

CHAPTER II - 1 B

Construction – subdivision and stability, machinery and electrical installations

Regulation 1	Intact stability Resolution A.749(18).....	2
Regulation 7	Special requirements concerning ship subdivision (R 7).....	4
Regulation 8	Stability in damaged conditions (R 8)	5
Regulation 8-1	Stability of ro-ro passenger ships in damaged conditions (R 8-1).....	10
Regulation 8-2	Special requirements for ro-ro passenger ships carrying 400 persons or more (R 8-2).....	10
Regulation 8-3	Special requirements for passenger ships, other than ro-ro passenger ships, carrying 400 persons or more	11
Regulation 9	Peak and machinery space bulkheads (R 10).....	11
Regulation 10	Double bottoms (R 12)	12
Regulation 11	Assigning, marking and recording of subdivision load lines (R 13).....	13
Regulation 12	Construction and initial testing of watertight bulkheads, etc. (R 14).....	14
Regulation 13	Openings in watertight bulkheads (R 15)	15
Regulation 14	Ships carrying goods vehicles and accompanying personnel (R 16).....	22
Regulation 15	Openings in the shell plating below the margin line (R 17)	22
Regulation 16	Watertight integrity of passenger ships above the margin line (R 20)	24
Regulation 17	Closure of cargo loading doors (R 20-1)	25
Regulation 17-1	Watertight integrity from the ro-ro deck (bulkhead deck) to spaces below (R 20-2).....	26
Regulation 17-2	Access to ro-ro decks (R 20-3)	27
Regulation 17-3	Closure of bulkheads on the ro-ro deck (R 20-4).....	27
Regulation 18	Stability information (R 22).....	27
Regulation 19	Damage control plans (R 23)	28
Regulation 20	Integrity of the hull and superstructure, damage prevention and control (R 23-2)	28
Regulation 21	Marking, periodical operation and inspection of watertight doors, etc. (R 24)	29
Regulation 22	Entries in log (R 25).....	29
Regulation 23	Hoistable car platforms and ramps	29
Regulation 24	Railings	31
Regulation 25	Hatches, cargo ladders, etc.	32

CHAPTER II - 1 B

Construction – subdivision and stability, machinery and electrical installations

Part B Intact stability, subdivision and damage stability

Regulation 1 Intact stability Resolution A.749(18)

NEW CLASS A, B, C AND D SHIPS:

All classes of new ships shall comply with the relevant provisions for passenger ships of the Code on Intact Stability as adopted on 4 November 1993 by the IMO at the 18th session of its Assembly through Resolution A.749(18).

Where the Danish Maritime Authority considers the application of the Severe Wind and Rolling Criterion of IMO Resolution A.749(18) inappropriate, an alternative approach ensuring satisfactory stability may be applied. This should be supported by evidence to the Danish Maritime Authority which confirms that an equivalent level of safety is achieved.

EXISTING CLASS A AND B SHIPS OF 24 METRES IN LENGTH AND ABOVE:

All existing class A and B ships shall, in all loading conditions, satisfy the following stability criteria after due correction for the effect of free surface of liquids in tanks in accordance with the assumptions of paragraph 3.3 of IMO Resolution A.749(18), or equivalent.

- (a) The area under the curve of righting lever (GZ curve) shall not be less than:
 - (i) 0.055 metre-radians up to an angle of heel of 30°;
 - (ii) 0.09 metre-radians up to an angle of heel of either 40° or the angle of flooding, i.e. the angle of heel at which any openings in the hull, superstructures or deckhouses, being openings that cannot be closed weathertight, are immersed, if that angle be less than 40°;
 - (iii) 0.03 metre-radians between the angles of heel of 30° and 40° or between 30° and the angle of flooding if this angle is less than 40°;
- (b) The righting lever GZ shall be at least 0.20 metre at an angle of heel equal to or greater than 30°.
- (c) The maximum righting lever GZ shall occur at an angle of heel preferably exceeding 30° but not less than 25°.
- (d) The initial transverse metacentric height shall not be less than 0.15 metre.

The loading conditions to be considered in order to verify the compliance with the above stability criteria shall include at least those listed in paragraph 3.5.1.1 of IMO Resolution A.749(18).

All existing ships of classes A and B having a length of 24 metres and over shall also comply with the additional criteria as given in IMO Resolution A.749(18), paragraph 3.1.2.6 (additional criteria for passenger ships) and paragraph 3.2 (Severe Wind and Rolling Criterion).

Where the Danish Maritime Authority considers the application of the Severe Wind and Rolling Criterion of A.749(18) inappropriate, an alternative approach to ensuring satisfactory stability may be applied. This should be supported by evidence to the Danish Maritime Authority which confirms that an equivalent level of safety is achieved.

Regulation 2 Watertight subdivision

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

Every ship shall be subdivided by bulkheads, which shall be watertight up to the bulkhead deck, into watertight compartments the maximum length of which shall be calculated according to the specific requirements given below.

Instead of those requirements, the regulations on subdivision and stability of passenger ships as an equivalent to Part B of Chapter II of the International Convention for the Safety of Life at Sea, 1960, as given in IMO Resolution A.265(VIII) may be used, if applied in their entirety.

Every other portion of the internal structure which affects the efficiency of the subdivision of the ship shall be watertight.

Regulation 3 Floodable length (R 4)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1 The floodable length at a given point is the maximum portion of the length of the ship, having its centre at the point in question, which can be flooded, under the assumption for permeability given below, without the ship being submerged beyond the margin line.
- .2 In case of a ship not having a continuous bulkhead deck, the floodable length at any point may be determined to an assumed continuous margin line which at no point is less than 76 mm below the top of the deck at side to which the bulkheads concerned and the shell are carried watertight.
- .3 Where a portion of an assumed margin line is appreciably below the deck to which bulkheads are carried, the Danish Maritime Authority may permit a limited relaxation in the watertightness of those portions of the bulkheads which are above the margin line and immediately under the higher deck.

Regulation 4 Permissible length of compartments (R 6)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

The maximum permissible length of a compartment having its centre at any point in the ship's length is obtained from the floodable length by multiplying the latter by an appropriate factor called factor of subdivision.

Regulation 5 Permeability (R 5)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

The definite assumptions referred to in regulation 3 relate to the permeability of the spaces below the margin line. In determining the floodable length, the assumed average permeability of the spaces below the margin line shall be as indicated in the table in regulation 8.3.

Regulation 6 Subdivision factor

The factor of subdivision shall be:

FOR NEW CLASS B, C AND D SHIPS AND EXISTING CLASS B RO-RO PASSENGER SHIPS:

1.0 when the number of persons the ship is certified to carry is less than 400,

and 0.5 when the number of persons the ship is certified to carry is 400 or more.

Existing class B ro-ro passenger ships have to comply with this requirement not later than the date of compliance laid down in regulation II-1/B/8-2, paragraph 2.

FOR EXISTING CLASS B NON RO-RO PASSENGER SHIPS:

1.0

**Regulation 7 Special requirements concerning ship subdivision
(R 7)**

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1 Where in a portion or portions of a ship the watertight bulkheads are carried to a higher deck than in the remainder of the ship and it is desired to take advantage of this higher extension of the bulkheads in calculating the floodable length, separate margin lines may be used for each such portion of the ship provided that:
 - .1 the sides of the ship are extended throughout the ship's length to the deck corresponding to the upper margin line and all openings in the shell plating below this deck throughout the length of the ship are treated as being below a margin line, for the purpose of regulation 15; and
 - .2 the two compartments adjacent to the 'step' in the bulkhead deck are each within the permissible length corresponding to their respective margin lines, and, in addition, their combined length does not exceed twice the permissible length based on the lower margin line.
- .2 A compartment may exceed the permissible length determined by the rules of regulation 4 provided the combined length of each pair of adjacent compartments to which the compartment in question is common does not exceed either the floodable length or twice the permissible length, whichever is less.
- .3 A main transverse bulkhead may be recessed provided that all parts of the recess lie inboard of vertical surfaces on both sides of the ship, situated at a distance from the shell plating equal to one fifth of the breadth of the ship, and measured at right angles to the centreline at the level of the deepest subdivision load line. Any part of a recess which lies outside these limits shall be dealt with as a step in accordance with paragraph 6.
- .4 Where a main transverse bulkhead is recessed or stepped, an equivalent plane bulkhead shall be used in determining the subdivision.
- .5 Where a main transverse watertight compartment contains local subdivision and the Danish Maritime Authority is satisfied that, after any assumed side damage extending over a length of 3.0 metres plus 3% of the length of the ship or 11

metres, or 10% of the length of the ship whichever is the less, the whole volume of the main compartment will not be flooded, a proportionate allowance may be made in the permissible length otherwise required for such compartment. In such a case the volume of the effective buoyancy assumed on the undamaged side shall not be greater than that assumed on the damaged side. Allowance under this paragraph will only be made if such allowance is not likely to prevent compliance with regulation 8.

