

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)

ANNEX I

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

CHAPTER I

GENERAL PROVISIONS

Where expressly provided, the regulations of this Annex are applicable to new and existing passenger ships of class A, B, C and D, engaged on domestic voyages.

New class B, C and D ships having a length of less than 24 metres have to comply with the requirements of Regulations II-1/B/2 to II-1/B/8 and II-1/B/10 set out in this Annex, unless the Administration of a flag State whose flag such ships are entitled to fly ensures that they comply with the flag State's national rules and that such rules guarantee an equivalent level of safety.

Where regulations of this Annex do not apply to new ships of less than 24 metres in length, the Administration of the flag State shall ensure that an equivalent safety level for such ships is provided through compliance with national rules.

Existing class C and D ships do not have to comply with the regulations of Chapters II-1 and II-2 of this Annex, provided that the Administration of a flag State whose flag such ships are entitled to fly ensures that they comply with the flag State's national rules and that such rules guarantee an equivalent level of safety.

Wherever the application of an IMO resolution is required in this Annex for existing ships, ships constructed until two years after the date of adoption by IMO of such resolution need not comply with such resolution provided they comply with the applicable previous resolution(s), if any.

Under repairs, alterations and modifications of a 'major character' is understood, by way of example:

- any change that substantially alters the dimensions of a ship,
example: lengthening by adding new midbody,
- any change that substantially alters the passenger-carrying capacity of a ship,
example: vehicle deck converted to passenger accommodation,
- any change that substantially increases a ship's service life,
example: renewal of passenger accommodation on one entire deck.

The indication '(R ...)' that follows several titles of regulations in this Annex refers to the regulations of the 1974 SOLAS Convention, as amended, on which the regulations set out in this Annex have been based.

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.
- .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.

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- .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.

.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.

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- .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 B

INTACT STABILITY, SUBDIVISION AND DAMAGE STABILITY

1 Intact stability Resolution A.749 (18)

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 on 4 November 1993 by the IMO at the 18th session of its Assembly through Resolution A.749 (18).

Where Member States consider the application of the Severe Wind and Rolling Criterion of IMO Resolution A.749 (18) inappropriate, an alternative approach ensuring satisfactory stability may

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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), 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 °;
- (b) The righting lever GZ shall be at least 0,20 metres 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 metres.

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

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

Where Member States consider the application of the Severe Wind and Rolling Criterion of A.749 (18) inappropriate, an alternative approach to ensuring satisfactory stability may be applied. This should be supported by evidence to the 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 the 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:

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

The factor of subdivision shall be:

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

1,0 when the number of persons the ship is certified to carry is less than 400, and

0,5 when the number of persons the ship is certified to carry is 400 or more.

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

FOR EXISTING CLASS B NON RO-RO PASSENGER SHIPS: 1,0

.....

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

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- deck throughout the length of the ship are treated as being below a margin line, for the purpose of Regulation 15; and
- .2 the two compartments adjacent to the 'step' in the bulkhead deck are each within the permissible length corresponding to their respective margin lines, and, in addition, their combined length does not exceed twice the permissible length based on the lower margin line.
 - .2 A compartment may exceed the permissible length determined by the rules of Regulation 4 provided the combined length of each pair of adjacent compartments to which the compartment in question is common does not exceed either the floodable length or twice the permissible length, whichever is less.
 - .3 A main transverse bulkhead may be recessed provided that all parts of the recess lie inboard of vertical surfaces on both sides of the ship, situated at a distance from the shell plating equal to one fifth of the breadth of the ship, and measured at right angles to the centreline at the level of the deepest subdivision load line. Any part of a recess which lies outside these limits shall be dealt with as a step in accordance with paragraph .6.
 - .4 Where a main transverse bulkhead is recessed or stepped, an equivalent plane bulkhead shall be used in determining the subdivision.
 - .5 Where a main transverse watertight compartment contains local subdivision and the 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

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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.
- .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 cases 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;

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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 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/m² to be applied;
classes C and D: a wind pressure of 80 N/m² 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

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as terminated at the angle the progressive flooding occurs and the range and the area referred to in .2.3.1 and .2.3.2 should be measured to that angle.

- .2.5 In cases where the progressive flooding is of limited nature that does not continue unabated and causes an acceptably slow reduction in righting lever of less than 0,04 metres, the remainder of the curve shall be partially truncated by assuming that the progressively flooded space is so flooded from the beginning.
- .2.6 In intermediate stages of flooding, the maximum righting lever shall be at least 0,05 metres and the range of positive righting levers shall be at least 7. In all cases, only one breach in the hull and only one free surface need be assumed.

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

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

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

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- .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 shall the final heel exceed 15;
- .3 in no case shall the margin line be submerged in the final stage of flooding. If it is considered that the margin line may become submerged during an intermediate stage of flooding, the 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 shall 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

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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/Amax as defined in the Annex of the Calculation Procedure to Assess the Survivability Characteristics of Existing Ro-Ro Passenger Ships when Using a Simplified Method Based Upon Resolution A.265 (VIII), developed by the Maritime Safety Committee at its 59th session in June 1991 (MSC/Circ. 574):

Value of A/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 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 occurs 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
500
or
more

1 October 2002

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1 000 or more but less than 1 500 600	1 October 2006
or more but less than 1 000 400	1 October 2008
or more but less than 600	1 October 2010

.2.3 Age of the ship equal or greater than 20 years:

where the age of the ship means the time counted from the date on which the keel was laid or the date on which it was at a similar stage of construction or from the date on which the ship was converted to a ro-ro passenger ship.

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

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

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

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

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- .3 at a distance 3 metres forward of the forward perpendicular, whichever gives the smallest measurement.
- .3 Where a long forward superstructure is fitted, the forepeak or collision bulkhead shall be extended weathertight to the next full deck above the bulkhead deck. The extension shall be so arranged as to preclude the possibility of the bow door causing damage to it in the case of damage to, or detachment of, a bow door.
- .4 The extension required in paragraph .3 need not be fitted directly above the bulkhead below provided all parts of the extension are not located forward of the forward limit specified in paragraph .1 or in paragraph .2.

However, in existing class B ships:

- .1 where a sloping loading ramp forms part of the extension of the collision bulkhead above the bulkhead deck, the part of the ramp which is more than 2,3 metres above the bulkhead deck may extend no more than 1,0 metre forward of the forward limits specified in paragraphs .1 and .2;
- .2 where the existing ramp does not comply with the requirements for acceptance as an extension to the collision bulkhead and the position of the ramp prevents the siting of such extension within the limits specified in paragraph .1 or paragraph .2, the extension may be sited within a limited distance aft of the aft limit specified in paragraph .1 or paragraph .2. The limited distance aft should be no more than is necessary to ensure non-interference with the ramp. The extension to the collision bulkhead shall open forward and comply with the requirements of paragraph .3 and shall be so arranged as to preclude the possibility of the ramp causing damage to it in the case of damage to, or detachment of, the ramp.
- .5 Ramps not meeting the above requirements shall be disregarded as an extension to the collision bulkhead.
- .6 In existing class B ships, the requirements of paragraph .3 and .4 apply as from the date of the first periodical survey after 1 July 1998.
- .7 An afterpeak bulkhead, and bulkheads dividing the machinery space, from the cargo and passenger spaces forward and aft, shall also be fitted and made watertight up to the bulkhead deck. The afterpeak bulkhead may, however, be stepped below the bulkhead deck, provided the degree of safety of the ship as regards subdivision is not thereby diminished.
- .8 In all cases stern tubes shall be enclosed in watertight spaces. The stern gland shall be situated in a watertight shaft tunnel or other watertight space separate from the stern tube compartment and of such volume that, if flooded by leakage through the stern gland, the margin line will not be submerged.

10 **Double bottoms (R 12)**

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

- .1 In new class B, C and D and existing class B ships, and new ships constructed on or after 1 January 2003 with a length of 24 metres and above, a double bottom shall be fitted extending from the forepeak bulkhead to the afterpeak bulkhead as far as this is practicable and compatible with the design and proper working of the ship.

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- .1 In ships of 50 metres and upwards but less than 61 metres in length, a double bottom shall be fitted at least from the machinery space to the forepeak bulkhead, or as near thereto as practicable.
- .2 In ships of 61 metres and upwards but less than 76 metres in length, a double bottom shall be fitted at least outside the machinery space and shall extend to the fore and after peak bulkheads or as near thereto as practicable.
- .3 In ships of 76 metres in length and upwards, a double bottom shall be fitted amidships and shall extend to the fore and after peak bulkhead or as near as practicable.
- .2 Where a double bottom is required to be fitted its depth shall comply with the standards of a recognised organisation and the inner bottom shall be continued out to the ship's sides in such a manner as to protect the bottom to the turn of the bilge. Such protection will be deemed satisfactory if the line of intersection of the outer edge of the margin plate with the bilge plating is not lower at any part than a horizontal plane passing through the point of intersection with the frame line amidships of a transverse diagonal line inclined at 25 ° to the base line and cutting it at a point one half of the ship's moulded breadth from the middle line.
- .3 Small wells constructed in the double bottom in connection with drainage arrangements of holds, etc., shall not extend downwards more than necessary. The depth of the well shall in no case be more than the depth less 460 mm of the double bottom at the centreline, nor shall the well extend below the horizontal plane referred to in paragraph .2. A well extending to the outer bottom is, however, permitted at the after end of the shaft tunnel. Other wells (e.g. for lubricating oil under main engines) may be permitted by the Administration of the flag State if satisfied that the arrangements give protection equivalent to that afforded by a double bottom complying with this regulation.
- .4 A double bottom need not be fitted in way of watertight compartments of moderate size used exclusively for the carriage of liquids, provided the safety of the ship, in the event of bottom or side damage, is not, in the opinion of the Administration of the flag State, thereby impaired.
- .5 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.

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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.

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 of this Regulation 12.
- .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

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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.
- .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 of this Regulation 13 and in Regulation 14.
- .3.2 Except as provided in paragraph .3.3, the collision bulkhead may be pierced below the margin line by no more than one pipe for dealing with fluid in the fore peak tank, provided that the pipe is fitted with a screw-down valve capable of being operated from above the bulkhead deck, the valve chest being secured inside the fore peak to the collision bulkhead. However, the fitting of this valve on the afterside of the collision bulkhead may be accepted provided that the valve is readily accessible under all service conditions and the space in which it is located is not a cargo space.
- .3.3 If the fore peak is divided to hold two different kinds of liquids, the collision bulkhead may be pierced below the margin line by two pipes each of which is fitted as required by paragraph .3.1, provided that 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

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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 of this Regulation 13 or Regulation 14, shall be power-operated sliding doors complying with the requirements of paragraph .7 capable of being closed simultaneously from the central operating console at the navigating bridge in not more than 60 seconds with the ship in upright position.

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

Sliding doors may be either:

- hand-operated only; or
- power-operated as well as hand-operated.

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

In ships where the total number of watertight doors is not more than two and these doors are situated in the machinery space or in the bulkheads bounding such space, the 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:

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

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

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

EXISTING CLASS B SHIPS:

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

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

- .7.1 Each power-operated sliding watertight door:
- .1 shall have a vertical or horizontal motion;
 - .2 shall, subject to paragraph .11, be normally limited to a maximum clear width of 1,2 metres. The 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

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- 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.
- .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

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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 paragraphs .7.3.1, .7.3.2 and .7.3.3, provision should be made as follows:

power systems for power-operated watertight sliding doors shall be separate from any other power system. A single failure in the electric or hydraulic power-operated systems excluding the hydraulic actuator shall not prevent the hand operation of any door.

- .7.4 Control handles shall be provided at each side of the bulkhead at a minimum height of 1,6 metres above the floor and shall be so arranged as to enable persons passing through the doorway to hold both handles in the open position without being able to set the power closing mechanism in operation accidentally. The direction of movement of the handles in opening and closing the door shall be in the direction of door movement and shall be clearly indicated. Hydraulic control handles for watertight doors in accommodation spaces shall, if only one action is required to start the door's closing movement, be so placed that children cannot operate them, e.g. behind panel doors with bolts placed at least 170 cm above deck level.

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

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

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

- .7.5 As far as practicable, electrical equipment and components for watertight doors shall be situated above the bulkhead deck and outside hazardous areas and spaces.
- .7.6 The enclosures of electrical components necessarily situated below the bulkhead deck shall provide suitable protection against the ingress of water.
- .7.7 Electric power, control, indication and alarm circuits shall be protected against fault in such a way that a failure in one door circuit will not cause a failure in any other door circuit. Short circuits or other faults in the alarm or indicator circuits of a door shall not result in a loss of power operation of that door. Arrangements shall be such that leakage of water into the electrical equipment located below the bulkhead deck will not cause the door to open.
- .7.8 A single electrical failure in the power-operating or control system of a power-operated sliding watertight door shall not result in a closed door opening. Availability of the power supply should be continuously monitored at a point in the electrical circuit as near as practicable to each of the motors required by paragraph .7.3. Loss of any

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such power supply should activate an audible and visual alarm at the central operating console at the navigating bridge.

- .8.1 The central operating console at the navigating bridge shall have a 'master mode' switch with two modes of control: a 'local control' mode which shall allow any door to be locally opened and locally closed after use without automatic closure, and a 'doors closed' mode which shall automatically close any doors that are open. The 'doors closed' mode shall permit doors to be opened locally and shall automatically re-close the door upon release of the local control mechanism. The 'master mode' switch shall normally be in the 'local control' mode. The 'door closed' mode shall only be used in an emergency or for testing purposes.
- .8.2 The central operating console at the navigating bridge shall be provided with a diagram showing the location of each door, with visual indicators to show whether each door is open or closed. A red light shall indicate a door is fully open and a green light shall indicate a door is fully closed. When the door is closed remotely the red light shall indicate the intermediate position by flashing. The indicating circuit shall be independent of the control circuit for each door.
- .8.3 It shall not be possible to open any door remotely from the central control position.

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

- .9.1 All watertight doors shall be kept closed during navigation except that they may be opened during navigation as specified in paragraphs .9.2 and .9.3. Watertight doors of width of more than 1,2 metres permitted by paragraph .11 may only be opened in the circumstances detailed in that paragraph. Any door which is opened in accordance with this paragraph shall be ready to be immediately closed.
- .9.2 A watertight door may be opened during navigation to permit the passage of passengers or crew, or when work in the immediate vicinity of the door necessitates it being opened. The door must be immediately closed when transit through the door is complete or when the task which necessitated it being open is finished.
- .9.3 Certain watertight doors may be permitted to remain open during navigation only if considered absolutely necessary; that is, being open is determined essential to the safe and effective operation of the ship's machinery or to permit passengers normally unrestricted access throughout the passenger area. Such determination shall be made by the 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

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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.
- .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 on Load Lines 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.

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- .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 non-return valve fitted with a positive means of closing it from above the bulkhead deck or with two automatic non-return valves without positive means of closing, provided that the inboard valve is situated above the deepest subdivision load line and is always accessible for examination under service conditions.

Where a valve with positive means of closing is fitted, the operating position above the bulkhead deck shall always be readily accessible and means shall be provided for indicating whether the valve is open or closed.

- .4.2 The requirements of the International Convention on Load Lines in force shall apply to discharges led through the shell plating from spaces above the margin line.
- .5 Machinery space main and auxiliary sea inlets and discharges in connection with the operation of machinery shall be fitted with readily accessible valves between the pipes and the shell plating or between the pipes and fabricated boxes attached to the shell plating. The valves may be controlled locally and shall be provided with indicators showing whether they are open or closed.

NEW CLASS B, C AND D SHIPS:

- .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

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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.
- .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, 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.

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- .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.
- .2 Notwithstanding the requirements of paragraphs .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;

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- .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 .2.4, provided that coaming and sill heights are at least 600 mm on open ro-ro cargo decks and at least 380 mm on enclosed ro-ro cargo decks.

EXISTING CLASS B RO-RO PASSENGER SHIPS:

- .2.1 All accesses from the ro-ro deck that lead to spaces below the bulkhead deck shall be made weathertight and means shall be provided on the navigation bridge, indicating whether the access is open or closed;
- .2.2 all such accesses shall be closed before the ship leaves the berth on any voyage and shall remain closed until the ship is at its next berth;
- .2.3 notwithstanding the requirements of paragraph .2.2, the Administration of the flag State may permit some accesses to be opened during the voyage but only for a period sufficient to permit through passage and, if required, for the essential working of the ship; and
- .2.4 the requirements of paragraph .2.1 apply as from the date of the first periodical survey after 1 July 1998.

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

ALL RO-RO PASSANGER 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 under way.

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

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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.

19 **Damage control plans (R 23)**

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

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

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

This regulation applies to all ro-ro passenger ships, except that for existing ships paragraph .2 shall apply as from the date of the first periodical survey after 1 July 1998.

- .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

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vehicles in adverse weather conditions and unauthorised access by passengers thereto can be detected whilst the ship is under way.

- .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 therewith, all valves, the closing of which is necessary to make a compartment watertight, and all valves the operation of which is necessary for damage control cross-connections shall be periodically inspected at sea at least once a week.
- .4 Such valves, doors and mechanisms shall be suitably marked to ensure that they may be properly used to provide maximum safety.

22 Entries in log (R 25)

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

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

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:

- .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.

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- .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 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

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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 suctions are provided there shall be at least one on each side of the ship. Direct suctions 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 suctions 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 suctions:

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

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 |

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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 suctions 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 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

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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 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;
 - .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.
- .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 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; and
 - .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 units is out of operation; and
 - .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.

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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 an 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;
 - .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 on 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

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.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 non-slip 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 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 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 6.4.2 applicable to auxiliary steering systems.

8 Ventilating systems in machinery spaces (R 35)

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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 of 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 the navigating bridge as appropriate.

11 **Location of emergency installations (R 39)**

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

Emergency sources of electrical power, fire pumps, bilge pumps except those specifically serving the spaces forward of the collision bulkhead, and the 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;

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- .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 the event 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 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 The ships shall comply with the requirements of paragraphs .1 to .4.
 - .1 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.
 - .2 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;

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- .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;
 - .7 the design of the remote control system shall be such that in the event 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:
 - .1 propeller speed and direction of rotation in the case of fixed pitch propellers, and
 - .2 propeller speed and pitch position in the case of controllable pitch propellers;and
 - .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.
- .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;

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for this purpose Regulations II-1/E/1 to II-1/E/5 shall apply as appropriate. Particular consideration shall be given to protecting 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.

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.

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 Provision 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⁾

NEW CLASS B, C AND D SHIPS:

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.

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- .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;
 - .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 set 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

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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.

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 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.
- .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) the ship's emergency bilge pump and one of the fire pumps;
- (b) emergency lighting:
1. at every assembly or embarkation station and over the sides;
 2. in all alleyways, stairways and exits giving access to the assembly or embarkation stations;

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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;
 6. at all stowage positions for firefighters' outfits;
 7. at the emergency bilge 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 minutes 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:

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- .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 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 regard to the specific service life in the ambient conditions to which such batteries are subject when 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 a particular application, the Administration of the flag State may permit the use of special types of cables, such as radio frequency cables, which do not comply with the foregoing.

NEW CLASS B, C AND D SHIPS:

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- .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 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 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 widely as is practicable.

PART E

ADDITIONAL REQUIREMENTS FOR 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.

1 General (R 46)

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

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- .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 the event 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 the event 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.
- .1 Such remote control shall be performed by a separate control device for each independent propeller, with automatic performance of all associated services,

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- 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 event 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 the event 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:
- .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;

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- .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 the event 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 shutdown 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 event 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;
 - .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 the event 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.

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- .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.

CHAPTER II-2

FIRE PROTECTION, FIRE DETECTION AND FIRE EXTINCTION

PART A

GENERAL

1 Basic principles (R 2)

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

- .1 The fire safety objectives of this chapter are to:
- .1 prevent the occurrence of fire and explosion;
- .2 reduce the risk to life caused by fire;
- .3 reduce the risk of damage caused by fire to the ship, its cargo and the environment;
- .4 contain, control and suppress fire and explosion in the compartment of origin; and
- .5 provide adequate and readily accessible means of escape for passengers and crew.
- .2 In order to achieve the fire objectives set out in paragraph .1 the following basic principles underlie the regulations in this chapter and are embodied in the regulations as appropriate, having regard to the type of ships and the potential fire hazard involved:
- .1 division of ship into main vertical zones by thermal and structural boundaries;
- .2 separation of accommodation spaces from the remainder of the ship by thermal and structural boundaries;
- .3 restricted use of combustible materials;

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- .4 detection of any fire in the zone of origin;
 - .5 containment and extinction of any fire in the space of origin;
 - .6 protection of means of escape or access for fire-fighting;
 - .7 ready availability of fire-extinguishing appliances;
 - .8 minimisation of possible ignition of flammable cargo vapour.
- .3 The fire safety objectives set out in paragraph .1 shall be achieved by ensuring compliance with the prescriptive requirements specified in this chapter or by alternative design and arrangements which comply with Part F of the revised Chapter II-2 of the 1974 SOLAS Convention, as amended, which applies to ships constructed on or after 1 January 2003. A ship shall be considered to meet the functional requirements set out in paragraph .2 and to achieve the fire safety objectives set out in paragraph .1 when either:
- .1 the ship's designs and arrangements, as a whole, complies with the relevant prescriptive requirements in this chapter;
 - .2 the ship's designs and arrangements, as a whole, have been reviewed and approved in accordance with Part F of the revised Chapter II-2 of the 1974 SOLAS Convention, as amended, which applies to ships constructed on or after 1 January 2003;
 - .3 part(s) of the ship's designs and arrangements have been reviewed and approved in accordance with the above-mentioned Part F of the revised Chapter II-2 of the 1974 SOLAS Convention, as amended and the remaining parts of the ship comply with the relevant prescriptive requirements of this chapter.
 - .4 All ships which undergo repairs, alterations, modifications and outfitting related thereto shall continue to comply with at least the requirements previously applicable to these ships.

Repairs, alterations and modifications which substantially alter the dimensions of a ship or the passenger accommodation spaces, or substantially increase a ship's service life and outfitting related thereto shall meet the latest requirements for new ships in so far as the Administration of the flag State deems reasonable and practicable.

EXISTING CLASS B SHIPS:

- .5 Notwithstanding the provisions of paragraph .4, existing class B ships carrying more than 36 passengers when undergoing repairs, alterations, modifications and outfitting related thereto shall comply with the following:
 - .1 all materials introduced into these ships shall comply with the requirements with regard to material applicable to new class B ships; and
 - .2 all repairs, alterations, modifications and outfitting related thereto involving the replacement of material of 50 tonnes or above, other than that required by Regulation II-2/B/16, shall comply with the requirements applicable to new class B ships.

2 Definitions (R 3)

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

- .1 Non-combustible material is a material which neither burns nor gives off flammable vapours in sufficient quantity for self-ignition when heated to approximately 750 °C, this being determined by a fire test in accordance with the IMO Resolution A.799

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(19) 'Revised recommendation on test methods for qualifying marine construction materials as non-combustible'. Any other material is a combustible material.

.1.a FOR B, C AND D SHIPS CONSTRUCTED ON OR AFTER 1 JANUARY 2003:

Non-combustible material is a material which neither burns nor gives off flammable vapours in sufficient quantity for self-ignition when heated to approximately 750 °C, this being determined in accordance with the Fire Test Procedures Code. Any other material is a combustible material.

.2 A standard fire test is one in which specimens of the relevant bulkheads or decks are exposed in a test furnace to temperatures corresponding approximately to the standard time-temperature curve. The specimen shall have an exposed surface of not less than 4,65 m² and height (or length of deck) of 2,44 metres, resembling as closely as possible the intended construction and including where appropriate at least one joint. The standard time-temperature curve is defined by a smooth curve drawn through the following internal furnace temperature points:

initial internal furnace temperature	20 °C
at the end of the first 5 minutes	576 °C
at the end of 10 minutes	679 °C
at the end of 15 minutes	738 °C
at the end of 30 minutes	841 °C
at the end of 60 minutes	945 °C

.2a. FOR CLASS B, C AND D SHIPS CONSTRUCTED ON OR AFTER 1 JANUARY 2003:

A standard fire test is one in which the specimens of the relevant bulkheads and decks are exposed in a test furnace to temperatures corresponding approximately to the standard temperature curve. The test methods shall be in accordance with the Fire Test Procedures Code.

.3 'A' class divisions are those divisions formed by bulkheads and decks which comply with the following:

- .1 they shall be constructed of steel or other equivalent material;
- .2 they shall be suitably stiffened;
- .3 they shall be so constructed as to be capable of preventing the passage of smoke and flame to the end of the one-hour standard fire test;
- .4 they shall be insulated with approved non-combustible materials such that the average temperature of the unexposed side will not rise more than 140 °C above the original temperature, nor will the temperature, at any one point, including any joint, rise more than 180 °C above the original temperature, within the time listed below:

class 'A-60'	60 minutes
class 'A-30'	30 minutes
class 'A-15'	15 minutes
class 'A-0'	0 minutes

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.5 The Administration of the flag State shall require a test of a prototype bulkhead or deck to ensure that it meets the above requirements for integrity and temperature rise in accordance with the IMO Resolution A.754 (18).

For class B, C and D ships constructed on or after 1 January 2003, 'IMO Resolution A.754 (18)' shall read 'Fire Test Procedures Code'.

.4 'B' class divisions are those divisions formed by bulkheads, decks, ceilings or linings which comply with the following:

.1 they shall be so constructed as to be capable of preventing the passage of flame to the end of the first half hour of the standard fire test;

.2 they shall have an insulation value such that the average temperature of the unexposed side will not rise more than 140 °C above the original temperature, nor will the temperature at any one point, including any joint, rise more than 225 °C above the original temperature within the time listed below:

class 'B-15'	15 min
class 'B-0'	0 min

.3 they shall be constructed of approved non-combustible materials and all materials entering into the construction and erection of 'B' class divisions shall be non-combustible, with the exception that combustible veneers may be permitted provided they meet other requirements of this chapter;

.4 the Administration of the flag State shall require a test of a prototype division to ensure that it meets the above requirements for integrity and temperature rise in accordance with IMO Resolution A.754 (18).

For class B, C and D ships constructed on or after 1 January 2003, 'IMO Resolution 754 (18)' shall read 'Fire Test Procedures Code'.

.5 'C' class divisions are divisions constructed of approved non-combustible materials. They need meet neither requirements relative to the passage of smoke and flame nor limitations relative to the temperature rise. Combustible veneers are permitted provided they meet other requirements of this chapter.

.6 Continuous 'B' class ceilings or linings are those 'B' class ceilings or linings which terminate only at an 'A' or 'B' class division.

.7 Steel or other equivalent material. Where the words 'steel or other equivalent material' occur, 'equivalent material' means any non-combustible material which, by itself or due to insulation provided, has structural and integrity properties equivalent to steel at the end of the applicable exposure to the standard fire test (e.g. aluminium alloy with appropriate insulation).

.8 Low flame spread means that the surface thus described will adequately restrict the spread of flame, this being determined by a fire test according to IMO Resolution A.653 (16), for bulkhead, ceiling and deck finish materials.

.8a FOR CLASS B, C, AND D SHIPS CONSTRUCTED ON OR AFTER 1 JANUARY 2003:

Low flame spread means that the surface thus described will adequately restrict the spread of flame, this being determined in accordance with the Fire Test Procedures Code.

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- .9 Main vertical zones are those sections into which the hull, superstructure, and deckhouses are divided by 'A' class divisions, the mean length and width of which on any deck does not in general exceed 40 metres.
- .10 Accommodation spaces are those spaces used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, barber shops, pantries containing no cooking appliances and similar spaces.
- .11 Public spaces are those portions of the accommodation which are used for halls, dining rooms, lounges and similar permanently enclosed spaces.
- .12 Service spaces are those spaces used for galleys, pantries containing cooking appliances, lockers, mail and specie rooms, storerooms, workshops other than those forming part of the machinery spaces, and similar spaces and trunks to such spaces.
- .13 Cargo spaces are all spaces used for cargo (including cargo oil tanks) and trunks to such spaces.
- .13-1 Vehicle spaces are cargo spaces intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion.
- .14 Ro-ro cargo spaces are spaces not normally subdivided in any way and extending to either a substantial length or the entire length of the ship in which motor vehicles with fuel in their tanks for their own propulsion and/or goods (packaged or in bulk, in or on rail or road cars, vehicles (including road and rail tankers), trailers, containers, pallets, dismountable tanks or in or on similar stowage units or other receptacles) can be loaded and unloaded normally in a horizontal direction.
- .15 Open ro-ro cargo spaces are ro-ro cargo spaces either open at both ends, or open at one end and provided with adequate natural ventilation effective over the entire length through permanent openings in the side plating or deckhead, or from above, and for ships constructed on or after 1 January 2003 having a total area of at least 10 % of the total area of the space sides.
- .15-1 Open vehicle spaces are those vehicle spaces either open at both ends or having an opening at one end and being provided with adequate natural ventilation effective over their entire length through permanent openings distributed in the side plating or deckhead or from above, and for ships constructed on or after 1 January 2003 having a total area of at least 10 % of the total area of the space sides.
- .16 Closed ro-ro cargo spaces are ro-ro cargo spaces which are neither open ro-ro cargo spaces nor weather decks.
- .16-1 Closed vehicle spaces are vehicle spaces which are neither open vehicle spaces nor weather decks.
- .17 Weather deck is a deck which is completely exposed to the weather from above and from at least two sides.
- .18 Special category spaces are those enclosed vehicle spaces above or below the bulkhead deck into and from which such vehicles can be driven and to which passengers have access. Special category spaces may be accommodated on more than one deck provided that the total overall clear height for vehicles does not exceed 10 metres.
- .19.1 Machinery spaces of category A are those spaces and trunks to such spaces which contain:

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- .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.
- .19.2 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.
- .20 Oil fuel unit is the equipment used for the preparation of oil fuel for delivery to an oil-fired boiler, or equipment used for the preparation for delivery of heated oil to an internal combustion engine, and includes any oil pressure pumps, filters and heaters dealing with oil at a pressure of more than 0,18 N/mm².
- .21 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.
 - .21.1 Central control station is a control station in which the following control and indicator functions are centralised:
 - .1 fixed fire detection and alarm systems;
 - .2 automatic sprinklers, fire detection and alarm systems;
 - .3 fire door indicator panels;
 - .4 fire doors closures;
 - .5 watertight door indicator panels;
 - .6 watertight door closures;
 - .7 ventilation fans;
 - .8 general/fire alarms;
 - .9 communication systems including telephones; and
 - .10 microphones to public address systems.
 - .21.2 Continuously manned central control station is a central control station which is continuously manned by a responsible member of the crew.
- .22 Rooms containing furniture and furnishings of restricted fire risk are, for the purpose of Regulation II-2/B/4, those rooms containing furniture and furnishings of restricted fire risk (whether cabins, public spaces, offices and other types of accommodation) in which:
 - .1 all case furniture such as desks, wardrobes, dressing tables, bureaux, dressers, is constructed entirely of approved non-combustible materials, except that a combustible veneer not exceeding 2 mm may be used on the working surface of such articles;
 - .2 all free-standing furniture such as chairs, sofas, tables, is constructed with frames of non-combustible materials;

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- .3 all draperies, curtains and other suspended textile materials have qualities of resistance to the propagation of flame not inferior to those of wool of mass 0,8 kg/m², in accordance with IMO Resolution A.471 (XII) and its amendments adopted by Resolution A.563 (14).

