

Directive 2009/45/EC of the European Parliament and of the Council of 6 May 2009 on safety rules and standards for passenger ships (Recast) (Text with EEA relevance)

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[^{F1}ANNEX I

SAFETY REQUIREMENTS FOR NEW AND EXISTING PASSENGER SHIPS ENGAGED ON DOMESTIC VOYAGES

Textual Amendments

- F1** Substituted by [Commission Directive 2010/36/EU of 1 June 2010 amending Directive 2009/45/EC of the European Parliament and of the Council on safety rules and standards for passenger ships \(Text with EEA relevance\)](#).

CHAPTER II-1

CONSTRUCTION — SUBDIVISION AND STABILITY, MACHINERY AND ELECTRICAL INSTALLATIONS

PART A

GENERAL

1 Definitions relating to Part B (R 2)

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

.1

1. *Subdivision load line* is the waterline used in determining the subdivision of the ship.
2. *Deepest subdivision load line* is the waterline which corresponds to the greatest draught permitted by the subdivision requirements which are applicable.
- .2 *Length of the ship* is the length measured between perpendiculars taken at the extremities of the deepest subdivision load line.
- .3 *Breadth of the ship* is the extreme width from outside of frame to outside of frame at or below the deepest subdivision load line.
- .4 *Draught* is the vertical distance from the moulded base line amidships to the subdivision load line in question.
- .5 *Deadweight* is the difference in tonnes between the displacement of a ship in water of a specific gravity of 1,025 at the load waterline corresponding to the assigned summer freeboard and the lightweight of the ship.
- .6 *Lightweight* is the displacement of a ship in tonnes without cargo, fuel, lubricating oil, ballast water, fresh water and feedwater in tanks, consumable stores, and passengers and crew and their effects.
- .7 *Bulkhead deck* is the uppermost deck up to which the transverse watertight bulkheads are carried.
- .8 *Margin line* is a line drawn at least 76 mm below the upper surface of the bulkhead deck at side.

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- .9 *Permeability of a space* is the percentage of that space which can be occupied by water. The volume of a space which extends above the margin line shall be measured only to the height of that line.
- .10 *Machinery space* is to be taken as extending from the moulded base line to the margin line and between the extreme main transverse watertight bulkheads, bounding the spaces containing the main and auxiliary propulsion machinery, and boilers serving the needs of propulsion.
- .11 *Passenger spaces* are those spaces which are provided for the accommodation and use of passengers, excluding baggage, store, provision and mail rooms.
- .12 *Watertight* in relation to structure means capable of preventing the passage of water through the structure in any direction under the head of water likely to occur in the intact or damage condition.
- .13 *Weathertight* means that water will not penetrate into the ship in any sea conditions.
- .14 *Ro-ro passenger ship* means a passenger ship with ro-ro cargo spaces or special category spaces as defined in Regulation II-2/A/2.

2 Definitions relating to Parts C, D, and E (R 3)
NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1
1. *Steering gear control system* is the equipment by which orders are transmitted from the navigating bridge to the steering gear power units. Steering gear control systems comprise transmitters, receivers, hydraulic control pumps and their associated motors, motor controllers, piping and cables.
2. *Main steering gear* is the machinery, rudder actuators, steering gear power units, if any, and ancillary equipment and the means of applying torque to the rudder stock (e.g. tiller or quadrant) necessary for effecting movement of the rudder for the purpose of steering the ship under normal service conditions.
- .2 *Steering gear power unit* is:
1. in the case of electric steering gear, an electric motor and its associated electrical equipment;
2. in the case of electrohydraulic steering gear, an electric motor and its associated electrical equipment and connected pump;
3. in the case of other hydraulic steering gear, a driving engine and connected pump.
- .3 *Auxiliary steering gear* is the equipment other than any part of the main steering gear necessary to steer the ship in the event of failure of the main steering gear but not including the tiller, quadrant or components serving the same purpose.
- .4 *Normal operational and habitable condition* is a condition under which the ship as a whole, the machinery, services, means and aids ensuring propulsion, ability to steer, safe navigation, fire and flooding safety, internal and external communications and signals, means of escape, and emergency boat winches, as well as the designed comfortable conditions of habitability are in working order and functioning normally.

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- .5 *Emergency condition* is a condition under which any services needed for normal operational and habitable conditions are not in working order due to failure of the main source of electrical power.
- .6 *Main source of electrical power* is a source intended to supply electrical power to the main switchboard for distribution to all services necessary for maintaining the ship in normal operational and habitable condition.
- .7 *Dead ship condition* is the condition under which the main propulsion plant, boilers and auxiliaries are not in operation due to the absence of power.
- .8 *Main generating station* is the space in which the main source of electrical power is situated.
- .9 *Main switchboard* is a switchboard which is directly supplied by the main source of electrical power and is intended to distribute electrical energy to the ship's services.
- .10 *Emergency switchboard* is a switchboard which in the event of failure of the main electrical power supply system is directly supplied by the emergency source of electrical power or the transitional source of emergency power and is intended to distribute electrical energy to the emergency services.
- .11 *Emergency source of electrical power* is a source of electrical power, intended to supply the emergency switchboard in the event of failure of the supply from the main source of electrical power.
- .12 *Maximum ahead service speed* is the greatest speed which the ship is designed to maintain in service at sea at the deepest seagoing draught.
- .13 *Maximum astern speed* is the speed which it is estimated the ship can attain at the designed maximum astern power at the deepest seagoing draught.
- .14(a) *Machinery spaces* are all machinery spaces of category A and all other spaces containing propelling machinery, boilers, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilising, ventilation and air conditioning machinery, and similar spaces, and trunks to such spaces.
- .14(b) *Machinery spaces of category A* are those spaces and trunks to such spaces which contain:
- .1 internal combustion machinery used for main propulsion; or
 - .2 internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 kW; or
 - .3 any oil-fired boiler or oil fuel unit.
- .15 *Power actuating system* is the hydraulic equipment provided for supplying power to turn the rudderstock, comprising a steering gear power unit or units, together with the associated pipes and fittings, and a rudder actuator. The power actuating systems may share common mechanical components, i.e. tiller, quadrant and rudder stock, or components serving the same purpose.
- .16 *Control stations* are those spaces in which the ship's radio or main navigating equipment or the emergency source of power is located or where the fire recording or fire control equipment is centralised.

PART A-1

STRUCTURE OF SHIPS

1 New installation of materials containing asbestos (R 3-5)

ALL SHIPS

- .1 This Regulation shall apply to materials used for the structure, machinery, electrical installations and equipment covered by the Regulations of this Annex.
- .2 For all ships, new installation of materials which contain asbestos shall be prohibited.

2 Construction drawings maintained on board and ashore (R 3-7)

CLASS B, C AND D SHIPS CONSTRUCTED ON OR AFTER 1 JANUARY 2012

- .1 A set of as-built construction drawings and other plans showing any subsequent structural alterations shall be kept on board ships constructed on or after 1 January 2012.
- .2 An additional set of such drawings shall be kept ashore by the Company, as defined in Regulation IX/1.2 of the 1974 SOLAS Convention.
- .3 Reference is made to the IMO MSC/Circ.1135 on 'As-built construction drawings to be maintained on board the ship and ashore'.

3 Towing and mooring equipment (R 3-8)

CLASS B, C AND D SHIPS OF 24 METRES IN LENGTH AND ABOVE CONSTRUCTED ON OR AFTER 1 JANUARY 2012

- .1 Ships shall be provided with arrangements, equipment and fittings of sufficient safe working load to enable the safe conduct of all towing and mooring operations associated with the normal operation of the ship.
- .2 Arrangements, equipment and fittings provided in accordance with paragraph 1 shall comply with the standards specified for classification by the rules of a recognised organisation, or equivalent rules used by an Administration in accordance with Article 14(2) of Directive 94/57/EC.
- .3 Reference is made to the IMO MSC/Circ.1175 on 'Guidance on shipboard towing and mooring equipment'.
- .4 Each fitting or item of equipment provided under this Regulation shall be clearly marked with any restrictions associated with its safe operation, taking into account the strength of its attachment to the ship's structure.

