STATUTORY INSTRUMENTS

1980 No. 535

MERCHANT SHIPPING

The Merchant Shipping (Passenger Ship Construction) Regulations 1980

Made - - -	*17th April* 1980
Laid before Parliament	*2nd May* 1980
Coming into Operation	*25th May* 1980

LONDON
HER MAJESTY'S STATIONERY OFFICE

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ARRANGEMENT OF REGULATIONS

PART I—GENERAL

Regulation No.

PART II

WATERTIGHT SUBDIVISION

Regulation No.

The Secretary of State, after consulting with the persons referred to in section 22(2) of the Merchant Shipping Act 1979(a), in exercise of the powers conferred on him by subsection (l), paragraphs (*a*), (*d*), (*f*), (*g*), (*j*) and (*q*) of subsection (3) and subsection (4)(*a*), (5), (6)(*a*) and (*b*) of section 21 and by section 22(1)(*a*) and (*c*) of that Act and of all other powers enabling him in that behalf, hereby makes the following Regulations:

PART I—GENERAL

Citation, commencement, interpretation and revocation

1.—(1) These Regulations may be cited as the Merchant Shipping (Passenger Ship Construction) Regulations 1980 and shall come into operation on 25th May 1980.

(2) In these Regulations the following expressions have the following meanings respectively:

" 'A' Class Division" means a bulkhead or part of a deck which is:

(*a*) constructed of steel or other equivalent material;

(*b*) suitably stiffened;

(*c*) so constructed as to be capable of preventing the passage of smoke and flame to the end of the 60 minute standard fire test; and

(*d*) so insulated where necessary with suitable non-combustible materials that if the division is exposed to a standard fire test the average temperature on the unexposed side of the division shall not increase more than 139°C above the initial temperature nor shall the temperature at any one point, including any joint, rise more than 180°C above the initial temperature within the time listed below:

"A—60" standard	60	minutes
"A—30" ,,	30	,,
"A—15" ,,	15	,,
"A—0" ,,	0	,,

"Accommodation spaces" means:

(*a*) public spaces;

(*b*) corridor and lobbies;

(*c*) stairways;

(a) 1979 c. 39.

(*d*) lavatories;

(*e*) cabins;

(*f*) offices;

(*g*) crew spaces;

(*h*) barber shops;

(*i*) pantries not containing cooking appliances;

(*j*) lockers;

(*k*) space similar to any of the foregoing and trunks to such space;

"Approved" means approved by the Secretary of State;

" 'B' Class Division" means a bulkhead, part of a deck, ceiling or lining which is:—

(*a*) so constructed as to be capable of preventing the passage of flame to the end of the first 30 minutes of the standard fire test;

(*b*) so constructed as to provide an insulation standard such that, if the division is exposed to a standard fire test, the average temperature on the unexposed side of the division shall not increase more than 139°C above the initial temperature, nor shall the temperature at any one point, including any joint, rise more than 225°C above the initial temperature within the time listed below:

"B—15" standard	15 minutes	
"B—0" „	0 „	; and

(*c*) constructed of suitable non-combustible materials and all materials whose use is necessary for or ancillary to its construction and erection shall be non-combustible;

"Breadth of the ship" means the greatest moulded breadth at or below the ship's deepest subdivision load water line;

"Bulkhead deck" means the uppermost deck up to which transverse watertight bulkheads are carried;

"Cargo space" in Parts V, VA and VC of these Regulations means space appropriated for cargo (including cargo oil tanks) and trunks leading to such spaces;

" 'C' Class division" means a bulkhead, ceiling or lining which is constructed of suitable non-combustible materials not being an 'A' Class division or a 'B' Class division;

"Continuous 'B' Class ceiling or lining" means a 'B' Class ceiling or lining which terminates only at an 'A' or 'B' Class division;

"Control room" means a room either within or outside a propelling machinery space from which propelling machinery and boilers may be controlled;

"Control stations" means spaces in which radio or main navigating equipment, or the emergency source of power, or the central fire recording equipment, or fire control equipment, or fire extinguishing installations are located, or a control room located outside a propelling machinery space;

"Crew space" means crew accommodation within the meaning of section 20 of the Merchant Shipping Act 1970(**a**);

"Criterion numeral" in relation to any ship means the criterion numeral of the ship determined in accordance with such provisions of Schedule 1 to these Regulations as apply to that ship;

(**a**) 1970 c. 36.

"Draught" means the vertical distance from the moulded base line amidships to a subdivision load waterline;

"Enclosed superstructure" has the same meaning as in the Merchant Shipping (Load Line) Rules 1968**(a)**;

"Equivalent material" where the words are used in the expression "steel or other equivalent material" means any material which, by itself or due to insulation provided, has structural and integrity properties equivalent to steel at the end of an appropriate fire test;

"Existing passenger ship" means a passenger ship which is not a new passenger ship;

"Factor of subdivision" in relation to any ship or portion thereof means the factor of subdivision determined in accordance with such of the provisions of Schedule 1 to these Regulations as apply to that ship or portion as the case may be;

"Floodable length" in relation to any portion of a ship at any draught means the maximum length of that portion having its centre at a given point in the ship which, at that draught and under such of the assumptions of permeability set forth in Schedule 1 to these Regulations as are applicable in the circumstances, can be flooded without submerging any part of the ship's margin line when the ship has no list;

"Freeboard deck" has the same meaning as in the Merchant Shipping (Load Line) Rules 1968;

"I.E.E. Regulations for the Electrical Equipment of Ships" means those Regulations issued by the Institute of Electrical Engineers dated September 1961;

"IMCO Resolution A265 (VIII)" means Resolution A265(VIII) adopted by the Inter-Governmental Maritime Consultation Organisation entitled "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";

"Independent power pump" means a pump operated by power otherwise than from the ship's main engines;

"International Standard" means a standard specification published by the International Organisation for Standardization, obtainable from the British Standards Institution;

"Length" in relation to a ship, except for the purposes of regulation 19(8); means the length of a ship measured between perpendiculars taken at the extremities of the deepest subdivision load water line;

"Machinery space" in every Part of these Regulations, other than Parts V, VA, VB, VC, and VD means any machinery space extending from the moulded base line of the ship to the margin line and between the extreme transverse watertight bulkheads bounding the spaces containing the main and auxiliary propelling machinery, boilers serving the needs of propulsion, when installed, and the permanent coal bunkers, if any;

"Machinery space" in Parts V, VA, VB, VC, VD of these Regulations means any machinery space of Category A and any other space 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;

(a) S.I. 1968/1053.

"Machinery space of Category A" means any space which contains:

(*a*) internal combustion type machinery used either for main propulsion purposes or for other purposes where such machinery has in the aggregate a total power output of not less than 373 kilowatts, or

(*b*) any oil fired boiler or oil fuel unit; and

any trunks to such spaces;

"Main circulating pump" means the pump installed for circulating water through the main condenser;

"Main vertical zones" means the main vertical zones into which the hull, superstructure and deck houses of a ship are divided in accordance with regulations 53, 69, 88 and 103 of these Regulations;

"Margin line" means a line drawn at least 76 millimetres below the upper surface of the bulkhead deck at the side of the ship and assumed for the purpose of determining the floodable length of the ship;

"Maximum service speed" means the greatest speed which the ship is designed to maintain at sea at her deepest seagoing draught;

"Merchant Shipping Notice" means a Notice described as such and issued by the Department of Trade;

"Mile" means a nautical mile of 1852 metres;

"Navigable speed" means the minimum speed at which a ship can be effectively steered in the ahead direction;

"New passenger ship" means a passenger ship the keel of which is laid, or which is at a similar stage of construction, on or after 25th May 1980 or a cargo ship which is converted to a passenger ship on or after that date;

"Non-combustible material" means material which when heated to a temperature of 750°C neither flames for longer than 10 seconds duration, nor raises either its internal temperature or the temperature of the test furnace more than 50°C above 750°C when tested in accordance with British Standard Specification 476: Part 4:1970 and the expression "combustible material" shall be construed accordingly;

"Oil fuel unit" means 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 greater than 1·8 bar gauge;

"Passenger" means any person carried in a ship except—

(*a*) a person employed or engaged in any capacity on board the ship on the business of the ship;

(*b*) a person on board the ship either in pursuance of the obligation laid upon the master to carry shipwrecked, distressed or other persons, or by reason of any circumstances that neither the master nor the owner nor the charterer (if any) could have prevented; and

(*c*) a child under one year of age;

"Passenger space" means a space provided for the use of passengers;

"Passenger ship" means a ship carrying more than 12 passengers and propelled by electricity or other mechanical power;

"Permeability" in relation to a space means the percentage of that space below the ship's margin line which, on the assumption that it is in use for the purpose for which it was appropriated, can be occupied by water;

"Permissible length" of a compartment having its centre at any point in the length of a ship means the product of the floodable length at that point and the factor of subdivision of the ship;

"Public spaces" includes halls, dining rooms, bars, smoke rooms, lounges, recreation rooms, nurseries, libraries and similar public permanently enclosed spaces;

"Radiotelegraph room" has the same meaning as in the Merchant Shipping (Radio Installations) Regulations 1980(a);

"Rooms containing furniture and furnishings of restricted fire risk" means rooms containing furniture and furnishings of restricted fire risk (whether cabins, public spaces, offices or other types of accommodation) in which:

(*a*) all case funiture such as desks, wardrobes, dressing tables, bureaux, dressers, is constructed entirely of approved non-combustible materials, except that a combustible veneer not exceeding 2 millimetres may be used on the working surface of such furniture;

(*b*) all free-standing furniture such as chairs, sofas, tables is constructed with frames of non-combustible materials;

(*c*) all draperies, curtains and other suspended textile materials have qualities of resistance to the propagation of flame in accordance with the requirement of Type 2 performance of British Standard 5867: Part 2;

(*d*) all carpet floor coverings have qualities of resistance to the propagation of flame to the satisfaction of the Secretary of State; and

(*e*) all exposed surfaces of bulkheads, linings and ceilings shall be such that a Class 1 or 2 surface spread of flame is not exceeded;

"Safety Convention ship" means a ship registered in a country to which the Safety of Life at Sea Convention of 1948 or of 1960 or of 1974 applies;

"Service space" includes galleys, pantries containing cooking appliances, lockers and storerooms, paint rooms, baggage rooms, workshops other than those forming part of machinery spaces, mail rooms and similar spaces and trunks to such spaces;

"Settling tank" means an oil storage tank having a heating surface of not less than 0·183 square metre per tonne of oil capacity;

"Special category space" means any enclosed space intended for the carriage of motor vehicles with fuel in their tanks for their propulsion, into and from which such vehicles can be driven and to which passengers have access;

"Standard fire test" means a test in which a specimen of the relevant "A" Class or "B" Class division, having an exposed surface area of not less than 4·65 square metres and a bulkhead height or deck length of 2·44 metres, resembling as closely as possible the intended construction and including where appropriate at least one joint, are exposed in a test furnace to a series of time temperature relationships approximately as follows:—

At the end of the first	5 minutes	538°C
,, ,, ,, ,, ,, ,,	10 ,,	704°C
,, ,, ,, ,, ,, ,,	30 ,,	843°C
,, ,, ,, ,, ,, ,,	60 ,,	927°C;

"Steering gear power unit" means:

(*a*) in the case of electric steering gear, the electric motor and its associated electrical equipment; or

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(a) S.I. 1980/529.

(*b*) in the case of electro-hydraulic steering gear, the electric motor, its associated electrical equipment and connected pump; or

(*c*) in the case of steam-hydraulic or pneumatic-hydraulic steering gear, the driving engine and connected pump;

"Subdivision load water line" means the waterline assumed in determining the subdivision of the ship in accordance with these Regulations;

"Suitable" in relation to material means approved by the Secretary of State as suitable for the purpose for which it is used;

"Summer load waterline" has the same meaning as in the Merchant Shipping (Load Line) Rules 1968;

"Surface spread of flame" means the surface spread of flame classified as Class 1, Class 2 or Class 3 within the meaning of British Standard 476: Part 7: 1971;

"Tons" means gross tons and the gross tonnage of a ship having alternative gross tonnages shall be taken to be the larger of those tonnages;

"United Kingdom ship" has the same meaning as in section 21(2) of the Merchant Shipping Act 1979;

"Watertight" in relation to a structure means capable of preventing the passage of water through the structure in any direction under a head of water up to the ship's margin line;

"Weathertight" in relation to a structure means capable of preventing the passage of sea water through the structure in ordinary sea conditions.

(3)(*a*) These Regulations apply to United Kingdom passenger ships: Provided that an existing passenger ship which undergoes repairs, alterations or modifications related thereto shall, as a minimum, comply with the Merchant Shipping (Passenger Ship Construction) Rules 1965(a) as if those Rules had not been revoked; but, to the extent that the Secretary of State is of the opinion that it is reasonable and practicable in the circumstances, any major repairs, alterations or modifications to such a ship shall comply with the requirements of these Regulations;

(*b*) other sea-going Safety Convention passenger ships while they are within the United Kingdom or the territorial waters thereof.

(4) The Merchant Shipping (Passenger Ship Construction) Rules 1965 are hereby revoked.

Exemptions for certain classes of ships and individual ships

2. The Secretary of State may exempt certain classes of ships or individual ships from the provisions of any of these Regulations, subject to such conditions as he may specify, and may alter or cancel any exemption so granted. In particular he may exempt—

(*a*) any existing ship, not being a ship converted on or after 25th May 1980 from the requirements of these Regulations to the extent that he is satisfied that compliance therewith is unreasonable or impracticable in the circumstances;

(*b*) any ship of Class II or II(A) (as defined in regulation 3 of these Regulations) which does not proceed more than 20 miles from the nearest land, from the requirements of these Regulations to the extent that he is

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(a) S.I. 1965/1103.

satisfied that compliance therewith is unreasonable or impracticable by reason of the sheltered nature and conditions of the intended services of the ship;

(*c*) any ship which is not normally engaged on international voyages but which, in exceptional circumstances is required to undertake a single international voyage, from any of the requirements of these Regulations: provided that she complies with safety requirements which in the opinion of the Secretary of State are adequate for the voyage which is to be undertaken by the ship;

(*d*) any ship which embodies features of a novel kind, from any of the requirements of these Regulations if the application might, in his opinion, seriously impede research into the development of such features and their incorporation in ships engaged on international voyages. Any such ship shall, however, comply with safety requirements which, in the opinion of the Secretary of State, are adequate for the service for which it is intended and are such as to ensure the overall safety of the ship;

(*e*) any ship of Class I or II (as defined in regulation 3 of these Regulations) employed in special trades for the carriage of large numbers of special trade passengers, such as the pilgrim trade, from any of the requirements of these Regulations : provided that she complies fully with the provisions of—

(i) the Final Act of the International Conference on Special Trade Passenger Ships 1971 (Cmnd. 5103), and

(ii) the Protocol on Space Requirements for Special Trade Passenger Ships 1973 (Cmnd. 5530).

Classification of ships

3.—(1) For the purposes of these Regulations United Kingdom passenger ships shall be arranged in Classes as follows:—

Ships engaged on international voyages

Class I. Ships engaged on voyages (not being short international voyages) any of which are long international voyages.

Class II. Ships engaged on voyages (not being long international voyages) any of which are short international voyages.

Ships not engaged on international voyages

Class II(A). Ships engaged on voyages of any kind other than international voyages.

Class III. Ships engaged only on voyages in the course of which they are at no time more than 70 miles by sea from their point of departure and not more than 18 miles from the coast of the United Kingdom, and which are at sea only in fine weather and during restricted periods.

Class IV. Ships engaged only on voyages in partially smooth waters, or voyages in smooth and partially smooth waters.

Class V. Ships engaged only on voyages in smooth waters.

Class VI. Ships engaged only on voyages with not more than 250 passengers on board, to sea, or in smooth or in partially smooth waters, in all cases in fine weather and during restricted periods, in the course of which the ships are at no time more than 15 miles, exclusive of any smooth waters, from their point of departure nor more than 3 miles from land.

Class VI(A). Ships carrying not more than 50 passengers for a distance of not more than 6 miles on voyages to or from isolated communities on the

islands or coast of Scotland and which do not proceed for a distance of more than 3 miles from land.

(2) For the purposes of this regulation the following expressions have the following meanings respectively:—

"Long international voyage" means an international voyage which is not a short international voyage within the meaning of the Merchant Shipping (Safety Convention) Act 1949(a);

"Partially smooth waters" means, as respects any period specified in Schedule 2 to the Merchant Shipping (Smooth and Partially Smooth Waters) Rules 1977(b) the waters of the areas specified in column 3 of that Schedule in relation to that period;

"Restricted period" means a period falling wholly within the following limits:—

(*a*) from the 1st April to 31st October, both dates inclusive; and

(*b*) between one hour before sunrise and one hour after sunset in the case of ships fitted with navigation lights conforming to the collision regulations and between sunrise and sunset in the case of any other ships;

"Sea" does not include any partially smooth waters;

"Smooth waters" means any waters not being the sea or partially smooth waters, and, in particular, means waters of any of the areas specified in column 2 of Schedule 2 to the Merchant Shipping (Smooth and Partially Smooth Waters) Rules 1977;

"Voyage" includes an excursion.

Structural strength

4. The structural strength of every ship to which these Regulations apply shall be sufficient for the service for which the ship is intended.

PART II

WATERTIGHT SUBDIVISION

Application of Part II

5. This Part of these Regulations applies to every ship to which these Regulations apply, not being an open or partially decked ship of Class V or a ship of Class VI carrying less than 101 passengers or a ship of Class VI(A):

Provided that a ship to which this Part of these Regulations applies which complies fully with all the equivalent requirements specified in IMCO Resolution A. 265(VIII) need not comply with the requirements of this Part of these Regulations.

Watertight subdivision

6. Every ship to which this Part of these Regulations applies shall be subdivided by bulkheads, which shall be watertight up to the bulkhead deck, into compartments the maximum length of which shall be calculated in accordance with such of the provisions of Schedule 1 to these Regulations as apply to that ship. Every other portion of the internal structure which affects the efficiency of the subdivision of the ship shall be watertight, and shall be of a design which will maintain the integrity of the subdivision.

(a) 1949 c. 43.
(b) S.I. 1977/252; the relevant amending instrument is S.I. 1978/801.

Peak and machinery space bulkheads, shaft tunnels, etc.

7.—(1) Every ship to which this Part of these Regulations applies shall be provided with a collision bulkhead which shall be watertight up to the bulkhead deck and shall be fitted at a distance from the ship's forward perpendicular of not less than 5 per cent of the length of the ship and not more than 3·05 metres plus 5 per cent of such length. If the ship has a forward superstructure, the collision bulkhead shall be extended weathertight to the deck next above the bulkhead deck. The extension shall not be required to be fitted directly over the bulkhead below, provided that it is at least 5 per cent of the length of the ship from the forward perpendicular and the part of the bulkhead deck which forms the step is made effectively weathertight. The plating and stiffeners of such extension shall be constructed in accordance with the provisions of Schedule 4 to these Regulations as if the extension formed part of a bulkhead immediately below the bulkhead deck.

(2) Every such ship shall be provided with a watertight afterpeak bulkhead and with watertight bulkheads dividing the space appropriated to the main and auxiliary propelling machinery, boilers, if any, and the permanent coal bunkers, if any, from other spaces. Such bulkheads shall be watertight up to the bulkhead deck, provided that the afterpeak bulkhead may be stopped below the bulkhead deck if the safety of the ship is not thereby impaired.

(3) The stern gland of every such ship shall be situated in a watertight shaft tunnel or other watertight space separate from the stern tube compartment and of such a volume that if the tunnel or space is flooded the margin line will not be submerged. The stern tube shall be enclosed in a watertight compartment, the volume of which shall be the smallest compatible with the proper design of the ship.

Double bottoms

8.—(1) Subject to the provisions of this regulation every ship of Classes I, II and II(A) shall be fitted with a watertight double bottom which shall be at least of the following extent:

(*a*) in ships of 50 metres but less than 61 metres in length, from the machinery space to the collision bulkhead or as near to that bulkhead as is practicable;

(*b*) in ships of 61 metres but less than 76 metres in length, from the collision bulkhead to the afterpeak bulkhead or as near to those bulkheads as is practicable, but not necessarily in the machinery space;

(*c*) in ships of 76 metres in length or over, from the collision bulkhead to the afterpeak bulkhead or as near to those bulkheads as is practicable.

(2) When a double bottom is required by this regulation to be fitted in a ship, its moulded depth in millimetres measured at the centre line shall be not less than 406 plus 4·17 times the length of ship in metres 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. The inner bottom shall be deemed to be adequate for this purpose if the line of intersection of the outer edge of the margin plate with the bilge plating is not lower at any point than a horizontal plane passing through the point of intersection with the frame line amidships of a transverse diagonal line inclined at 25 degrees to the base line and cutting it at a point one-half of the ship's moulded breadth from the centre line.

(3) Wells constructed in the double bottom for the purpose of drainage shall not be larger nor extend downwards more than is necessary for such purpose. The depth of the well shall in no case be more than the depth of the double

bottom at the centre line, less 457 millimetres, nor shall the well extend below the horizontal plane referred to in paragraph (2) of this regulation, provided that a well extending to the outer bottom may be constructed at the after end of a shaft tunnel.

(4) Wells for purposes other than drainage shall not be constructed in the double bottom. The Secretary of State may exempt any ship from the requirements of this paragraph in respect of any well which he is satisfied will not diminish the protection given by the double bottom.

(5) Nothing in this regulation shall require a double bottom to be fitted in way of watertight compartments of moderate size used exclusively for the carriage of liquids, if the safety of the ship will not be impaired in the event of bottom or side damage by reason of the absence of a double bottom in that position.

(6) The Secretary of State may exempt any ship of Class II or II(A) from the requirements of a double bottom in any portion of the ship which is subdivided by application of a factor of subdivision not exceeding ·5, if he is satisfied that the fitting of a double bottom in that portion of the ship would not be compatible with the design and proper working of the ship.

Stability information

9.—(1) Every ship on her completion shall be inclined and the elements of her stability determined. The master shall be supplied by the owner with reliable information relating to the stability of the ship in accordance with the following provisions of this regulation.

(2) Where any alterations are made to a ship so as materially to affect the stability information supplied to the master, amended stability information shall be provided. If necessary the ship shall be re-inclined.

(3) Stability information provided pursuant to paragraphs (1) and (2) shall be furnished in the form of a book which shall be kept on board at all times in the custody of the master. The information shall include particulars appropriate to the ship in respect of the matters specified in Schedule 2 to these Regulations and shall be in the form set out in that Schedule.

Intact stability

10.—(1) Every ship to which this Part of these Regulations applies shall, in all probable loading conditions, satisfy the following stability criteria after due correction for the effect of free surface of liquids in tanks.

(*a*) The area under the curve of righting levers (GZ curve) shall not be less than:—

(i) 0·055 metre-radian up to an angle of 30 degrees;

(ii) 0·09 metre-radian up to an angle of either 40 degrees or the angle at which the lower edges of any openings in the hull, superstructures or deckhouses, being openings which cannot be closed weathertight, are immersed if that angle be less;

(iii) 0·03 metre-radian between the angles of heel 30 degrees and 40 degrees or such lesser angle as is referred to in (ii).

(*b*) The righting lever (GZ) shall be at least 0·20 metre at an angle of heel equal to or greater than 30 degrees.

(*c*) The maximum righting lever (GZ) shall occur at an angle of heel not less than 30 degrees.

(*d*) The initial transverse metacentric height shall not be less than 0·15 metre.

(2) Where it is not possible, due to the particular design or operating conditions of a particular ship, to comply with the above criteria, the Secretary of State may permit the application of such alternative criteria as he is satisfied gives a standard of stability at least as effective as that specified in paragraph (1) of this regulation.

Stability in damaged condition

11.—(1)(*a*) In addition to the requirements of regulation 10 of these Regulations, every ship to which this Part of these Regulations applies shall be so constructed as to provide sufficient intact stability in all service conditions to enable the ship to withstand the final flooding of any one of the main compartments into which the ship is subdivided in accordance with the provisions of regulation 6 of these Regulations. If two of the main compartments, being adjacent to each other, are separated by a bulkhead which is stepped under the conditions of paragraph 6(3)(*a*) of Schedule 1 to these Regulations, the intact stability shall be adequate to withstand the final flooding of those two adjacent main compartments.

(*b*) Where in any such ship the factor of subdivision required under paragraph 4 or paragraph 9 of Schedule 1 to these Regulations is ·50 or less but more than ·33, the intact stability shall be adequate to withstand the final flooding of any two adjacent main compartments.

(*c*) Where in any such ship the factor of subdivision required under paragraph 4 of Schedule 1 to these Regulations is ·33 or less, the intact stability shall be adequate to withstand the final flooding of any three adjacent main compartments.

(2) For the purposes of this regulation the sufficiency of the intact stability of every such ship shall be determined in accordance with the provisions of Schedule 3 to these Regulations.

(3)(*a*) Every ship to which this Part of these Regulations applies shall be so constructed as to keep unsymmetrical flooding when the ship is in a damaged condition at the minimum consistent with efficient arrangements. If cross-flooding fittings are provided in any such ship the fittings shall, where practicable, be self-acting but in any case where controls to cross-flooding fittings are provided, they shall be capable of being operated from an accessible position above the bulkhead deck. Such fittings together with their controls as well as the maximum heel before equalisation shall be such as will not endanger the safety of the ship. The cross-flooding fittings shall be capable of reducing the heel within 15 minutes, sufficiently to meet the requirements of sub-paragraph (*b*) of paragraph 3 of Schedule 3 to these Regulations.

(*b*) If the margin line may become submerged during the flooding assumed for the purposes of the calculation referred to in Schedule 3 to these Regulations, the construction of the ship shall be such as will enable the master of the ship to ensure

(i) that the maximum angle of heel during any stage of such flooding will not be such as will endanger the safety of the ship; and

(ii) that the margin line will not be submerged in the final stage of flooding.

(4)(*a*) There shall be provided by the owner in every such ship a document for the use of the master of the ship containing information as to the use of any cross-flooding fittings provided in the ship.

(*b*) There shall be provided by the owner in every ship of Classes I, II and II(A) a document for the use of the master of the ship containing the following additional information:—

(i) information necessary for the maintenance of sufficient intact stability under service conditions to enable the ship to withstand damage to the extent referred to in Schedule 3 to these Regulations; and

(ii) information as to the conditions of stability on which the calculations of heel have been based, together with a warning that excessive heeling might result should the ship sustain damage when in a less favourable condition.

Ballasting

12. In every ship to which this Part of these Regulations applies, when ballasting with water is necessary, the water ballast shall not in general be carried in tanks intended for oil fuel. In ships in which it is not practicable to avoid putting water in oil fuel tanks, oily-water separator equipment to the satisfaction of the Secretary of State shall be fitted, or an alternative means acceptable to the Secretary of State shall be provided for disposing of the oily-water ballast.

Construction of watertight bulkheads, etc.

13.—(1) In every ship to which this Part of these Regulations applies every portion of the ship required by these Regulations to be watertight shall be constructed in accordance with such of the requirements of Schedule 4 to these Regulations as apply to it.

(2) In every such ship all tanks forming part of the structure of the ship and used for the storage of oil fuel or other liquids including double bottoms, peak tanks, settling tanks and bunkers shall be of a design and construction adequate for that purpose.

Openings in watertight bulkheads, etc.

14.—(1) In every ship of Classes I, II and II(A) the number of openings in bulkheads and other structures required by these Regulations to be watertight shall be the minimum compatible with the design and proper working of the ship.