For class B, C and D ships constructed on or after 1 January 2003, 'IMO Resolution A.471 (XII) and its amendments adopted by Resolution A.563 (14)' shall read 'Fire Test Procedures Code';

- .4 all floor coverings have qualities of resistance to the propagation of flame not inferior to those of an equivalent woollen material used for the same purpose.

For class B, C and D ships constructed on or after 1 January 2003, this subparagraph shall read:

all floor coverings have low flame spread characteristics;

- .5 all exposed surfaces of bulkheads, linings and ceilings have low flame-spread characteristics; and

- .6 all upholstered furniture has qualities of resistance to the ignition and propagation of flame in accordance with the Fire Test Procedures of Upholstered Furniture of IMO Resolution A.652 (16).

For class B, C and D ships constructed on or after 1 January 2003, 'IMO Resolution A.652 (16)' shall read 'Fire Test Procedures Code'.

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

- .7 all bedding components have qualities of resistance to the ignition and propagation of flame, this being determined in accordance with the Fire Test Procedures Code.

- .23 Ro-ro passenger ship means a passenger ship with ro-ro cargo spaces or special category spaces as defined in this regulation.

- .24 Fire Test Procedures Code means the International Code for Application of Fire Test Procedures, as adopted by the Maritime Safety Committee of the IMO by Resolution MSC 61 (67), as amended by the IMO.

- .25 Fire Safety Systems Code means the International Code for Fire Safety Systems as adopted by the Maritime Safety Committee of the IMO by Resolution MSC98 (73), as may be amended by IMO, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of Article VIII of the 1974 SOLAS Convention, as amended, concerning the amendment procedures applicable to the Annex other than Chapter I thereof.

- .26 Flashpoint is the temperature in degrees Celsius (closed cup test) at which a product will give off enough flammable vapour to be ignited, as determined by an approved flashpoint apparatus.

- .27 Prescriptive requirements mean the constructive characteristics, limiting dimensions or fire safety systems specified in this chapter.

3 **Fire pumps, fire mains, hydrants, hoses and nozzles (R 4)**

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

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.1.1 Every ship shall be provided with fire pumps, fire mains, hydrants, hoses and nozzles complying as applicable with the requirements of this regulation.

NEW CLASS B, C AND D SHIPS CONSTRUCTED BEFORE 1 JANUARY 2003:

.1.2 Where more than one independent fire pump is required, isolating valves to separate the section of the fire main within the machinery space containing the main fire pump or pumps from the rest of the fire main shall be fitted in an easily accessible and tenable position outside this machinery space. The fire main shall be so arranged that when the isolating valves are shut all the hydrants on the ship, except those in the machinery space referred above, can be supplied with water by a fire pump not located in this machinery space through pipes which do not enter this space. Exceptionally, short lengths of the emergency fire pump suction and discharge piping may penetrate the machinery space if it is impracticable to route it externally provided that the integrity of the fire main is maintained by the enclosure of the piping in a substantial steel casing.

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

.1.3 Isolating valves to separate the section of the fire main within the machinery space containing the main fire pump or pumps from the rest of the fire main shall be fitted in an easily accessible and tenable position outside the machinery spaces. The fire main shall be so arranged that when the isolating valves are shut all the hydrants on the ship, except those in the machinery space referred to above, can be supplied with water by another pump or an emergency fire pump. The emergency pump, its seawater inlet and suction and delivery pipes and isolating valves shall be located outside the machinery space. If this arrangement cannot be made, the sea-chest may be fitted in the machinery space if the valve is remotely controlled from a position in the same compartment as the emergency pump and the suction pipe is as short as practicable. Short lengths of suction or discharge piping may penetrate the machinery space, provided they are enclosed in a substantial steel casing or are insulated to A-60 standards. The pipes shall have substantial wall thickness, but in no case less than 11 mm and shall be welded except for the flanged connection to the sea inlet valve.

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

.2 Capacity of fire pumps

.1 The required fire pumps shall be capable of delivering for fire-fighting purposes a quantity of water, at the pressure specified in paragraph .4.2 not less than two thirds of the quantity required to be dealt with by the bilge pumps when employed for bilge pumping.

.2 In every ship which is required by this regulation to be provided with more than one power fire pump, each of the required fire pumps shall have a capacity not less than 80 % of the total required capacity divided by the minimum number of required fire pumps but in any case not less than 25 m³/h and each such pump shall in any event be capable of delivering at least the two required jets of water. These fire pumps shall be capable of supplying the fire main system under the required conditions.

.3 In ships constructed on or after 1 January 2003 where more pumps than the minimum required pumps are installed such additional pumps shall have a capacity of at least 25 m³/h and shall be capable of delivering at least the two jets of water required in paragraph .5 of this regulation.

.3 Arrangements of fire pumps, fire mains and ready availability of water supply

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- .1 Ships shall be provided with power-driven fire pumps as follows:
 - .1 ships certified to carry more than 500 passengers: at least three, one of which may be a main engine-driven pump;
 - .2 ships certified to carry up to 500 passengers or fewer: at least two, one of which may be a main engine-driven pump.
 - .2 Sanitary, ballast, bilge or general service pumps may be accepted as fire pumps, provided that they are not normally used for pumping oil and that if they are subject to occasional duty for the transfer or pumping of oil fuel, suitable changeover arrangements are fitted.
 - .3 The arrangement of sea connections, fire pumps and their sources of power shall be such as to ensure that in a ship certified to carry more than 250 passengers, in the event of a fire in any one compartment all the fire pumps will not be put out of action.

In new class B ships certified to carry up to 250 passengers or fewer, if a fire in any one compartment could put all the pumps out of action, the alternative means of providing water for fire-fighting purposes shall be an independently driven, power-operated emergency fire pump and with its source of power and sea connection located outside the machinery space. Such an independently driven, power-operated emergency fire pump shall comply with the provisions of the Fire Safety Systems Code for ships constructed on or after 1 January 2003.

- .4 In new class B ships certified to carry more than 250 passengers, the arrangements for the ready availability of water supply shall be such that at least one effective jet of water is immediately available from any hydrant in an interior location and so as to ensure the continuation of the output of water by the automatic starting of a required fire pump.
- .5 In ships with a periodically unattended machinery space or when only one person is required on watch, there shall be immediate water delivery from the fire main system at a suitable pressure, either by remote starting of one of the main fire pumps with remote starting from the navigating bridge and fire control station, if any, or permanent pressurisation of the fire main system by one of the main fire pumps.
- .6 The delivery valve of each fire pump shall be fitted with a non-return valve.
- .4 Diameter of and pressure in the fire mains
 - .1 The diameter of the fire main and water service pipes shall be sufficient for the effective distribution of the maximum required discharge from two fire pumps operating simultaneously.
 - .2 With two pumps simultaneously delivering through nozzles specified in paragraph .8 and sufficient hydrants to provide for the quantity of water specified in paragraph .4.1, the following minimum pressures shall be maintained at all hydrants:

Class B ships certified to carry	New	Existing
more than 500 passengers	0,4 N/mm ²	0,3 N/mm ²
up to 500 passengers	0,3 N/mm ²	0,2 N/mm ²

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- .3 The maximum pressure at any hydrant shall not exceed that at which the effective control of a fire hose can be demonstrated.
- .5 Number and position of hydrants
 - .1 The number and position of hydrants shall be such that at least two jets of water not emanating from the same hydrant, one of which shall be from a single length of hose, may reach any part of the ship normally accessible to the passengers or crew while the ship is being navigated and any part of any cargo space when empty, any ro-ro cargo space or any special category space in which latter case the two jets shall reach any part of such space, each from a single length of hose. Furthermore, such hydrants shall be positioned near the accesses to the protected spaces.
 - .2 In the accommodation, service and machinery spaces the number and position of the hydrants shall be such that the requirements of paragraph .5.1 may be complied with when all watertight doors and all doors in main vertical zone bulkheads are closed.
 - .3 Where access is provided to a machinery space at a low level from an adjacent shaft tunnel, two hydrants shall be provided external to, but near the entrance to, that machinery space. Where such access is provided from other spaces, in one of those spaces two hydrants shall be provided near the entrance of the machinery space. Such provision need not be made where the tunnel or adjacent spaces are not part of the escape route.
- .6 Pipes and hydrants
 - .1 Materials readily rendered ineffective by heat shall not be used for fire mains and hydrants unless adequately protected. The pipes and hydrants shall be so placed that the fire hoses may be easily coupled to them. The arrangement of pipes and hydrants shall be such as to avoid the possibility of freezing. In ships where deck cargo may be carried, the positions of the hydrants shall be such that they are always readily accessible and the pipes shall be arranged as far as practicable to avoid risk of damage by such cargo.
 - .2 A valve shall be fitted to serve each fire hose so that any fire hose may be removed while the fire pumps are at work.
 - .3 On ships constructed on or after 1 January 2003 isolating valves shall be installed for all open deck fire main branches used for purposes other than fire-fighting.
- .7 Fire hoses
 - .1 Fire hoses shall be of non-perishable material, approved by the Administration of the flag State, and shall be sufficient in length to project a jet of water to any of the spaces in which they may be required to be used. Each hose shall be provided with a nozzle and the necessary couplings. There shall be complete interchangeability of hose couplings and nozzles. Hoses specified in this chapter as 'fire hoses' shall, together with any necessary fittings and tools, be kept ready for use in conspicuous positions near the water service hydrants or connections. Additionally, in interior locations in ships carrying more than 36 passengers fire hoses shall be permanently connected to the hydrants.
 - .2 There shall be at least one fire hose for each of the hydrants required by paragraph .5. The length of a fire hose should be restricted to not more than 20 metres on deck and in superstructures and to 15 metres in machinery spaces and on smaller ships to 15 metres and 10 metres respectively.

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- .8 Nozzles
- .1.1 For the purposes of this chapter, standard nozzle sizes shall be 12 mm, 16 mm and 19 mm or as near thereto as possible. In cases where other systems are used – such as fog systems – different diameter nozzles may be permitted.
- .1.2 All nozzles shall be of an approved dual-purpose type (i.e., spray/jet type), and shall have a shut-off facility.
- .2 For accommodation and service spaces, a nozzle size greater than 12 mm need not be used.
- .3 For machinery spaces and exterior locations, the nozzle size shall be such as to obtain the maximum discharge possible from two jets at the pressure mentioned in paragraph .4 from the smallest pump, provided that a nozzle size greater than 19 mm need not be used.

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

- .9 Fire pumps, fire mains, hydrants, hoses, nozzles and ready availability of water supply
- .1 One independent fire pump is required, which shall be capable of delivering for fire-fighting purposes at least one jet of water from any fire hydrant, at the pressure specified below. The quantity of water so delivered shall not be less than two thirds of the quantity required to be dealt with by the bilge pumps when employed for bilge pumping. Such fire pump shall be capable, when discharging the maximum amount referred to above through fire hydrants with nozzles of 12 or 16 or 19 mm, of maintaining at any hydrant minimum pressures as required in class B ships.
- .2 Every ship carrying over 250 passengers shall be provided with an additional fire pump which shall be permanently connected to the fire main. Such pump shall be operated by power. Such pump and its source of power shall not be situated in the same compartment as the pump required by paragraph .9.1 and shall be provided with a permanent sea connection situated outside the machinery space. Such pump shall be capable of delivering at least one jet of water from any fire hydrants provided in the ship maintaining a pressure of at least 0,3 N/mm².
- .3 Sanitary, ballast, bilge or general service pumps may be accepted as fire pumps.
- .4 Every ship shall be provided with a fire main having a diameter sufficient for the effective distribution of the maximum discharge given above. The number and position of the hydrants shall be such that at least one jet of water may reach any part of the ship using one single maximum length of hose as given for class B ships in paragraph .7.2.
- .5 Every ship shall be fitted with at least one fire hose for every hydrant fitted.
- .6 In ships with a periodically unattended machinery space or when only one person is required on watch, there shall be immediate water delivery from the fire main system at a suitable pressure, either by remote starting of one of the main fire pumps with remote starting from the navigating bridge and fire control station, if any, or permanent pressurisation of the fire main system by one of the main fire pumps.
- .7 The delivery valve of each fire pump shall be fitted with a non-return valve.
- 4 **Fixed fire-extinguishing systems (R 5 + 8 + 9 + 10)**
- .1 Fixed gas fire-extinguishing systems: General (R 5.1)

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NEW CLASS B, C AND D SHIPS CONSTRUCTED BEFORE 1 JANUARY 2003 AND EXISTING CLASS B SHIPS:

- .1 The necessary pipes for conveying fire-extinguishing medium into protected spaces shall be provided with control valves so marked as to indicate clearly the spaces to which the pipes are led. Suitable provision shall be made to prevent inadvertent admission of the medium to any space.
- .2 The piping for the distribution of fire-extinguishing medium shall be arranged and discharge nozzles so positioned that a uniform distribution of medium is obtained.
- .3 Means shall be provided to close from outside the protected spaces all openings which may admit air to or allow gas to escape from the protected space.
- .4 Means shall be provided for automatically giving an audible warning of the release of fire-extinguishing medium into any space in which personnel normally work or to which they have access. The alarm shall operate for a suitable period before the medium is released.
- .5 The means of control of any fixed gas fire-extinguishing system shall be readily accessible and simple to operate and shall be grouped together in as few locations as possible at positions not likely to be cut off by a fire in a protected space. At each location there shall be clear instructions relating to the operation of the system having regard to the safety of personnel.
- .6 Automatic release of fire-extinguishing medium shall not be permitted, except as permitted in respect of local automatically operated units fitted, in addition to and independent of any required fixed fire-extinguishing system, in machinery spaces over equipment having a high fire risk or in enclosed areas of high fire risk within machinery spaces.
- .7 Where the quantity of extinguishing medium is required to protect more than one space, the quantity of medium available need not be more than the largest quantity required for any one space so protected.
- .8 Except as otherwise permitted, pressure containers required for the storage of fire-extinguishing medium shall be located outside protected spaces in accordance with paragraph .1.11.
- .9 Means shall be provided for the crew or shore personnel to safely check the quantity of medium in the containers.
- .10 Containers for the storage of fire extinguishing medium and associated pressure components shall be designed to appropriate codes of practice having regard to their locations and maximum ambient temperatures expected in service.
- .11 When the fire-extinguishing medium is stored outside a protected space, it shall be stored in a room which shall be situated in a safe and readily accessible position and shall be effectively ventilated. Any entrance to such a storage room shall preferably be from the open deck and in any case shall be independent of the protected space.

Access doors shall open outwards, and bulkheads and decks including doors and other means of closing any opening therein, which form the boundaries between such rooms and adjoining enclosed spaces shall be gastight. For the purpose of application of the tables for fire integrity of bulkheads and decks in Regulations II-2/B/4 or II-2/B/5, as applicable, such storage rooms shall be treated as control stations.

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.12 The use of a fire-extinguishing medium which either by itself or under expected conditions of use gives off toxic gases in such quantities as to endanger persons or gives off gases which are harmful to the environment, in fire-extinguishing systems on board new ships and in such new installations on board existing ships, is not permitted.
NEW CLASS B, C AND D SHIPS CONSTRUCTED ON OR AFTER 1 JANUARY 2003:

.13 Fixed gas fire-extinguishing systems shall comply with the provisions of the Fire Safety Systems Code.

.14 Means shall be provided to close from outside the protected space all openings which may admit air to or allow gas escape from the protected space.

.15 When the fire-extinguishing medium is stored outside a protected space, it shall be stored in a room which is located behind the forward collision bulkhead and is used for no other purposes. Any entrance to such a storage room shall preferably be from the open deck and shall be independent of the protected space. If the storage place is located below deck, it shall be located no more than one deck below the open deck and shall be directly accessible by a stairway or ladder from the open deck.

Spaces which are located below deck or spaces where access from the open deck is not provided shall be fitted with a mechanical ventilation system designed to take exhaust air from the bottom of the space and shall be sized to provide at least 6 air changes per hour. Access doors shall open outwards and bulkheads and decks including doors and other means of closing any opening therein, which form boundaries between such rooms and adjacent enclosed spaces, shall be gastight. For the purpose of the application of tables 4.1, 4.2, 5.1 and 5.2 such storage rooms shall be treated as fire control stations.

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

.16 Where the volume of free air contained in air receivers in any space is such that, if released in such space in the event of fire, such release of air within that space would seriously affect the efficiency of the fixed fire-extinguishing system, an additional quantity of fire-extinguishing medium shall be provided.

.17 Suppliers of fixed fire-extinguishing installations shall provide a description of the installation, including a checklist for maintenance, in English and in the official language(s) of the flag State.

.18 The quantity of the fire-extinguishing medium shall be checked at least once a year by either an expert authorised by the Administration of the flag State, the supplier of the installation or a recognised organisation.

.19 The periodic checking which is carried out by the ship's chief engineer or organised by the ship's management shall be entered in the ship's logbook, stating the scope and the time of such checking.

.20 Non-prescribed fire-extinguishing equipment which is installed e.g. in store rooms shall, in its construction and dimensioning, comply with the provisions of this regulation for the type of installation in question.

.21 All doors to spaces protected by CO₂ /halon installation shall be marked 'This space is protected by a CO₂/halon installation and shall be evacuated when the alarm equipment comes into operation.'

.2 Carbon dioxide systems (R 5.2)

NEW CLASS B, C AND D SHIPS CONSTRUCTED BEFORE 1 JANUARY 2003 AND EXISTING CLASS B SHIPS:

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- .1.1 For cargo spaces the quantity of CO₂ available shall, unless otherwise provided, be sufficient to give a minimum volume of free gas equal to 30 % of the gross volume of the largest cargo space so protected in the ship.

If there is a connection through ventilation ducts between two or more cargo spaces, these shall be considered one space. In ships used for the carriage of vehicles, the necessary quantity of CO₂ shall be calculated as 45 % of the gross cubic content of the largest cargo space.

- .1.2 For machinery spaces the quantity of carbon dioxide carried shall be sufficient to give a minimum volume of free gas equal to the larger of the following volumes, either:

.1 40 % of the gross volume of the largest machinery space so protected, the volume to exclude that part of the casing above the level at which the horizontal area of the casing is 40 % or less of the horizontal area of the space concerned taken midway between the tank top and the lowest part of the casing; or

.2 35 % of the gross volume of the largest machinery space protected, including the casing; provided that if two or more machinery spaces are not entirely separated they shall be considered as forming one space.

.2 For the purpose of this paragraph the volume of free carbon dioxide shall be calculated at 0,56 m³/kg.

.3 The fixed piping system shall be such that 85 % of the gas can be discharged into the space within 2 minutes.

.4 Release mechanism of carbon dioxide:

.1 Two separate controls shall be provided for releasing carbon dioxide into a protected space and to ensure the activities of the alarm. One control shall be used to discharge the gas from its storage containers. A second control shall be used for opening the valve of the piping which conveys the gas into the protected space.

.2 The two controls shall be located inside a release box clearly identified for the particular space. If the box containing the controls is to be locked, a key to the box shall be in a break-glass-type enclosure conspicuously located adjacent to the box.

.5 The Administration of the flag State shall ensure that the spaces in which the CO₂ batteries are located will be properly arranged as regards their access, ventilation and communication equipment. It shall take the necessary safety measures regarding the construction, installation, marking, filling and testing of CO₂ cylinders, pipes and fittings, and for the control and alarm equipment for such installation.

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

.6 Carbon dioxide systems shall comply with the provisions of the Fire Safety Systems Code.

.7 The Administration of the flag State shall ensure that the spaces in which the CO₂ batteries are located will be properly arranged as regards their access, ventilation and communication equipment. It shall take the necessary safety measures regarding the construction, installation, marking, filling and testing of CO₂ cylinders piping and fittings and for control and alarm equipment for such installation.

.3 Fixed low-expansion foam fire-extinguishing systems in machinery spaces (R 8)

NEW CLASS B, C AND D SHIPS CONSTRUCTED BEFORE 1 JANUARY 2003 AND EXISTING B CLASS SHIPS:

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.1 Where in any machinery space a fixed low-expansion foam fire-extinguishing system is fitted in addition to the requirements of Regulation 6, such system shall be capable of discharging through fixed discharge outlets in not more than five minutes a quantity of foam sufficient to cover to a depth of 150 mm the largest single area over which oil fuel is liable to spread. The system shall be capable of generating foam suitable for extinguishing oil fires. Means shall be provided for effective distribution of the foam through a permanent system of piping and control valves or cocks to suitable discharge outlets and for the foam to be effectively directed by fixed sprayers on other main fire hazards in the protected space. The expansion ratio of the foam shall not exceed 12 to 1.

.2 The means of control of any such systems shall be readily accessible and simple to operate and shall be grouped together in as few locations as possible at positions not likely to be cut off by a fire in the protected space.

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

.3 Fixed low-expansion foam fire-extinguishing systems in machinery spaces shall comply with the provisions of the Fire Safety Systems Code.

.4 Fixed high-expansion foam fire-extinguishing systems in machinery spaces (R 9)
NEW CLASS B, C AND D SHIPS CONSTRUCTED BEFORE 1 JANUARY 2003 AND
EXISTING CLASS B SHIPS:

.1 Any required fixed high-expansion foam system in machinery spaces shall be capable of rapidly discharging through fixed discharge outlets a quantity of foam sufficient to fill the greatest space to be protected at a rate of at least 1 metre in depth per minute. The quantity of foam-forming liquid available shall be sufficient to produce a volume of foam equal to five times the volume of the largest space to be protected. The expansion ratio of the foam shall not exceed 1 000 to 1.

.2 Supply ducts for delivering foam, air intakes to the foam generator and the number of foam-producing units shall be such as will provide effective foam production and distribution.

.3 The arrangement of the foam generator delivery ducting shall be such that a fire in the protected space will not affect the foam generating equipment.

.4 The foam generator, its sources of power supply, foam-forming liquid and means of controlling the system shall be readily accessible and simple to operate and shall be grouped in as few locations as possible at positions not likely to be cut off by a fire in the protected space.

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

.5 Fixed high-expansion foam fire-extinguishing systems in machinery spaces shall comply with the provisions of the Fire Safety Systems Code.

.5 Fixed pressure water-spraying fire-extinguishing systems in machinery spaces (R 10)
NEW CLASS B, C AND D SHIPS CONSTRUCTED BEFORE 1 JANUARY 2003 AND
EXISTING B CLASS SHIPS:

.1 Any required fixed-pressure water-spraying fire-extinguishing system in machinery spaces shall be provided with spraying nozzles of an approved type.

.2 The number and arrangement of the nozzles shall be such as to ensure an effective average distribution of water of at least 5 litres/m² per minute in the spaces to be protected. Increased application rates may be considered if necessary for particular

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hazardous areas. Nozzles shall be fitted above bilges, tank tops and other areas over which oil fuel is liable to spread and also above other specific fire hazards in the machinery spaces.

- .3 The system may be divided into sections, the distribution valves of which shall be operated from easily accessible positions outside the spaces to be protected and will not be readily cut off by a fire in the protected space.
- .4 The system shall be kept charged at the necessary pressure and the pump supplying the water for the system shall be put automatically into action by a pressure drop in the system.
- .5 The pump shall be capable of simultaneously supplying at the necessary pressure all sections of the system in any one compartment to be protected. The pump and its controls shall be installed outside the space or spaces to be protected. It shall not be possible for a fire in the space or spaces protected by the water-spraying system to put the system out of action.
- .6 Precautions shall be taken to prevent the nozzles from becoming clogged by impurities in the water or corrosion of piping, nozzles, valves and pump.

NEW CLASS B, C AND D SHIPS CONSTRUCTED BEFORE 1 JANUARY 2003:

- .7 The pump may be driven by an independent internal combustion machinery but, if it is dependent upon power being supplied from the emergency generator fitted in compliance with the provisions of Part D of Chapter II-1, that generator shall be so arranged as to start automatically in the event of main power failure so that power for the pump required by paragraph .5 is immediately available. When the pump is driven by independent internal combustion machinery it shall be so situated that a fire in the protected space will not affect the air supply to the machinery.

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

- .8 Fixed-pressure water-spraying fire-extinguishing systems in machinery spaces shall comply with the provisions of the Fire Safety Systems Code.

5 **Portable fire extinguishers (R 6)**

NEW CLASS B, C AND D SHIPS CONSTRUCTED BEFORE 1 JANUARY 2003 AND EXISTING CLASS B SHIPS:

- .1 All fire extinguishers shall be of approved types and designs.
- .2 The capacity of required portable fluid extinguishers shall be not more than 13,5 litres and not less than 9 litres. Other extinguishers shall be at least as portable as the 13,5-litre fluid extinguisher and shall have a fire-extinguishing capability at least equivalent to that of a 9-litre fluid extinguisher.
- .3 Spare charges shall be carried for 50 % of the total of each type of extinguisher on board. Another extinguisher of the same type is a spare charge for an extinguisher which cannot be readily recharged on board.
- .4 In general, portable CO₂ fire extinguishers shall not be located in accommodation spaces. Where such extinguishers are provided in radio rooms, at switchboards and in other similar positions, the volume of any space containing one or more extinguishers shall be such as to limit the concentration of vapour that can occur due to discharge to not more than 5 % of the net volume of the space for the purpose of this regulation.

The volume of CO₂ shall be calculated at 0,56 m³/kg.

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

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- .5 Portable fire extinguishers shall comply with the provisions of the Fire Safety Systems Code.
 - .6 Carbon dioxide fire extinguishers shall not be placed in accommodation spaces. In control stations and other spaces containing electrical or electronic equipment or appliances necessary for the safety of the ship, fire extinguishers should be provided the extinguishing media of which are neither electrically conductive nor harmful to the equipment and appliances.
 - .7 Fire extinguishers shall be situated ready for use at easily visible places which can be reached quickly and easily at any time in the event of a fire and in such a way that their serviceability is not impaired by the weather, vibration or other external factors. Portable fire extinguishers shall be provided with devices which indicate whether they have been used.
 - .8 Spare charges shall be provided for 100 % of the first 10 extinguishers and 50 % of the remaining fire extinguishers capable of being recharged on board.
 - .9 For the extinguishers which cannot be recharged on board, additional portable fire extinguishers of the same quantity, type, capacity and number as determined in paragraph .13 below shall be provided in lieu of spare charges.
- NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS:
- .10 Fire extinguishers containing an extinguishing medium which either by itself or under expected conditions of use gives off toxic gases in such quantities as to endanger persons or gives off gases which are harmful to the environment shall not be permitted.
 - .11 The fire extinguishers shall be suitable for extinguishing fires which are possible in the vicinity of the fire extinguisher location.
 - .12 One of the portable fire extinguishers intended for use in any space shall be located near the entrance of that space.
 - .13 The minimum number of fire extinguishers shall be as follows:
 - .1 in accommodation and service spaces:

the fire extinguishers shall be so located that no point in the space is more than 10 metres walking distance from an extinguisher;
 - .2 an extinguisher suitable for use in high voltage areas shall be located in the proximity of any electric panel or subpanel having a power of 20 kW or more;
 - .3 in galleys the extinguishers shall be so located that no point in the space is more than 10 metres walking distance from an extinguisher;
 - .4 an extinguisher shall be located in the proximity of paint lockers and store rooms containing readily flammable products;
 - .5 at least one extinguisher shall be located on the navigating bridge and in each control station.
 - .14 Portable fire extinguishers provided for use in accommodation or service spaces shall so far as practicable have a uniform method of operation.
 - .15 Periodic inspection of fire extinguishers:

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the Administration of the Flag State shall ensure that portable fire extinguishers shall be periodically inspected, function-tested and pressure-tested.