[^{F24} Protection against noise

CLASS B, C AND D SHIPS CONSTRUCTED ON OR AFTER 1 JANUARY 2018

- .1 Ships of 1 600 gross tonnage and above shall be constructed to reduce on-board noise and to protect personnel from the noise in accordance with the IMO Code on noise levels on-board ships, adopted by the Maritime Safety Committee by resolution MSC.337(91), as may be amended by the IMO.]

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Textual Amendments

- F2** Inserted by [Commission Directive \(EU\) 2016/844 of 27 May 2016 amending Directive 2009/45/EC of the European Parliament and of the Council on safety rules and standards for passenger ships \(Text with EEA relevance\)](#).

PART B

INTACT STABILITY, SUBDIVISION AND DAMAGE STABILITY

Part B-1

Ships constructed on or after 1 January 2009 – option of applying Resolution MSC.216(82)

Class B, C and D ships the keel of which was laid on or after 1 January 2009, or which were at a similar stage of construction on that date, shall apply the requirements in part B-2 or, alternatively, the appropriate provisions of SOLAS Chapter II-1, part B, as laid down in Annex 2 of Resolution MSC 216(82).

Part B-2

Ships constructed before 1 January 2009

1 Intact stability Resolution A.749(18) as amended by Resolution MSC.75(69) NEW CLASS A, B, C AND D SHIPS OF 24 METRES IN LENGTH AND ABOVE:

All classes of new ships of 24 metres in length and above shall comply with the relevant provisions for passenger ships of the Code on Intact Stability as adopted by the IMO Resolution A.749(18), as amended.

Where Member States consider the application of the Severe Wind and Rolling Criterion of IMO Resolution A.749(18), as amended, inappropriate, an alternative approach ensuring satisfactory stability may be applied. This should be supported by evidence to the Commission 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) as amended, 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 the lower edges of 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 °;

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- (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), as amended.

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), as amended, paragraph 3.1.2.6 (additional criteria for passenger ships) and paragraph 3.2 (Severe Wind and Rolling Criterion).

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

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.

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 Administration of the flag State 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.

4 Permissible length of compartments (R 6)

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

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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.

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.

6 Subdivision factor

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

The factor of subdivision shall be:

- 1,0 when the ship is certified to carry less than 400 persons, and
- 1,0 when the ship is certified to carry 400 persons or more with a length $L < 55$, and
- 0,5 when the ship is certified to carry 400 persons 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.

EXISTING CLASS B NON RO-RO PASSENGER SHIPS:

The factor of subdivision shall be: 1,0

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.

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- .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 Administration of the flag State 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 11,0 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.

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.

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.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:

.2.3.1 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.

.2.3.2 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.

.2.3.3 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.

.2.3.4 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

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- 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:
- .2.1 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;
- .2.2 for lifeboats which are arranged to be launched fully loaded from the stowed position, the maximum heeling moment during launching shall be taken;
- .2.3 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;
- .2.4 persons not in the life-saving appliances which are swung out shall not provide either additional heeling or righting moment;
- .2.5 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:
- .3.1 class B: a wind pressure of 120 N/m^2 to be applied;
classes C and D: a wind pressure of 80 N/m^2 to be applied;
- .3.2 the area applicable shall be the projected lateral area of the ship above the waterline corresponding to the intact condition;
- .3.3 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:

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Spaces	Permeability(%)
Appropriated to cargo or stores	60
Occupied by accommodations	95
Occupied by machineries	85
Intended for liquids	0 or 95 ^a

a 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 °.

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- .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 Administration of the flag State 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 cross-flooding, 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 Administration of the flag State 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 Administration of the Flag State 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.

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 to MSC/Circ.574, 'Calculation Procedure to Assess the Survivability Characteristics of Existing Ro-Ro Passenger Ships When Using a Simplified Method Based Upon Resolution A.265(VIII)'.

Value of A/A_{max}:	Date of compliance:
less than 85 %	1 October 1998

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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

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 is to occur at the latest:

.2.1	Value of A/Amax:	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

.2.2 Number of persons permitted to be carried:

1	1 October 2002
500	
or	
more	
1	1 October 2006
000	
or	
more	
but	
less	
than	
1	
500	
600	1 October 2008
or	
more	
but	
less	
than	

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1
000
400 1 October 2010
or
more
but
less
than
600

.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.

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 400 persons or more, 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.

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:

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- .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 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.
- .7 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.

10 **Double bottoms (R 12)**

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

- .1 In ships with a length of less than 50 metres 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.
- .2 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.
- .3 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.
- .4 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.
- .5 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.

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- .6 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 Administration of the flag State if satisfied that the arrangements give protection equivalent to that afforded by a double bottom complying with this Regulation.
- .7 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 Administration of the flag State, thereby impaired.
- .8 Notwithstanding paragraph .1 of this Regulation 10, the Administration of the flag State 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.

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 Administration of the flag State 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.

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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 out fitting 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.
- .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.

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.

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- .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 after side 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:

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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 Administration of the flag State 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

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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 Administration of the flag State 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 Administration of the flag State;
 - .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 Administration of the flag State. 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 Administration of the flag State 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.

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- .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

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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

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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 Administration of the flag State 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 Administration of the flag State 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 Administration of the flag State.
- .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 Administration of the flag State 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.

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.

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- .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.

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

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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:

- .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.
- .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.
- .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.
- .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 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.
- .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.
- .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 Administration of the flag State.
- .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.

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- .8 Such ports shall in no case be so fitted as to have their lowest point below the deepest subdivision load line.

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.

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.

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- .2 Notwithstanding the requirements of paragraph .1.1 and .1.4, the Administration of the flag State 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.

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 Administration of the flag State 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 ro-ro passenger ships of less than 40 metres in length and new class D ro-ro passenger ships may, instead of complying with paragraphs .1.1 to .1.6, comply with paragraphs .2.1 to .2.3, 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 Administration of the flag State may permit some accesses to be opened during the voyage but only for a period

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sufficient to permit through passage and, if required, for the essential working of the ship.

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.

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 Administration of the flag State 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.

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 Administration of the flag State, 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 Administration of the flag State 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 Administration of the flag State that reliable stability information for the exempted ship can be obtained from such basic data. Reference is made to MSC/Circ.1158.
- .5 When an accurate inclining is not practical, the lightweight displacement and centre of gravity shall be determined by a lightweight survey and accurate calculation. Reference is made to the information contained in Regulation 2.7 in the in the High Speed Craft Code 2000.

19 Damage control plans (R 23)

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

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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.

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

- .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 Administration of the flag State, 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.

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 ensue that they may be properly used to provide maximum safety.

22 Entries in log (R 25)

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

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- .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.

23 Hoistable car platforms and ramps

NEW CLASS A, B, C AND D AND EXISTING CLASS 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 measures imposed by the Administration of the flag State. With regard to the construction, the relevant rules of a recognised organisation shall be used.

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.
2. Stairs and landings on such external decks shall be provided with railings of equivalent construction.

PART C

MACHINERY

1 General (R 26)

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

- .1 The machinery, boilers and other pressure vessels, associated piping systems and fittings shall be so installed and protected as to reduce to a minimum any danger to persons on board, due regard being paid to moving parts, hot surfaces and other hazards.
- .2 Means shall be provided whereby normal operation of propulsion machinery can be sustained or restored even though one of the essential auxiliaries becomes inoperative.
- .3 Means shall be provided to ensure that the machinery can be brought into operation from the dead ship condition without external aid.

NEW CLASS B AND C SHIPS:

- .4 Main propulsion machinery and all auxiliary machinery essential to the propulsion and the safety of the ship shall, as fitted in the ship, be designed to operate when the ship is upright and when inclined at any angle of list up to and including 15 ° either way under static conditions and 22,5 ° under dynamic conditions (rolling) either way and simultaneously inclined dynamically (pitching) 7,5 ° by bow or stern.

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

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- .5 Means shall be provided for the propulsion machinery and the propeller to be stopped in cases of emergencies from relevant positions outside of the engine room/engine control room, e.g. open deck or the wheel house.

