

Uniform Shipping Laws Code 2008

Section 5D: Construction - Watertight subdivision of Class 2 and Class 3 Vessels (CTH, NSW, NT, QLD, SA, TAS, VIC & WA)

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SUB-SECTION D

Watertight subdivision of Class 2 and Class 3 Vessels

This section is divided into Parts, as follows:

- Part I: Class 2 and Class 3 vessels 35 metres and over in measured length
- Part II: Class 2 and Class 3 vessels of less than 35 metres in measured length
- Part III: Special Provisions Applicable to Class 2 Vessels not subject to the provisions of the Load Lines Section and Class 3 Vessels other than vessels to which Part IV applies
- Part IV: Modifications applicable to Class 2B and Class 2C vessels less than 16 metres in measured length, Class 3B and Class 3C vessels less than 20 metres in measured length, Class 2D, Class 2E, Class 3D and Class 3E vessels
- Part V: Provisions applicable to all Class 2 and Class 3 vessels

Part I - Class 2 and Class 3 Vessels 35 metres and over in measured length**D.1 Number and disposition of transverse bulkheads**

- D.1.1 All vessels shall have a collision bulkhead situated not less than 0.05L, nor more than 0.075L, from the fore end of the load waterline as defined in A 4.8, an after peak bulkhead enclosing the stern tube in a watertight compartment and a bulkhead at each end of the machinery space.
- D.1.2 Additional bulkheads shall be fitted so that the total number of bulkheads is in accordance with the following Table:

Length (L)	Total Number of bulkheads	
	Machinery amidships	Machinery aft*
less than 65 metres	4	3
65 metres and over but less than 85 metres	4	4
85 metres and over but less than 105 metres	5	5
105 metres and over but less than 115 metres	6	5
115 metres and over but less than 125 metres	6	6
125 metres and over but less than 145 metres	7	6
145 metres and over but less than 165 metres	8	7
165 metres and over but less than 190 metres	9	8
190 metres and over	Subject to special consideration	

* After peak bulkhead forming the after boundary of the engine room.

- D.1.3 The bulkheads in the holds shall be spaced at reasonably uniform intervals. Where this is departed from the transverse strength of the vessel is to be maintained.
- D.1.4 Consideration may be given to proposals to dispense with one or more of the required bulkheads if they interfere with the requirements of a special trade, subject to suitable structural compensation.

D.2 Height of bulkheads

- D.2.1 The collision bulkhead is to extend to the uppermost continuous deck.
- D.2.2 The after peak bulkhead may terminate at the first deck above the load waterline, provided that deck is made watertight to the stern or to a watertight transom floor.
- D.2.3 The remaining bulkheads are to extend to the uppermost continuous deck except where the draught is not greater than that permitted with a superstructure extending for the full length of the vessel above the second deck, when the bulkheads may terminate at that deck provided it lies above the load waterline.

D.3 Double bottom

- D.3.1 A vessel the length of which is 50 metres or more but less than 61 metres shall be fitted with a watertight double bottom extending from the machinery space to, or as near as is practicable to, the collision bulkhead.
- D.3.2 Subject to the next succeeding sub-clause, a vessel the length of which is 61 metres or more shall be fitted with a watertight double bottom extending from, or from as near as is practicable to, the collision bulkhead to, or as near as is practicable to, the afterpeak bulkhead.
- D.3.3 The last preceding sub-clause does not require a double bottom to be fitted in the machinery space of a vessel the length of which is less than 75 metres.

D.4 Inner bottom of double bottom

D.4.1 Where a double bottom is fitted to a vessel in pursuance of the last preceding clause its depth shall not be less than that determined by the formula and its inner bottom shall be continued out to the sides of the vessel in such a manner as to protect the vessel to the turn of the bilge.

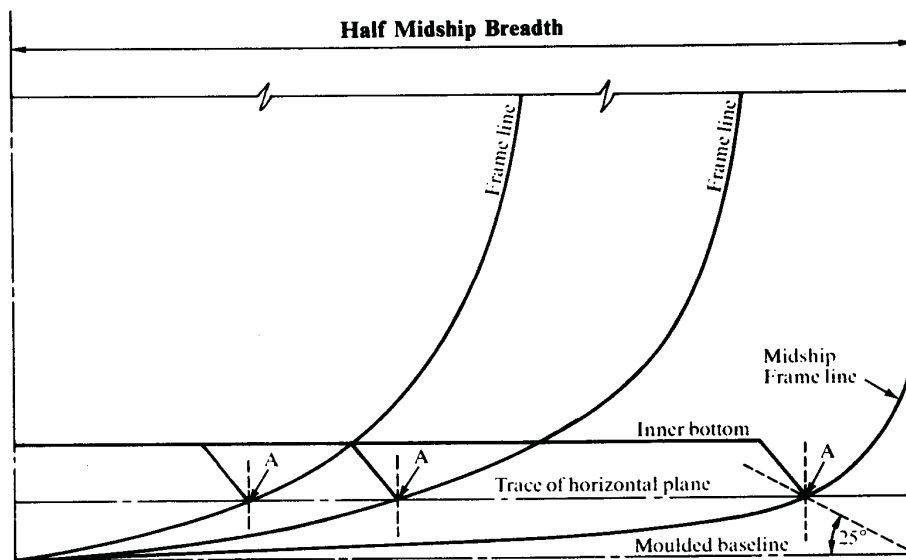
The depth of the centre girder shall be not less than