6 Fire-extinguishing arrangements in machinery spaces (R 7)

Machinery spaces of category A shall be provided with:

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

- .1 any one of the following fixed fire-extinguishing systems:
 - .1 a gas system complying with the relevant provisions of paragraphs .1 and .2 of Regulation 4, or an equivalent water-based system as an alternative arrangement for halon systems, complying with the provisions of MSC/Circ. 668 of 30 December 1994 and MSC/Circ. 728 of June 1996, taking into consideration the date of construction of the ship;
 - .2 a high-expansion foam system complying with the relevant provisions of paragraph .4 of Regulation 4, taking into consideration the date of construction of the ship;
 - .3 a pressure water-spraying system complying with the relevant provisions of paragraph .5 of Regulation 4, taking into consideration the date of construction of the ship;
- .2 at least one set of portable air-foam equipment consisting of an air-foam nozzle of an inductor type capable of being connected to the fire main by a fire hose, together with a portable tank containing at least 20 litres of foam-making liquid and one spare tank. The nozzle shall be capable of producing effective foam suitable for extinguishing an oil fire, at a rate of at least 1,5 m³ per minute;
- .3 in each such space, approved foam-type fire extinguishers, each of at least 45 litres capacity, or equivalent, sufficient in number to enable foam or its equivalent to be directed on to any part of the fuel and lubricating oil pressure systems, gearing and other fire hazards. In addition, there shall be provided a sufficient number of portable foam extinguishers or equivalent which shall be so located that no point in the space is more than 10 metres walking distance from an extinguisher and that there are at least two such extinguishers in each such space;

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

- .4 one of the fixed fire-extinguishing systems specified in paragraph .1 above, and in addition in any space containing internal combustion engines, or oil-fuel settling tanks or oil-fuel units, one foam fire extinguisher of at least 45 litres capacity or one carbon dioxide extinguisher of at least 16 kg capacity shall be provided, and
- .5 one portable fire extinguisher suitable for extinguishing oil fires for each 736 kW or part thereof of such machinery; provided that not less than two nor more than six such extinguishers shall be required in any such space.

The use of low-expansion foam fixed system in lieu of some of the six portable fire extinguishers required by this regulation is permitted.

IN NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS CARRYING MORE THAN 36 PASSENGERS:

- .6 Each machinery space shall be provided with two suitable water fog applicators, consisting of a metal L-shaped pipe, the long limb being about two metres in length capable of being fitted to a fire hose and the short limb being about 250 mm in length fitted with a fixed water fog nozzle or capable of being fitted with a water spray nozzle.

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

- .7 When heated oil is used as heating medium, it may be additionally required that boiler rooms are equipped with permanently installed or portable equipment for local systems for jet spraying of water under pressure or the spreading of foam above and below the floor for fire-extinguishing purposes.

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

.8

- .1 Machinery spaces of category A above 500 m³ in volume shall, in addition to the fixed fire-extinguishing system required in this regulation, be protected by an approved type of fixed water-based or equivalent local application fire-fighting system, based on the guidelines developed by the IMO; see MSC/Circ. 913 'Guidelines for the approval of fixed water-based local application fire-fighting systems for use in category A machinery spaces'.

In the case of periodically unattended machinery spaces, the fire-fighting system shall have both automatic and manual release capabilities. In the case of continuously manned machinery spaces the fire-fighting system is only required to have a manual release capability.

- .2 Fixed local application fire-fighting systems are to protect areas such as the following without the necessity of engine shutdown, personnel evacuation or sealing of spaces:
- .1 the fire hazard portions of internal combustion machinery used for the ship's main propulsion and power generation,
 - .2 boiler fronts,
 - .3 the fire hazard portions of incinerators, and
 - .4 purifiers for heated fuel oil.
- .3 Activation of any local application system shall give a visual and distinct audible alarm in the protected space and at continuously manned stations. The alarm shall indicate the specific system activated. The system alarm requirements described within this paragraph are in addition to and not a substitute for the detection and fire alarm systems required elsewhere in this chapter.

IN NEW CLASS B, C AND D SHIPS CONSTRUCTED BEFORE 1 JANUARY 2003 AND IN EXISTING CLASS B SHIPS, AND IN ALL SHIPS CERTIFIED TO CARRY MORE THAN 400 PASSENGERS:

- .9 Fixed local application fire-fighting systems shall be fitted in accordance with paragraph .8 of this regulation not later than 1 October 2005.

7 Special arrangements in machinery spaces (R 11)

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

- .1 The number of skylights, doors, ventilators, openings in funnels to permit exhaust ventilation and other openings to machinery spaces shall be reduced to a minimum consistent with the needs of ventilation and the proper and safe working of the ship.
- .2 Skylights shall be of steel and shall not contain glass panels. Suitable arrangements shall be made to permit the release of smoke in the event of fire, from the space to be protected.

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NEW CLASS B, C AND D SHIPS:

- .3 Doors other than power-operated watertight doors shall be so arranged that positive closure is assured in the event of fire in the space, by power-operated closing arrangements or by the provision of self-closing doors capable of closing against an inclination of 3,5 ° opposing closure and having a fail-safe hold-back facility, provided with a remotely operated release device.

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

- .4 Windows shall not be fitted in machinery space boundaries. This does not preclude the use of glass in control rooms within the machinery spaces.
- .5 Means of control shall be provided for:
- .1 opening and closure of skylights, closure of openings in funnels which normally allow exhaust ventilation, and closure of ventilator dampers;
- .2 permitting the release of smoke;
- .3 closing power-operated doors or actuating release mechanism on doors other than power-operated watertight doors;
- .4 stopping ventilating fans; and
- .5 stopping forced and induced draught fans, oil fuel transfer pumps, oil fuel unit pumps and other similar fuel pumps. Other similar fuel pumps means for ships constructed on or after 1 January 2003 lubricating oil service pumps, thermal oil circulating pumps and oil separators. However paragraph .6 of this regulation need not apply to oily water separators.
- .6 The controls required in paragraph .5 and Regulation II-2/A/10.2.5 shall be located outside the space concerned, where they will not be cut off in the event of fire in the space they serve. Such controls and the controls for any required fire-extinguishing system shall be situated at one control position or grouped in as few positions as possible. Such positions shall have a safe access from the open deck.
- .7 When access to any machinery space of category A is provided at a low level from an adjacent shaft tunnel, there shall be provided in the shaft tunnel, near the watertight door, a light steel fire-screen door operable from each side.

8 **Automatic sprinkler, fire detection and fire alarm systems (R 12)**

NEW CLASS B, C AND D SHIPS CONSTRUCTED BEFORE 1 JANUARY 2003 AND EXISTING CLASS B SHIPS:

- .1 Any required automatic sprinkler, fire detection and fire alarm system shall be capable of immediate operation at all times and no action by the crew shall be necessary to set it in operation. It shall be of the wet pipe type but small exposed sections may be of the dry pipe type where this is a necessary precaution. Any parts of the system which may be subjected to freezing temperatures in service shall be suitably protected against freezing. It shall be kept charged at the necessary pressure and shall have provision for a continuous supply of water as required in this regulation.
- .2 Each section of sprinklers shall include means for giving a visual and audible alarm signal automatically at one or more indicating units whenever any sprinkler comes into operation. Such units shall indicate in which section served by the system fire has occurred and shall be centralised on the navigation bridge and, in addition, visible and audible alarms from the unit shall be placed in a position other than on the navigating

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bridge so as to ensure that the indication of fire is immediately received by the crew. The alarm system shall be such as to indicate if any fault occurs in the system.

- .3 Sprinklers shall be grouped into separate sections, each of which shall contain not more than 200 sprinklers. Any section of sprinklers shall not serve more than two decks and shall not be situated in more than one main vertical zone, unless it can be demonstrated that arrangements with a section of sprinklers serving more than two decks or situated in more than one main vertical zone will not reduce the protection of the ship against fire.
- .4 Each section of sprinklers shall be capable of being isolated by one stop valve only. The stop valve in each section shall be readily accessible and its location shall be clearly and permanently indicated. Means shall be provided to prevent the operation of the stop valves by any unauthorised person.
- .5 A gauge indicating the pressure in the system shall be provided at each section stop valve and at a central station.
- .6 The sprinklers shall be resistant to corrosion by marine atmosphere. In accommodation and service spaces the sprinklers shall come into operation within the temperature range from 68 to 79 °C, except that in locations such as drying rooms, where high ambient temperatures might be expected, the operating temperature may be increased by not more than 30 °C above the maximum deckhead temperature.
- .7 A list or plan shall be displayed at each indicating unit showing the spaces covered and the location of the zone in respect of each section. Suitable instructions for testing and maintenance shall be available.
- .8 Sprinklers shall be placed in an overhead position and spaced in a suitable pattern to maintain an average application rate of not less than 5 litres/m² per minute over the nominal area covered by the sprinklers.

Sprinklers shall be placed as clear as possible of beams or other objects likely to obstruct the projections of water and in such positions that combustible material in the space will be well sprayed.

- .9 A pressure tank having a volume equal to at least twice that of the charge of water specified in this paragraph shall be provided. The tank shall contain a standing charge of fresh water, equivalent to the amount of water which would be discharged in one minute by the pump referred to in paragraph .12, and the arrangements shall provide for maintaining an air pressure in the tank such as to ensure that where the standing charge of fresh water in the tank has been used the pressure will be not less than the working pressure of the sprinkler, plus the pressure exerted by a head of water measured from the bottom of the tank to the highest sprinkler in the system. Suitable means of replenishing the air under pressure and of replenishing the fresh water charge in the tank shall be provided. A glass gauge shall be provided to indicate the correct level of the water in the tank.
- .10 Means shall be provided to prevent the passage of seawater into the tank. The pressure tank shall be fitted with an efficient relief valve and a pressure gauge. Stop valves or cocks shall be provided at each of the gauge connections.
- .11 An independent power pump shall be provided solely for the purpose of continuing automatically the discharge of water from the sprinklers. The pump shall be brought into action automatically by the pressure drop in the system before the standing fresh water charge in the pressure tank is completely exhausted.

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- .12 The pump and the piping system shall be capable of maintaining the necessary pressure at the level of the highest sprinkler to ensure a continuous output of water sufficient for the simultaneous coverage of a minimum area of 280 m² at the application rate specified in paragraph .8. For new class C and D ships of less than 40 metres in length with a total protected area of less than 280 m², the Administration of the flag State may specify the appropriate area for sizing of pumps and alternative supply components.
- .13 The pump shall have fitted on the delivery side a test valve with a short open-ended discharge pipe. The effective area through the valve and the pipe shall be adequate to permit the release of the required pump output while maintaining the pressure in the system specified in paragraph .9.
- .14 The sea inlet to the pump shall wherever possible be in the space containing the pump and shall be so arranged that when the ship is afloat it will not be necessary to shut off the supply of seawater to the pump for any purpose other than the inspection or repair of the pump.
- .15 The sprinkler pump and tank shall be situated in a position reasonably remote from any machinery space and shall not be situated in any space required to be protected by the sprinkler system.
- .16 There shall be not less than two sources of power supply for the seawater pump and automatic alarm and detection system. Where the sources of power for the pump are electrical, these shall be a main generator and an emergency source of power. One supply for the pump shall be taken from the main switchboard, and one from the emergency switchboard by separate feeders reserved solely for that purpose. The feeders shall be so arranged as to avoid galleys, machinery spaces and other enclosed spaces of high fire risk except in so far as it is necessary to reach the appropriate switchboards, and shall be run to an automatic changeover switch situated near the sprinkler pump. This switch shall permit the supply of power from the main switchboard so long as a supply is available therefrom, and to be so designed that upon failure of that supply it will automatically change over to the supply from the emergency switchboard. The switches on the main switchboard and the emergency switchboard shall be clearly labelled and normally kept closed. No other switch shall be permitted in the feeders concerned. One of the sources of power supply for the alarm and detection system shall be an emergency source. Where one of the sources of power for the pump is an internal combustion engine it shall, in addition to complying with the provisions of paragraph .15, be so situated that a fire in any protected space will not affect the air supply to the machinery.
- .17 The sprinkler system shall have a connection from the ship's fire main by way of a lockable screw-down non-return valve at the connection which will prevent a backflow from the sprinkler system to the fire main.
- .18 A test valve shall be provided for testing the automatic alarm for each section of sprinklers by a discharge of water equivalent to the operation of one sprinkler. The test valve for each section shall be situated near the stop valve for that section.
- .19 Means shall be provided for testing the automatic operation of the pump on reduction of pressure in the system.
- .20 Switches shall be provided at one of the indicating positions referred to in paragraph .2 which will enable the alarm and the indicators for each section of sprinklers to be tested.

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- .21 At least 6 spare sprinkler heads shall be provided for each section.
NEW CLASS B, C AND D SHIPS CONSTRUCTED ON OR AFTER 1 JANUARY 2003:
- .22 The automatic sprinkler, fire detection and fire alarm systems shall be of an approved type, complying with the provisions of the Fire Safety System Code.
- .23 For new C and D class ships of less than 40 metres in length and with a total protected area of less than 280 m² the Administration of the flag State may specify the appropriate area for sizing of pumps and alternative components.

9 Fixed fire detection and fire alarm systems (R 13)

NEW CLASS B, C AND D SHIPS CONSTRUCTED BEFORE 1 JANUARY 2003 AND EXISTING CLASS B SHIPS:

- .1 General
- .1 Any required fixed fire detection and fire alarm system with manually operated call points shall be capable of immediate operation at all times.
- .2 Power supplies and electric circuits necessary for the operation of the system shall be monitored for loss of power or fault conditions as appropriate. Occurrence of a fault condition shall initiate a visual and audible fault signal at the control panel which shall be distinct from a fire signal.
- .3 There shall be not less than two sources of power supply for the electrical equipment used in the operation of the fire detection and fire alarm system, one of which shall be an emergency source. The supply shall be provided by separate feeders reserved solely for that purpose. Such feeders shall run to an automatic changeover switch situated in or adjacent to the control panel for the fire detection system.
- .4 Detectors and manually operated call points shall be grouped into sections. The activation of any detector or manually operated call point shall initiate a visual and audible fire signal at the control panel and indicating units. If the signals have not received attention within 2 minutes an audible alarm shall be automatically sounded throughout the crew accommodation and service spaces, control stations and machinery spaces. This alarm sounder system need not be an integral part of the detection system.
- .5 The control panel shall be located on the navigating bridge or in the main fire control station.
- .6 Indicating units shall, as a minimum, denote the section in which a detector or manually operated call point has operated. At least one unit shall be so located that it is easily accessible to responsible members of the crew at all times, when at sea or in port, except when the ship is out of service. One indicating unit shall be located on the navigating bridge if the control panel is located in the main fire control station.
- .7 Clear information shall be displayed on or adjacent to each indicating unit about the spaces covered and the location of the sections.
- .8 Where the fire detection system does not include means of remotely identifying each detector individually, no section covering more than one deck within accommodation, service and control stations shall normally be permitted except a section which covers an enclosed stairway. In order to avoid delay in identifying the source of fire, the number of enclosed spaces included in each section shall be limited as determined by the Administration of the flag State. In no case shall more than 50 enclosed

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spaces be permitted in any section. If the detection system is fitted with remotely and individually identifiable fire detectors, the sections may cover several decks and serve any number of enclosed spaces.

- .9 If there is no fire detection system capable of remotely and individually identifying each detector, a section of detectors shall not serve spaces on both sides of the ship nor on more than one deck and neither shall it be situated in more than one main vertical zone except that the Administration of the flag State, if it is satisfied that the protection of the ship against fire will not thereby be reduced, may permit such a section of detectors to serve both sides of the ship and more than one deck. In ships fitted with individually identifiable fire detectors, a section may serve spaces on both sides of the ship and on several decks but may not be situated in more than one main vertical zone.
- .10 A section of fire detectors which covers a control station, a service space or an accommodation space shall not include a machinery space.
- .11 Detectors shall be operated by heat, smoke or other products of combustion, flame or any combination of these factors. Detectors operated by other factors indicative of incipient fires may be considered by the Administration of the flag State provided that they are not less sensitive than such detectors. Flame detectors shall only be used in addition to smoke or heat detectors.
- .12 Suitable instructions and component spares for testing and maintenance shall be provided.
- .13 The functioning of the detection system shall be periodically tested to the satisfaction of the Administration of the flag State by means of equipment producing hot air at the appropriate temperature, or smoke or aerosol particles having the appropriate range of density or particle size, or other phenomena associated with incipient fires to which the detector is designed to respond.

All detectors shall be of a type such that they can be tested for correct operation and restored to normal surveillance without the renewal of any component.

- .14 The fire detection system shall not be used for any other purpose, except that closing of fire doors and similar functions may be permitted at the control panel.
- .15 Fire detection systems with a zone address identification capability shall be so arranged that:
 - a loop cannot be damaged at more than one point by a fire,
 - means are provided to ensure that any fault (e.g. power break, short circuit, earth) occurring in the loop will not render the whole loop ineffective,
 - all arrangements are made to enable the initial configuration of the system to be restored in the event of failure (electrical, electronic, informatic),
 - the first initiated fire alarm will not prevent any other detector to initiate further fire alarms.
- .2 Installation requirements
 - .1 Manually operated call points shall be installed throughout the accommodation spaces, service spaces and control stations. One manually operated call point shall be located at each exit. Manually operated call points shall be readily accessible in the corridors of each deck such that no part of the corridor is more than 20 metres from a manually operated call point.

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- .2 Smoke detectors shall be installed in all stairways, corridors and escape routes within accommodation spaces.
- .3 Where a fixed fire detection and fire alarm is required for the protection of spaces other than those specified in paragraph .2.2, at least one detector complying with paragraph .1.11 shall be installed in each such space.
- .4 Detectors shall be located for optimum performance. Positions near beams and ventilation ducts or other positions where patterns of airflow could adversely affect performance and positions where impact or physical damage is likely shall be avoided. In general, detectors which are located on the overhead shall be a minimum distance of 0,5 metres away from bulkheads.
- .5 The maximum spacing of detectors shall be in accordance with the table below:

Type of detector	Maximum floor area per detector(m ²)	Maximum distance apart between centres(m)	Maximum distance away from bulkheads(m)
Heat	37	9	4,5
Smoke	74	11	5,5

The Administration of the flag State may require or permit other spacings based upon test data which demonstrate the characteristics of the detectors.

- .6 Electrical wiring which forms part of the system shall be so arranged as to avoid galleys, machinery spaces, and other enclosed spaces of high fire risk except where it is necessary to provide for fire detection or fire alarm in such spaces or to connect to the appropriate power supply.
- .3 Design requirements
- .1 The system and equipment shall be suitably designed to withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in ships.
- .2 Smoke detectors to be installed in stairways, corridors and escape routes within accommodation spaces as required by paragraph .2.2 shall be certified to operate before the smoke density exceeds 12,5 % obscuration per metre, but not until the smoke density exceeds 2 % obscuration per metre.

Smoke detectors to be installed in other spaces shall operate within sensitivity limits to the satisfaction of the Administration of the flag State, having regard to the avoidance of detector insensitivity or oversensitivity.

- .3 Heat detectors shall be certified to operate before the temperature exceeds 78 °C but not until the temperature exceeds 54 °C, when the temperature is raised to those limits at a rate less than 1 °C per minute. At higher rates of temperature rise, the heat detector shall operate within temperature limits to the satisfaction of the Administration of the flag State, having regard to the avoidance of detector insensitivity or oversensitivity.
- .4 The permissible temperature of operation of heat detectors may be increased to 30 °C above the maximum deckhead temperature in drying rooms and similar spaces of a normal high ambient temperature.

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

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- .4.1 The fixed fire detection and fire alarm systems shall be of an approved type, complying with the provisions of the Fire Safety Systems Code.
- .4.2 Manually operated call points complying with the Fire Safety Systems Code shall be installed throughout the accommodation spaces, service spaces and control stations. One manually operated call point shall be located at each exit. Manually operated call points shall be readily accessible in the corridors of each deck such that no part of the corridor is more than 20 metres from a manually operated call point.

NEW CLASS A, B, C AND D SHIPS:

- .5 In addition to the above provisions, the Administration of the flag State shall ensure that safety provisions on the installations regarding their independence from other installations or systems, the corrosion resistance of their components, the electrical power supply to their control system, and the availability of instructions for their operation and maintenance shall be complied with.

10 Arrangements for oil fuel, lubricating oil and other flammable oils (R 15)

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

- .1 Limitations in the use of oil as fuel

The following limitations shall apply to the use of oil as fuel:

- .1 Except as otherwise permitted by this paragraph, no oil fuel with a flashpoint of less than 60 °C shall be used.
- .2 In emergency generators, oil fuel with a flashpoint of not less than 43 °C may be used.
- .3 Subject to such additional precautions as it may consider necessary and on condition that the ambient temperature of the space in which such oil fuel is stored or used shall not be allowed to rise to within 10 °C below the flashpoint of the oil fuel, the Administration of the flag State may permit the general use of oil fuel having a flashpoint of less than 60 °C but not less than 43 °C.

For ships constructed on or after 1 January 2003 oil fuel having a flashpoint of less than 60 °C but not less than 43 °C may be permitted subject to the following:

- .3.1 fuel oil tanks except those arranged in double bottom compartments shall be located outside of machinery spaces of category A;
- .3.2 provisions for the measurement of oil temperature are provided on the suction pipe of the fuel pump;
- .3.3 stop valves and/or cocks are provided on the inlet side and outlet side of the oil fuel strainers; and
- .3.4 pipe joints of welded construction or of circular cone type or spherical type union joint are applied as much as possible.

The flashpoint of oils shall be determined by an approved closed cup method.

- .2 Oil fuel arrangements

In a ship in which oil fuel is used, the arrangements for the storage, distribution and utilisation of the oil fuel shall be such as to ensure the safety of the ship and persons on board and shall at least comply with the following provisions:

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- .1.1 As far as practicable, parts of the oil fuel system containing heated oil under pressure exceeding $0,18 \text{ N/mm}^2$ shall not be placed in a concealed position such that defects and leakage cannot readily be observed. The machinery spaces in way of such parts of the oil fuel system shall be adequately illuminated.
- .1.2 By heated oil is meant oil the temperature of which after heating is higher than $60 \text{ }^\circ\text{C}$ or higher than the current flashpoint of the oil, if this is lower than $60 \text{ }^\circ\text{C}$.
- .2 The ventilation of machinery spaces shall be sufficient under all normal conditions to prevent accumulation of oil vapour.
- .3 As far as practicable, oil fuel tanks shall be part of the ship's structure and shall be located outside machinery spaces. Where oil fuel tanks, other than double bottom tanks, are necessarily located adjacent to or within machinery spaces, at least one of their vertical sides shall be contiguous to the machinery space boundaries, and shall preferably have a common boundary with the double bottom tanks, and the area of the tank boundary common with the machinery spaces shall be kept to a minimum. Where such tanks are situated within the boundaries of machinery spaces they shall not contain oil fuel having a flashpoint of less than $60 \text{ }^\circ\text{C}$. The use of freestanding oil fuel tanks shall be avoided and shall be prohibited in machinery spaces.
- .4 No oil fuel tank shall be situated where spillage or leakage therefrom can constitute a hazard by falling on heated surfaces. Precautions shall be taken to prevent any oil that may escape under pressure from any pump, filter or heater from coming into contact with heated surfaces.
- .5 Every oil fuel pipe, which, if damaged, would allow oil to escape from a storage, settling or daily service tank, having a capacity of 500 litres or above, situated above the double bottom, shall be fitted with a cock or valve directly on the tank capable of being closed from a safe position outside the space concerned in the event of a fire occurring in the space in which such tanks are situated. In the special case of deep tanks situated in any shaft or pipe tunnel or similar space, valves on the tank shall be fitted but control in the event of fire may be effected by means of an additional valve on the pipe or pipes outside the tunnel or similar space. If such additional valve is fitted in the machinery space it shall be operated from a position outside this space.

In ships constructed on or after 1 January 2003 the controls for remote operation of the valve for the emergency generator fuel tank shall be in a separate location from the controls for remote operation of other valves located in machinery spaces.

- .6 Safe and efficient means of ascertaining the amount of oil fuel contained in any oil fuel tank shall be provided.

NEW CLASS B, C AND D SHIPS:

- .1 Sounding pipes shall not terminate in any space where the risk of ignition of spillage from the sounding pipe might arise. In particular, they shall not terminate in passenger or crew spaces. As a general rule, sounding pipes shall not terminate in machinery spaces. However, where the Administration of the flag State considers that these latter requirements are impracticable, it may permit termination of sounding pipes in machinery spaces on condition that all the following requirements are met:
 - .1.1 in addition, an oil-level gauge is provided meeting the requirements of subparagraph .2.6.2;

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- .1.2 the sounding pipes terminate in locations remote from ignition hazards unless precautions are taken, such as the fitting of effective screens, to prevent the oil fuel in the case of spillage through the terminations of the sounding pipes from coming into contact with a source of ignition;
- .1.3 the termination of sounding pipes are fitted with self-closing blanking devices and with a small-diameter self-closing control cock located below the blanking device for the purpose of ascertaining before the blanking device is opened that oil fuel is not present. Provision shall be made as to ensure that any spillage of oil fuel through the control cock involves no ignition hazard.

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

- .2 Other means of ascertaining the amount of oil fuel contained in any oil fuel tank may be permitted if such means, like the means provided in subparagraph .2.6.1.1, do not require penetration below the top of the tank, and providing their failure or overfilling of the tanks will not permit release of fuel.
- .3 Means prescribed in subparagraph .2.6.2 shall be maintained in the proper condition to ensure their continued accurate functioning in service.
- .7 Provision shall be made to prevent overpressure in any oil tank or in any part of the oil fuel system, including the filling pipes served by pumps on board. Any relief valves and air or overflow pipes shall discharge to a position where there is no risk of fire or explosion from the emergence of oils and vapour and shall not lead into crew spaces, passenger spaces nor into special category spaces, closed ro-ro spaces, machinery spaces or similar spaces, situated in ships constructed on or after 1 January 2003.
- .8 Oil fuel pipes and their valves and fittings shall be of steel or other approved material, except that restricted use of flexible pipes may be permitted. Such flexible pipes and end attachments shall be of approved fire-resisting materials of adequate strength.

For valves, fitted to oil fuel tanks and which are under static pressure, steel or spheroidal-graphite cast iron may be accepted. However, ordinary cast iron valves may be used in piping systems, where the design pressure is lower than 7 bar and the design temperature is below 60 °C.

NEW CLASS B, C AND D SHIPS:

- .9 All external high pressure fuel delivery lines between the high pressure fuel pumps and fuel injectors shall be protected with a jacketed piping system capable of containing fuel from a high pressure line failure. A jacketed pipe incorporates an outer pipe into which the high-pressure fuel pipe is placed forming a permanent assembly. The jacketed piping system shall include a means for collection of leakages and arrangements shall be provided for an alarm to be given of a fuel line failure.
- .10 All surfaces with temperatures above 220 °C which may be impinged as a result of a fuel system failure shall be properly insulated.
- .11 Oil fuel lines shall be screened or otherwise suitably protected to avoid as far as practicable oil spray or oil leakages onto hot surfaces, into machinery air intakes, or other sources of ignition. The number of joints in such piping systems shall be kept to a minimum.

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

- .12 Oil fuel lines shall not be located immediately above or near units of high temperature including boilers, steam pipelines, exhaust manifolds, silencers or other equipment required to be insulated. As far as practicable, oil fuel lines shall be arranged far

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apart from hot surfaces, electrical installations or other sources of ignition and shall be screened or otherwise suitably protected to avoid oil spray or oil leakage onto the sources of ignition. The number of joints in such piping systems shall be kept to a minimum.

- .13 Components of a diesel engine fuel system shall be designed considering the maximum peak pressure which will be experienced in service, including any high pressure pulses which are generated and transmitted back into fuel supply and spill lines by the action of fuel injection pumps. Connections within the fuel supply and spill lines shall be constructed having regard to their ability to prevent pressurised oil fuel leaks while in service and after maintenance.
- .14 In multi-engine installations which are supplied from the same fuel source, means of isolating the fuel supply and spill piping to individual engines, shall be provided. The means of isolation shall not affect the operation of the other engines and shall be operable from a position not rendered inaccessible by a fire on any of the engines.
- .15 Where the Administration of the flag State may permit the conveying of oil and combustible liquids through accommodation and service spaces, the pipes conveying oil or combustible liquids shall be of a material approved by the Administration having regard of the fire risk.
- .16 Existing class B ships shall comply with the requirements of paragraphs .2.9 to .2.11, except that a suitable enclosure of engines having an output of 375 kW or less having fuel injection pumps serving more than one injector may be used as an alternative to the jacketed piping system in paragraph .2.9.

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

.3 Lubricating oil arrangements

The arrangements for the storage, distribution and utilisation of oil used in pressure lubrication systems shall be such as to ensure the safety of the ship and persons on board, and such arrangements in machinery spaces shall at least comply with the provisions of paragraphs .2.1, .2.4, .2.5, .2.6, .2.7, .2.8, .2.10 and .2.11, except that:

- .1 this does not preclude the use of sight-flow glasses in lubricating systems provided that they are shown by test to have a suitable degree of fire resistance. If sight-flow glasses are used, the pipe shall be provided with valves in both ends. The valve at the lower end of the pipe shall be of a self-closing type;
- .2 sounding pipes may be authorised in machinery spaces; the requirements of paragraphs .2.6.1.1 and .2.6.1.3 need not be applied on condition that the sounding pipes are fitted with appropriate means of closure.

For ships constructed on or after 1 January 2003 the provisions of paragraph .10.2.5 shall also apply to lubricating oil tanks except those of having a capacity less than 500 litres, storage tanks on which valves are closed during the normal operation of the ship or where it is determined that the unintended operation of a quick closing valve on the lubricating oil tank would endanger the safe operation of the main propulsion and essential auxiliary machinery.

.4 Arrangements for other flammable oils

The arrangements for the storage, distribution and utilisation of other flammable oils employed under pressure in power transmission systems, control and activating systems and heating systems shall be such as to ensure the safety of the ship and persons on board. In locations

where means of ignition are present, such arrangements shall at least comply with the provisions of paragraphs .2.4, .2.6, .2.10 and .2.11 and with the provisions of paragraphs .2.7 and .2.8 in respect of strength and construction.