(2) So far as practicable, trunks installed in connection with ventilation, forced draught or refrigeration systems in any such ship shall not pierce such bulkheads or structures.

(3) Every tunnel above the double bottom, if any, in such a ship whether for access from the crew space to the machinery space, for piping or for any other purpose, which passes through such a bulkhead shall be watertight. The means of access to at least one end of such tunnel, if it may be used as a passage at sea, shall be through a trunkway extending watertight to a height sufficient to permit access above the margin line. The means of access to the other end of the tunnel shall be through a watertight door. No tunnel shall extend through the first subdivision bulkhead abaft the collision bulkhead.

(4) Within spaces containing the main and auxiliary propelling machinery including boilers serving the needs of propulsion and all permanent bunkers, not more than one doorway, apart from the doorways to bunkers and shaft tunnels, may be fitted in each main transverse bulkhead. Where two or more shafts are fitted, the tunnels shall be connected by an inter-communicating passage. There shall be only one doorway between the machinery space and the tunnel spaces

where one or two shafts are fitted and only two doorways where there are more than two shafts. All such doorways shall be located so as to have their sills as high as practicable.

(5) Doorways, manholes and access openings shall not be fitted in the collision bulkhead below the margin line of any such ship or in any other bulkhead which is required by these Regulations to be watertight and which divides a cargo space from another cargo space or from a permanent or reserve bunker. Provided that the Secretary of State may permit any such ship to be fitted with doorways in bulkheads dividing two between-deck cargo spaces if he is satisfied that—

(*a*) the doorways are necessary for the proper working of the ship;

(*b*) the number of such doorways in the ship is the minimum compatible with the design and proper working of the ship, and they are fitted at the highest practicable level; and

(*c*) the outboard vertical edges of such doorways are situated at a distance as far as practicable from the ship's shell plating and in no case less than one-fifth of the breadth of the ship such distance being measured at right angles to the centre line of the ship at the level of the deepest subdivision load water line.

(6) In every ship of Classes I, II and II(A) bulkheads outside the spaces containing machinery which are required by these Regulations to be watertight shall not be pierced by openings which are capable of being closed only by portable bolted plates.

(7) In every ship of Classes III to VI, inclusive, to which this Part of these Regulations applies, bulkheads required by these Regulations to be watertight shall not be pierced by doorways, ventilation trunks or other similar openings.

(8)(*a*) In every ship to which this Part of these Regulations applies—

(i) valves and cocks not forming part of a pipe system shall not be fitted in any bulkhead required by these Regulations to be watertight;

(ii) if any such bulkhead is pierced by pipes, scuppers, electric cables or other similar fittings, provision shall be made which will ensure that the watertightness of the bulkhead is not thereby impaired;

(iii) 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 unless measures are taken to prevent the possibility of such deterioration.

(*b*) The collision bulkhead of such a ship shall not be pierced below the margin line by more than one pipe. Provided that if the forepeak in such a ship is divided to hold two different kinds of liquids the collision bulkhead may be pierced below the margin line by not more than two pipes. Any pipe which pierces the collision bulkhead of such a ship shall be fitted with a screw-down valve capable of being operated from above the bulkhead deck, the valve chest being secured to the forward side of the collision bulkhead.

Means of closing openings in watertight bulkheads, etc.

15.—(1) In every ship of Classes I, II and II(A) efficient means shall be provided for closing and making watertight all openings in bulkheads and other structures required by these Regulations to be watertight.

(2) Every door fitted to any such opening shall be a sliding watertight door. Provided that, in a ship of Class I, or in any ship of Class II or II(A) which is

not required to be subdivided in accordance with Part III of Schedule 1 to these Regulations hinged watertight doors may be fitted in the following positions:—

(*a*) in passenger, crew and working spaces above any deck the underside of which at its lowest point is at least 2·13 metres above the deepest subdivision load water line; and

(*b*) in any bulkhead, not being a collision bulkhead, which divides two cargo between-deck spaces.

(3) Sliding watertight doors may have a horizontal or vertical motion and shall be either:—

(*a*) hand operated only, or

(*b*) power operated, when so required by these Regulations, as well as hand operated.

(4) Hinged watertight doors fitted in accordance with sub-paragraph (*a*) of paragraph (2) of this regulation shall be fitted with catches, or similar quick action closing devices, capable of being worked from each side of the bulkhead in which the door is fitted.

(5) Where sliding watertight doors are fitted in the position referred to in sub-paragraph (*b*) of paragraph (2) of this regulation such doors shall not be fitted with remote control devices, and every watertight door which is fitted in such a position and which is accessible while the ship is at sea, shall be fitted with efficient locking arrangements.

(6) Every door required by these Regulations to be watertight shall be capable of being secured by means other than bolts and of being closed by means other than by gravity.

(7) In every ship of Classes I, II and II(A) watertight doors fitted in bulkheads between permanent and reserve bunkers, other than the doors referred to in regulation 14(4) of these Regulations, shall always be accessible.

Means of operating sliding watertight doors

16.—(1) If in any ship of Class I, II or II(A) which is not required to be subdivided in accordance with Part III of Schedule 1 to these Regulations, any sliding watertight door fitted in a bulkhead is in a position which may require it to be opened at sea and the sill thereof is below the deepest subdivision load water line, the following provisions shall apply:—

(*a*) when the number of such doors (excluding doors at entrances to shaft tunnels) exceeds five, all such doors and those at the entrances to shaft tunnels, ventilation, forced draught or similar ducts shall be power operated and shall be capable of being simultaneously closed from a single position situated on the navigating bridge;

(*b*) when the number of such doors (excluding doors at entrances to shaft tunnels) is greater than one, but does not exceed five,

(i) where the ship has no passenger spaces below the bulkhead deck, all such doors may be hand operated;

(ii) where the ship has passenger spaces below the bulkhead deck all such doors and those at the entrances to shaft tunnels, ventilation or forced draught or similar ducts, shall be power operated and shall be capable of being simultaneously closed from a single position situated on the navigating bridge;

(*c*) in any ship where there are only two such doors and they lead into or are within the space containing machinery, the Secretary of State may permit them to be hand operated only.

(2) Watertight doors the sills of which are above the deepest subdivision load water line and below the line specified in sub-paragraph (*a*) of regulation 15(2) shall be sliding doors and may be hand operated, except in vessels to which paragraph (3) of this regulation applies.

(3) In every ship of Class II or II(A) which is subdivided in accordance with Part III of Schedule 1 to these Regulations all sliding watertight doors shall be operated by power and shall be capable of being simultaneously closed from a single position situated on the navigating bridge. Provided that if in any such ship there is only one such door and it is in the space containing machinery it shall not be required to be operated by power.

(4) If in any ship of Class I, II or II(A) any sliding watertight doors which may be opened at sea for the purpose of trimming coal are fitted between bunkers in the between decks below the bulkhead deck, such doors shall be operated by power.

(5) If in any ship of Class I, II or II(A) a trunkway, being part of a refrigeration, ventilation or forced draught system, is carried through more than one transverse watertight bulkhead and the sills of the openings of such trunkways are less than 2·13 metres above the deepest subdivision load water line, the sliding watertight doors at such openings shall be operated by power.

(6)(*a*) If a sliding watertight door is required by these Regulations to be operated by power from a single position on the navigating bridge, the power system shall be so arranged that the door can also be operated by power at the door itself. The arrangement shall be such that the door will close automatically if opened at the door itself after being closed from the single position on the navigating bridge and will be capable of being kept closed at the door itself notwithstanding that an attempt may be made to open it from such single position. Handles for controlling the power system shall be provided at both sides of the bulkhead in which the door is situated and shall be so arranged that any person passing through the doorway is able to hold both handles in the open position simultaneously without being able to set the closing mechanism in operation accidentally.

(*b*) Watertight doors shall be capable of closing as expeditiously as possible, but the rate of closing shall not be so rapid as to be a danger to persons passing through the opening.

(7)(*a*) In every ship of Classes I, II and II(A) there shall be at least two independent sources of power for opening and closing all sliding watertight doors which are required by these Regulations to be operated by power, and each power unit shall be sufficient to operate simultaneously all such doors in the ship. The power shall be controlled from a single position on the navigating bridge, and there shall be provided at such position suitable indicators for checking that each of the two sources of power is capable of giving the required service satisfactorily.

(*b*) Where the sources of power are hydraulic, there shall be two pumps each of which shall be capable of closing all watertight doors in not more than 60 seconds. In addition, there shall be for the whole installation hydraulic accumulators of sufficient capacity to operate all such doors at least three times, that is to say from the open to the closed position, from the closed to the open position and from the open to the closed position. The fluid used shall be one which

does not freeze at any temperature liable to be encountered by the ship during her service.

(8) In every such ship every sliding watertight door which is operated by power shall be provided with efficient hand-operating gear having an all-round crank motion, or some other movement providing the same guarantee of safety, capable of being operated on each side of the door itself and at an accessible position above the bulkhead deck.

(9) In every such ship if a sliding watertight door is not required to be operated by power, it shall be provided with efficient hand-operating gear having an all-round crank motion, or some other movement providing the same guarantee of safety, capable of being operated on each side of the door itself and at an accessible position above the bulkhead deck.

(10) Where hand-operating gear is fitted in accordance with paragraphs (8) and (9) of this regulation, the Secretary of State may permit any door to be operated on one side only, if the requirements of the said paragraphs cannot be met owing to the layout of the spaces.

(11) (*a*) In every such ship the time necessary for the complete closure of any door by means of hand-operating gear with the vessel upright shall not exceed 90 seconds.

(*b*) The hand-operating gear shall be of such a design that the doors can be closed and opened from each of the required operating positions.

(12) In every such ship the hand-operating gear for operating the sliding watertight doors in the machinery space from above the bulkhead deck shall be placed outside the machinery space unless such a position is inconsistent with the efficient arrangement of the necessary gearing.

(13) In every such ship the means of operation of any watertight door, whether power operated or not, shall be capable of closing the door when the ship is listed to 15 degrees either way.

Watertight doors: signals and communications

17.—(1) Every sliding watertight door fitted in a ship of Class I, II or II(A) shall be connected with an indicator at each position from which the door may be closed, other than at the door itself, showing when the door is open and when it is closed.

(2) There shall be provided in connection with every such door which is operated by power a means of giving an audible warning signal at the door itself when the door is about to be closed. The arrangement shall be such that one movement of the operating handle at the position from which the door is about to be closed will be sufficient to sound the signal and to close the door, the signal preceding the movement of the door by an interval sufficient to allow the movement of persons and articles away from the door. The signal shall continue to sound until the door is completely closed.

(3) If any door required by these Regulations to be watertight is not capable of being operated from a single position on the navigating bridge, means of communication by telegraph, telephone or any other direct means shall be provided whereby the officer of the watch may communicate with the person responsible for the closing of the door.

Construction of watertight doors

18.—(1) Every door required by these Regulations to be watertight shall be of such design, material and construction as will maintain the integrity of the water tight bulkhead in which it is fitted. Any such door giving direct access to any space which may contain bunker coal shall, together with its frame, be made of cast or mild steel. Any such door in any other position shall, together with its frame, be made of cast or mild steel or cast iron.

(2) Every sliding watertight door shall be fitted with rubbing faces of brass or similar material which may be fitted either on the door itself or on the door frame, and which, if they are less than one inch in width, shall be fitted in recesses.

(3) If screw gear is used for operating such a door, the screw shall work in a nut of suitable metal which is resistant to corrosion.

(4) The frame of every vertically sliding watertight door shall have no groove at the bottom thereof in which dirt may lodge. The bottom of such a frame, if it is of skeleton form, shall be so arranged that dirt cannot lodge therein. The bottom edge of every such door shall be tapered or bevelled.

(5) Every vertically sliding watertight door which is operated by power shall be so designed and fitted that, if the power supply ceases, there shall be no danger of the door dropping.

(6) Every horizontally sliding watertight door shall be so installed as to prevent its moving if the ship rolls, and if necessary a clip or other suitable device shall be provided for that purpose. The device shall not interfere with the closing of the door when the door is required to be closed.

(7) The frame of every watertight door shall be properly fitted to the bulkhead in which the door is situated, and the jointing material between the frame and the bulkhead shall be of a type which will not deteriorate or be injured by heat.

(8) Every watertight door, being a coal-bunker door, shall be provided with screens or other devices to prevent coal from interfering with its closing.

Openings in the shell plating below the margin line

19—(1) In every ship to which this Part of these Regulations applies, the number of sidescuttles, scuppers, sanitary discharges and other openings in the shell below the margin line shall be the minimum which, in the opinion of the Secretary of State, is compatible with the design and proper working of the ship.

(2) The arrangements for closing every such opening below the margin line shall be consistent with its intended purpose and shall be such as will ensure watertightness.

Sidescuttles

(3)(*a*) In every ship of Classes I, II and II(A) the number of sidescuttles below the margin line which are capable of being opened shall be the minimum which, in the opinion of the Secretary of State, is compatible with the requirements of the proper operation of the ship.

(*b*) In every ship of Classes I, II, II(A) and III which is marked with a summer load line no side scuttle shall be fitted in a between-decks such that its sill will be below a line drawn parallel to the freeboard deck at its side and which has its lower point at a distance of either—

(i) 2·5 per cent of the breadth of the ship above the summer load waterline; or

(ii) 500 millimetres above the summer load waterline;

whichever is the greater.

Every sidescuttle in the between-decks of such a ship shall be either of a non-opening type or of an opening type fitted with locking arrangements approved by the Secretary of State.

(*c*) If, in the between-decks of any ship of Class II(A) which is not marked with a summer load line, the sill of any sidescuttle is below a line drawn parallel to the bulkhead deck at side and which has its lowest point at a distance of 2·5 per cent of the breadth of the ship above the deepest subdivision load waterline, every sidescuttle in that between-decks shall be of a non-opening type. If in a between-decks of such a ship all the sills of the sidescuttles are above the aforesaid line, every sidescuttle in that between-decks shall be either of a non-opening type or of an opening type fitted with approved locking arrangements. No sidescuttle shall be so fitted that its sill is below the deepest subdivision load waterline.

(*d*) In every ship of Classes III to VI inclusive all sidescuttles below the margin line shall be of the non-opening type.

(*e*) In every ship to which this regulation applies, each sidescuttle below the margin line shall be fitted with an efficiently hinged deadlight permanently attached so that it can be readily and effectively closed and secured watertight.

(*f*) In every ship to which this regulation applies, a sidescuttle shall not be fitted below the margin line to any space appropriated solely for the carriage of cargo or coal. If sidescuttles are fitted below the margin line to spaces appropriated to carry either cargo or passengers, such sidescuttles and their deadlights shall be fitted with approved locking arrangements.

(4) Automatic ventilating sidescuttles shall not be fitted below the margin line in the shell of any ship to which this regulation applies.

Inlets and discharges

(5)(*a*) In every ship each inlet and discharge led through the shell below the margin line shall be fitted with efficient and readily accessible means for preventing the accidental admission of water into the ship. Lead or other heat-sensitive materials shall not be used for pipes fitted outboard of shell valves in inlets or discharges or in any other place where the deterioration of such pipes in the event of fire would give rise to the danger of flooding.

(*b*) Each discharge led through the shell from any space below the margin line, not being a discharge in connection with machinery, shall be provided with either:

(i) one automatic non-return valve fitted at the shell of the ship and having positive means of closure from a position or positions above the bulkhead deck or, in a ship which is marked with a summer load line, from a position or positions above the freeboard deck, whichever is the higher. Such positions shall be readily accessible at all times under service conditions and the means of closure shall be provided in either case with an indicator showing whether the valve is open or closed; or

(ii) two automatic non-return valves having no positive means of closure in any ship which is marked with a summer load line and in which the vertical distance from the summer load waterline to the inboard end of the discharge pipe exceeds .01L, (where L is the length of the ship as defined in the Merchant Shipping (Load Lines) (Length of Ship) Regulations 1968(a)) and in any ship which is not marked with a

(a) S.I. 1968/1072.

summer load line. One such valve shall be situated as close to the ship's shell as practicable and substantially connected thereto and the inboard valve shall be situated above the deepest load waterline and in a position such that it will at all times under service conditions be readily accessible for examination.

(*c*) In every ship which is marked with a summer load line every discharge led through the shell below the margin line from any space above the margin line, being a space below the freeboard deck or from within any enclosed superstructure or from within any deckhouse on the freeboard deck which is fitted with weathertight doors, not being a discharge in connection with machinery, shall be fitted with either;

(i) one automatic non-return valve fitted in compliance with the requirements of sub-paragraph (*b*)(i); or

(ii) two automatic non-return valves fitted in compliance with the requirements of sub-paragraph (*b*)(ii); or

(iii) one automatic non-return valve having no positive means of closure in any ship where the vertical distance from the summer load waterline to the inboard end of the discharge pipe exceeds ·02L, (where L is the length of the ship as defined in the Merchant Shipping (Load Lines) (Length of Ship) Regulations 1968). Such valve shall be situated as close to the ship's shell as practicable and substantially connected thereto.

(*d*) In every ship which is marked with a summer load line every scupper and discharge originating at any level above that described in sub-paragraph (*c*) of this regulation and penetrating the shell of the ship either:

(i) more than 450 millimetres below the freeboard deck; or

(ii) less than 600 millimetres above the summer load waterline

shall be equipped with an automatic non-return valve situated as close to the ship's shell as practicable and substantially connected thereto:

Provided that this sub-paragraph shall not apply:—

(*aa*) where the scupper or discharge pipe is fitted with means for preventing water from passing inboard in accordance with the provisions of sub-paragraphs (*b*)(i) and (ii) or sub-paragraphs (*c*)(i), (ii) and (iii); or

(*bb*) in any case in which the piping of the scupper, or discharge pipe is of adequate thickness.

(*e*) In every ship all cocks and valves attached to inlets or discharges, other than inlets or discharges, connected with machinery, being cocks or valves fitted below the margin line or the failure of which may give rise to the danger of flooding, shall be made of steel, bronze or other equivalent material.

(*f*) In every ship inlets and discharges connected with main or auxiliary machinery shall be fitted with cocks or valves between the pipes and the shell of the ship or between the pipes and a box attached to the shell. The controls to such cocks and valves or of any bilge injection system shall be readily accessible at all times under service conditions and fitted with indicators to show whether the cock or valve is open or closed. All such cocks or valves attached to such inlets or discharges and all fittings outboard thereof shall be made of steel, bronze or other equivalent material. If made of steel, such cocks and valves shall be protected against corrosion.

(*g*) Discharge pipes led through the shell below the margin line of any ship of Classes I, II, II(A) and III shall not be fitted in a direct line between the outboard

opening and the connection with a deck, water closet or other similar fitting, but shall be arranged with bends or elbows of substantial metal other than cast iron or lead.

(*h*) In every ship all discharge pipes led through the shell below the margin line and the valves relating thereto shall be protected from damage.

(*i*) In every ship all bolts connecting cocks, valves, discharge pipes and other similar equipment to the shell plating below the margin line shall have their heads outside the shell and shall be either countersunk or cup-headed.

(*j*) In every ship efficient means shall be provided for the drainage of all watertight decks below the margin line and any drainage pipes shall be so fitted with valves or otherwise arranged as to avoid the danger of water passing from a damaged to an undamaged compartment.

(*k*) In every ship the inboard opening of every ash-shoot, rubbish-shoot and other similar shoot shall be fitted with an efficient watertight cover, and, if such opening is below the margin line, it shall also be fitted with an automatic non-return valve in the shoot in a readily accessible position above the ship's deepest subdivision load waterline. The valve shall be of the horizontal balanced type, and shall normally be kept closed and provided with local means for securing it in a closed position. The requirements of this sub-paragraph shall not apply to ash ejectors and expellers the inboard openings of which are in the ship's stokehold and below the deepest subdivision load waterline. Such ejectors and expellers shall be fitted with means which will prevent water entering the ship.

(*l*) (i) In every ship each gangway port, cargo port or coaling port fitted in the shell below the margin line shall be provided with a door or doors so fitted and designed as to ensure watertightness and structural integrity commensurate with the surrounding shell.

(ii) In every ship which is marked with a summer load line no such gangway port, cargo port or coaling port below the freeboard deck shall, unless the Secretary of State otherwise approves, to be so situated that the lower edge of the port or opening will be below a line drawn parallel to the freeboard deck at side and having as its lowest point the upper edge of the uppermost load line. In any ship which is not marked with a summer load line the lower edge of the port or opening shall in no case be below the deepest subdivision load waterline.

(6) The Secretary of State may exempt any ship of Classes IV to VI, inclusive, from the requirements of paragraph (5) of this regulation to the extent that he is satisfied that compliance therewith is unreasonable or impracticable in the circumstances.

Side and other openings above the margin line

20.—(1) In every ship, sidescuttles, windows, gangway ports, cargo ports, bunkering ports and other openings in the shell above the margin line and their means of closing shall be of efficient design and construction and of sufficient strength having regard to the spaces in which they are fitted and to their positions relative to the deepest subdivision load waterline and to the intended service of the ship.

(2) In every ship efficiently hinged deadlights, which can be easily closed and secured watertight, shall be provided for all sidescuttles to spaces below the first deck above the bulkhead deck and, in a ship which is marked with a summer load line, to all sidescuttles in an enclosed superstructure.

(3) In every ship which is marked with a summer load line, each discharge led through the shell above the margin line from a space below the freeboard deck or from within any enclosed superstructure or from within any deckhouse on the freeboard deck which is fitted with weathertight doors, shall be fitted in compliance with the requirements of regulation 19(5)(*b*)(i), (ii) or (*c*)(iii) of these Regulations with efficient means for preventing water from passing inboard.

Weather deck

21. In every ship to which this Part of these Regulations applies the bulkhead deck or a deck above the bulkhead deck shall be weathertight. All openings in an exposed weathertight deck shall have coamings of adequate height and strength and shall be provided with efficient and rapid means of closing so as to make 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.

Partial subdivision above the margin line

22. In every ship to which this Part of these Regulations applies all reasonable and practicable measures shall be taken to limit where necessary the entry and spread of water above the bulkhead deck, which measures may include partial bulkheads or webs. Where such partial watertight bulkheads and webs are fitted on the bulkhead decks, 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 heeled in a damaged condition. Where such partial watertight bulkheads do not coincide with the bulkheads below, the bulkhead deck between shall be made effectively watertight.

Subdivision load lines

23.—(1) Every ship shall be marked on its side amidships with the subdivision load lines assigned to it by the Secretary of State. The marks shall consist of horizontal lines 25 millimetres in breadth and 230 millimetres in length for any ship to which the Merchant Shipping (Load Lines) Act 1967**(a)** applies and 305 millimetres in length for any other ship. The marks shall be painted in white or yellow if the background is dark or in black if the background is light and, if the sides of the ship are of metal, they shall be cut in, centre punched or indicated by welded beads; if the sides of the ship are of wood, the marks shall be cut into the planking to a depth of not less than 3 millimetres; if the sides are of other materials to which the foregoing methods of marking cannot effectively be applied, the marks shall be permanently affixed to the sides of the ship by bonding or some other effective method.

(2) The subdivision load lines shall be identified with the letter C, and, in ships of Classes I and II, with consecutive numbers beginning from the deepest subdivision load line which shall be marked C_1. In ships of Classes II(A) to VI inclusive,

(*a*) if there is only one subdivision load line, it shall be identified with the letter C;

(*b*) if there is more than one subdivision load line, the subdivision load lines shall be identified with the letter C and with consecutive letters beginning from the deepest subdivision load line, which shall be marked CA.

The identifying letters and numerals shall in every case be painted and cut in or centre punched or indicated by welded beads or otherwise marked as appropriate, on the sides of the ship in the same manner as the lines to which they relate.

(a) 1967 c. 27.

(3) Ships which are assigned freeboards and are required to be marked with load lines under the Merchant Shipping (Load Line) Rules 1968 shall be marked as follows:—

(*a*) where the lowest of the ordinary load lines is higher on the ship's side than the deepest subdivision load line, the latter shall form part of the same marking, the vertical line of the grid being extended downwards as necessary to reach the lowest subdivision load line. The subdivision load line or lines shall appear on the after side of the vertical line;

(*b*) where the deepest subdivision load line coincides or nearly coincides with the fresh water line, the subdivision marking C_1 may be indicated on the forward side of the grid;

(*c*) where an "all seasons" freeboard is assigned and the deepest subdivision load line coincides with the horizontal line intersecting the load line mark, a vertical line shall be marked extending downwards from the fresh water load line to reach the subdivision load line marked C_1 on the after side of the vertical line.

Exhibition of damage control plans

24. In every ship to which this Part of these Regulations applies there shall be permanently exhibited, for the information 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, the means of closing such openings, the position of the controls and the arrangements for the correction of any list due to flooding. In addition, booklets containing such information shall be made available by the owner for the use of the officers of the ship.

PART IIA

SHIPS NOT REQUIRED TO COMPLY WITH PART II

Application of Part IIA

25. This Part of these Regulations applies to every open or partially decked ship of Class V and to every ship of Class VI carrying less than 101 passengers, and to every ship of Class VI(A).

Stability information

26. Every ship to which this Part of these Regulations applies, upon completion, shall be inclined and the elements of her stability determined: provided that, where no hydrostatic data is available, the inclining test will not be required to be carried out, but a test will be required to determine the angle of heel which will occur with two-thirds of the passengers on one side of the ship, and one-third on the other side, which shall not normally exceed seven degrees.

Openings in the sides of the ship

27.—(1) Efficient means shall be provided for preventing the accidental admission of water into any ship to which this Part of these Regulations applies through any openings in the sides of the ship.

(2) Every sidescuttle fitted in such a ship shall be of the non-opening type and shall be watertight and of sufficient strength having regard to its position in the ship.

PART III

BILGE PUMPING ARRANGEMENTS

Application of Part III

28. This Part of these Regulations applies to every ship to which these Regulations apply.

General

29. Except in the case of open ships of Classes V and VI not exceeding 12 metres in length, and not proceeding on voyages to a point more than 3 miles from the starting point, every ship to which these Regulations apply shall be provided with an efficient pumping plant capable of pumping from and draining any watertight compartment in the ship, other than a space permanently appropriated for the carriage of fresh water, water ballast or oil and for which other efficient means of pumping or drainage is provided, under all conditions likely to arise in practice after a casualty, whether or not the ship remains upright. Wing suctions shall be provided if necessary for that purpose. Efficient arrangements shall be provided whereby water in any watertight compartment may find its way to the suction pipes. Efficient means shall be provided for draining water from all insulated holds and insulated between decks in such a ship.

Provided that the Secretary of State may allow the provision for drainage to be omitted in a particular compartment if he is satisfied—

(*a*) that having regard to the calculations made in accordance with the conditions set out in Schedule 3 to these Regulations, the safety of the ship will not thereby be impaired; and

(*b*) that the provision of drainage would otherwise be undesirable.

Number and type of bilge pumps: ships of Classes I and II

30.—(1) Every ship of Classes I and II shall be provided with power pumps connected to the bilge main in accordance with the following table:

Criterion numeral	Less than 30	30 and over
Main engine pump (which may be replaced by one independent power pump) ...	1	1
Independent power pumps	2	3

(2) Such pumps shall be arranged as follows:—

(*a*) one of the pumps shall be an efficient emergency pump of a submersible type having its source of power and the necessary controls situated above the ship's bulkhead deck. Such pump and its source of power shall not be installed forward of the collision bulkhead or nearer to the side of the ship than one-fifth of the breadth of the ship measured at right angles to the centre line of the ship at the level of the deepest subdivision load line; or

(*b*) the power pumps in the ship and their sources of power shall be so disposed throughout the ship's length that under any condition of flooding which the ship is required to withstand at least one such pump in an undamaged watertight compartment will be available.