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

- .6 Location and arrangement of vent pipes for fuel oil service, settling and lubricating oil tanks shall be such that in the event of a broken vent pipe this shall not directly lead to the risk of ingress of seawater splashes or rainwater. Two fuel oil service tanks for each type of fuel used on board necessary for propulsion and vital systems or equivalent arrangements shall be provided on each ship, with a capacity of at least 8 hours for class B ships and at least 4 hours for class C and D ships, at maximum continuous rating of the propulsion plant and normal operating load at sea of the generator plant.

2 Internal combustion engines (R 27)

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

- .1 Internal combustion engines of a cylinder diameter of 200 mm, or a crankcase volume of 0,6 m³ and above shall be provided with crankcase explosion relief valves of a suitable type with sufficient relief area. The relief valves shall be arranged or provided with means to ensure that discharge from them is so directed as to minimise the possibility of injury to personnel.

3 Bilge pumping arrangement (R 21)

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

- .1.1 An efficient bilge pumping system shall be provided, capable of pumping from and draining any watertight compartment other than a space permanently appropriated for the carriage of fresh water, water ballast, oil fuel or liquid cargo and for which other efficient means of pumping are provided, under all practical conditions. Efficient means shall be provided for draining water from insulated holds.
- .1.2 Sanitary, ballast and general service pumps may be accepted as independent power bilge pumps if fitted with the necessary connections to the bilge pumping system.
- .1.3 All bilge pipes used in or under fuel storage tanks or in boiler or machinery spaces, including spaces in which oil-settling tanks or oil fuel pumping units are situated, shall be of steel or other suitable material.
- .1.4 The arrangement of the bilge and ballast pumping system shall be such as to prevent the possibility of water passing from the sea and from water ballast spaces into the cargo and machinery spaces, or from one compartment to another. Provision shall be made to prevent any deep tank having bilge and ballast connections being inadvertently flooded from the sea when containing cargo, or being discharged through a bilge pump when containing water ballast.
- .1.5 All distribution boxes and manually operated valves in connection with the bilge pumping arrangements shall be in positions which are accessible under ordinary circumstances.

NEW CLASS B, C AND D SHIPS:

- .1.6 Provision shall be made for the drainage of enclosed cargo spaces situated on the bulkhead deck.
- .1.6.1 Where the freeboard to the bulkhead deck is such that the deck edge is immersed when the ship heels more than 5 °, the drainage shall be by means of a sufficient number

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of scuppers of suitable size discharging directly overboard, fitted in accordance with the requirements of Regulation 15.

- .1.6.2 Where the freeboard is such that the edge of the bulkhead deck is immersed when the ship heels 5 ° or less, the drainage of the enclosed cargo spaces on the bulkhead deck shall be led to a suitable space, or spaces, of adequate capacity, having high water level alarm and provided with suitable arrangements for discharge overboard. In addition it will be ensured that:
- .1 the number, size and disposition of the scuppers are such as to prevent unreasonable accumulation of free water;
 - .2 the pumping arrangements required by this Regulation take account of the requirements for any fixed pressure water spraying fire-extinguishing system;
 - .3 water contaminated with petrol or other dangerous substances is not drained to machinery spaces or other spaces where sources of ignition may be present; and
 - .4 where the enclosed cargo space is protected by a carbon dioxide fire-extinguishing system the deck scuppers are fitted with means to prevent the escape of the smothering gas.

NEW CLASS A, B, C AND D SHIPS:

- .1.6.3 The drainage from ro-ro decks and car decks shall be of sufficient capacity that the scuppers, wash ports etc. on the starboard and the port side shall be able to cope with a quantity of water originating from drencher and fire pumps, taking into account the ship's conditions of heel and trim.
- .1.6.4 When provided with sprinkler installations and hydrants, passenger and crew lounges shall have an adequate number of scuppers, sufficient to cope with the quantity of water originating from fire extinguishing by the room's sprinkler heads and from two fire hoses with jets. The scuppers shall be located in the most effective positions, e.g. in each corner.

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

- .2.1 The bilge pumping system required by paragraph .1.1 shall be capable of operation under all practicable conditions after a casualty whether the ship is upright or listed. For this purpose wing suctions shall generally be fitted except in narrow compartments at the end of the ship where one suction may be sufficient. In compartments of unusual form, additional suctions may be required. Arrangements shall be made whereby water in the compartment may find its way to the suction pipes.
- .2.2 Where practicable, the power bilge pumps shall be placed in separate watertight compartments and so arranged or situated that these compartments will not be flooded by the same damage. If the main propulsion machinery, auxiliary machinery and boilers are in two or more watertight compartments, the pumps available for bilge service shall be distributed as far as is possible throughout these compartments.
- .2.3 With the exception of additional pumps which may be provided for peak compartments only, each required bilge pump shall be so arranged as to draw water from any space required to be drained by paragraph .1.1.
- .2.4 Each power bilge pump shall be capable of pumping water through the required main bilge pipe at a speed of not less than 2 m/sec. Independent power bilge pumps situated in machinery spaces shall have direct suctions from these spaces, except that not more than two such suctions shall be required in any one space. Where two or more such

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suctions are provided there shall be at least one on each side of the ship. Direct suction shall be suitably arranged and those in a machinery space shall be of a diameter not less than that required for the bilge main.

- .2.5 In addition to the direct bilge suction or suction required by paragraph .2.4 a direct emergency bilge suction fitted with a non-return valve shall be led from the largest available independent power driven pump to the drainage level of the machinery space; the suction shall be of the same diameter as the main inlet to the pumps used.
- .2.6 The spindles of the sea inlet and direct suction valves shall extend well above the engine-room platform.
- .2.7 All bilge suction piping up to the connection to the pumps shall be independent of other piping.
- .2.8 The diameter 'd' of the main and branch bilge suction pipes shall be calculated according to the following formulae. However, the actual internal diameter may be rounded off to the nearest standard size acceptable to the Administration of the flag State: main bilge suction pipe:

$$d = 25 + 1,68\sqrt{L(B+D)}$$

branch bilge suction pipes between collecting boxes and suction:

$$d = 25 + 2,15\sqrt{L_1(B+D)}$$

where:

d	is the internal diameter of the bilge main (millimetres),
L and B	are the length and the breadth of the ship (metres),
L ₁	is the length of the compartment, and
D	is the moulded depth of the ship to bulkhead deck (metres) provided that, in a ship having an enclosed cargo space on the bulkhead deck which is internally drained in accordance with the requirements of paragraph .1.6.2 and which extends for the full length of the ship, D shall be measured to the next deck above the bulkhead deck. Where the enclosed cargo spaces cover a lesser length, D shall be taken as the moulded depth to the bulkhead deck plus lh/L where l and h are the aggregate length and height respectively of the enclosed cargo spaces.

- .2.9 Provision shall be made to prevent the compartment served by any bilge suction pipe being flooded in the event of the pipe being severed or otherwise damaged by collision or grounding in any other compartment. For this purpose, where the pipe is at any part situated nearer the side of the ship than one fifth of the breadth of the ship (measured at right angles to the centreline at the level of the deepest subdivision load line), or is in a duct keel, a non-return valve shall be fitted to the pipe in the compartment containing the open end.
- .2.10 Distribution boxes, cocks and valves in connection with the bilge pumping system shall be so arranged that, in the event of flooding, one of the bilge pumps may be operative on any compartment; in addition, damage to a pump or its pipe connecting to the bilge main outboard of a line drawn at one fifth of the breadth of the ship shall not put the bilge system out of action. If there is only one system of pipes common to all the pumps, the necessary valves for controlling the bilge suction must be capable of being operated from above the bulkheads deck. Where in addition to the main bilge pumping system an emergency bilge pumping system is provided, it shall be independent of the

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main system and so arranged that a pump is capable of operating on any compartment under flooding condition as specified in paragraph .2.1; in the case only the valves necessary for the operation of the emergency system need be capable of being operated from above the bulkhead deck.