NEW CLASS B, C AND D SHIPS:

- .6 A main transverse bulkhead may be stepped provided that it meets one of the following conditions:
 - .1 the combined length of the two compartments, separated by the bulkhead in question, does not exceed either 90% of the floodable length or twice the permissible length, except that, in ships having a subdivision factor equal to 1, the combined length of the two compartments in question shall not exceed the permissible length;
 - .2 additional subdivision is provided in way of the step to maintain the same level of safety as that secured by a plane bulkhead;
 - .3 the compartment over which the step extends does not exceed the permissible length corresponding to a margin line taken 76 mm below the step.
- .7 In ships of 100 metres in length and upwards, one of the main transverse bulkheads abaft the forepeak shall be fitted at a distance from the forward perpendicular which is not greater than the permissible length.
- .8 If the distance between two adjacent main transverse bulkheads, or their equivalent plank bulkheads, or the distance between the transverse planes passing through the nearest stepped portions of the bulkheads, is less than 3.0 metres plus 3% of the length of the ship, or 11.0 metres, or 10% of the length of the ship, whichever is less, only one of these bulkheads shall be regarded as forming part of the subdivision of the ship.
- .9 Where the required subdivision factor is 0.50, the combined length of any two adjacent compartments shall not exceed the floodable length.

Regulation 8 Stability in damaged conditions (R 8)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1.1 Sufficient intact stability shall be provided in all service conditions so as to enable the ship to withstand the final stage of flooding of any one main compartment which is required to be within the floodable length.
- .1.2 Where two adjacent main compartments are separated by a bulkhead which is stepped under the conditions of regulation 7.6.1, the intact stability shall be adequate to withstand the flooding of those two adjacent compartments.
- .1.3 Where the required factor of subdivision is 0.50, the intact stability shall be adequate to withstand the flooding of any two adjacent compartments.

- .2.1 The requirements of subparagraph .1 shall be determined by calculations which are in accordance with paragraphs .3, .4 and .6 and which take into consideration the proportions and design characteristics of the ship and the arrangement and configuration of the damaged compartments. In making these calculations the ship is to be assumed in the worst anticipated service condition as regards stability.
- .2.2 Where it is proposed to fit decks, inner skins or longitudinal bulkheads of sufficient tightness to seriously restrict the flow of water, proper consideration is to be given to such restrictions in the calculations.

NEW CLASS B, C AND D SHIPS AND EXISTING CLASS B RO-RO PASSENGER SHIPS AND EXISTING CLASS B NON RO-RO PASSENGER SHIPS, CONSTRUCTED ON OR AFTER 29 APRIL 1990:

- .2.3 The stability required in the final condition after damage, and after equalisation where provided, shall be determined as follows:
- .1 The positive residual righting lever curve shall have a minimum range of 15° beyond the angle of equilibrium. This range may be reduced to a minimum of 10°, in the case where the area under the righting lever curve is that specified in subparagraph .2.3.2 multiplied by the ratio 15°/range, where range is expressed in degrees.
 - .2 The area under the righting lever curve shall be at least 0.015 m-rad, measured from the angle of equilibrium to the lesser of:
 - .1 the angle at which progressive flooding occurs;
 - .2 22° (measured from upright) in the case of one-compartment flooding, or 27° (measured from the upright) in the case of the simultaneous flooding of two adjacent compartments.
 - .3 A residual righting lever is to be obtained within the range of positive stability, taking into account the greatest of the following heeling moments:
 - .1 the crowding of all passengers towards one side;
 - .2 the launching of all fully loaded davit-launched survival craft on one side;
 - .3 due to wind pressure;as calculated by the formula:
$$GZ \text{ (metres)} = \frac{\text{heeling moment}}{\text{displacement}} + 0.04$$
However, in no case is the righting lever to be less than 0.10 metres.
- .4 For the purpose of calculating the heeling moments in paragraph .2.3.3 the following assumptions shall be made:
- .1 Moment due to crowding of passengers:
 - .1.1 four persons per square metre;
 - .1.2 a mass of 75 kg for each passenger;
 - .1.3 passengers shall be distributed on available deck areas towards one side of the ship on the decks where

assembly stations are located and in such a way that they produce the most adverse heeling moment.

- .2 Moment due to launching of all fully loaded davit-launched survival craft on one side:
 - .1 all lifeboats and rescue boats fitted on the side to which the ship has heeled after having sustained damage shall be assumed to be swung out fully loaded and ready for lowering;
 - .2 for lifeboats which are arranged to be launched fully loaded from the stowed position, the maximum heeling moment during launching shall be taken;
 - .3 a fully loaded davit-launched life-raft attached to each davit on the side to which the ship has heeled after having sustained damage shall be assumed to be swung out ready for lowering;
 - .4 persons not in the life-saving appliances which are swung out shall not provide either additional heeling or righting moment;
 - .5 life-saving appliances on the side of the ship opposite to the side to which the ship has heeled shall be assumed to be in a stowed position.
- .3 Moments due to wind pressure:
 - .1 class B:
a wind pressure of 120 N/m² to be applied;
classes C and D:
a wind pressure of 80 N/m² to be applied;
 - .2 the area applicable shall be the projected lateral area of the ship above the waterline corresponding to the intact condition;
 - .3 the moment arm shall be the vertical distance from a point at one half of the mean draught corresponding to the intact condition to the centre of gravity of the lateral area.
- .2.4 When major progressive flooding occurs, that is when it causes a rapid reduction in the righting lever of 0.04 metres or more, the righting lever curve is to be considered as terminated at the angle the progressive flooding occurs and the range and the area referred to in .2.3.1 and .2.3.2 should be measured to that angle.
- .2.5 In cases where the progressive flooding is of limited nature that does not continue unabated and causes an acceptably slow reduction in righting lever of less than 0.04 metres, the remainder of the curve shall be partially truncated by assuming that the progressively flooded space is so flooded from the beginning.
- .2.6 In intermediate stages of flooding, the maximum righting lever shall be at least 0.05 metres and the range of positive righting levers shall be at least 7°. In all cases, only one breach in the hull and only one free surface need be assumed.

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .3 For the purpose of making damaged stability calculations the volume and surface permeabilities shall be as follows:

Spaces	Permeability
Appropriated to cargo or stores	60%
Occupied by accommodations	95%
Occupied by machineries	85%
Intended for liquids	0 or 95%, whichever results in more severe requirements

Higher surface permeabilities are to be assumed in respect of spaces which, in the vicinity of the damaged waterplane, contain no substantial quantity of accommodation or machinery and spaces which are not generally occupied by any substantial quantity of cargo or stores.

- .4 Assumed extent of damage shall be as follows:
- .1 longitudinal extent: 3.0 metres plus 3% of the length of the ship, or 11.0 metres or 10% of the length of the ship, whichever is less;
 - .2 transverse extent (measured inboard from the ship's side, at right angles to the centreline at the level of the deepest subdivision load line): a distance of one fifth of the breadth of the ship; and
 - .3 vertical extent: from the base line upwards without limit;
 - .4 if any damage of lesser extent than that indicated in .4.1, .4.2, .4.3 would result in a more severe condition regarding heel or loss of metacentric height, such damage shall be assumed in the calculations.
- .5 Unsymmetrical flooding is to be kept to a minimum consistent with efficient arrangements. Where it is necessary to correct large angles of heel, the means adopted shall, where practicable, be self-acting, but in any case where controls to cross-flooding fittings are provided they shall be operable from above the bulkhead deck. For new class B, C and D ships the maximum angle of heel after flooding but before equalisation shall not exceed 15°. Where cross-flooding fittings are required the time for equalisation shall not exceed 15 minutes. Suitable information concerning the use of cross-flooding fittings shall be supplied to the master of the ship.
- .6 The final conditions of the ship after damage and, in the case of unsymmetrical flooding, after equalisation measures have been taken shall be as follows:
- .1 in the case of symmetrical flooding there shall be a positive residual metacentric height of at least 50 mm as calculated by the constant displacement method;
 - .2a unless provided otherwise in paragraph 6.2b, in the case of unsymmetrical flooding the angle of heel for one-compartment flooding shall not exceed 7° for class B ships (new and existing) and 12° for classes C and D ships (new). For the simultaneous flooding of two adjacent compartments, a heel of 12° may be permitted for existing and new class B ships, provided that the factor of subdivision is nowhere greater than 0.50 in that part of the ship that is flooded;
 - .2b for existing class B non ro-ro passenger ships, constructed before 29 April 1990, in the case of unsymmetrical flooding, the angle shall not exceed 7°,

- except that in exceptional cases the Administration may allow additional heel due to the unsymmetrical moment, but in no case the final heel shall exceed 15°.
- .3 in no case shall the margin line be submerged in the final stage of flooding. If it is considered that the margin line may become submerged during an intermediate stage of flooding, the Danish Maritime Authority may require such investigations and arrangements as it considers necessary for the safety of the ship.
 - .7 The master of the ship shall be supplied with the data necessary to maintain sufficient intact stability under service conditions to enable the ship to withstand the critical damage. In the case of ships requiring crossflooding, the master of the ship shall be informed of the conditions of stability on which the calculations of heel are based and be warned that excessive heeling might result should the ship sustain damage when in a less favourable condition.
 - .8 The data referred to in paragraph .7 to enable the master to maintain sufficient intact stability shall include information which indicates the maximum permissible height of the ship's centre of gravity above keel (KG), or alternatively the minimum permissible metacentric height (GM), for a range of draughts or displacements sufficient to include all service conditions. The information shall show the influence of various trims taking into account the operational limits.
 - .9 Each ship shall have scales of draughts marked clearly at the bow and stern. In the case where the draught marks are not located where they are easily readable, or operational constraints for a particular trade make it difficult to read the draught marks, then the ship shall also be fitted with a reliable draught indicating system by which the bow and stern draughts can be determined.
 - .10 On completion of loading of the ship and prior to its departure, the master shall determine the ship's trim and stability and also ascertain and record that the ship is in compliance with stability criteria in the relevant regulations. The determination of the ship's stability shall always be made by calculation. An electronic loading and stability computer or equivalent means may be used for this purpose.
 - .11 No relaxation from the requirements for damage stability may be considered by the Danish Maritime Authority unless it is shown that the intact metacentric height in any service condition necessary to meet these requirements is excessive for the service intended.
 - .12 Relaxations from the requirements for damage stability shall be permitted only in exceptional cases and subject to the condition that the Danish Maritime Authority is to be satisfied that the proportions, arrangements and other characteristics of the ship are the most favourable to stability after damage which can practically and reasonably be adopted in the particular circumstances.

