



## Department of Marine Administration - Yangon Myanmar

### Policy for the Implementation of International Load Lines

Operational Procedure : QOP - 72 - 01- (05)

Revision: 0

Page 1

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### Subj: INTERIM GUIDANCE FOR INTERNATIONAL CONVENTION ON LOAD LINES, 1966 IMPLEMENTATION

Ref: (a) International Convention on Load Lines, 1966 and Protocol of 1988, as amended in 2003.

#### 1. Purpose:

This policy letter provides interim guidance to ensure Myanmar and other flag oceangoing ships are in compliance with International Convention on Load Lines, 1966 and Protocol of 1988, as amended in 2003 to reference.

#### 2. Action:

Myanmar flag state Surveyors and recognized Surveyors shall use this interim guidance in the oversight of their respective Myanmar flag and foreign flag ships calling on Myanmar ports.

#### 3. Directives Affected:

April 21 2014.

#### 4. Background:

International Convention on Load Lines, 1966. On January 11, 1987, the Republic of the Union of Myanmar was signed the International Convention on Load Lines, 1966 and enter into force on January 11, 1988.

#### 5. Enforcement:

Myanmar flag state officers should verify a foreign flag ship's compliance with International Convention on Load Lines, 1966 during normally scheduled inspection. For Myanmar ships operating strictly on domestic routes, compliance should be verified by Myanmar Flag state Surveyors during normally scheduled inspections, but an educational outreach and awareness

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# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 2

approach is encouraged. However, current enforcement options remain in place for willful and egregious violators or repeat offenders.

## 6. Limitation:

**According to Article 3 of the International Convention on Load Lines, 1966 and Protocol of 1988, as amended in 2003**

### **Application**

- (1) No ship to which the present convention applies shall proceed to sea on an international voyage after the date on which the present standard comes into force unless it has been surveyed, marked and provided with an International Load Line Certificate (1966) or, where *appropriate, an International Load Line Exemption Certificate in accordance with the provisions of the present Standard.*
- (2) Nothing in this convention shall prevent the Administration from assigning a greater freeboard than the minimum freeboard determined in accordance with annex I of the convention.
- (3) 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 Regulations.
- (4) Ships of wood or of composite construction, or of other materials the use of which the Administration has approved, or ships whose constructional features are such as to render the application of the provisions.
- (5) Regulations 10 to 26 inclusive of this Annex 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.

### **Exceptions**

- (1) The present Standard shall not apply to:
  - (a) ships of war;
  - (b) new ships of less than 24 metres (79 feet) in length;
  - (c) existing ships of less than 150 tons gross;
  - (d) pleasure yachts not engaged in trade;
  - (e) fishing vessels.

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 3

## *Regulations for determining load lines*

*The following regulations shall use to determine for load line calculations.*

### **Definitions of terms used in the Annexes**

(1) ***Length***

The length (L) shall be taken as 96% of the total length on a waterline at 8 % of the least moulded depth measured from the top of the keel, or as the length from the foreside 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.

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 4

- (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.

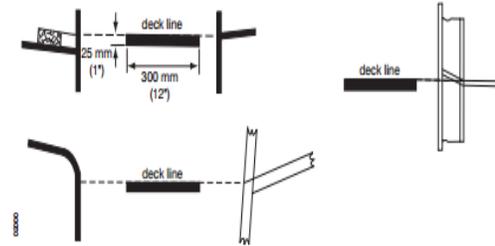


Figure 1 – Deck line

(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  $\frac{T(L-S)}{L}$

if the exposed freeboard deck is sheathed, where

T is the mean thickness of the exposed sheathing clear of deck openings, and

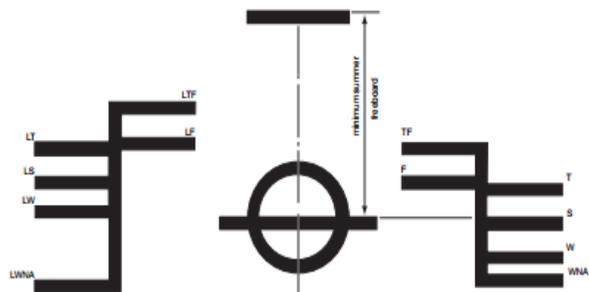


Figure 3 – Timber Load Line Mark and lines to be used with this mark

S is the total length of superstructures as defined in sub-paragraph (10)(d) of this Regulation.