- .2.11 All cocks and valves referred to in paragraph .2.10 which can be operated from above the bulkhead deck shall have their controls at their place of operation clearly marked and shall be provided with means to indicate whether they are open or closed.

4 **Number and type of bilge pumps (R 21)**

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

- up to 250 : one main engine pump and one independent power pump, located and powered outside the engine room,
passengers
over 250 : one main engine pump and two independent power pumps, one of which has to be located and powered outside the engine room.
passengers

The main engine pump may be replaced by one independent power pump.

The drainage of very small compartments may be dealt with movable hand pumps.

5 **Means of going astern (R 28)**

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

- .1 Sufficient power for going astern shall be provided to secure proper control of the ship in all normal circumstances.
- .2 The ability of the machinery to reverse the direction of thrust of the propeller in sufficient time, and so to bring the ship to rest within a reasonable distance from maximum ahead service speed, shall be demonstrated and recorded.
- .3 The stopping times, ship headings and distances recorded on trials, together with the results of trials to determine the ability of ships having multiple propellers to navigate and manoeuvre with one or more propellers inoperative, shall be available on board for use of the master or designated personnel.

6 **Steering gear (R 29)**

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

- .1 Every ship shall be provided with an efficient main and auxiliary steering system. The main steering system and the auxiliary steering system shall be so arranged that the failure of one of them will not render the other one inoperative.
- .2 The main steering gear and rudder stock where fitted shall be:
- .2.1 of adequate strength, and capable to steer the ship at maximum service speed ahead, and so designed that they will not be damaged at maximum speed astern;
- .2.2 [^{F3}capable of putting the rudder over from 35° on one side to 35° on the other side with the ship at its deepest seagoing draught and running ahead at maximum ahead service speed and, under the same conditions from 35° on either side to 30° on the other side in not more than 28 seconds. Where it is impractical to demonstrate compliance with this requirement during sea trials with the ship at its deepest seagoing draught and running ahead at the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch, ships, regardless of their date of construction, may demonstrate compliance with this requirement by one of the following methods:

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- .1 during sea trials the ship is at even keel and the rudder fully submerged whilst running ahead at the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch; or
 - .2 where full rudder immersion during sea trials cannot be achieved, an appropriate ahead speed shall be calculated using the submerged rudder blade area in the proposed sea trial loading condition. The calculated ahead speed shall result in a force and torque applied to the main steering gear which is at least as great as if it was being tested with the ship at its deepest seagoing draught and running ahead at the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch; or
 - .3 the rudder force and torque at the sea trial loading condition have been reliably predicted and extrapolated to the full load condition. The speed of the ship shall correspond to the number of maximum continuous revolutions of the main engine and maximum design pitch of the propeller;]
- .2.3 operated by power where necessary to meet the requirements of paragraph .2.2.2 and in any case when a rudder stock over 120 mm in diameter in way of the tiller, excluding strengthening for navigation in ice, is required in order to comply with paragraph .2.2.1.

Textual Amendments

- F3** Substituted by [Commission Directive \(EU\) 2016/844 of 27 May 2016 amending Directive 2009/45/EC of the European Parliament and of the Council on safety rules and standards for passenger ships \(Text with EEA relevance\)](#).

- .3 If fitted, the auxiliary steering gear shall be:
 - .1 of adequate strength and capable of steering the ship at navigable speed and of being brought speedily into action in an emergency;
 - .2 [^{F3}capable of putting the rudder over from 15° on one side to 15° on the other side in not more than 60 seconds with the ship at its deepest seagoing draught and running ahead at one half of the maximum ahead service speed or 7 knots, whichever is the greater. Where it is impractical to demonstrate compliance with this requirement during sea trials with the ship at its deepest seagoing draught and running ahead at one half of the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch or 7 knots, whichever is greater, ships regardless of their date of construction may demonstrate compliance with this requirement by one of the following methods:
 - .1 during sea trials the ship is at even keel and the rudder fully submerged whilst running ahead at one half of the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch or 7 knots, whichever is greater; or
 - .2 where full rudder immersion during sea trials cannot be achieved, an appropriate ahead speed shall be calculated using the submerged rudder blade area in the proposed sea trial loading condition. The calculated ahead speed shall result in a force and torque applied to the auxiliary steering gear which is at least as great as if it was being tested with the ship at its deepest

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seagoing draught and running ahead at one half of the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch or 7 knots, whichever is greater; or

.3 the rudder force and torque at the sea trial loading condition have been reliably predicted and extrapolated to the full load condition;]

.3 operated by power where necessary to meet the requirements of paragraph .3.2 and in any case where a rudder stock is more than 230 mm in diameter in way of the tiller, excluding strengthening for navigation in ice.

NEW CLASS B, C AND D SHIPS:

.4 Steering power units shall be:

.1 arranged to restart automatically when power is restored after a power failure; and

.2 capable of being brought into operation from a position on the navigating bridge. In the event of a power failure to any of the steering power units, an audible and visual alarm shall be given on the navigating bridge.

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

.5 Where the main steering gear comprises two or more identical power units, an auxiliary steering gear need not be fitted, provided that:

.1 the main steering gear is capable of operating the rudder as required by paragraph .2.2.2 while any one of the power unit is out of operation;

.2 the main steering gear is so arranged that after a single failure in its piping system or in one of the power units the defect can be isolated so that the steering capability can be maintained or speedily regained.

NEW CLASS B, C AND D SHIPS:

.6 Steering gear control shall be provided:

.1 for the main steering gear, both on the navigating bridge and in the steering compartment;

.2 when the main steering gear is arranged in accordance with paragraph .4, by two independent control systems, both operable from the navigating bridge. This does not require duplication of the steering wheel or steering lever. Where the control system consists of a hydraulic telemotor, a second independent system need not be fitted;

.3 for the auxiliary steering gear, in the steering gear compartment and, if power operated, it shall also be operable from the navigating bridge and shall be independent of the control system for the main steering gear.

.7 Any main and auxiliary steering gear control system operable from the navigating bridge shall comply with the following:

.1 if electric, it shall be served by its own separate circuit supplied from a steering gear power circuit from a point within the steering gear compartment, or directly from switchboard busbars supplying that steering gear power circuit at a point on the switchboard adjacent to the supply to the steering gear power circuit;

.2 means shall be provided in the steering gear compartment for disconnecting any control system operable from the navigating bridge from the steering gear it serves;

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- .3 the system shall be capable of being brought into operation from a position on the navigating bridge;
 - .4 in the event of a failure in the electrical power supply to the control system, an audible and visual alarm shall be given in the navigating bridge; and
 - .5 short circuit protection only shall be provided for steering gear control supply circuits.
 - .8 The electrical power circuits and the steering gear control systems with their associated components, cables and pipes required by this Regulation and by Regulation 7 shall be separated as far as is practicable throughout their length.
 - .9 A means of communication shall be provided between the navigating bridge and the steering gear compartment or alternative steering position.
 - .10 The angular position of the rudder(s) shall:
 - .1 if the main steering gear is power operated, be indicated on the navigating bridge. The rudder angle indication shall be independent of the steering gear control system;
 - .2 be recognisable in the steering gear compartment.
 - .11 Hydraulic power-operated steering gear shall be provided with the following:
 - .1 arrangements to maintain the cleanliness of the hydraulic fluid taking into consideration the type and design of the hydraulic system;
 - .2 a low-level alarm for each hydraulic fluid reservoir to give the earliest practical indication of hydraulic fluid leakage. Audible and visual alarms shall be given on the navigating bridge and in the machinery space where they can be readily observed; and
 - .3 a fixed storage tank having sufficient capacity to recharge at least one power actuating system including the reservoir, where the main steering gear is required to be power-operated. The storage tank shall be permanently connected by piping in such manner that the hydraulic systems can be readily recharged from a position within the steering gear compartment and shall be provided with a contents gauge.
 - .12 The steering gear compartments shall be:
 - .1 readily accessible and, as far as practicable, separated from machinery spaces; and
 - .2 provided with suitable arrangements to ensure working access to steering gear machinery and controls. These arrangements shall include handrails and gratings or other nonslip surfaces to ensure suitable working conditions in the event of hydraulic fluid leakage.
- 7 Additional requirements for electric and electro-hydraulic steering gear (R 30)**
 NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:
- .1 Means for indicating that the motors of electric and electro-hydraulic steering gears are running shall be installed on the navigating bridge and at a suitable main machinery control position.
- NEW CLASS B, C AND D SHIPS:
- .2 Each electric or electro-hydraulic steering system comprising one or more power units shall be served by at least two exclusive circuits fed directly from the main switchboard; however, one of the circuits may be supplied through the emergency switchboard. An auxiliary electric or electro-hydraulic steering system associated with

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a main electric or electro-hydraulic steering system may be connected to one of the circuits supplying this main steering system. The circuits supplying an electric or electro-hydraulic steering system shall have adequate rating for supplying all motors which can be simultaneously connected to them and may be required to operate simultaneously.