$$32 B + 190 \sqrt{d} \text{ mm}$$

where B = greatest moulded breadth m.

d = draft for scantlings m.

D.4.2 The inner bottom shall be deemed to comply with the last preceding sub-clause if the line of intersection of the outer edge of the margin plate of the inner bottom with the shell plating of the vessel is not lower at any point than a horizontal plane passing through the point of intersection of the frame line amidships with a line inclined at an angle of twenty-five degrees to the base line amidships and cutting that base line at a point one half of the vessel's moulded breadth from the middle line. See Figure 1.



Intersection of outer edge of margin plate with bilge plating not to be lower than A.A.A.

Figure 1

D.5 Well not be constructed in double bottom

D.5.1 Subject to sub-clause D.5.3, a well shall not be constructed in a double bottom fitted to a vessel in pursuance of this Sub-section unless the Authority exempts the vessel from the requirements of this sub-clause.

D.5.2. The Authority shall not exempt a vessel from the requirements of the last preceding sub-clause unless it is satisfied that the protection given to the vessel by the double bottom will not be diminished by reason of the exemption.

D.5.3 A well may be constructed in the double bottom of a vessel for the purposes of drainage in the after end of the shaft tunnel, if the vessel is a screw vessel and in any other position, if –

- (a) the well is not larger, and does not extend downwards further, than is necessary for that purpose;
- (b) the depth of the well is not, except in the case of a well at the after end of the shaft tunnel, more than the depth less 457 mm of the double bottom at the centreline; and
- (c) the well does not, except in the case of a well at the after end of the shaft tunnel, extend below the horizontal plane referred to in sub-clause D.4.2.

D.6 Double bottom not required

D.6.1 Nothing in this Sub-section requires a double bottom to be fitted in a part of a vessel in way of a watertight compartment used exclusively for the carriage of liquids if, in the event of bottom or side damage to that part of the vessel, the safety of the vessel will not be impaired by reason of the absence of the double bottom.

D.7 Openings in watertight bulkheads

D.7.1 The number of openings in watertight bulkheads shall be kept to the minimum compatible with the general arrangement and operational needs of the vessel.

D.7.2 A manhole may be fitted in a collision bulkhead provided it is located as high as practicable, is suitably compensated and closed with a bolted watertight cover.

D.7.3 If a pipe, scupper, electric cable or other equipment is carried through a watertight bulkhead it shall be located as high as is practicable and such provisions as are necessary to ensure that the bulkhead is watertight shall be made.

D.7.4 Where the Authority determines, a trunkway installed in connection with a ventilator or with a control or other system may be carried through a watertight bulkhead. The trunkway shall be located as high as is practicable in the bulkhead, be watertight over its entire length, be of equivalent strength to the bulkhead and have its upper opening not less than 4.3 metres above the weather deck or enclosed by a weathertight superstructure or deckhouse.

D.7.5 Heat-sensitive materials shall not be used in a system which penetrates a watertight bulkhead if deterioration in that system in event of a fire would impair the watertightness of the bulkhead.

D.8 Door in watertight bulkheads

D.8.1 Watertight doors, in watertight bulkheads which may, in the normal working of the vessel, be required to be open at sea shall be sliding doors.

D.8.2 The sliding doors shall be of steel or, if the Authority has approved of the bulkhead being of another material may be of the same material as that approved for the bulkhead and shall be so constructed that when closed the watertight integrity of the bulkhead will not be impaired.

D.8.3 A sliding door may have a horizontal or vertical motion and shall be provided with a hand-operated mechanism capable of being operated from each side of the opening and from an accessible position above the bulkhead deck.

D.8.4 Where a sliding door is fitted in a machinery space bulkhead the gear by which the door can be operated from above the bulkhead deck shall, unless the Authority otherwise approves, be situated outside the machinery space.

D.8.5 An access opening in a watertight shaft tunnel shall be fitted with a watertight sliding door which may be of the same material as the material of the shaft tunnel and the door shall be capable of being operated from both sides of the opening.

D.8.6 Where a sliding door is capable of being operated from a position above the bulkhead deck, means to indicate whether the door is opened or closed shall be provided at the place from which the door may be so operated.