- (b) The depth for freeboard (D) in a ship having a rounded gunwale with a radius greater than 4 per cent 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 ( $C_b$ ) is given by:

$$C_b = \frac{\nabla}{L \cdot B \cdot d_1}$$

Where  $\nabla$  is the volume of the moulded displacement of the ship, excluding bossing, in a ship with a metal shell, and  $d_1$  is the volume of displacement to the outer surface of the

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 5

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% of the least moulded depth.

## 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.

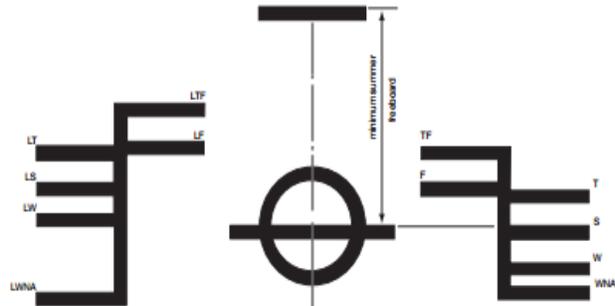


Figure 3 – Timber Load Line Mark and lines to be used with this mark

## 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.

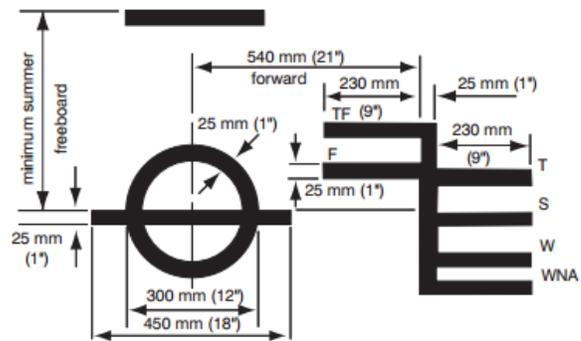


Figure 2 – Load Line Mark and lines to be used with this mark

## Lines to be used with the Load Line Mark

- (1) The lines which indicate the load line assigned in accordance with these Regulations 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

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 6

540 millimetres (21 inches) forward of the centre of the ring (as illustrated in Figure 2).

- (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 Winter Load Line indicated by the upper edge of a line marked W.
    - (c) The Winter North Atlantic Load Line indicated by the upper edge of a line marked WNA.
    - (d) The Tropical Load Line indicated by the upper edge of a line marked T.
    - (e) 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.
    - (f) The Tropical Fresh Water Load Line indicated by the upper edge of a line marked TF, and marked abaft the vertical line.
  - (3) If timber freeboards are assigned in accordance with these Regulations, the timber load lines shall be marked in addition to ordinary load lines. These lines shall be horizontal lines 230 millimetres (9 inches) in length and 25 millimetres (1 inch) in breadth which extend abaft unless expressly provided otherwise, and are at right angles to, a vertical line 25 millimetres (1 inch) in breadth marked at a distance 540 millimetres (21 inches) abaft the centre of the ring (as illustrated in figure 3).
  - (4) The following timber load lines shall be used:
    - (a) The Summer Timber Load Line indicated by the upper edge of a line marked LS.
    - (b) The Winter Timber Load Line indicated by the upper edge of a line marked LW.
    - (c) The Winter North Atlantic Timber Load Line indicated by the upper edge of a line marked LWNA.
    - (d) The Tropical Timber Load Line indicated by the upper edge of a line marked LT.
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# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

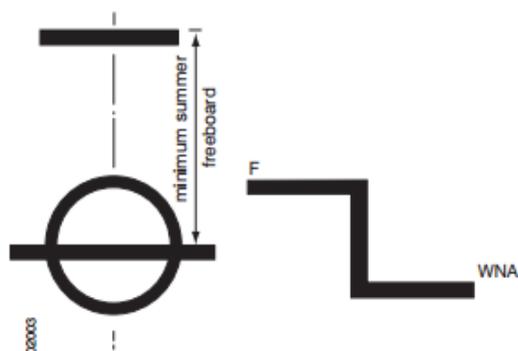
Revision: 0

Page 7

- (e) The Fresh Water Timber Load Line in summer indicated by the upper edge of a line marked LF and marked forward of the vertical line.
- The difference between the Fresh Water Timber Load Line in summer and the Summer Timber Load Line is the allowance to be made for loading in fresh water at the other timber load lines.
- (f) The Tropical Fresh Water Timber Load Line indicated by the upper edge of a line marked LTF and marked forward of the vertical line.
- (5) Where the characteristics of a ship or the nature of the ship's service or navigational limits make any of the seasonal lines inapplicable, these lines may be omitted.
- (6) Where a ship is assigned a greater than minimum freeboard so that the load line is marked at a position corresponding to, or lower than, the lowest seasonal load line assigned at minimum freeboard in accordance with the present Convention, only the Fresh Water Load Line need be marked.
- (7) On sailing ships only the Fresh Water Load Line and the Winter North Atlantic Load Line need be marked (as illustrated in Figure 4).
- (8) Where a Winter North Atlantic Load Line is identical with the Winter Load Line corresponding to the same vertical line, this load line shall be marked W.
- (9) Additional load lines required by other international conventions in force may be marked at right angles to and abaft the vertical line specified in paragraph (1) of this Regulation.