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

- .3 Short circuit protection and an overload alarm shall be provided for steering gear electric and electro-hydraulic circuits and motors. Protection against excess current, including starting current, if provided, shall be for not less than twice the full load current of the motor or circuit so protected, and shall be arranged to permit the passage of the appropriate starting currents.

NEW CLASS B, C AND D SHIPS:

The alarms required in this paragraph shall be both audible and visual and shall be situated in a conspicuous position in the main machinery space or control room from which the main machinery is normally controlled and as may be required by Regulation 6 of Part E of this chapter.

- .4 When an auxiliary steering gear required by Regulation II-1/6.3.3 to be operated by power is not electrically powered or is powered by an electric motor primarily intended for other services, the main steering system may be fed by one circuit from the main switchboard. Where such an electric motor primarily intended for other services is arranged to power such an auxiliary steering system, the requirements of paragraph .3 may be waived by the Administration of the flag State, if satisfied with the protection arrangement together with the requirements of Regulation 6.4.1 and .4.2 applicable to auxiliary steering systems.

8 Ventilating systems in machinery spaces (R 35)

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

Machinery spaces of category A shall be adequately ventilated so as to ensure that when machinery or boilers therein are operating at full power in all weather conditions including heavy weather, an adequate supply of air is maintained to the spaces for the safety and comfort of personnel and the operation of the machinery.

9 Communication between the navigating bridge and machinery space (R 37)

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

At least two independent means of communication shall be provided for communication orders from the navigating bridge to the position in the machinery space or in the control room from which the speed and direction of thrust of the propellers are normally controlled: one of these shall be an engine-room telegraph which provides visual indication of the orders and responses both in the machinery space and on the navigating bridge. Appropriate means of communication shall be provided to any other position from which the speed or direction of thrust of the propellers may be controlled.

10 Engineers' alarm (R 38)

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

An engineers' alarm shall be provided to be operated from the engine control room or at a manoeuvring platform as appropriate, and shall be clearly audible in the engineers' accommodation, and/or navigating bridge as appropriate.

11 Location of emergency installations (R 39)

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

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Emergency sources of electrical power, fire pumps, bilge pumps except those specifically serving the spaces forward of the collision bulkhead, and fixed fire-extinguishing system required by Chapter II-2 and other emergency installations which are essential for the safety of the ship, except anchor windlasses, shall not be installed forward of the collision bulkhead.

12 Machinery controls (R 31)

NEW CLASS B, C AND D SHIPS:

- .1 Main and auxiliary machinery essential for the propulsion and the safety of the ship shall be provided with effective means for its operation and control.
- .2 Where remote control of propulsion machinery from the navigating bridge is provided and the machinery spaces are intended to be manned, the following shall apply:
 - .1 the speed, direction of thrust and, if applicable, the pitch of the propeller shall be fully controllable from the navigating bridge under all sailing conditions, including manoeuvring;
 - .2 the remote control shall be performed, for each independent propeller, by a control device so designed and constructed that its operation does not require particular attention to the operational details of the machinery. Where multiple propellers are designed to operate simultaneously, they may be controlled by one control device.
 - .3 the main propulsion machinery shall be provided with an emergency stopping device on the navigating bridge which shall be independent of the navigating bridge control system;
 - .4 propulsion machinery orders from the navigating bridge shall be indicated in the main machinery control room or at the manoeuvring platform as appropriate;
 - .5 remote control of the propulsion machinery shall be possible only from one location at a time; at such locations interconnected control positions are permitted. At each location there shall be an indicator showing which location is in control of the propulsion machinery. The transfer of control between the navigating bridge and machinery spaces shall be possible only in the main machinery space or the main machinery control room. This system shall include means to prevent the propelling thrust from altering significantly when transferring control from one location to another;
 - .6 it shall be possible to control the propulsion machinery locally, even in the case of failure in any part of the remote control system;
 - .7 the design of the remote control system shall be such that in case of its failure an alarm will be given. The pre-set speed and direction of thrust of the propellers shall be maintained until local control is in operation;
 - .8 indicators shall be fitted on the navigating bridge for:
 - .1 propeller speed and direction of rotation in the case of fixed pitch propellers;
 - .2 propeller speed and pitch position in the case of controllable pitch propellers;
 - .9 an alarm shall be provided on the navigating bridge and in the machinery space to indicate low starting air pressure which shall be set at a level to permit further main engine starting operations. If the remote control system of the propulsion machinery is designed for automatic starting, the number of automatic consecutive attempts which

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fail to produce a start shall be limited in order to safeguard sufficient starting air pressure for starting locally.

- .3 Where the main propulsion and associated machinery, including sources of main electrical power supply, are provided with various degrees of automatic and remote control and are under continuous manual supervision from a control room the arrangements and controls shall be so designed, equipped and installed that the machinery operation will be as safe and effective as if it were under direct supervision; for this purpose Regulations II-1/E/1 to II-1/E/5 shall apply as appropriate. Particular consideration shall be given to protect such spaces against fire and flooding.
- .4 In general, automatic starting, operational and control systems shall include provisions for manually overriding the automatic controls. Failure of any part of such systems shall not prevent the use of the manual override.

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

- .5 Main and auxiliary machinery essential for the propulsion, control and safety shall be provided with effective means for its operation and control. All control systems essential for the propulsion, control and safety of the ship shall be independent or designed such that failure of one system does not degrade the performance of another system.
- .6 Where remote control of propulsion machinery from the navigating bridge is provided, the following shall apply:
 - .1 the speed, direction of thrust and, if applicable, the pitch of the propeller shall be fully controllable from the navigating bridge under all sailing conditions, including manoeuvring;
 - .2 the control shall be performed by a single control device for each independent propeller with automatic performance of all associated services including, where necessary, means of preventing overload of the propulsion machinery. Where multiple propellers are designed to operate simultaneously, they may be controlled by one control device;
 - .3 the main propulsion machinery shall be provided with an emergency stopping device on the navigating bridge which shall be independent of the navigating bridge control system;
 - .4 propulsion machinery orders from the navigation bridge shall be indicated in the main machinery control room and at the manoeuvring platform;
 - .5 remote control of the propulsion machinery shall be possible only from one location at a time; at such locations interconnected control positions are permitted. At each location there shall be an indicator showing which location is in control of the propulsion machinery. The transfer of control between the navigating bridge and machinery spaces shall be possible only in the main machinery space or the main machinery control room. This system shall include means to prevent the propelling thrust from altering significantly when transferring control from one location to another;
 - .6 it shall be possible to control the propulsion machinery locally, even in the case of failure in any part of the remote control system. It shall also be possible to control the auxiliary machinery, essential for the propulsion and safety of the ship, at or near the machinery concerned;

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- .7 the design of the remote control system shall be such that in case of its failure an alarm will be given. The pre-set speed and direction of thrust of the propellers shall be maintained until local control is in operation;
- .8 indicators shall be fitted in the navigation bridge, the main machinery control room and at the manoeuvring platform for:
 - .8.1 propeller speed and direction of rotation in the case of fixed pitch propellers, and
 - .8.2 propeller speed and pitch position in the case of controllable pitch propellers;
- .9 an alarm shall be provided on the navigating bridge and in the machinery space to indicate low starting air pressure which shall be set at a level to permit further main engine starting operations. If the remote control system of the propulsion machinery is designed for automatic starting, the number of automatic consecutive attempts which fail to produce a start shall be limited in order to safeguard sufficient starting air pressure for starting locally.
- .7 Where the main propulsion and associated machinery, including sources of main electrical power supply, are provided with various degrees of automatic and remote control and are under continuous manual supervision from a control room the arrangements and controls shall be so designed, equipped and installed that the machinery operation will be as safe and effective as if it were under direct supervision; for this purpose Regulations II-1/E/1 to II-1/E/5 shall apply as appropriate. Particular consideration shall be given to protect such spaces against fire and flooding.
- .8 In general, automatic starting, operational and control systems shall include provisions for manually overriding the automatic controls. Failure of any part of such systems shall not prevent the use of the manual override.

