
26	217	72	754	118	1651
27	225	73	769	119	1671
28	233	74	784	120	1690
29	242	75	800	121	1709
30	250	76	816	122	1729
31	258	77	833	123	1750
32	267	78	850	124	1771
33	275	79	868	125	1793
34	283	80	887	126	1815
35	292	81	905	127	1837
36	300	82	923	128	1859
37	308	83	942	129	1880
38	316	84	960	130	1901
39	325	85	978	131	1921
40	334	86	996	132	1940
41	344	87	1015	133	1959
42	354	88	1034	134	1979
43	364	89	1054	135	2000
44	374	90	1075	136	2021
45	385	91	1096	137	2043
46	396	92	1116	138	2065
47	408	93	1135	139	2087
48	420	94	1154	140	2109
49	432	95	1172	141	2130
50	443	96	1190	142	2151
51	455	97	1209	143	2171
52	467	98	1229	144	2190
53	478	99	1250	145	2209
54	490	100	1271	146	2229
55	503	101	1293	147	2250
56	516	102	1315	148	2271
57	530	103	1337	149	2293
58	544	104	1359	150	2315
59	559	105	1380	151	2334
60	573	106	1401	152	2354
61	587	107	1421	153	2375
62	601	108	1440	154	2396
63	615	109	1459	155	2418
64	629	110	1479	156	2440
65	644	111	1500	157	2460
66	659	112	1521	158	2480

67	674	113	1543	159	2500
68	689	114	1565	160	2520
69	705	115	1587	161	2540
162	2560	225	3660	288	4490
163	2580	226	3675	289	4502
164	2600	227	3690	290	4513
165	2620	228	3705	291	4525
166	2640	229	3720	292	4537
167	2660	230	3735	293	4548
168	2680	231	3750	294	4560
169	2698	232	3765	295	4572
170	2716	233	3780	296	4583
171	2735	234	3795	297	4595
172	2754	235	3808	298	4607
173	2774	236	3821	299	4618
174	2795	237	3835	300	4630
174	2815	238	3849	301	4642
176	2835	239	3864	302	4654
177	2855	240	3880	303	4665
178	2875	241	3893	304	4676
179	2895	242	3906	305	4686
180	2915	243	3920	306	4695
181	2933	244	3934	307	4704
182	2952	245	3949	308	4714
183	2970	246	3965	309	4725
184	2988	247	3978	310	4736
185	3007	248	3992	311	4748
186	3025	249	4005	312	4757
187	3044	250	4018	313	4768
188	3062	251	4032	314	4779
189	3080	252	4045	315	4790
190	3098	253	4058	316	4801
191	3116	254	4072	317	4812
192	3134	255	4085	318	4823
193	3151	256	4098	319	4834
194	3167	257	4112	320	4844
195	3185	258	4125	321	4855
196	3202	259	4139	322	4866
197	3219	260	4152	323	4878
198	3235	261	4165	324	4890
199	3249	262	4177	325	4899
200	3264	263	4189	326	4909
201	3280	264	4201	327	4920
202	3296	265	4214	328	4931
203	3313	266	4227	329	4943
204	3330	267	4240	330	4955
205	3347	268	4252	331	4965
206	3363	269	4264	332	4975
207	3380	270	4276	333	4985
208	3397	271	4289	334	4995
209	3413	272	4302	335	5005

210	3430	273	4315	336	5015
211	3445	274	4327	337	5025
212	3460	275	4339	338	5035
213	3475	276	4350	339	5045
214	3490	277	4362	340	5055
215	3505	278	4373	341	5065
216	3520	279	4385	342	5075
217	3537	280	4397	343	5086
218	3554	281	4408	344	5097
219	3570	282	4420	3445	5108
220	3586	283	4432	346	5119
221	3601	284	4443	347	5130
222	3615	285	4455	348	5140
223	3630	286	4467	349	5150
224	3645	287	4478	350	5160
351	5170	356	5220	361	5268
352	5180	357	5230	362	5276
353	5190	358	5240	363	5285
354	5200	359	5250	364	5294
355	5210	360	5260	365	5303

Freeboards at intermediate lengths of ship shall be obtained by linear interpolation.
Ships above 200 m in length shall be dealt with by the Administration.