## *Mark of assigning authority*

The mark of the Authority 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.



**Figure 4 – Load Line Mark on sailing ships and lines to be used with this mark**

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 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.

## **CONDITIONS OF ASSIGNMENT OF FREEBOARD**

### **Information to be supplied to the master**

Every new ship shall be supplied with sufficient information with the approved form, enable to arrange for the loading and ballasting of the ship and provided as the guidance for stability information under an international convention for the safety of life at sea under varying conditions of service.

### **Doors**

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 weathertight when closed. 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.

### **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 Regulations 15 and 16 of this Annex.
- (2) Coamings and hatchway covers to exposed hatchways on decks above the superstructure deck shall comply with the requirements of the Administration.

### **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 (23½ inches) if in position 1.

450 millimetres (17½ inches) if in position 2.

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 9

## *Hatchway covers*

- (2) The width of each bearing surface for hatchway covers shall be at least 65 millimetres (2½ inches).
- (3) Where covers are made of wood, the finished thickness shall be at least 60 millimetres (2⅜ 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 or 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 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.

## *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 Regulation 15(1). The height of these coamings may be reduced, or the coamings omitted entirely, on condition that the Administration is satisfied that the safety of the ship is not thereby impaired in any sea conditions. Where coamings are provided they shall be of substantial construction.

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 10

## *Weathertight covers*

- (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 and 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 Regulation 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 to the satisfaction of the Administration.

## *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.

## *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 for not protected shall be specially considered. Access openings in such casings shall be fitted with doors complying with the requirements of Regulation 12(1), the sills of which shall be at least 600 millimetres (23½ 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.

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 11

## *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 Regulation 12(1).
- (3) In position 1 the height above the deck of sills to the doorways in companionways shall be at least 600 millimetres (23½ inches). In position 2 it shall be at least 380 millimetres (15 inches).

## *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 (35½ 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 paragraph (3) of this Regulation, 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

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 12

ventilators to which they are to be fitted. Ventilators in position 1 shall have coamings of a height of at least 900 millimetres (35½ 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.

## *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 (17½ 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.

## *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.

## *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 Regulation 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

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 13

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 connexion with the operation of machinery may be controlled locally. The controls shall be readily accessible and shall be provided with indicators showing whether the valves are open or closed.
- (3) Scuppers and discharge pipes originating at any level and penetrating the shell either more than 450 millimetres (17½ inches) below the freeboard deck or less than 600 millimetres (23½ inches) above the summer load waterline shall be provided with a non-return valve at the shell. This valve, unless required by paragraph (1), 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 Regulation 12 shall be led overboard.
- (5) All valves and shell fittings required by this Regulation 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 Regulation refers shall be of steel or other equivalent material to the satisfaction of the Administration.

## *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 (19½ 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.

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 14

## *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 paragraphs (2) and (3) of this Regulation, 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

$$A = 0.7 + 0.035l \text{ m}^2 \text{ (square metres)}$$

where  $l$  exceeds 20 metres

$$A = 0.07l \text{ (square metres)}$$

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

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

$$A = 7.6 + 0.115l \text{ (square feet)}$$

where  $l$  exceeds 66 feet

$$A = 0.23l \text{ (square feet)}$$

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

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.

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 15

- (3) Where a ship is fitted with a trunk which does not comply with the requirements of Regulation 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:

<b>Breadth of hatchway of trunk in relation to the breadth of ship</b>	<b>Area of freeing ports in relation to the total area of the bulwarks</b>
$A = 0.7 + 0.035L \text{ m}^2$	$A = 0.7 + 0.035L \text{ m}^2$
$A = 0.7 + 0.035L \text{ m}^2$	$A = 0.7 + 0.035L \text{ m}^2$

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.

## ***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 (39½ 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

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 16

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 any 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.

## *Special conditions of assignment for Type "A" ships*

### *Machinery casings*

- (1) Machinery casings on Type "A" ships as defined in Regulation 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 Regulation 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.

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 17

## *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.

## **FREEBOARDS**

### *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 waterline, 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:

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 18

- (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°;
  - (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 Regulation 28.