CLASS B, C AND D SHIPS CONSTRUCTED ON OR AFTER 1 JANUARY 2012 OF 24 METRES IN LENGTH AND OVER:

- .9 On new class B, C and D ships constructed on or after 1 January 2012 the automation systems shall be designed in a manner which ensures that threshold warning of impending or imminent slowdown or shutdown of the propulsion system is given to the officer in charge of the navigational watch in time to assess navigational circumstances in an emergency. In particular, the systems shall control, monitor, report, alert and take safety action to slow down or stop propulsion while providing the officer in charge of the navigational watch an opportunity to manually intervene, except for those cases where manual intervention will result in total failure of the engine and/or propulsion equipment within a short time, for example in the case of overspeed.

13 **Steam pipe systems (R 33)**

NEW CLASS B, C AND D SHIPS:

- .1 Every steam pipe and every fitting connected thereto through which steam may pass shall be so designed, constructed and installed as to withstand the maximum working stresses to which it may be subjected.
- .2 Means shall be provided for draining every steam pipe in which dangerous water hammer action might otherwise occur.
- .3 If a steam pipe or fitting may receive steam from any source at a higher pressure than that for which it is designed a suitable reducing valve, relief valve and pressure gauge shall be fitted.

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14 **Air pressure systems (R 34)**

NEW CLASS B, C AND D SHIPS:

- .1 Means shall be provided to prevent overpressure in any part of compressed air systems and wherever water jackets or casings of air compressors and coolers might be subjected to dangerous overpressure due to leakage into them from air pressure parts. Suitable pressure relief arrangements shall be provided for all systems.
- .2 The main starting air arrangements for main propulsion internal combustion engines shall be adequately protected against the effects of backfiring and internal explosion in the starting air pipes.
- .3 All discharge pipes from starting air compressors shall lead directly to the starting air receivers, and all starting pipes from the air receivers to main and auxiliary engines shall be entirely separate from the compressor discharge pipe system.
- .4 Provisions shall be made to reduce to a minimum the entry of oil into the air pressure systems and to drain these systems.

15 **Protection against noise (R 36)⁽²⁾**

[^{F3}NEW CLASS B, C AND D SHIPS NOT COVERED UNDER REGULATION II-1/A-1/4:]

Measures shall be taken to reduce machinery noise in machinery spaces to acceptable levels. If this noise cannot be sufficiently reduced the source of excessive noise shall be suitably insulated or isolated or a refuge from noise shall be provided if the space is required to be manned. Ear protectors shall be provided for personnel required to enter such spaces.

16 **Lifts**

NEW CLASS A, B, C AND D SHIPS:

- .1 Passenger and goods lifts shall, in respect of dimensioning, layout, number of passengers and/or quantity of goods, comply with the provisions laid down by the Administration of the flag State in each individual case or for each type of plant.
- .2 Installation drawings and maintenance instructions, including provisions governing periodical inspections, shall be approved by the Administration of the flag State, which shall inspect and approve the plant before it is taken into use.
- .3 Following approval, the Administration of the flag State will issue a certificate which is to be kept on board.
- .4 The Administration of the flag State may permit the periodical inspections to be carried out by an expert authorised by the Administration, or by a recognised organisation.

PART D

ELECTRICAL INSTALLATIONS

1 **General (R 40)**

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

- .1 Electrical installations shall be such that:
 - .1 all electrical auxiliary services necessary for maintaining the ship in normal operational and habitable conditions will be ensured without recourse to the emergency source of electrical power;

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- .2 electrical services essential for safety will be ensured under various emergency conditions; and
- .3 the safety of passengers, crew and ship from electrical hazards will be ensured.
- .2 The Administration of the flag State shall take appropriate steps to ensure uniformity of implementation and application of the provision of this part in respect of electrical installations⁽³⁾.

2 **Main source of electrical power and lighting (R 41)**

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

- .1 New ships of class C and D in which the electrical power is the only power for maintaining the auxiliary services essential for the safety of the ship, and new and existing ships of class B in which the electrical power is the only power for maintaining the auxiliary services essential for the safety and the propulsion of the ship, shall be provided with two or more main generating sets of such power that the aforesaid services can be operated when any one sets is out of service.

In new class C and D ships of less than 24 metres in length, one of the main generating sets may be main propulsion engine driven, provided it is of such power that the aforesaid services can be operated when any one other set is out of service.

- .2.1 A main electric lighting system which shall provide illumination throughout those parts of the ship normally accessible to and used by passengers or crew shall be supplied from the main source of electrical power.
- .2.2 The arrangement of the main electric lighting system shall be such that a fire or other casualty in spaces containing the main source of electrical power, associated transforming equipment, if any, the main switchboard and the main lighting switchboard, will not render the emergency lighting system, required by Regulation 3, inoperative.
- .2.3 The arrangement of the emergency electric lighting system shall be such that a fire or other casualty in spaces containing the emergency source of electrical power, associated transforming equipment, if any, the emergency switchboard and the emergency lighting switchboard will not render the main electric lighting system required by this Regulation inoperative.
- .3 The main switchboard shall be so placed relative to one main generating station that, as far as is practicable, the integrity of the normal electrical supply may be affected only by a fire or other casualty in the space where the generating set and the switchboard are installed.

CLASS B, C AND D SHIPS CONSTRUCTED ON OR AFTER 1 JANUARY 2012

- .4 In class B, C and D ships constructed on or after 1 January 2012, supplementary lighting shall be provided in all cabins to clearly indicate the exit so that occupants will be able to find their way to the door. Such lighting, which may be connected to an emergency source of power or have a self-contained source of electrical power in each cabin, shall automatically illuminate when power to the normal cabin lighting is lost and remain on for a minimum of 30 min.

3 **Emergency source of electrical power (R 42)**

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

- .1 Every ship shall be provided with a self-contained emergency source of electrical power with emergency switchboard located above the bulkhead deck, in a readily

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accessible space which shall not be contiguous to the boundaries of machinery spaces of category A or of those spaces containing the main source of electrical power or main switchboard.

- .1 The requirement in the first paragraph is not required provided that ships are designed with two fully redundant machinery spaces, separated by at least one watertight and fire-safe compartment and two bulkheads or an alternative construction giving the same level of safety, and that there is at least one generator with an associated switchboard etc in each machinery space.
- .2 The emergency source of electric power may be either an accumulator battery capable of complying with the requirements of paragraph .5, without being recharged or suffering an excessive voltage drop, or a generator, capable of complying with the requirements of paragraph .5, driven by internal combustion type of machinery with an independent supply of fuel having a flashpoint of not less than 43 °C, with automatic starting arrangements for new ships and approved starting arrangements for existing ships, and provided with a transitional source of emergency electrical power according to paragraph .6, unless, in the case of new class C and D ships of less than 24 metres in length a suitably located independent battery arrangement is provided for that particular consumer for the period of time required for these Regulations.
- .3 The emergency source of electric power shall be so arranged that it will operate efficiently when the ship is listed to 22,5 ° and when the trim of the ship is 10 ° from an even keel. Emergency generator set(s) shall be capable of being readily started in any cold condition likely to be encountered and, in new ships, capable of being started automatically.
- .4 The emergency switchboard shall be situated as near as practicable to the emergency source of power.
- .5 The emergency source of power required by paragraph .1 shall:
 - .1 be capable of operating in general for a period of:
 - 12 hours for class B ships (new and existing)
 - 6 hours for class C ships (new)
 - 3 hours for class D ships (new);
 - .2 in particular, be capable to operate simultaneously the consumers as identified within the following services as required for the class of ships for the times indicated above:
 - (a) one independent bilge power pump and one of the fire pumps;
 - (b) emergency lighting:
 1. at every assembly or embarkation station and over the sides as provided in Regulation III/5.3;
 2. in all alleyways, stairways and exits giving access to the assembly or embarkation stations;
 3. in the machinery spaces, and in the place where the emergency generator is situated;
 4. in the control stations where radio and main navigating equipment are situated;
 5. as required in Regulations II-2/B/16.1.3.7 and II-2/B/6.1.7;