Regulation 8-1 Stability of ro-ro passenger ships in damaged conditions (R 8-1)

EXISTING CLASS B RO-RO PASSENGER SHIPS:

- .1 Existing class B ro-ro passenger ships shall comply with regulation 8, not later than the date of the first periodical survey after the date of compliance prescribed below, according to the value of A/A_{max} as defined in the Annex of the Calculation Procedure to Assess the Survivability Characteristics of Existing Ro-Ro Passenger Ships When Using a Simplified Method Based Upon Resolution A.265(VIII), developed by the Maritime Safety Committee at its 59th session in June 1991 (MSC/Circ. 574):

Value of A/A_{max}:	Date of compliance:
less than 85%	1 October 1998
85% or more but less than 90%	1 October 2000
90% or more but less than 95%	1 October 2002
95% or more but less than 97.5%	1 October 2004
97.5% or more	1 October 2005

- .2 *The calculation of A/A_{max} documented by a company or person authorised by the Danish Maritime Authority shall be presented to the Danish Maritime Authority for assessment. The Danish Maritime Authority shall accept calculations carried out by recognised test institutes in other EU member states which provide appropriate and satisfactory guarantees of a technical, professional and impartial character.*

Regulation 8-2 Special requirements for ro-ro passenger ships carrying 400 persons or more (R 8-2)

NEW CLASS B, C AND D AND EXISTING CLASS B RO-RO PASSENGER SHIPS:

Notwithstanding the provisions of regulation II-1/B/8 and II-1/B/8-1:

- .1 new ro-ro passenger ships certified to carry 400 persons or more shall comply with the provisions of paragraph .2.3 of regulation II-1/B/8, assuming the damage applied anywhere within the ship's length L; and
- .2 existing ro-ro passenger ships certified to carry 400 persons or more shall comply with the requirements of paragraph 1 not later than the date of the first periodical survey after the date of compliance prescribed in subparagraph .2.1, .2.2 or .2.3 which occurs the latest:

Value of A/A_{max}:	Date of compliance:
less than 85%	1 October 1998
85% or more but less than 90%	1 October 2000
90% or more but less than 95%	1 October 2002
95% or more but less than 97.5%	1 October 2004
97.5% or more	1 October 2010

Number of persons permitted to be carried:	Date of compliance:
1,500 or more	1 October 2002
1,000 or more but less than 1,500	1 October 2006
600 or more but less than 1,000	1 October 2008
400 or more but less than 600	1 October 2010

- .2.3 **Age of the ship equal or greater than 20 years:** where the age of the ship means the time counted from the date on which the keel was laid or the date on which it was at a similar stage of construction or from the date on which the ship was converted to a ro-ro passenger ship.

Regulation 8-3 Special requirements for passenger ships, other than ro-ro passenger ships, carrying 400 persons or more

CLASS B, C AND D SHIPS, CONSTRUCTED ON OR AFTER 1 JANUARY 2003, OTHER THAN RO-RO PASSENGER SHIPS:

Notwithstanding the provisions of regulation II-1/B/8 passenger ships, other than ro-ro passenger ships, certified to carry more than 400 persons shall comply with the provisions of paragraphs 2.3 and 2.6 of regulation II-1/B/8, assuming the damage applied anywhere within the ship's length L.

Regulation 9 Peak and machinery space bulkheads (R 10)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1 A forepeak or collision bulkhead shall be fitted which shall be watertight up to the bulkhead deck. This bulkhead shall be located at a distance from the forward perpendicular of not less than 5% of the length of the ship and not more than 3 metres plus 5% of the length of the ship.
- .2 Where any part of the ship below the waterline extends forward of the forward perpendicular, e.g. a bulbous bow, the distances stipulated in paragraph 1 shall be measured from a point either:
 - .1 at the mid-length of such extension; or
 - .2 at a distance 1.5% of the length of the ship forward of the forward perpendicular; or
 - .3 at a distance 3 metres forward of the forward perpendicular, whichever gives the smallest measurement.
- .3 Where a long forward superstructure is fitted, the forepeak or collision bulkhead shall be extended weathertight to the next full deck above the bulkhead deck. The extension shall be so arranged as to preclude the possibility of the bow door causing damage to it in the case of damage to, or detachment of, a bow door.
- .4 The extension required in paragraph 3 need not be fitted directly above the bulkhead below provided all parts of the extension are not located forward of the forward limit specified in paragraph 1 or in paragraph 2. However in existing class B ships:

- .1 where a sloping loading ramp forms part of the extension of the collision bulkhead above the bulkhead deck, the part of the ramp which is more than 2.3 metres above the bulkhead deck may extend no more than 1.0 metre forward of the forward limits specified in paragraphs .1 and .2;
- .2 where the existing ramp does not comply with the requirements for acceptance as an extension to the collision bulkhead and the position of the ramp prevents the siting of such extension within the limits specified in paragraph .1 or paragraph .2, the extension may be sited within a limited distance aft of the aft limit specified in paragraph .1 or paragraph .2. The limited distance aft should be no more than is necessary to ensure non-interference with the ramp. The extension to the collision bulkhead shall open forward and comply with the requirements of paragraph .3 and shall be so arranged as to preclude the possibility of the ramp causing damage to it in the case of damage to, or detachment of, the ramp.
- .5 Ramps not meeting the above requirements shall be disregarded as an extension to the collision bulkhead.
- .6 In existing class B ships, the requirements of paragraph .3 and .4 shall apply not later than the date of the first periodical survey after the date referred to in Article 14(1) of this Directive.
- .7 An afterpeak bulkhead, and bulkheads dividing the machinery space, from the cargo and passenger spaces forward and aft, shall also be fitted and made watertight up to the bulkhead deck. The afterpeak bulkhead may, however, be stepped below the bulkhead deck, provided the degree of safety of the ship as regards subdivision is not thereby diminished.
- .8 In all cases stern tubes shall be enclosed in watertight spaces. The stern gland shall be situated in a watertight shaft tunnel or other watertight space separate from the stern tube compartment and of such volume that, if flooded by leakage through the stern gland, the margin line will not be submerged.

Regulation 10 Double bottoms (R 12)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS, AND NEW SHIPS CONSTRUCTED ON OR AFTER 1 JANUARY 2003 WITH A LENGTH OF 24 METRES AND ABOVE:

- .1 In new class B, C and D and existing class B ships, and new ships constructed on or after 1 January 2003 with a length of 24 metres and above, a double bottom shall be fitted extending from the forepeak bulkhead to the afterpeak bulkhead as far as this is practicable and compatible with the design and proper working of the ship.
 - .1 In ships of 50 metres and upwards but less than 61 metres in length, a double bottom shall be fitted at least from the machinery space to the forepeak bulkhead, or as near thereto as practicable.
 - .2 In ships of 61 metres and upwards but less than 76 metres in length, a double bottom shall be fitted at least outside the machinery space and shall extend to the fore and after peak bulkheads or as near thereto as practicable.

- .3 In ships of 76 metres in length and upwards, a double bottom shall be fitted amidships and shall extend to the fore and after peak bulkhead or as near as practicable.
- .2 Where a double bottom is required to be fitted its depth shall comply with the standards of a recognised organisation and the inner bottom shall be continued out to the ship's sides in such a manner as to protect the bottom to the turn of the bilge. Such protection will be deemed satisfactory if the line of intersection of the outer edge of the margin plate with the bilge plating is not lower at any part than a horizontal plane passing through the point of intersection with the frame line amidships of a transverse diagonal line inclined at 25° to the base line and cutting it at a point one half of the ship's moulded breadth from the middle line.
- .3 Small wells constructed in the double bottom in connection with drainage arrangements of holds, etc., shall not extend downwards more than necessary. The depth of the well shall in no case be more than the depth less 460 mm of the double bottom at the centreline, nor shall the well extend below the horizontal plane referred to in paragraph .2. A well extending to the outer bottom is, however, permitted at the after end of the shaft tunnel. Other wells (e.g. for lubricating oil under main engines) may be permitted by the Danish Maritime Authority if satisfied that the arrangements give protection equivalent to that afforded by a double bottom complying with this regulation.
- .4 A double bottom need not be fitted in way of watertight compartments of moderate size used exclusively for the carriage of liquids, provided the safety of the ship, in the event of bottom or side damage, is not, in the opinion of the Danish Maritime Authority, thereby impaired.
- .5 Notwithstanding paragraph .1 of this regulation 10, the Danish Maritime Authority may permit a double bottom to be dispensed with in any part of the ship which is subdivided by a factor not exceeding 0.5, if satisfied that the fitting of a double bottom in that part would not be compatible with the design and proper working of the ship.