Number and type of bilge pumps: ships of Classes II(A) and III

31.—(1) Every ship of Classes II(A) and III shall be provided with bilge pumps in accordance with the following table:

Length of Ship in metres	Number of Pumps		
	Main Engine Pump*	Independent Power Pumps	Hand Pumps†
Under 15	1	—	One of the lever type for each watertight compartment or one of the crank type.
15 and under 30·5	1	1	One of the lever type for each watertight compartment or one of the crank type.
30·5 and under 76	1	1	One of the crank type.
76 and over	1	2	—

*The main engine pump may be replaced by one independent power pump.
†The hand pumps specified in this column may be replaced by one independent power pump.

(2) In every such ship of 76 metres in length or over and in every such ship of under 76 metres in length in which a hand pump is replaced by an independent power pump, regulation 30(2) of these Regulations shall apply to such a ship as it applies to ships of Classes I and II.

Number and type of bilge pumps etc.: ships of Classes IV to VI(A) inclusive

32.—(1) Every ship of Class IV shall be provided with a power bilge pump, which may be worked by the ship's main engines and, in addition, a hand pump other than a hand pump of the lever type.

(2) Every ship of Classes V, VI and VI(A) shall be provided with bilge pumps and means for bailing as follows:—

(*a*) Every such ship exceeding 18 metres in length shall be provided with a power pump, which may be worked by the main engine and, in addition, a hand pump other than a hand pump of the lever type;

(*b*) Every such ship, being a decked ship not exceeding 18 metres in length, shall be provided with a hand pump other than a hand pump of the lever type;

(*c*) Every such ship, being a partially decked ship not exceeding 18 metres in length, shall be provided with a hand pump and, in addition, two bailers or one bailer and one bucket;

(*d*) Every such ship, being an open ship exceeding 12 metres in length but not exceeding 18 metres in length, shall be provided with a hand pump and, in addition, two bailers or one bailer and one bucket;

(*e*) Every ship of Classes V and VI, being an open ship not exceeding 12 metres in length, and proceeding beyond 3 miles from the starting

point of her voyage, and every ship of Class VI(A), being an open ship not exceeding 12 metres in length, shall be provided with a hand pump and, in addition, two bailers or one bailer and one bucket;

(*f*) Every ship of Classes V and VI being an open ship not exceeding 12 metres in length, and not proceeding on voyages more than 3 miles from the starting point, shall be provided with two bailers or one bailer and one bucket.

Requirements for bilge pumps and bilge suctions

33.—(1) Power bilge pumps fitted in any ship to which these Regulations apply, shall where practicable be placed in separate watertight compartments so arranged or situated as not to be readily flooded by the same damage, and if the ship's engines and boilers are in two or more watertight compartments the bilge pumps there available shall be distributed through such compartments as far as possible.

(2) Every bilge pump provided in such a ship in compliance with these Regulations shall be self-priming unless efficient means of priming are provided. Every such pump, other than a hand pump of the lever type and a pump provided for peak compartments only, shall, whether operated by hand or by power, be so arranged as to be capable of drawing water from any space required by regulation 29 of these Regulations to be drained.

(3) Every independent power bilge pump in such a ship shall be capable of giving a speed of water of not less than 122 metres per minute through the ship's main bilge pipe when its diameter is that determined by regulation 35(1) of these Regulations. Every such independent power bilge pump shall have a direct suction from the space in which it is situated, provided that not more than two direct suctions shall be required in any one space. Every such suction shall be of a diameter not less than that of the ship's main bilge pipe. The direct suctions in the ship's machinery space shall be so arranged that water may be pumped from each side of the space through direct suctions to independent power bilge pumps.

(4) There shall be provided in the stokehold of every such ship, being a coal burning ship, a flexible suction hose of sufficient length to reach from a fitting on an independent power bilge pump in the ship to each side of the stokehold bilges. The hose shall be in addition to the other bilge suctions required by this regulation and shall have an internal diameter of 100 millimetres or 12 millimetres larger than that of the largest branch bilge suction required by regulation 35 of these Regulations, whichever is the less.

(5) One of the sea water pumps circulating each main engine in such a ship shall be fitted with direct suction connections, which shall be provided with non-return valves, to the lowest drainage level in the ship's machinery space, or as near thereto as will satisfy the Secretary of State. Such connections in steamships shall be of a diameter at least two-thirds of that of the ship's main sea inlet, and in motor ships of the same diameter as the pump inlet. Where in the opinion of the Secretary of State any main circulating pump is not suitable for this purpose, a direct emergency bilge suction 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 of the pump used. The capacity of the pump so connected shall exceed that of a required bilge pump by an amount satisfactory to the Secretary of State. The open end of such suctions or the strainer, if any, attached thereto shall be accessible for clearing. If the boiler fuel may be coal and there is no watertight bulkhead between the ship's

engines and boilers, a direct discharge overboard shall be fitted from at least one of the aforesaid pumps unless a by-pass is fitted to the circulating discharge thereof. The spindles of the ship's main sea inlet and of the direct suction valves shall extend well above the engine room platform.

(6) The hand bilge pumps in such a ship shall be workable from above the ship's bulkhead deck, if any, and shall be so arranged that the bucket and tail valve can be withdrawn for examination and overhaul under flooding conditions.

Arrangement of bilge pipes

34.—(1) In every ship to which these Regulations apply all pipes from the pumps for draining cargo spaces or any part of the machinery space shall be distinct from pipes which may be used for filling or emptying spaces in which water or oil is carried.

(2) All bilge pipes used in or under coal bunkers or 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.

(3) Bilge suction pipes in such a ship shall not be led through oil tanks unless the pipes are enclosed in an oiltight trunkway. Such pipes shall not be led through double bottom tanks.

(4) Such pipes shall be made with flanged joints and shall be thoroughly secured in position and protected where necessary against the risk of damage. Efficient expansion joints or bends shall be provided in each line of pipe, and where a connection is made at a bulkhead or elsewhere with a lead bend the radius of each bend and the distance between the axes of the straight parts of the pipes shall be not less than three times the diameter of the pipe and the length of any bend shall be not less than eight times that diameter.

Diameter of bilge suction pipes

35.—(1) Subject to the provisions of paragraphs (2) and (3) of this regulation, in every ship of Classes I to III inclusive, and in every ship of Classes IV to VI(A) inclusive, which is required by regulation 32 of these Regulations to be provided with a pump, the internal diameter of main and branch bilge suction pipes shall be determined to the nearest standard size calculated according to the following formulae:—

$$d_m = 25 + [1{\cdot}68\sqrt{L(B+D)}]$$

$$d_b = 25 + [2{\cdot}15\sqrt{l(B+D)}]$$

where d_m = internal diameter of the main bilge suction pipes in millimetres.

d_b = internal diameter of the branch bilge suction pipes in millimetres.

L = length of ship in metres.

B = breadth of ship in metres.

D = moulded depth of ship at bulkhead deck in metres.

l = length of compartment in metres.

(2) No main bilge suction pipe in any ship of Classes I to III inclusive, shall be less than 63 millimetres in bore, and no branch suction pipe shall be less than 50 millimetres or need be more than 100 millimetres in bore.

(3) No bilge suction pipe in any ship of Classes IV to VI(A) inclusive, which is required by regulation 32 of these Regulations to be provided with a pump, shall be less than 32 millimetres in bore.

Precautions against flooding through bilge pipes

36.—(1) In every ship to which Part II of these Regulations applies the bilge and ballast pumping systems shall be so arranged as to prevent water passing from the sea or from water ballast spaces into the ship's cargo spaces or into any part of the machinery space or from one watertight compartment in the ship to another. The bilge connection to any pump which effects suction from the sea or from water ballast spaces shall be made by means of either a non-return valve or a cock which cannot be opened at the same time to the bilges and to the sea or to the bilges and the water ballast spaces. Valves in bilge distribution boxes shall be of a non-return type. An arrangement of lock-up valves or of blank flanges shall be provided to prevent any deep tank in such a ship being inadvertently run up from the sea when it contains cargo or pumped out through a bilge pipe when it contains water ballast, and instructions for the working of such arrangement shall be conspicuously displayed nearby.

(2) In every such ship provision shall be made to prevent the flooding of any watertight compartment served by a bilge suction pipe in the event of the pipe being severed or otherwise damaged in any other watertight compartment through collision or grounding. Where any part of such a pipe is situated nearer to the side of the ship than one-fifth of the mid-ship breadth of the ship measured at the level of the deepest subdivision load water line or in any duct keel a non-return valve shall be fitted to the pipe in the watertight compartment containing the open end of the pipe.

(3) In every ship of Classes I to III inclusive, the bilge main shall not be situated nearer to the ship's side than one-fifth of the breadth of the ship measured at right angles to the centre line of the ship at the level of the deepest subdivision load water line, and where any bilge pump or its pipe connecting it to the bilge main is not so situated the arrangements shall be such that damage to the ship's side penetrating to the extent of one-fifth of the ship's breadth measured as described in this paragraph shall not put the other bilge pumping arrangements out of action.

Bilge valves, cocks, etc.

37.—(1) In every ship to which Part II of these Regulations applies all distribution boxes, valves and cocks fitted in connection with the bilge pumping arrangements shall be in positions which are accessible at all times in ordinary circumstances and shall be so arranged that in the event of flooding one of the bilge pumps may operate on any watertight compartment in the ship. If in any such ship there is only one system of pipes common to all such pumps, the necessary valves or cocks for controlling the bilge suctions shall be capable of being operated from above the ship's bulkhead deck. If an emergency bilge pumping system is provided in addition to the main bilge pumping system it shall be independent of the main system and shall be so arranged that a pump is capable of being operated on any watertight compartment under flooding conditions; in that case the cocks and valves necessary for the operation of the emergency system shall be capable of being operated from above the bulkhead deck. Provided that in any ship of Class II(A) or Class III of under 30·5 metres in length provided with a hand pump of the lever type for each watertight compartment in accordance with the provisions of regulation 31 (1) of these Regulations, the valves and cocks on the bilge main for controlling the bilge suctions shall not be

required to be capable of being operated from above the ship's bulkhead deck if they are in the same compartment as a power pump.

(2) In every such ship every operating rod for bilge suction valves or cocks shall be led as directly as possible. Every such rod passing through a cargo or coal bunker space shall be protected against damage in such spaces.

(3) In every such ship every valve or cock which is required by this regulation to be operated from above the bulkhead deck shall have its control at its place of operation clearly marked to show the purpose it serves and how it may be opened and closed and shall be provided with a means to indicate when it is open and when it is closed.

Bilge mud boxes and strum boxes

38. Bilge suctions in the machinery space of every ship to which these Regulations apply shall be led from readily accessible mud boxes placed wherever practicable above the level of the working floor of such space. The boxes shall have straight tailpipes to the bilges and covers secured in such a manner as will permit them to be readily opened and closed. The suction ends in hold spaces and tunnel wells shall be enclosed in strum boxes having perforations approximately 10 millimetres in diameter, and the combined area of such perforations shall be not less than twice that of the end of the suction pipe. Strum boxes shall be so constructed that they can be cleared without breaking any joint of the suction pipe.

Sounding pipes

39. In every ship to which Part II of these Regulations applies all tanks forming part of the structure of the ship and all watertight compartments, not being part of the machinery space, shall be provided with efficient sounding arrangements which shall be protected where necessary against damage. Where such arrangements consist of sounding pipes, a thick steel doubling plate shall be securely fixed below each sounding pipe for the sounding rod to strike upon. All such sounding pipes shall extend to positions above the ship's bulkhead deck which shall at all times be readily accessible. Sounding pipes for bilges, cofferdams and double bottom tanks, being bilges, cofferdams and tanks situated in the machinery space, shall so extend unless the upper ends of the pipes are accessible in ordinary circumstances and are furnished with cocks having parallel plugs with permanently secured handles so loaded that on being released they automatically close the cocks. Sounding pipes for the bilges of insulated holds shall be insulated and not less than 63 millimetres in diameter.

PART IV

ELECTRICAL EQUIPMENT AND INSTALLATIONS—NEW SHIPS

Application of Part IV

40. This Part of these Regulations applies to every new ship to which these Regulations apply.

General

41.—(1) In every ship to which this Part of these Regulations apply the electrical equipment and installations, other than the electrical means of propulsion, if any, shall be such that the electrically operated services essential for the safety of the ship and of persons on board can be maintained under emergency conditions.

(2) In every ship to which this Part of these Regulations apply, the electrical equipment and installations, including any electrical means of propulsion, shall

be such that the ship and all persons on board are protected against electrical hazards. The electrical equipment and installations shall comply with the requirements specified in Merchant Shipping Notice No. M 932 and shall include a reference to any document amending these requirements which is considered by the Secretary of State to be relevant from time to time and is specified in a Merchant Shipping Notice.

Main generating sets: ships of Classes I to III inclusive

42.—(1) Every ship of Classes I to III inclusive, being a ship in which electrical power is the only power for maintaining the auxiliary services essential for the propulsion or safety 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 of the sets is out of service. Arrangements shall be made which will safeguard such sets from being rendered inoperative in the event of the partial flooding of the ship's machinery space through leakage from a damaged compartment or otherwise.

(2) In every such ship where there is only one main generating station, such main generating station and the main switchboard shall be situated in the same main fire zone. Where there is more than one main generating station, and only one main switchboard, such switchboard shall be situated in the same main fire zone as one of the generating stations.

Emergency source of electric power: ships of Classes I, II and II(A)

43.—(1) In every ship of Classes I, II and II(A) there shall be provided in a position above the bulkhead deck not forward of the collision bulkhead and outside the machinery casings a self-contained emergency source of electric power. The location of this self-contained emergency source in relation to the main source or sources of electric power shall be such as to ensure that a fire or other casualty to the machinery space will not interfere with the supply or distribution of emergency power.

(2) The emergency source of power required by the preceding paragraph shall be capable of operating simultaneously for a period of 36 hours, or for such shorter period as the Secretary of State may permit in the case of any ship regularly engaged on voyages of short duration, the following services:—

(*a*) the ship's emergency bilge pump, if it is electrically operated;

(*b*) the ship's watertight doors, if they are electrically or electro-hydraulically operated, together with their indicators which show if the doors are open or closed, and the warning signals, if they are electrically operated;

(*c*) the ship's emergency lights at every boat station on deck and overside, in all alleyways, stairways and exits, in the machinery space, in the control stations where radio, main navigating and central fire recording equipments are situated, and in the place where the emergency generator, if any, is situated;

(*d*) the ship's navigation lights;

(*e*) all communication equipment, fire detecting systems and signals which may be required in an emergency, if they are electrically operated from the ship's main generating sets;

(*f*) the ship's sprinkler pump, if it is electrically operated; and

(*g*) the ship's daylight signalling lamp, if it is operated by the ship's main source of electric power.

(3) The emergency source of electric power shall be either an accumulator (storage) battery capable of complying with the preceding paragraph without being recharged or suffering an excessive voltage drop, or a generator driven by internal combustion type machinery with an independent fuel supply and with efficient starting arrangements and the fuel provided for such machinery shall have a flashpoint of not less than 43°C.

(4) The emergency source of electric power shall be so arranged that it will operate efficiently when the ship is listed $22\frac{1}{2}$ degrees and when the trim of the ship is 10 degrees from an even keel.

(5) (*a*) If the emergency source of electric power is an accumulator (storage) battery, the arrangements shall be such that the ship's emergency lighting system will come into operation automatically in the event of the failure of the main source of power for the ship's main lighting system.

(*b*) If the emergency source of electric power is a generator, an accumulator (storage) battery shall be provided as a temporary source of electric power, so arranged as to come into operation automatically in the event of a failure of the main or emergency source of electric power, and of sufficient capacity to operate the ship's emergency lighting system continuously for half an hour and while such lighting system is in operation—

(i) to close the ship's watertight doors if they are electrically operated, but not necessarily to close all such doors simultaneously;

(ii) to operate the indicators, which show if the doors are open or closed, if such indicators are electrically operated;

(iii) to operate the sound signals, which give warning that power operated watertight doors are about to close, if such sound signals are electrically operated; and

(iv) to operate all communication equipment, fire detecting systems and signals which may be required in an emergency, if they are electrically operated from the ship's main generating sets.

(*c*) Means shall be provided for the periodical testing of the emergency source of power and the temporary source of power, if provided, including the testing of automatic arrangements.

(*d*) An indicator shall be provided in the machinery space, on the main switchboard or at some other suitable position, to show when any accumulator (storage) battery fitted in accordance with this regulation is being discharged.

Emergency source of electric power: ships of Class III

44.—(1) In a ship of Class III which is provided with an emergency bilge pump in compliance with regulation 31(2) of these Regulations, being an electrically operated pump, there shall be provided in a position above the bulkhead deck outside the machinery casings a self-contained emergency source of electric power capable of operating the pump for a period of 24 hours.

(2) The emergency source of electric power may be either an accumulator (storage) battery capable of complying with the preceding paragraph, without being recharged or suffering an excessive voltage drop, or a generator driven by internal combustion type machinery with an independent fuel supply and with efficient starting arrangements and the fuel provided for such machinery shall have a flashpoint of not less than 43°C.

(3) The emergency source of electric power shall be so arranged that it will operate efficiently when the ship is listed to $22\frac{1}{2}$ degrees and when the trim of the ship is 10 degrees from an even keel.

Emergency switchboards

45. In every ship of Classes I, II, II(A), and III in which the provision of an emergency source of electric power is required by these Regulations—

(*a*) the emergency switchboard shall be situated as near as practicable to the emergency source of power;

(*b*) if the emergency source of power is a generator, the emergency switchboard shall be situated in the same space as the generator unless the operation of the switchboard would thereby be impaired;

(*c*) if the emergency source of power is a generator, an interconnecting feeder, adequately protected at each end, connecting the main and emergency switchboards shall be fitted;

(*d*) no accumulator (storage) battery fitted in accordance with regulations 43 or 44 of these Regulations shall be situated in the same space as the emergency switchboard.

Distribution systems

46.—(1) In every ship to which this Part of these Regulations applies every main and emergency switchboard shall be so arranged as to give easy access to the back and the front thereof without danger to any person and shall be suitably guarded. A non-conducting mat or grating shall be provided at the back and front where necessary. No exposed parts which may have a voltage between conductors or to earth exceeding 250 volts direct current or 55 volts alternating current shall be installed on the face of any switchboard or control panel.

(2) Hull return shall not be used in any such ship for the power, heat and light distribution systems thereof.

(3) If in any such ship two or more generating sets may be in operation at the same time for maintaining the auxiliary services essential for the propulsion or safety of the ship, provision shall be made for the sets to operate in parallel and means shall be provided to trip automatically sufficient non-essential load when the total current exceeds the connected generator capacity.

(4) (a) In every such ship electric and electro-hydraulic steering gear shall be served by two circuits fed from the main switchboard, one of which may pass through the emergency switchboard, if one is provided. Each circuit shall have adequate capacity for supplying all the motors which are normally connected to it and which operate simultaneously and if transfer arrangements are provided in the steering gear room to permit either circuit to supply any motor or combination of motors, the capacity of each circuit shall be adequate for the most severe load condition. The circuits shall be separated as widely as is practicable throughout their length.

(b) Short circuit protection only shall be provided for such circuits and motors.

(c) Every such ship which is fitted with electric or electro-hydraulic steering gear shall be provided with indicators which will show when the power units of such steering gear are running. These indicators shall be situated in suitable positions on the navigating bridge and in the machinery space or the machinery control room.

(5) The electrical arrangements for any automatic sprinkler and fire alarm and fire detection system shall comply with the requirements specified in Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980(**a**).

(6) In every such ship to which these Regulations apply distribution systems shall be so arranged that a fire in any main fire zone will not interfere with essen-

(**a**) S.I. 1980/544.

tial services in any other main fire zone. Main and emergency feeders passing through any main fire zone shall be separated as widely as is practicable both horizontally and vertically.

General electrical precautions

47.—(1) (*a*) In every ship to which this Part of these Regulations applies all electrical equipment shall be so constructed and installed that there will be no danger of injury to any person handling it in a proper manner. Subject to the provisions of sub-paragraph (*b*) of this paragraph, where electrical equipment supplied as ship's equipment is to be operated at a voltage in excess of 55 volts, the exposed metal parts of such equipment which are not intended to have a voltage above that of earth, but which may have such a voltage under fault conditions, shall be earthed.

(*b*) Exposed metal parts of portable electric lamps, tools and similar apparatus, supplied as ship's equipment to be operated at a voltage in excess of 55 volts shall be earthed through a conductor in the supply cable, unless by the use of double insulation or a suitable isolating transformer, protection at least as effective as earthing through a conductor is provided. When electric lamps, tools or other apparatus are used in damp spaces provision shall be made, so far as practicable, to ensure that the danger of electric shock is reduced to a minimum.

(2) Every electric cable in such a ship shall be of a flame retarding type. All metal sheaths and metal armour of any electric cable in use in such a ship shall be electrically continuous and shall be earthed. Every electric cable which is neither metal sheathed nor armoured shall, if installed where its failure might cause a fire or explosion, be otherwise effectively protected.

(3) Wiring in every such ship shall be supported in such a manner as to avoid chafing and other injury.

(4) In every such ship the joints in all electrical conductors shall be made only in junction or outlet boxes except in the case of low voltage communication circuits. All such junctions or outlet boxes shall be so constructed as to prevent the spread of fire therefrom.

(5) In every such ship lighting fittings shall be arranged to prevent rises in temperature which would be injurious to the electrical wiring thereof or which would result in a risk of fire in the surrounding material.

(6) Every electric space-heater forming part of the equipment of such a ship shall be fixed in position and shall be so constructed as to reduce the risk of fire to a minimum. No such heater shall be constructed with an element so exposed that clothing, curtains or other material can be scorched or set on fire by heat from the element.

(7) In every such ship every separate electrical circuit, other than a circuit which operates the ship's steering gear, shall be protected against overload and short circuit. There shall be clearly and permanently indicated on or near each overload protective device the current carrying capacity of the circuit which it protects and the rating or setting of the device.

(8) In every such ship all accumulator (storage) batteries shall be housed in boxes or compartments which are so constructed as to protect the batteries from damage and are so ventilated as to minimise the accumulation of explosive gas.

(9) In spaces where flammable mixtures are liable to collect, no electrical equipment shall be installed unless it is of a type which will not ignite the mixture concerned.

(10) In every such ship every lighting circuit in a bunker or hold shall be provided with an isolating switch outside the space.

Spare parts and tools

48. Every ship of Classes I, II and II(A) shall be provided with an adequate quantity of replacements for those parts of the ship's electrical equipment and installations which, having regard to the intended service of the ship, it would be essential for the safety of the ship and of persons on board to replace in the event of failure while the ship is at sea, together with such tools as are necessary for the fitting of these replacements.

PART IVA

ELECTRICAL EQUIPMENT AND INSTALLATIONS—EXISTING SHIPS

Application of Part IVA

49. This Part of these Regulations applies to every existing ship to which these Regulations apply.

General

50.—(1) Every ship to which this Part of these Regulations applies shall comply with paragraph (1) of regulation 41, regulation 42, 44 and 45, paragraphs (1), (2), (3), (4) and (6) of regulation 46, regulation 47 and regulation 48 of these Regulations.

(2) In every such ship, the electrical equipment and installations (including any electrical means of propulsion) shall be such that the ship and all persons on board are protected against electrical hazards and shall conform with the relevant provisions of the I.E.E. Regulations for the Electrical Equipment of Ships except in so far as such Regulations are inconsistant with this Part of these Regulations.

(3) If in any such ship the power supply for an automatic sprinkler system, requiring not less than two sources of power supply for sea-water pumps, air compressors and automatic alarms, is electrical, such power supplies shall be taken from the main generating sets and from an emergency source of electric power. One supply shall be taken from the main switchboard and another from the emergency switchboard, by separate feeders reserved solely for that purpose. Such feeders shall be run to a change-over switch situated near to the sprinkler unit and the switch shall normally be kept closed to the feeder from the emergency switchboard. The change-over switch shall be clearly labelled and no other switch shall be permitted in these feeders.

PART V

FIRE PROTECTION: NEW SHIPS OF CLASSES I, II AND II(A)

Application of Part V

51. This Part of these Regulations applies to new ships of Classes I, II and II(A) carrying more than 36 passengers.

Structure

52.—(1) The hull, superstructure, structural bulkheads, decks and deckhouses shall be constructed of steel or other equivalent material, except that the crowns and casings of machinery spaces of Category A shall be constructed only of steel.

Where any part of the structure is of aluminium alloy, the following requirements shall apply:—

(*a*) The insulation of aluminium alloy components of "A" or "B" Class divisions, and supports of such divisions, shall be such that the temperature of the structural core does not rise more than 200°C above the ambient temperature at any time during a standard fire test of 60 minutes duration in the case of an "A" Class division and 30 minutes duration in the case of a "B" Class division.

(*b*) The insulation of aluminium alloy components of columns, stanchions and other structural members required to support lifeboat and liferaft stowage, launching and embarkation areas, shall be such that the temperature rise limitation specified in sub-paragraph (*a*) of this regulation shall apply for 60 minutes duration.

Main vertical zones and horizontal zones

53.—(1) The hull, superstructure and deckhouses of every ship to which this Part of these Regulations applies shall be subdivided by bulkheads consisting of "A" Class divisions into main vertical zones except in respect of special category spaces to which regulation 64 applies. The mean length of each zone on any one deck, above the bulkhead deck, shall not normally exceed 40 metres. Steps and recesses shall be kept to a minimum, but any which are necessary shall consist of "A" Class divisions. These divisions shall have insulation values in accordance with the tables at the end of regulation 55 of these Regulations.

(2) Any portions of such divisions which extend above the bulkhead deck shall, whenever possible, be in line with watertight subdivision bulkheads situated immediately below the bulkhead deck, and shall extend from deck to deck and to the ship's shell and in the case of a deckhouse, to the external plating thereof.

(3) Where a main vertical zone is subdivided by horizontal "A" Class divisions into horizontal zones for the purpose of providing an appropriate barrier between sprinklered 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 have insulation and integrity values in accordance with Table 3 at the end of regulation 55 of these Regulations.

(4) In ships designed for special purposes, such as car or train services, where the provisions of main vertical zone bulkheads would conflict with the purpose for which the ship is intended, the Secretary of State may allow an equivalent means for controlling and limiting a fire to be substituted:

Provided that in a ship with special category spaces, any such space shall comply with the applicable provisions of regulation 64 of these Regulations and in so far as such compliance would be inconsistent with compliance with other requirements of this Part of these Regulations, the requirements of regulation 64 shall prevail.

Bulkheads within a main vertical zone

54.—(1) Every bulkhead within the accommodation spaces or service spaces of every ship to which this Part of these Regulations applies, not being a bulkhead required by these Regulations to consist of an "A" Class division, shall consist of a "B" Class or "C" Class division as required by the tables at the end of regulation 55 of these Regulations. All such divisions may be faced with combustible materials in accordance with regulation 61 of these Regulations.