.5 Periodically unattended machinery spaces

In addition to the requirements of provisions .1 to .4, the oil fuel and lubricating oil systems shall comply with the following:

- .1 where daily service oil fuel tanks are filled automatically, or by remote control, means shall be provided to prevent overflow spillages. Other equipment which treats flammable liquids automatically, e.g. oil fuel purifiers, which, whenever practicable, shall be installed in a special space reserved for purifiers and their heaters, shall have arrangements to prevent overflow spillages;
- .2 where daily service oil fuel tanks or settling tanks are fitted with heating arrangements, a high temperature alarm shall be provided if the flashpoint of the oil fuel can be exceeded.
- .6 Prohibition of carriage of flammable oils in forepeak tanks

Fuel oil, lubrication oil and other flammable oils shall not be carried in forepeak tanks.

11 **Firefighter's outfit (R 17)**

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

- .1 A firefighter's outfit shall consist of:
 - .1.1 Personal equipment comprising:
 - .1 protective clothing of material to protect the skin from the heat radiating from the fire and from burns and scalding by steam. The outer surface shall be water-resistant;
 - .2 boots and gloves of rubber or other electrically non-conducting material;
 - .3 a rigid helmet providing effective protection against impact;
 - .4 an electric safety lamp (hand lantern) of an approved type with a minimum burning period of three hours;
 - .5 a firefighter's axe.
 - .1.2 A breathing apparatus of an approved type consisting of a self-contained compressed-air-operated breathing apparatus (SCBA), the volume of air contained in the cylinders of which shall be at least 1 200 litres, or other self-contained breathing apparatus which shall be capable of functioning for at least 30 minutes. Every SCBA shall be provided with fully charged spare cylinders having a spare storage capacity of at least 2 400 litres of free air except that:
 - (i) if the ship is carrying five or more SCBA, the total spare storage capacity of free air need not exceed 9 600 litres; or
 - (ii) if the ship is equipped with means for recharging the air cylinders with full pressure with air, free from contamination, the spare storage capacity of the fully charged spare cylinders of each SCBA shall be at least 1 200 litres of free air, and the total spare storage capacity of free air provided in the ship shall not be required to exceed 4 800 litres of free air.

All air cylinders for SCBA's shall be interchangeable.

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- .2 For each breathing apparatus a fireproof lifeline of sufficient length and strength shall be provided capable of being attached by means of a snaphook to the harness of the apparatus or to a separate belt in order to prevent the breathing apparatus becoming detached when the lifeline is operated.
- .3 New class B and existing class B ships of 24 metres in length and above and all new class C and D ships of 40 metres in length and above shall carry at least two firefighter's outfits.
- .1 In ships of 60 metres in length and above, in addition there shall be provided, if the aggregate of the lengths of all passenger spaces and service spaces on the deck which carries such spaces is more than 80 metres, or, if there is more than one such deck, on the deck which has the largest aggregate of such lengths, two firefighter's outfits and two sets of personal equipment for every 80 metres, or part thereof, of such aggregate of lengths.

In ships carrying more than 36 passengers, two additional firefighter's outfits shall be provided for each main vertical zone, except for stairway enclosures which constitute individual main vertical zones and for main vertical zones of limited length in the fore and aft end of a ship which do not include, machinery spaces or main galleys.
- .2 In ships of 40 metres in length and above but less than 60 metres two firefighter's outfits have to be provided.
- .3 In new class B and existing class B ships of 24 metres in length and above but less than 40 metres, also two firefighter's outfits have to be provided, but with only one spare aircharge for self-contained breathing apparatus.
- .4 In new and existing class B ships of less than 24 metres length and in new class C and D ships of less than 40 metres in length no firefighter's outfit has to be provided.
- .5 The firefighter's outfits or sets of personal equipment shall be so stored as to be easily accessible and ready for use and, where more than one fire-fighter's outfit or more than one set of personal equipment is carried, they shall be stored in widely separated positions. At least one firefighter's outfit and one set of personal equipment shall be available at any one such position.

12 Miscellaneous items (R 18)

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

- .1 Where class 'A' divisions are penetrated for the passage of electric cables, pipes, trunks, ducts etc., or for girders, beams or other structural members, arrangements shall be made to ensure that the fire resistance is not impaired in so far as is reasonable and practicable.

For ships which are constructed on or after 1 January 2003, where 'A' class divisions are penetrated, such penetrations shall be tested in accordance with the Fire Test Procedures Code, to ensure that the fire resistance of the divisions is not impaired.

In the case of ventilation ducts Regulations II-2/B/9.2.2b and II-2/B/9.3 apply.

However, where a pipe penetration is made of steel or equivalent material having a thickness of 3 mm or greater and a length of not less than 900 mm (preferably 450 mm on each side of the division) and no openings, testing is not required.

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Such penetrations shall be suitably insulated by extension of the insulation at the same level of the division.

- .2 Where class 'B' divisions are penetrated for the passage of electric cables, pipes, trunks, ducts etc., or for the fitting of ventilation terminals, lighting fixtures and similar devices, arrangements shall be made to ensure that the fire resistance is not impaired in so far as is reasonable and practicable. In ships which are constructed on or after 1 January 2003 for such penetrations arrangements shall be made to ensure that the fire resistance of the divisions is not impaired.

Pipes other than steel or copper that penetrate 'B' class divisions shall be protected by either:

- .1 a fire tested penetration device, suitable for the fire resistance of the division pierced and the type of the pipe used; or
- .2 a steel sleeve, having a thickness of not less than 1,8 mm and a length of not less than 900 mm for pipe diameters of 150 mm or more and not less than 600 mm for pipe diameters of less than 150 mm (preferably equally divided to each side of the division).

The pipe shall be connected to the ends of the sleeve by flanges or couplings or the clearance between the sleeve and the pipe shall not exceed 2,5 mm or any clearance between pipe and sleeve shall be made tight by means of non-combustible or other suitable material.

- .3 Pipes penetrating 'A' or 'B' class divisions shall be of approved materials having regard to the temperature such divisions are required to withstand.

In ships constructed on or after 1 January 2003, no-insulated metallic pipes penetrating 'A' or 'B' class divisions shall be of materials having a melting temperature which exceeds 950 °C for 'A-0' and 850 °C for 'B-0' class divisions.

- .4 In accommodation spaces, service spaces or control stations, pipes intended to convey oil or other flammable liquids shall be of a suitable material and construction having regard to the fire risk.
- .5 Materials readily rendered ineffective by heat shall not be used for over board scuppers, sanitary discharges, and other outlets which are close to the waterline and where the failure of the material in the event of fire would give rise to danger of flooding.
- .6 Electric radiators, if used, shall be fixed in position and so constructed as to reduce fire risks to a minimum. No such radiators shall be fitted with an element so exposed that clothing, curtains, or other similar materials can be scorched or set on fire by heat from the element.
- .7 All waste receptacles shall be constructed of non-combustible materials with no openings in the sides or bottom.
- .8 In spaces where penetration of oil products is possible, the surface of insulation shall be impervious to oil or oil vapours.

NEW CLASS A, B, C AND D SHIPS: In spaces in which there is a risk of oils splashing or oil vapour, e.g. in machinery spaces of category A, the surface of the insulating material shall be impermeable by oil and oil vapour. Where there is covering by non-perforated steel plate or other non-combustible materials (not aluminium) which is the ultimate physical surface, this covering may be joined by seaming, riveting, etc.

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- .9 Paint lockers and flammable liquid lockers shall be protected by an approved fire-extinguishing arrangement, enabling the crew to extinguish a fire without entering the space.

In ships which are constructed on or after 1 January 2003:

- .1 Paint lockers shall be protected by:
- .1.1 a carbon dioxide system, designed to give a minimum volume of free gas equal to 40 % of the gross volume of the protected space;
 - .1.2 a dry powder system, designed for at least 0,5 kg powder/m³;
 - .1.3 a waterspraying or sprinkler system, designed for 5 litres/m² min. Water spraying systems may be connected to the fire main of the ship; or
 - .1.4 a system providing equivalent protection, as determined by the Administration of the flag State.

In any case the system shall be operable from outside the protected space.

- .2 Flammable liquid lockers shall be protected by an appropriate fire extinguishing arrangement approved by the Administration of the flag State.
- .3 For lockers of a deck area of less than 4 m², which do not give access to accommodation spaces, a carbon dioxide portable extinguisher sized to provide a minimum volume of free gas equal to 40 % of the gross volume of the space may be accepted in lieu of a fixed system.

A discharge port shall be arranged in the locker to allow the discharge of the extinguisher without having to enter into the protected space. The required portable fire extinguisher shall be stowed adjacent to the port. Alternatively a port or hose connection may be provided to facilitate the use of fire main water.

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

- .10 Deep-fat friers, boiling and roasting apparatus:

When deep-fat friers, boiling and roasting apparatus are installed and used in spaces outside the main galley, the Administration of the flag State shall impose additional safety measures with regard to the specific fire hazards associated with the use of this type of equipment.

In ships which are constructed on or after 1 January 2003, deep-fat cooking equipment shall be fitted with the following:

- .1 an automatic or manual extinguishing system tested to an international standard in accordance with Publication ISO 15371:2000 on fire-extinguishing systems for protection of galley deep-fat cooking equipment;
- .2 a primary and backup thermostat with an alarm to alert the operator in the event of failure of either thermostat;
- .3 arrangements for automatically shutting off the electrical power upon activation of the extinguishing system;
- .4 an alarm for indicating operation of the extinguishing system in the galley where the equipment is installed; and

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- .5 controls for manual operation of the extinguishing system, which are clearly labelled for ready use of the crew.

In ships which are constructed before 1 January 2003, new installations for deep-fat cooking equipment shall comply with the requirements of this paragraph.

NEW CLASS A, B, C AND D SHIPS:

- .11 Heat bridges:

In the implementation of fire proofing measures, steps shall be undertaken by the Administration of the flag State to prevent heat transfer through heat bridges, e.g. between decks and bulkheads.

In ships which are constructed on or after 1 January 2003, the insulation of a deck or bulkhead shall be carried past the penetration, intersection or terminal point for a distance of at least 450 mm in the case of steel and aluminium structures. If a space is divided with a deck or a bulkhead of 'A' class standard having insulation of different values, the insulation with the higher value shall continue on the deck or bulkhead with the insulation of the lesser value for a distance of at least 450 mm.

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

- .12 Pressurised gas containers:

Portable containers for gases which are compressed, liquefied or broken down under pressure, which may feed a possible fire, shall immediately after use be put in a suitable place above the bulkhead deck, from which there is direct access to open deck.

13 **Fire control plans (R 20)**

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

- .1 In all ships general arrangement plans shall be permanently exhibited for the guidance of the ship's officers, showing clearly for each deck the control stations, the various fire sections enclosed by 'A' class divisions, the sections enclosed by 'B' class divisions together with particulars of the fire detection and fire alarm systems, the sprinkler installation, the fire-extinguishing appliances, means of access to different compartments, decks, etc. and the ventilating system including particulars of the fan control positions, the position of dampers and identification numbers of the ventilating fans serving each section. Alternatively the aforementioned details may be set out in a booklet, a copy of which shall be supplied to each officer, and one copy shall at all times be available on board in an accessible position. Plans and booklets shall be kept up to date, any alterations being recorded thereon as soon as practicable. Description in such plans and booklets shall be in the official language of the flag State. If the language is neither English nor French, a translation into one of these languages shall be included. In the case the ship is engaged on domestic voyages in another Member State, a translation into the official language of that host State, if this language is neither English nor French, shall be included.

For new class B, C and D ships constructed on or after 1 January 2003, the information to be provided with the required fire control plans and booklets and the graphical symbols to be used for the fire control plans shall be in accordance with the IMO Resolutions A.756 (18) and A.654 (16).

- .2 In all ships with a length of 24 metres and over a duplicate set of fire control plans or a booklet containing such plans shall be permanently stored in a prominently marked weather tight enclosure outside the deckhouse for the assistance of shore side fire-fighting personnel.

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14 **Operational readiness and maintenance**

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

.1 General requirements

At all times while the ship is in service, the fire protection systems and fire-fighting systems and appliances shall be maintained ready for use.

A ship is not in service when:

- .1 it is in for repairs or lay-up (either at anchor or at port) or in dry-dock;
- .2 it is declared not in service by the owner or the owner's representative; and
- .3 if there are no passengers on board.

The following fire protection systems shall be kept in good order so as to ensure their required performance if a fire occurs:

.1.1 Operational readiness

- .1 structural fire protection including fire resisting divisions and protection of openings and penetrations in these divisions;
- .2 fire detection and fire alarm systems; and
- .3 means of escape systems and appliances.

Fire-fighting systems and appliances shall be kept in good working order and readily available for immediate use. Portable extinguishers which have been discharged shall be immediately recharged or replaced with an equivalent unit.

.1.2 Maintenance, testing and inspections

Maintenance, testing and inspections shall be carried out based on the guidelines developed by IMO and in a manner having due regard to ensuring the reliability of fire-fighting systems and appliances.

A maintenance plan shall be kept on board the ship and shall be available for inspection, whenever required by the Administration of the flag State.

The maintenance plan shall include at least the following fire protection systems and fire-fighting systems and appliances, where installed:

- .1 fire mains, fire pumps and hydrants including hoses and nozzles;
- .2 fixed fire detection and fire alarm systems;
- .3 fixed fire-extinguishing systems and other fire-extinguishing appliances;
- .4 automatic sprinkler, fire detection and fire alarm systems;
- .5 ventilation systems including fire and smoke dampers, fans and their controls;
- .6 emergency shut down of fuel supply;
- .7 fire doors including their controls;
- .8 general emergency alarm systems;

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- .9 emergency escape breathing devices;
- .10 portable fire extinguishers including spare charges; and
- .11 firefighter's outfits.

The maintenance programme may be computer-based.

.2 Additional requirements

For new class B, C and D ships constructed on or after 1 January 2003 carrying more than 36 passengers, a maintenance plan for low-location lighting and public address systems shall be developed in addition to the maintenance plan mentioned under paragraph .1.2.

15 **Instructions, on-board training and drills**

NEW CLASS B, C AND D AND EXISTING SHIPS:

- .1 Instructions, duties and organisation
 - .1 Crew members shall receive instructions on fire safety on-board the ship.
 - .2 Crew members shall receive instructions on their assigned duties.
 - .3 Parties responsible for fire extinguishing shall be organised. These parties shall have the capability to complete their duties at all times while the ship is in service.
- .2 On-board training and drills
 - .1 Crew members shall be trained to be familiar with the arrangements of the ship as well as the location and operation of any fire-fighting systems and appliances that they may be called upon to use.
 - .2 Training in the use of the emergency escape breathing devices shall be considered as a part of on-board training.
 - .3 Performance of crew members assigned fire-fighting duties shall be periodically evaluated by conducting on-board training and drills to identify areas in need of improvement, to ensure competency in fire-fighting skills is maintained and to ensure the operational readiness of the fire-fighting organisation.
 - .4 On-board training in the use of the ship's fire-extinguishing systems and appliances shall be planned and conducted in accordance with provisions of Regulation III/19.4.1 of the 1974 SOLAS Convention, as amended.
 - .5 Fire drills shall be conducted and recorded in accordance with the provisions of Regulations III/19.3.4, III/19.5 and III/30 of the 1974 SOLAS Convention, as amended.
- .3 Training manuals

A training manual shall be provided in each crew mess room and recreation room or in each crew cabin. The training manual shall be written in the working language of the ship. The training manual, which may comprise several volumes, shall contain the instructions and the information required in this paragraph in easily understood terms and illustrated wherever possible. Any part of such information may be provided in the form of audio-visual aides in lieu of the manual. The training manual shall explain the following in detail:

- .1 general fire safety practice and precautions related to the dangers of smoking, electrical hazards, flammable liquids and similar common shipboard hazards;

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- .2 general instructions on fire-fighting activities and fire-fighting procedures including procedures for notification of a fire and use of manually operated call points;
- .3 meanings of ship's alarms;
- .4 operation and use of fire-fighting systems and appliances;
- .5 operation and use of fire doors;
- .6 operation and use of fire and smoke dampers; and
- .7 escape systems and appliances.
- .4 Fire control plans

Fire control plans have to comply with the requirements of Regulation II-2/A-13.

16 Operations

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

- .1 To provide information and instruction for proper ship and cargo handling operations in relation to fire safety, operational booklets shall be provided on board.
- .2 The required fire operational booklet shall contain the necessary information and instructions for the safe operation of the ship and cargo handling operations in relation to fire safety. The booklet shall include information concerning the crew's responsibilities for the general fire safety of the ship while loading and discharging cargo and while underway. For ships carrying dangerous goods the fire safety booklet shall provide reference to the pertinent fire-fighting and emergency cargo handling instructions contained in the International Maritime Dangerous Goods Code.
- .3 The fire safety operational booklet shall be written in the working language of the ship.
- .4 The fire safety operational booklet may be combined with the training manuals required in Regulation II-2/A/15.3.

PART B

FIRE SAFETY MEASURES

1 Structure (R 23)

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

- .1 The hull, superstructures, structural bulkheads, decks and deckhouses shall be constructed of steel or other equivalent material. For the purpose of applying the definition of steel or other equivalent material as given in Regulation II-2/A/2.7, the 'applicable fire exposure' shall be according to the integrity and insulation standards given in the tables of Regulations 4 and 5. For example, where divisions such as decks or sides and ends of deckhouses are permitted to have 'B-0' fire integrity, the 'applicable fire exposure' shall be half an hour.
- .2 However, in cases where any part of the structure is of aluminium alloy, the following shall apply:
 - .1 The insulation of aluminium alloy components of 'A' or 'B' class divisions, except structure which is non-load-bearing, shall be such that the temperature of the structural

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core does not rise more than 200 °C above the ambient temperature at any time during the applicable fire exposure to the standard fire test.

- .2 Special attention shall be given to the insulation of aluminium alloy components of columns, stanchions and other structural members required to support lifeboat and life-raft stowage, launching and embarkation areas, and 'A' and 'B' class divisions to ensure:
 - .1 that for such members supporting lifeboat and life-raft areas and 'A' class divisions, the temperature rise limitation specified in paragraph .2.1 shall apply at the end of one hour; and
 - .2 that for such members required to support 'B' class divisions, the temperature rise limitation specified in paragraph .2.1 shall apply at the end of half an hour.
- .3 Crowns and casings of machinery spaces shall be of steel construction adequately insulated and openings therein, if any, shall be suitably arranged and protected to prevent the spread of fire.

2 Main vertical zones and horizontal zones (R 24)

NEW CLASS B, C AND D SHIPS:

- .1.1 In ships carrying more than 36 passengers, the hull, superstructure and deckhouses shall be subdivided into main vertical zones by A-60 class divisions.

Steps and recesses shall be kept to a minimum but where they are necessary, they shall also be A-60 class divisions.

Where an open deck space, a sanitary or similar space or a tank including a fuel oil tank, void space or auxiliary machinery space having little or no fire risk, is on one side or where fuel oil tanks are on both sides of the division the standard may be reduced to A-0.

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

- .1.2 For new class B, C and D ships carrying not more than 36 passengers and for existing class B ships carrying more than 36 passengers, the hull, superstructure and deckhouses in way of accommodation and service spaces shall be subdivided into main vertical zones by 'A' class divisions. These divisions shall have insulation values in accordance with the tables in Regulation 5.

NEW CLASS B, C AND D SHIPS:

- .2 As far as practicable, the bulkheads forming the boundaries of the main vertical zones above the bulkhead deck shall be in line with watertight subdivision bulkheads situated immediately below the bulkhead deck. The length and width of main vertical zones may be extended to a maximum of 48 metres in order to bring the ends of main vertical zones to coincide with subdivision watertight bulkheads or in order to accommodate a large public space extending for the whole length of the main vertical zone provided that the total area of the main vertical zone is not greater than 1 600 m² on any deck. The length or width of a main vertical zone is the maximum distance between the furthestmost points of the bulkheads bounding it.

NEW CLASS B, C AND D SHIPS AND EXISTING CLASS B SHIPS CARRYING MORE THAN 36 PASSENGERS:

- .3 Such bulkheads shall extend from deck to deck and to the shell or other boundaries.
- .4 Where a main vertical zone is subdivided by horizontal 'A' class divisions into horizontal zones for the purpose of providing an appropriate barrier between sprinkled

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and non-sprinklered zones of the ship, the divisions shall extend between adjacent main vertical zone bulkheads and to the shell or exterior boundaries of the ship and shall be insulated in accordance with the fire insulation and integrity values given in table 4.2 for new ships carrying more than 36 passengers, respectively table 5.2 for new ships carrying not more than 36 passengers and existing class B ships carrying more than 36 passengers.

.5

.1 On ships designed for special purposes, such as automobile or railroad car ferries where the provision of main vertical zone bulkheads would defeat the purpose for which the ship is intended, equivalent protection shall be obtained by dividing space in horizontal zones.

.2 However, in a ship with special category spaces, any such space shall comply with the applicable provisions of Regulation II-2/B/14 and in so far as such compliance would be inconsistent with compliance with other requirements of this part, the requirements of Regulation II-2/B/14 shall prevail.

3 Bulkheads within a main vertical zone (R 25)

NEW CLASS B, C AND D SHIPS CARRYING MORE THAN 36 PASSENGERS:

.1.1 For new ships carrying more than 36 passengers all bulkheads which are not required to be 'A' class divisions shall be at least 'B' class or 'C' class divisions as prescribed in the tables in Regulation 4. All such divisions may be faced with combustible materials in accordance with the provisions of Regulation 11.

NEW CLASS B, C AND D SHIPS CARRYING NOT MORE THAN 36 PASSENGERS AND EXISTING CLASS B SHIPS CARRYING MORE THAN 36 PASSENGERS:

.1.2 For new ships carrying not more than 36 passengers and existing class B ships carrying more than 36 passengers all bulkheads within accommodation and service spaces which are not required to be 'A' class divisions shall be at least 'B' class or 'C' class divisions as prescribed in the tables in Regulation 5.

If such divisions may be faced with combustible materials in accordance with the provisions of Regulation 11.

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

.2 In new class B, C and D ships carrying not more than 36 passengers and in existing class B ships carrying more than 36 passengers all corridor bulkheads where not required to be 'A' class shall be 'B' class divisions which shall extend from deck to deck except:

.1 when continuous 'B' class ceilings or linings are fitted on both sides of the bulkhead, the portion of the bulkhead behind the continuous ceiling or lining shall be of material which, in thickness and composition, is acceptable in the construction of 'B' class divisions but which shall be required to meet 'B' class integrity standards only in so far as is reasonable and practicable;

.2 in the case of a ship protected by an automatic sprinkler system complying with the provisions of Regulation II-2/A/8, the corridor bulkheads of 'B' class materials may terminate at a ceiling in the corridor provided such ceiling is of material which, in thickness and composition, is acceptable in the construction of 'B' class divisions.

Notwithstanding the requirements of Regulations 4 and 5, such bulkheads and ceilings shall be required to meet 'B' class integrity standards only in so far as is reasonable

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and practicable. All doors and frames in such bulkheads shall be of non-combustible materials and shall be so constructed and erected as to provide substantial fire resistance.

- .3 All bulkheads required to be 'B' class division, except corridor bulkheads prescribed in paragraph .2, shall extend from deck to deck and to the shell or other boundaries unless the continuous 'B' class ceilings or linings fitted on both sides of the bulkheads are at least of the same fire resistance as the bulkhead, in which case the bulkhead may terminate at the continuous ceiling or lining.

4 **Fire integrity of bulkheads and decks in new ships carrying more than 36 passengers (R 26)**

NEW CLASS B, C AND D SHIPS:

- .1 In addition to complying with the specific provisions for fire integrity of bulkheads and decks mentioned elsewhere in this part, the minimum fire integrity of all bulkheads and decks shall be as prescribed in tables 4.1 and 4.2.

- .2 The following requirements shall govern the application of the tables:

- .1 Table 4.1 shall apply to bulkheads not bounding either main vertical zones or bounding horizontal zones.

Table 4.2 shall apply to decks not forming steps in main vertical zones nor bounding horizontal zones.

- .2 For determining the appropriate fire integrity standards to be applied to boundaries between adjacent spaces, such spaces are classified according to their fire risk as shown in categories (1) to (14). Where the contents and use of a space are such that there is a doubt as to its classification for the purpose of this regulation, it shall be treated as a space within the relevant category having the most stringent boundary requirements. The title of each category is intended to be typical rather than restrictive. The number in parentheses preceding each category refers to the applicable column or row in the tables.

(1) Control stations:

- spaces containing emergency sources of power and lighting,
- wheelhouse and chartroom,
- spaces containing the ship's radio equipment,
- fire-extinguishing rooms, fire control rooms and fire-recording stations,
- control room for propulsion machinery when located outside the propulsion machinery space,
- spaces containing centralised fire alarm equipment,
- spaces containing centralised emergency public address system stations and equipment.

(2) Stairways:

- interior stairways, lifts and escalators (other than those wholly contained within the machinery spaces) for passengers and crew and enclosures thereto;
- in this connection a stairway which is enclosed at only one level shall be regarded as part of the space from which it is not separated by a fire door.

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- (3) Corridors:
 - passenger and crew corridors.
- (4) Evacuation stations and external escape routes:
 - survival craft stowage area,
 - open deck spaces and enclosed promenades forming lifeboat and life-raft embarkation and lowering stations,
 - assembly stations, internal and external,
 - external stairs and open decks used for escape routes,
 - the ship's side to the waterline in the lightest seagoing condition, superstructure and deckhouse sides situated below and adjacent to the life-rafts and evacuation slide's embarkation areas.
- (5) Open deck spaces:
 - open deck spaces and enclosed promenades clear of lifeboat and life-raft embarkation and lowering stations,
 - air spaces (the space outside superstructures and deckhouses).
- (6) Accommodation spaces of minor fire risk:
 - cabins containing furniture and furnishing of restricted fire risk,
 - offices and dispensaries containing furniture and furnishings of restricted fire risk,
 - public spaces containing furniture and furnishings of restricted fire risk and having a deck area of less than 50 m².
- (7) Accommodation spaces of moderate fire risk:
 - spaces as in category (6) above but containing furniture and furnishing of other than restricted fire risk,
 - public spaces containing furniture and furnishing of restricted fire risk and having a deck area of 50 m² or more,
 - isolated lockers and small storerooms in accommodation spaces having areas less than 4 m² (in which flammable liquids are not stowed),
 - sale shops,
 - motion picture projection and film stowage rooms,
 - diet kitchens (containing no open flame),
 - cleaning gear lockers (in which flammable liquids are not stowed),
 - laboratories (in which flammable liquids are not stowed),
 - pharmacies,
 - small drying rooms (having a deck area of 4 m² or less),
 - specie rooms,
 - operating rooms.
- (8) Accommodation spaces of greater fire risk:
 - public spaces containing furniture and furnishing of other than restricted fire risk and having a deck area of 50 m² or more,
 - barber shops and beauty parlours.
- (9) sanitary and similar spaces:

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- communal sanitary facilities, shower, baths, water closets, etc.,
 - small laundry rooms,
 - indoor swimming pool area,
 - isolated pantries containing no cooking appliances in accommodation spaces,
 - private sanitary facilities shall be considered a portion of the space in which they are located.
- (10) Tanks, voids and auxiliary machinery spaces having little or no fire risk:
- water tanks forming part of the ship's structure,
 - voids and cofferdams,
 - auxiliary machinery spaces which do not contain machinery having a pressure lubrication system and where storage of combustibles is prohibited, such as,
 - ventilation and air-conditioning rooms; windlass room; steering gear room; stabiliser equipment room; electrical propulsion motor room; rooms containing section switchboards and purely electrical equipment other than oil-filled electrical transformers (above 10 kVA); shaft alleys and pipe tunnels; spaces for pumps and refrigeration machinery (not handling or using flammable liquids),
 - closed trunks serving the spaces listed above,
 - other closed trunks such as pipe and cable trunks.
- (11) Auxiliary machinery spaces, cargo spaces, cargo and other oil tanks and other similar spaces of moderate fire risk:
- cargo oil tanks,
 - cargo holds, trunkways and hatchways,
 - refrigerated chambers,
 - oil fuel tanks (where installed in a separate space with no machinery),
 - shaft alleys and pipe tunnels allowing storage of combustibles,
 - auxiliary machinery spaces as in category (10) which contain machinery having a pressure lubrication system or where storage of combustibles is permitted,
 - oil fuel filling stations,
 - spaces containing oil-filled electrical transformers (above 10 kVA),
 - spaces containing small internal combustion engines of power output up to 110 kW driving generators, sprinkler, drencher or fire pumps, bilge pumps, etc.,
 - closed trunks serving the spaces listed above.
- (12) Machinery spaces and main galleys:
- main propulsion machinery rooms (other than electric propulsion motor rooms) and boiler rooms,
 - auxiliary machinery spaces other than those in categories (10) and (11) which contain internal combustion machinery or other oil burning, heating or pumping units,
 - main galleys and annexes,
 - trunks and casings to the spaces listed above.

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- (13) Storesrooms, workshops, pantries, etc.:
- main pantries not annexed to galleys,
 - main laundry,
 - large drying rooms (having a deck area of more than 4 m²),
 - miscellaneous stores,
 - mail and baggage rooms,
 - garbage rooms,
 - workshops (not part of machinery spaces, galleys, etc.),
 - lockers and storerooms having areas greater than 4 m², other than those spaces that have provisions for the storage of flammable liquids.
- (14) Other spaces in which flammable liquids are stowed:
- paint lockers,
 - storerooms containing flammable liquids (including dyes, medicines, etc.),
 - laboratories (in which flammable liquids are stowed).
- .3 Where a single value is shown for the fire integrity of a boundary between two spaces, that value shall apply in all cases.
- .4 There are no special requirements for material or integrity of boundaries where only a dash appears in the tables.
- .5 The Administration of the flag State shall determine in respect of category (5) spaces whether the insulation values in table 4.1 shall apply to ends of deckhouses and superstructures, and whether the insulation values in table 4.2 shall apply to weather decks. In no case shall the requirements of category (5) of table 4.1 or 4.2 necessitate enclosure of spaces which in the opinion of the Administration of the flag State need not be enclosed.
- .3 Continuous ‘B’ class ceiling or linings, in association with the relevant decks or bulkheads, may be accepted as contributing wholly or in part, to the required insulation and integrity of a division.
- .4 In approving structural fire protection details the Administration of the flag State shall have regard to the risk of heat transmission at intersections and terminal points of required thermal barriers.