D.8.7 Where a sliding door is capable of being power-operated, the control for the operating mechanism shall be connected to a warning device which upon any movement of the control will give an audible warning at the door.

D.8.8 A sliding door shall be so fitted that it is capable of being operated when the vessel is at an adverse list of 15 degrees.

D.9 Openings-generally

D.9.1 The number of openings, and the number of each class of opening in the shell plating of a vessel below the bulkhead deck shall be the minimum compatible with the design and proper working of the vessel.

D.9.2 Such an opening shall be provided with a watertight covering, or other device, by means of which the opening may be closed and made watertight.

D.9.3 In this clause 'opening' includes a side scuttle (whether opening or non-opening), a port, a scupper and a sanitary discharge opening.

D.10 Side scuttles

- D.10.1 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.
- D.10.2 A side scuttle shall not be fitted in such a position 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 or 500 mm above the load waterline, whichever is the greater distance.
- D.10.3 Side scuttles, their glasses and deadlights shall comply with the requirements of British Standard MA24.
- D.10.4 Where an opening in a superstructure deck or in the top of a deckhouse on the freeboard deck which gives access to a space below the freeboard deck or to a space within an enclosed superstructure is protected by an efficient deckhouse fitted with side scuttles, only those side scuttles that give direct access to an open stairway shall be fitted with deadlights in accordance with this clause.

D.11 Discharges, inlets and scuppers

- D.11.1 Subject to sub-clause D.11.6 each discharge 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 sub-clauses 6.1 and 6.2 of the Load Lines Section shall be fitted with efficient and accessible means for preventing water from passing inboard.
- D.11.2 Subject to sub-clause D.11.4 and D.11.5, the means for preventing water from passing inboard referred to in sub-clause D.11.1 shall consist of one automatic non-return valve with a positive means of closing it from a position above the freeboard deck in respect of each separate discharge.
- D.11.3 The means for closing the valve referred to in sub-clause D.11.2 shall be readily accessible at all times under service conditions and shall be provided with an indicator showing whether the valve is open or closed.
- D.11.4 Where the vertical distance from the summer load waterline to the inboard end of a discharge pipe referred to in sub-clause D.11.1 exceeds 1 per cent of the length of the vessel, 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.
- D.11.5 Where the vertical distance from the summer load waterline to the inboard end of a discharge pipe referred to in sub-clause D.11.1 exceeds 2 per cent of the length of the vessel, the discharge may have a single automatic non-return valve without positive means of closing.
- D.11.6 Where a discharge associated with the operation of machinery is connected to a ship side discharge valve that is located within the machinery space and is readily accessible at all times, the provisions of sub-clauses D.11.1 to D.11.5 inclusive do not apply to the discharge.
- D.11.7 In manned machinery spaces, main and auxiliary sea inlets and discharges in connection with the operation of machinery may be controlled locally and, if they are controlled locally, the controls shall be readily accessible and provided with indicators showing whether the valves are open or closed.
- D.11.8 In a machinery space which may be unmanned for any period during the normal operation of the vessel at sea-
 - (a) the main and auxiliary sea inlets and discharges in connection with the operation of machinery in the spaces may be controlled locally and, if they are controlled locally, the controls shall be readily accessible and provided with indicators showing whether the valves are open or closed; and
 - (b) the machinery space shall be fitted with an efficient warning device to give warning at the position where the machinery is being monitored or controlled, of an entry of water into the machinery space other than water resulting from the normal operation of the machinery.
- D.11.9 Scuppers and discharge pipes originating at any level and penetrating the shell either more than 450 mm below the freeboard deck or less than 600 mm above the summer load waterline shall be provided with a non-return valve at the shell.
- D.11.10 The provisions of sub-clause D.11.9 do not apply to a scupper or discharge pipe-
 - (a) where the discharge pipe is associated with the operation of machinery and is connected to a ship side discharge valve that is located within the machinery space and that valve is readily accessible at all times; or

- (b) except in the case of a discharge referred to in sub-clauses D.11.1 to D.11.6 inclusive, where the piping is of a thickness not less than:

$$\frac{\text{Diameter of pipe in mm}}{24} + 6.5\text{mm}$$

but need not exceed 12.5mm.

- D.11.11 Scuppers leading from superstructures or deckhouses not fitted with doors complying with the requirements of sub-clauses 6.1 and 6.2 of the Load Lines Section shall be led overboard.
- D.11.12 All shell fittings and valves required by this clause shall be of steel, bronze or other approved ductile material and shall not be of ordinary cast iron.
- D.11.13 All pipes referred to in this clause shall be of steel or other equivalent material.

D.12 Bolts connecting fittings to shell plating

- D.12.1 A bolt which connects a cock, valve, discharge or inlet pipe, or other similar equipment to the shell plating of a vessel below the bulkhead deck of the vessel shall-
- (a) have its head outside the shell plating of the vessel; and
- (b) be either countersunk or cup-headed.