(2) All corridor bulkheads where not required to be "A" Class shall be "B" Class divisions which shall extend from deck to deck except:—

(*a*) when continuous "B" Class ceilings and/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 meets the requirements of "B" Class divisions, but which is required to meet "B" Class fire integrity standards only so far as is reasonable and practicable in the opinion of the Secretary of State;

(*b*) in the case of a ship protected by an automatic sprinkler system complying with Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980 the corridor bulkheads of "B" Class materials may terminate at a ceiling in the corridor, provided such a ceiling is of material which in thickness and composition meets the requirements of "B" Class divisions. Notwithstanding the requirements of regulation 55 of these Regulations, such bulkheads and ceilings are required to meet "B" Class fire integrity standards only so far as is reasonable and practicable in the opinion of the Secretary of State. All doors and frames in such bulkheads shall be of non-combustible materials and shall be constructed and erected so as to provide substantial fire resistance to the satisfaction of the Secretary of State.

(3) Every bulkhead required to be a "B" Class division, except a corridor bulkhead, shall extend from deck to deck and to the shell or other boundaries unless continuous "B" Class ceilings and/or linings are fitted on both sides of the bulkhead, in which case the bulkhead may terminate at the continuous ceiling or lining.

Fire integrity of bulkheads and decks

55.—(1) In addition to complying with the specific provisions for fire integrity of bulkheads and decks of these Regulations, the minimum fire integrity and insulation standards of all bulkheads and decks shall be as prescribed in paragraphs (2) to (4) of this regulation and the tables at the end of this regulation.

(2) Where, due to any particular structural arrangement in the ship, there may be doubt in determining from the tables the minimum fire integrity and insulation standard of any division, such standard shall be determined to the satisfaction of the Secretary of State.

(3) The following requirements shall govern application of the tables:

(*a*) Table 1 shall apply to bulkheads bounding main vertical zones or horizontal zones.
Table 2 shall apply to bulkheads not bounding either main vertical zones or horizontal zones.
Table 3 shall apply to decks forming steps in main vertical zones or bounding horizontal zones.
Table 4 shall apply to decks not forming steps in main vertical zones nor bounding horizontal zones.

(*b*) For the purpose of determining the appropriate fire integrity and insulation 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) below. Where the contents and use of a space are such that there may be 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 number in parentheses preceding each category refers to the applicable column or row numbers in the tables:

(1) *control stations* include:

spaces containing emergency sources of power and lighting;

wheelhouse and chartroom and other spaces housing main navigation equipment;

spaces containing the ship's radio equipment;

fire extinguishing installation rooms and fire control and recording stations;

control room for propelling machinery when located outside the propelling machinery space;

spaces containing centralized fire alarm equipment;

spaces containing centralized emergency public address systems and equipment.

(2) *stairways* include interior stairways, lifts and escalators and enclosures thereto (other than those wholly contained within machinery spaces) for passengers and crew; 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.

(3) *corridors* include passenger and crew space corridors and lobbies.

(4) *lifeboat and liferaft handling and embarkation stations* include open deck spaces and enclosed promenades forming lifeboat and liferaft embarkation and lowering stations.

(5) *open deck spaces* include:

open deck spaces and enclosed promenades clear of lifeboat and liferaft embarkation and lowering stations;

the space outside superstructures and deckhouses.

(6) *accommodation spaces of minor fire risk* include:

cabins 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 square metres;

offices and dispensaries containing furniture and furnishings of restricted fire risk.

(7) *accommodation spaces of moderate fire risk* include:

spaces listed in Category (6) but containing furniture and furnishings of other than restricted fire risk;

public spaces containing furniture and furnishings of restricted fire risk and having a deck area of 50 square metres and greater;

lockers and store rooms having a deck area of less than 4 square metres in which no flammable liquids are stowed;

shops;

motion picture projection and film storage rooms;

laboratories in which no flammable liquids are stowed;

pharmacies;

drying rooms having a deck area of less than 4 square metres.

(8) *accommodation spaces of greater fire risk* include:

public spaces containing furniture and furnishings of other than restricted fire risk and having a deck area of 50 square metres and greater;

barber shops and beauty parlours.

(9) *sanitary and similar spaces* include:

communal sanitary facilities, showers, baths, and water closets;

laundry rooms having a deck area of less than 6 square metres;

indoor swimming pool area;

operating theatres;

pantries containing no cooking appliances and not annexed to galleys.

Private sanitary facilities shall be considered part of the accommodation space in which they are located.

(10) *tanks, voids and auxiliary machinery spaces having little or no fire risk* include:

water tanks forming part of the ship's structure;

voids and cofferdams;

auxiliary machinery spaces which do not contain machinery having a pressure lubricated system and where storage of combustibles is prohibited, such as:—

a ventilation and air-conditioning room; windlass room; steering gear room; stabilizer equipment room; electrical propulsion motor room; a room containing section switchboards and purely electrical equipment other than oil-filled electrical transformers (above 10 kVA); shaft and pipe tunnels; spaces for pumps and refrigeration machinery not using flammable liquids;

closed trunks serving the spaces listed in this paragraph;

other closed trunks such as pipe and cable trunks.

(11) *auxiliary machinery spaces, cargo spaces, special category spaces, cargo and other oil tanks and other spaces of moderate fire risk* include:

cargo oil tanks;

cargo holds, trunkways and hatchways;

refrigerated chambers;

oil fuel tanks where installed in a separate space with no machinery;

shaft and pipe tunnels allowing storage of combustibles;

auxiliary machinery spaces specified in category (10) which contain machinery having a pressure lubricated system or where storage of combustibles is permitted;

oil fuel filling stations;

spaces containing oil-filled electrical transformers (above 10 kVA);

spaces containing turbine and reciprocating steam engine driven auxiliary generators and small internal combustion engines of power output up to 112 kW driving emergency generators, sprinkler, drencher or fire pumps, or bilge pumps;

special category spaces (Tables 1 and 3 at the end of this regulation only apply);

closed trunks serving the auxiliary machinery spaces listed in this paragraph.

(12) *machinery spaces and galleys* include:

main propelling 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;

galleys and annexes;

pantries containing cooking appliances;

trunks and casings to the spaces listed in this paragraph.

(13) *store-rooms, workshops,* include:

laundry rooms having a deck area of 6 square metres and greater;

drying-rooms having a deck area of 4 square metres and greater;

lockers and store rooms having a deck area of 4 square metres and greater;

mail and baggage rooms;

garbage rooms;

workshops not part of machinery spaces, or galleys.

(14) *other spaces in which flammable liquids are stowed* include;

lamp rooms;

paint rooms;

store-rooms containing flammable liquids (including dyes, medicines, or potable spirits);

laboratories in which flammable liquids are stowed.

(*c*) Where a single value is shown for the fire integrity of a boundary between two spaces, that value shall apply in all cases.

(*d*) 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 Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980 or between such zones neither of which is so protected, the higher of the two values given in the tables set out in this regulation shall apply.

(*e*) 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 Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980 or between such zones both of which are so protected, the lesser of the two values, given in the tables set out in this regulation, 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.

(*f*) Where adjacent spaces are in the same numerical category and the superscription "1" appears in the tables set out at the end of this regu-

lation, a bulkhead or deck between such spaces need not be fitted if in the opinion of the Secretary of State it is unnecessary; so that, in Category (12) a bulkhead need not be required between a galley and its annexed pantries, provided that the pantry bulkheads and decks maintain the integrity of the galley boundaries. A bulkhead will be required between a galley and a machinery space, even though both spaces are in Category (12).

(*g*) Where the superscription "2" appears in the tables set out at the end of this regulation, the lesser insulation value may be permitted only if at least one of the adjoining spaces is protected by an automatic sprinkler system complying with the provisions of Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980.

(*h*) Where a dash appears in the tables set out at the end of this regulation, no special requirements for material or integrity of boundaries are required.

(*i*) The Secretary of State shall determine in respect of Category (5) spaces whether the integrity values in Tables 1 or 2, set out at the end of this regulation, shall apply to ends of deckhouses and superstructures, and whether the integrity values in Tables 3 or 4 shall apply to weather decks. The requirements of Tables 1 to 4 in respect of Category (5) shall not necessitate enclosure of spaces which, in the opinion of the Secretary of State, need not be enclosed.

(4) 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.

(5) The integrity of "A" Class divisions shall be maintained at the intersections and boundaries.

TABLE 1.—BULKHEADS BOUNDING MAIN VERTICAL ZONES OR HORIZONTAL ZONES

Spaces		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Control stations	(1)	A-60	A-30	A-30	A-0	A-0	A-60	A-60	A-60	A-0	A-0	A-60	A-60	A-60	A-60
Stairways	(2)		A-0	A-0	A-0	A-0	A-15 A-0	A-30 A-0	A-60 A-15	A-0	A-0	A-30	A-60	A-15 A-0	A-60
Corridors	(3)			A-0	A-0	A-0	A-0	A-30 A-0	A-30 A-0	A-0	A-0	A-30	A-60	A-15 A-0	A-60
Lifeboat and liferaft handling and embarkation stations	(4)				—	—	A-0	A-0	A-0	A-0	A-0	A-0	A-60	A-0	A-60
Open deck spaces	(5)					—	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-15 A-0	A-30 A-0	A-30 A-0	A-0	A-0	A-15 A-0	A-30	A-15 A-0	A-30
Accommodation spaces of moderate fire risk	(7)							A-30 A-0	A-60 A-15	A-0	A-0	A-30 A-0	A-60	A-30 A-0	A-60
Accommodation spaces of greater fire risk	(8)								A-60 A-15	A-0	A-0	A-60 A-15	A-60	A-30 A-0	A-60
Sanitary and similar spaces	(9)									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
Auxiliary machinery spaces, cargo spaces, special category spaces, cargo and other oil tanks and other similar spaces of moderate fire risk	(11)											A-0	A-60	A-0	A-60
Machinery spaces and main galleys	(12)												A-60	A-30[2] A-15	A-60
Store-rooms, workshops, pantries, etc.	(13)													A-0	A-30
Other spaces in which flammable liquids are stowed	(14)														A-60

TABLE 2.—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	(1)	B-0[1]	A-0	A-0	A-0	A-0 B-0	A-60	A-60	A-60	A-0	A-0	A-60	A-60	A-60	A-60
Stairways	(2)		A-0[1]	A-0	A-0	A-0	A-0	A-15 A-0	A-30 A-0	A-0	A-0	A-15	A-30	A-15 A-0	A-30
Corridors	(3)			C	A-0	A-0 B-0	B-0	B-15 B-0	B-15 B-0	B-0	A-0	A-15	A-30	A-0	A-30 A-0
Lifeboat and liferaft handling and embarkation stations	(4)				—	—	A-0	A-0	A-0	A-0	A-0	A-0	A-15	A-0	A-15 A-0
Open deck space	(5)					—	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0	A-0	A-0	A-0 B-0	A-0 B-0
Accommodation spaces of minor fire risk	(6)						B-0 C	B-15 C	B-15 C	B-0 C	A-0	A-15 A-0	A-30	A-0	A-30 A-0
Accommodation spaces of moderate fire risk	(7)							B-15 C	B-15 C	B-0 C	A-0	A-15 A-0	A-60	A-15 A-0	A-60 A-15
Accommodation spaces of greater fire risk	(8)								B-15 C	B-0 C	A-0	A-30 A-0	A-60	A-15 A-0	A-60 A-15
Sanitary and similar spaces	(9)									C	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[1]	A-0	A-0	A-0	A-0
Auxiliary machinery spaces, cargo spaces, cargo and other oil tanks and other similar spaces of moderate fire risk	(11)											A-0[1]	A-0	A-0	A-30[2] A-15
Machinery spaces and main galleys	(12)												A-0[1]	A-0	A-60
Store-rooms, workshops, pantries, etc.	(13)													A-0[1]	A-0
Other spaces in which flammable liquids are stowed	(14)														A-30[2] A-15

TABLE 3.—DECKS FORMING STEPS IN MAIN VERTICAL ZONES OR BOUNDING HORIZONTAL ZONES

Space below ↓ Space above →		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Control stations	(1)	A-60	A-60	A-30	A-0	A-0	A-15	A-30	A-60	A-0	A-0	A-30	A-60	A-15	A-60
Stairways	(2)	A-15	A-0	A-0	A-0	A-0	A-0	A-15 A-0	A-15 A-0	A-0	A-0	A-0	A-60	A-0	A-60
Corridors	(3)	A-30	A-0	A-0	A-0	A-0	A-0	A-15 A-0	A-15 A-0	A-0	A-0	A-0	A-60	A-0	A-60
Lifeboat and liferaft handling and embarkation stations	(4)	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	A-0
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	A-0	A-0
Accommodation spaces of minor fire risk	(6)	A-60	A-30 A-0	A-15 A-0	A-0	A-0	A-0	A-15 A-0	A-30 A-0	A-0	A-0	A-15 A-0	A-15	A-0	A-15
Accommodation spaces of moderate fire risk	(7)	A-60	A-60 A-15	A-30 A-0	A-15 A-0	A-0	A-15 A-0	A-30 A-0	A-60 A-15	A-0	A-0	A-30 A-0	A-30	A-0	A-30
Accommodation spaces of greater fire risk	(8)	A-60	A-60 A-15	A-60 A-15	A-60 A-15	A-0	A-30 A-0	A-60 A-15	A-60 A-15	A-0	A-0	A-30 A-0	A-60	A-15 A-0	A-60
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	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-0	A-0	A-0	A-0	A-0
Auxiliary machinery spaces, cargo spaces, special category spaces, cargo and other oil tanks and other similar spaces of moderate fire risk	(11)	A-60	A-60	A-60	A-60	A-0	A-30 A-0	A-60 A-15	A-60 A-15	A-0	A-0	A-0	A-30	A-30[2] A-0	A-30
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-60	A-60	A-60	A-60
Store-rooms, workshops, pantries, etc.	(13)	A-60	A-60 A-15	A-30 A-0	A-15	A-0	A-15 A-0	A-30 A-0	A-60 A-15	A-0	A-0	A-0	A-30	A-0	A-30
Other spaces in which flammable liquids are stowed	(14)	A-60	A-60	A-60	A-60	A-0	A-60	A-60	A-60	A-0	A-0	A-60	A-60	A-60	A-60

TABLE 4.—DECKS NOT FORMING STEPS IN MAIN VERTICAL ZONES NOR BOUNDING HORIZONTAL ZONES

Space below ↓ Space above →		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Control stations	(1)	A-30 A-0	A-30 A-0	A-15 A-0	A-0	A-0 B-0	A-0	A-15 A-0	A-30 A-0	A-0	A-0	A-0	A-60	A-0	A-60 A-15
Stairways	(2)	A-0	A-0	A-0	A-0	A-0 B-0	A-0	A-0	A-0	A-0	A-0	A-0	A-30	A-0	A-30 A-0
Corridors	(3)	A-15 A-0	A-0	A-0[1] B-0[1]	A-0	A-0 B-0	A-0 B-0	A-15 B-0	A-15 B-0	A-0 B-0	A-0	A-0	A-30	A-0	A-30 A-0
Lifeboat and liferaft handling and embarkation stations	(4)	A-0	A-0	A-0	A-0	—	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0	A-0	A-0	A-0	A-0
Open deck spaces	(5)	A-0	A-0	A-0 B-0	A-0	—	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0	A-0	A-0	A-0 B-0	A-0
Accommodation spaces of minor fire risk	(6)	A-60	A-15 A-0	A-0	A-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0	A-0	A-15 A-0	A-0	A-15 A-0
Accommodation spaces of moderate fire risk	(7)	A-60	A-30 A-0	A-15 A-0	A-15 A-0	A-0 B-0	A-0 B-0	A-15 B-0	A-30 B-0	A-0 B-0	A-0	A-15 A-0	A-30 A-0	A-0	A-30 A-0
Accommodation spaces of greater fire risk	(8)	A-60	A-60 A-15	A-60 A-0	A-30 A-0	A-0 B-0	A-15 B-0	A-30 B-0	A-60 B-0	A-0 B-0	A-0	A-30 A-0	A-30 A-0	A-0	A-30[2] A-0
Sanitary spaces and similar spaces	(9)	A-0	A-0	A-0 B-0	A-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-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-0[1]	A-0	A-0	A-0	A-0
Auxiliary machinery spaces, cargo spaces, cargo and other oil tanks and other similar spaces of moderate fire risk	(11)	A-60	A-60 A-15	A-60 A-15	A-30 A-0	A-0	A-0	A-15 A-0	A-30 A-0	A-0	A-0	A-0[1]	A-0	A-0	A-30[2] A-15
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[1]	A-0	A-60
Store-rooms, workshops, pantries etc.	(13)	A-60	A-30 A-0	A-15 A-0	A-15 A-0	A-0 B-0	A-15 A-0	A-30 A-0	A-30 A-0	A-0 B-0	A-0	A-0	A-0	A-0	A-15[2] A-0
Other spaces in which flammable liquids are stowed	(14)	A-60	A-60 A-30	A-60 A-30	A-60	A-0	A-30 A-0	A-60 A-15	A-60 A-15	A-0	A-0	A-30[2] A-0	A-30[2] A-0	A-0	A-30[2] A-0

Protection of stairways and lifts in accommodation and service spaces

56.—(1) All stairways shall be of steel frame construction, except where the Secretary of State may approve the use of other equivalent material, and shall be within enclosures formed of "A" Class divisions, except that:

(*a*) a stairway connecting only two decks need not be enclosed on both decks provided that the integrity of the deck is maintained by adequate bulkheads or doors at one between-deck space. When a stairway is closed at one between-deck space, the stairway enclosure shall have the same integrity standards as is required by the tables at the end of regulation 55 for the deck which separates the between-deck spaces;

(*b*) stairways may be fitted in the open in a public space, provided that they lie wholly within such public space.

(2) Every opening in a stairway enclosure shall be provided with a means of closure which shall be permanently attached thereto.

(3) Every stairway enclosure shall have direct communication with the corridors and be of sufficient area to prevent congestion, having regard to the number of persons likely to use them in an emergency. In so far as practicable, stairway enclosures shall not give direct access to cabins, service lockers, or other enclosed spaces containing combustibles in which a fire is likely to originate.

(4) Every lift trunk 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.

Openings in "A" Class divisions

57.—(1) Where an "A" Class division is pierced for the passage of electric cables, pipes, trunks, girders, beams or for other purposes, the arrangements shall be such that the effectiveness of the division in resisting fire is not thereby impaired except as provided in paragraph (7) of this regulation.

(2) Where, of necessity, a ventilation duct passes through a main vertical zone bulkhead, a fail-safe automatic closing fire damper shall be fitted adjacent to the bulkhead. The damper shall also be capable of being manually closed from each side of the bulkhead. The operating positions shall be readily accessible and be marked in red light-reflecting colour. The duct between the bulkhead and the damper shall be of steel or other equivalent material and, if necessary, be insulated to a standard to comply with paragraph (1) of this regulation. The damper shall be fitted with a visible indicator at each operating position showing whether the damper is in the open or shut position.

(3) Except for hatches between special category spaces within a single horizontal zone, or between cargo spaces or stores or baggage spaces, and between such spaces and the weather decks, every opening shall be provided with permanently attached means of closing which shall be at least as effective for resisting fire as the division in which it is fitted.

(4) Every door and door frame in an "A" Class division shall be constructed of steel or other equivalent material and the means of securing it 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 bulkhead in which the door is situated. Provided that a watertight door shall not be required to be insulated.

(5) Any door in such a division shall be so constructed that it can be opened and closed by one person from either side of the division.

(6) Every door in a division constructed in compliance with regulation 53(1) and 56(1) of these Regulations, except a watertight door or one which is normally locked, shall be self-closing and capable of closing against an adverse inclination of up to $3\frac{1}{2}$ degrees. The speed of door closure shall be controlled so as to prevent undue danger to personnel. All such doors which are held in the open position shall be capable of release from a control station, either simultaneously or in groups, and also individually from a position at the door. The release mechanism shall be so designed that the door will automatically close in the event of disruption of the control system; except that this requirement shall not apply to a water-tight door. Hold-back hooks, not subject to control station release, are not permitted.

(7) Where a space is protected by an automatic sprinkler system complying with the provisions of Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980, or fitted with a continuous "B" Class ceiling, the closing of openings in decks not forming steps in main vertical zones nor bounding horizontal zones shall be reasonably tight and such decks shall meet the "A" Class integrity requirements in so far as is reasonable and practicable in the opinion of the Secretary of State.

(8) The requirements for "A" Class integrity of the outer boundaries of a ship shall not apply to glass partitions, windows and sidescuttles, subject to the requirements of regulation 60. The requirements for "A" Class integrity shall not apply to exterior doors in superstructures and deckhouses, except that doors opening on to lifeboat and liferaft handling and embarkation areas shall be of such construction as to protect these areas from a space having a potential fire hazard.

Openings in "B" Class divisions

58.—(1) Where a "B" Class division is pierced for the passage of electric cables, pipes, trunks, girders, beams or for other purposes, the arrangements shall be such that the effectiveness of the division in resisting fire is not thereby impaired except as provided in paragraph (4) of this regulation.

(2) 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 as far as practicable equivalent to the division, 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 square metre. When such opening is cut in a door, it shall be fitted with a grille made of steel. Doors shall be non-combustible.

(3) The requirements for "B" Class integrity of the outer boundaries of a ship shall not apply to glass partitions, windows and sidescuttles. The requirements for "B" Class integrity shall not apply to exterior doors in superstructures and deckhouses.

(4) Where an automatic sprinkler system complying with the provisions of Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980, is fitted:—

(*a*) the closing of openings in decks need only meet the "B" Class integrity requirements in so far as is reasonable and practicable.

(*b*) openings in corridor bulkheads of "B" Class materials shall be protected in accordance with the provisions of regulation 54 of these Regulations.

Ventilation systems

59.—(1) Wherever practicable the system of ducts leading from each ventilating fan shall be within one main vertical or horizontal zone.

(2) Where ventilation systems penetrate decks, precautions shall be taken, in addition to those relating to the fire integrity of the decks required by regulation 57 of these Regulations, 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 tables at the end of regulation 55.

(3) The main inlets of every air supply system and the main outlets of every air exhaust system shall be capable of being closed from external positions.

(4) Ducts serving a stairway enclosure shall be taken from the fan room independently of other ducts in the ventilation system and shall not serve any other space.

(5) All power ventilation, except machinery and cargo space ventilation and any alternative system which may be required under paragraph (6) of this regulation, 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 be so grouped 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.

(6) There shall be provided for every control station situated below deck other than a control station situated in the machinery space, means to ensure ventilation, visibility and freedom from smoke within it so that, in the event of a fire in the ship, the equipment it contains may be operated effectively. Unless the control station is situated on, and has access to, an open deck or is provided with local closing arrangements equally effective to maintain ventilation, visibility and freedom from smoke in the event of a fire in the ship, there shall be provided at least two entirely separate means of supplying air to such control stations and the air inlets to these sources of supply shall be so situated that the risk of both drawing in smoke simultaneously is, as far as practicable, eliminated.

(7) Except in cargo spaces, ventilation ducts shall be constructed of the following materials:—

(*a*) Ducts not less than 0·075 square metre in sectional area and all vertical ducts serving more than a single between-deck space shall be constructed of steel or other equivalent material.

(*b*) Subject to the requirements of sub-paragraph (*c*) and of paragraphs (8) and (9), ducts of less than 0·075 square metre in sectional area 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.

(*c*) Ducts, not in general exceeding 0·02 square metre in sectional area nor 2 metres in length, need not be non-combustible provided that the following conditions are satisfied:

(i) the duct is constructed of suitable material having regard to the risk of fire;

(ii) the duct is used only at the terminal end of the ventilation system; and

(iii) the duct is not located closer than 0·6 metre along its length to a penetration of an "A" or "B" Class division.

(8) Ducts provided for the ventilation of machinery spaces of Category A, galleys or car deck spaces shall not pass through accommodation spaces, service spaces or control stations unless either:—

(*a*)(i) the ducts are constructed of steel having a thickness of at least 3 millimetres and 5 millimetres for ducts the widths or diameters of which are up to and including 300 millimetres and 760 millimetres and over respectively and, in the case of such ducts, the widths or diameters of which are between 300 and 760 millimetres having a thickness to be obtained by interpolation; and

(ii) are suitably supported and stiffened; and

(iii) are fitted with automatic fire dampers close to the the boundaries penetrated; and

(iv) are insulated to "A—60" standard from the machinery space, galley or car deck space to a point at least 5 metres beyond each fire damper, or;

(*b*)(i) the ducts are constructed of steel in accordance with (*a*)(i) and (ii) of this paragraph; and

(ii) are insulated to "A—60" standard throughout the accommodation spaces, service spaces or control stations;

except that penetrations of main zone bulkhead or decks shall comply with the requirements of regulation 57 of these Regulations.

(9) Ducts providing ventilation to accommodation spaces, service spaces or control stations shall not pass through machinery spaces of Category A, galleys or car deck spaces unless either:—

(*a*)(i) the ducts where they pass through a machinery space of Category A galley or car deck space are constructed of steel in accordance with paragraph (8)(*a*)(i) and (ii) of this regulation; and

(ii) automatic fire dampers are fitted close to the boundaries penetrated; and

(iii) provided the integrity of the machinery space, galley or car deck space boundaries is maintained at the penetrations,
or;

(*b*)(i) the ducts where they pass through a machinery space of Category A, galley or car deck space are constructed of steel in accordance with paragraph (8)(*a*)(i) and (ii) of this regulation; and

(ii) are insulated to "A—60" standard within the machinery space, galley or car deck space;

except that penetrations of main zone bulkheads and decks shall comply with the requirements of regulation 57 of these Regulations.

(10) Exhaust ducts from galley ranges, where they pass through accommodation spaces containing combustible materials, shall be constructed of "A" Class divisions. Every exhaust duct shall be fitted with—

(*a*) a grease trap readily removable for cleaning;

(*b*) a fire damper located in the duct at the boundary of the galley;

(*c*) arrangements, operable from within the galley, for shutting off the exhaust fan; and

(*d*) a fixed means of extinguishing a fire within the duct.

(11) Where a ventilation duct of sectional are exceeding 0·02 square metre passes through an "A" Class bulkhead or deck, the opening in the bulkhead or deck shall be lined with a steel sheet sleeve unless the duct, where it passes through the bulkhead or deck, is constructed of steel. At the penetration the sleeve or duct shall comply with the following specification:—

(*a*) The duct or sleeve shall have a thickness of least 3 millimetres over a length of 900 millimetres. When passing through bulkheads this length shall if possible be divided into 450 millimetres on each side of the bulkhead. The duct or sleeve shall be insulated so as to maintain the standard of fire integrity of the deck or bulkhead; and

(*b*) every duct shall be fitted with a fire damper unless the Secretary of State determines otherwise. In every duct of sectional area exceeding 0·075 square metre the fire damper shall operate automatically, but it shall also be capable of being closed manually from each side of the bulkhead or deck. The operating position shall be readily accessible and be marked in red light-reflecting colour. The damper shall be fitted with a visible indicator showing whether the damper is in the open or shut position. 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 and insulation value as the bulkheads which they pierce.

(12) Where a ventilation duct of sectional area exceeding 0·02 square metre passes through a "B" Class bulkhead, the opening shall be lined with a steel sleeve of 900 millimetres in length unless the duct, where it passes through the bulkhead, is constructed of steel. This length shall be divided, if possible, into 450 millimetres on each side of the bulkhead.

Windows and sidescuttles

60.—(1) All windows and sidescuttles in bulkheads within accommodation and service spaces and control stations other than those to which the provisions of paragraph (8) of regulation 57 and paragraph (3) of regulation 58 of these Regulations apply, shall be constructed so as to preserve the integrity requirements of the type of bulkheads in which they are fitted.