29. ***Correction to the Freeboard for Ships under 100 metres (328feet) in length***

The tabular freeboard for a Type "B" ship of between 24 metres (79 feet) and 100 metres (328 feet) in length having enclosed superstructures with an effective length of up to 35 per cent of the length of the ship shall be increased by:

7,5 (100 - L) (0,35 - E/L) millimetres

where

L = length of ship in metres,

E = effective length of superstructure in metres as defined in Paragraph 35;

30. ***Correction for Block Coefficient***

Where the block coefficient (C_b) exceeds 0.68, the tabular freeboard specified in Paragraph 28 as modified, if applicable, by Paragraphs 27(8), 27(10) and 29 shall be multiplied by the factor

(Cb + 0,68)/1,36

31. ***Correction for Depth***

1) Where D exceeds L/15 the freeboard shall be increased by (D - L/15)R millimetres, where R is L/0.48 at lengths less than 120 metres and 250 at 120 metres length and above, or (D - L/15)R inches, where R is L/131.2 at lengths less than 396.6 feet and 3 at 393.6 feet length and above.
2) Where D is less than L/15 no reduction shall be made except in a ship with an enclosed superstructure covering at least 0.6 L amidships, with a complete trunk, or combination of detached enclosed superstructures and trunks which extend all fore and aft, where the freeboard shall be reduced at the rate prescribed in sub-paragraph (1) of this Paragraph.
3) Where the height of superstructure or trunk is less than the standard height, the reduction shall be in the ratio of the actual to the standard height as defined in Paragraph 33.

32. ***Correction for Position of Deck Line***

Where the actual depth to the upper edge of the deck line is greater or less than D, the difference between the depths shall be added to or deducted from the freeboard.

33. ***Standard Height of Superstructure***

Standard Height (in metres)

L (metres)	Raised Quarter Deck	All other Superstructures
30 or less	0,90	1,80
75	1,20	1,80
125 or more	1,80	2,30

The standard height of a superstructure shall be as given in the following table:

The standard heights at intermediate lengths of the ship shall be obtained by linear interpolation.

34. ***Length of Superstructure***

1) Except as provided in sub-paragraph (2) of this Paragraph, the length of a superstructure (S) shall be the mean length of the parts of the superstructure which lie within the length (L).

2) Where the end bulkhead of an enclosed superstructure extends in a fair convex curve beyond its intersection with the superstructure sides, the length of the superstructure may be increased on the basis of an equivalent plane bulkhead. This increase shall be two-thirds of the fore and aft

Standard Height (in feet)

L (feet)	Raised Quarter Deck	All other Superstructures
98,5 or less	3,0	5,9
246	3,9	5,9
410 or more	5,9	7,5

extent of the curvature. The maximum curvature which may be taken into account in determining this increase is one-half the breadth of the superstructure at the point of intersection of the curved end of the superstructure with its side.

35. ***Effective Length of Superstructure***

1) Except as provided for in sub-paragraph (2) of this Paragraph, the effective length (E) of an enclosed superstructure of standard height shall be its length.

2) In all cases where an enclosed superstructure of standard height is set in from the sides of the ship as permitted in Paragraph 3(10), the effective length shall be the length modified by the ratio of b/B_s, where

b is the breadth of superstructure at the middle of its length; and

B_s is the breadth of the ship at the middle of the length of the superstructure.

Where a superstructure is set in for a part of its length, this modification shall be applied only to the set in part.

3) Where the height of an enclosed superstructure is less than the standard height, the effective length shall be its length reduced in the ratio of the actual height to the standard height.

4) The effective length of a raised quarter deck, if fitted with an intact front bulkhead, shall be its length up to a maximum of 0.6 L. Where the bulkhead is not intact, the raised quarter deck shall be treated as a poop of less than standard height.