Table 4.1

Bulkheads not bounding either main vertical zones or horizontal zones

Spaces	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Control stations	B-0 ⁰	A-0	A-0	A-0	A-0	A-60	A-60	A-60	A-0	A-0	A-60	A-60	A-60	A-60
Stairways		A-0 ⁰	A-0	A-0	A-0	A-0	A-15	A-15	A-0 ⁰	A-0	A-15	A-30	A-15	A-30
Corridors			B-15	A-60	A-0	B-15	B-15	B-15	B-15	A-0	A-15	A-30	A-0	A-30
Evacuation stations and					A-0	A ⁰ -60	A ⁰ -60	A ⁰ -60	A-0 ⁰	A-0	A-60 ⁰	A-60 ⁰	A-60 ⁰	A-60 ⁰

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Table 4.1

Bulkheads not bounding either main vertical zones or horizontal zones

external escape routes														
Open (5) deck spaces					—	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
Accommodation spaces of minor fire risk (6)						B-0	B-0	B-0	C	A-0	A-0	A-30	A-0	A-30
Accommodation spaces of moderate fire risk (7)							B-0	B-0	C	A-0	A-15	A-60	A-15	A-60
Accommodation spaces of greater fire risk (8)								B-0	C	A-0	A-30	A-60	A-15	A-60
Sanitary and similar spaces (9)									C	A-0	A-0	A-0	A-0	A-0
Tanks and auxiliary machinery spaces having little or no fire risk (10)										A-0 ⁰	A-0	A-0	A-0	A-0
Auxiliary machinery spaces, cargo spaces, cargo											A-0 ⁰	A-0	A-0	A-15

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Table 4.2

Decks neither forming steps in main vertical zones nor bounding horizontal zones															
Open deck spaces	(5)	A-0	A-0	A-0	A-0	—	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	
Accommodation spaces of minor fire risk	(6)	A-0	A-15	A-0	A-60	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	
Accommodation spaces of moderate fire risk	(7)	A-0	A-15	A-15	A-60	A-0	A-0	A-15	A-15	A-0	A-0	A-0	A-0	A-0	
Accommodation spaces of greater fire risk	(8)	A-0	A-15	A-15	A-60	A-0	A-15	A-15	A-30	A-0	A-0	A-0	A-0	A-0	
Sanitary and similar spaces	(9)	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	
Tanks, voids and auxiliary machinery spaces having little or no fire risk	(10)	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0 ^a	A-0	A-0	A-0	A-0	
Auxiliary machinery spaces, cargo spaces, cargo and other oil	(11)	A-60	A-60	A-60	A-60	A-0	A-0	A-15	A-30	A-0	A-0	A-0 ^a	A-0	A-0	A-30

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Table 4.2

Decks neither forming steps in main vertical zones nor bounding horizontal zones

tanks and other similar spaces of moderate fire risk															
Machinery spaces and main galleys	(12)	A-60	A-60	A-60	A-60	A-0	A-60	A-60	A-60	A-0	A-0	A-30	A-30 ^a	A-0	A-60
Storerooms, workshops, pantries, etc.	(6)	A-60	A-30	A-15	A-60	A-0	A-15	A-30	A-30	A-0	A-0	A-0	A-0	A-0	A-0
Other spaces in which flammable liquids are stowed	(14)	A-60	A-60	A-60	A-60	A-0	A-30	A-60	A-60	A-0	A-0	A-0	A-0	A-0	A-0

a Where adjacent spaces are in the same numerical category and superscript a appears, a bulkhead or deck between such spaces need not be fitted if deemed unnecessary by the Administration of the flag State. For example, in category (12) a bulkhead need not be required between a galley and its annexed pantries provided the pantry bulkhead and decks maintain the integrity of the galley boundaries. A bulkhead is, however, required between a galley and a machinery space even though both spaces are in category (12).

b The ship's side, to the waterline in the lightest seagoing condition, superstructure and deckhouse sides situated below and adjacent to the life-rafts and evacuation slides may be reduced to A-30.

c Where public toilets are installed completely within the stairway enclosure, the public toilet bulkhead within the stairway enclosure can be of 'B' class integrity.

d Where spaces of categories 6, 7, 8 and 9 are located completely within the outer perimeter of the assembly station, the bulkheads of these spaces are allowed to be of 'B-0' class integrity. Control positions for audio, video and light installations may be considered as part of the assembly station.

Notes to be applied to tables 4.1 and 4.2

5 Fire integrity of bulkheads and decks in new ships carrying not more than 36 passengers and existing class B ships carrying more than 36 passengers (R 27)
NEW CLASS B, C, AND D SHIPS CARRYING NOT MORE THAN 36 PASSENGERS AND EXISTING CLASS B SHIPS CARRYING MORE THAN 36 PASSENGERS:

- .1 In addition to complying with the specific provisions for fire integrity of bulkheads and decks mentioned elsewhere in this part, the minimum fire integrity of bulkheads and decks shall be as prescribed in tables 5.1 and 5.2.

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In approval of structural precautions for fire protection in new ships, account shall be taken of the risk of heat transfer between heat bridges at intersection points, and where the thermal barring devices terminate.

- .2 The following requirements shall govern application of the tables:
 - .1 Tables 5.1 and 5.2 shall apply respectively to the bulkheads and decks separating adjacent spaces.
 - .2 For determining the appropriate fire integrity standards to be applied to divisions between adjacent spaces, such spaces are classified according to their fire risk as shown in categories (1) to (11) below. The title of each category is intended to be typical rather than restrictive. The number in parentheses preceding each category refers to the applicable column or row in the tables.
 - (1) Control stations:
 - spaces containing emergency sources of power and lighting,
 - wheelhouse and chartroom,
 - spaces containing the ship's radio equipment,
 - fire-extinguishing rooms, fire control rooms and fire-recording stations,
 - control room for propulsion machinery when located outside the propulsion machinery space,
 - spaces containing centralised fire alarm equipment.
 - (2) Corridors:
 - passenger and crew corridors and lobbies.
 - (3) Accommodation spaces:
 - spaces as defined in Regulation II-2/A/2.10 excluding corridors.
 - (4) Stairways:
 - interior stairways, lifts and escalators (other than those wholly contained within the machinery spaces) and enclosures thereto,
 - in this connection, a stairway which is enclosed only at one level shall be regarded as part of the space from which it is not separated by a fire door.
 - (5) Service spaces (low risk):
 - lockers and storerooms not having provisions for the storage of flammable liquids and having areas less than 4 m² and drying rooms and laundries.
 - (6) Machinery spaces of category A:
 - spaces as defined in Regulation II-2/A/2.19.1.
 - (7) Other machinery spaces:
 - spaces as defined in Regulation II-2/A/2.19.2 excluding machinery spaces of category A.
 - (8) Cargo spaces:
 - all spaces used for cargo (including cargo oil tanks) and trunkways and hatchways to such spaces, other than special category spaces.

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- (9) Service spaces (high risk):
- galleys, pantries containing cooking appliances, paint and lamp rooms, lockers and storerooms having areas of 4 m² or more, spaces for the storage of flammable liquids, and workshops other than those forming part of the machinery spaces.
- (10) Open decks:
- open deck spaces and enclosed promenades having no fire risk. Air spaces (the space outside superstructures and deckhouses).
- (11) Special category spaces:
- spaces as defined in Regulation II-2/A/2.18.
- .3 In determining the applicable fire integrity standard of a boundary between two spaces within a main vertical zone or horizontal zone which is not protected by an automatic sprinkler system complying with the provisions of Regulation II-2/A/8 or between such zones neither of which is so protected, the higher of the two values given in the tables shall apply.
- .4 In determining the applicable fire integrity standard of a boundary between two spaces within a main vertical zone or horizontal zone which is protected by an automatic sprinkler system complying with the provisions of Regulation II-2/A/8 or between such zones both of which are so protected, the lesser of the two values given in the tables shall apply. Where a sprinklered zone and a non-sprinklered zone meet within accommodation and service spaces, the higher of the two values given in the tables shall apply to the division between the zones.
- .3 Continuous ‘B’ class ceilings or linings, in association with the relevant decks or bulkheads, may be accepted as contributing, wholly or in part, to the required insulation and integrity of a division.
- .4 External boundaries which are required in Regulation 1.1 to be of steel or other equivalent material may be pierced for the fitting of windows and sidescuttles provided that there is no requirement for such boundaries to have ‘A’ class integrity elsewhere in this part. Similarly, in such boundaries which are not required to have ‘A’ class integrity, doors may be of materials to the satisfaction of the Administration of the flag State.

Table 5.1

Fire integrity of bulkheads separating adjacent spaces

Spaces	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Control stations (1)	A-0 ⁰	A-0	A-60	A-0	A-15	A-60	A-15	A-60	A-60	—	A-60
Corridors (2)	C ⁰	B-0 ⁰	A-0 ⁰	B-0 ⁰	B-0 ⁰	A-60	A-0	A-0	A-15	0	A-15
									A-0 ⁰		
Accommodation spaces (3)			C ⁰	A-0 ⁰	B-0 ⁰	A-60	A-0	A-0	A-15	0	A-30
				B-0 ⁰					A-0 ⁰		A-0 ⁰
Stairways (4)				A-0 ⁰	A-0 ⁰	A-60	A-0	A-0	A-15	0	A-15

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Table 5.1

Fire integrity of bulkheads separating adjacent spaces

					B-0 ⁰	B-0 ⁰				A-0 ⁰	0	
Service spaces (low risk) undefined	(5)					C ⁰	A-60	A-0	A-0	A-0	0	A-0
Machinery spaces of category A	(6)						0	A-0	A-0	A-60	0	A-60
Other machinery spaces	(7)							A-0 ⁰	A-0	A-0	0	A-0
Cargo spaces	(8)							0		A-0	0	A-0
Service spaces (high risk)	(9)									A-0 ⁰	0	A-30
Open decks	(10)											A-0
Special category spaces	(11)											A-0

Table 5.2

Fire integrity of decks separating adjacent spaces

Space below Space above		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Control stations	(1)	A-0	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0	g	A-30
Corridors	(2)	A-0	g	g	A-0	g	A-60	A-0	A-0	A-0	g	A-0
Accommodation spaces	(3)	A-60	A-0	g	A-0	g	A-60	A-0	A-0	A-0	g	A-30
												A-0 ^d
Stairways	(4)	A-0	A-0	A-0	g	A-0	A-60	A-0	A-0	A-0	g	A-0
Service spaces (low risk)	(5)	A-15	A-0	A-0	A-0	g	A-60	A-0	A-0	A-0	g	A-0

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Table 5.2

Fire integrity of decks separating adjacent spaces

Machinery spaces of category A	(6)	A-60	A-60	A-60	A-60	A-60	*	A-60 ^f	A-30	A-60	*	A-60
Other machinery spaces	(7)	A-15	A-0	A-0	A-0	A-0	A-0	*	A-0	A-0	*	A-0
Cargo spaces	(8)	A-60	A-0	A-0	A-0	A-0	A-0	A-0	*	A-0	*	A-0
Service spaces (high risk)	(9)	A-60	A-30	A-30	A-30	A-0	A-60	A-0	A-0	A-0	*	A-30
			A-0 ^d	A-0 ^d	A-0 ^d							
Open decks	(10)	*	*	*	*	*	*	*	*	*	—	A-0
Special category spaces	(11)	A-60	A-15	A-30	A-15	A-0	A-30	A-0	A-0	A-30	A-0	A-0
				A-0 ^d								

a For clarification as to which applies, see Regulations 3 and 8.

b Where spaces are of the same numerical category and superscript b appears, a bulkhead or deck of the rating shown in the tables is only required when the adjacent spaces are for a different purpose, e.g. in category (9). A galley next to a galley does not require a bulkhead but a galley next to a paint room requires an 'A-0' bulkhead.

c Bulkheads separating the wheelhouse and chartroom from each other may be 'B-0' rating.

d See paragraph .2.3 and .2.4 of this Regulation.

e For the application of Regulation 2.1.2, 'B-0' and 'C', where appearing in table 5.1, shall be read as 'A-0'.

f Fire insulation need not be fitted if the machinery space in category (7) has little or no fire risk.

g Where an asterisk appears in the tables, the division is required to be of steel or other equivalent material but is not required to be of 'A' class standard.
In ships, which are constructed on or after 1 January 2003, however, where a deck, except in a category (10) space, is penetrated for the passage of electric cables, pipes and ventilation ducts, such penetration shall be made tight to prevent the passage of flame and smoke. Divisions between control stations (emergency generators) and open decks may have air intake openings without means for closure, unless a fixed gas fire-fighting system is fitted.
For the application of Regulation 2.1.2, an asterisk, where appearing in table 5.2, except for categories (8) and (10), shall be read as 'A-0'.

Notes to be applied to both tables 5.1 and 5.2, as appropriate.

6 Means of escape (R 28)

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

- .1 Stairways and ladders, corridors and doors shall be arranged to provide ready means of escape to the lifeboat and life-raft embarkation deck from all passenger and crew spaces and from spaces in which the crew is normally employed, other than machinery spaces. In particular, the following provisions shall be complied with:
 - .1 Below the bulkhead deck two means of escape, at least one of which shall be independent of watertight doors, shall be provided from each watertight compartment

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or similarly restricted space or group of spaces. Exceptionally one of the means of escape may be dispensed with, due regard being paid to the nature and location of spaces and to the number of persons who might be normally employed there.

In such a case the sole means of escape shall provide safe escape.

For ships which are constructed on or after 1 January 2003, the abovementioned dispensation may only be given for crew spaces that are entered only occasionally, in which case the required escape route shall be independent of watertight doors.

- .2 Above the bulkhead deck there shall be at least two means of escape from each main vertical zone or similarly restricted space or group of spaces at least one of which shall give access to a stairway forming a vertical escape.
- .3 If a radiotelegraph station has no direct access to the open deck, two means of escape from or access to such station shall be provided, one of which may be a porthole or window of sufficient size or another means.
- .4 In existing class B ships, a corridor, or part of a corridor from which there is only one route of escape shall not exceed 5 metres in length.

In new class A, B, C and D ships of 24 metres in length and above, a corridor, lobby or part of a corridor from which there is only one route of escape shall be prohibited.

Dead-end corridors used in service areas which are necessary for the practical utility of the ship, such as fuel oil stations and athwartship supply corridors, shall be permitted, provided such dead-end corridors are separated from crew accommodation areas and inaccessible from passenger accommodation areas. A part of a corridor that has a depth not exceeding its width is considered a recess or local extension and is permitted.

NEW CLASS B, C AND D SHIPS OF 24 METRES IN LENGTH AND ABOVE
CONSTRUCTED BEFORE 1 JANUARY 2003:

- .5 At least one of the means of escape required by paragraphs .1.1 and .1.2 shall consist of a readily accessible enclosed stairway, which shall provide continuous fire shelter from the level of its origin to the appropriate lifeboat and life-raft embarkation decks, or to the uppermost deck if the embarkation deck does not extend to the main vertical zone being considered.

In the latter case, direct access to the embarkation deck by way of external open stairways and passageways shall be provided and shall have emergency lighting in accordance with Regulation III/5.3 and slip-free surfaces underfoot. Boundaries facing external open stairways and passageways forming part of an escape route shall be so protected that a fire in any enclosed space behind such boundaries would not impede escape to the embarkation stations.

The widths, number and continuity of escapes shall be as follows:

- .1 Stairways shall not be less than 900 mm in clear width, if reasonable and practicable to the satisfaction of the Member State, but shall in no case be less than 600 mm. Stairways shall be fitted with handrails on each side. The minimum clear width of stairways shall be increased by 10 mm for every one person provided for in excess of 90 persons. The maximum clear width between handrails where stairways are wider than 900 mm shall be 1 800 mm. The total number of persons to be evacuated by such stairways shall be assumed to be two thirds of the crew and the total number of passengers in the areas served by such stairways. The width of the stairways shall at least conform to the standard as given in IMO Resolution A.757 (18).
- .2 All stairways sized for more than 90 persons shall be aligned before and after.

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- .3 Doorways and corridors and intermediate landings included in means of escape shall be sized in the same manner as stairways.
- .4 Stairways shall not exceed 3,5 metres in vertical rise without the provision of a landing and shall not have an angle of inclination greater than 45 °.
- .5 Landings at each deck level shall not be less than 2 m² in area and shall increase by 1 m² for every 10 persons provided for in excess of 20 persons but need not exceed 16 m², except for those landings servicing public spaces having direct access onto the stairway enclosure.

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

- 5a. At least one of the means of escape required in the paragraphs .1.1 and .1.2 shall consist of a readily accessible enclosed stairway, which shall provide continuous fire shelter from the level of its origin to the appropriate lifeboat and life-raft embarkation decks or to the uppermost weather deck if the embarkation deck does not extend to the main vertical zone being considered.

In the latter case direct access to the embarkation deck by way of external open stairways and passageways shall be provided and shall have emergency lighting in accordance with Regulation III/5.3 and slip-free surfaces underfoot. Boundaries facing external open stairways and passageways forming part of an escape route and boundaries in such a position that their failure during a fire would impede escape to the embarkation deck shall have fire integrity, including insulation values, in accordance with tables 4.1 to 5.2, as appropriate.

The widths, number and continuity of escapes shall be in accordance with the requirements of the Fire Safety Systems Code.

NEW CLASS B, C AND D SHIPS CONSTRUCTED BEFORE 1 JANUARY 2003 AND EXISTING CLASS B SHIPS:

- .6 Satisfactory protection of access from the stairway enclosures to the lifeboat and life-raft embarkation areas shall be provided.

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

- 6a. Protection of access from the stairway enclosures to the lifeboat and life-raft embarkation areas shall be provided either directly or through protected internal routes which have fire integrity and insulation values for stairway enclosures as determined by tables 4.1 to 5.2, as appropriate.

NEW CLASS B, C AND D SHIPS:

- .7 In addition to the emergency lighting required by Regulations II-1/D/3 and III/5.3, the means of escape including stairways and exits, shall be marked by lighting or photoluminescent strip indicators placed not more than 0,3 metres above the deck at all points of the escape route including angles and intersections. The marking must enable passengers to identify all the routes of escape and readily identify the escape exits. If electric illumination is used, it shall be supplied by the emergency source of power and it shall be so arranged that the failure of any single light or cut in a lighting strip will not result in the marking being ineffective. Additionally, all escape route signs and fire equipment location markings shall be of photoluminescent material or marked by lighting. The Administration of the flag State shall ensure that such lighting or photoluminescent equipment have been evaluated, tested and applied in accordance with the guidelines as given in IMO Resolution A.752 (18).

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However, for new class B, C and D ships constructed on or after 1 January 2003 the Administration of the Flag State shall ensure that such lighting or photoluminescent equipment has been evaluated, tested and applied in accordance with the Fire Safety Systems Code.

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

- .8 In ships carrying more than 36 passengers the requirements of paragraph .1.7 of this regulation shall also apply to the crew accommodations.
- .9 Normally locked doors that form part of an escape route.
- .1 Cabin and stateroom doors shall not require keys to unlock them from inside the room.
Neither shall there be any doors along any designated escape route which require keys to unlock them when moving in the direction of escape.
- .2 Escape doors from public spaces that are normally latched shall be fitted with a means of quick release. Such means shall consist of a door-latching mechanism incorporating a device that releases the latch upon the application of a force in the direction of escape flow. Quick release mechanisms shall be designed and installed to the satisfaction of the Administration of the flag State and in particular:
 - .2.1 consist of bars or panels, the actuating portion of which extends across at least one half of the width of the door leaf, at least 760 mm and not more than 1 120 mm above the deck;
 - .2.2 cause the door latch to release when a force not exceeding 67 N is applied; and
 - .2.3 not be equipped with any locking device, set screw or other arrangement that prevents the release of the latch when pressure is applied to the releasing device.

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

- .2 .1 In special category spaces the number and disposition of the means of escape both below and above the bulkhead deck shall be to the satisfaction of the Administration of the flag State and in general the safety of access to the embarkation deck shall be at least equivalent to that provided under paragraphs .1.1, .1.2, .1.5 and .1.6.

In new class B, C and D ships constructed on or after 1 January 2003, such spaces shall be provided with designated walkways to the means of escape with a breadth of at least 600 mm, and where practicable and reasonable those designated longitudinal walkways shall raise at least 150 mm above the deck surface. The parking arrangements for the vehicles shall maintain the walkways clear at all times.
- .2 One of the escape routes from the machinery spaces where the crew is normally employed shall avoid direct access to any special category space.
- .3 Hoistable drive-up/down ramps to platform decks must not be capable of blocking the approved escape routes when in lowered position.
- .3.1 Two means of escape shall be provided from each machinery space. In particular, the following provisions shall be complied with:
 - .1 Where the space is below the bulkhead deck the two means of escape shall consist of either:
 - .1 two sets of steel ladders as widely separated as possible, leading to doors in the upper part of the space similarly separated and from which there is access

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to the appropriate lifeboat and life-raft embarkation decks. In new ships, one of these ladders shall provide continuous fire shelter from the lower part of the space to a safe position outside the space. In new class B, C and D ships constructed on or after 1 January 2003 that ladder shall be located within a protected enclosure that satisfies Regulation II-2/B/4, category (2) or II-2/B/5, category (4), as appropriate, from the lower part of the space it serves to a safe position outside the space. Self-closing fire doors of the same fire integrity standards shall be fitted in the enclosure. The ladder shall be fixed in such a way that heat is not transferred into the enclosure through non-insulated fixing points. The protected enclosure shall have minimum internal dimensions of at least 800 mm × 800 mm, and shall have emergency lighting provisions; or

- .2 one steel ladder leading to a door from which access is provided to the embarkation deck and additionally, in the lower part of the space and in a position well separated from the ladder referred to, a steel door capable of being operated from each side and which provides access to a safe escape route from the lower part of the space to the embarkation deck.

- .2 Where the space is above the bulkhead deck, the two means of escape shall be as widely separated as possible and the doors leading from such means of escape shall be a position from which access is provided to the appropriate lifeboat and life-raft embarkation decks. Where such means of escape require the use of ladders, these shall be of steel.

NEW CLASS A, B, C AND D SHIPS:

- .3 From spaces for monitoring of operation of machinery, and from work spaces, there shall be at least two means of escape, of which one shall be independent of the machinery space and give access to the embarkation deck.
- .4 The underside of stairs in machinery spaces shall be shielded.

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

- .3.2 In a ship of less than 24 metres in length, the Administration of the flag State may dispense with one of the means of escape in machinery spaces, due regard being paid to the width and disposition of the upper part of the space.

In a ship of 24 metres in length and above, the Administration of the flag State may dispense with one means of escape from any such space so long as either a door or a steel ladder provides a safe escape route to the embarkation deck, due regard being paid to the nature and location of the space and whether persons are normally employed in that space. In new class B, C and D ships constructed on or after 1 January 2003, a second means of escape shall be provided in the steering gear space when the emergency steering position is located in that space unless there is a direct access to the open deck.

- .3.3 Two means of escape shall be provided from a machinery control room located within a machinery space, at least one of which will provide continuous fire shelter to a safe position outside the machinery space.

- .4 In no case shall lifts be considered as forming one of the required means of escape.

.5 NEW CLASS B, C AND D AND EXISTING CLASS B SHIPS OF 40 METRES IN LENGTH AND ABOVE:

- .1 Emergency escape breathing devices shall be carried, complying with the Fire Safety Systems Code.

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- .2 At least two emergency escape breathing devices shall be carried in each main vertical zone.
- .3 In ships carrying more than 36 passengers, two emergency escape breathing devices, in addition to those required in subparagraph .5.2 shall be carried in each main vertical zone.
- .4 However, subparagraphs .5.2 and .5.3 do not apply to stairway enclosures which constitute individual main vertical zones and for the main vertical zones in the fore or aft end of a ship, which do not contain spaces of categories (6), (7), (8) or (12) defined in Regulation II-2/B/4.
- .5 Within the machinery spaces, emergency escape breathing devices shall be situated ready for use at easily visible places, which can be reached quickly and easily at any time in the event of fire. The location of emergency escape breathing devices shall take into account the layout of the machinery space and the number of persons normally working in the space.
- .6 Reference is made to the IMO Guidelines for the performance, location, use and care of emergency breathing devices. (MSC/Circ. 849).
- .7 The number and location of these devices shall be indicated in the fire control plan required in Regulation II-2/A/13.

6-1 **Escape routes on ro-ro passenger ships (R 28-1)**

- .1 **REQUIREMENTS APPLICABLE TO NEW CLASS B, C AND D AND EXISTING CLASS B RO-RO PASSENGER SHIPS**
 - .1.1 This paragraph applies to new class B, C and D and existing class B ro-ro passenger ships. For existing ships the requirements of the regulation shall apply not later than the date of the first periodical survey after the date referred to in paragraph .1 of Regulation II-2/B/16.
 - .1.2 Handrails or other handholds shall be provided in all corridors along the entire escape route, so that a firm handhold is available every step of the way, where possible, to the assembly stations and embarkation stations. Such handrails shall be provided on both sides of longitudinal corridors more than 1,8 metres in width and transverse corridors more than 1 metre in width. Particular attention shall be paid to the need to be able to cross lobbies, atriums and other large open spaces along escape routes. Handrails and other handholds shall be of such strength as to withstand a distributed horizontal load of 750 N/m applied in the direction of the centre of the corridor or space, and a distributed vertical load of 750 N/m applied in the downward direction. The two loads need not be applied simultaneously.
 - .1.3 Escape routes shall not be obstructed by furniture or other obstructions. With the exception of tables and chairs which may be cleared to provide open space, cabinets and other heavy furnishings in public spaces and along escape routes shall be secured in place to prevent shifting if the ship rolls or lists. Floor coverings shall also be secured in place. When the ship is underway, escape routes shall be kept clear of obstructions such as cleaning carts, bedding, luggage and boxes of goods.
 - .1.4 Escape routes shall be provided from every normally occupied space on the ship to an assembly station. These escape routes shall be arranged so as to provide the most direct route possible to the assembly station, and shall be marked with symbols related to life-saving appliances and arrangements, adopted by IMO by Resolution A.760 (18).

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- .1.5 Where enclosed spaces adjoin an open deck, openings from the enclosed space to the open deck shall, where practicable, be capable of being used as an emergency exit.
- .1.6 Decks shall be sequentially numbered, starting with '1' at the tank top or lowest deck. These numbers shall be prominently displayed at stair landings and lift lobbies. Decks may also be named, but the deck number shall always be displayed with the name.
- .1.7 Simple 'mimic' plans showing the 'you are here' position and escape routes marked by arrows shall be prominently displayed on the inside of each cabin door and in public spaces. The plan shall show the directions of escape, and shall be properly oriented in relation to its position on the ship.
- .1.8 Cabin and stateroom doors shall not require keys to unlock them from inside the room. Neither shall there be any doors along any designed escape route which require keys to unlock them when moving in the direction of escape.
- .2 REQUIREMENTS APPLICABLE TO NEW CLASS B, C AND D RO-RO PASSENGER SHIPS
 - .2.1 The lowest 0,5 metres of bulkheads and other partitions forming vertical divisions along escape routes shall be able to sustain a load of 750 N/m² to allow them to be used as walking surfaces from the side of the escape route with the ship at large angles of heel.
 - .2.2 The escape route from cabins to stairway enclosures shall be as direct as possible, with a minimum number of changes in direction. It shall not be necessary to cross from one side of the ship to the other to reach an escape route. It shall not be necessary to climb more than two decks up or down in order to reach an assembly station or open deck from any passenger space.
 - .2.3 External routes shall be provided from open decks, referred to in paragraph .2.2, to the survival craft embarkation stations.
- .3 REQUIREMENTS APPLICABLE TO NEW CLASS B, C AND D RO-RO PASSENGER SHIPS CONSTRUCTED ON OR AFTER 1 JULY 1999

For new class B, C and D ro-ro passenger ships constructed on or after 1 July 1999, escape routes shall be evaluated by an evacuation analysis early in the design process. The analysis shall be used to identify and eliminate, as far as practicable, congestion which may develop during an abandonment, due to normal movement of passengers and crew along escape routes, including the possibility that crew may need to move along these routes in a direction opposite the movement of the passengers. In addition, the analysis shall be used to demonstrate that escape arrangements are sufficiently flexible to provide for the possibility that certain escape routes, assembly stations, embarkation stations or survival craft may not be available as a result of a casualty.

7 Penetrations and openings in 'A' and 'B' class divisions (R 30, 31)

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

- .1 All openings in 'A' class divisions shall be provided with permanently attached means of closing which shall be as effective for resisting fires as the divisions in which they are fitted.
- .2 The construction of all doors and door frames in 'A' class divisions, with the means of securing them when closed, shall provide resistance to fire as well as to the passage of smoke and flame, as far as practicable, equivalent to that of the bulkheads in which the

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doors are situated. Such doors and doorframes shall be constructed of steel or other equivalent material. Watertight doors need not be insulated.

- .3 It shall be possible for each door to be opened and closed from each side of the bulkhead by one person only.
- .4 Fire doors in main vertical zone bulkheads and stairways enclosures other than power-operated sliding watertight doors and doors normally locked, shall satisfy the following requirements:
 - .1 The doors shall be self-closing and be capable of closing with an angle of up to 3,5 ° opposing closure. The speed of closure shall, if necessary, be controlled so as to prevent undue danger to persons. In new ships the uniform rate of closure shall be no more than 0,2 m/s and no less than 0,1 m/s with the ship in the upright position.