(2) Notwithstanding the requirements of the tables set out at the end of regulation 55 of these Regulations:

(*a*) 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 materials. The glass shall be retained by a metal glazing bead or angle.

(*b*) The fire integrity of windows facing open or enclosed lifeboat and liferaft embarkation areas and of windows situated below such areas in such a position that their failure during a fire would impede the launching of, or embarkation into, lifeboats or liferafts shall be such that any potential fire hazard is kept to a minimum.

Restriction of combustible materials

61.—(1) Within accommodation spaces, service spaces and control stations—

(*a*) The following surfaces shall be such that a Class 1 or 2 surface spread of flame will not be exceeded:

(i) exposed surfaces in corridor, stairway enclosures, bulkheads, wall and ceiling linings; and

(ii) concealed or inaccessible spaces.

(*b*) The total volume of combustible facings, mouldings, decorations and veneers shall not exceed a volume equivalent to 2·5 millimetres of veneer on the combined area of walls and ceilings. In the case of ships fitted with an automatic sprinkler system complying with the provisions of Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980, the above volume may include some combustible material used for the erection of "C" Class divisions.

(*c*) Veneers used on surfaces and linings to which paragraph (1)(*a*) applies shall not have a gross calorific potential exceeding 45 megajoules per square metre of surface area for the thickness used as measured in accordance with the method specified in International Standard ISO 1716-1973 (E).

(*d*) Furniture in the corridors and stairway enclosures shall be kept to a minimum.

(*e*) Primary deck coverings, if applied, shall be of approved material which will not readily ignite, or give rise to toxic or explosive hazards at elevated temperatures.

(*f*) Waste-paper receptacles shall be constructed of non-combustible materials and with solid sides and bottoms.

(2) Within accommodation spaces, service spaces, control stations and machinery spaces—

(*a*) all ceilings, linings, draught stops and insulating materials shall be of non-combustible materials except in respect of:

(i) mail rooms and baggage rooms;

(ii) materials used to insulate refrigerated compartments;

(iii) materials used to insulate valves associated with hot and cold service systems provided that their exposed surfaces are such that a Class 1 or 2 surface spread of flame will not be exceeded;

(iv) vapour barriers and adhesives used in conjunction with insulating materials, if their exposed surfaces are such that a Class 1 or 2 surface spread of flame will not be exceeded;

(*b*) paints, varnishes and other finishes used on exposed interior surfaces shall not be capable of producing excessive quantities of smoke and toxic products.

Miscellaneous items of fire protection

62.—(1) The following provisions shall apply to all parts of any ship to which this Part of these Regulations applies:—

(*a*) Any pipe which penetrates an "A" Class or "B" Class division shall be of suitable material having regard to the temperature such divisions are required to withstand;

(*b*) Pipes intended for oil or other flammable liquids shall be of suitable material having regard to the risk of fire;

(*c*) Overboard scuppers, sanitary discharges or other outlets close to or below the waterline shall not be of a material likely to fail in the event of fire and thereby give rise to a danger of flooding.

(2) The following provisions shall apply to the accommodation spaces, service spaces, and control stations, of any ship to which this Part of these Regulations applies:

(*a*) Every air space enclosed behind a ceiling, panel or lining, shall be divided

by close-fitting draught-stops which shall be spaced not more than 14 metres apart and which shall be closed at each deck.

(*b*) Every ceiling and lining shall be so constructed as to enable a fire patrol to detect any smoke originating in a concealed or inaccessible space without impairing the efficiency of the fire protection of the ship. The Secretary of State may exempt any ship from the requirement of this regulation if he is satisfied that there is no risk of fire originating in such a space.

Automatic sprinkler and fire alarm and fire detection system or automatic fire alarm and fire detection system

63.—(1) In every ship to which this Part of these Regulations applies there shall be installed throughout each separate zone, whether vertical or horizontal, in all accommodation and service spaces and in control stations either:

(*a*) an automatic sprinkler and fire alarm and fire detection system complying with the requirements specified in Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980 and so arranged to protect all such spaces in the ship; or

(*b*) an automatic fire alarm and fire detection system complying with the requirements specified in Schedule 12 to the Merchant Shipping (Fire Appliances) Regulations 1980 and so arranged to detect the presence or the signs of a fire and its location in any such spaces.

(2) the Secretary of State may exempt any ship from the requirements of this regulation:

(*a*) in the case of any spaces which afford no substantial fire risk; or

(*b*) in the case of any control station.

Protection of special category spaces

64.—(1) The following provisions shall apply to special category spaces, whether above or below the bulkhead deck, of any ship to which this Part of these Regulations applies:—

(*a*)(i) If normal main vertical zoning is not practicable in special category spaces, equivalent protection shall be obtained in such spaces by horizontal zoning and the provision of an efficient fixed fire-extinguishing system. A horizontal zone for the purpose of this regulation may include special category spaces on more than one deck, provided that the overall height of the zone does not exceed 10 metres.

(ii) The requirements of regulations 57 and 59 of these Regulations for maintaining the integrity of vertical zones shall apply to decks and bulkheads forming the boundaries separating horizontal zones from each other and from the remainder of the ship.

Structural protection

(*b*)(i) Boundary bulkheads of special category spaces shall be insulated as required for Category (11) spaces in Table 1 and the horizontal boundaries as required for Category (11) spaces in Table 3 at the end of regulation 55.

(ii) Indicators shall be provided on the navigating bridge which shall show when any access fire door in the boundary of a special category space is closed.

Fixed fire extinguishing system

(*c*) Every special category space shall be fitted with a manually operated fixed pressure water-spraying system which complies with the require-

ments specified in Schedule 8 to the Merchant Shipping (Fire Appliances) Regulations 1980. The Secretary of State may permit the use of any other fixed fire extinguishing system which he is satisfied is equally effective by full-scale tests in conditions simulating a flowing petrol fire in a special category space.

Patrols and detection

(*d*)(i) 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 in that space an automatic fire alarm and fire detection system complying with the requirements of Schedule 12 to the Merchant Shipping (Fire Appliances) Regulations 1980.

(ii) Manual fire alarms shall be provided throughout the special category spaces and one shall be placed close to each exit from such spaces.

Ventilation system

(*e*) Every special category space shall be provided with a ventilation system capable of changing the atmosphere within such spaces at least ten times per hour based upon the gross volume of the space. The ventilation system shall so be arranged as to prevent stratification of the atmosphere and the formation of gas pockets in such spaces. The ventilation system shall be separate from any other ventilation system and the master shall ensure that it shall be operated at all times when vehicles are in such spaces. Any loss or reduction of the ventilating system capacity shall be indicated on the navigating bridge. The outlet from any exhaust ventilation duct shall be sited in a safe position having regard to possible sources of ignition.

Additional requirements applicable only to special category spaces above the bulkhead deck

(2) The following provisions shall apply additionally to those in paragraph (1) of this regulation to special category spaces above the bulkhead deck of any ship to which this Part of these Regulations applies:—

Scuppers

(*a*) To ensure the clearance of water accumulating on the deck or decks following 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.

Precautions against ignition of flammable vapours

(*b*) Electrical equipment, wiring and other equipment capable of igniting flammable vapours shall not be installed less than 450 mm above any deck on which vapours may accumulate, provided that electrical equipment and wiring may be installed below such level and within the ventilation trunks if it is essential for the safe operation of the ship provided that the equipment is of a type suitable for use in an explosive petrol vapour and air mixture. Electrical equipment installed more than 450 mm above any deck on which vapours may accumulate shall be enclosed and protected to prevent discharge of sparks.

Additional requirements applicable only to special category spaces below the bulkhead deck

(3) The following provisions shall apply additionally to paragraph (1) of this

regulation to special category spaces below the bulkhead deck of any ship to which this Part of these Regulations applies:—

Bilge pumping and drainage

(*a*) Adequate bilge pumping and drainage facilities shall be provided to ensure the clearance of water from the deck or tank top following the operation of the fixed pressure water-spraying system. Where the capacity of the bilge pumps is insufficient to ensure the clearance of the water, additional bilge pumping capacity shall be provided.

Precautions against ignition of flammable vapours

(*b*) Electrical equipment and wiring within such spaces and in ventilation trunks serving such spaces shall be of a type suitable for use in an explosive petrol vapour and air mixture. Other equipment which may constitute a source of ignition of flammable vapours shall not be fitted.

Protection of cargo spaces, other than special category spaces, intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion

65. In every ship to which this Part of these Regulations applies the following provisions shall apply to any cargo space, other than a special category space, containing motor vehicles with fuel in their tanks for their own propulsion:—

Fire detection

(*a*) An automatic fire alarm and fire detection system complying with the requirements specified in Schedule 12 to the Merchant Shipping (Fire Appliances) Regulations 1980 shall be provided.

Fire-extinguishing arrangements

(*b*) A fixed gas fire-extinguishing system complying with the requirements specified in Schedule 9 to the Merchant Shipping (Fire Appliances) Regulations 1980 shall be provided.

Ventilation system

(*c*) Every such space shall be provided with a ventilation system capable of changing the atmosphere within such spaces at least 10 times per hour based upon the gross volume of the space. The ventilation system shall be arranged to prevent stratification of the atmosphere and the formation of gas pockets in such spaces. The ventilating system shall be separate from any other ventilation system and the master shall ensure that it shall be operated at all times when vehicles are in such spaces. Any loss or reduction of the ventilation system capacity shall be indicated on the navigating bridge. The outlet from any exhaust ventilation duct shall be sited in a safe position having regard to possible sources of ignition.

Precautions against ignition of flammable vapours

(*d*) Electrical equipment and wiring within such spaces and their exhaust ventilation trunks shall be of a type suitable for use in an explosive petrol vapour and air mixture. Other equipment which may constitute a source of ignition of flammable vapours shall not be fitted.

Special arrangement in machinery spaces

66. The following provisions shall apply to machinery spaces of any ship to which this Part of these Regulations applies:—

(*a*) The number of openings to machinery spaces shall be the minimum compatible with the proper working of the ship.

(*b*) The sky-lights to machinery spaces of Category A shall be constructed of steel and their flaps shall be capable of being closed and opened from a suitable position outside the space in the event of fire.

(*c*) Adequate arrangements shall be made to permit the release of smoke in the event of fire.

(*d*) Windows shall not be fitted in machinery space casings.

(*e*) Doors in the boundaries of machinery spaces of Category A, other than watertight doors, shall be arranged so that the closure of the door will be assured in the event of fire in the space. The doors shall be provided with closing arrangements which either comply with regulation 57(6) of these Regulations or are provided with power operated closing arrangements operable from the control position required by sub-paragraph (*h*) of this regulation.

(*f*) Means shall be provided, at a location outside the machinery spaces where they will be accessible in the event of fire, for stopping ventilation fans serving such spaces, forced draught fans, induced draught fans, oil fuel transfer and pressure pumps and other oil fuel pumps.

(*g*) Means shall be provided, at a location outside the machinery spaces where they will be accessible in the event of a fire, for closing all machinery space ventilators, annular spaces around funnels and other openings to such spaces.

(*h*) The controls required by sub-paragraphs (*b*), (*c*), (*f*) and (*g*) of this regulation shall, together with the oil fuel installation controls required by regulation 114(14) of these Regulations and the fixed fire extinguishing system controls required by regulations 7, 14 or 15 of the Merchant Shipping (Fire Appliances) Regulations 1980, be located at one control position where they will be available in the event of fire. The Secretary of State may permit such controls to be grouped in more than one control position if he is satisfied that the arrangements provided are not less effective.

(*i*) Any machinery space of Category A which is accessible from an adjacent shaft tunnel shall be provided with a light-weight steel fire-screen door in addition to any water tight door. The fire-screen door shall be operable from each side and shall be located at the shaft tunnel side of the bulkhead.

PART V A

FIRE PROTECTION: NEW SHIPS OF CLASSES I, II AND II(A)

Application of Part VA

67. This Part of these Regulations applies to new United Kingdom ships of Classes I, II and II(A) carrying not more than 36 passengers.

Passenger ships carrying not more than 36 passengers

68.—(1) Every ship to which this regulation applies, being a ship carrying not more than 36 passengers shall comply with regulation 52 except that any reference to steel or other equivalent material, shall mean that the fire integrity and insulation standards of the structure shall be in accordance with Tables 1 and 2 of at the end of regulation 71.

Main vertical zones and horizontal zones

69.—(1) The hull, superstructure and deckhouses in the way of accommodation and service spaces of every ship to which this Part of these Regulations

applies shall be subdivided by bulkheads consisting of "A" Class divisions into main vertical zones. The mean length of each zone on any one deck above the bulkhead deck shall not in general exceed 40 metres. Steps and recesses shall be kept to a minimum, but any which are necessary shall consist of "A" Class divisions. These divisions shall have insulation values in accordance with the tables at the end of regulation 71, except that where insulation values of "B—0" and "C" appear in Table 1 the value of "A—0" shall be substituted.

(2) Any portions of such divisions which extend above the bulkhead deck shall, whenever possible, be in line with watertight subdivision bulkheads situated immediately below the bulkhead deck and shall extend from deck to deck and to the ship's shell and, in the case of a deckhouse, to the external plating thereof.

(3) Where a main vertical zone is subdivided by horizontal "A" Class divisions into horizontal zones for the purpose of providing an appropriate barrier between sprinklered 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 2 at the end of regulation 71 of these Regulations.

(4) In ships designed for special purposes, such as car or train services, where the provision of main vertical zone bulkheads would conflict with the purpose for which the ship is intended, the Secretary of State may allow an equivalent means for controlling and limiting a fire to be substituted:

Provided that in a ship with special category spaces, any such space shall comply with the applicable provisions of regulation 80 of these Regulations and in so far as such compliance would be inconsistent with compliance with other requirements of this Part of the Regulations, the requirements of regulation 80 shall prevail.

Bulkheads within a main vertical zone

70.—(1) Every bulkhead within the accommodation spaces or service spaces of every ship to which this Part of these Regulations applies, not being a bulkhead required by these Regulations to consist of an "A" Class division, shall consist of a "B" Class or a "C" Class division as prescribed in the tables at the end of regulation 71. All such divisions may be faced with combustible materials in accordance with the provisions of regulation 77 of these Regulations.

(2) All corridor bulkheads where not required to be "A" Class, shall be "B" Class divisions, which shall extend from deck to deck except:—

(*a*) When continuous "B" Class ceilings and/or linings are fitted on both sides of the bulkhead, the portion of the bulkhead behind the continuous ceiling or lining shall be of a material which in thickness and composition meets the requirements of "B" Class divisions, but which is required to meet "B" Class fire integrity standards only so far as is reasonable and practicable in the opinion of the Secretary of State.

(*b*) In the case of a ship protected by an automatic sprinkler system complying with the provisions of Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980, a corridor bulkhead of "B" Class integrity may terminate at a ceiling in the corridor, provided that such a ceiling is of a material which, in thickness and composition, is acceptable in the construction of "B" Class divisions. Notwithstanding the requirements of regulation 71, such bulkheads and ceilings are required to meet "B" Class fire integrity standards only as far as is reasonable and

practicable in the opinion of the Secretary of State. All doors and frames in such bulkheads shall be of non-combustible materials and shall be constructed and erected so as to provide adequate fire resistance to the satisfaction of the Secretary of State.

(3) Every bulkhead required to be a "B" Class division, except a corridor bulkhead, shall extend from deck to deck and to the shell or other boundaries unless continuous "B" Class ceilings and/or linings are fitted on both sides of the bulkhead, in which case the bulkhead may terminate at the continuous ceiling or lining.

Fire integrity of bulkheads and decks

71.—(1) In addition to complying with the specific provisions for fire integrity of bulkheads and decks of these Regulations, the minimum fire integrity of bulkheads and decks shall be as prescribed in paragraphs (2) to (4) of this regulation and the tables at the end of this regulation.

(2) Where, due to any particular structural arrangement in the ship, there may be doubt in determining from the tables the minimum fire integrity and insulation standard of any division, such standard shall be determined to the satisfaction of the Secretary of State.

(3) The following requirements shall govern application of the tables:—

(*a*) Tables 1 and 2 shall apply respectively to the bulkheads and decks separating adjacent spaces.

(*b*) For the purpose of determining the appropriate fire integrity and insulation standards to be applied to boundaries between adjacent spaces, such spaces are classified according to their fire risk as shown in Categories (1A) to (11A) below. The number in parentheses preceding each category refers to the applicable column or row numbers in the tables.

(1A) *control stations* include:

spaces containing emergency sources of power and lighting;

wheelhouse and chartroom;

spaces containing ship's radio equipment;

fire extinguishing installation rooms, fire control stations and fire-recording stations;

control room for propelling machinery when located outside the machinery space;

spaces containing centralized fire alarm equipment.

(2A) *corridors* include passenger and crew space corridors and lobbies.

(3A) *accommodation spaces* include:

public spaces of any size, such as halls, dining rooms, lounges and similar permanently enclosed spaces;

cabins;

hospitals and dispensaries;

offices;

lavatories;

motion picture projection and film storage rooms;

games and hobbies rooms;

pantries containing no cooking appliances.

(4A) *stairways* include interior stairways, lifts and escalators and enclosures thereto (other than those wholly contained within the machinery spaces); 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.

(5A) *service spaces (low risk)* include lockers and storerooms having areas of less than 4 square metres, drying rooms and laundries.

(6A) *machinery spaces of Category A* include spaces as defined in regulation 1 of these Regulations.

(7A) *other machinery spaces* include machinery spaces as defined in regulation 1 of these Regulations but excluding machinery spaces of Category A.

(8A) *cargo spaces* include all spaces used for cargo (including cargo oil tanks) and trunkways and hatchways to such spaces, other than special category spaces.

(9A) *service spaces (high risk)* include galleys, pantries containing cooking appliances, paint and lamp rooms, lockers and storerooms having areas of 4 square metres or more, workshops other than those forming part of the machinery spaces.

(10A) *open decks* include:

open deck spaces, enclosed promenades containing no fire risk, and the space outside superstructures and deckhouses.

(11A) *special category spaces* include all enclosed spaces above or below the bulkhead deck intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion, into and from which such vehicles can be driven and to which passengers have access.

(*c*) Where a single value is shown for the fire integrity of a boundary between two spaces, that value shall apply in all cases.

(*d*) 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 Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980, or between such zones neither of which is so protected the higher of the two values given in the tables shall apply.

(*e*) 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 Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980, 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.

(*f*) Where spaces are of the same numerical category and superscription "1" is specified a bulkhead or deck of the rating shown in the tables is only required when the adjacent spaces are for a different purpose, so that in category (9A) a galley next to a galley does not require a bulkhead, but a galley next to a paint room requires an "A—0" bulkhead.

(*g*) Bulkheads separating the wheelhouse and chartroom from each other may be "B—0" rating.

(*h*) For the application of paragraph (1) of regulation 69 of these Regu-

lations "B—0" and "C" where appearing in Table 1 shall be read as "A—0".

(*i*) Where an asterisk is specified in the tables, the division is required to be of steel or equivalent material but is not required to be of "A" Class standard. For the application of paragraph (1) of regulation 69 of these Regulations an asterisk where appearing in Table 2, except categories (8A) and (10A), shall be read as "A—0".

(4) 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.

(5) The integrity of "A" Class divisions shall be maintained at intersections and boundaries.

TABLE 1.—FIRE INTEGRITY OF BULKHEADS SEPARATING ADJACENT SPACES

Spaces		(1A)	(2A)	(3A)	(4A)	(5A)	(6A)	(7A)	(8A)	(9A)	(10A)	(11A)
Control Stations	(1A)	A-0	A-0	A-60	A-0	A-15	A-60	A-15	A-60	A-60	•	A-60
Corridors	(2A)		C	B-0	A-0	B-0	A-60	A-0	A-0	A-15 A-0	•	A-15
Accommodation Spaces	(3A)			C	A-0	B-0	A-60	A-0	A-0	A-15 A-0	•	A-30 A-0
Stairways	(4A)				A-0	A-0	A-60	A-0	A-0	A-15 A-0	•	A-15
Service Spaces (Low Risk)	(5A)					C	A-60	A-0	A-0	A-0	•	A-0
Machinery Spaces of Category A	(6A)						•	A-0	A-0	A-60	•	A-60
Other Machinery Spaces	(7A)							A-0[1]	A-0	A-0	•	A-0
Cargo Spaces	(8A)								•	A-0	•	A-0
Service Spaces (High Risk)	(9A)									A-0[1]	•	A-30
Open Decks	(10A)										—	A-0
Special Category Spaces	(11A)											A-0

TABLE 2.—FIRE INTEGRITY OF DECKS SEPARATING ADJACENT SPACES

Space Below ↓ / Space Above →		(1A)	(2A)	(3A)	(4A)	(5A)	(6A)	(7A)	(8A)	(9A)	(10A)	(11A)
Control Stations	(1A)	A-0	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0	•	A-30
Corridors	(2A)	A-0	•	•	A-0	•	A-60	A-0	A-0	A-0	•	A-0
Accommodation Spaces	(3A)	A-60	A-0	•	A-0	•	A-60	A-0	A-0	A-0	•	A-30 A-0
Stairways	(4A)	A-0	A-0	A-0	•	A-0	A-60	A-0	A-0	A-0	•	A-0
Service Spaces (Low Risk)	(5A)	A-15	A-0	A-0	A-0	•	A-60	A-0	A-0	A-0	•	A-0
Machinery Spaces of Category A	(6A)	A-60	A-60	A-60	A-60	A-60	•	A-60	A-30	A-60	•	A-60
Other Machinery Spaces	(7A)	A-15	A-0	A-0	A-0	A-0	A-0	•	A-0	A-0	•	A-0
Cargo Spaces	(8A)	A-60	A-0	A-0	A-0	A-0	A-0	A-0	•	A-0	•	A-0
Service Spaces (High Risk)	(9A)	A-60	A-30 A-0	A-30 A-0	A-30 A-0	A-0	A-60	A-0	A-0	A-0	•	A-30
Open Decks	(10A)	•	•	•	•	•	•	•	•	•	—	A-0
Special Category Spaces	(11A)	A-60	A-15	A-30 A-0	A-15	A-0	A-30	A-0	A-0	A-30	A-0	A-0

Protection of stairways and lifts in accommodation and service spaces

72.—(1) All stairways shall be of steel frame construction except where the Secretary of State may approve the use of other equivalent material, and shall be within enclosures formed of "A" Class divisions, except that:

(*a*) a stairway connecting only two decks need not be enclosed on both decks provided the integrity of the deck is maintained by proper bulkheads or doors at one between-deck. When a stairway is closed at one between-deck space, the stairway enclosure shall have the same integrity standard as is required by Table 2 at the end of regulation 71 for the deck which separates the between-deck spaces;

(*b*) stairways may be fitted in the open in a public space provided they lie wholly within such public space.

(2) Every opening in a stairway enclosure shall be provided with a means of closure which shall be permanently attached thereto.

(3) Every stairway enclosure shall have direct communication with the corridors and be of sufficient area to prevent congestion having regard to the number of persons likely to use them in an emergency. In so far as practicable, stairway enclosures shall not give direct access to cabins, service lockers or other enclosed spaces containing combustibles in which a fire is likely to originate.

(4) Every lift trunk 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.

Openings in "A" Class divisions

73.—(1) Where an "A" Class division is pierced for the passage of electric cables, pipes, trunks, girders or beams or for other purposes, the arrangements shall be such that the effectiveness of the division in resisting fire is not thereby impaired except as provided in paragraph (7) of this regulation.

(2) Where of necessity, a ventilation duct passes through a main vertical zone bulkhead, an automatic closing fire damper shall be fitted adjacent to the bulkhead. The damper shall also be capable of being manually closed from each side of the bulkhead. The operating position shall be readily accessible and be marked in red light-reflecting colour. The duct between the bulkhead and the damper shall be of steel or other equivalent material and, if necessary, be insulated to a standard such as to comply with paragraph (1) of this regulation. The damper shall be fitted with a visible indicator at each operating position showing whether the damper is in the open or shut position.

(3) Except for hatches between special category spaces within a single horizontal zone or between cargo spaces or stores or baggage spaces, and between such spaces and the weather decks, all openings shall be provided with a permanently attached means of closing which shall be at least as effective for resisting fire as the division in which it is fitted.

(4) Every door and door frame in an "A" Class division shall be constructed of steel or other equivalent material and the means of securing it 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 doors are situated: provided that a watertight door shall not be required to be insulated.

(5) Any door in such a division shall be so constructed that it can be opened and closed by one person from either side of the division.

(6) Every door, in a division constructed in compliance with regulation 69(1) and 72(1) of these Regulations, except a watertight door or one which is normally locked, shall be self-closing and capable of closing against an adverse inclination of up to 3½ degrees. The speed of door closure shall be controlled so as to prevent undue danger to personnel. All such doors which are held in the open position shall be capable of release from a control station, either simultaneously or in groups, and also individually from a position at the door. The release mechanism shall be so designed that the door will automatically close in the event of disruption of the control system, except that this requirement shall not apply to approved watertight doors. Hold-back hooks, not subject to control station release, are not permitted.

(7) Where a space is protected by an automatic sprinkler system complying with the provisions of Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980 or fitted with a continuous "B" Class ceiling, the closing of openings in decks not forming steps in main vertical zones nor bounding horizontal zones shall be closed reasonably tight and such decks shall meet the "A" Class integrity requirements in so far as is reasonable and practicable in the opinion of the Secretary of State.

(8) The requirements for "A" Class integrity of the outer boundaries of a ship shall not apply to glass partitions, windows and sidescuttles, subject to the requirements of regulation 76. The requirements for "A" Class integrity shall not apply to exterior doors in superstructures and deckhouses, except that doors opening onto lifeboat and liferaft handling and embarkation areas shall be of such construction as to protect these areas from a space having a potential fire hazard.

Openings in "B" Class divisions

74.—(1) Where a "B" Class division is pierced for the passage of electric cables, pipes, trunks, girders, beams, or for other purposes, the arrangements shall be such that the effectiveness of the division in resisting fire is not thereby impaired except as provided in paragraph (5) of this regulation.

(2) All 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 as far as practicable equivalent to the division, 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 square metre. When such opening is cut in a door it shall be fitted with a grill made of steel. Doors shall be non-combustible.

(3) 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.

(4) A door which separates a cabin from an individual interior sanitary space, such as a shower space, may be constructed of combustible materials.

(5) Where an automatic sprinkler system complying with the provisions of Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980 is fitted:

(*a*) the closing of openings in decks need only meet the "B" Class integrity requirements in so far as is reasonable and practicable;

(*b*) openings in corridor bulkheads of "B" Class materials shall be protected in accordance with the provisions of regulation 70 of these Regulations.

Ventilation systems

75.—(1) Wherever practicable the system of ducts leading from each ventilating fan shall be within one main vertical or horizontal zone.

(2) Where ventilation systems penetrate decks, precautions shall be taken, in addition to those relating to the fire integrity of the decks required by regulation 73 of these Regulations, 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 tables at the end of regulation 71.

(3) The main inlets of every air supply system and the main outlets of every air exhaust system shall be capable of being closed from external positions.

(4) Ducts serving a stairway enclosure shall be taken from the fan room independently of other ducts in the ventilation system and shall not serve any other space.

(5) All power ventilation of accommodation spaces, service spaces, control stations (except any alternative ventilation system which may be required under paragraph (6) of this regulation) and machinery spaces shall be capable of being stopped from an easily accessible position outside the space being served. This position should not be so situated as to be 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 the ventilation of other spaces.