## **Type "B" ships**

- (5) All ships which do not come within the provisions regarding Type "A" ships in paragraphs (2) and (3) of this Regulation 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 Regulation 15(7) or 16 shall, except as provided in paragraphs (7) to (10) inclusive of this Regulation, be assigned freeboards based on Table B of Regulation 28.
- (7) Any Type "B" ships of over 100 metres (328 feet) in length may be assigned freeboards less than those required under paragraph (6) of this Regulation 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 Regulation 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.

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 19

For the guidance of Administrations in applying sub-paragraphs (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 paragraph (7) of this Regulation, the values from Table B of Regulation 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 paragraph (8) of this Regulation may be increased up to the total difference between the values in Table A and those in Table B of Regulation 28 on condition that the ship complies with the requirements of Regulation 26(1), (2), (3), (5) and (6), as if it were a Type "A" ship, and further complies with the provisions of paragraph (7)(a) to (d) inclusive of this Regulation except that the reference in sub-paragraph (d) to the flooding of any single damaged compartment shall be treated as a reference 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 Regulation 15, other than paragraph (7), shall be assigned freeboards based upon the values given in Table B of Regulation 28 increased by the values given in the *freeboard* table.

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 20

## *Correction to the freeboard for ships under 100 metres (328 feet) 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:

$$7.5 (100 - L) (0.35 - \frac{E}{L}) \text{ mm}$$

where L = length of ship in metres,

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

$$0.09 (328 - L) (0.35 - \frac{E}{L}) \text{ inches}$$

where L = length of ship in feet,

E = effective length of superstructure in feet as defined in Regulation 35.

## *Correction for block coefficient*

Where the block coefficient ( $C_b$ ) exceeds 0.68, the tabular freeboard specified in Regulation 28 as modified, if applicable, by Regulations 27(8), 27(10) and 29 shall be multiplied by the factor  $\frac{C_b + 0.68}{1.36}$

## *Correction for depth*

(1) Where D exceeds  $\frac{L}{15}$  the freeboard shall be increased by

$$(D - \frac{L}{15})R \text{ mm where } R \text{ is } \frac{L}{0.48} \text{ at lengths less than 120 metres and 250 at 120 metres}$$

length and above, or

$$(D - \frac{L}{15})R \text{ inches, where } R \text{ is } \frac{L}{131.2} \text{ y at lengths less than 393.6 feet and 3 at 393.6 feet}$$

length and above.

(2) Where D is less than  $\frac{L}{15}$  no reduction shall be made except in a ship with an enclosed superstructure covering at least  $0.6L$  amidships, with a complete trunk, or combination

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 21

of detached enclosed superstructures and trunks which extend all fore and aft, where the freeboard shall be reduced at the rate prescribed in paragraph (1) of this Regulation.

- (3) Where the height of superstructure of trunk is less than the standard height, the reduction shall be in the ratio of the actual to the standard height as defined in Regulation 33.

### *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.

### *Standard height of superstructure*

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

#### **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

#### **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

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

### *Length of superstructure*

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

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 22

- (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 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.

## *Effective length of superstructure*

- (1) Except as provided for in paragraph (2) of this Regulation, 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 Regulation 3(10), the effective length shall be the length modified by the ratio of  $b/B_s$ , where

$b$  is the breadth of the 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. Where the height exceeds the standard, no increase shall be made to the effective length of the superstructure.
- (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  $0.6L$ . 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.

## *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 Regulations 13 to 16 inclusive and the width

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 23

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  $0.6L$ .
- (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 Regulation 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.

## ***Deduction for superstructures and trunks***

- (1) Where the effective length of superstructures and trunks is  $1.0L$ , 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

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 24

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 1.0L the deduction shall be a percentage obtained from one of the following tables:

***Percentage of deduction for Type "A" ships***

	<b>Total effective length of superstructures and trunks</b>										
	0	0.1L	0.2L	0.3L	0.4L	0.5L	0.6L	0.7L	0.8L	0.9L	1.0L
Percentage of deduction for all types of superstructures	0	7	14	21	31	41	52	63	75.3	87.7	100

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

***Percentage of deduction for Type "B" ships***

	<b>Total effective length of superstructures and trunks</b>										
	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 bridge	0	5	10	15	23.5	32	46	63	75.3	87.7	100
Ships with forecastle and detached bridge	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 0.2L, the percentages shall be obtained by linear interpolation between lines I and II.
  - (b) Where the effective length of a forecastle is more than 0.4L, the percentages shall be obtained from line II.
  - (c) Where the effective length of a forecastle is less than 0.07L, the above percentages shall be reduced by:



# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 25

Where  $f$  is the effective length of the forecastle.