Regulation 11 Assigning, marking and recording of subdivision load lines (R 13)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1 In order that the required degree of subdivision shall be maintained, a load line corresponding to the approved subdivision draught shall be assigned and marked on the ship's sides amidships. A ship having spaces which are specially adapted for the accommodation of passengers and the carriage of cargo alternatively may, if owners desire, have one or more additional load lines assigned and marked to correspond with the subdivision draughts which the Danish Maritime Authority may approve for alternative service conditions.
- .2 The subdivision load lines assigned and marked shall be recorded in the Passenger Ship Safety Certificate, and shall be identified by the notation C.1 if there is only one subdivision load line. If there is more than one subdivision load line, the

alternative conditions shall be identified by the notations C.2, C.3, C.4 etc.¹

- .3 The freeboard corresponding to each of these load lines shall be measured at the same position and from the same deck line as the freeboards determined in accordance with the International Convention on Load Lines in force.
- .4 The freeboard corresponding to each approved subdivision load line and the conditions of service for which it is approved, shall be clearly indicated on the Passenger Ship Safety Certificate.
- .5 In no case shall any subdivision load line mark be placed above the deepest load line in salt water as determined by the strength of the ship or the International Convention on Load Lines in force.
- .6 Whatever may be the position of the subdivision load line marks, a ship shall in no case be loaded so as to submerge the load line mark appropriate to the season and locality as determined in accordance with the International Convention on Load Lines in force.
- .7 A ship shall in no case be so loaded that the subdivision load line mark appropriate to the particular voyage and condition of service is submerged.

Regulation 12 Construction and initial testing of watertight bulkheads, etc. (R 14)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1 Each watertight subdivision bulkhead, whether transverse or longitudinal, shall be constructed in such a manner that it shall be capable of supporting, with a proper margin of resistance, the pressure due to the maximum head of water which it might have to sustain in the event of damage to the ship but at least the pressure due to a head of water up to the margin line. The construction of these bulkheads shall be in accordance with the standards of a recognised organisation.
- .2.1 Steps and recesses in bulkheads shall be watertight and as strong as the bulkhead at the place where each occurs.
- .2.2 Where frames or beams pass through a watertight deck or bulkhead, such deck or bulkhead shall be made structurally watertight without the use of wood or cement.
- .3 Testing main compartments by filling them with water is not compulsory. When testing by filling with water is not carried out, a hose test shall be carried out where practicable. This test shall be carried out in the most advanced stage of the fitting out of the ship. Where a hose test is not practicable because of possible damage to machinery, electrical equipment, insulation or outfitting items, it may be replaced by a careful visual examination of welded connections, supported where deemed necessary by means such as a dye penetrant test or ultrasonic leak test or an equivalent test. In any case, a thorough inspection of the watertight bulkheads shall be carried out.

¹ The arabic numerals following the letter "C" in the subdivision load line notations may be replaced by roman numerals or letters if the Danish Maritime Authority considers this necessary to make the distinction with the international subdivision load line notations.

- .4 The forepeak, double bottoms (including duct keels) and inner skins shall be tested with water to a head corresponding to the requirements of paragraph .1.
- .5 Tanks which are intended to hold liquids, and which form part of the subdivision of the ship, shall be tested for tightness with water to a head up to the deepest subdivision load line or to a head corresponding to two thirds of the depth from the top of keel to the margin line in way of the tanks, whichever is the greater, provided that in no case shall the test head be less than 0.9 metres above the top of the tank; if testing by water is impracticable, air leak testing while the tanks are subjected to an air pressure of not more than 0.14 bar may be accepted.
- .6 The tests referred to in paragraphs .4 and .5 are for the purpose of ensuring that the subdivision structural arrangements are watertight and are not to be regarded as a test of the fitness of any compartment for the storage of oil fuel or for other special purposes for which a test of a superior character may be required depending on the height to which the liquid has access in the tank or its connections.

Regulation 13 Openings in watertight bulkheads (R 15)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1 The number of openings in watertight bulkheads shall be reduced to the minimum compatible with the design and proper working of the ship; satisfactory means shall be provided for closing these openings.
 - .2.1 Where pipes, scuppers, electrical cables, etc., are carried through watertight subdivision bulkheads, arrangements shall be made to ensure the watertight integrity of the bulkheads.
 - .2.2 Valves not forming part of a piping system shall not be permitted in watertight subdivision bulkheads.
 - .2.3 Lead or other heat sensitive materials shall not be used in systems which penetrate watertight subdivision bulkheads, where deterioration of such systems in the event of fire would impair the watertight integrity of the bulkheads.
- .3.1 No doors, manholes, or access openings are permitted:
 - .1 in the collision bulkhead below the margin line;
 - .2 in watertight transverse bulkheads dividing a cargo space from an adjoining cargo space, except as provided for in paragraph .10.1 and in regulation 14.
- .3.2 Except as provided in paragraph .3.3, the collision bulkhead may be pierced below the margin line by no more than one pipe for dealing with fluid in the fore peak tank, provided that the pipe is fitted with a screw-down valve capable of being operated from above the bulkhead deck, the valve chest being secured inside the fore peak to the collision bulkhead. However the fitting of this valve on the afterside of the collision bulkhead may be accepted provided that the valve is readily accessible under all service conditions and the space in which it is located is not a cargo space.
- .3.3 If the fore peak is divided to hold two different kinds of liquids, the collision bulkhead may be pierced below the margin line by two pipes each of which is fitted as required by paragraph .3.1, provided there is no practical alternative to the

fitting of such a second pipe and that, having regard to the additional subdivision provided in the forepeak, the safety of the ship is maintained.

- .4 Within spaces containing the main and auxiliary propulsion machinery including boilers serving the needs of propulsion not more than one door apart from the doors to shaft tunnels may be fitted in each main transverse bulkhead. Where two or more shafts are fitted the tunnels shall be connected by an intercommunicating passage. There shall be only one door between the machinery space and the tunnel spaces where two shafts are fitted and only two doors where there are more than two shafts. All these doors shall be of the sliding type and shall be so located as to have their sills as high as practicable. The hand gear for operating these doors from above the bulkhead deck shall be situated outside the spaces containing the machinery.

.5.1 EXISTING CLASS B SHIPS AND NEW CLASS B, C AND D SHIPS OF LESS THAN 24 METRES IN LENGTH:

Watertight doors shall be sliding doors or hinged doors or doors of an equivalent type. Plate doors secured only by bolts and doors required to be closed by dropping or by the action of a dropping weight are not permitted.

NEW CLASS B, C AND D SHIPS OF 24 METRES IN LENGTH AND OVER:

Watertight doors, except as provided in paragraph .10.1 or regulation 14, shall be power-operated sliding doors complying with the requirements of paragraph 7 capable of being closed simultaneously from the central operating console at the navigating bridge in not more than 60 seconds with the ship in upright position.

.5.2 EXISTING CLASS B SHIPS AND NEW CLASS B, C AND D SHIPS OF LESS THAN 24 METRES IN LENGTH:

Sliding doors may be either hand-operated only, or power-operated as well as hand-operated.

NEW CLASS B, C AND D SHIPS OF 24 METRES IN LENGTH AND OVER:

In ships where the total number of watertight doors is not more than two and these doors are situated in the machinery space or in the bulkheads bounding such space, the Danish Maritime Authority may allow these two doors to be hand-operated only. Where hand-operated sliding doors are fitted, such doors are to be closed before the vessel leaves its berth on a passenger carrying voyage and shall be kept closed during navigation.

NEW CLASS B, C AND D SHIPS AND EXISTING CLASS B SHIPS:

- .5.3 The means of operation whether by power or by hand of any sliding watertight door whether power-operated or not shall be capable of closing the door with the ship listed to 15° either way. Consideration shall also be given to the forces which may act on either side of the doors as may be experienced when water is flowing through the opening applying a static head equivalent to a water height of at least 1 metre above the sill on the centreline of the door.

NEW CLASS B, C AND D SHIPS OF 24 METRES IN LENGTH AND OVER:

- .5.4 Watertight door controls, including hydraulic piping and electric cables, shall be kept as close as practicable to the bulkhead in which the doors are fitted, in order to minimise the likelihood of them being involved in any damage which the ship may sustain. The positioning of watertight doors and their controls shall be such that if the ship sustains damage within one fifth of the breadth of the ship, such distance being measured at right angles to the centreline at the level of the deepest subdivision load line, the operation of the watertight doors clear of the damaged portion of the ship is not impaired.
- .5.5 All power-operated and hand-operated sliding watertight doors shall be provided with means of indication which will show at all remote operating positions whether the doors are open or closed. Remote operating positions shall only be at the navigating bridge as required by paragraph .7.1.5 and the location where hand operation above the bulkhead deck is required by paragraph .7.1.4.