(6) There shall be provided for every control station situated below deck, other than a control station situated in the machinery space, means to ensure ventilation, visibility and freedom from smoke within it so that in the event of a fire in the ship, the equipment it contains may be operated effectively. Unless the control station is situated on, and has access to, an open deck or is provided with local closing arrangements equally effective to maintain ventilation, visibility and freedom from smoke in the event of a fire in the ship, there shall be provided at least two entirely separate means of supplying air to such control stations and the air inlets to these sources of supply shall be so situated that the risk of both drawing in smoke simultaneously is, as far as practicable, eliminated.

(7) Except in cargo spaces, ventilation ducts shall be constructed of the following materials:—

(*a*) Ducts not less than 0·075 square metre in sectional area and all vertical ducts serving more than a single between-deck space shall be constructed of steel or other equivalent material.

(*b*) Subject to the requirements of sub-paragraph (*c*) and of paragraphs (8) and (9), ducts of less than 0·075 square metre in sectional area 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.

(*c*) Ducts, not in general exceeding 0·02 square metre in sectional area nor 2 metres in length, need not be non-combustible provided that the following conditions are satisfied:

(i) the duct is constructed of suitable material having regard to the risk of fire;

(ii) the duct is used only at the terminal end of the ventilation system; and

(iii) the duct is not located closer than 0·6 metre along its length to a penetration of an "A" or "B" Class division.

(8) Ducts provided for the ventilation of machinery spaces of Category A, galleys or car deck spaces shall not pass through accommodation spaces, service spaces or control stations unless either:—

(*a*)(i) the ducts are constructed of steel having a thickness of at least 3 millimetres and 5 millimetres for ducts the widths or diameters of which are up to and including 300 millimetres and 760 millimetres and over respectively and, in the case of such ducts, the widths or diameters of which are between 300 and 760 millimeters having a thickness to be obtained by interpolation;

(ii) are suitably supported and stiffened;

(iii) are fitted with automatic fire dampers close to the boundaries penetrated; and

(iv) are insulated to "A—60" standard from the machinery space, galley or car deck space to a point at least 5 metres beyond each fire damper; or;

(*b*)(i) the ducts are constructed of steel in accordance with (*a*)(i) and (ii) of this paragraph; and

(ii) are insulated to "A—60" standard throughout the accommodation spaces, service spaces or control stations;

except that penetrations of main zone bulkheads or decks shall comply with the requirements of regulation 73.

(9) Ducts providing ventilation to accommodation spaces, service spaces or control stations shall not pass through machinery spaces of Category A, galleys or car deck spaces unless either—

(*a*)(i) the ducts where they pass through a machinery space of Category A, galley or car deck space are constructed of steel in accordance with paragraph (8)(*a*)(i) and (ii) of this regulation;

(ii) automatic fire dampers are fitted close to the boundaries penetrated; and

(iii) providing the integrity of the machinery space, galley or car deck space boundaries is maintained at the penetrations; or;

(*b*)(i) the ducts where they pass through a machinery space of Category A, galley or car deck space are constructed of steel in accordance with paragraph (8)(*a*)(i) and (ii) of this regulation; and

(ii) are insulated to "A—60" standard within the machinery space, galley or car deck space;

except that penetrations of main zone bulkheads and decks shall comply with regulation 73.

(10) Exhaust ducts from galley ranges, where they pass through accommodation spaces containing combustible materials, shall be constructed of "A" Class divisions. Every exhaust duct shall be fitted with—

(*a*) a grease trap readily removable for cleaning;

(*b*) a fire damper located in the duct at the boundary of the galley;

(*c*) arrangements, operable from within the galley, for shutting off the exhaust fan; and

(*d*) a fixed means of extinguishing a fire within the duct.

(11) Where a ventilation duct of sectional area exceeeding 0·02 square metre passes through an "A" Class bulkhead or deck, the opening in the bulkhead or deck shall be lined with a steel sheet sleeve unless the duct, where it passes through the bulkhead or deck, is constructed of steel. At the penetration the sleeve or duct shall comply with the following specification:—

(*a*) the duct or sleeve shall have a thickness of at least 3 millimetres over a length of 900 millimetres. When passing through bulkheads this length shall if possible be divided into 450 millimetres on each side of the bulkhead. The duct or sleeve shall be insulated so as to maintain the standard of fire integrity of the deck or bulkhead; and

(*b*) every duct shall be fitted with a fire damper unless the Secretary of State determines otherwise. In every duct of sectional area exceeding 0·075 square metre, the fire damper shall operate automatically but it shall also be capable of being closed manually from each side of the bulkhead or deck. The operating position shall be readily accessible and be marked in red light-reflecting colour. The damper shall be fitted with a visible indicator showing whether the damper is in the open or shut position. 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 and insulation value as the bulkheads which they pierce.

(12) Where a ventilation duct of sectional area exceeding 0·02 square metre passes through a "B" Class bulkhead, the opening shall be lined with a steel sleeve of 900 millimetres in length unless the duct, where it passes through the bulkhead, is constructed of steel. This length shall be divided, if possible, into 450 millimetres on each side of the bulkhead.

Windows and sidescuttles

76.—(1) All windows and sidescuttles in bulkheads within accommodation and service spaces and control stations other than those to which the provisions of paragraph 8 of regulation 73 and paragraph 3 of regulation 74 of these Regulations apply, shall be constructed so as to preserve the integrity requirements of the type of bulkheads in which they are fitted.

(2) Notwithstanding the requirements of the Tables at the end of regulation 71 of these Regulations:

(*a*) 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 bead or angle;

(*b*) the fire integrity of windows facing open or enclosed lifeboat and liferaft embarkation areas and of windows situated below such areas in such a position that their failure during a fire would impede the launching of, or embarkation into, lifeboats or liferafts shall be such that any potential fire hazard is kept to a minimum.

Restriction of combustible materials

77.—(1) Within accommodation spaces, service spaces and control stations—

(*a*) The following surfaces shall be such that a Class 1 or 2 surface spread of flame will not be exceeded:

(i) exposed surfaces in corridor, stairway enclosures, bulkheads, wall and ceiling linings; and

(ii) concealed or inaccessible spaces.

(*b*) The total volume of combustible facings, mouldings, decorations and veneers shall not exceed a volume equivalent to 2·5 millimetres of veneer on the combined area of walls and ceilings. In the case of ships fitted with an automatic sprinkler system complying with the provisions of Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980, the above volume may include some combustible material used for the erection of "C" Class divisions.

(*c*) Veneers used on surfaces and linings to which paragraphs (1)(*a*) applies shall not have a gross calorific potential exceeding 45 megajoules per square metre of surface area for the thickness used as measured in accordance with International Standard ISO 1716-1973(E).

(*d*) Furniture in the corridors and stairway enclosures shall be kept to a minimum.

(*e*) Primary deck coverings, if applied, shall be of approved material which will not readily ignite or give rise to toxic or explosive hazards at elevated temperatures.

(*f*) Waste-paper receptacles shall be constructed of non-combustible materials and with solid sides and bottoms.

(2) Within accommodation spaces, service spaces, control stations and machinery spaces—

(*a*) all ceilings, linings, draught stops and insulating materials shall be of non-combustible materials except in respect of:

(i) mail rooms and baggage rooms;

(ii) materials used to insulate refrigerated compartments;

(iii) materials used to insulate valves associated with hot and cold service systems if their exposed surfaces are such that a Class 1 or 2 surface spread of flame will not be exceeded;

(iv) vapour barriers and adhesives used in conjunction with insulating materials if their exposed surfaces are such that a Class 1 or 2 surface spread of flame will not be exceeded.

(*b*) Paints, varnishes and other finishes used on exposed interior surfaces shall not be capable of producing excessive quantities of smoke and toxic products.

Miscellaneous items of fire protection

78.—(1) The following provisions shall apply to all parts of any ship to which this Part of these Regulations applies:—

(*a*) any pipe which penetrates an "A" Class or "B" Class division shall be of suitable material and having regard to the temperature such divisions are required to withstand;

(*b*) pipes intended for oil or other flammable liquids shall be of suitable material having regard to the risk of fire;

(*c*) overboard scuppers, sanitary discharges or other outlets close to or below the waterline shall not be of a material likely to fail in the event of fire and thereby give rise to a danger of flooding.

(2) The following provisions shall apply to the accommodation and service spaces, control stations, corridors and stairways of any ship to which this Part of these Regulations applies:—

(*a*) every air space enclosed behind a ceiling, panel or lining shall be divided

by close-fitting draught-stops, which shall be spaced not more than 14 metres apart and which shall be closed at each deck;

(*b*) every ceiling panel and lining shall be so constructed as to enable a fire patrol to detect any smoke originating in a concealed or inaccessible space without impairing the efficiency of the fire protection of the ship. The Secretary of State may exempt any ship from the requirements of this regulation if he is satisfied that there is no risk of fire originating in such a space.

Automatic sprinkler and fire alarm and fire detection system or automatic fire alarm and fire detection system

79.—(1) In every ship to which this Part of these Regulations applies there shall be installed throughout each separate zone, whether vertical or horizontal, in all accommodation and service spaces and in control stations either;

(*a*) an automatic sprinkler and fire alarm and fire detection system complying with the requirements specified in Schedule 11 to the Merchant Shipping (Fire Appliances) Regulations 1980 and so arranged to protect all such spaces in the ship; or

(*b*) an automatic fire alarm and fire detection system complying with the requirements specified in Schedule 12 to the Merchant Shipping (Fire Appliances) Regulations 1980 and so arranged to detect the presence or the signs of a fire and its location in any such spaces.

(2) the Secretary of State may exempt any ship from the requirements of this regulation:

(*a*) in the case of any spaces which afford no substantial fire risk; or

(*b*) in the case of any control station.

Protection of special category spaces

80.—(1) The following provisions shall apply to special category spaces, whether above or below the bulkhead deck, of any ship to which this Part of these Regulations applies:—

(*a*)(i) if normal main vertical zoning is not practicable in special category spaces, equivalent protection shall be obtained in such spaces by horizontal zoning and the provision of an efficient fixed fire-extinguishing system. A horizontal zone for the purpose of this regulation may include special category spaces on more than one deck provided that the overall height of the zone does not exceed 10 metres;

(ii) all requirements laid down in regulations 73 and 75 of these Regulations for maintaining the integrity of vertical zones shall apply to decks and bulkheads forming the boundaries separating horizontal zones from each other and from the remainder of the ship.

Structural protection

(*b*)(i) Boundary bulkheads of special category spaces shall be insulated as required for Category (11A) spaces in Table 1 and the horizontal boundaries as required for Category (11A) spaces in Table 2 at the end of regulation 71 of these Regulations.

(ii) Indicators shall be provided on the navigating bridge which shall indicate when any access fire door in the boundary of a special category space is closed.

Fixed fire-extinguishing system

(*c*) Every special category space shall be fitted with a manually operated fixed pressure water-spraying system which complies with the requirements specified in Schedule 8 to the Merchant Shipping (Fire Appliances) Regulations 1980. The Secretary of State may permit any other fixed fire extinguishing system which he is satisfied is equally effective by full-scale test in conditions simulating a flowing petrol fire in a special category space.

Patrols and detection

(*d*)(i) An automatic fire alarm and fire detection system of an approved type shall be provided unless an efficient continuous patrol system is maintained.

(ii) Manual fire alarms shall be provided throughout the special category spaces and one shall be placed close to each exit from such spaces.

Ventilation system

(*e*) Every special category space shall be provided with a ventilation system capable of changing the atmosphere within such spaces at least ten times per hour based upon the gross volume of the space. The ventilation system shall be arranged to prevent stratification of the atmosphere and the formation of gas pockets in such spaces. The ventilation system shall be separate from any other ventilation system and the master shall ensure that it shall be operated at all times when vehicles are in such spaces. Any loss or reduction of the ventilation system capacity shall be indicated on the navigating bridge. The outlet from any exhaust ventilation duct shall be sited in a safe position having regard to possible sources of ignition.

Additional requirements applicable only to special category spaces above the bulkhead deck

(2) The following provisions shall apply additionally to those in paragraph (1) of this regulation to special category spaces above the bulkhead deck of any ship to which this Part of these Regulations applies:—

Scuppers

(*a*) To ensure the clearance 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.

Precautions against ignition of flammable vapours

(*b*) Electrical equipment, wiring and other equipment capable of igniting flammable vapours shall not be installed less than 450 mm above any deck on which vapours may accumulate: Provided that electrical equipment and wiring may be installed below such level and within the ventilation trunks, if it is essential for the safe operation of the ship, provided that the equipment is of a type suitable for use in an explosive petrol vapour and air mixture. Electrical equipment installed more than 450 mm above any deck on which vapours may accumulate shall be enclosed and protected to prevent discharge of sparks.

Additional requirements applicable only to special category spaces below the bulkhead deck

(3) The following provisions shall apply additionally to paragraph (1) of this

regulation to special category spaces below the bulkhead deck of any ship to which this Part of these Regulations applies:—

Bilge pumping and drainage

(*a*) Adequate bilge pumping and drainage facilities shall be provided to ensure the clearance of water from the deck or tank top following the operation of the fixed pressure water-spraying system. Where the capacity of the bilge pumps is insufficient to ensure the clearance of the water, additional bilge pumping capacity shall be provided.

Precautions against ignition of flammable vapours

(*b*) Electrical equipment and wiring within such spaces and in ventilation trunks serving such spaces shall be of a type suitable for use in an explosive petrol vapour and air mixture. Other equipment which may constitute a source of ignition of flammable vapours shall not be fitted.

Protection of cargo spaces, other than special category spaces, intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion

81. In every ship to which this Part of these Regulations applies, the following provisions shall apply to any cargo space, other than special category spaces, containing motor vehicles with fuel in their tanks for their own propulsion:—

Fire detection

(*a*) An automatic fire alarm and fire detection system complying with the requirements specified in Schedule 12 to the Merchant Shipping (Fire Appliances) Regulations 1980 shall be provided.

Fire extinguishing arrangements

(*b*) A fixed fire extinguishing system complying with the requirements specified in Schedule 9 to the Merchant Shipping (Fire Appliances) Regulations 1980 shall be provided.

Ventilation system

(*c*) Every such space shall be provided with a ventilation system capable of changing the atmosphere within such spaces at least 6 times per hour based upon the gross volume of the space. The ventilation system shall be arranged to prevent stratification of the atmosphere and the formation of gas pockets in such spaces. The ventilating system shall be separate from any other ventilation system and the master shall ensure that it shall be operated at all times when vehicles are in such spaces. Any loss or reduction of the ventilation system capacity shall be indicated on the navigating bridge. The outlet from any exhaust ventilation duct shall be sited in a safe position having regard to possible sources of ignition.

Precautions against ignition of flammable vapours

(*d*) Electrical equipment and wiring within such spaces and their exhaust ventilation trunks shall be of a type suitable for use in an explosive petrol vapour and air mixture. Other equipment which may constitute a source of ignition of flammable vapours shall not be fitted.

Special arrangement in machinery spaces

82. The following provisions shall apply to machinery spaces of any ship to which this Part of these Regulations applies:—

(*a*) The number of openings to machinery spaces shall be the minimum compatible with the proper working of the ship.

(*b*) The skylights to machinery spaces of Category A shall be constructed of steel and their flaps shall be capable of being closed and opened from a suitable position outside the space in the event of fire.

(*c*) Suitable arrangements shall be made to permit the release of smoke in the event of fire.

(*d*) Windows shall not be fitted in machinery space casings.

(*e*) Doors in the boundaries of machinery spaces of Category A, other than watertight doors, shall be arranged so that the closure of the door will be assured in the event of fire in the space. The doors shall be provided with closing arrangements which either comply with regulation 73(6) of these Regulations or are provided with power operated closing arrangements operable from a location outside the machinery spaces where they will be accessible in the event of a fire.

(*f*) Means shall be provided, at a location outside the machinery spaces where they will be accessible in the event of fire, for stopping ventilation fans serving such spaces, forced draught fans, induced draught fans, oil fuel transfer and pressure pumps and other oil fuel pumps.

(*g*) Means shall be provided, at a location outside the machinery spaces where they will be accessible in the event of a fire, for closing all machinery space ventilators, annular spaces around funnels and other openings to such spaces.

(*h*) Any machinery space of Category A which is accessible from an adjacent shaft tunnel shall be provided with a light-weight steel fire-screen door in addition to any watertight door. The fire-screen door shall be operable from each side and shall be located at the shaft tunnel side of the bulkhead.

PART VB

FIRE PROTECTION: NEW AND EXISTING SHIPS OF CLASSES III TO VI(A) INCLUSIVE

Application of Part VB

83. This Part of these Regulations applies to new and existing ships of Classes III to VI(A) inclusive.

Structure of the ship

84. The hull, superstructure, structural bulkheads, decks and deckhouses of every ship of Classes III and IV shall be constructed of steel. The Secretary of State may exempt any ship wholly or in part from the requirement of this regulation.

Divisions

85. In every ship to which this Part of these Regulations applies, being a ship fitted with internal combustion propelling machinery or oil-fired boilers, the accommodation spaces shall be separated from machinery spaces by "A" Class divisions.

PART VC

FIRE PROTECTION: EXISTING SHIPS OF CLASSES I, II AND II(A)

Application of Part VC

86. This Part of these Regulation applies to existing ships of Classes I, II and II(A) carrying more than 36 passengers.

(1) Ships, the keels of which were laid or which were at a similar stage of construction before 19 November 1952 shall comply with the provisions of regulations 87 to 101 of this Part;

(2) Ships, the keels of which were laid or which were at a similar stage of construction on or after 19 November 1952 but before 26 May 1965, shall comply with the provisions of the Merchant Shipping (Construction) Rules 1952(a) as though those Rules had not been revoked, relating to fire safety measures and shall comply with the provisions of regulations 89(2) and (3), 96, 98(2), 99 and 101 of these Regulations.

(3) Ships, the keels of which were laid on or after 26 May 1965 but before 25 May 1980, shall, unless they comply with regulations 51 to 66 of these Regulations, comply with the provisions of the Merchant Shipping (Passenger Ship Construction) Rules 1965 as though those Rules had not been revoked, relating to fire safety measures and shall also comply with the provisions of regulations 43 and 89(2) and (3) of these Regulations.

Structure

87. The structure of the ship shall be of steel or other suitable material in compliance with paragraph (1) of Rule 45 of the Merchant Shipping (Construction) Rules 1952, except that isolated deckhouses containing no accommodation and decks exposed to the weather may be of wood if structural fire protection measures are taken to the satisfaction of the Secretary of State.

Main vertical zones

88. The ship shall be subdivided by "A" Class divisions into main vertical zones in compliance with Rule 45(2) and (3) of the Merchant Shipping (Construction) Rules 1952. Such divisions shall have as far as practicable adequate insulating value, having regard to the nature of the adjacent spaces as provided for in Rule 44(1) of those Rules.

Openings in main vertical zone bulkheads

89.—(1) The ship shall comply substantially with Rule 46 of the Merchant Shipping (Construction) Rules 1952.

(2) Fire doors shall be of steel.

(3) In the case of ventilation trunks and ducts having a cross-sectional area of 0·02 square metre or more which pass through main zone divisions, the following provisions shall apply:

(*a*) for trunks and ducts having cross-sectional areas between 0·02 square metre and 0·075 square metre inclusive, fire dampers shall be of a fail-safe automatic closing type, or such trunks and ducts shall be insulated for at least 457 millimetres on each side of the division to meet the applicable bulkhead requirements;

(*b*) for trunks and ducts having a cross-sectional area exceeding 0·075 square metre, fire dampers shall be of the fail-safe automatic closing type.

Separation of accommodation spaces from machinery, cargo and service spaces

90. The ship shall comply with Rule 47 of the Merchant Shipping (Construction) Rules 1952.

(a) S.I. 1952/1948.

Methods of fire protection and application

91. The accommodation spaces and service spaces in every ship to which this Part of these Regulations applies shall be constructed in accordance with any one of the following methods of fire protection, or a combination thereof:—

Method I: The construction in the accommodation spaces and service spaces of a system of internal bulkheading consisting of "B" Class divisions, together with an automatic fire alarm and fire detection system in these spaces.

Method II: The fitting of an automatic sprinkler, fire detection and fire alarm system in the accommodation spaces and service spaces.

Method III: The subdivision of the accommodation spaces and service spaces by "A" Class and "B" Class divisions, together with the fitting of an automatic fire alarm and fire detection system in all accommodation spaces and service spaces and a restriction of the provision of combustible material in these spaces.

Each accommodation space and service space in a ship shall comply with all the provisions stipulated in any one of paragraphs (1), (2), (3) or (4) of this regulation as appropriate:

(1) A ship shall be accepted for the purposes of Method I if a network of non-combustible "B" Class divisions is provided in substantial compliance with Rule 57(1) of the Merchant Shipping (Construction) Rules 1952 together with maximum use of non-combustible material in compliance with Rule 60(1) of those Rules.

(2) A ship shall be accepted for the purposes of Method II if:

(*a*) an automatic sprinkler, fire alarm and fire detection system is provided in substantial compliance with Rule 59 of, and the sixth Schedule to, the Merchant Shipping (Construction) Rules 1952, and

(*b*) the use of combustible materials of all kinds is reduced as far as is reasonable and practicable.

(3) A ship shall be accepted for the purposes of Method III if a network of "A" and "B" Class divisions is fitted from deck to deck in substantial compliance with rule 57(2) of the Merchant Shipping (Construction) Rules 1952, together with an automatic fire alarm and fire detection system in substantial compliance with Rule 58 of those Rules. The use of combustible and highly flammable materials shall be restricted as prescribed in Rule 60(2) of those Rules. Departure from the requirements of Rule 60(2) of those Rules may be permitted by the Secretary of State if a fire patrol is provided at intervals not exceeding 20 minutes.

(4) A ship shall be accepted for the purposes of Method III if:

(*a*) additional "A" Class divisions are provided within the accommodation spaces in order to reduce in those spaces the mean length of the main vertical zones to about 20 metres; and

(*b*) an automatic fire alarm and fire detection system is provided in substantial compliance with Rule 58 of the Merchant Shipping (Construction) Rules 1952; and

(*c*) all exposed surfaces, and their coatings, of corridor and cabin bulkheads in accommodation spaces have surfaces of low flame spread; and

(*d*) the use of combustible materials is restricted as prescribed in Rule 60(2) of the Merchant Shipping (Construction) Rules 1952. Departure from the requirements of Rule 60(2) of those Rules

may be permitted if a fire patrol is provided at intervals not exceeding 20 minutes; and

(*e*) additional non-combustible "B" Class divisions are fitted from deck to deck to form a network of bulkheads within which the area of any compartment, except public spaces, does not in general exceed 300 square metres.

Protection of vertical stairways

92. The stairways shall comply with Rule 48 of the Merchant Shipping (Construction) Rules 1952 except that, in exceptional cases, the Secretary of State may permit (*a*) the use of non-combustible "B" Class divisions and doors instead of "A" Class divisions and doors for stairway enclosures and (*b*) the retention of a wooden stairway if it is sprinkler-protected and satisfactorily enclosed.

Protection of lifts and vertical trunks for light and air

93. The ship shall comply with Rule 49 of the Merchant Shipping (Construction) Rules 1952.

Protection of control stations

94. The ship shall comply with Rule 50 of the Merchant Shipping (Construction) Rules 1952 except that, in cases where the disposition or construction of control stations is such as to preclude full compliance, such as timber construction of the wheelhouse, the Secretary of State may permit the use of free-standing non-combustible "B" Class divisions to protect the boundaries of such control stations. In such cases, where spaces immediately below such control stations constitute a significant fire hazard, the deck between shall be fully insulated as an "A" Class division.

Protection of store-rooms etc.

95. The ship shall comply with Rule 51 of the Merchant Shipping (Construction) Rules 1952.

Windows and sidescuttles

96. Skylights of engine and boiler spaces shall be capable of being closed from outside such spaces.

Ventilation systems

97.—(1) All power ventilation, except cargo and machinery space ventilation, shall be fitted with master controls so located outside the machinery space and in readily accessible positions that it shall not be necessary to go to more than three stations in order to stop all the ventilation fans to spaces other than machinery and cargo spaces. Machinery space ventilation shall be provided with a master control operable from a position outside the machinery space.

(2) Efficient insulation shall be provided for exhaust ducts from galley ranges where the ducts pass through accommodation spaces.

Miscellaneous items

98.—(1) The ship shall comply with Rule 54(1) and (2) of the Merchant Shipping (Construction) Rules 1952, except that in Rule 54(1), 20 metres shall be substituted for 13·73 metres.

(2) Fuel pumps shall be fitted with remote controls situated outside the space concerned so that they may be stopped in the event of a fire arising in the space in which they are located.

Cinematograph film

99. Cellulose-nitrate based film shall not be used in cinematograph installations on board ship.

Plans

100. Plans shall be provided in compliance with Rule 43 of the Merchant Shipping (Construction) Rules 1952.

Emergency source of electrical power

101.—(1) There shall be provided in a position above the bulkhead deck not forward of the collision bulkhead outside the machinery casings a self-contained emergency source of electrical power capable of operating simultaneously for a period of 36 hours, or for such shorter period as the Secretary of State may permit, in the case of any ship regularly engaged on voyages of short duration;

(*a*) the ship's emergency bilge pump, if it is electrically operated;

(*b*) the ship's watertight doors, if they are electrically operated;

(*c*) the ship's emergency lights at every boat station on deck and overside, in all alleyways, stairways and exits, in the machinery space, in the control stations where radio, main navigating and central fire recording equipments are situated, and in the place where the emergency generator, if any, is situated;

(*d*) the ship's navigation lights, if operated solely by electric power; and

(*e*) all communication equipment and signals which may be required in an emergency, if they are electrically operated from the ship's main generating sets.

(2) The emergency source of electrical power may be either an accumulator battery capable of complying with paragraph (1) of this regulation without being recharged or suffering an excessive voltage drop, or a generator driven by a compression ignition engine with an independent fuel supply and with efficient starting arrangements. The fuel provided for such engine shall have a flashpoint of not less than 43°C.

(3) The emergency source of electrical power shall be so arranged that it will operate efficiently when the ship is listed 22½° and when the trim of the ship is 10° from an even keel.

(4) (*a*) If the emergency source of electrical power is an accumulator battery, the arrangements shall be such that the ship's emergency lighting system will come into operation automatically in the event of the failure of the main source of power for the ship's main lighting system.

(*b*) If the emergency source of electrical power is a generator, an accumulator battery shall be provided as a temporary source of electrical power, so arranged as to come into operation automatically in the event of a failure of the main or emergency source of electrical power, and of sufficient capacity:

(i) to operate the ship's emergency lighting system continouusly for half an hour; and

(ii) while such lighting system is in operation, to close the ship's watertight doors if they are electrically operated, but not necessarily to close all of such doors simultaneously.

(*c*) Means shall be provided by which the automatic arrangements referred to in this paragraph can be tested.

PART VD

FIRE PROTECTION: EXISTING SHIPS OF CLASSES I, II AND II(A)

Application of Part VD

102. This Part of these Regulations applies to existing ships of Classes I, II and II(A) and new ships other than United Kingdom ships of Classes I and II carrying not more than 36 passengers.