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- 6. at all stowage positions for firefighter's outfits;
 - 7. at one independent bilge power pump and one of the fire pumps, referred to in subparagraph (a) and at the starting position of their motors;
 - (c) the ship's navigation lights;
 - (d)
 - 1. all communication equipment,
 - 2. the general alarm system,
 - 3. the fire detecting system, and
 - 4. all signals which may be required in an emergency, if they are electrically operated from the ship's main generating sets;
 - (e) the ship's sprinkler pump, if any and if it is electrically operated; and
 - (f) the ship's daylight signalling lamp, if it is operated by the ship's main source of electric power;
- .3 be capable to operate, for a period of half an hour, the power-operated watertight doors together with the associated control, indication and alarm circuits.
- .6 The transitional source of emergency electrical power required by paragraph .2 shall consist of an accumulator battery suitably located for the use in an emergency which shall operate without recharging or suffering an excessive voltage drop for half an hour:
- (a) the lighting required by paragraph .2(b)1 of this Regulation;
 - (b) the watertight doors, as required by paragraphs .7.2 and .7.3 of Regulation II-1/B/13, but not necessarily all of them simultaneously, unless an independent temporary source of stored energy is provided; and
 - (c) the control, indication and alarm circuits as required by paragraph .7.2 of Regulation II-1/B/13.
- .7 CLASS B, C AND D SHIPS CONSTRUCTED ON OR AFTER 1 JANUARY 2003:
- Where electrical power is necessary to restore propulsion, the capacity shall be sufficient to restore propulsion to the ship in conjunction with other machinery, as appropriate, from a dead ship condition within 30 min. after blackout.

4 **Supplementary emergency lighting for ro-ro ships (R 42-1)** NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

In addition to the emergency lighting required in Regulation II-1/D/3.5.2(b), on every ship with ro-ro cargo spaces or special category spaces:

- .1 all passenger public spaces and alleyways shall be provided with supplementary electric lighting that can operate for at least three hours when all other sources of electrical power have failed and under any condition of heel. The illumination provided shall be such that the approach to the means of escape can be readily seen. The source of power for the supplementary lighting shall consist of accumulator batteries located within the lighting units that are continuously charged, where practicable, from the emergency switchboard. Alternatively, any other means of

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lighting which is at least as effective may be accepted by the Administration of the flag State. The supplementary lighting shall be such that any failure of the lamp will be immediately apparent. Any accumulator battery provided shall be replaced at intervals having regards to the specific service life in the ambient conditions that they are subject to in service; and

- .2 a portable rechargeable battery operated lamp shall be provided in every crew space alleyway, recreational space and every working space which is normally occupied unless supplementary emergency lighting, as required by paragraph .1 is provided.

5 Precautions against shock, fire and other hazards of electrical origin (R 45)
NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:

- .1 Exposed metal parts of electrical machines or equipment which are not intended to be live but which are liable under fault conditions to become live shall be earthed unless the machines or equipment are:
 - .1 supplied at a voltage not exceeding 50 V direct current or 50 V, root mean square, between conductors; auto-transformers shall not be used for the purpose of achieving this voltage; or
 - .2 supplied at a voltage not exceeding 250 V by safety isolating transformers supplying only one consuming device; or
 - .3 constructed in accordance with the principle of double insulation.
- .2 All electrical apparatus shall be so constructed and so installed as not to cause injury when handled or touched in the normal manner.
- .3 The sides and the rear and, where necessary, the front of switchboards shall be suitably guarded. Exposed live parts having voltages to earth exceeding the voltage specified under 1.1 shall not be installed on the front of such switchboards. Where necessary, non-conducting mats or gratings shall be provided at the front and rear of the switchboard.
- .4 In distribution systems with no connection to earth, a device capable of monitoring the insulation level to earth and giving an audible or visual indication of abnormally low insulation values shall be provided.
- .5.1 All metal sheaths and armour of cables shall be electrically continuous and shall be earthed.
- .5.2 All electrical cables and wiring external to equipment shall be at least of a flame-retarding type and shall be so installed as not to impair their original flame-retarding properties. Where necessary for particular application the Administration of the flag State may permit the use of special type of cables such as radio frequency cables, which do not comply with the foregoing.

NEW CLASS B, C AND D SHIPS:

- .5.3 Cables and wiring serving essential or emergency power, lighting, internal communications or signals shall so far as practicable be routed clear of galleys, laundries, machinery spaces of category A and their casings and other high fire risk areas. In new and existing ro-ro passenger ships, cabling for emergency alarms and public address systems installed on or after 1 July 1998 shall be approved by the Administration of the flag State having regard to the recommendations developed by the IMO. Cables connecting fire pumps to the emergency switchboard shall be of a fire-resistant type where they pass through high fire risk areas. Where practicable

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all such cables should be run in such a manner as to preclude their being rendered unserviceable by heating of the bulkheads that may be caused by a fire in an adjacent space.

- .6 Cables and wiring shall be installed and supported in such a manner as to avoid chafing or other damage. Terminations and joints in all conductors shall be so made as to retain the original electrical, mechanical flame-retarding and, where necessary, fire resisting.

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

- .7.1 Each separate circuit shall be protected against short circuit and against overload, except as permitted in Regulations II-1/C/6 and II-1/C/7.

NEW CLASS B, C AND D SHIPS:

- .7.2 Lighting fittings shall be so arranged as to prevent temperature rises which could damage the cables and wiring, and to prevent surrounding material from becoming excessively hot.

- .8.1 Accumulator batteries shall be suitably housed, and compartments used primarily for their accommodation shall be properly constructed and efficiently ventilated.

- .8.2 Electrical or other equipment which may constitute a source of ignition of flammable vapours shall not be permitted in these compartments.

- .9 Distribution systems shall be so arranged that fire in any main vertical zone, as is defined in Regulation II-2/A/2.9, will not interfere with services essential for safety in any other such zone. This requirement will be met if main and emergency feeders passing through any such zone are separated both vertically and horizontally as wide as is practicable.

NEW CLASS B, C AND D SHIPS, CONSTRUCTED ON OR AFTER 1 JANUARY 2012:

- .10 No electrical equipment shall be installed in any space where flammable mixtures are liable to collect, e.g. in compartments assigned principally to accumulator batteries, in paint lockers, acetylene stores or similar spaces, unless the Administration is satisfied that such equipment is:

- .1 essential for operational purposes;
- .2 of a type which will not ignite the mixture concerned;
- .3 appropriate to the space concerned; and
- .4 appropriately certified for safe usage in the dusts, vapours or gases likely to be encountered.

PART E

ADDITIONAL REQUIREMENTS FOR SHIPS CONSTRUCTED WITH PERIODICALLY UNATTENDED MACHINERY SPACES

Special consideration (R 54)

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

All new ships of class B, C and D and existing class B ships shall be specially considered by the Administration of the flag State as to whether or not their machinery spaces may be periodically unattended and if so whether additional requirements to those stipulated in these Regulations are necessary to achieve equivalent safety to that of normally attended machinery spaces.