EXISTING CLASS B SHIPS AND NEW CLASS B, C AND D SHIPS OF LESS THAN 24 METRES IN LENGTH:

- .5.6 Watertight doors which do not comply with paragraphs .5.1 to .5.5 shall be closed before the voyage commences, and shall be kept closed during navigation; the time of opening such doors in port and of closing them before the ship leaves port shall be entered in the logbook.

NEW CLASS B, C AND D SHIPS OF LESS THAN 24 METRES IN LENGTH AND EXISTING CLASS B SHIPS:

- .6.1 Hand-operated sliding doors may have a horizontal or vertical motion. It shall be possible to operate the mechanism at the door itself from either side, and from an accessible position above the bulkhead deck, with an all round crank motion, or some other movement providing the same guarantee of safety and of an approved type. When operating a hand gear the time necessary for the complete closure of the door with the vessel upright, shall not exceed 90 seconds.

EXISTING CLASS B SHIPS:

- .6.2 Power-operated sliding doors may have a vertical or horizontal motion. If a door is power-operated from a central control, the gearing shall be so arranged that the door can also be operated by power at the door itself from both sides. Local control handles in connection with the power gear shall be provided on each side of the bulkhead and shall be so arranged as to enable persons passing through the doorway to hold both handles in the open position without being able to set the closing mechanism in operation accidentally. Power-operated sliding doors shall be provided with hand gear workable at the door itself on either side and from an accessible position above the bulkhead deck, with an all round crank motion or some other movement providing the same guarantee of safety and of an approved type. Provision shall be made to give warnings by sound signal that the door has begun to close and will continue to sound until it is completely closed. Additionally, in areas of high ambient noise an audible alarm shall be required to be supplemented by an intermittent visual signal at the door.

NEW CLASS B, C AND D SHIPS OF 24 METRES IN LENGTH AND OVER:

- .7.1 Each power-operated sliding watertight door:
.1 shall have a vertical or horizontal motion;

- .2 shall, subject to paragraph .11, be normally limited to a maximum clear width of 1.2 metres. The Danish Maritime Authority may permit larger doors only to the extent considered necessary for the effective operation of the ship provided that other safety measures, including the following, are taken into consideration:
 - .2.1 special consideration shall be given to the strength of the door and its closing appliances in order to prevent leakages;
 - .2.2 the door shall be located outside the damage zone B/5;
 - .2.3 the door shall be kept closed when the ship is at sea, except for limited periods when absolutely necessary as determined by the Administration of the flag State;
 - .3 shall be fitted with the necessary equipment to open and close the door using electric power, hydraulic power, or any other form of power that is acceptable to the Danish Maritime Authority;
 - .4 shall be provided with an individual hand-operated mechanism. It shall be possible to open and close the door by hand at the door itself from either side, and in addition, close the door from an accessible position above the bulkhead deck with an all round crank motion or some other movement providing the same degree of safety acceptable to the Danish Maritime Authority. Direction of rotation or other movement is to be clearly indicated on all operating positions. The time necessary for the complete closure of the door, when operated by hand gear, shall not exceed 90 seconds with the ship in upright position;
 - .5 shall be provided with controls for opening and closing the door by power from both sides of the door and also for closing the door by power from the central operating console at the navigating bridge;
 - .6 shall be provided with an audible alarm, distinct from any other alarm in the area, which will sound whenever the door is closed remotely by power and which shall sound for at least 5 seconds but no more than 10 seconds before the door begins to move and shall continue sounding until the door is completely closed. In the case of remote hand operation it is sufficient for the audible alarm to sound only when the door is moving. Additionally, in passenger areas and areas of high ambient noise, the Danish Maritime Authority may require the audible alarm to be supplemented by an intermittent visual signal at the door; and
 - .7 shall have an approximately uniform rate of closure under power. The closure time, from the time the door begins to move to the time it reaches the completely closed position, shall in no case be less than 20 seconds and no more than 40 seconds with the ship in upright position.
- .7.2 The electrical power required for power-operated sliding watertight doors shall be supplied from the emergency switchboard either directly or by a dedicated distribution board situated above the bulkhead deck; the associated control, indication and alarm circuits shall be supplied from the emergency switchboard either directly or by a dedicated

distribution board situated above the bulkhead deck and be capable of being automatically supplied by the transitional source of emergency electrical power in the event of failure of either the main or emergency source of electrical power.

- .7.3 Power-operated sliding watertight doors shall have either:
- .1 a centralised hydraulic system with two independent power sources each consisting of a motor and pump capable of simultaneously closing all doors. In addition, there shall be for the whole installation hydraulic accumulators of sufficient capacity to operate all the doors at least three times, i.e. closed-open-closed, against an adverse list of 15°. This operating cycle shall be capable of being carried out when the accumulator is at the pump cut-in pressure. The fluid used shall be chosen considering the temperature liable to be encountered by the installation during its service. The power-operating system shall be designed to minimise the possibility of having a single failure in the hydraulic piping adversely affect the operation of more than one door. The hydraulic system shall be provided with a low-level alarm for hydraulic fluid reservoirs serving the power-operated system and a low gas pressure alarm or other effective means of monitoring loss of stored energy in hydraulic accumulators. These alarms are to be audible and visual and shall be situated on the central operating console at the navigating bridge; or
 - .2 an independent hydraulic system for each door with each power source consisting of a motor and pump capable of opening and closing the door. In addition, there shall be a hydraulic accumulator of sufficient capacity to operate the door at least three times, i.e. closed-open-closed, against an adverse list of 15°. This operating cycle shall be capable of being carried out when the accumulators at the pump cut-in pressure. The fluid used shall be chosen considering the temperatures liable to be encountered by the installation during its service. A low gas pressure group alarm or other effective means of monitoring loss of stored energy in hydraulic accumulators shall be provided at the central operating console on the navigating bridge. Loss of stored energy indication at each local operating position shall also be provided; or
 - .3 An independent electrical system and motor for each door with each power source consisting of a motor capable of opening and closing the door. The power source shall be capable of being automatically supplied by the transitional source of emergency electrical power in the event of failure of either the main or emergency source of electrical power and with sufficient capacity to operate the door at least three times, i.e. closed-open-closed, against an adverse list of 15°. For the systems specified in .7.3.1, .7.3.2 and .7.3.3, provision should be made as follows: Power systems for power-operated watertight sliding doors shall be separate from any other power system. A single failure in the electric or hydraulic power-operated systems excluding the hydraulic actuator shall not prevent the hand operation of any door.
- .7.4 Control handles shall be provided at each side of the bulkhead at a minimum height of 1.6 metres above the floor and shall be so arranged as to enable persons passing through the doorway

to hold both handles in the open position without being able to set the power closing mechanism in operation accidentally. The direction of movement of the handles in opening and closing the door shall be in the direction of door movement and shall be clearly indicated. Hydraulic control handles for watertight doors in accommodation spaces shall, if only one action is required to start the door's closing movement, be so placed that children cannot operate them, e.g. behind panel doors with bolts placed at least 170 cm above deck level.

NEW CLASS B, C AND D SHIPS AND EXISTING CLASS B SHIPS OF 24 METRES IN LENGTH AND OVER:

On both sides of the doors there shall be a plate with instructions as to how the door system is to be operated. On both sides of each door there shall also be a plate with text or pictures warning of the danger of remaining in the door opening when the door has begun its closing movement. These plates shall be made of durable material, and shall be firmly fixed. The text on the instruction or warning plate shall include information about the closing time of the door in question.

NEW CLASS B, C AND D SHIPS OF 24 METRES IN LENGTH AND OVER:

- .7.5 As far as practicable, electrical equipment and components for watertight doors shall be situated above the bulkhead deck and outside hazardous areas and spaces.
- .7.6 The enclosures of electrical components necessarily situated below the bulkhead deck shall provide suitable protection against the ingress of water.
- .7.7 Electric power, control, indication and alarm circuits shall be protected against fault in such a way that a failure in one door circuit will not cause a failure in any other door circuit. Short circuits or other faults in the alarm or indicator circuits of a door shall not result in a loss of power operation of that door. Arrangements shall be such that leakage of water into the electrical equipment located below the bulkhead deck will not cause the door to open.
- .7.8 A single electrical failure in the power operating or control system of a power-operated sliding watertight door shall not result in a closed door opening. Availability of the power supply should be continuously monitored at a point in the electrical circuit as near as practicable to each of the motors required by paragraph .7.3. Loss of any such power supply should activate an audible and visual alarm at the central operating console at the navigating bridge.
- .8.1 The central operating console at the navigating bridge shall have a 'master mode' switch with two modes of control: a 'local control' mode which shall allow any door to be locally opened and locally closed after use without automatic closure, and a 'doors closed' mode which shall automatically close any doors that are open. The 'doors closed' mode shall permit doors to be opened locally and shall automatically re-close the door upon release of the local control mechanism. The 'master mode' switch shall normally be in the 'local control' mode. The 'door closed' mode shall only be used in an emergency or for testing purposes.
- .8.2 The central operating console at the navigating bridge shall be provided with a diagram showing the location of each door, with visual indicators to show whether each door is open or

closed. A red light shall indicate a door is fully open and a green light shall indicate a door is fully closed. When the door is closed remotely the red light shall indicate the intermediate position by flashing. The indicating circuit shall be independent of the control circuit for each door.