Existing passenger ships carrying not more than 36 passengers

103.—(1) Every ship to which this Part of these Rules applies shall comply with Rules 48 to 51 inclusive, Rule 58, Rule 59(1), Rule 60, Rule 61, Rule 63(1) (*a*) (*b*) (*c*) and (*d*), Rule 63(2)(*c*) (*d*) (*e*) (*f*) and (*g*) of the Merchant Shipping (Passenger Ship Construction) Rules 1965. Where insulated "A" Class divisions are required by those Rules, the Secretary of State may permit smaller amounts of insulation to be fitted than are required by Rule 50(1) of those Rules.

(2) In every ship to which this Part of these Regulations applies the following additional provisions shall apply:—

(*a*) all stairways and means of escape in accommodation and service spaces shall be of steel or other equivalent material;

(*b*) power ventilation of a machinery space shall be capable of being stopped from an easily accessible position outside the space;

(*c*) except where all bulkheads in accommodation spaces conform with the requirements of Rules 53(1) and 54(1) of the Merchant Shipping (Passenger Ship Construction) Rules 1965, such ships shall be provided with an automatic fire alarm and fire detection system comforming with Rule 55 of those Rules, and in accommodation spaces the corridor bulkheads shall be of steel or shall be non-combustible "B" Class divisions.

PART VI

BOILERS AND MACHINERY: NEW SHIPS

Application of Part VI

104. This Part of these Regulations applies to every new ship to which these Regulations apply.

General

105. In every ship to which these Regulations apply the machinery, boilers and other pressure vessels shall be of a design and construction adequate for the service for which they are intended and shall be so installed and protected as to minimise any danger to persons on board. Without prejudice to the generality of the foregoing, means shall be provided which shall prevent overpressure in any part of such machinery, boilers and other pressure vessels, and in particular every boiler and every unfired steam generator shall be provided with not less than two safety valves. Provided that the Secretary of State may, having regard to the output or any other features of any boiler or unfired steam generator, permit only one safety valve to be fitted if he is satisfied that adequate protection against overpressure is thereby provided.

Boilers and other pressure vessels

106.—(1) In every ship to which these Regulations apply every boiler or other pressure vessel and its respective mountings shall, before being put into service for the first time, be subjected to a hydraulic test to a pressure suitably in excess of the working pressure which will ensure that the boiler or other pressure vessel and its mountings are adequate in strength and design for the intended service, having regard to:—

(*a*) the design and material of which it is constructed;

(*b*) the purpose for which it is intended to be used; and

(*c*) the working conditions under which it is intended to be used;

and every such boiler or other pressure vessel shall at any time thereafter be capable of withstanding such a test.

(2) Provision shall be made which will facilitate the cleaning and inspection of every pressure vessel.

Machinery

107.—(1) In every ship to which these Regulations apply the main and auxiliary machinery necessary for the propulsion and safety of the ship shall be provided with effective means of control, and the machinery shall be capable of being brought into operation when initially no power is available in the ship.

(2) In every such ship, where risk from over-speeding of machinery exists, means shall be provided to ensure that the safe speed is not exceeded, and in particular a governor shall be provided for any turbine or set of turbines which drives a single gear wheel forming part of the main propelling machinery so as to shut off the steam automatically in the event of overspeed. A hand trip gear shall also be provided for that purpose.

(3) In every such ship means shall be provided which will shut off automatically the steam from any ahead turbine and any other machinery served by the same lubricating oil system as the turbine in the event of any failure of that system.

(4) In every such ship where main or auxiliary machinery or any parts of such machinery are subject to internal pressure those parts shall, before being put into service for the first time, be subjected to a hydraulic test to a pressure suitably in excess of the working pressure having regard to :—

(*a*) the design and the material of which they are constructed;

(*b*) the purpose for which they are intended to be used; and

(*c*) the working conditions under which they are intended to be used;

and such parts shall at any time thereafter be capable of withstanding such a test.

Astern power

108.—(1) Every ship to which these Regulations apply shall have sufficient power for going astern 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, under normal manoeuvring conditions, and so to bring the ship to rest from maximum ahead service speed shall be demonstrated.

Shafts

109. In every ship to which these Regulations apply every shaft shall be so designed and constructed that it will withstand the maximum working stresses to which it may be subjected, with a factor of safety which is adequate having regard to—

(*a*) the material of which it is constructed;

(*b*) the service for which it is intended; and

(*c*) the type of engines by which it is driven or of which it forms a part.

Boiler feed systems

110.—(1) In every ship to which these Regulations apply every boiler fitted shall be provided with not less than two efficient and separate feed systems so arranged that either of such systems may be opened up for inspection or overhaul without affecting the efficiency of the other. Means shall be provided which will prevent overpressure in any part of the systems.

(2) In every such ship in which boilers are fitted there shall be provided not less than two feed pumps and when the boilers are operating under full load conditions, there shall be at least one feed pump available for stand-by duties.

(3) In every such ship in which boilers are fitted provision shall be made to ensure that a supply of suitable reserve feed water is available, having regard to the nature and intended duration of the voyage.

(4) If it is possible for oil to enter the feed water system in any such ship, the arrangements for supplying boiler feed water shall provide for the interception of oil in the feed water.

(5) Every feed check valve, fitting or pipe through which feed water passes from a pump to the boilers in any such ship shall be designed and constructed to withstand the maximum working stresses to which it may be subjected, with a factor of safety which is adequate having regard to the material of which it is constructed and the working conditions under which it will be used. Every such valve, fitting or pipe shall, before being put into service for the first time, be subjected to a hydraulic test suitably in excess of the maximum working pressure of the boiler to which it is connected or of the maximum working pressure to which the feed line may be subjected, whichever shall be the greater, and shall at any time thereafter be capable of withstanding such a test.

(6) In every such ship where oil fired water tube boilers are fitted, an automatic boiler water low level alarm and an automatic boiler water low level shut-off valve in the fuel supply pipe to the furnace fronts shall be provided.

Steam pipe systems

111.—(1) In every ship to which these Regulations apply every steam pipe and fitting connected thereto through which steam may pass shall be so designed and constructed as to withstand the maximum working stresses to which it may be subjected with a factor of safety which is adequate having regard to—

(*a*) the material of which it is constructed; and

(*b*) the working conditions under which it will be used.

(2) Without prejudice to the generality of the foregoing, every such steam pipe or fitting shall, before being put into service for the first time, be subjected to a test to a hydraulic pressure to be determined having regard to the requirements of sub-paragraphs (*a*) and (*b*) of the preceding paragraph but in no case to less

than twice the working pressure to which it may be subjected and shall at any time thereafter be capable of withstanding such a test.

(3) Steam pipes shall be adequately supported.

(4) Provision shall be made which will avoid excessive stress likely to lead to the failure of any such steam pipe or fitting, whether by reason of variation in temperature, vibration or otherwise.

(5) Efficient means shall be provided for draining every such steam pipe so as to ensure that the interior of the pipe is kept free of water and that water hammer action will not occur under any conditions likely to arise in the course of the intended service of the ship.

(6) If in any ship to which these Regulations apply a steam pipe may receive steam from any source at a higher pressure than it can withstand with an adequate factor of safety, an efficient reducing valve, relief valve and pressure gauge shall be fitted to such pipe.

Air pressure systems

112.—(1) In every ship to which these Regulations apply, being a ship in which machinery essential for the propulsion and safety of the ship or of persons on board is required to be started, operated or controlled solely by compressed air, there shall be provided at least two independently driven air compressors each of which shall be of efficient design and of sufficient strength and capacity for the service for which it is intended. Provided that in ships of Classes III to VI(A) inclusive only one such compressor shall be required.

(2) Every ship to which these Regulations apply, being a ship propelled by compression ignition engines designed to start by compressed air, shall be provided with at least two air receivers, which shall be of such aggregate capacity that, when they are filled with compressed air, the air contained therein will be sufficient to start each of the ship's main engines twelve times, if such engines are reversible, and six times, if such engines are non-reversible. Provided that in ships of Classes III to VI(A) inclusive only one such air receiver shall be required.

(3) Every air receiver and air bottle provided in any ship shall be fitted with means of access for purposes of inspection and shall be provided with efficient drains for the removal of oil and water and with efficient relief valves to prevent overpressure. If the air receiver or air bottle can be isolated from the relief valve, it shall be fitted with one or more fusible plugs so as to discharge its contents in the event of fire.

(4) (*a*) Every air pressure pipe provided in any such ship and every fitting connected to such pipe shall be capable of withstanding the maximum working stresses to which it may be subjected with a factor of safety which is adequate having regard to—

(i) the material of which it is constructed; and

(ii) the working conditions under which it is intended to be used.

(*b*) Without prejudice to the generality of the foregoing, every such pipe and fitting other than a pipe or fitting in a pneumatic control system, shall, before being put into service for the first time, be subjected to a test by hydraulic pressure to twice its maximum working pressure and shall at any time thereafter be capable of withstanding such a test.

(5) (*a*) Every such pipe shall be properly supported. Provision shall be made which will keep the interior of the pipe free from oil and will either prevent the

passage of flame from the cylinders of the engine to the pipe, or protect the pipe from the effects of an internal explosion.

(*b*) In every such ship all discharge pipes from starting air compressors shall lead directly to the starting air receivers and all starting air pipes from the air receivers to main or auxiliary engines shall be kept entirely separate from the compressor discharge pipe system.

(6) (*a*) Means shall be provided in any such ship to prevent overpressure in any part of any compressed air system and where 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.

(*b*) If an air pressure pipe may receive air from any source at a higher pressure than it can withstand with an adequate factor of safety, an efficient reducing valve, relief valve and pressure gauge shall be fitted to such pipe.

Cooling systems

113.—(1) In every ship to which these Regulations apply where machinery essential for the propulsion or safety of the ship or of persons on board is dependent for its operation on an efficient cooling water system there shall be provided at least one circulating pump and, except in the case of any emergency generator and in ships of Classes III to VI(A) inclusive, provision shall be made so that in the event of the failure of such pump an alternative pump is available for the same duty. Such pumps shall be capable of supplying adequate cooling water to such machinery, oil coolers, fresh water coolers or condensers fitted thereto, as the case may be.

(2) If direct sea water cooling is used for essential internal combustion machinery the sea water suctions shall be provided with strainers which can be cleaned without interruption of the supply of water.

(3) Means shall be provided for ascertaining whether the cooling systems are working properly and for preventing overpressure in any part thereof.

(4) The exhaust pipes and silencers of every internal combustion engine provided in a ship to which these Regulations apply shall be efficiently cooled or lagged.

Oil fuel installations: (boilers and machinery)

114. 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 comply, as a minimum, with the following provisions:

(1) In every ship to which these Regulations apply, any oil fuel used in boilers or machinery shall, except as allowed by regulation 43(3) or 44(2), have a flashpoint of not less than 60°C (Closed test).

(2) In every ship to which these Regulations apply, being a ship propelled by means of oil-fired boilers or internal combustion machinery, every double bottom compartment appropriated for the storage of oil fuel, not being a compartment situated at the extreme forward or after end of the ship, shall be fitted with a watertight centre division:

Provided that the Secretary of State may exempt any ship from the requirement to be fitted with a watertight centre division if he is satisfied that the safety of the ship, when in service, will not thereby be impaired.

(3) Oil fuel tanks shall be part of the ship's structure and shall be located outside machinery spaces of Category A. When oil fuel tanks, except double bottom tanks, are necessarily located adjacent to machinery spaces of Category A, they shall have a boundary common with the double bottom tanks and the area of the tank boundary common with the machinery space shall be kept to a minimum. The use of free-standing oil fuel tanks shall be avoided but when such tanks are employed they shall not be situated in machinery spaces of Category A. Where it is impracticable to meet the requirements of this paragraph, the Secretary of State may permit other arrangements.

(4) Every oil fuel tank in such a ship shall be properly constructed and shall, where necessary, be provided with save-alls or gutters which will catch any oil which may leak from the tank. No such tank shall be situated directly above boilers or other heated surfaces.

(5) Every oil fuel tank shall, before being put into service for the first time, be subjected to a test by hydraulic pressure in the case of a storage tank, settling tank or service tank, equal to that of a head of water 300 millimetres greater than the greatest head to which the tank may be subject when in service, but in the case of a settling tank in which oil fuel is heated in the course of its preparation for combustion in boilers or machinery and which is situated in, or forms part of, the boundary of any machinery space, to not less than 1 bar. Every such tank shall at any time thereafter be capable of withstanding such a test.

(6) The oil fuel carried in such a ship shall be effectively isolated from water ballast which may be carried therein. The pumping arrangements shall be such as will permit the oil fuel to be transferred from any storage tank or settling tank appropriated for oil fuel into another storage tank or settling tank so appropriated. Provision shall be made to prevent the accidental discharge or overflow of oil overboard. If fresh water is stored in a tank adjacent to a tank appropriated for the storage of oil fuel a cofferdam shall be provided which will prevent contamination of the fresh water by the oil.

(7) In every such ship safe and efficient means shall be provided for sounding every oil fuel tank and for preventing overpressure therein. Sounding pipes with suitable means of closing may be permitted if the open ends of such pipes terminate at a position where there will be no risk of fire or explosion from the emergence of oil or oil vapour when the tank is being filled. Other means of ascertaining the amount of oil fuel contained in any oil fuel tank shall not require penetration of the tank below the top of the tank and their failure or overfilling of the tank shall not permit release of oil fuel.

(8) In every such ship an air pipe shall be led from every oil fuel tank to the open air, and the outlet thereof shall be in such a position that there will be no danger of fire or explosion resulting from the emergence of oil vapour from the pipe when the tank is being filled. Every such pipe shall be fitted with a detachable wire gauze diaphragm. If such pipe also serves as an overflow pipe provision shall be made which will prevent the overflow from running into or near a boiler room, galley or other place in which it might be ignited.

(9) Every drain provided in such a ship for the purpose of removing water from oil fuel in storage or settling tanks or in separators shall be of the self-closing type.

(10) The oil fuel filling stations in every such ship shall be isolated from other spaces in the ship and shall be sufficiently drained and ventilated. Provision shall be made which will prevent overpressure in any oil-filling pipe lines.

(11) (*a*) In every such ship every oil pressure pipe shall be made of seamless steel, or other suitable material and, if used for conveying heated oil, shall be situated in a conspicuous position above the platforms in well-lighted parts of the boiler room or engine room.

(*b*) Where permitted by the Secretary of State flexible pipes and their end attachments shall be of suitable materials and construction.

(12) In every such ship every oil pipe, not being an oil pressure pipe, shall be made of steel or other suitable material and shall be led at such a height above the ship's inner bottom, if any, as will facilitate the inspection and repair of the pipe. Every such pipe and joint therein and every fitting connected to such pipe shall, before being put into service for the first time, be subjected to a test by hydraulic pressure to 3·5 bar or to twice its maximum working pressure, whichever shall be the greater, and shall at any time thereafter be capable of withstanding such a test.

(13) In every such ship every steam heating pipe which may be in contact with oil shall be made of steel and, together with its joints, shall, before being put into service for the first time, be subjected to a test by hydraulic pressure to twice its maximum working pressure and shall at any time thereafter be capable of withstanding such a test.

(14) In every such ship every suction pipe from any oil fuel tank situated above an inner bottom and every oil fuel levelling pipe within a boiler room or engine room shall be fitted with a valve or cock secured to each tank to which the pipe is connected. Every such valve or cock fitted to an oil fuel suction pipe shall be so arranged that it may be closed both from the compartment in which it is situated and from a readily accessible position outside such compartment and not likely to be cut off in the event of fire in that compartment. Every such valve or cock fitted to an oil fuel levelling pipe shall be so arranged that it can be closed or opened from a readily accessible position above the bulkhead deck and not likely to be cut off by flooding or by fire in the compartment in which the pipe is situated. If any oil tank filling pipe is not connected to an oil fuel tank at or near the top of the tank, it shall be fitted with a non-return valve or with a valve or cock secured to the tank to which it is connected and so arranged that it may be closed both from the compartment in which it is situated and from a readily accessible position outside such compartment and not likely to be cut off in the event of fire in that compartment.

(15) In every such ship every master valve at the furnace fronts which controls the supply of oil fuel to sets of burners shall be of a quick-closing type and fitted in a conspicuous position and readily accessible. Provision shall be made to prevent oil from being turned on to any burner unless such burner has been correctly coupled up to the oil supply line.

(16) In every such ship every valve used in connection with the oil fuel installation shall be so designed and constructed as to prevent the cover of the valve chest being slackened back or loosened when the valve is operated.

(17) In every such ship every pump provided for use in connection with the oil fuel system shall be separate from the ship's feed pumps, bilge pumps and ballast pumps and the connections of any such pumps and shall be provided with an efficient relief valve which shall be in close circuit.

(18) Every such ship shall be provided with not less than two oil fuel units, each comprising a pressure pump, filters and a heater. Such pump, filters and heater shall be of efficient design and substantial construction. Provision shall be made which will prevent over-pressure in any part of the oil fuel units.

Every oil fuel pressure pipe and joint therein and every fitting connected to such pipes and all parts of oil fuel units which are subject to oil pressure, shall, before being put into service for the first time, be subjected to a test by hydraulic pressure to 28 bar or twice their maximum working pressure, whichever shall be the greater, and shall at any time thereafter be capable of withstanding such a test. Any relief valves fitted to prevent overpressure in the oil fuel heater shall be in close circuit. If steam is used for heating oil fuel in bunkers, tanks, heaters or separators in any such ship, exhaust drains shall be provided to discharge the water or condensation into an observation tank.

(19) In every such ship save-alls or gutters shall be provided under every oil fuel pump, filter and heater to catch any oil which may leak or be spilled therefrom. Save-alls or gutters shall be provided in way of the furnace mouths to catch oil which may escape from the burners. Provision shall be made which will prevent oil which may escape from any oil fuel pump, filter or heater from coming into contact with boilers or other heated surfaces.

(20) Every oil fuel separator in such a ship shall be of efficient design and substantial construction. Provision shall be made which will prevent overpressure in any part thereof and which will prevent the discharge of oil vapour therefrom into confined spaces.

(21) If in any ship to which these Regulations apply being a ship propelled by means of oil-fired boilers, dampers are fitted to the funnels or boilers, provision shall be made for securing the dampers in the open position and an indicator shall be provided to show whether the dampers are open or shut.

(22) For the purposes of this regulation the expression "oil fuel tank" includes an oil fuel storage tank, an oil fuel settling tank, an oil fuel service tank and an oil fuel overflow tank.

Oil fuel installations: (cooking ranges and other heating appliances)

115.—(1) If in any ship to which these Regulations apply a cooking range or other heating appliance is supplied with fuel from an oil tank, the tank shall not be situated in a galley, and the supply of oil to the burners shall be capable of being controlled from a position outside the galley. No range or burner shall be fitted which is designed to be operated by means of oil fuel having a flashpoint of less than 60°C.

(2) The tank shall be provided with an air pipe leading to the open air. The pipe shall be in such a position that there will be no danger of fire or explosion resulting from the emergence of oil vapour from the pipe when the tank is being filled. The pipe shall be fitted with a detachable wire gauze diaphragm.

(3) Safe and efficient means shall be provided for filling every such tank and for preventing overpressure therein.

Ventilation

116. In every ship to which these Regulations apply every space in which an oil fuel tank or any part of an oil fuel installation is situated shall be adequately ventilated.

Oil systems for lubricating, cooling and control

117.—(1) In every ship to which these Regulations apply, being a ship in which oil is circulated under pressure for the lubrication or cooling or as the sole means of control of machinery essential for the propulsion or safety of the ship or per-

sons on board, at least two pumps shall be provided each of which shall be adequate for circulating such oil. Provided that in ships of Classes III to VI(A) inclusive and in the case of any emergency generator in any ship only one such pump shall be required.

(2) In every ship of Classes I, II and II(A) propelled by turbine machinery, or having turbo-electric propelling machinery, the lubricating oil arrangements shall be such that an emergency supply of oil is available sufficient to maintain after a power failure an adequate supply of lubricating oil for at least three minutes or for such time as may be required for unloaded turbo-electric propelling machinery to come to rest from the maximum running speed. Such emergency supply shall automatically come into use on failure of the pressure supply of lubricating oil from the pump or pumps.

(3) Strainers shall be provided for straining the lubricating oil and, except in ships of Classes III to VI(A) inclusive, shall be capable of being cleaned without interrupting the supply of such oil.

(4) Means shall be provided for ascertaining whether the lubricating system is working properly and for preventing overpressure in any part of the system. If the means of preventing overpressure is a relief valve it shall be in close circuit.

(5) The arrangements for the storage and distribution of flammable oils used in pressure systems in machinery spaces shall comply with the requirements of regulation 114(4), (7), (11), (14) and (19) as they apply to oil fuel installations. Other arrangements may be permitted in machinery spaces other than those of Category A, where the Secretary of State is satisfied that the safety of the ship is not impaired.

Communication between bridge and engine room

118. Every ship in Class I, II or II(A) to which these Regulations apply shall be provided with two means of communicating orders from the navigating bridge to the engine room control platform. One of the means shall be an engine room telegraph.

Steering gear

119.—(1) Every ship to which these Regulations apply shall be provided with efficient main and auxiliary steering gear. Provided that if main steering gear power units and their connections are fitted in duplicate to the satisfaction of the Secretary of State and each power unit enables the steering gear to meet the requirements of paragraph (2)(*b*) of this regulation no auxiliary steering gear shall be required.

(2) In every such ship—

(*a*) the main steering gear shall be of adequate strength and sufficient to steer the ship at maximum service speed. The main steering gear, including the rudder and associated fittings, and rudder stock shall be so designed that they are not damaged at maximum astern speed;

(*b*) the main steering gear shall be capable of putting the rudder over from 35 degrees on one side to 35 degrees on the other side with the ship running ahead at maximum service speed. The rudder shall be capable of being put over from 35 degrees on either side to 30 degrees on the other side in 28 seconds at maximum service speed;

(*c*) the auxiliary steering gear shall be capable of being rapidly brought into action and shall be of adequate strength and of sufficient power to enable

the ship to be steered at navigable speed and in any such ship in which a rudder stock of over 228·6 millimetres diameter in way of the tiller is required to comply with sub-paragraph (*a*) of this paragraph the auxiliary steering gear shall be operated by power.

(3) (*a*) In every such ship in which a rudder stock of over 228·6 millimetres is required to comply with sub-paragraph (*a*) of the preceding paragraph, there shall be provided a suitably located alternative steering station. In every other ship to which these Regulations apply means shall be provided by which the ship can be steered from a position aft.

(*b*) In every such ship the remote steering control systems from the principal and alternative steering stations shall be so arranged that failure of either system will not result in inability to steer the ship by means of the other system. Means of communication shall be provided to enable orders to be transmitted from the bridge to the alternative steering station.

(4) In every such ship which is fitted with power operated steering gear the position of the rudder shall be indicated at the principal steering station.

Spare gear

120. Every ship of Classes I, II and II(A) shall be provided with sufficient spare gear having regard to the intended service of the ship.

PART VIA

BOILERS AND MACHINERY: EXISTING SHIPS

Application of Part VIA

121. This Part of these Regulations applies to every existing ship to which these Regulations apply.

General

122.—(1) Every ship to which this Part of these Regulations applies shall comply with regulations 105 to 113 inclusive, regulation 114, except paragraphs (3) and (7), regulations 115 and 116, regulation 117(1), (2), (3) and (4) and regulations 118 to 120 inclusive of these Regulations.

(2) In every such ship safe and efficient means shall be provided for sounding every oil fuel tank.

PART VII

MISCELLANEOUS: NEW SHIPS

Application of Part VII

123. This Part of these Regulations applies to every new ship to which these Regulations apply.

Compasses

124.—(1) (*a*) Every ship of Class I shall be provided with three efficient magnetic compasses which shall be sited on the ship's centre line. One of such compasses shall be provided for use as a steering compass and shall be sited at the normal steering position and another shall be provided for use as a standard compass and shall be sited near to the normal steering position and in a position from which the view of the horizon is least obstructed. A third such compass shall

be provided at the after steering position and shall, together with its gimbal units, be interchangeable with the steering compass.

Provided that a magnetic steering compass shall not be required if—

(i) the standard compass is of the reflector or projector type and is equipped with a device by which it may be read from the normal steering position;

(ii) the standard compass is interchangeable with the after steering compass; and

(iii) a card of a gyroscopic compass or of a repeater thereof can be read from the normal steering position.

(*b*) Every magnetic compass provided in such a ship shall be mounted on a binnacle, provided that the after steering compass may be mounted on a pedestal.

(2) Every ship of Classes II, II(A) and III shall be provided with two efficient magnetic compasses which shall be sited on the ship's centre line. One of such compasses shall be provided for use as a steering compass and shall be sited at the normal steering position and the other shall be provided for use as a standard compass and shall be sited near to the normal steering position and in a position from which the view of the horizon is least obstructed. Each of such compasses shall be mounted on a binnacle.

(3) Every ship of Classes IV, VI and VI(A) shall be provided with one efficient magnetic compass which shall be readily available at the normal steering position.

Depth-sounding devices

125.—(1) Every ship of Classes I, II and II(A) shall be provided with an efficient mechanical depth-sounding device operated by means of a line and with such spare parts as are sufficient, having regard to the type of the device and to the intended service of the ship, to enable the device to be maintained in working order while the ship is at sea. Provided that a mechanical depth-sounding device shall not be required in any ship of Class II or II(A) which is under 1,600 tons.

(2) Every ship of Classes I to III inclusive shall be provided with two hand lead-lines, each at least 45 metres long and each with a lead weighing at least 3 kilogrammes.

Anchors and chain cables

126. Every ship to which these Regulations apply shall be provided with such anchors and chain cables as are sufficient in number, weight and strength, having regard to the size and intended service of the ship.

Hawsers and warps

127. Every ship to which these Regulations apply shall be provided with such hawsers and warps as are sufficient in number and strength, having regard to the size and intended service of the ship.

Means of escape

128.—(1) Every ship to which these Regulations apply, not being an open or partially decked ship of Class V, VI or VI(A), shall be provided with such doorways, stairways, ladderways and other means of escape as will provide readily accessible means of escape for all persons in the ship from all passenger and crew accommodation and spaces, other than machinery spaces, in which the crew is normally employed, to the lifeboat and liferaft embarkation decks. The means

of escape shall be so designed and constructed as to be capable of being easily used by the persons for whom they are intended. The number, width and continuity of such means of escape shall be sufficient, having regard to the number of persons by whom they may be used.

(2) Notwithstanding the generality of paragraph (1) of this regulation in every ship of Classes I, II and II(A) the following shall be complied with:—

(*a*) There shall be provided below the bulkhead deck at least two means of escape from each watertight compartment or from each similarly restricted space or group of spaces. At least one of the means of escape provided from each such compartment or from each such space or group of spaces shall be independent of watertight doors. One of the means of escape may be dispensed with, in an exceptional case, having regard to the nature and location of spaces and to the number of persons who normally might be accommodated or employed there.

(*b*) There shall be provided above the bulkhead deck at least two means of escape from each space bounded by main vertical zone bulkheads or from each similarly restricted space or group of spaces.

(*c*) At least one of the means of escape required by sub-paragraphs (*a*) and (*b*) of this paragraph shall be by means of a readily accessible enclosed stairway, which shall provide continuous fire shelter from the level of its origin to the appropriate lifeboat and liferaft embarkation decks or the highest level served by the stairway, whichever level is the highest. However, where only one means of escape is permitted for the purpose of compliance with sub-paragraph (*a*), the sole means of escape shall provide satisfactory safe escape.

(*d*) Satisfactory protection of access from the stairway enclosures to the lifeboat and liferaft embarkation areas shall be provided.