NEW CLASS B, C AND D SHIPS:

- .2 Remote-controlled sliding or power-operated doors shall be equipped with an alarm that sounds at least 5 seconds but no more than 10 seconds before the door begins to move and continue sounding until the door is completely closed. Doors designed to re-open upon contacting an object in its path shall re-open sufficiently to allow a clear passage of at least 0,75 metres, but no more than one metre.
- .3 All doors, except fire doors which are normally kept closed, shall be capable of remote and automatic release from a continuously manned central control station, either simultaneously or in groups, and also individually from a position at both sides of the door. Indication must be provided at the fire control panel in the continuously manned central control station whether each of the remote-controlled doors is closed. The release mechanism shall be so designed that the door will automatically close in the event of disruption of the control system or central power supply. Release switches shall have an on-off function to prevent automatic resetting of the system. Holdback hooks not subject to central control station release are prohibited.
- .4 Local power accumulators for power-operated doors shall be provided in the immediate vicinity of the doors to enable the doors to be operated at least 10 times (fully opened and closed) using the local controls.
- .5 Double-leaf doors equipped with a latch necessary to their fire integrity shall have a latch that is automatically activated by the operation of the doors when released by the system.
- .6 Doors giving direct access to special category spaces which are power-operated and automatically closed need not be equipped with alarms and remote-release mechanisms required in .4.2 and .4.3.

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

Instead of .4 the following paragraph .4a shall apply:

- 4a. Fire doors in main vertical zone bulkheads, galley boundaries and stairway enclosures other than power-operated watertight doors and those which are normally locked, shall satisfy the following requirements:
 - .1 the doors shall be self-closing and be capable of closing against an angle of inclination of up to 3,5 ° opposing closure;
 - .2 the approximate time of closure for hinged fire doors shall be no more than 40 seconds and no less than 10 seconds from the beginning of their movement with the ship in

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- upright position. The approximate uniform rate of closure for sliding fire doors shall be of no more than 0,2 m/s and no less than 0,1 m/s with the ship in the upright position;
- .3 the doors shall be capable of remote release from the continuously manned central control station, either simultaneously or in groups and shall be capable of release also individually from a position at both sides of the door. Release switches shall have an on-off function to prevent automatic resetting of the system;
 - .4 hold-back hooks not subject to central control station release are prohibited;
 - .5 a door closed remotely from the central control station shall be capable of being reopened at both sides of the door by local control. After such local opening the door shall automatically close again;
 - .6 indication shall be provided at the fire door indicator panel in the continuously manned central control station whether each of the remote-released doors are closed;
 - .7 the release mechanism shall be so designed that the door will automatically close in the event of disruption of the control system or main source of electric power;
 - .8 local power accumulators for power-operated doors shall be provided in the immediate vicinity of the doors to enable the doors to be operated after disruption of the control system or main source of electric power at least 10 times (fully opened or closed) using the local controls;
 - .9 disruption of the control system or main source of electric power at one door shall not impair the safe functioning of the other doors;
 - .10 remote-released sliding or power-operated doors shall be equipped with an alarm that sounds for at least 5 seconds but no more than 10 seconds after the door is released from the central control station and before the door begins to move and continue sounding until the door is completely closed;
 - .11 a door designed to re-open upon contacting an object in its path shall re-open not more than one metre from the point of contact;
 - .12 double-leaf doors equipped with latch necessary to their fire integrity shall have a latch that is automatically activated by the operation of the doors when released by the control system;
 - .13 doors giving direct access to special category spaces which are power-operated and automatically closed need not be equipped with the alarms and remote-release mechanisms required in paragraph .3 and .10;
 - .14 the components of the local control system shall be accessible for maintenance and adjusting; and
 - .15 power-operated doors shall be provided with a control system of an approved type which shall be able to operate in case of fire, this being determined in accordance with the Fire Test Procedure Code. This system shall satisfy the following requirements:
 - .15.1 the control system shall be able to operate the door at a temperature of at least 200 °C for at least 60 minutes, served by the power supply;
 - .15.2 the power supply for all other doors not subject to fire shall not be impaired, and;

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- .15.3 at temperatures exceeding 200 °C the control system shall be automatically isolated from the power supply and shall be capable of keeping the door closed up to at least 945 °C.

NEW CLASS B, C AND D SHIPS:

- .5 The requirements for 'A' class integrity of the outer boundaries of a ship shall not apply to glass partitions, windows and sidescuttles, provided that there is no requirement for such boundaries to have 'A' class integrity in Regulation 10. Similarly, the requirements for 'A' class integrity shall not apply to exterior doors in superstructures and deckhouses.

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

Instead of .5: the following paragraph .5a shall apply:

- 5a. The requirements for 'A' class integrity of the outer boundaries of a ship shall not apply to glass partitions, windows and sidescuttles, provided that there is no requirement for such boundaries to have a 'A' class integrity in Regulation 10.

The requirements for 'A' class integrity of the outer boundaries of the ship shall not apply to exterior doors, except for those in superstructures and deckhouses facing life-saving appliances, embarkation and external assembly station areas, external stairs and open decks used for escape routes. Stairway enclosure doors need not meet this requirement.

NEW CLASS B, C AND D SHIPS:

- .6 Except for watertight doors, weathertight doors (semi-watertight doors), doors leading to the open deck and doors which need to be reasonably gastight all 'A' class doors located in stairways, public spaces and main vertical zone bulkheads in escape routes shall be equipped with a self-closing hose port of material, construction and fire resistance which is equivalent to the door into which it is fitted, and shall be a 150 mm square clear opening with the door closed and shall be inset into the lower edge of the door, opposite to the door hinges, or in the case of sliding doors, nearest the opening.

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

- .7 Doors and door frames in 'B' class divisions and means of securing them shall provide a method of closure which shall have resistance to fire equivalent to that of the divisions except that ventilation openings may be permitted in the lower portion of such doors. Where such opening is in or under a door the total net area of any such opening or openings shall not exceed 0,05 m². Alternatively, a non-combustible air balance duct routed between the cabin and the corridor and located below the sanitary unit is permitted where the cross-sectional area of the duct does not exceed 0,05 m². All ventilation openings shall be fitted with a grill made of non-combustible material. Doors shall be non combustible.
- .7.1 For reasons of noise reduction, the Administration may approve, as an equivalent, doors with built-in ventilation sound-locks with openings at the bottom on one side of the door and at the top on the other side, on condition that the following provisions have been complied with:
- .1 The upper opening shall always face towards the corridor and shall be provided with a grating of non-combustible material and an automatically operating fire damper, which is activated at a temperature of about 70 °C.
- .2 The lower opening shall be provided with a grating made of a non-combustible material.

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.3 The doors shall be tested in accordance with Resolution A.754 (18).
 NEW CLASS B, C AND D SHIPS:

.8 Cabin doors in 'B' class divisions shall be of a self-closing type. Hold-backs are not permitted.

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

.9 The requirements for 'B' class integrity of the outer boundaries of a ship shall not apply to glass partitions, windows and sidescuttles. Similarly the requirements for 'B' class integrity shall not apply to exterior doors in superstructures and deckhouses. For ships carrying not more than 36 passengers, the Administration of the flag State may permit the use of combustible materials in doors separating cabins from the individual interior sanitary spaces such as showers.

8 Protection of stairways and lifts in accommodation and service spaces (R 29)

NEW CLASS B, C AND D SHIPS:

.1 All stairways shall be of steel frame construction and shall be within enclosures formed of 'A' class divisions, with positive means of closure of all openings except that:

.1 a stairway connecting only two decks need not be enclosed, provided the integrity of the deck is maintained by proper bulkheads or doors in one between-deck space. When a stairway is closed in one between-deck space, the stairway enclosure shall be protected in accordance with the tables for decks in Regulations 4 and 5;

.2 stairways may be fitted in the open in a public space, provided they lie wholly within such public space.

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

.2 Stairway enclosures shall have direct access with the corridors and be of a sufficient area to prevent congestion, having in view the number of persons likely to use them in an emergency.

NEW CLASS B, C AND D SHIPS: Within the perimeter of such stairway enclosures only public toilets, lockers of non-combustible material providing storage for safety equipment and open information counters are permitted.

Only public spaces, corridors, public toilets, special category spaces, other escape stairways required by Regulation 6.1.5 and external areas are permitted to have direct access to these stairway enclosures.

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

.3 Lift trunks shall be so fitted as to prevent the passage of smoke and flame from one between-deck to another and shall be provided with means of closing so as to permit the control of draught and smoke.

9 Ventilation systems (R 32)

.1 Ships carrying more than 36 passengers

NEW CLASS B, C AND D SHIPS:

.1 The ventilation system shall, in addition to paragraph .1 of Regulation 32, also be in compliance with paragraphs .2.2 to .2.6, .2.8 and .2.9 of Regulation 32.

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

.2 In general, the ventilation fans shall be so disposed that the ducts reaching the various spaces remain within the main vertical zone.

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- .3 Where ventilation systems penetrate decks, precautions shall be taken, in addition to those relating to fire integrity of the deck required by Regulation II-2/A/12.1, to reduce the likelihood of smoke and hot gases passing from one between-deck space to another through the system. In addition to insulation requirements contained in this regulation, vertical ducts shall, if necessary, be insulated as required by the appropriate tables in Regulation 4.

NEW CLASS B, C AND D SHIPS:

- .4 Ventilation ducts shall be constructed of the following materials:
- .1 ducts not less than 0,075 m² in sectional area and all vertical ducts serving more than a single between-deck space shall be constructed of steel or other equivalent material;
- .2 ducts less than 0,075 m² in sectional area other than vertical ducts referred to in paragraph .1.4.1, shall be constructed of non-combustible materials. Where such ducts penetrate 'A' or 'B' class divisions due regard shall be given to ensuring the fire integrity of the division;
- .3 short lengths of duct, not in general exceeding 0,02 m² in sectional area nor two metres in length, need not be non-combustible provided that all of the following conditions are met:
- .1 the duct is constructed of a material of low fire risk to the satisfaction of the Administration of the flag State;
- .2 the duct is used only at the terminal end of the ventilation system, and
- .3 the duct is not located closer than 600 mm measured along its length to a penetration of an 'A' or 'B' class division, including continuous 'B' class ceilings.

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

instead of subparagraph .1 the following subparagraph .1a shall apply:

- .1a the duct shall be of a material which has low flame spread characteristics.
- .5 Stairway enclosures shall be ventilated and shall be served only by an independent fan and duct system which shall not serve any other spaces in the ventilation system.

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

- .6 All power ventilation, except machinery space and cargo space ventilation and any alternative system which may be required under subparagraph .9.2.6, shall be fitted with controls so grouped that all fans may be stopped from either of two separate positions which shall be situated as far apart as practicable. Controls provided for the power ventilation serving machinery spaces shall also be grouped so as to be operable from two positions, one of which shall be outside such spaces. Fans serving power ventilation systems to cargo spaces shall be capable of being stopped from a safe position outside such spaces.

NEW CLASS B, C AND D SHIPS:

- .7 Where public spaces span three or more open decks and contain combustibles such as furniture and enclosed spaces such as shops, offices and restaurants, the space shall be equipped with a smoke extraction system. The smoke extraction system shall be activated by the required smoke detection system and be capable of manual control. The fans shall be sized such that the entire volume within the space can be exhausted in 10 minutes or less.

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- .8 Ventilation ducts shall be provided with suitably located hatches for inspection and cleaning, where reasonable and practicable.
- .9 Exhaust ducts from galley ranges in which grease or fat is likely to accumulate shall meet requirements of paragraphs .9.2.3.2.1 and .9.2.3.2.2 and shall be fitted with:
- .1 a grease trap readily removable for cleaning unless an alternative approved grease removal system is fitted;
- .2 a fire damper located in the lower end of the duct which is automatically and remotely operated, and in addition a remotely operated fire damper located in the upper end of the duct;
- .3 a fixed means for extinguishing a fire within the duct;
- .4 remote control arrangements for shutting off the exhaust fans and supply fans, for operating the fire dampers mentioned in .2 and for operating the fire-extinguishing system, which shall be placed in a position close to the entrance to the galley. Where a multi-branch system is installed, means shall be provided to close all branches exhausting through the same main duct before an extinguishing medium is released into the system; and
- .5 suitably located hatches for inspection and cleaning.

.2 Ships carrying not more than 36 passengers

NEW CLASS B, C AND D SHIPS:

- .1 Ventilation ducts shall be of non-combustible material. Short ducts, however, not generally exceeding two metres in length and with a cross-section not exceeding 0,02 m² need not be non-combustible, subject to the following conditions:
- .1 these ducts shall be of a material which, in the opinion of the Administration of the flag State, has a low fire risk;
- .2 they may only be used at the end of the ventilation device;
- .3 they shall not be situated less than 600 mm, measured along the duct, from an opening in an 'A' or 'B' class division, including continuous 'B' class ceilings.

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

instead of subparagraph .1 the following subparagraph .1a shall apply:

- .1a these ducts shall be of a material which has low flame spread characteristics.
- .2a Where the ventilation ducts with a free-sectional area exceeding 0,02 m² pass through class 'A' bulkheads or decks, the openings shall be lined with a steel sheet sleeve unless the ducts passing through the bulkheads or decks are of steel in the vicinity of passage through the deck or bulkhead and the ducts and sleeves shall comply in this part with the following:
- .1 The sleeves shall have a thickness of at least 3 mm and a length of at least 900 mm. When passing through bulkheads, this length shall be divided preferably into 450 mm on each side of the bulkhead. These ducts, or sleeves lining such ducts, shall be provided with fire insulation. The insulation shall have at least the same fire integrity as the bulkhead or deck through which the duct passes.

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- .2 Ducts with a free cross-sectional area exceeding 0,075 m² shall be fitted with fire dampers in addition to the requirements of paragraph .9.2.2.1. The fire damper shall operate automatically but shall also be capable of being closed manually from both sides of the bulkhead or deck. The damper shall be provided with an indicator which shows whether the damper is open or closed. Fire dampers are not required, however, where ducts pass through spaces surrounded by 'A' class divisions, without serving those spaces, provided those ducts have the same fire integrity as the divisions which they pierce. Fire dampers shall be easily accessible. In new class B, C and D ships constructed on or after 1 January 2003, where fire dampers are placed behind ceilings or linings, these ceilings or linings shall be provided with an inspection door on which a plate reporting the identification number of the fire damper is provided. The fire damper identification number shall also be placed on any remote controls required.
- .2b In new class B, C and D ships constructed on or after 1 January 2003, where a thin plated duct with a free cross-sectional area equal to or less than 0,02 m² passes through 'A' class bulkheads or decks, the opening shall be lined with a steel sleeve having a thickness of at least 3 mm and a length of at least 200 mm, divided preferably into 100 mm on each side of the bulkhead or, in the case of the deck, wholly laid on the lower side of the decks pierced.
- .3 Ducts provided for the ventilation of machinery spaces, galleys, car deck spaces, ro-ro cargo spaces or special category spaces shall not pass through accommodation spaces, service spaces or control stations unless they comply with the conditions specified in paragraphs .9.2.3.1.1 to .9.2.3.1.4 or .9.2.3.2.1 and .9.2.3.2.2:
- .1.1 the ducts are constructed of steel having a thickness of at least 3 mm and 5 mm for ducts the widths or diameters of which are up to and including 300 mm and 760 mm and over respectively and, in the case of such ducts, the widths or diameters of which are between 300 mm and 760 mm having a thickness to be obtained by interpolation;
- .1.2 the ducts are suitably supported and stiffened;
- .1.3 the ducts are fitted with automatic fire dampers close to the boundaries penetrated; and
- .1.4 the ducts are insulated to 'A-60' standard from the machinery spaces, galleys, car deck spaces, ro-ro cargo spaces or special category spaces to a point at least 5 metres beyond each fire damper;
- or
- .2.1 the ducts are constructed of steel in accordance with paragraphs .9.2.3.1.1 and .9.2.3.1.2; and
- .2.2 the ducts are insulated to 'A-60' standard throughout the accommodation spaces, service spaces or control stations;
- except that penetrations of main zone divisions shall also comply with the requirements of paragraph .9.2.8.

In new class B, C and D ships constructed on or after 1 January 2003, the ventilation systems for machinery spaces of category A, vehicle spaces, ro-ro spaces, galleys, special category spaces and cargo spaces shall, in general, be separated from each other and from the ventilation systems serving other spaces. Except that the galley ventilation systems on passenger ships carrying not more than 36 passengers need not be completely separated, but may be served by separate ducts from a ventilation unit

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- serving other spaces. In any case an automatic fire damper shall be fitted in the galley ventilation duct near the ventilation unit.
- .4 Ducts provided for ventilation to accommodation spaces, service spaces or control stations shall not pass through machinery spaces, galleys, car deck spaces, ro-ro cargo spaces or special category spaces unless they comply with the conditions specified in paragraphs .9.2.4.1.1 to .9.2.4.1.3 or .9.2.4.2.1 and .9.2.4.2.2:
- .1.1 the ducts where they pass through a machinery space, galley, car deck space, ro-ro cargo space or special category space are constructed of steel in accordance with paragraphs .9.2.3.1.1 and .9.2.3.1.2;
- .1.2 automatic fire dampers are fitted close to the boundaries penetrated; and
- .1.3 the integrity of the machinery space, galley, car deck space, ro-ro cargo space or special category space boundaries is maintained at the penetrations;
- or
- .2.1 the ducts where they pass through a machinery space, galley, car deck space, ro-ro cargo space or special category space are constructed of steel in accordance with paragraphs .9.2.3.1.1 and .9.2.3.1.2; and
- .2.2 the ducts are insulated to ‘A-60’ standard throughout the machinery space, galley, car deck space, ro-ro cargo space or special category space;
- except that penetrations of main zone divisions shall also comply with the requirements of paragraph .9.2.8.
- .5 Ventilation ducts with a free-sectional area exceeding 0,02 m² passing through class ‘B’ bulkheads shall be lined with steel sheet sleeves of 900 mm in length divided preferably into 450 mm on each side of the bulkheads unless the duct is of steel for this length.
- .6 Such measures as are practicable shall be taken in respect of control stations outside machinery spaces in order to ensure that ventilation, visibility and freedom from smoke are maintained, so that in the event of fire the machinery and equipment contained therein may be supervised and continue to function effectively. Alternative and separate means of air supply shall be provided; air inlets of the two sources of supply shall be so disposed that the risk of both inlets drawing in smoke simultaneously is minimised. Such requirements need not apply to control stations situated on, and opening on to, an open deck, or where local closing arrangements would be equally effective.
- .7 Where they pass through accommodation spaces or spaces containing combustible materials, the exhaust ducts from galley ranges shall be constructed of ‘A’ class divisions. Each exhaust duct shall be fitted with:
- .1 a grease trap readily removable for cleaning;
- .2 a fire damper located in the lower end of the duct;
- .3 arrangements, operable from within the galley, for shutting off the exhaust fans; and
- .4 fixed means for extinguishing a fire within the duct.
- .8 Where it is necessary that a ventilation duct passes through a main vertical zone division, a fail-safe automatic closing fire damper shall be fitted adjacent to the

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division. The damper shall also be capable of being manually closed from each side of the division. The operating position shall be readily accessible and be marked in red light-reflecting colour. The duct between the division and the damper shall be of steel or other equivalent material and, if necessary, insulated to comply with the requirements of Regulation II-2/A/12.1. The damper shall be fitted on at least one side of the division with a visible indicator showing whether the damper is in the open position.

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

- .9 The main inlets and outlets of all ventilation systems shall be capable of being closed from outside the spaces being ventilated.

NEW CLASS B, C AND D SHIPS:

- .10 Power ventilation of accommodation spaces, service spaces, cargo spaces, control stations and machinery spaces shall be capable of being stopped from an easily accessible position outside the space being served. This position should not be readily cut off in the event of a fire in the spaces served. The means provided for stopping the power ventilation of the machinery spaces shall be entirely separate from the means provided for stopping ventilation of other spaces.

- .3 ALL CLASS B, C AND D SHIPS CONSTRUCTED ON OR AFTER 1 JANUARY 2003:

The following arrangements shall be tested in accordance with the IMO Fire Test Procedures Code:

- .1 fire dampers including relevant means of operation; and
.2 duct penetrations through 'A' class divisions. Where steel sleeves are directly joined to ventilation ducts by means of riveted or screwed flanges or by welding, the test is not required.

.10 Windows and sidescuttles (R 33)

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

- .1 All windows and sidescuttles in bulkheads within accommodation and service spaces and control stations other than those to which the provisions of Regulation 7.5 apply, shall be so constructed as to preserve the integrity requirements of the type of bulkheads in which they are fitted.

In new class B, C and D ships constructed on or after 1 January 2003 this shall be determined in accordance with the IMO Fire Test Procedures Code.

- .2 Notwithstanding the requirements of the tables in Regulations 4 and 5, all windows and sidescuttles in bulkheads separating accommodation and service spaces and control stations from weather shall be constructed with frames of steel or other suitable material. The glass shall be retained by a metal glazing bed or angle.

NEW CLASS B, C AND D SHIPS CARRYING MORE THAN 36 PASSENGERS:

- .3 Windows facing life-saving appliances, embarkation and assembly areas, external stairs and open decks used for escape routes, and windows situated below life-raft and escape slide embarkation areas shall have the fire integrity as required in the tables of Regulation 4. Where automatic dedicated sprinkler heads are provided for windows, 'A-0' windows may be accepted as equivalent.

In new class B, C and D ships constructed on or after 1 January 2003, the automatic dedicated sprinkler heads must either be:

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- .1 dedicated heads located above the windows and installed in addition to the conventional ceiling sprinklers; or
- .2 conventional ceiling sprinkler heads arranged such that the window is protected by an average application rate of at least 5 litres/m² per minute and the additional window area is included in the calculation of the area of coverage.

Windows located in the ship's side below the lifeboat embarkation areas shall have the fire integrity at least equal to 'A-0' class.

NEW CLASS B, C AND D SHIPS CARRYING NOT MORE THAN 36 PASSENGERS AND EXISTING CLASS B SHIPS:

- .4 Notwithstanding the requirements of the tables in Regulation II-2/B/5, special attention shall be given to the fire integrity of windows facing open or enclosed lifeboat and life-raft embarkation areas and to the fire integrity of windows situated below such areas in such a position that their failure during a fire would impeded the launching of, or embarkation into, lifeboats or life-rafts.

11 **Restricted use of combustible material (R 34)**

NEW CLASS B, C AND D SHIPS:

- .1 Except in cargo spaces, mail rooms, baggage rooms, or refrigerated compartments of service spaces, all linings, grounds, draughtstops, ceilings, and insulations shall be of non-combustible materials. Partial bulkheads or decks used to subdivide a space for utility or artistic treatment shall also be of non-combustible material.
- .2 Vapour barriers and adhesives used in conjunction with insulation, as well as insulation of pipe fittings, for cold service systems need not be non-combustible, but they shall be kept to the minimum quantity practicable and their exposed surfaces shall have qualities of resistance to the propagation of flame in accordance with the test procedure of IMO Resolution A.653 (16).

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

Instead of .2 the following paragraph .2a shall apply:

- .2a Vapour barriers and adhesives used in conjunction with insulation, as well as insulation of pipe fittings for cold service systems need not be non-combustible, but they shall be kept to the minimum quantity practicable and their exposed surfaces shall have low flame spread characteristics.
- .3 The following surfaces shall have low flame-spread characteristics:
 - .1 exposed surfaces in corridors and stairway enclosures, and of bulkheads, wall and ceiling linings in all accommodation and service spaces and control stations;
 - .2 concealed or inaccessible spaces in accommodation, service spaces and control stations.
 - .4 The total volume of combustible facings, mouldings, decorations and veneers in any accommodation and service space shall not exceed a volume equivalent to 2,5 mm veneer on the combined area of the walls and ceilings. Furniture fixed to linings, bulkheads or decks need not be included in the calculation of the total volume of combustible materials.

In the case of ships fitted with an automatic sprinkler system complying with the provisions of Regulation II-2/A/8, the above volume may include some combustible material used for erection of 'C' class divisions.

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- .5 Veneers used on surfaces and linings covered by the requirements of paragraph .3 shall have a calorific value not exceeding 45 MJ/m² of the area for the thickness used.
- .6 Furniture in stairway enclosures shall be limited to seating. It shall be fixed, limited to six seats on each deck in each stairway enclosure, be of restricted fire risk, and shall not restrict the passenger escape route. The Administration of the flag State may permit additional seating in the main reception area within a stairway enclosure if it is fixed, non-combustible and does not restrict the passenger escape route. Furniture shall not be permitted in passenger and crew corridors forming escape routes in cabin areas. In addition to the above, lockers of non-combustible material, providing storage for safety equipment required by regulations, may be permitted. Drinking water dispensers and ice cube machines may be permitted in corridors provided they are fixed and do not restrict the width of the escape routes. This applies as well to decorative flower or plant arrangements, statues or other objects of art such as paintings and tapestries in corridors and stairways.
- .7 Paints, varnishes and other finishes used on exposed interior surfaces shall not be capable of producing excessive quantities of smoke and toxic products.

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

Instead of .7 the following paragraph .7a. shall apply:

- .7a. Paints, varnishes and other finishes used on exposed interior surfaces shall not be capable of producing excessive quantities of smoke and toxic products, this being determined in accordance with the IMO Fire Test Procedures Code.
- .8 Primary deck coverings, if applied within accommodation and service spaces and control stations, shall be of approved material which will not readily ignite, in accordance with the fire test procedures of IMO Resolution A.687 (17) or give rise to toxic or explosive hazards at elevated temperatures.

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

Instead of paragraph .8 the following paragraph .8a shall apply:

- .8a. Primary deck coverings, if applied within accommodation and service spaces and control stations, shall be of an approved material which will not readily ignite or give rise to toxic or explosive hazards at elevated temperatures, this being determined in accordance with the IMO Fire Test Procedures Code.

12 **Details of construction (R 35)**

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

In accommodation and service spaces, control stations, corridors and stairways:

- .1 air spaces enclosed behind ceilings, panelling or linings shall be suitably divided by close-fitting draught stops not more than 14 metres apart;
- .2 in the vertical direction, such enclosed air spaces, including those behind linings of stairways, trunks, etc. shall be closed at each deck.

13 **Fixed fire detection and fire alarm systems and automatic sprinkler, fire detection and fire alarm system (R 14) (R 36)**

NEW CLASS B, C AND D SHIPS:

- .1 In ships carrying not more than 36 passengers and in ships with a length of less than 24 metres there shall be installed throughout each separate zone, whether vertical or

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horizontal, in all accommodation and service spaces and in control stations, except spaces which afford no substantial fire risk such as void spaces, sanitary spaces, etc., either:

- .1 a fixed fire detection and fire alarm system of an approved type and complying with the requirements of Regulation II-2/A/9 and so installed and arranged as to detect the presence of fire in such spaces, however in new class B, C and D ships constructed on or after 1 January 2003 providing smoke detection in corridors, stairways and escape routes within accommodation spaces, or,
- .2 an automatic sprinkler, fire detection and fire alarm system of an approved type complying with the requirements of Regulation II-2/A/8 or with the IMO guidelines for an approved equivalent sprinkler system as given in IMO Resolution A.800 (19) and so installed and arranged as to protect such spaces and, in addition, a fixed fire detection and fire alarm system of an approved type and complying with the requirements of Regulation II-2/A/9 and so installed and arranged as to provide smoke detection in corridors, stairways and escape routes within accommodation spaces.
- .2 Ships carrying more than 36 passengers, except ships with a length of less than 24 metres, shall be equipped with:

An automatic sprinkler, fire detection and fire alarm system of an approved type complying with the requirements of Regulation II-2/A/8 or with the IMO guidelines for an approved equivalent sprinkler system as given in IMO Resolution A.800 (19), in all service spaces, control stations and accommodation spaces, including corridors and stairways.

Alternatively control stations where water may cause damage to essential equipment may be fitted with an approved fixed fire-extinguishing system of another type.

A fixed fire detection and fire alarm system of an approved type, complying with the requirements of Regulation II-2/A/9 shall be installed, so installed and arranged as to provide smoke detection in service spaces, control stations and accommodation spaces, including corridors and stairways. Smoke detectors need not be fitted in private bathrooms and galleys.

Spaces having little or no fire risk such as voids, public toilets, carbon dioxide rooms and similar spaces need not be fitted with an automatic sprinkler system or fixed fire detection and alarm system.

- .3 In periodically unattended machinery spaces a fixed fire detection and fire alarm system of an approved type, in accordance with the relevant provisions of Regulation II-2/A/9, shall be installed.

This fire detection system shall be so designed and the detectors so positioned as to detect rapidly the onset of fire in any part of those spaces and under any normal conditions of operation of the machinery and variations of ventilation as required by the possible range of ambient temperatures. Except in spaces of restricted height and where their use is specially appropriate, detection systems using only thermal detectors shall not be permitted. The detection system shall initiate audible and visual alarms distinct in both respects from the alarms of any other system not indicating fire, in sufficient places to ensure that the alarms are heard and observed on the navigating bridge and by a responsible engineer officer.

When the navigating bridge is unmanned the alarm shall sound in a place where a responsible member of the crew is on duty.

After installation the system shall be tested under varying conditions of engine operation and ventilation.

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14 Protection of special category spaces (R 37)

.1 Provisions applicable to special category spaces whether above or below the bulkhead deck

NEW CLASS B, C AND D SHIPS AND EXISTING CLASS B SHIPS CARRYING MORE THAN 36 PASSENGERS:

.1 General

.1 The basic principle underlying the provisions of this regulation is that as normal main vertical zoning may not be practicable in special category spaces, equivalent protection must be obtained in such spaces on the basis of a horizontal zone concept and by the provision of an efficient fixed fire-extinguishing system. Under this concept a horizontal zone for the purpose of this regulation may include special category spaces on more than one deck provided that the total overall clear height for vehicles does not exceed 10 metres.

.2 The requirements of Regulations II-2/A/12, II-2/B/7 and II-2/B/9 for maintaining the integrity of vertical zones shall be applied equally to decks and bulkheads forming the boundaries separating horizontal zones from each other and from the remainder of the ship.