5) Superstructures which are not enclosed shall have no effective length.

36. ***Trunks***

1) A trunk or similar structure which does not extend to the sides of the ship shall be regarded as efficient on the following conditions:

a) the trunk is at least as strong as a superstructure;

b) the hatchways are in the trunk deck, and the hatchway coamings and covers comply with the requirements of Paragraphs 13 to 16 inclusive and the width of the trunk deck stringer provides a satisfactory gangway and sufficient lateral stiffness. However, small access openings with watertight covers may be permitted in the freeboard deck;

c) a permanent working platform fore and aft fitted with guard rails is provided by the trunk deck, or by detached trunks connected to superstructures by efficient permanent gangways;

d) ventilators are protected by the trunk, by watertight covers or by other equivalent means;

e) open rails are fitted on the weather parts of the freeboard deck in way of the trunk for at least half their length;

f) the machinery casings are protected by the trunk, by a superstructure of at least standard height, or by a deckhouse of the same height and of equivalent strength;

g) the breadth of the trunk is at least 60 per cent of the breadth of the ship; and

h) where there is no superstructure, the length of the trunk is at least 0.6 L.

2) The full length of an efficient trunk reduced in the ratio of its mean breadth to B shall be its effective length.

3) The standard height of a trunk is the standard height of a superstructure other than a raised quarter deck.

4) Where the height of a trunk is less than the standard height, its effective length shall be reduced in the ratio of the actual to the standard height. Where the height of hatchway

coamings on the trunk deck is less than that required under Paragraph 15 (1), a reduction from the actual height of trunk shall be made which corresponds to the difference between the actual and the required height of coaming.

37. ***Deduction for Superstructures and Trunks***

1) Where the effective length of superstructures and trunks is 1.0 L, the deduction from the freeboard shall be 350 millimetres at 24 metres length of ship, 860 millimetres at 85 metres length, and 1070 millimetres at 122 metres length and above (14 inches at 79 feet length of ship, 34 inches at 279 feet length, and 42 inches at 400 feet length and above); deductions at intermediate lengths shall be obtained by linear interpolation.

2) Where the total effective length of superstructures and trunks is less than 1.0 L the deduction shall be a percentage obtained from one of the following tables:

Total Effective Length of Superstructures and Trunks

	0	0.1 L	0.2 L	0.3 L	0.4 L	0.5 L	0.6 L	0.7 L	0.8 L	0.9 L	1.0 L
Percentage of deduction for all types of superstructures	0	7	14	21	31	41	52	63	75,3	87,7	100

Percentage of Deduction for Type “A” ships

Percentages at intermediate lengths of superstructures shall be obtained by linear interpolation.

Percentage of Deduction for Type “B” ships

	Line	Total Effective Length of Superstructures and Trunks										
		0	0.1L	0.2L	0.3L	0.4L	0.5L	0.6L	0.7L	0.8L	0.9L	1.0L
Ships with forecastle and without detached bridged	I	0	5	10	15	23,5	32	46	63	75,3	87,7	100
Ships with forecastle and detached bridged	II	0	6,3	12,7	19	27,5	36	46	63	75,3	87,7	100

Percentages at intermediate lengths of superstructures shall be obtained by linear interpolation.

3) For ships of Type "B":

a) Where the effective length of a bridge is less than 0,2 L, the percentages shall be obtained by linear interpolation between lines I and II.

b) Where the effective length of a forecastle is more than 0,4 L, the percentages shall be obtained from line II.

c) Where the effective length of a forecastle is less than 0,07 L, the above percentages shall be reduced by:

$$5 \times \frac{(0.07L - f)}{0.07L}$$

where f is the effective length of the forecastle.

38. *Sheer*

General

1) The sheer shall be measured from the deck at side to a line of reference drawn parallel to the keel through the sheer line amidships.

2) In ships designed with a rake of keel, the sheer shall be measured in relation to a reference line drawn parallel to the design load waterline.