- .8.3 It shall not be possible to open any door remotely from the central control position.

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .9.1 All watertight doors shall be kept closed during navigation except that they may be opened during navigation as specified in paragraphs 9.2 and 9.3. Watertight doors of width of more than 1.2 metres permitted by paragraph 11 may only be opened in the circumstances detailed in that paragraph. Any door which is opened in accordance with this paragraph shall be ready to be immediately closed.
- .9.2 A watertight door may be opened during navigation to permit the passage of passengers or crew, or when work in the immediate vicinity of the door necessitates it being opened. The door must be immediately closed when transit through the door is complete or when the task which necessitated it being open is finished.
- .9.3 Certain watertight doors may be permitted to remain open during navigation only if considered absolutely necessary; that is, being open is determined essential to the safe and effective operation of the ship's machinery or to permit passengers normally unrestricted access throughout the passenger area. Such determination shall be made by the Danish Maritime Authority only after careful consideration of the impact on ship operations and survivability. A watertight door permitted to remain thus open shall be clearly indicated in the ship's stability information and shall always be ready to be immediately closed.

NEW CLASS B, C AND D SHIPS:

- .10.1 If the Danish Maritime Authority is satisfied that such doors are essential, watertight doors of satisfactory construction may be fitted in watertight bulkheads dividing cargo between deck spaces. Such doors may be hinged, rolling or sliding doors but shall not be remotely controlled. They shall be fitted at the highest level and as far from the shell plating as practicable, but in no case shall the outboard vertical edges be situated at a distance from the shell plating which is less than one fifth of the breadth of the ship, such distance being measured at right angles to the centreline at the level of the deepest subdivision load line.
- .10.2 Such doors shall be closed before the voyage commences and shall be kept closed during navigation; the time of opening such doors in port and of closing them before the ship leaves port shall be entered in the logbook. Should any of the doors be accessible during the voyage, they shall be fitted with a device which prevents unauthorised opening. When it is proposed to fit such doors, the number and the arrangements shall receive the special consideration of the Danish Maritime Authority.
- .11 Portable plates on bulkheads shall not be permitted except in machinery spaces. Such plates shall always be in place before the ship leaves port, and shall not be removed during navigation except in case of urgent necessity at the discretion

of the master. The Danish Maritime Authority may permit not more than one power-operated sliding watertight door in each main transverse bulkhead larger than those specified in paragraph .7.1.2 to be substituted for these portable plates, provided these doors are closed before the ship leaves the port and remain closed during navigation except in case of urgent necessity at the discretion of the master. These doors need not meet the requirements of paragraph 7.1.4 regarding complete closure by hand-operated gear in 90 seconds. The time of opening and closing these doors, whether the ship is at sea or in port, shall be recorded in the logbook.

Regulation 14 Ships carrying goods vehicles and accompanying personnel (R 16)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1 This regulation applies to passenger ships designed or adapted for the carriage of goods vehicles and accompanying personnel.
- .2 If in such a ship the total number of passengers, including persons accompanying vehicles, does not exceed $N = 12 + A/25$, where A = total deck area (square metres) of spaces available for the stowage of goods vehicles and where the clear height at the stowage position and at the entrance to such spaces is not less than 4 metres, the provisions of regulation 13, paragraph .10, in respect of watertight doors apply except that the doors may be fitted at any level in watertight bulkheads dividing cargo spaces. Additionally, indicators are required on the navigating bridge to show automatically when each door is closed and all door fastenings are secured.
- .3 When applying the provisions of this chapter to such a ship, N shall be taken as the maximum number of passengers for which the ship may be certified in accordance with this regulation.

Regulation 15 Openings in the shell plating below the margin line (R 17)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1 The number of openings in the shell plating shall be reduced to the minimum compatible with the design and proper working of the ship.
- .2.1 The arrangement and efficiency of the means for closing any opening in the shell plating shall be consistent with its intended purpose and the position in which it is fitted.
- .2.2 Subject to the requirements of the International Convention of the Load Line in force, no side scuttles shall be fitted in such a position that its sill is below a line drawn parallel to the bulkhead deck at side and having its lowest point 2.5% of the breadth of the ship above the deepest subdivision load line, or 500 mm, whichever is the greater.
- .2.3 All side scuttles the sills of which are below the margin line shall be of such construction as will effectively prevent any person opening them without the consent of the master of the ship.

- .2.4 Where in a between-deck, the sills of any of the sidescuttles referred to in paragraph .2.3 are below a line drawn parallel to the bulkhead deck at side and having its lowest point 1.4 metres plus 2.5% of the breadth of the ship above the water when the ship departs from any port, all the sidescuttles in that between-deck shall be closed watertight and locked before the ship leaves port, and they shall not be opened before the ship arrives at the next port. In the application of this paragraph the appropriate allowance for fresh water may be made when applicable.
- .2.5 Sidescuttles and their deadlights which will not be accessible during navigation shall be closed and secured before the ship leaves port.
- .3 The number of scuppers, sanitary discharges and other similar openings in the shell plating shall be reduced to the minimum either by making each discharge serve for as many as possible of the sanitary and other pipes, or in any other satisfactory manner.
- .4 All inlets and discharges in the shell plating shall be fitted with efficient and accessible arrangements for preventing the accidental admission of water into the ship.
- .4.1 Subject to the requirements of the International Convention on Load Lines in force, and except as provided in paragraph .5, each separate discharge led through the shell plating from spaces below the margin line shall be provided with either one automatic nonreturn valve fitted with a positive means of closing it from above the bulkhead deck or with two automatic nonreturn valves without positive means of closing, provided that the inboard valve is situated above the deepest subdivision load line and is always accessible for examination under service conditions. Where a valve with positive means of closing is fitted, the operating position above the bulkhead deck shall always be readily accessible and means shall be provided for indicating whether the valve is open or closed.
- .4.2 The requirements of the International Convention on Load Lines in force shall apply to discharges led through the shell plating from spaces above the margin line.
- .5 Machinery space main and auxiliary sea inlets and discharges in connection with the operation of machinery shall be fitted with readily accessible valves between the pipes and the shell plating or between the pipes and fabricated boxes attached to the shell plating. The valves may be controlled locally and shall be provided with indicators showing whether they are open or closed.

NEW CLASS B, C AND D SHIPS:

- .5.1 The handwheels or handles of the sea cocks shall be easily accessible for operation. All valves which are used as sea cocks shall close by clockwise movement of their handwheels.
- .5.2 Discharge taps or valves on the side of the ship for blow-off water from boilers shall be located in easily accessible locations and not beneath deck plating. Taps or valves shall be so designed that it is easy to see whether they are open or closed. Taps shall be provided with safety screens, so designed that the key cannot be lifted off when the tap is open.
- .5.3 All valves and taps in pipe systems such as bilge and ballast systems, fuel oil and lubricating oil systems, fire extinguishing

and sluicing systems, cooling water and sanitary systems, etc. shall be clearly marked as to their functions.

- .5.4 Other outlet pipes shall, if they emerge below the deepest subdivision load line, be provided with equivalent means of shut-off on the side of the ship; if they emerge above the deepest subdivision load line, they shall be provided with an ordinary storm valve. In both cases the valves may be omitted if pipes are used of the same thickness as the plating indirect outlets from toilets and wash-basins, and floor outlets from washrooms etc. provided with deadlights or otherwise protected against water shock. The wall thickness of such pipes need not, however, be greater than 14 mm.
- .5.5 If a valve with a direct closing mechanism is fitted, the place from which it may be operated shall always be easily accessible, and there shall be a means of indicating whether the valve is open or closed.
- .5.6 When valves with direct closing mechanisms are placed in machinery spaces, it is sufficient that they be operable from where they are located, provided that this place is easily accessible under all conditions.

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .6 All shell fittings and valves 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 Danish Maritime Authority.
- .7 Gangway, and cargo ports fitted below the margin line shall be of sufficient strength. They shall be effectively closed and secured watertight before the ship leaves port, and shall be kept closed during navigation.
- .8 Such ports shall in no case be so fitted as to have their lowest point below the deepest subdivision load line.

Regulation 16 Watertight integrity of passenger ships above the margin line (R 20)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1 All reasonable and practicable measures shall be taken to limit the entry and spread of water above the bulkhead deck. Such measures may include partial bulkheads or webs. When partial watertight bulkheads and webs are fitted on the bulkhead deck, above or in the immediate vicinity of main subdivision bulkheads, they shall have watertight shell and bulkhead deck connections so as to restrict the flow of water along the deck when the ship is in a heeled damaged condition. Where the partial watertight bulkhead does not line up with the bulkhead below, the bulkhead deck between shall be made effectively watertight.
- .2 The bulkhead deck or a deck above it shall be weathertight. All openings in the exposed weather deck shall have coamings of ample height and strength and shall be provided with efficient means for expeditiously closing them weathertight. Freeing ports, open rails and scuppers shall be fitted as necessary for rapidly clearing the weather deck of water under all weather conditions.