.2 Structural protection

.1 In new ships carrying more than 36 passengers the boundary bulkheads and decks of special category spaces shall be insulated to 'A-60' class standard. However, where an open deck space (as defined in Regulation 4.2.2(5)), a sanitary or similar space (as defined in Regulation 4.2.2(9)) or a tank, void or auxiliary machinery space having little or no fire risk (as defined in Regulation 4.2.2(10)), is on one side of the division the standard may be reduced to 'A-0'.

Where fuel oil tanks are below a special category space, the integrity of the deck between such spaces may be reduced to 'A-0' standard.

.2 In new ships carrying not more than 36 passengers and existing class B ships carrying more than 36 passengers the boundary bulkheads of special category spaces shall be insulated as required for category (11) spaces in table 5.1 of Regulation 5 and the horizontal boundaries as required for category (11) in table 5.2 of Regulation 5.

.3 Indicators shall be provided on the navigating bridge which shall indicate when any fire door leading to or from the special category spaces is closed.

Doors to special category spaces shall be of such a construction that they cannot be kept open permanently and shall be kept closed during the voyage.

.3 Fixed fire-extinguishing system

Each special category space shall be fitted with an approved fixed pressure water-spraying system for manual operation which shall protect all parts of any deck and vehicle platform in such space.

In new class B, C and D ships constructed on or after 1 January 2003, such water spray systems shall have:

.1 a pressure gauge on the valve manifold;

.2 clear marking on each manifold valve indicating the spaces served;

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- .3 instructions for maintenance and operation located in the valve room; and
- .4 a sufficient number of drainage valves.

The Administration of the flag State may permit the use of any other fixed fire-extinguishing system that has been shown by full-scale test in conditions simulating a flowing petrol fire in a special category space to be not less effective in controlling fires likely to occur in such a space. Such fixed pressure water-spraying system or other equivalent fire-extinguishing system shall comply with the provisions of IMO Resolution A.123 (V) and the IMO MSC/Circ. 914 'Guidelines when approving alternative water-based fire-fighting systems for use in special category spaces' shall be taken into consideration.

.4 Patrols and detection

- .1 An efficient patrol system shall be maintained in special category spaces. In any such space in which the patrol is not maintained by a continuous fire watch at all times during the voyage there shall be provided a fixed fire detection and fire alarm system of an approved type complying with the requirements of Regulation II-2/A/9. The fixed fire detection system shall be capable of rapidly detecting the onset of fire. The type and the spacing and location of detectors shall determined taking into account the effects of ventilation and other relevant factors.

In new class B, C and D ships constructed on or after 1 January 2003, after being installed the system shall be tested under normal ventilation conditions and shall give an overall response time to the satisfaction of the Administration of the flag State.

- .2 Manually operated call points shall be provided as necessary throughout the special category spaces and one shall be placed close to each exit from such spaces.

In new class B, C and D ships constructed on or after 1 January 2003, manually operated call points shall be spaced so that no part of the space is more than 20 metres from a manually operated call point.

.5 Portable fire-extinguishing equipment

NEW CLASS B, C AND D SHIPS CONSTRUCTED BEFORE 1 JANUARY 2003 AND EXISTING CLASS B SHIPS:

- .5a. There shall be provided in each special category space:

- .1 at least three water fog applicators;
- .2 one portable foam applicator unit complying with the provisions of Regulation II-2/A/6.2, provided that at least two such units are available in the ship for use in such spaces; and
- .3 at least one portable extinguisher located at each access to such spaces.

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

- .5b. Portable extinguishers shall be provided at each deck level in each hold or compartment where vehicles are carried, spaced not more than 20 metres apart on both sides of the space. At least one portable fire extinguisher shall be located at each access to such space.

In addition the following fire extinguishing appliances shall be provided in special category spaces:

- .1 at least three water-fog applicators; and

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- .2 one portable foam applicator unit complying with the provisions of the Fire Safety Systems Code, provided that at least two such units are available in the ship for use in such ro-ro space.

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

- .6 Ventilation system
- .1 There shall be provided an effective power ventilation system for the special category spaces sufficient to give at least 10 air changes per hour. The system for such spaces shall be entirely separated from other ventilation systems and shall be operating at all times when vehicles are in such spaces. The number of air changes shall be increased at least to 20 during loading and unloading of vehicles.

Ventilation ducts serving special category spaces capable of being effectively sealed shall be separated for each such space. The system shall be capable of being controlled from a position outside such spaces.

- .2 The ventilation shall be such as to prevent air stratification and the formation of air pockets.
- .3 Means shall be provided to indicate on the navigating bridge any loss or reduction of the required ventilating capacity.
- .4 Arrangements shall be provided to permit a rapid shutdown and effective closure of the ventilation system in case of fire, taking into account the weather and sea conditions.
- .5 Ventilation ducts, including dampers, shall be made of steel and their arrangement shall be to the satisfaction of the Administration of the flag State.

In new class B, C and D ships constructed on or after 1 January 2003, ventilation ducts that pass through horizontal zones or machinery spaces shall be 'A-60' class steel ducts constructed in accordance with Regulations II-2/B/9.2.3.1.1 and II-2/B/9.2.3.1.2.

- .2 Additional provisions applicable only to special category spaces above the bulkhead deck

NEW CLASS B, C AND D SHIPS:

- .1.1 Scuppers

In view of the serious loss of stability which could arise due to large quantities of water accumulating on the deck or decks consequent on the operation of the fixed pressure water-spraying system, scuppers shall be fitted so as to ensure that such water is rapidly discharged directly overboard.

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

- .1.2 Discharges
- .1.2.1 Discharge valves for scuppers, fitted with positive means of closing operable from a position above the bulkhead deck in accordance with the requirements of the International Convention on Load Lines in force, shall be kept open while the ships are at sea.
- .1.2.2 Any operation of the valves referred to in paragraph .1.2.1 shall be recorded in the logbook.

NEW CLASS B, C AND D SHIPS:

- .2 Precautions against ignition of flammable vapours

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- .1 On any deck or platform, if fitted, on which vehicles are carried and on which explosive vapours might be expected to accumulate, except platforms with openings of sufficient size permitting penetration of petrol gases downwards, equipment which may constitute a source of ignition of flammable vapours and, in particular, electrical equipment and wiring, shall be installed at least 450 mm above the deck or platform. Electrical equipment installed at more than 450 mm above the deck or platform shall be of a type so enclosed and protected as to prevent the escape of sparks. However, if the installation of electrical equipment and wiring at less than 450 mm above the deck or platform is necessary for the safe operation of the ship, such electrical equipment and wiring may be installed provided that it is of a certified safe type approved for use in an explosive petrol and air mixture.
- .2 Electrical equipment and wiring, if installed in an exhaust ventilation duct, shall be of a type approved for use in explosive petrol and air mixtures and the outlet from any exhaust duct shall be sited in a safe position, having regard to other possible sources of ignition.
- .3 Additional provisions applicable only to special category spaces below the bulkhead deck

NEW CLASS B, C AND D SHIPS:

- .1 Bilge pumping and drainage

In view of the serious loss of stability which could arise due to large quantities of water accumulating on the deck or tank top consequent on the operation of the fixed pressure water-spraying system, the Administration of the flag State may require pumping and drainage facilities to be provided additional to the requirements of Regulation II-1/C/3.

In new class B, C and D ships constructed on or after 1 January 2003 in such case, the drainage system shall be sized to remove not less than 125 % of the combined capacity of both the water spraying system pumps and the required number of fire hose nozzles. The drainage system valves shall be operable from outside the protected space at a position in the vicinity of the extinguishing system controls. Bilge wells shall be of sufficient holding capacity and shall be arranged at the side shell of the ship at a distance from each other of not more than 40 metres in each watertight compartment.

- .2 Precautions against ignition of flammable vapours
 - .1 Electrical equipment and wiring, if fitted, shall be of a type suitable for use in explosive petrol and air mixtures. Other equipment which may constitute a source of ignition of flammable vapours shall not be permitted.
 - .2 Electrical equipment and wiring, if installed in an exhaust ventilation duct, shall be of a type approved for use in explosive petrol and air mixtures and the outlet from any exhaust duct shall be sited in a safe position, having regard to other possible sources of ignition.
- .4 Permanent openings

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

Permanent openings in the side plating, the ends or deckhead of special category spaces shall be so situated that a fire in the special category space does not endanger stowage areas and embarkation stations for survival craft and accommodation spaces, service spaces and control stations in superstructures and deckhouses above the special category spaces.

- 15 **Fire patrols, detection, alarms and public address systems (R 40)**

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NEW CLASS B, C AND D SHIPS:

- .1 Manually operated call points complying with the requirements of Regulation II-2/A/9 shall be installed.
- .2 All ships shall at all times when at sea, or in port (except when out of service), be so manned or equipped as to ensure that any initial fire alarm is immediately received by a responsible member of the crew.
- .3 A special alarm, operated from the navigating bridge or fire control station, shall be fitted to summon the crew. This alarm may be part of the ship's general alarm system but it shall be capable of being sounded independently of the alarm to the passenger spaces.
- .4 A public address system or other effective means of communication shall be available throughout the accommodation and service spaces and control stations and open decks.

In new class B, C and D ships constructed on or after 1 January 2003, this public address system shall comply with the requirements of Regulation III/6.5.

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

For ships carrying more than 36 passengers an efficient patrol system shall be maintained so that an outbreak of fire may be promptly detected. Each member of the fire patrol shall be trained to be familiar with the arrangements of the ship as well as the location and operation of any equipment he or she may be called upon to use. Each member of the fire patrol shall be provided with a two-way portable radio telephone apparatus.

NEW CLASS B, C AND D SHIPS:

- .6 Ships carrying more than 36 passengers shall have the detection alarms for the systems required by Regulation 13.2 centralised in a continuously manned central control station. In addition, controls for remote closing of the fire doors and shutting down the ventilation fans, shall be centralised in the same location. The ventilation fans shall be capable of reactivation by the crew at the continuously manned control station. The control panel in the central control station shall be capable of indicating open or closed positions of fire doors, closed or off status of the detectors, alarms and fans. The control panel shall be continuously powered and should have an automatic changeover to standby power supply in case of loss of normal power supply. The control panel shall be powered from the main source of electrical power and the emergency source of electrical power defined by Regulation II-1/D/3 unless other arrangements are permitted by the regulations, as applicable.
- .7 The control panel shall be designed on the fail-safe principle, e.g. an open detector circuit shall cause an alarm condition.

16 **Upgrading of existing class B ships carrying more than 36 passengers (R 41-1)**

In addition to the requirements for existing class B ships in this Chapter II-2, existing class B ships carrying more than 36 passengers shall comply with the following requirements:

- .1 Not later than 1 October 2000:
 - .1 All accommodation and service spaces, stairway enclosures and corridors shall be equipped with a smoke detection and alarm system of an approved type, and complying with the requirements of Regulation II-2/A/9. Such system need not be fitted in private bathrooms, and spaces having little or no

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- fire risk such as voids and similar spaces. Detectors operated by heat instead of smoke shall be installed in galleys.
- .2 Smoke detectors connected to the fire detection and alarm system shall also be fitted above ceilings in stairways and corridors in the areas where ceilings are of combustible construction.
 - .3.1 Hinged fire doors in stairway enclosures, main vertical zone bulkheads and galley boundaries which are normally kept open shall be self-closing and be capable of release from a central control station and from a position at the door.
 - .3.2 A panel shall be placed in a continuously manned central control station to indicate whether the fire doors in stairway enclosures, main vertical zone bulkheads and galley boundaries are closed.
 - .3.3 Exhaust ducts from galley ranges in which grease or fat is likely to accumulate and which pass through accommodation spaces or spaces containing combustible materials shall be constructed of 'A' class divisions. Each galley range exhaust duct shall be fitted with:
 - .1 a grease trap readily removable for cleaning unless an alternative grease removal process is fitted;
 - .2 a fire damper located in the lower end of the duct;
 - .3 arrangements operable from within the galley for shutting off the exhaust fans;
 - .4 fixed means for extinguishing a fire within the duct; and
 - .5 suitably located hatches for inspection and cleaning.
 - .3.4 Only public toilets, lifts, lockers of non-combustible materials providing storage for safety equipment and open information counters may be located within the stairway enclosure boundaries. Other existing spaces within the stairway enclosure:
 - .1 shall be emptied, permanently closed and disconnected from the electrical system; or
 - .2 shall be separated from the stairway enclosure by the provision of 'A' class divisions in accordance with Regulation 5. Such spaces may have direct access to stairway enclosures by the provision of 'A' class doors in accordance with Regulation 5, and subject to a sprinkler system being provided in these spaces. However, cabins shall not directly open into the stairway enclosure.
 - .3.5 Spaces other than public spaces, corridors, public toilets, special category spaces, other stairways required by Regulation 6.1.5, open deck spaces and spaces covered by paragraph .3.4.2 are not permitted to have direct access to stairway enclosures.
 - .3.6 Existing machinery spaces of category (10) described in Regulation II-2/B/4 and back offices for information counters which open directly into the stairway enclosure may be retained, provided that they are protected by

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smoke detectors and that back offices for information counters contain only furniture of restricted fire risk.

.3.7 In addition to the emergency lighting required by Regulations II-1/D/3 and III/5.3, the means of escape including stairways and exits shall be marked, at all points of the escape route including angles and intersections, by lighting or photoluminescent strip indicators placed not more than 0,3 metres above the deck. The marking must enable passengers to identify all the routes of escape and readily identify the escape exits. If electric illumination is used, it shall be supplied by the emergency source of power and it shall be so arranged that the failure of any single light or cut in a lighting strip, will not result in the marking being ineffective. Additionally, all escape route signs and fire equipment location markings shall be of photoluminescent material or marked by lighting. The Administration of the flag State shall ensure that such lighting or photoluminescent equipment have been evaluated, tested and applied in accordance with the guidelines as given in IMO Resolution A.752 (18) or in ISO Standard 15370-2001.

.3.8 A general emergency alarm system shall be provided. The alarm shall be audible throughout all the accommodation and normal crew working spaces and open decks, and its sound pressure level shall comply with the standards of the Code on Alarms and Indicators adopted by IMO in Resolution A.686 (17).

.3.9 A public address system or other effective means of communication shall be available throughout the accommodation, public and service spaces, control stations and open decks.

.3.10 Furniture in stairway enclosures shall be limited to seating. It shall be fixed, limited to six seats on each deck in each stairway enclosure, be of restricted fire risk, and shall not restrict the passenger escape route. The Administration of the flag State may permit additional seating in the main reception area within a stairway enclosure, if it is fixed, non-combustible, and does not restrict the passenger escape route. Furniture shall not be permitted in passenger and crew corridors forming escape routes in cabin areas. In addition to the above, lockers of non-combustible material, providing storage for safety equipment required by regulations, may be permitted.

.2 Not later than 1 October 2003:

.1 All stairways in accommodation and service spaces shall be of steel frame construction except where the Administration of the flag State sanctions the use of other equivalent material, and shall be within enclosures formed of 'A' class divisions, with positive means of closure at all openings, except that:

.1 a stairway connecting only two decks need not be enclosed, provided the integrity of the deck is maintained by proper bulkheads or doors in one between-deck space. When a stairway is closed in one between-deck space, the stairway enclosure shall be protected in accordance with the tables for decks in Regulation 5;

.2 stairways may be fitted in the open in a public space, provided they lie wholly within such public space.

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- .2 Machinery spaces shall be fitted with a fixed fire-extinguishing system complying with the requirements of Regulation II-2/A/6.
- .3 Ventilation ducts passing through divisions between main vertical zones shall be equipped with a fail-safe automatic closing fire damper which shall also be capable of being manually closed from each side of the division. In addition, fail-safe automatic closing fire dampers with manual operation from within the enclosure shall be fitted to all ventilation ducts serving both accommodation and service spaces and stairway enclosures where they pierce such enclosures. Ventilation ducts passing through a main fire zone division without serving spaces on both sides or passing through a stairway enclosure without serving that enclosure need not be fitted with dampers provided that the ducts are constructed and insulated to 'A-60' standard and have no openings within the stairway enclosure or in the trunk on the side which is not directly served.
- .4 Special category spaces shall comply with the requirements of Regulation II-2/B/14.
- .5 All fire doors in stairway enclosures, main vertical zone bulkheads and galley boundaries which are normally kept open shall be capable of release from a central control station and from a position at the door.
- .6 The requirements of paragraph .1.3.7 of this regulation shall also apply to the accommodations.
- .3 Not later than 1 October 2005 or 15 years after the date of construction of the ship, whichever is the later:
 - .1 Accommodation and service spaces, stairway enclosures and corridors shall be fitted with an automatic sprinkler, fire detection and fire alarm system complying with the requirements of Regulation II-2/A/8 or with the IMO guidelines for an approved equivalent sprinkler system as given in IMO Resolution A.800 (19).

17 **Special requirements for ships carrying dangerous goods (R 41)**

NEW CLASS B, C AND D SHIPS CONSTRUCTED BEFORE 1 JANUARY 2003 AND EXISTING CLASS B SHIPS:

The requirements of SOLAS Regulation II-2/54 shall apply, as appropriate, to passenger ships carrying dangerous goods.

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

The requirements of Regulation 19 of Part G of the 1974 SOLAS Convention Chapter II-2, as amended, shall apply, as appropriate, to passenger ships carrying dangerous goods.

18 **Special requirements for helicopter facilities**

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

Ships equipped with helidecks shall comply with the requirements of Regulation 18 of Part G of the 1974 SOLAS Convention Chapter II-2, as amended.

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Distress flares ^g	12	12	12	12	6	6
Line-throwing appliances	1	1	1	1	—	—
Radar transponders	1	1	1	1	1	1
Two-way VHF radiotelephone apparatus	3	3	3	3	3	2

- a** Survival craft may be either lifeboats complying with section 4.5 or 4.6 or 4.7 of the LSA Code or life-rafts complying with the requirements of section 4.1 of the LSA Code and of either section 4.2 or 4.3 of the LSA Code. In addition, life-rafts on ro-ro passenger ships have also to comply with the requirements of Regulation III/5-1.2. When justified by the sheltered nature of the voyages and/or the favourable climatic conditions of the area of operation, the Administration of the flag State may accept, if this is not rejected by the host Member State:
- open reversible inflatable life-rafts not complying with the section 4.2 or 4.3 of the LSA Code provided that such life-rafts entirely comply with the requirements of Annex 10 of the High-Speed Craft Code;
 - life-rafts not complying with the requirements of paragraphs 4.2.2.2.1 and 4.2.2.2.2 of the LSA Code on the insulation against cold of the floor of the life-raft.
- Survival craft for existing B, C and D ships shall comply with the relevant regulations of the 1974 SOLAS Convention, as amended, for existing ships as amended at the date of adoption of this Directive. A marine evacuation system or systems complying with section 6.2 of the LSA Code may be substituted for the equivalent capacity of life-rafts and launching appliances required by the table.
- b** Survival craft shall, as far as practicable, be equally distributed on each side of the ship.
- c** The total number of survival craft shall be in accordance with the percentage mentioned in the table above and the aggregate capacity of a combination of survival craft and additional life-rafts shall be 110 % of the total number of persons (N) the ship is certified to carry. Sufficient number of survival craft has to be carried in order to ensure that in the event of any one survival craft being lost or rendered unserviceable, the remaining survival craft can accommodate the total number of persons the ship is certified to carry.
- d** The number of lifeboats and/or rescue boats, shall be sufficient to ensure that in providing for abandonment by the total number of persons the ship is certified to carry, no more than nine life-rafts need to be marshalled by each lifeboat or rescueboat.
- e** Rescue boats shall be served by their own launching appliances capable of launching and recovery. If a rescue boat complies with the requirements of section 4.5 or 4.6 of the LSA Code, it may be included in the capacity of the survival craft specified in the table above. At least one of the rescue boats on ro-ro passenger ships shall be a fast rescue boat complying with the requirements of Regulation III/5-1.3. When the Administration of the flag State considers that the installation of a rescue boat on board of a ship is physically impossible, such ship may be exempted from carrying a rescueboat, provided the ship meets all of the following requirements:
- the ship is arranged to allow a helpless person to be recovered from the water;
 - recovery of the helpless person can be observed from the navigating bridge; and
 - the ship is sufficiently manoeuvrable to close and recover persons in the worst intended conditions
- f** At least one lifebuoy on each side shall be equipped with a buoyant lifeline equal in length to not less than twice the height at which it is stowed above the waterline in the lightest seagoing condition or 30 metres, whichever is the greater. Two lifebuoys shall be equipped with a self-activating smoke signal and a self-activating light; they shall be capable of quick release from the navigation bridge. The remainder of the lifebuoys shall be equipped with self-igniting lights, in compliance with the provisions of paragraph 2.1.2 of the LSA Code.
- g** Distress flares, complying with the requirements of section 3.1 of the LSA Code shall be stowed on the navigation bridge or steering position.
- h** Life jackets on board ro-ro passenger ships shall comply with the requirements of Regulation III/5-1.5.
- i** An inflatable life jacket shall be provided for each person that has to carry out work on board in exposed areas. These inflatable life jackets may be included in the total number of life jackets required by this Directive.

3 Emergency alarm, operating instructions, training manual, assembly lists and emergency instructions (R 6 + 8 + 9 +19 + 20)

NEW AND EXISTING CLASS B, C AND D SHIPS:

Every ship shall be provided with:

.1 A general emergency alarm system (R 6.4.2)

It must comply with the requirements of paragraph 7.2.1.1 of the LSA Code, and be suitable for summoning passengers and crews to assembly stations and to initiate the actions included in the assembly list.

In all ships carrying more than 36 passengers the emergency alarm system shall be supplemented by a public address system that can be used from the bridge. The system shall be of a such nature and so arranged and located that messages read out over the system are readily audible for persons whose hearing is normal, in all places where persons are likely to stay when the main engine is in operation.

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

The general emergency alarm systems shall be audible on all open decks and minimum sound pressure levels for the emergency alarm tone shall be in accordance with paragraphs 7.2.1.2 and 7.2.1.3 of the LSA Code.

.2 A public address system (R 6.5)

.2.1 In addition to the requirements of Regulation II-2/B/15.4 and of paragraph .1, all passenger ships carrying more than 36 passengers shall be fitted with a public address system. With respect to existing ships the requirements of paragraphs .2.2, .2.3 and .2.5, subject to the provisions of paragraph .2.6, shall apply not later than the date of the first periodical survey after 1 July 1998.

.2.2 The public address system shall be a loudspeaker installation enabling the broadcast of messages into all spaces where crew members or passengers, or both, are normally present, and to assembly stations. It shall allow for the broadcast of messages from the navigation bridge and such other places on board the ship as the Administration of the flag State deems necessary. It shall be installed with regard to acoustically marginal conditions and not require any action from the addressee.

.2.3 The public address system shall be protected against unauthorised use and be clearly audible above the ambient noise in all spaces, prescribed by paragraph .2.2, and shall be provided with an override function controlled from one location on the navigation bridge and such other places on board as the Administration of the flag State deems necessary, so that all emergency messages will be broadcast if any loudspeaker in the spaces concerned has been switched off, its volume has been turned down or the public address system is used for other purposes.

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

The minimum sound pressure levels for broadcasting emergency announcements shall be in accordance with paragraph 7.2.2.2 of the LSA Code.

.2.4 NEW CLASS B, C AND D SHIPS:

.1 The public address system shall have at least two loops which shall be sufficiently separated throughout their length and have two separate and independent amplifiers; and

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- .2 the public address system and its performance standards shall be approved by the Administration of the flag State having regard to the recommendations adopted by the IMO.
- .2.5 The public address system shall be connected to the emergency source of electrical power.
- .2.6 Existing ships which are already fitted with the public address system approved by the Administration of the flag State which comply substantially with those required by paragraph .2.2, .2.3 and .2.5 are not required to change their system.
- .3 Assembly list and emergency instructions (R 8)

Clear instructions to be followed in the event of an emergency shall be provided for every person on board, in accordance with IMO Resolution A.691 (17).

Assembly lists and emergency instructions complying with the requirements of SOLAS Regulation III/37 shall be exhibited in conspicuous places throughout the ship including the navigating bridge, engine room and crew accommodation spaces.

Illustrations and instructions in appropriate languages shall be posted in passenger cabins and be conspicuously displayed at assembly stations and other passenger spaces to inform passengers of:

- (i) their assembly station;
- (ii) the essential actions they must take in an emergency;
- (iii) the method of donning life jackets.

The person, who in accordance to SOLAS Regulation IV/16, is designated to have primary responsibility for radio-communications during distress situations, shall have no other duties assigned in such situations. The above shall be reflected in the assembly list and the emergency instructions.

.4 Operating instructions (R 9)

Posters or signs shall be provided on or in the vicinity of survival craft and their launching controls and shall:

- (i) illustrate the purpose of controls and the procedures for operating the appliance and give relevant instructions or warnings;
- (ii) be easily seen under emergency lighting conditions;
- (iii) use symbols in accordance with IMO Resolution A.760 (18).

.5 Training manual

A training manual complying with the requirements of SOLAS Regulation III/35 shall be provided in each crew messroom and recreation room or in each crew cabin.

.6 Instruction for maintenance (R 20.3)

Instructions for on-board maintenance of life-saving appliances or a shipboard planned maintenance programmes which includes the maintenance of life-saving appliances, shall be provided on board and maintenance shall be carried out accordingly. The instructions shall be in compliance with the requirements of SOLAS Regulation III/36.

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4 Manning of survival craft and supervision (R 10)

NEW AND EXISTING CLASS B, C AND D SHIPS:

- .1 There shall be a sufficient number of trained persons on board for assembling and assisting untrained persons.
- .2 There shall be a sufficient number of crew members on board for operating the survival craft and launching arrangements required for abandonment of the total number of persons on board.
- .3 An officer or certified person shall be placed in charge of each survival craft to be used. However, a crew member practised in the handling and operation of life-rafts, may be placed in charge of each life-raft or group of life-rafts. Every rescue boat and motorised survival craft shall have a person assigned who is capable of operating the engine and carrying out minor adjustments.
- .4 The master shall ensure the equitable distribution of persons referred to in paragraphs .1, .2 and .3 among the ship's survival craft.

5 Survival craft assembly and embarkation arrangements (R 11 + 23 + 25)

NEW AND EXISTING CLASS B, C AND D SHIPS:

- .1 Survival craft for which approved launching appliances are required shall be stowed as close to accommodation and service spaces as possible.
- .2 Assembly stations shall be provided close to the embarkation stations and shall be readily accessible from accommodation and work areas and have ample room for marshalling and instruction of the passengers. Clear deck space at least 0,35 m² per person.
- .3 Assembly and embarkation stations, alleyways, stairways and exits giving access to the assembly and embarkation stations shall be adequately illuminated.

Such lighting shall be capable of being supplied by the emergency source of electrical power required by Regulations II-1/D/3 and II-1/D/4.

In addition to and as part of the markings required under II-2/B 6.1.7 for new class B, C and D ships, routes to assembly stations shall be indicated with the assembly station symbol, intended for that purpose, in accordance with IMO Resolution A.760 (18). This requirement shall also be applied to existing class B ships, carrying more than 36 passengers.

- .4 Lifeboats shall be capable of being boarded either directly from the stowed position or from an embarkation deck, but not both.
- .5 Davit-launched life-raft shall be capable of being boarded from a position immediately adjacent to the stowed position or from a position the life-raft is transferred to prior to launching.
- .6 Where necessary means shall be provided for bringing the davit-launched survival craft against the ship's side and holding them alongside so that persons can safely embark.

NEW CLASS B, C AND D SHIPS:

- .7 If a survival craft launching arrangement does not allow embarkation into the survival craft before it is on the water and the height from the embarkation station to the water is more than 4,5 metres above the waterline in the lightest seagoing condition, an

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approved type of MES (Marine Evacuation System) complying with section 6.2 of the LSA Code shall be installed.

On ships fitted with a marine evacuation system communication between the embarkation station and the platform of the survival craft shall be ensured.

- .8 There shall be at least one embarkation ladder, complying with the requirements of paragraph 6.1.6 of the LSA Code on each side of the ship; the Administration of the flag State may exempt a ship from this requirement provided that, in all undamaged and prescribed damage conditions of trim and heel, the freeboard between the intended embarkation position and the waterline is not more than 1,5 metres.

5-1 Requirements for ro-ro passenger ships (R 26)

CLASS B, C AND D RO-RO SHIPS CONSTRUCTED BEFORE 1 JANUARY 2003:

- .1 Ro-ro passenger ships constructed before 1 January 2003 shall comply with the requirements of paragraphs .6.2, .6.3, .6.4, .7, .8 and .9 not later than the date of the first periodical survey after 1 January 2006.

Prior to this date, paragraphs .2, .3, .4 and .5 shall apply for ro-ro ships constructed before 1 January 2003.

Notwithstanding the above, when life-saving appliances or arrangements on such ships are replaced or such ships undergo repairs, alterations or modifications of a major character which involve replacement of, or any addition to, their existing life saving appliances or arrangements, such life-saving appliances or arrangements shall comply with the relevant requirements of paragraphs .6, .7, .8 and .9.

.2 Life-rafts

- .1 The ro-ro passenger ship's life-rafts shall be served by marine evacuation systems complying with SOLAS Regulation III/48.5, as amended, or launching appliances complying with SOLAS Regulation III/48.6, as amended, equally distributed on each side of the ship.

Communication between the embarkation station and the platform shall be ensured.

- .2 Every life-raft on ro-ro passenger ships shall be provided with float-free stowage arrangements complying with the requirements of SOLAS Regulation III/23, as amended.
- .3 Every life-raft on ro-ro passenger ships shall be of a type fitted with a boarding ramp complying with the requirements of SOLAS Regulation III/39.4.1 or SOLAS Regulation III/40.4.1, as amended.
- .4 Every life-raft on ro-ro passenger ships shall either be automatically self-righting or be a canopied reversible life-raft which is stable in a seaway and is capable of operating safely whichever way up it is floating. Open reversible life-rafts may be permitted if the Administration of the flag State considers this appropriate in view of the sheltered nature of the voyage and the favourable climatic conditions of the area and period of operation, and provided that such life-rafts entirely comply with the requirements of Annex 10 to the High-Speed Craft Code.