D.13 Watertight decks to be drained

- D.13.1 A drainage system shall be provided for the drainage of each watertight deck of a vessel below the bulkhead deck of the vessel and, where drainage pipes are used for that purpose, they shall be so fitted with valves, or otherwise so constructed, as to prevent the passage of water from one to another of the watertight compartments into which the vessel is sub-divided in pursuance of this Sub-section.

D.14 Rubbish-chutes

- D.14.1 The inboard opening of a rubbish-chutes or other similar chute in a vessel shall be fitted with-
- (a) a watertight cover; and
- (b) where the opening is below the bulkhead deck of the vessel-an automatic non-return valve in a readily accessible position above the deepest load waterline of the vessel.
- D.14.2 The valve referred to in the last preceding sub-clause shall be of a horizontal balanced type which is normally closed and shall be provided with a control at the valve for securing it in a closed position.

D.15 Ports

- D.15.1 Where a gangway port or cargo port is fitted below the bulkhead deck of a vessel
- (a) the port shall be of adequate strength; and
- (b) the lowest point of the port shall be above the deepest load waterline of the vessel.

Part II - Class 2 and Class 3 vessels of less than 35 metres in measured length

D.16 Number and disposition of transverse bulkheads

- D.16.1 All vessels 12.5 metres and over in measured length shall have 2 machinery space bulkheads, except that where the machinery space is located at one end of the vessel then only the after or forward machinery space bulkhead as appropriate need be provided. In the case of sailing vessels with small machinery spaces, those spaces may be protected with partial transverse and longitudinal bulkheads forming an enclosure in lieu of the transverse bulkheads required above, provided that a collision bulkhead is fitted in accordance with provision D.16.2 (i).
- D.16.2 All vessels of 16 metres in measured length and over, and under 25 metres measured length, shall be provided with bulkheads as follows:
- (i) (a) where the rake of the stem does not exceed 15° the collision bulkhead shall be located not less than 5 percent of the length or 750 mm whichever is the greater and not more than 15 percent of the length abaft the stem at the waterline assumed in sub-clause 3.16 of the Load Lines Section.
 - (b) where the rake of the stem exceeds 15° a stepped collision bulkhead may be fitted, the bulkhead to the step shall be positioned not less than 5 percent of the length abaft the stem at the load waterline, the top of the step shall be not less than 2.5 percent of the length above the load waterline and the continuation of the bulkhead to the bulkhead deck shall be positioned at a distance not less than 1.5 percent of the length abaft the stem measured at the top of the step.
 - (ii) Bulkheads at each end of the machinery space, provided that, where the machinery space is situated immediately aft of the collision bulkhead the after bulkhead only need be provided, and when the machinery space is at the extreme after end of the vessel the forward bulkhead only need be provided.
- D.16.3 All vessels of 25 metres in length and over, and under 35 metres in length, shall, in addition to being provided with the bulkheads specified in D.16.2 be provided with an after bulkhead forward of the rudder stock. The bulkhead shall extend to the first deck above the load waterline.

D.17 Openings in watertight bulkheads

- D.17.1 The number of openings in watertight bulkheads shall be kept to the minimum compatible with the general arrangement and operational needs of the vessel.
- D.17.2 The openings shall be fitted with approved closing appliances. Watertight doors shall be of equivalent strength to the adjacent unpierced structure.
- D.17.3 Subject to the next succeeding sub-clauses D.17.4, D.17.5 watertight doors shall not be fitted in the collision bulkhead below the weather deck.
- D.17.4 A manhole may be provided in the collision bulkhead provided it is located as high as practicable, is suitably compensated, and fitted with a bolted watertight cover.
- D.17.5 Watertight doors may be of the hinged type, which shall be capable of being operated locally from either side of the door.
- D.17.6 Hinged doors shall be marked on each side, in bold and permanent lettering-'THIS DOOR TO BE KEPT CLOSED AND SECURED'.
- D.17.7 Sliding watertight doors shall be capable of being operated when the vessel is listed 15 degrees either way.
- D.17.8 Sliding watertight doors whether manually operated or otherwise shall be capable of being operated locally from both sides of the door. Where the doors are capable of being operated by remote control means shall be provided at the remote operating positions to indicate when each door is open or closed.

Part III - Special provisions applicable to Class 2 vessels not subject to the provisions of the Load Lines Section and Class 3 vessels other than vessels to which Part IV applies

D.18 Watertight integrity

- D.18.1 Openings through which water can enter a vessel shall be provided with closing devices in accordance with the applicable provisions of this Sub-section.
- D.18.2 All hatches exposed to the weather shall be of weathertight construction.
- D.18.3 Deck openings which may be open during fishing or other operations carried out at sea shall be arranged near to the centreline.
- D.18.4 Fish flaps on stern trawlers shall be flush, watertight, power operated and capable of being closed from an adjacent position on the deck. Stern trawlers having a ramp or slip shall be fitted with a wave trap or door to prevent water flooding the deck.