- .3 In existing class B ships, the open end of air pipes terminating within a superstructure shall be at least 1 metre above the waterline when the ship heels to an angle of 15 °C, or the maximum angle of heel during intermediate stages of flooding, as determined by direct calculation, whichever is the greater. Alternatively, air pipes from tanks other than oil tanks may discharge through the side of the superstructure. The provisions of this paragraph are without prejudice to the provisions of the International Convention on Load Lines in force.
- .4 Sidescuttles, gangway, cargo ports and the other means for closing openings in the shell plating above the margin line shall be of efficient design and construction and of sufficient strength having regard to the spaces in which they are fitted and their positions relative to the deepest subdivision load line.
- .5 Efficient inside deadlights, so arranged that they can be easily and effectively closed and secured watertight, shall be provided for all sidescuttles to spaces below the first deck above the bulkhead deck.

Regulation 17 Closure of cargo loading doors (R 20-1)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1 The following doors, located above the margin line, shall be closed and locked before the ship proceeds on any voyage, and shall remain closed and locked until the ship is at its next berth:
 - .1 cargo loading doors in the shell or the boundaries of enclosed superstructures;
 - .2 bow visors fitted in positions, as indicated in paragraph .1.1;
 - .3 cargo loading doors in the collision bulkhead;
 - .4 weathertight ramps forming an alternative closure to those defined in paragraphs .1.1 to .1.3 inclusive.

Provided that where a door cannot be opened or closed while the ship is at the berth, such a door may be opened or left open while the ship approaches or draws away from the berth, but only so far as may be necessary to enable the door to be immediately operated. In any case, the inner bow door must be kept closed.
- .2 Notwithstanding the requirements of paragraph .1.1 and .1.4, the Danish Maritime Authority may authorise that particular doors can be opened at the discretion of the master, if necessary for the operation of the ship or the embarking and disembarking of passengers, when the ship is at safe anchorage and provided that the safety of the ship is not impaired.
- .3 The master shall ensure that an effective system of supervision and reporting of the closing and opening of the doors referred to in paragraph .1 is implemented.
- .4 The master shall ensure, before the ship proceeds on any voyage, that an entry in the logbook, as required in regulation 22, is made of the time of the last closing of the doors specified in paragraph .1 and the time of any opening of particular doors in accordance with paragraph .2.

Regulation 17-1 Watertight integrity from the ro-ro deck (bulkhead deck) to spaces below (R 20-2)

NEW CLASS B, C AND D RO-RO PASSENGER SHIPS:

- .1.1 Subject to the provisions of paragraphs .1.2 and .1.3, all accesses that lead to spaces below the bulkhead deck shall have a lowest point which is not less than 2.5 metres above the bulkhead deck;
- .1.2 where vehicle ramps are installed to give access to spaces below the bulkhead deck, their openings shall be able to be closed weathertight to prevent ingress of water below, alarmed and indicated to the navigation bridge;
- .1.3 the Danish Maritime Authority may permit the fitting of particular accesses to spaces below the bulkhead deck provided they are necessary for the essential working of the ship, e.g. movement of machinery and stores, subject to such accesses being made watertight, alarmed and indicated to the navigation bridge;
- .1.4 the accesses referred to in paragraphs .1.2 and .1.3 shall be closed before the ship leaves the berth on any voyage and shall remain closed until the ship is at its next berth;
- .1.5 the master shall ensure that an effective system of supervision and reporting of the closing and opening of such accesses referred to in paragraphs .1.2 and .1.3 is implemented; and
- .1.6 the master shall ensure, before the ship leaves the berth on any voyage, that an entry in the logbook, as required by regulation II-1/B/22, is made of the time of the last closing of the accesses referred to in paragraphs .1.2 and .1.3;
- .1.7 new class C and D ro-ro passenger ships may, instead of complying with paragraphs .1.1 to .1.6, comply with paragraphs .2.1 to .2.4, provided that coaming and sill heights are at least 600 mm on open ro-ro cargo decks and at least 380 mm on enclosed ro-ro cargo decks.

EXISTING CLASS B RO-RO PASSENGER SHIPS:

- .2.1 All accesses from the ro-ro deck that lead to spaces below the bulkhead deck shall be made weathertight and means shall be provided on the navigation bridge, indicating whether the access is open or closed;
- .2.2 all such accesses shall be closed before the ship leaves the berth on any voyage and shall remain closed until the ship is at its next berth;
- .2.3 notwithstanding the requirements of paragraph .2.2, the Danish Maritime Authority may permit some accesses to be opened during the voyage but only for a period sufficient to permit through passage and, if required, for the essential working of the ship; and
- .2.4 the requirements of paragraph .2.1 shall apply not later than the date of the first periodical survey after the date referred to in paragraph 1 of Article 14 of this Directive.

Regulation 17-2 Access to ro-ro decks (R 20-3)

ALL RO-RO PASSENGER SHIPS:

The master, or the designated officer shall ensure that, without the expressed consent of the master or the designated officer, no passengers are allowed access to an enclosed ro-ro deck when the ship is underway.

Regulation 17-3 Closure of bulkheads on the ro-ro deck (R 20-4)

NEW CLASS B, C AND D AND EXISTING CLASS B RO-RO PASSENGER SHIPS:

- .1 All transverse and longitudinal bulkheads which are taken into account as effective to confine the seawater accumulated on the ro-ro deck shall be in place and secured before the ship leaves the berth and remain in place and secured until the ship is at its next berth.
- .2 Notwithstanding the requirements of paragraph .1, the Danish Maritime Authority may permit some accesses within such bulkheads to be opened during the voyage but only for sufficient time to permit through passage and, if required, for the essential working of the ship.

Regulation 18 Stability information (R 22)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1 Every passenger ship, shall be inclined upon its completion and the elements of its stability determined. The master shall be supplied with such information, approved by the Danish Maritime Authority, as is necessary to enable him by rapid and simple processes to obtain accurate guidance as to the stability of the ship under varying conditions of service.
- .2 Where any alterations are made to a ship so as to affect materially the stability information supplied to the master, amended stability information shall be provided. If necessary the ship shall be re-inclined.
- .3 At periodical intervals not exceeding five years, a lightweight survey shall be carried out to verify any changes in the light ship displacement and longitudinal centre of gravity. The ship shall be re-inclined whenever, in comparison with the approved stability information, a deviation from the lightship displacement exceeding 2% or a deviation of the longitudinal centre of gravity exceeding 1% of the length of the ship is found or anticipated.
- .4 The Danish Maritime Authority may allow the inclining test of an individual ship to be dispensed with provided basic stability data are available from the inclining test of a sister ship and it is shown to the satisfaction of the Danish Maritime Authority that reliable stability information for the exempted ship can be obtained from such basic data.

Regulation 19 Damage control plans (R 23)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

There shall be permanently exhibited, for the guidance of the officer in charge of the ship, plans showing clearly for each deck and hold the boundaries of the watertight compartments, the openings therein with the means of closure and position of any controls thereof, and the arrangements for the correction of any list due to flooding. In addition, booklets containing the aforementioned information shall be made available to the officers of the ship.

Regulation 20 Integrity of the hull and superstructure, damage prevention and control (R 23-2)

ALL RO-RO PASSENGER SHIPS:

This regulation applies to all ro-ro passenger ships, except that for existing ships paragraph .2 shall apply not later than the date of the first periodical survey after the date referred to in Article 14(1) of this Directive.

- .1 Indicators shall be provided on the navigating bridge for all shell doors, loading doors and other closing appliances which, if left open or not properly secured, could lead to flooding of a special category space or ro-ro cargo space. The indicator system shall be designed on the fail-safe principle and shall show by visual alarms if the door is not fully closed or if any of the securing arrangements are not in place and fully locked and by audible alarms if such door or closing appliances become open or the securing arrangements become unsecured. The indicator panel on the navigating bridge shall be equipped with a mode selection function 'harbour/sea voyage' so arranged that an audible alarm is given on the navigation bridge if the ship leaves harbour with the bow doors, inner doors, stern ramp or any other shell doors not closed or any closing device not in correct position. The power supply for the indicator system shall be independent of the power supply for operating and securing the doors. Indicator systems, approved by the Danish Maritime Authority, which were installed on board existing ships, need not be changed.
- .2 Television surveillance and a water leakage detection system shall be arranged to provide an indication to the navigation bridge and to the engine control station of any leakage through inner and outer bow doors, stern doors or any other shell doors which could lead to flooding of special category spaces or ro-ro cargo spaces.
- .3 Special category spaces and ro-ro cargo spaces shall be continuously patrolled or monitored by effective means, such as television surveillance, so that any movement of vehicles in adverse weather conditions and unauthorised access by passengers thereto can be detected whilst the ship is underway.
- .4 Documented operating procedures for closing and securing all shell doors, loading doors and other closing appliances which, if left open or not properly secured, could lead to flooding of a special category space or ro-ro cargo space, shall be kept on board and posted at an appropriate place.

Regulation 21 Marking, periodical operation and inspection of watertight doors, etc. (R 24)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1 Drills for the operating of the watertight doors, sidescuttles, valves and closing mechanisms of scuppers shall take place weekly.
- .2 All watertight doors in main transverse bulkheads, in use at sea, shall be operated daily.
- .3 The watertight doors and all mechanisms and indicators connected herewith, all valves, the closing of which is necessary to make a compartment watertight, and all valves the operation of which is necessary for damage control cross-connections shall be periodically inspected at sea at least once a week.
- .4 Such valves, doors and mechanisms shall be suitably marked to ensure that they may be properly used to provide maximum safety.