Alternatively, the ship shall carry automatically self-righting life-rafts or canopied reversible life-rafts in addition to its normal complement of life-rafts, of such aggregate capacity as will accommodate at least 50 % of the persons not accommodated in lifeboats. This additional life-raft capacity shall be determined on the basis of the difference between the total number of

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persons on board and the number of persons accommodated in lifeboats. Every such life-raft shall be approved by the Administration of the flag State having regard to the recommendations adopted by the IMO with MSC/Circ. 809.

.3 Fast rescue boats

.1 At least one of the rescue boats on a ro-ro passenger ship shall be a fast rescue boat approved by the administration of the flag State having regard to the recommendations adopted by the IMO by MSC/Circ. 809.

.2 Each fast rescue boat shall be served by a suitable launching appliance approved by the Administration of the flag State. When approving such appliances, the Administration of the flag State shall take into account that the fast rescue boat is intended to be launched and retrieved even under severe adverse weather conditions, and also have regard to the recommendations adopted by the IMO.

.3 At least two crews of each fast rescue boat shall be trained and drilled regularly having regard to section A-VI/2, table A-VI/2-2 'Specification of the minimum standard of competence in fast rescue boats' of the Seafarers Training, Certification and Watchkeeping (STCW) Code and the recommendations adopted by the IMO by Resolution A.771(18). The training and drills shall include all aspects of rescue, handling, manoeuvring, operating these craft in various conditions, and righting them after capsizing.

.4 In the case where the arrangement or size of an existing ro-ro passenger ship is such as to prevent the installation of the fast rescue boat required by paragraph .3.1, the fast rescue boat may be installed in place of an existing lifeboat which is accepted as a rescue boat or boat for use in an emergency, provided that all of the following conditions are met:

.1 the fast rescue boat installed is served by a launching appliance complying with the provisions of paragraph .3.2;

.2 the capacity of the survival craft lost by the above substitution is compensated by the installation of life-rafts capable of carrying at least an equal number of persons served by the lifeboat replaced; and

.3 such life-rafts are served by the existing launching appliances or marine evacuation systems.

.4 Means of rescue

.1 Each ro-ro passenger ship shall be equipped with efficient means for rapidly recovering survivors from the water and transferring survivors from rescue units or survival craft to the ship.

.2 The means of transfer of survivors to the ship may be part of a marine evacuation system, or may be part of a system designed for rescue purposes.

These means shall be approved by the flag State having regard to the recommendations adopted by IMO with MSC/Circ. 810.

.3 If the slide of a marine evacuation system is intended to provide the means of transfer of survivors to the deck of the ship, the slide shall be equipped with handlines or ladders to aid in climbing up the slide.

.5 Life jackets

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.1 Notwithstanding the requirements of SOLAS Regulations III/7.2 and III/22.2, as amended, a sufficient number of life jackets shall be stowed in the vicinity of the assembly stations so that passengers do not have to return to their cabins to collect their life jackets.

.2 In ro-ro passenger ships, each life jacket shall be fitted with a light complying with the requirements of SOLAS Regulation III/32.2, as amended.

CLASS B, C AND D RO-RO SHIPS CONSTRUCTED AFTER 1 JANUARY 2003

.6 Life-rafts

.1 The ro-ro passenger ship's life-rafts shall be served by marine evacuation systems complying with section 6.2 of the LSA Code or launching appliances complying with paragraph 6.1.5 of the LSA Code equally distributed on each side of the ship.

Communication between the embarkation station and the platform shall be ensured.

.2 Every life-raft on ro-ro passenger ships shall be provided with float-free stowage arrangements complying with the requirements of SOLAS Regulation III/13.4. as amended.

.3 Every life-raft on ro-ro passenger ships shall be of a type fitted with a boarding ramp complying with the requirements of paragraph 4.2.4.1 or 4.3.4.1 of the LSA Code as appropriate.

.4 Every life-raft on ro-ro passenger ships shall either be automatically self-righting or be a canopied reversible life-raft which is stable in a seaway and is capable of operating safely whichever way up it is floating. Open reversible life-rafts may be permitted if the administration of the flag State considers this appropriate in view of the sheltered nature of the voyage and the favourable climatic conditions of the area and period of operation, and provided that such life-rafts entirely comply with the requirements of Annex 10 to the High-Speed Craft Code.

Alternatively, the ship shall carry automatically self-righting life-rafts or canopied reversible life-rafts in addition to its normal complement of life-rafts, of such aggregate capacity as will accommodate at least 50 % of the persons not accommodated in lifeboats. This additional life-raft capacity shall be determined on the basis of the difference between the total number of persons on board and the number of persons accommodated in lifeboats. Every such life-raft shall be approved by the administration of the flag State having regard to the recommendations adopted by the IMO, with MSC/Circ. 809.

.7 Fast rescue boats

.1 At least one of the rescue boats on a ro-ro passenger ship shall be a fast rescue boat approved by the administration of the flag State having regard to the recommendations adopted by the IMO, with MSC Circ./809.

.2 Each fast rescue boat shall be served by a suitable launching appliance approved by the administration of the flag State. When approving such appliances, the administration of the flag State shall take into account that the fast rescue boat is intended to be launched and retrieved even under severe adverse weather conditions, and also have regard to the recommendations adopted by the IMO.

.3 At least two crews of each fast rescue boat shall be trained and drilled regularly having regard to section A-VI/2, table A-VI/2-2 'Specification of the minimum standard of competence in fast rescue boats' of the Seafarers Training, Certification

and Watchkeeping (STCW) Code and the recommendations adopted by the IMO by Resolution A.771(18). The training and drills shall include all aspects of rescue, handling, manoeuvring, operating these craft in various conditions, and righting them after capsize.

.4 In the case where the arrangement or size of an existing ro-ro passenger ship is such as to prevent the installation of the fast rescue boat required by paragraph .3.1, the fast rescue boat may be installed in place of an existing lifeboat which is accepted as a rescue boat or boat for use in an emergency, provided that all of the following conditions are met:

.1 the fast rescue boat installed is served by a launching appliance complying with the provisions of paragraph .3.2;

.2 the capacity of the survival craft lost by the above substitution is compensated by the installation of life-rafts capable of carrying at least an equal number of persons served by the lifeboat replaced; and

.3 such life-rafts are served by the existing launching appliances or marine evacuation systems.

.8 Means of rescue

.1 Each ro-ro passenger ship shall be equipped with efficient means for rapidly recovering survivors from the water and transferring survivors from rescue units or survival craft to the ship.

.2 The means of transfer of survivors to the ship may be part of a marine evacuation system, or may be part of a system designed for rescue purposes.

These means shall be approved by the flag State having regard to the recommendations adopted by IMO with MSC/Circ. 810.

.3 If the slide of a marine evacuation system is intended to provide the means of transfer of survivors to the deck of the ship, the slide shall be equipped with handlines or ladders to aid in climbing up the slide.

.9 Life jackets

.1 Notwithstanding the requirements of SOLAS Regulations III/7.2 and III/22.2, as amended, a sufficient number of life jackets shall be stowed in the vicinity of the assembly stations so that passengers do not have to return to their cabins to collect their life jackets.

.2 In ro-ro passenger ships, each life jacket shall be fitted with a light complying with the requirements of paragraph 2.2.3 of the LSA Code.

5-2 Helicopter landing and pick-up areas (R 28)

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

.1 Existing ro-ro passenger ships shall comply with the requirements of paragraph .2 of this regulation not later than the date of the first periodical survey after 1 July 1998.

.2 Ro-ro passenger ships shall be provided with a helicopter pick-up area approved by the Administration of the flag State having regard to the recommendations adopted by the IMO in Resolution A.229(VII).

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- .3 New ro-ro passenger ships of class B, C and D of 130 metres and upwards in length shall be fitted with a helicopter landing area approved by the Administration of the flag State having regard to the recommendations adopted by the IMO.

5-3 Decision support system for masters (R 29)

NEW AND EXISTING CLASS B, C AND D SHIPS:

- .1 Existing ships shall comply with the requirements of this regulation not later than the date of the first periodical survey after 1 July 1999.
- .2 In all ships, a decision support system for emergency management shall be provided on the navigation bridge.
- .3 The system shall, as a minimum, consist of a printed emergency plan or plans. All foreseeable emergency situations shall be identified in the emergency plan or plans, including but not limited to, the following main groups of emergencies:
- .1 fire;
- .2 damage to ship;
- .3 pollution;
- .4 unlawful acts threatening the safety of the ship and the security of its passengers and crew;
- .5 personnel accidents; and
- .6 cargo-related accidents;
- .7 emergency assistance to other ships.
- .4 The emergency procedures established in the emergency plan or plans shall provide decision support to masters for handling any combination of emergency situations.
- .5 The emergency plan or plans shall have a uniform structure and be easy to use. Where applicable, the actual loading condition as calculated for the ship's voyage stability shall be used for damage control purposes.
- .6 In addition to the printed emergency plan or plans the Administration of the flag State may also accept the use of a computer-based decision-support system on the navigation bridge which provides all the information contained in the emergency plan or plans, procedures, check lists, etc., which is able to present a list of recommended actions to be carried out in foreseeable emergencies.

6 Launching stations (R 12)

NEW AND EXISTING CLASS B, C AND D SHIPS:

Launching stations shall be in such positions as to ensure safe launching having particular regard to clearance from the propeller and steeply overhanging portions of the hull, and so that survival craft can be launched down the straight side of the ship. If positioned forward they shall be positioned abaft the collision bulkhead, in a sheltered position.

7 Stowage of survival craft (R 13 + 24)

NEW AND EXISTING CLASS B, C AND D SHIPS:

- .1 Each survival craft shall be stowed:

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- a. so that neither the survival craft nor its stowage arrangements will interfere with other survival craft launching operations;
 - b. as near to the water surface as is safe and practicable; for a davit-launched survival craft the height of the davit head, with the survival craft in embarkation position, shall, as far as practicable, not exceed 15 metres to the waterline when the ship is in its lightest seagoing condition, and the position of a davit launched survival craft in the embarkation position shall be such that it stays clear of the waterline with the ship in the fully loaded condition under unfavourable conditions of trim of up to 10 ° and listed up to 20 ° either way for new ships, respectively up to at least 15 ° either way for existing ships, or to the angle at which the ship's weatherdeck becomes submerged, whichever is less;
 - c. in a state of continuous readiness so that two crew members can prepare it for embarkation and launching within 5 minutes;
 - d. as far forward of the propeller as is practicable; and
 - e. fully equipped, as required by the relevant SOLAS regulations, as amended, except that additional life-rafts as defined in note 3 to the table of Regulation III/2 may be exempted from some of the SOLAS requirements for equipment as mentioned in this note;
- .2 Lifeboats shall be stowed attached to launching appliances, and on passenger ships of 80 metres in length and upwards, each lifeboat shall be so stowed that the after end of the lifeboat is not less than 1,5 times the length of the lifeboat forward of the propeller.
- .3 Every life-raft shall be stowed:
- a. with its painter attached to the ship;
 - b. with a float-free arrangement, complying with the requirements of paragraph 4.1.6 of the LSA Code enabling the life-raft to float free and, if inflatable, to inflate automatically when the ship sinks. One float-free arrangement may be used for two or more life-rafts if the float-free arrangement is sufficient to comply with the requirements of paragraph 4.1.6 of the LSA Code;
 - c. so as to permit manual release from its securing arrangements.
- .4 Davit-launched life-rafts shall be stowed within reach of the lifting hooks, unless some means of transfer is provided which is not rendered inoperable within the limits of trim of up to 10 ° and list up to 20 ° either way for new ships, respectively up to at least 15 ° either way for existing ships, or by ship motion or power failure.
- .5 Life-rafts intended for throw-overboard launching shall be so stowed as to be in a position providing easy side to side transfer at a single open deck level. If this stowing arrangement cannot be met additional life-rafts shall be provided so that the total capacity available on each side will accommodate 75 % of the total number of persons on board.
- .6 Life-rafts associated with a Marine Evacuation System (MES) shall:
- a. be stowed close to the container containing the MES;
 - b. be capable of release from its stowage rack with arrangements which will enable it to be moored and inflated alongside the boarding platform;
 - c. be capable of release as an independent survival craft; and

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d. be provided with retrieving lines to the boarding platform.

8 **Stowage of rescue boats (R 14)**

NEW AND EXISTING CLASS B, C AND D SHIPS:

Rescue boats shall be stowed:

- .1 in a state of continuous readiness for launching in no more than 5 minutes;
- .2 in a position suitable for launching and recovery;
- .3 so that neither the rescue boat nor its stowage arrangements will interfere with the operation of any survival craft at any other launching station;
- .4 if it is also a lifeboat, in compliance with the requirements of Regulation 7.

8a **Stowage of marine evacuation systems (R 15)**

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

- .1 The shipside shall not have any openings between the embarkation station of the marine evacuation system and the waterline in the lightest seagoing condition and means shall be provided to protect the system from any projections.
- .2 Marine evacuation systems shall be in such position as to ensure safe launching having particular regard to clearance from the propeller and steeply overhanging positions of the hull and so that, as far as practicable, the system can be launched down the straight side of the ship.
- .3 Each marine evacuation system shall be stowed so that neither the passage nor the platform nor its stowage or operational arrangements will interfere with the operation of any other life-saving appliance at any other launching station.
- .4 Where appropriate, the ship shall be so arranged that the marine evacuation systems in their stowed positions are protected from damage by heavy seas.

9 **Survival craft launching and recovering arrangements (R 16)**

NEW AND EXISTING CLASS B, C AND D SHIPS:

- .1 Launching appliances complying with the requirements of section 6.1 of the LSA Code shall be provided for all survival craft and except:
 - .1 FOR EXISTING CLASS B, C AND D SHIPS:
 - a. survival craft which are boarded from a position on deck which is less than 4,5 metres above the waterline in the lightest seagoing condition and which either:
 - have a mass of not more than 185 kg, or
 - are stowed for launching directly from the stowed position under unfavourable conditions of trim of up to 10 ° and list up to at least 15 ° either way, or
 - b. survival craft which are carried in excess of the survival craft for 110 % of the total number of persons on board; or survival craft provided for use in conjunction with a marine evacuation system (MES) complying with the requirements of section 6.2 of the LSA Code and stowed for launching directly from the stowed position under unfavourable conditions of trim of up to 10 ° and list of up to 20 ° either way.
 - .2 FOR NEW CLASS B, C AND D SHIPS:

where, subject to survival craft and rescue boat embarkation arrangements being effective within the environmental conditions in which the ship is likely to operate and in all undamaged and prescribed damage conditions of trim and heel, the freeboard between the intended embarkation position and the waterline in the lightest seagoing condition is not more than 4,5 metres, the Administration of the flag State may accept a system where persons board life-rafts directly.

.2 Each lifeboat shall be provided with an appliance which is capable of launching and recovering the lifeboat.

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

In addition there shall be provision for hanging-off the lifeboat to free the release gear for maintenance.

.3 Launching and recovering arrangements shall be such that the appliance operator on the ship is able to observe the survival craft at all times during launching and for lifeboats during recovery.

.4 Only one type of release mechanism shall be used for similar survival craft carried on board the ship.

.5 Falls, where used, shall be long enough for survival craft to reach the water with the ship in its lightest seagoing condition, under unfavourable conditions of trim of up to 10 ° and list of up to 20 ° either way for new ships, respectively up to at least 15 ° either way for existing ships.

.6 Preparation and handling of survival craft at any one launching station shall not interfere with the prompt preparation and handling of any other survival craft or rescue boat at any other station.

.7 Means shall be available to prevent any discharge of water on survival craft during abandonment.

.8 During preparation and launching, the survival craft, its launching appliance, and the area of water into which it is to be launched shall be adequately illuminated by lighting supplied from the emergency source of electrical power required by Regulations II-1/D/3 and II-1/D/4.

10 **Rescue boat embarkation, launching and recovery arrangements (R 17)**

NEW AND EXISTING CLASS B, C AND D SHIPS:

.1 The rescue boat embarkation and launching arrangements shall be such that the rescue boat can be boarded and launched in the shortest possible time.

.2 The rescue boat shall be capable of being boarded and launched directly from the stowed position with the number of persons assigned to crew the rescue boat on board.

.3 If the rescue boat is included in the capacity of the survival craft and the other lifeboats are boarded from the embarkation deck the rescue boat shall, in addition to paragraph .2, also be capable of being boarded from the embarkation deck.

.4 Launching arrangements shall comply with the requirements of Regulation 9. However all rescue boats shall be capable of being launched, where necessary utilising painters, with the ship making headway at speeds up to 5 knots in calm water.

.5 Recovery time of the rescue boat shall be not more than 5 minutes in moderate sea conditions when loaded with its full complement of persons and equipment. If the rescue boat is included in the capacity of the survival craft, this recovery time shall be

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possible when loaded with its survival craft equipment and the approved rescue boat complement of at least 6 persons.

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

Rescue boat embarkation and recovery arrangements shall allow for safe and efficient handling of a stretcher case. Foul weather recovery strops shall be provided for safety if heavy fall blocks constitute a danger.

11 Emergency instructions (R 19)

NEW AND EXISTING CLASS B, C AND D SHIPS:

Whenever new passengers embark a passenger safety briefing shall be given immediately before or after departure. This briefing shall at least include the instructions required by Regulation III/3.3. It shall be made by means of an announcement in one or more languages likely to be understood by the passengers. The announcement shall be made on the ship's public address system or by other suitable means likely to be heard at least by the passengers who have not yet heard it during the voyage.

12 Operational readiness, maintenance and inspections (R 20)

NEW AND EXISTING CLASS B, C AND D SHIPS:

- .1 Before the ship leaves port and at all times during the voyage all life-saving appliances shall be in working order and ready for immediate use.
- .2 Maintenance and inspections of life-saving appliances shall be carried out in accordance with the requirements of SOLAS Regulation III/20, as amended.

13 Abandon ship training and drills (R 19 + R 30)

NEW AND EXISTING CLASS B, C AND D SHIPS:

- .1 Every crew member with assigned emergency duties shall be familiar with these duties before the voyage begins.
- .2 An abandon ship drill and fire drill shall take place weekly.

Each member of the crew shall participate in at least one abandon ship drill and one fire drill every month. The drills of the crew shall take place before departure of the ship if more than 25 % of the crew have not participated in abandon ship and fire drills on board that particular ship in the previous month. When a ship enters into service for the first time, after modification of a major character or when a new crew is engaged, the above mentioned drills shall be held before sailing.

- .3 Each abandon ship drill shall include the actions required in SOLAS Regulation III/19.3.3.1, as amended.
- .4 Lifeboats and rescue boats shall be lowered at successive drills in accordance with the provision of SOLAS Regulation III/19.3.3.2, 3.3.3, 3.3.6, and 3.3.7, as amended.

The Administration of the flag State may allow ships not to launch the lifeboats on one side if their berthing arrangements in port and their trading patterns do not permit launching of lifeboats on that side. However, all such lifeboats shall be lowered at least once every 3 months and launched at least annually.

- .5 If a ship is fitted with marine evacuation systems drills shall include the actions required in SOLAS Regulation III/19.3.3.8, as amended.

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- .6 Emergency lighting for assembling and abandonment shall be tested at each abandon ship drill.
- .7 Fire drills shall be carried out in accordance with the provisions of SOLAS Regulation III/19.3.4, as amended.
- .8 On-board training and instructions shall be given to crew members in accordance with the provisions of SOLAS Regulation III/19.4, as amended.

ANNEX II

FORM OF PASSENGER SHIP SAFETY CERTIFICATE PASSENGER SHIP SAFETY CERTIFICATE

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(Official seal)	(State)								
Issued under the provisions of the									
..... (name of the relevant measure(s) introduced by the Flag State)									
and confirming compliancy of the vessel named hereafter with the provisions of Directive 2009/45/EC of the European Parliament and of the Council on safety rules and standards for passenger ships									
under the authority of the Government of									
..... (full official designation of the Flag State)									
by									
..... (full official designation of the competent organisation recognised under the provisions of Council Directive 94/57/EC)									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Name of the ship</th> <th style="width: 33%;">Distinctive numbers or letters</th> <th style="width: 33%;">Port of registry</th> <th style="width: 33%;">Number of passengers</th> </tr> </thead> <tbody> <tr> <td style="height: 20px;"> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		Name of the ship	Distinctive numbers or letters	Port of registry	Number of passengers				
Name of the ship	Distinctive numbers or letters	Port of registry	Number of passengers						
IMO number ⁽¹⁾ :									
Length:									
Date on which the keel was laid or ship was at a similar stage of construction:									
Date of initial survey:									
Class of ship in accordance with the sea area in which the ship is certified to operate: A / B / C / D ⁽²⁾									
subject to following restrictions or additional requirements ⁽³⁾ :									
.....									
<p>⁽¹⁾ IMO ship identification number in accordance with Resolution A.600(15), if any.</p> <p>⁽²⁾ Delete as appropriate.</p> <p>⁽³⁾ Record of any restriction applicable by reason of either the route, area of operation or restricted period of operation or any additional requirement due to specific local circumstances.</p>									

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(Reverse of certificate)

Initial survey

This is to certify,

1. that the ship has been surveyed in accordance with Article 12 of Directive 2009/45/EC of the European Parliament and of the Council
2. that the survey showed that the ship fully complies with the requirements of Directive 2009/45/EC
3. that the ship is, under the authority conferred by Article 9(3) of Directive 2009/45/EC, exempted from the following requirements of the Directive:

.....

Conditions, if any, on which the exemptions are granted:

.....

4. that the following subdivision load lines have been assigned:

Subdivision load lines assigned and marked on the ship's side at amidships (Regulation II-1/B/11)	Freeboard (in mm)	Remarks with regard to alternative service conditions:
C.1 ⁽¹⁾		
C.2		
C.3		

This certificate is valid until (date of next renewal survey) in accordance with Article 12 of Directive 2009/45/EC

Issued at on
 (Place of issue of certificate) (Date of issue)

.....
 (Signature of official issuing the certificate)

and/or

(Seal of issuing authority)

If signed, the following paragraph is to be added:

The undersigned declares that he is duly authorised by the said Flag State to issue this Passenger Ship Safety Certificate.

.....
 (Signature)

⁽¹⁾ 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 distinguish them from the international subdivision load line notations.

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(Next page of certificate)

Periodical surveys

This is to certify that a periodical survey as required by Article 12 of Directive 2009/45/EC of the European Parliament and of the Council carried out and that the survey showed that the ship was found to comply with all the relevant requirements of Directive 2009/45/EC

Place Date

.....
(Signature and/or seal of issuing authority)

Place Date

.....
(Signature and/or seal of issuing authority)

Place Date

.....
(Signature and/or seal of issuing authority)

Place Date

.....
(Signature and/or seal of issuing authority)

Place Date

.....
(Signature and/or seal of issuing authority)

ANNEX III

GUIDELINES FOR SAFETY REQUIREMENTS FOR PASSENGER SHIPS AND HIGH-SPEED PASSENGER CRAFT FOR PERSONS WITH REDUCED MOBILITY(as referred to in Article 8)

In applying the guidelines of this Annex, Member States shall follow the IMO circular MSC/735 of 24 June 1996 entitled 'Recommendation on the design and operation of passenger ships to respond to elderly and disabled persons' needs'.

1. ACCESS TO THE SHIP

The ships should be constructed and equipped in such a way that a person with reduced mobility can embark and disembark easily and safely, and can be ensured access between decks, either unassisted or by means of ramps, elevators or lifts. Directions to such access should be posted at the other accesses to the ship and at other appropriate locations throughout the ship.

2. SIGNS

Signs provided on a ship to aid passengers should be accessible and easy to read for persons with reduced mobility, (including persons with sensory disabilities), and be positioned at key points.

3. MEANS TO COMMUNICATE MESSAGES

The operator should have the means onboard the vessel visually and verbally to provide announcements, such as those regarding delays, schedule changes and on-board services, to persons with various forms of reduced mobility.

4. ALARM

The alarm system and alarm buttons must be designed so as to be accessible by and to alert all passengers with reduced mobility, including persons with sensory disabilities and persons with learning disabilities.

5. ADDITIONAL REQUIREMENTS ENSURING MOBILITY INSIDE THE SHIP

Handrails, corridors and passageways, doorways and doors shall accommodate the movement of a person in a wheelchair. Elevators, vehicle decks, passenger lounges, accommodation and washrooms shall be designed in order to be accessible in a reasonable and proportionate manner to persons with reduced mobility.

ANNEX IV

PART A

REPEALED DIRECTIVE WITH LIST OF ITS SUCCESSIVE AMENDMENTS

(referred to in Article 17)

Council Directive 98/18/EC (OJ L 144, 15.5.1998, p. 1)	
Commission Directive 2002/25/EC (OJ L 98, 15.4.2002, p. 1)	

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Directive 2002/84/EC of the European Parliament and of the Council (OJ L 324, 29.11.2002, p. 53)	only Article 7
Directive 2003/24/EC of the European Parliament and of the Council (OJ L 123, 17.5.2003, p. 18)	
Commission Directive 2003/75/EC (OJ L 190, 30.7.2003, p. 6)	

PART B

LIST OF TIME-LIMITS FOR TRANSPOSITION
INTO NATIONAL LAW AND APPLICATION

(referred to in Article 17)

Directive	Time-limit for transposition	Date of application
98/18/EC	1 July 1998	
2002/25/EC	15 October 2002	1 January 2003, unless otherwise specified in the Annex to the Directive
2002/84/EC	23 November 2003	
2003/24/EC	16 November 2004	
2003/75/EC	31 January 2004	

ANNEX V

CORRELATION TABLE

Directive 98/18/EC	This Directive
Article 1	Article 1
Article 2 introductory words	Article 2 introductory words
Article 2(a)	Article 2(a)
Article 2(b)	Article 2(b)
Article 2(c)	Article 2(c)
Article 2(d)	Article 2(d)
Article 2(e)	Article 2(e)
Article 2(ea)	Article 2(f)
Article 2(f) introductory words	Article 2(g) introductory words
Article 2(f) first indent	Article 2(g)(i)

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Article 2(f) second indent	Article 2(g)(ii)
Article 2(g)	Article 2(h)
Article 2(h)	Article 2(i)
Article 2(ha)	Article 2(j)
Article 2(i)	Article 2(k)
Article 2(j)	Article 2(l)
Article 2(k)	Article 2(m)
Article 2(l)	Article 2(n)
Article 2(m)	Article 2(o)
Article 2(n)	Article 2(p)
Article 2(o)	Article 2(q)
Article 2(p)	Article 2(r)
Article 2(q)	Article 2(s)
Article 2(r)	Article 2(t)
Article 2(s)	Article 2(u)
Article 2(t)	Article 2(v)
Article 2(u)	Article 2(w)
Article 2(v)	Article 2(x)
Article 2(w)	Article 2(y)
Article 3(1)	Article 3(1)
Article 3(2) introductory words	Article 3(2) introductory words
Article 3(2)(a) introductory words	Article 3(2)(a) introductory words
Article 3(2)(a) first to seventh indent	Article 3(2)(a)(i) to (vii)
Article 3(2)(b) introductory words	Article 3(2)(b) introductory words
Article 3(2)(b) first to third indent	Article 3(2)(b)(i) to (iii)
Articles 4 to 6	Articles 4 to 6
Article 6a	Article 7
Article 6b	Article 8
Article 7(1) to (3)	Article 9(1) to (3)
Article 7(4) introductory sentence	Article 9(4) first subparagraph
Article 7(4)(a)	Article 9(4) second subparagraph
Article 7(4)(b)	Article 9(4) third subparagraph
Article 7(4)(c)	Article 9(4) fourth subparagraph
Article 7(4)(d)	Article 9(4) fifth subparagraph

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Article 7(4)(e)	Article 9(4) sixth subparagraph
Article 7(5)	Article 9(5)
Article 8 first paragraph introductory words	Article 10(1) introductory words
Article 8 first paragraph, point (a)(i)	Article 10(1)(a)
Article 8 first paragraph, point (a)(ii)	Article 10(1)(b)
Article 8 first paragraph, point (a)(iii)	Article 10(1)(c)
Article 8 first paragraph, point (a)(iv)	Article 10(1)(d)
Article 8 first paragraph, final words	Article 10(1) introductory words
Article 8 first paragraph, point (b) introductory words	Article 10(2) introductory words
Article 8 first paragraph, point (b)(i)	Article 10(2)(a)
Article 8 first paragraph, point (b)(ii)	Article 10(2)(b)
—	Article 10(3)
Article 8 second paragraph	Article 10(4)
Article 9(1) and (2)	Article 11(1) and (2)
—	Article 11(3)
Article 9(3)	—
Article 10	Article 12
Article 11	Article 13
Article 12 introductory wording and 12(1) introductory sentence	Article 14(1) introductory sentence
Article 12 first paragraph (1)(a) and (b)	Article 14(1)(a) and (b)
Article 12 first paragraph (2) first sentence	Article 14(2) first subparagraph
Article 12 first paragraph (2) second sentence	Article 14(2) second subparagraph
Article 13	Article 15
Article 14(1) and (2)	—
Article 14(3)	Article 16
—	Article 17
Article 15	Article 18
Article 16	Article 19
Annex I	Annex I
Annex II	Annex II
Annex III	Annex III
—	Annex IV
—	Annex V

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- (1) 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) Refer to the Code on Noise Levels on Board Ships, adopted by IMO Assembly Resolution A.468 (XII).
- (3) Reference is made to the recommendations published by the International Electrotechnical Commission and, in particular, Publication 92 – Electrical Installations in Ships.