3) In flush deck ships and in ships with detached superstructures the sheer shall be measured at the freeboard deck.

4) In ships with topsides of unusual form in which there is a step or break in the topsides, the sheer shall be considered in relation to the equivalent depth amidships.

5) In ships with a superstructure of standard height which extends over the whole length of the freeboard deck, the sheer shall be measured at the superstructure deck. Where the height exceeds the standard the least difference (Z) between the actual and standard heights shall be added to each end ordinate. Similarly, the intermediate ordinates at distances of 1/6 L and 1/3 L from each perpendicular shall be increased by 0.444 Z and 0.111 Z respectively.

6) Where the deck of an enclosed superstructure has at least the same sheer as the exposed freeboard deck, the sheer of the enclosed portion of the freeboard deck shall not be taken into account.

7) Where an enclosed poop or forecastle is of standard height with greater sheer than that of the freeboard deck, or is of more than standard height, an addition to the sheer of the

freeboard deck shall be made as provided in paragraph (12) of this Paragraph.

Standard Sheer Profile

8) The ordinates of the standard sheer profile are given in the following table:

Standard Sheer Profile (Where L is in metres)

	Station	Ordinate (in mm)	Factor
After half	After Perpendicular	25 (L/3 + 10)	1
	1/6 L from A.P.	11,1 (L/3 + 10)	3
	1/3 L from A.P.	2,8 (L/3 + 10)	3
	Amidships	0	1

	Station	Ordinate (in mm)	Factor
Forward half	Amidships	0	1
	1/3 L from F.P	5,6 (L/3 + 10)	3
	1/6 L from F.P	22,2 (L/3 + 10)	3
	Forward Perpendicular	50 (L/3 + 10)	1

Standard Sheer Profile

(Where L is in feet)

	Station	Ordinate (in inches)	Factor
After half	After Perpendicular	0,1 L + 10	1
	1/6 L from A.P.	0,0444 L + 4,44	3
	1/3 L from A.P.	0,111 L + 1,11	3
	Amidships	0	1
Forward half	Amidships	0	1

1/3 L from F.P.	0,0222 L + 2,22	3
1/6 L from F.P.	0,0888 L + 8,88	3
Forward Perpendicular	0,2 L + 20	1

Measurement of Variation from Standard Sheer Profile.

9) Where the sheer profile differs from the standard, the four ordinates of each profile in the forward or after half shall be multiplied by the appropriate factors given in the table of ordinates. The difference between the sums of the respective products and those of the standard divided by 8 measures the deficiency or excess of sheer in the forward or after half. The arithmetical mean of the excess or deficiency in the forward and after halves measures the excess or deficiency of sheer.

10) Where the after half of the sheer profile is greater than the standard and the forward half is less than the standard, no credit shall be allowed for the part in excess and deficiency only shall be measured.

11) Where the forward half of the sheer profile exceeds the standard, and the after portion of the sheer profile is not less than 75 per cent of the standard, credit shall be allowed for the part in excess; where the after part is less than 50 per cent of the standard no credit shall be given for the excess sheer forward. Where the after sheer is between 50 per ant and 75 per cent of the standard, intermediate allowances may be granted for excess sheer forward.

12) Where sheer credit is given for a poop or forecastle the following formula shall be used:

$$s = \frac{\gamma L'}{3L}$$

where

s = sheer credit, to be deducted from the deficiency or added to the excess of sheer,

γ = difference between actual and standard height of superstructure at the end of sheer,

L’ = mean enclosed length of poop or forecastle up to a maximum length of 0.5 L,

L = length of ship as defined in Paragraph 3(1).

The above formula provides a curve in the form of a parabola tangent to the actual sheer curve at the freeboard deck and intersecting the end ordinate at a point below the superstructure deck a distance equal to the standard height of a superstructure. The superstructure deck shall not be less than standard height above this curve at any point.

This curve shall be used in determining the sheer profile for forward and after halves of the ship.

Correction for Variations from Standard Sheer Profile.