D.19 Weathertight doors

- D.19.1 All access openings in bulkheads of enclosed superstructures and other outer structures through which water could enter and endanger the vessel shall be fitted with doors permanently attached to the bulkhead, framed and stiffened so that the whole structure is of equivalent strength to the unpierced structure, and weathertight when closed. The means for securing the 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.
- D.19.2 Doors in deckhouses or superstructures giving access to spaces below the weather deck where those access ways are not fitted with coamings as required by sub-clause D.20.1 shall be of substantial construction and strongly attached to the deckhouse or superstructure and so framed stiffened and fitted that the whole structure of which they are part is of equivalent strength to the unpierced structure. They shall be capable of being closed weathertight.
- D.19.3 The height of door sills in deckhouses or superstructures from inside which there is access to below the deck level shall not be less than given in the following table:

<i>Measured length (metres)</i>	<i>Sill height (millimetres)</i>
less than 12.5	200
12.5 or over but less than 20	300
20 or over but less than 30	450
30 and over	600

D.20 Hatchway coamings

- D.20.1 Hatchway coamings shall be of substantial construction of equivalent strength to the deck or deckhead on which they are mounted. The height of the coaming above the deck shall be not less than that given in the table below:

	<i>Measured length</i>			
	<i>less than 12.5m</i>	<i>12.5 m and over but less than 20m</i>	<i>20m and over but less than 30m</i>	<i>30m and over</i>
Cargo hatches on weatherdeck	200	300	450	600
Hatches in weatherdeck giving direct access to machinery or accommodation spaces below deck	200	300	450	600

Hatches in weatherdeck providing direct access to machinery or accommodation spaces below the weatherdeck from inside deckhouses fitted with sills as provided in sub-clause D.19.3 or superstructures	nil	nil	nil	nil
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- D.20.2 The height of hatch coamings specified in sub-clause D.20.1 may be reduced where compliance with the requirements of that sub-clause is not reasonably practicable, provided that the hatches are:
- (a) situated within the mid half beam of the vessel
 - (b) of a width less than half the beam of the vessel
 - (c) closed with efficient weathertight covers of steel or other equivalent material fitted with gaskets and clamping devices and capable of being rapidly closed and battened down, and
 - (d) the Authority is satisfied that the safety of the vessel in the service sea conditions will not be impaired by so doing.

D.21 Hatchways closed by wood covers

- D.21.1 The finished thickness of wooden hatch covers shall be at least 4 mm for each 100 mm of unsupported span subject to a minimum of 40 mm and the width of their bearing surface shall be at least 65 mm.
- D.21.2 Arrangements acceptable to the Authority shall be provided for securing wood hatch covers weathertight.

D.22 Hatchways closed by covers other than wood

- D.22.1 For the purpose of strength calculations it shall be assumed that hatchway covers are subjected to the weight of cargo intended to be carried on them or to the following static loads, whichever is the greater:
- (i) 0.75 tonnes per square metre for vessels of 18 metres in length or less;
 - (ii) 1.0 tonnes per square metre for vessels of 24 metres in length;
 - (iii) 1.75 tonnes per square metre for vessels of 100 metres in length and over.

For intermediate lengths the load values shall be determined by linear interpolation.

The loads may be reduced to not less than 75 per cent of the above values for covers to hatchways situated on the superstructure deck in a position abaft a point located 25 per cent of the vessel's length from the forward perpendicular.

- D.22.2 Where covers are made of mild steel the maximum stress calculated according to D.22.1 multiplied by 4.25 shall not exceed the minimum ultimate strength of the material. Under these loads the deflections shall be not more than 0.0028 times the span.
- D.22.3 The strength and stiffness of covers made of materials other than mild steel shall be equivalent to those of mild steel.
- D.22.4 Covers shall be fitted with approved clamping devices and gaskets sufficient to ensure weathertightness.

D.23 Machinery space openings

- D.23.1 Machinery space openings shall be framed and enclosed by casings of equivalent strength to the superstructure. External access openings therein shall be fitted with doors complying with the requirements of clause D.19.
- D.23.2 Openings other than access openings shall be fitted with covers of equivalent strength to the unpierced structure, permanently attached thereto and capable of being closed weathertight.

D.24 Other deck openings

- D.24.1 Where it is essential for fishing or other operations, flush deck scuttles of the screw, bayonet or equivalent type may be fitted provided they are capable of being closed weathertight and are permanently attached to the adjacent structure. Having regard to the size and disposition of the openings and the design of the closing devices, metal to metal closures may be fitted if the Authority is satisfied that they are effectively weathertight.