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

## *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  $1/6L$  and  $1/3L$  from each perpendicular shall be increased by  $0.444Z$  and  $0.111Z$  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 Regulation.

### *Standard sheer profile*

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

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 26

*Standard sheer profile (Where L is in metres)*

	Station	Ordinate (mm)	Factor
<b>After half</b>	After perpendicular	$25(\frac{L}{3} + 10)$	1
	$\frac{1}{6} L$ from A.P.	$11.1(\frac{L}{3} + 10)$	3
	$\frac{1}{3} L$ from A.P.	$2.8(\frac{L}{3} + 10)$	3
	Amidships	0	1
<b>For-ward half</b>	Amidships	0	1
	$\frac{1}{3} L$ from F.P.	$5.6(\frac{L}{3} + 10)$	3
	$\frac{1}{6} L$ from F.P.	$22.2(\frac{L}{3} + 10)$	3
	Forward perpendicular	$50(\frac{L}{3} + 10)$	1

	Station	Ordinate (mm)	Factor
<b>After half</b>	After perpendicular	$25(\frac{L}{3} + 10)$	1
	$\frac{1}{6} L$ from A.P.	$11.1(\frac{L}{3} + 10)$	3
	$\frac{1}{3} L$ from A.P.	$2.8(\frac{L}{3} + 10)$	3
	Amidships	0	1
<b>For-ward half</b>	Amidships	0	1
	$\frac{1}{3} L$ from F.P.	$5.6(\frac{L}{3} + 10)$	3
	$\frac{1}{6} L$ from F.P.	$22.2(\frac{L}{3} + 10)$	3
	Forward perpendicular	$50(\frac{L}{3} + 10)$	1

**Standard sheer profile** (where L is in feet)

*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

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 27

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% of the standard, credit shall be allowed for the part in excess; where the after part is less than 50% of the standard no credit shall be given for the excess sheer forward. Where the after sheer is between 50% and 75% 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:

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

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

$Y$  = 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  $0.5L$ ,

$L$  = length of ship as defined in paragraph 33(1) of this annex.

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 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 this paragraph (13)) shall be added to the freeboard.

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 28

## *Deduction for excess sheer*

- (15) In ships where an enclosed superstructure covers 0.1L before and 0.1L abaft amidships, the correction for excess of sheer as calculated under the provisions of this sub -paragraph (13) 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 0.1L before and 0.1L abaft amidships, the deduction shall be obtained by linear interpolation. The maximum deduction for excess sheer shall be at the rate of 125 mm per 100 m of length (1± inches per 100 feet of length).

## **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 m in length,

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

for ships of 250 m and above in length,

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

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 below 820 above feet in length,

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% 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 0.07L abaft the forward perpendicular, and it shall comply with the following requirements:

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 29

- (a) for ships not over 100 m (328 feet) in length it shall be enclosed as defined in paragraph 3(10), and
  - (b) for ships over 100 m (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.

## ***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 paragraphs 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 mm (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 mm (6 inches).

### ***Tropical freeboard***

- (3) The minimum freeboard in the Tropical Zone shall be the freeboard obtained by a deduction from the summer freeboard of one forty-eighth of the summer draught measured from the top of the keel to the centre of the ring of the load line mark.
- (4) 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 mm (2 inches). For ships having in position 1 hatchways with covers which do not comply with the requirements of paragraphs 15(7), 16 or 26, the freeboard shall be not less than 150 mm (6 inches).

### ***Winter freeboard***

- (5) The minimum freeboard in winter shall be the freeboard obtained by an addition to the summer freeboard of one forty-eighth of summer draught, measured from the top of the keel to the centre of the ring of the load line mark.

# Policy for the Implementation of International Load Lines

Operational Procedure : QOP- 72 - 01- (05)

Revision: 0

Page 30

## *Winter North Atlantic freeboard*

- (6) The minimum freeboard for ships of not more than 100 m (328 feet) in length which enter any part of the North Atlantic defined in paragraph 52 (annex II) during the winter seasonal period shall be the winter freeboard plus 50 mm (2 inches). For other ships, the Winter North Atlantic freeboard shall be the winter freeboard.

## *Fresh water freeboard*

- (7) The minimum freeboard in fresh water of unit density shall be obtained by deducting from the minimum freeboard in salt water:

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

where  $\nabla$  = displacement in salt water in tons at the summer load waterline

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

- (8) Where the displacement at the summer load water line 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.