13) The correction for sheer shall be the deficiency or excess of sheer (see sub-paragraphs (9) to (11) inclusive of this Paragraph), multiplied by

$$0.75 - \frac{S}{2L}$$

where S is the total length of enclosed superstructures.

Addition for Deficiency in Sheer.

14) Where the sheer is less than the standard, the correction for deficiency in sheer (see sub-paragraph (13) of this Paragraph) shall be added to the freeboard.

Deduction for Excess Sheer.

15) In ships where an enclosed superstructure covers 0.1 L before and 0.1 L abaft amidships, the correction for excess of sheer as calculated under the provisions of sub-paragraph (13) of this Paragraph shall be deducted from the freeboard; in ships where no enclosed superstructure covers amidships, no deduction shall be made from the freeboard; where an enclosed superstructure covers less than 0.1 L before and 0.1 L abaft amidships, the deduction shall be obtained by linear interpolation. The maximum deduction for excess sheer shall be at the rate of 125 millimetres per 100 metres of length (1 1/2 inches per 100 feet of length).

39. *Minimum Bow Height*

1) The bow height defined as the vertical distance at the forward perpendicular between the waterline corresponding to the assigned summer freeboard and the designed trim and the top of the exposed deck at side shall be not less than:

for ships below 250 metres in length,

$$56L\left(1 - \frac{L}{500}\right)\frac{1.36}{C_b + 0.68} \text{ millimetres;}$$

for ships of 250 metres and above in length,

$$7000\ \frac{1.36}{C_b + 0.68} \text{ millimetres;}$$

where L is the length of the ship in metres,

C_b is the block coefficient which is to be taken as not less than 0,68.

or,

for ships below 820 feet in length,

$$0.672L\left(1-\frac{L}{1640}\right)\frac{1.36}{C_b+0.68} \text{ inches}$$

for ships of 820 feet and above in length,

$$275.6\,\frac{1.36}{C_b+0.68} \text{ inches}$$

where L is the length of the ship in feet,

C_b is the block coefficient which is to be taken as not less than 0.68.

2) Where the bow height required in sub-paragraph (1) of this Paragraph is obtained by sheer, the sheer shall extend for at least 15 per cent of the length of the ship measured from the forward perpendicular. Where it is obtained by fitting a superstructure, such superstructure shall extend from the stem to a point at least 0.07 L abaft the forward perpendicular, and it shall comply with the following requirements:

a) for ships not over 100 metres (328 feet) in length it shall be enclosed as defined in Paragraph 3 (10), and

b) for ships over 100 metres (328 feet) in length it need not comply with Paragraph 3(10) but shall be fitted with closing appliances to the satisfaction of the Administration.

3) Ships which, to suit exceptional operational requirements, cannot meet the requirements of sub-paragraphs (1) and (2) of this Paragraph may be given special consideration by the Administration.

40. ***Minimum Freeboards***

Summer Freeboard

1) The minimum freeboard in summer shall be the freeboard derived from the tables in Paragraph 28 as modified by the corrections in Paragraph 27, as applicable, 29, 30, 31, 32, 37, 38 and, if applicable, 39.

2) The freeboard in salt water, as calculated in accordance with sub-paragraph (1) of this Paragraph, but without the correction for deck line, as provided by Paragraph 32, shall not be less than 50 millimetres (2 inches). For ships having in position 1 hatchways with covers which do not comply with the requirements of Paragraph 15(7), 16 or 26, the freeboard shall be not less than 150 millimetres (6 inches).

Fresh Water Freeboard.

3) The minimum freeboard in fresh water of unit density shall be obtained by deducting from

the minimum freeboard in salt water:

$$\frac{\Delta}{40T} \text{ centimetres (inches)}$$

where Δ = displacement in salt water in tons at the summer load waterline,

T = tons per centimetre (inch) immersion in salt water at the summer load waterline.

4) Where the displacement at the summer load waterline cannot be certified, the deduction shall be one forty-eighth of summer draught, measured from the top of the keel to the centre of the ring of the load line mark.