- D.24.2 Openings other than hatchways, machinery space openings, manholes and flush scuttles on the weather or superstructure deck shall be protected by enclosed structures fitted with weathertight doors or their equivalent. Companionways should be situated as close as practicable to the centreline of the vessel.

D.25 Ventilators

- D.25.1 The height above deck of ventilator coamings, shall be as follows:

<i>Measured length</i>	<i>Height above deck of ventilator coaming</i>	
	<i>On weather deck (mm)</i>	<i>On super-structure deck (mm)</i>
less than 25 metres	600	375
25 metres and over but less than 45 metres	760	450
45 metres and over	900	760

Ventilators shall be of substantial construction and of equivalent strength to the structure to which they are attached and shall be capable of being closed weathertight by devices permanently attached to the ventilator or adjacent structure provided that closing appliances need not be fitted to ventilators:

- (a) Where the length of the vessel is less than 10 metres and the vessel is a Class C vessel.
- (b) Where the length of the vessel is less than 15 metres and the height of the ventilator is not less than 1.0 metres above the weather deck and positioned not more than 0.25 of the moulded breadth from the centreline of the vessel.
- (c) Where the length of the vessel is less than 25 metres and the height of the ventilator is not less than 2.0 metres above the weather deck and positioned not more than 0.25 of the moulded breadth from the centre line of the vessel.
- (d) Where the height of the ventilator exceeds 4.5 metres above the weather deck.

Wood plugs and canvas covers, or equally effective closing appliances may be used on all Class C vessels less than 15 metres.

Where the coaming of any ventilator exceeds 900 mm in height it shall be specially supported.

D.26 Air Pipes

- D.26.1 Where air pipes to tanks and other spaces extend above the weather or superstructure deck the exposed parts of the pipes shall be of substantial construction. Where the diameter of the pipe exceeds 30 mm bore the pipe shall be provided with efficient means of closing watertight permanently attached to the pipe or adjacent structure.
- D.26.2 The height of air pipes above deck to the point where water may have access below shall be at least 760 mm on the weatherdeck and at least 450 mm on the superstructure deck. The Authority may allow reduction of the height of an air pipe to avoid interference with fishing or similar operations.

D.27 Side Scuttles and Skylights

- D.27.1 Side scuttles to spaces below the weather deck shall be fitted with hinged deadlights capable of being closed watertight.
- D.27.2 A side scuttle shall be fitted in a position such that its sill is above a line drawn parallel to the weather deck having its lowest point 500 mm above the load water line.
- D.27.3 Side scuttles glasses and deadlights shall comply with the requirements of British Standard MA24.
- D.27.4 Subject to sub-clause D27.5 skylights leading to spaces below the weather deck shall be fitted with hinged metal covers capable of being closed weathertight by means of gaskets and suitable clamping devices.
- D.27.5 Skylights leading to spaces below the weather deck, other than machinery spaces, may be fitted without deadlights if the skylights have a glazing material having sufficient strength to withstand the following appropriate assumed loads:

- (a) where the skylight is in position 1
 - (i) 1.75 tonnes per square metre for vessels of 100 metres measured length or over;
 - (ii) 1.00 tonnes per square metre for vessels of 16 metres measured length or over but less than 24 metres measured length; or
 - (iii) for vessels of 24 metres measured length or over but less than 100 metres measured length the appropriate assumed load is to be obtained by linear interpolation.
- (b) when the skylight is in position 2
 - (i) 1.30 tonnes per square metre for vessels of 100 metres measured length or over;
 - (ii) 0.75 tonnes per square metre for vessels of 16 metres measured length or over but less than 24 metres measured length; or
 - (iii) for vessels of 24 metres measured length or over but less than 100 metres measured length the appropriate assumed load is to be obtained by linear interpolation.

D.27.6 Deadlights are not required on fixed side scuttles and fixed skylights for vessels operating solely in smooth and partially smooth waters.

D.28 Scuppers, inlets and discharges

D.28.1 All sea inlets are to be fitted with valves of steel or material of equivalent strength direct to the hull or approved skin fittings.

D.28.2 Scuppers and discharge pipes which pass through the side of the vessel shall comply with the following:

Scupper and discharge pipes, excluding machinery exhaust systems, shall be fitted with valves or cocks in an easily accessible position against the vessel's side, except where approved bilge alarms are fitted. Such valves or cocks shall not be required in the case of a discharge not exceeding 50 mm internal diameter, the lowest point of which is not less than 225 mm above the load waterline. Waste and soil discharges greater than 50 mm internal diameter from spaces above the freeboard deck which are led through the vessel's side more than 225 mm above the designed load waterline may be fitted with an automatic non-return valve in lieu of a valve or cock.

Main propulsion machinery exhaust systems shall be fitted with an approved hull fitting the lower edge of which shall be as high as practicable above the load waterline.