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1 **General (R 46)**

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

- .1 The arrangements provided shall be such as to ensure that the safety of the ship in all sailing conditions, including manoeuvring, is equivalent to that of a ship having the machinery spaces manned.
- .2 Measures shall be taken to ensure that the equipment is functioning in a reliable manner and that satisfactory arrangements are made for regular inspections and routine tests to ensure continuous reliable operation.
- .3 Every ship shall be provided with documentary evidence of its fitness to operate with periodically unattended machinery spaces.

2 **Fire precautions (R 47)**

NEW CLASS B, C AND D SHIPS:

- .1 Means shall be provided to detect and give alarms at an early stage in case of fires:
 - .1 in boiler air supply casings and exhausts (uptakes); and
 - .2 in scavenging air belts of propulsion machinery, unless it is considered to be unnecessary in a particular case.
- .2 Internal combustion engines of 2 250 kW and above or having cylinders of more than 300 mm bore shall be provided with crankcase oil mist detectors or engine bearing temperature monitors or equivalent devices.

3 **Protection against flooding (R 48)**

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

- .1 Bilge wells in periodically unattended machinery spaces shall be located and monitored in such a way that the accumulation of liquids is detected at normal angles of trim and heel, and shall be large enough to accommodate easily the normal drainage during the unattended period.
- .2 Where the bilge pumps are capable of being started automatically, means shall be provided to indicate when the influx of liquid is greater than the pump capacity or when the pump is operating more frequently than would normally be expected. In these cases, smaller bilge wells to cover a reasonable period of time may be permitted. Where automatically controlled bilge pumps are provided, special attention shall be given to oil pollution prevention requirements.
- .3 The location of the controls of any valve serving a sea inlet, a discharge below the waterline or a bilge injection system shall be so sited as to allow adequate time for operation in case of influx of water to the space, having regard to the time likely to be required in order to reach and operate such controls. If the level to which the space could become flooded with the ship in the fully loaded condition so requires, arrangements shall be made to operate the controls from a position above such level.

4 **Control of propulsion machinery from the navigating bridge (R 49)**

NEW CLASS B, C AND D SHIPS:

- .1 Under all sailing conditions, including manoeuvring, the speed, direction of thrust and, if applicable, the pitch of the propeller shall be fully controllable from the navigating bridge.

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- .1 Such remote control shall be performed by a separate control device for each independent propeller, with automatic performance of all associated services, including, where necessary, means of preventing overload of the propulsion machinery.
- .2 The main propulsion machinery shall be provided with an emergency stopping device on the navigating bridge which shall be independent of the navigating bridge control system.
- .2 Propulsion machinery orders from the navigating bridge shall be indicated in the main machinery control room or at the propulsion machinery control position as appropriate.
- .3 Remote control of the propulsion machinery shall be possible only from one location at a time; at such locations interconnected control positions are permitted. At each location there shall be an indicator showing which location is in control of the propulsion machinery. The transfer of control between the navigating bridge and machinery spaces shall be possible only in the main machinery space or in the main machinery control room. The system shall include means to prevent the propelling thrust from altering significantly when transferring control from one location to another.
- .4 It shall be possible for all machinery essential for the safe operation of the ship to be controlled from a local position, even in the case of failure in any part of the automatic or remote control systems.
- .5 The design of the remote automatic control system shall be such that in case of its failure an alarm will be given. Unless it is considered impracticable, the preset speed and direction of thrust of the propeller shall be maintained until local control is in operation.
- .6 Indicators shall be fitted on the navigating bridge for:
 - .1 propeller speed and direction of rotation in the case of fixed pitch propellers; or
 - .2 propeller speed and pitch position in the case of controllable pitch propellers.
- .7 The number of consecutive automatic attempts which fail to produce a start shall be limited to safeguard sufficient starting air pressure. An alarm shall be provided to indicate low starting air pressure set at a level which still permits starting operations of the propulsion machinery.

5 Communication (R 50)

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

A reliable means of vocal communication shall be provided between the main machinery control room or the propulsion machinery control position as appropriate, the navigating bridge and the engineer officers' accommodation.

6 Alarm system (R 51)

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

- .1 An alarm system shall be provided indicating any fault requiring attention and shall:

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- .1 be capable of sounding an audible alarm in the main machinery control room or at the propulsion machinery control position, and indicate visually each separate alarm function at a suitable position;
 - .2 have a connection to the engineers' public rooms and to each of the engineers' cabins through a selector switch, to ensure connection to a least one of those cabins. Alternative arrangements may be permitted if they are considered to be equivalents;
 - .3 activate an audible and visual alarm on the navigating bridge for any situation which requires action by or attention of the officer on watch;
 - .4 as far as is practicable be designed on the fail-to-safety principle; and
 - .5 activate the engineers' alarm required by Regulation II-1/C/10, if an alarm function has not received attention locally within a limited time.
- .2.1 The alarm system shall be continuously powered and shall have an automatic changeover to a stand-by power supply in case of loss of normal power supply.
 - .2.2 Failure of the normal power supply of the alarm system shall be indicated by an alarm.
 - .3.1 The alarm system shall be able to indicate at the same time more than one fault and the acceptance of any alarm shall not inhibit another alarm.
 - .3.2 Acceptance at the position referred to in paragraph .1 of any alarm condition shall be indicated at the positions where it was shown. Alarms shall be maintained until they are accepted and the visual indications of individual alarms shall remain until the fault has been corrected, when the alarm system shall automatically reset to the normal operating condition.

7 Safety systems (R 52)

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

A safety system shall be provided to ensure that serious malfunction in machinery or boiler operations, which presents an immediate danger, shall initiate the automatic shutdown of that part of the plant and that an alarm shall be given. Shutdown of the propulsion system shall not be automatically activated except in cases which could lead to serious damage, complete breakdown, or explosion. Where arrangements for overriding the shutdown of the main propelling machinery are fitted, these shall be such as to preclude inadvertent operation. Visual means shall be provided to indicate when the override has been activated. Automatic machinery safety shut down and slow down controls should be separated from the alarm installation.

8 Special requirements for machinery, boiler and electrical installations (R 53)

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

- .1 The main source of electrical power shall comply with the following:
 - .1 where the electrical power can normally be supplied by one generator, suitable load-shedding arrangements shall be provided to ensure the integrity of supplies to services required for propulsion and steering as well as the safety of the ship. In the case of loss of the generator in operation, adequate provision shall be made for automatic starting and connecting to the main switchboard of a stand-by generator of sufficient capacity to permit propulsion and steering and to ensure the safety of the ship with automatic restarting of the essential auxiliaries including, where necessary, sequential operations;

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.2 if the electrical power is normally supplied by more than one generator simultaneously in parallel operation, provision shall be made, for instance by load shedding, to ensure that, in case of loss of one of these generating sets, the remaining ones are kept in operation without overload to permit propulsion and steering, and to ensure the safety of the ship.

.2 Where stand-by machines are required for other auxiliary machinery essential to propulsion, automatic changeover devices shall be provided.

9 Automatic control and alarm system (R 53.4)

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

.1 The control system shall be such that the services needed for the operation of the main propulsion machinery and its auxiliaries are ensured through the necessary automatic arrangements.

.2 An alarm shall be given on the automatic changeover.

.3 An alarm system complying with Regulation 6 shall be provided for all important pressures, temperatures and fluid levels and other essential parameters.

.4 A centralised control position shall be arranged with the necessary alarm panels and instrumentation indicating any alarm.

.5 Means shall be provided to keep the starting air pressure at the required level where internal combustion engines essential for main propulsion are started by compressed air.]

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- (1) [^{F1}The arabic numerals following the letter 'C' in the subdivision load line notations may be replaced by roman numerals or letters if the Administration of the flag State considers this necessary to make the distinction with the international subdivision load line notations.]
- (2) [^{F1}Refer to the Code on Noise levels on Board Ships, adopted by IMO Resolution A.468 (XII).]
- (3) [^{F1}Reference is made to the recommendations published by the International Electrotechnical Commission and, in particular, 60092 series — Electrical Installations in Ships.]

Textual Amendments

- F1** Substituted by [Commission Directive 2010/36/EU of 1 June 2010 amending Directive 2009/45/EC of the European Parliament and of the Council on safety rules and standards for passenger ships \(Text with EEA relevance\)](#).