Regulation 22 Entries in log (R 25)

NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1 Hinged doors, portable plates, sidescuttles, gangway and cargo ports and other openings, which are required by these regulations to be kept closed during navigation, shall be closed before the ship leaves the port. The time of closing and the time of opening (if permissible under these regulations) shall be recorded in the logbook.
- .2 A record of all drills and inspections required by regulation 21 shall be entered in the logbook with an explicit record of any defects which may be disclosed.

Regulation 23 Hoistable car platforms and ramps

NEW CLASS A, B, C AND D AND EXISTING CLASS A AND B SHIPS:

On ships fitted with suspended decks for transport of passenger vehicles, the construction, installation and operation shall be carried out in accordance with the rules laid down by the Danish Maritime Authority.

- .1 With regard to the construction, the relevant rules of a recognised organisation shall be used. *Depending on the arrangement of suspension and hoisting systems, the Danish Maritime Authority may require documentation for the fatigue life of vital design details. Ramps and suspended decks shall be made of incombustible materials, and any surface coating shall have low flame-spreading characteristics.*
- .2 *The suspended end of each ramp shall be provided with an automatic fall arresting system, which shall protect the ramp in case of wire breaks or failure of the main hydraulic system. Fall arresting systems may, however, be replaced by a double wire system or any other equivalent arrangement.*

- .3 *A safety factor of 6 shall be used in relation to the breaking load on the components used in the lifting system.*
- .4 *Automatic emergency stop valves shall be installed in connection with the hydraulic installation for the operation of ramps and platforms.*
- .5.1 *The suspended end of each ramp shall be provided with an automatic safety fender, which shall engage as soon as the ramps are raised above deck. The height of such a safety fender shall be at least 200 mm.*
- .5.2 *The sides of the ramps and platforms facing away from house sides or the like shall be provided with a safety fender of a height of at least 200 mm.*
- .6.1 *Above each end of each ramp, an illuminated warning notice shall be put with the following text:*
WALKING ON THE RAMP PROHIBITED – REMAIN IN YOUR CAR
(Danish text: FÆRDSEL PÅ RAMPEN FORBUDT – FORBLIV I BILEN)
- .6.2 *The sign, which shall be visible to the drivers and passengers of vehicles parked on the ramp, shall be capable of being switched on and off manually, and be provided with automation to ensure that it is always switched on when the ramp is being manoeuvred. The sign shall be switched on before embarkation or disembarkation.*
- .6.3 *The sign shall not be switched off until the ramp has been secured in the horizontal position.*
- .6.4 *Furthermore, signs shall be put at the control desks with the following text: “Before the ramps are operated, ensure that there is nobody on the ramps outside the vehicles”.*
Danish text: “Før manøvrering af ramperne skal det påses, at der ikke befinder sig personer på ramperne uden for bilerne”.
- .7 *It shall be possible to secure platforms and ramps in the stowed position, and the ramps in both the horizontal working position and in the stowed position. Platforms and ramps may not be permanently suspended from the lifting system.*
- .8 *The necessary guard rails and guards shall be designed and located according to the regulations. In principle, the guard rails shall comply with the requirements for guard rails or rails stipulated in the Load Line Convention. It is not required that the guard rails be made with vertical posts.*
- .9.1 *Access doors to platforms and ramps shall be secured against opening when such platforms and ramps are in their highest position.*
- .9.2 *Where access doors to decks are located below ramps, these shall also be secured against opening when the ramps are being manoeuvred.*
- .9.3 *Ramps to platform decks must not block the approved routes of escape.*
- .10.1 *Platforms and ramps shall be test-loaded in the presence of the Danish Maritime Authority or recognised classification societies using the following test loads: 125% of the workload if this is between 20 and 50 tonnes, 110% of the workload if this is 50 tonnes or above. Platforms shall be testloaded with the loadings stipulated above if one or both edges are*

- suspended from stays or wires. If the platform rests on permanent brackets at both edges, test-loading shall not be carried out, but the entire load-bearing structure shall be inspected.*
- .10.2 Ramps shall be statically test-loaded (supported at the movable end) with the test loadings stipulated above.*
- .11 The hydraulic system shall be pressure-tested at 1.5 times the maximum working pressure, however not at more than 7 N/mm² above the working pressure.*
- .12 Fall arrest systems shall not be tested with the ramp loaded, but a simulated release of the fall arrest shall be carried out with the ramp resting on trestles or the like. Where a double wire system has been installed instead of a fall arrest system, the ramps shall be test-loaded in the horizontal position with the loading mentioned above.*
- .13 When ramp and platform lifting devices are being used, a load test shall be carried out of each platform and ramp during movement from working position to rest position, or as close to this as possible, with a test loading of 25% of the platform's or ramp's own weight.*
- .14 When the tests have been completed, the structure shall be thoroughly examined, and if any part of it shows deformation, cracking or any other damage of significance as far as safety is concerned, the damage shall be remedied and a new test may be required by order of the Danish Maritime Authority in each individual case.*
- .15.1 Each year, a complete examination shall be carried out of platforms, ramps and lifting devices, including tests of fall-arresting systems, cf. subparagraph 23.12.*
- .15.2 If the fall-arresting system is of such a type or design that a test cannot be arranged, the functioning of all the components of the system shall be tested and replaced if necessary.*
- .15.3 Every second year, load tests shall also be carried out, cf. subparagraphs 23.10, 23.13 and 23.14.*
- .15.4 In the case of ramps and platforms that are manoeuvred only when there are no persons on them, the load tests shall be carried out every four years, cf. subparagraphs 23.10, 23.13 and 23.14.*
- .15.5 Functional tests and replacements shall be recorded in the survey book.*

Regulation 24 Railings

NEW CLASS A, B, C AND D SHIPS CONSTRUCTED ON OR AFTER 1 JANUARY 2003:

- .1 On external decks to which passengers are permitted access, and where there is no bulwark of adequate height provided, railings shall be provided of a height of minimum 1,100 mm above the deck and of such design and construction as to prevent any passenger from climbing on these railings and from accidentally falling from that deck.*

NEW CLASS A, B, C AND D SHIPS AND EXISTING CLASS A AND B SHIPS:

- .2 *On decks to which passengers are permitted access, and where there is no bulwark of adequate height provided, railings shall be provided complying with the following guidelines:*
 - .2.1 *The railings shall have a total height of at least 1,000 mm measured from the deck.*
 - .2.2 *The railings shall be designed with vertical stanchions that are connected only to an upper and a lower horizontal bar, possibly a stringer or a curtain plate.*
 - .2.3 *The distance between the upper and lower horizontal bars/stringers or curtain plates mentioned in subparagraph 24.2.2 may not be less than 800 mm.*
 - .2.4 *The opening below the lower horizontal bar mentioned in subparagraph 24.2.2 may not be above 120 mm.*
 - .2.5 *The opening between the vertical stanchions may not be above 120 mm and the distance between sceptres may not be above 1.5 m.*
- .3 *Stairs and landings on such external decks shall be provided with railings of equivalent construction.*
- .4 *Decks which have been effectively barred so that passengers cannot stay or move about on them shall either be fitted with railing complying with subparagraphs 24.2.1 to 24.2.5 above or railings/bulwark as prescribed in the Load Line Convention.*
- .5 *An arrangement that is poorer than a railing or a gate complying with subparagraphs 24.2.1 to 24.2.5 above cannot be approved as an effective barring.*
- .6 *Where a gate is used, the means of closing it may not be immediately accessible to the passengers, and suitable signs shall be affixed.*
- .7 *The Danish Maritime Authority may allow deviations from the above provided that the intended prevention against forcing and falls is achieved.*

Regulation 25 Hatches, cargo ladders, etc.¹

NEW CLASS A, B, C AND D SHIPS AND EXISTING CLASS A AND B SHIPS:

- .1 *Where the height from the upper edge of the deck to the bottom of the cargo spaces exceeds 1.5 m, sound and secure ladders shall be provided which can continue directly into steps or the like on the hatch coaming. If there are more decks, ladders between the lower decks shall, where practicable, be located in line with ladders from decks above. At the hatch coamings, sufficient room shall be provided to use the ladders. The steps shall have a breadth of at least 250 mm, and the foothold shall have a depth of at least 115 mm. It may not be possible for the foot to slip to the side outside the step.*

¹ *The provisions in this regulation are based on the International Convention on the Protection of Workers against Accidents during the Loading and Unloading of Ships, ILO Conventions no. 32 and 152. Furthermore, reference is made to IMO Resolutions A.272(VIII) and A.330(IX) on safe access to and work in large tanks and large cargo spaces.*

- .2 *Around hatches the coaming height of which is less than 75 cm measured from the upper edge of the deck and leading to cargo spaces with a depth of more than 1.5 m, it shall be possible to erect a fencing of a height of at least 90 cm consisting of railings, hand ropes or the like.*
- .3 *Similar fencing shall be provided at companionways or other deck openings where it is considered necessary.*
- .4 *It shall be possible to secure hatch beams against horizontal and vertical shifting.*