Such systems may pass through watertight bulkheads aft of the machinery space provided that:

- (a) the system is passed through the bulkhead or bulkheads as close to the underside of the weather deck as practicable;
- (b) an approved bulkhead fitting is provided at each watertight bulkhead through which the system passes.

Auxiliary propulsion machinery exhaust systems shall be fitted with an approved hull fitting the lower edge of which shall be as high as practicable but not less than 225 mm above the summer load waterline but shall not pass through watertight bulkheads without the approval of the Authority.

D.29 Freeing ports

D.29.1 Where bulwarks in the weather portion of the weather deck form wells, there shall be provided on each side of the vessel, in each well a minimum freeing port area of:

- (a) Where the vessel is less than 12.5 metres measured length

$$A = \frac{2 \times m \times h}{100}$$

where A = area in square metres
 m = length of well in metres
 h = height of bulwark in metres

- (b) Where the vessel is 12.5 metres and over measured length

$$A = \frac{(1.0 + 3.5h) m \times h}{100}$$

The area A may include:

- (1) openings cut in the transom
- (2) in stern trawlers the apertures under the stern doors.

D.29.2 Freeing ports shall be so arranged throughout the length of the bulwark as to provide an effective means of freeing the deck of water. Lower edges of free ports shall be as near to the deck as is practicable. Freeing ports greater than 230 mm in depth shall be fitted with bars spaced not more than 230 mm apart.

D.29.3 If the Authority considers that the minimum freeing port area ascertained in accordance with D.29.1 is insufficient, then a greater minimum freeing port area shall be provided on each side of the vessel as determined by the Authority.

Part IV - Modifications applicable to Class 2B and Class 2C vessels less than 16 metres in measured length, Class 3B and Class 3C vessels less than 20 metres in measured length, Class 2D, Class 2E, Class 3D and Class 3E vessels

D.30 Openings in deckhouses or superstructures in which there are windows or side scuttles not fitted with hinged deadlights

- D.30.1 Openings in deckhouses or superstructures in which there are windows or side scuttles not fitted with hinged deadlights shall be fitted with doors of substantial construction permanently attached to the deckhouse or superstructure and capable of preventing the ingress of spray. Openings in the after end of such deckhouses and superstructures may have sills not exceeding 100 mm in height. Openings in the sides of such deckhouses and superstructures shall have sills not exceeding 200 mm in height.
- D.30.2 Accessways to spaces below the weatherdeck from inside deckhouses or superstructures referred to in D.30.1 shall be fitted with sills or hatchcoamings as given in Table 1.
- D.30.3 Where the Authority is satisfied that the safety of the vessel in normal sea conditions will not be impaired by so doing weathertight deck plugs or other approved flush closures may be fitted in lieu of coamings and covers.

D.31 Hatchway coamings

- D.31.1 Hatchway coamings shall be of substantial construction of equivalent strength to the deck or deckhead on which they are mounted. The height of the coaming above the deck in millimetres shall be not less than that given in Table 1.

TABLE 1
Height of hatch coamings and door sills

	Class of Vessel	Measured length (m)		
		<12.5	12.5-20	>20
Hatches in weatherdeck giving direct access to machinery or accommodation spaces or to spaces which are required to be opened for loading at sea	B&C	200	300	
	D&E	100	150	250
Hatches in weatherdeck giving direct access to spaces not normally opened at sea	B&C	100	150	
	D&E	100	100	150
Hatches inside non weathertight deckhouses giving direct access to spaces below the weatherdeck and having after doors only	B&C	100	200	
	D&E	100	150	150
Hatches inside non weathertight deckhouses giving direct access to spaces below the weatherdeck and having side doors	B&C	150	200	
	D&E	100	150	200
Sills in access ways to spaces below the weatherdeck inside non weathertight deckhouses	B&C	200	300	
	D&E	100	150	200
Openings in deck heads not less than 1.5 metres above the weatherdeck	B&C	100	150	
	D&E	nil	nil	nil

- D.31.2 The height of the hatch coamings and sill specified in sub-clause D.31.1 may be reduced or omitted where compliance with the requirement of that sub-clause is not reasonably practicable provided that the openings are:
- situated within the mid half beam of the vessel;
 - of a width less than half the beam of the vessel; and
 - the Authority is satisfied that the safety of the vessel in service condition will not be impaired by so doing.

D.32 Hatchways on the weatherdeck closed by wood covers

- D.32.1 The thickness of the cover shall be at least 4 mm for each 100 mm of unsupported span. The cover may be made in the form of an inverted box, the depth of the sides of the box being at least 0.4 times the height of the hatch coaming. The cover shall be secured to the deck by substantial retaining clips.

D.33 Hatchways on the weatherdeck closed by covers other than by wood

The cover should comply with the requirements of clause D22.

D.34 Hatchways on a deckhouse top

Hatchways on a deckhouse top shall be of substantial construction equal in strength to the Strength of the deckhouse top, permanently attached to the deckhouse top and capable of preventing the ingress of spray under normal sea conditions.

D.35 (Withdrawn)

Part V-Provisions applicable to all Class 2 and Class 3 vessels

D.36 Wheelhouse and deckhouse windows

- D.36.1 Wheelhouse windows should be so located as to afford, where practicable, an all round arc of visibility.
- D.36.2 The maximum size of windows to be fitted in wheelhouses and deckhouses of seagoing vessels should not exceed 0.6 m² (and the length to width ratio should not exceed 2 to 1).
- D.36.3 Window openings of wheelhouses and deckhouses shall be fitted with laminated or toughened safety glass.
Wheelhouse window panes shall be of clear glass. Plateglass shall not be used.
- D.36.4 Details of window frames and supporting structure are to be submitted to the Authority for approval.
- D.36.5 Window glasses fitted in rubber or synthetic rubber mouldings are to be afforded continuous internal support against the impact of wind and water.
- D.36.6 Vessels which operate solely within the limits of sheltered waters may have windows fitted in accordance with sub-clause D.36.8 but with 25 percent reduction in the design head values given in Table 2.
- D.36.7 The thickness of glass to be used in the windows of wheelhouses and deckhouses of seagoing vessels shall be determined in accordance with sub-clause D.36.8.
- D.36.8 The thickness of the glass is to be determined from the following formula:
where

$$t = \sqrt{\frac{10\beta Hb^2}{\sigma}} \text{ mm}$$

- t = thickness mm
- β = non-dimensional coefficient determined from Table 1.
- H = design pressure head in metres determined from Table 2 and associated notes
- b = length in mm of the short dimension of the window
- σ = allowable working stress of glass in kPa determined from Table 3.

In no case should the glass thickness fitted be less than 6 mm.

TABLE 1
Values for β and α for aspect ratio $\frac{a}{b}$

(Where a = long dimension of window, b = short dimension of window)										
$\frac{a}{b}$	1.0	1.2	1.4	1.6	1.8	2.0	3.0	4.0	5.0	α
β	.2874	.3762	.4530	.5172	.5688	.6102	.7134	.7410	.7476	.750
α	.0444	.0616	.0770	.0906	.1017	.1110	.1335	.1400	.1417	.1421

TABLE 2
Design Pressure Head

Forward facing 1st tier windows			
<i>L.W.L.</i>	<i>Design Head</i>	<i>L.W.L.</i>	<i>Design Head</i>
(m)	(m)	(m)	(m)
5	0.27	18	1.82
6	0.32	19	2.02
7	0.40	20	2.22

8	0.48	21	2.42
9	0.58	22	2.63
10	0.69	23	2.86
11	0.79	24	3.10
12	0.90	25	3.37
13	1.03	26	3.59
14	1.17	27	3.85
15	1.33	28	4.12
16	1.48	29	4.40
17	1.65	30	4.70

Notes:

1. Design pressure heads for a vessel having a waterline length greater than 30 metres should be determined from Appendix E of British Standard MA25: October 1973, Ships' Windows.
2. Design pressure heads for windows in other positions shall be the following percentages of the design heads given in the Table.

For side and after windows in 1st tier deckhouses 70%. For forward windows in 2nd tier deckhouses 70%. For side and after windows for 2nd tier and for windows in 3rd and higher tier deckhouses 40%.

TABLE 3

Allowable Working Stress (σ) and Young Modulus (E)

Material	σ (kPa)	E (kPa)
Laminated float glass	27.6×10^3	69×10^6
Toughened glass	58×10^3	69×10^6

Deflection (d) determined in accordance with the following formula is not to exceed 1/100 span of short dimension of the pane.

$$d = \frac{10\alpha Hb^4}{Et^3} \text{ mm}$$

- where
- d = deflection in mm
 - α = non-dimensional coefficient determined from Table 1
 - H = design pressure head in metres determined from Table 2 and associated notes
 - b = length in mm of the short dimension of the window
 - E = Young's modulus of the material in kPa determined from Table 3
 - t = thickness of window glass in mm

D.36.9 Window panes of material other than glass shall be specially considered by the Authority.

D.36.10 The following points concerning glazing of the windows are to be observed:

- (a) Toughened glass having chipped edges or surface damage shall not be used.
- (b) Edge clearance must be allowed and insulation shall be used to prevent direct contact between toughened glass and hard materials. In general the edge clearance should be not less than one half the thickness of the glass.
- (c) Windows are to be mounted using suitable resilient gaskets of neoprene rubber or synthetic compounds.
- (d) The support to be afforded in the frames shall not be less than 1.5 times the thickness of glass.