(*e*) Lifts shall not be considered as forming one of the required means of escape.

(*f*) Stairways serving only a space and a balcony in that space shall not be considered as forming one of the required means of escape.

(*g*) If a radio office has no direct access to a weather deck, two means of escape shall be provided from each office.

(*h*) Dead-end passageways exceeding the following distances shall not be permitted:

ships carrying not more than 36 passengers—7 metres
ships carrying more than 36 passengers—13 metres.

(*i*) In special category spaces the number and disposition of the means of escape both below and above the bulkhead deck shall be adequate, and, in general, the safety of access to the lifeboat and liferaft embarkation decks shall be at least equivalent to that required by sub-paragraphs (*a*), (*b*), (*c*), (*d*) and (*e*) of this paragraph.

(*j*) One of the escape routes from the machinery spaces where the crew is normally employed shall avoid access to any special category space.

(3) In every ship of Classes III to VI(A) inclusive, not being an open or partially-decked ship of Class V, VI or VI(A), such means of escape shall lead to an open deck of sufficient area, having regard to the number of persons which the ship may carry.

(4) Every ship of Classes V, VI and VI(A), being an open or partially-decked ship, shall be provided with readily accessible means of escape from all enclosed

spaces in the ship. Such means of escape shall be sufficient in number and width, having regard to the number of persons who may be in the said spaces.

(5) In every ship of Class I suitable signs shall be displayed in passageways and stairways indicating the direction of escape routes to passenger muster stations. Such signs shall be continuously illuminated and shall be adequate in number and distribution. They shall be capable of being illuminated by the ship's emergency lighting system.

(6) In every ship to which this Part of these Regulations applies the means of escape from any public room which may be used for the purpose of concerts, cinema shows and similar forms of entertainment shall be adequate, having regard to the number of persons who may be in the audience, and the seating shall be arranged in rows to ensure free access to the exits. When in any such public room subdued lighting is used, the exits shall be clearly marked with illuminated signs and any doors shall be constructed to open outwards.

(7) (*a*) In the machinery spaces in every ship of Classes I, II and II(A) there shall be provided from each machinery space two means of escape in compliance with the following provisions:—

(i) 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 access is provided to the appropriate lifeboat and liferaft embarkation decks. One of these ladders shall provide continuous fire shelter from the lower part of the space to a safe position outside the space; or

(2) one steel ladder leading to a door in the upper part of the space from which access is provided to the embarkation deck and a steel door capable of being operated from each side and which provides a safe escape route to the embarkation deck.

(ii) Where the space is above the bulkhead deck, two means of escape shall be as widely separated as possible and the doors leading from such means of escape shall be in a position from which access is provided to the appropriate lifeboat and liferaft embarkation decks. Where such escapes require the use of ladders these shall be of steel.

The Secretary of State may exempt any such ship of less than 1,000 tons from the requirements of this paragraph where he is satisfied that one means of escape is satisfactory having regard to the width and disposition of the upper part of the machinery space. The Secretary of State may exempt any such ship of 1,000 tons and above from the requirements of this paragraph where he is satisfied that one means of escape from any such space is satisfactory, provided that either a door or a steel ladder provides a safe escape route to the embarkation deck having regard to the nature and location of the space and whether persons are normally employed in that space.

(*b*) In the machinery spaces in every ship of Classes III to VI(A), which is decked by way of the machinery space, there shall be provided from each engine room, shaft tunnel and boiler room two means of escape as widely separated as practicable, one of which may be a watertight door if such a door is available as a means of escape. Where no such watertight door is available, the two means of escape shall consist of two sets of steel ladders leading to separate doors in the casing or elsewhere from which there is access to the lifeboat or liferaft embarkation deck or decks. The Secretary of State may exempt any such ship from the requirements of this paragraph, if at least one effective means of escape is provided.

Guard rails, stanchions and bulwarks

129.—(1) In every ship to which these Regulations apply bulwarks or guard rails shall be provided on every exposed deck to which any persons or vehicles may have access. Such bulwarks or guard rails, together with stanchions supporting the guard rails, shall be so placed, designed and constructed, and in particular shall be of such a height above the deck as to prevent any person who may have access to that deck or any vehicle from accidentally falling therefrom. Any freeing ports fitted in such a bulwark shall be covered by a grid or bars which will prevent any person from falling through the port.

(2) In every open or partially-decked ship of Class V, VI or VI(A) every washstrake, covering board and coaming shall be so placed, designed and constructed and in particular shall be of such a height above the floorboards as to prevent any person from accidentally falling overboard.

PART VIIA

MISCELLANEOUS: EXISTING SHIPS

Application of Part VIIA

130. This Part of these Regulations applies to every existing ship to which these Regulations apply.

General

131.—(1) Every ship to which this Part of these Regulations applies shall comply with regulations 124 to 127 inclusive, and regulations 129 of these Regulations.

(2) (*a*) Every ship to which this Part of these Regulations apply, not being an open or partially-decked ship of Class V, VI or VI(A), shall be provided with such doorways, stairways, ladderways and other means of escape as will provide readily accessible means of escape for all persons in the ship. The means of escape shall be so designed and constructed as to be capable of being easily used by the persons for whom they are intended. The number and width of such means of escape shall be sufficient, having regard to the number of persons by whom they may be used.

(*b*) In every such ship of Classes I, II and II(A) there shall be provided below the bulkhead deck at least two such means of escape from each compartment bounded by watertight bulkheads or from each similarly restricted space or group of spaces and at least one of the means of escape provided from each such compartment or from each such space or group of spaces shall be independent of watertight doors.

(*c*) In every such ship of Classes I, II and II(A) there shall be provided above the bulkhead deck at least two such means of escape from each space bounded by main vertical zone bulkheads or from each similarly restricted space or group of spaces and one of the means of escape provided from each space or group of spaces shall give access to the lifeboat or liferaft embarkation deck or decks or to a stairway leading to such decks.

(*d*) In every such ship of Classes I, II and II(A) at least one of the means of escape so provided shall be enclosed so as to afford, as far as practicable, continuous fire shelter from the level of its origin to the lifeboat and liferaft embarkation deck or decks.

(*e*) In every such ship of Classes III to VI(A) inclusive, not being an open or partially-decked ship of Class V, VI or VI(A), such means of escape shall lead to an open deck of sufficient area, having regard to the number of persons which the ship may carry.

(*f*) Every such ship of Classes V, VI and VI(A), being an open or partially-decked ship, shall be provided with readily accessible means of escape from all enclosed spaces in the ship. Such means of escape shall be sufficient in number and width, having regard to the number of persons who may be in the said spaces.

(*g*) In the machinery spaces in every such ship of Classes I to VI(A) inclusive, not being a ship undecked in way of the machinery space, there shall be provided from each engine room, shaft tunnel and boiler room two means of escape as widely separated as practicable, one of which may be a watertight door if such a door is available as a means of escape. Where no such watertight door is available the two means of escape shall consist of two sets of steel ladders leading to separate doors in the casing or elsewhere from which there is access to the lifeboat or liferaft embarkation deck or decks. The Secretary of State may exempt any such ship of less than 2,000 tons from the requirements of this paragraph if at least one effective means of escape is provided.

(*h*) In every such ship of Class I suitable signs shall be displayed in corridors and stairways indicating the direction of escape routes to passenger muster stations. Such signs shall be continuously illuminated and shall be adequate in number and distribution. They shall be capable of being illuminated by the ship's emergency lighting system.

(*i*) In every ship to which this Part of these Regulations applies the means of escape from any public room which may be used for the purpose of concerts, cinema shows or similar forms of entertainment shall be adequate having regard to the number of persons who may be in the audience and the seating shall be arranged in rows to ensure free access to the exits. Where in any such public rooms subdued lighting is used, the exits shall be clearly marked with illuminated signs and any doors shall be constructed to open outwards.

PART VIII

Alternative construction, equipment and machinery

132. Where these Regulations require that the hull or machinery of a ship shall be constructed in a particular manner, or that particular equipment shall be provided, or particular provision shall be made, the Secretary of State may approve the hull or machinery of the ship to be constructed in any other manner or any other equipment to be provided or other provision made, if he is satisfied by trial thereof or otherwise that that other construction or equipment or other provision is at least as effective as that required by these Regulations.

Penalties

133. If a ship to which these Regulations apply, proceeds or attempts to proceed to sea without complying with the requirements of these Regulations, the owner or master of the ship shall each be guilty of an offence and liable on summary conviction to a fine not exceeding £1,000 or on conviction on indictment, to imprisonment for a term not exceeding two years and a fine.

Power to detain

134. In any case where a ship to which these Regulations apply, does not comply with the requirements of these Regulations, the ship shall be liable to be detained and section 692 of the Merchant Shipping Act 1894 (which relates to

the detention of a ship) shall have effect in relation to the ship, subject to the modification that for the words "this Act" wherever they appear, there were substituted "the Merchant Shipping Acts 1894 to 1979 or any Regulations made thereunder."

Norman Tebbit,
Parliamentary Under Secretary of State,
Department of Trade.

17th April 1980.

SCHEDULE 1

Regulation 6

CALCULATION OF MAXIMUM LENGTH OF WATERTIGHT COMPARTMENTS

PART I

1. *General*

(1) For the purposes of this Schedule, except where otherwise specified,

(*a*) all linear measurements shall be in metres, and

(*b*) all volumes shall be in cubic metres and shall be calculated from measurements taken to moulded lines.

(2) In this Schedule the symbol "L" denotes the length of the ship.

(3) In this Schedule the expression "passenger spaces" shall include galleys, laundries and other similar spaces provided for the service of passengers, in addition to space provided for the use of passengers.

2. *Permissible length*

Subject to the provisions of paragraph 6 of this Schedule, the length of a compartment shall not exceed its permissible length.

PART II

SHIPS OF CLASSES I, II AND II(A), OTHER THAN SHIPS TO WHICH PART III OF THIS SCHEDULE APPLIES

3. *Assumptions of permeability*

(1) The assumptions of permeability which shall be taken into account in determining the floodable length at any point in ships to which this Part of this Schedule applies shall be as follows:—

(*a*) Machinery space:—

(i) The assumed average permeability throughout the machinery space shall be determined by the following formula:—

$$85+10\,\frac{(a-c)}{v}$$ where

a=volume of the passenger spaces and crew spaces below the margin line within the limits of the machinery space;

c=volume of the between-deck spaces below the margin line within the limits of the machinery space which are appropriated for cargo, coal or stores; and
v=volume of the machinery space below the margin line.

(ii) In any case in which the average permeability throughout the machinery space, as determined by detailed calculation, is less than that given by the aforesaid formula, the calculated value may be substituted. For the purposes of such calculation, the permeability of passenger spaces and crew spaces shall be taken to be 95, that of all spaces appropriated for cargo, coal or stores shall be taken to be 60, and that of double bottom, oil fuel and other tanks forming part of the structure of the ship shall be taken to be 95 or such lesser figure as the Secretary of State may approve in the case of that ship.

(*b*) Portions before and abaft the machinery space:—

(i) The assumed average permeability throughout the portions of the ship before and abaft the machinery space shall be determined—

(1) by the following formula:—

$$63+35\frac{a}{v} \text{ where}$$

a=volume of the passenger spaces and crew spaces which are situated below the margin line before or abaft the machinery space, as the case may be, and
v=volume of the portion of the ship below the margin line before or abaft the machinery space, as the case may be; or

(2) if the Secretary of State determines in the case of any ship at any time not later than 40 days after a surveyor has received a plan of the ship showing the watertight subdivision thereof, by detailed calculation for the purpose of which the permeability of spaces shall be assumed to be as follows:—

passenger spaces	95
crew spaces	95
spaces appropriated for machinery ...	85
spaces appropriated for cargo, coal, stores or baggage rooms	60
tanks forming part of the structure of the ship and double bottoms	95, or such lesser figure as the Secretary of State may permit in the case of any ship.

(ii) For the purposes of this paragraph a space within a passenger space or crew space shall be deemed to be a part thereof unless it is appropriated for other purposes and is enclosed by permanent steel bulkheads.

4. *Factor of subdivision*

(1) Subject to the provisions of sub-paragraph (4) of this paragraph, in the case of ships of 131 metres in length or over, the factor of subdivision F shall be determined by the following formula:—

$$F=A-\frac{(A-B)(Cs-23)}{100}$$

where A and B are respectively determined in accordance with the provisions of sub-paragraph (5) of this paragraph and Cs is the criterion numeral determined in accordance with the provisions of paragraph 5 of this Schedule.

Provided that:—

(*a*) where the criterion numeral is equal to 45 or more and simultaneously the computed factor of subdivision as given by the preceding formula is ·65 or less, but more than ·50, the subdivision abaft the forepeak shall be governed by the factor ·50;

(*b*) where in the case of any ship the factor F is less than ·4 and the Secretary of State is satisfied that it is impracticable to apply the factor F in determining the permissible length of a compartment appropriated for machinery, the Secretary of State may allow an increased factor not exceeding ·4 to be applied to that compartment.

(2) Subject to the provisions of sub-paragraph (4) of this paragraph, in the case of ships the length of which is less than 131 metres but not less than 79 metres having a criterion numeral of not less than

$$\frac{3574-25L}{13}$$

(hereinafter in this paragraph referred to as S), the factor of subdivision F shall be determined by the following formula:—

$$F=1-\frac{(1-B)\,(Cs-S)}{123-S}$$

where B is the factor determined in accordance with the provisions of sub-paragraph (5) of this paragraph and Cs is the criterion numeral determined in accordance with the provisions of paragraph 5 of this Schedule.

(3) In the case of ships the length of which is less than 131 metres but not less than 79 metres and having a criterion numeral less than S or in the case of ships the length of which is less than 79 metres the factor of subdivision shall be unity.

(4) In the case of a ship of any length which is intended to carry a number of passengers exceeding 12 but not exceeding

$$\frac{L^2}{650} \text{ or } 50$$

whichever is the lower, the factor of subdivision shall be determined in the manner provided in sub-paragraph (3) of this paragraph.

(5) For the purposes of this paragraph the factors A and B shall be determined by the following formulae:—

$$A=\frac{58\cdot2}{L-60}+\cdot18 \text{ (where } L=131 \text{ and upwards)}$$

$$B=\frac{30\cdot3}{L-42}+\cdot18 \text{ (where } L=79 \text{ and upwards)}$$

5. *Criterion of service*

The criterion numeral for ships to which this Part of this Schedule applies shall be determined by the following formulae:—

(*a*) when P_1 is greater than P

$$Cs=72\frac{M+2P_1}{V+P_1-P}$$

(*b*) and in all other cases

$$Cs=72\frac{M+2P}{V}$$

where:—

Cs=the criterion numeral;
M=the volume of the machinery space, as defined in regulation 1, with the addition thereto of the volume of any permanent oil fuel bunkers which may be situated above the inner bottom and before or abaft the machinery space;
P=the volume of the passenger spaces and crew spaces below the margin line;
V=the volume of the ship below the margin line;
N=number of passengers which the ship is intended to carry; and
P_1=·056LN

Provided that:

(*a*) where the value of ·056LN is greater than the sum of P and the whole volume of the passenger spaces above the margin line, the figure to be taken as P_1 shall be that sum or ·037LN whichever is the greater;

(*b*) values of Cs less than 23 shall be taken as 23; and

(*c*) values of Cs greater than 123 shall be taken as 123.

6. *Special rules for subdivision*

(1) Compartments exceeding the permissible length:—

(*a*) A compartment may exceed its permissible length provided that 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 the less.

(*b*) If one compartment of either of such pairs of adjacent compartments is situated inside the machinery space, and the other compartment thereof is situated outside the machinery space, the combined length of the two compartments shall be adjusted in accordance with the mean average permeability of the two portions of the ship in which the compartments are situated.

(*c*) Where the lengths of two adjacent compartments are governed by different factors of subdivision, the combined length of the two compartments shall be determined proportionately.

(*d*) Where in any portion of a ship bulkheads required by these Regulations to be watertight are carried to a higher deck than in the remainder of the ship, separate margin lines may be used for calculating the floodable length of that portion of the ship, if—

(i) the two compartments adjacent to the resulting 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 determined by reference to the lower margin line of such compartments;

(ii) the sides of the ship are extended throughout the ship's length to the deck corresponding to the uppermost margin line and all openings in the shell plating below that deck throughout the length of the ship comply with the requirements of regulation 19 of these Regulations as if they were openings below the margin line.

(2) Additional subdivision at forward end:—

In ships 100 metres in length or over, the watertight bulkhead next abaft the collision bulkhead shall be fitted at a distance from the forward perpendicular which is not greater than the permissible length appropriate to a compartment bounded by the forward perpendicular and such bulkhead.

(3) Steps in bulkheads:—

If a bulkhead required by these Regulations to be watertight is stepped it shall comply with one of the following conditions:—

(*a*) in ships having a factor of subdivision not greater than ·9, the combined length of the two compartments separated by such bulkhead shall not exceed 90 per cent of the floodable length or twice the permissible length whichever is the less. In ships having a factor of subdivision greater than ·9, the combined length of the two compartments shall not exceed the permissible length; or

(*b*) additional subdivision is provided in way of the step to maintain the same measure of safety as that secured by a plane bulkhead; or

(*c*) the compartment over which the step extends does not exceed the permissible length corresponding to a margin line taken 76 millimetres below the step.

(4) Recesses in bulkheads:—

If any part of a recess lies outside vertical surfaces on either side 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 centre line at the level of the deepest subdivision load water line, the whole of such recess shall be deemed to be a step in a bulkhead for the purposes of sub-paragraph (3) of this paragraph.

(5) Equivalent plane bulkheads:—

Where a bulkhead required by these Regulations to be watertight is recessed or stepped an equivalent plane bulkhead shall be assumed in determining the subdivision.

(6) Minimum spacing of bulkheads:—

If the distance between two adjacent bulkheads required by these Regulations to be watertight, or their equivalent plane bulkheads, or the distance between transverse planes passing through the nearest stepped portions of the bulkheads, is less than ·03L+3·05 metres, or 10·67 metres, or ·1L, whichever is the least, only one of those bulkheads shall be regarded as forming part of the subdivision of the ship.

(7) Allowance for local subdivision:—

Where in any ship a main transverse watertight compartment contains local subdivision and the Secretary of State is satisfied that, after any assumed side damage extending over a length of ·03L+3·05 metres, or 10·67 metres, or ·1L, whichever is the least, 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 effective buoyancy assumed on the undamaged side shall not be greater than that assumed on the damaged side. Allowance under this sub-paragraph will be made only if the Secretary of State is satisfied that such allowance is not likely to prevent compliance with paragraph 2 of Schedule 3 to these Regulations.

(8) Where in any ship the required factor of subdivision is ·50 or less, the combined length of any two adjacent compartments shall not exceed the floodable length or twice the permissible length whichever is the less.

PART III

SHIPS OF CLASSES II AND II(A) WHICH ARE PERMITTED BY THE SECRETARY OF STATE, IN EXERCISE OF HIS POWER UNDER PARAGRAPH (7) OF REGULATION 4 OF THE MERCHANT SHIPPING (LIFE-SAVING APPLIANCES) REGULATIONS 1980(a) TO CARRY PERSONS IN EXCESS OF THE LIFEBOAT CAPACITY PROVIDED ON BOARD

7. *General rules for subdivision*

Subject to the modifications set out in this Part of this Schedule, the maximum length of compartments in ships to which this Part of this Schedule applies shall be determined as if they were ships to which Part II of this Schedule applies.

8. *Assumptions of permeability in portions before and abaft the machinery space*

In ships to which this Part of this Schedule applies the assumed average permeability throughout the portions of the ship before and abaft the machinery space shall be determined—

(*a*) by the following formula:—

$$95-35\frac{b}{v} \text{ where}$$

b = the volume of the spaces which are situated below the margin line before or abaft the machinery space, as the case may be, and above the tops of floors, inner bottom or peak tanks, and which are appropriated for use as coal or oil fuel bunkers, store rooms, baggage rooms, mail rooms, chain lockers or fresh water tanks and of spaces appropriated for cargo if the Secretary of State is satisfied that the greater part of the volume of the space is intended to be occupied by cargo; and

v = the volume of the portion of the ship below the margin line before or abaft the machinery space, as the case may be; or

(*b*) if the Secretary of State so determines, in the case of any ship at any time not later than 40 days after a Surveyor of Ships has received a plan of the ship

(a) S.I. 1980/538.

showing the watertight subdivision thereof, by detailed calculation for the purpose of which the permeability of spaces shall be assumed to be as follows:—

passenger spaces	95
crew spaces	95
spaces appropriated for machinery	85
spaces appropriated for bunker coal, stores or baggage rooms	60
spaces appropriated for cargo, tanks forming part of the structure of the ship and double bottom	95, or such lesser figure as the Secretary of State may permit in the case of any ship.

9. *Factor of subdivision*

(1) Subject to the provisions of this paragraph, the factor of subdivision of ships to which this Part of this Schedule applies shall be the factor determined in the manner provided in paragraph 4 of this Schedule, or ·5 whichever is the less. Provided that if the Secretary of State is satisfied in the case of any ship the length of which is less than 91·5 metres that it is impracticable to apply that factor to any compartment, he may allow a higher factor to be applied to that compartment.

(2) If in the case of any ship to which this Part of this Schedule applies the Secretary of State is satisfied that the quantity of cargo to be carried in the ship will be such as to render impracticable the application abaft the collision bulkhead of a factor of subdivision not exceeding ·5, the factor of subdivision of the ship shall be determined as follows:—

(*a*) in the case of ships the length of which is 131 metres and upwards, by the formula:—

$$F=A-\frac{(A-BB)\,(Cs-23)}{100}$$

(*b*) in the case of ships the length of which is less than 131 metres but not less than 55 metres, and having a criterion numeral not less than S_1, by the formula:—

$$F=1-\frac{(1-BB)\,(Cs-S_1)}{123-S_1}$$

For the purposes of the above formulae:—

$A = \frac{58\cdot2}{L-60}+0\cdot18$ (where L=131 and upwards)

$BB = \frac{17\cdot6}{L-33}+0\cdot20$ (where L=55 and upwards)

$S_1 = \frac{3712-25L}{19}$

Cs =the criterion numeral determined in accordance with paragraph 5 of this Schedule where P_1 has the following values:—

(i) ·056LN or 125N whichever is the greater for berthed passengers;

(ii) 125N for unberthed passengers;

(*c*) in the case of ships the length of which is less than 131 metres but not less than 55 metres and having a criterion numeral less than S_1, and of all ships the length of which is less than 55 metres, the factor of subdivision shall be unity.

PART IV

SHIPS OF CLASSES III TO VI INCLUSIVE

10. *General rules for subdivision*

Subject to the modifications set out in this Part of this Schedule the maximum length of compartments in ships to which this Part of this Schedule applies shall be determined as if they were ships to which Part II of this Schedule applies.

11. *Assumptions of permeability*

In ships to which this Part of this Schedule applies, the assumed average permeability shall be as follows:—

(*a*) of the machinery space 85

(*b*) of spaces other than the machinery space 95

12. *Factor of subdivision*

The factor of subdivision of ships to which this Part of this Schedule applies shall be as follows:—

Length of ship in metres	Factor of subdivision
Over 106·7	·5
Over 91·5 but not over 106·7 ...	·5 for compartments in machinery space and forward thereof. Unity for all other compartments.
Over 76·2 but not over 91·5 ...	·5 for compartments forward of machinery space. Unity for all other compartments.
Over 61 but not over 76·2... ...	Unity for combined forepeak and adjacent compartment, and for each other compartment.
61 and under	Unity.

SCHEDULE 2

Regulation 9.

Stability Information

The information relating to the stability of a ship to be provided for the master pursuant to regulation 9 of these Regulations shall include particulars appropriate to the ship of the matters specified below. Such particulars shall be in the form of a statement unless the contrary is indicated.

1. The ship's name, official number, port of registry, gross and register tonnages, principal dimensions, displacement, deadweight and draught to the summer load line.

2. A profile view and, if the Secretary of State so requires in a particular case, plan views of the ship drawn to scale showing with their names all compartments, tanks, storerooms and crew and passenger accommodation spaces, and also showing the mid-length position.

3. The capacity and the centre of gravity (longitudinally and vertically) of every compartment available for the carriage of cargo, fuel, stores, feed water, domestic water or water ballast.

In the case of a vehicle ferry, the vertical centre of gravity of compartments for the carriage of vehicles shall be based on the estimated centres of gravity of the vehicles and not on the volumetric centres of the compartments.

4. The estimated total weight of (*a*) passengers and their effects and (*b*) crew and their effects, and the centre of gravity (longitudinally and vertically) of each such total weight. In assessing such centres of gravity passengers and crew shall be assumed to be distributed about the ship in the spaces they will normally occupy, including the highest decks to which either or both have access.

5. The estimated weight and the disposition and centre of gravity of the maximum amount of deck cargo which the ship may reasonably be expected to carry on an exposed deck.

6. A diagram or scale showing the load line mark and subdivision load lines in accordance with regulation 23 of these Regulations, with particulars of the corresponding freeboards, and also showing the displacement, tonnes per centimetre immersion, and deadweight corresponding in each case to a range of mean draughts

extending between the waterline representing the deepest load line and the waterline of the ship in the light condition.

7. A diagram or tabular statement showing the hydrostatic particulars of the ship, including—

(1) the heights of the transverse metacentre and

(2) the values of the moment to change trim one centimetre,

for a range of mean draughts extending at least between the waterline representing the deepest load line and the waterline of the ship in the light condition. Where a tabular statement is used, the intervals between such draughts shall be sufficiently close to permit accurate interpolation. In the case of ships having raked keels, the same datum for the heights of centres of buoyancy and metacentres shall be used as for the centres of gravity referred to in paragraphs 3, 4 and 5.

8. The effect on stability of free surface in each tank in the ship in which liquids may be carried, including an example to show how the metacentric height is to be corrected.

9.—(1) A diagram showing cross curves of stability indicating the height of the assumed axis from which the righting levers are measured and the trim which has been assumed. In the case of ships having raked keels, where a datum other than the top of keel has been used the position of the assumed axis shall be clearly defined.

(2) Subject to the following paragraph, only enclosed superstructures shall be taken into account in deriving such curves.

(3) The following structures may be taken into account in deriving such curves if the Secretary of State is satisfied that their location, integrity and means of closure will contribute to the ship's stability:—

(*a*) superstructures located above the superstructure deck;

(*b*) deckhouses on or above the freeboard deck, whether wholly or in part only;

(*c*) hatchway structures on or above the freeboard deck.

(4) An example shall be given showing how to obtain a curve of righting levers (GZ) from the cross curves of stability.

(5) Where the buoyancy of a superstructure is to be taken into account in the calculation of stability information in the case of a vehicle ferry or similar ship having bow doors, ship's side doors or stern doors, there shall be included in the stability information a specific statement that such doors must be secured weathertight before the ship proceeds to sea and that the cross curves of stability are based upon the assumption that such doors have been so secured.

10.—(1) The diagrams and statement referred to in sub-paragraph (2) of this paragraph shall be provided separately for each of the following conditions of the ship:—

(*a*) *Light condition.* If the ship has permanent ballast, such diagrams and statement shall be provided for the ship in the light condition both (i) with such ballast, and (ii) without such ballast.

(*b*) *Ballast condition,* both (i) on departure, and (ii) on arrival, it being assumed for the purpose of the latter in this and the following sub-paragraphs that oil fuel, fresh water, consumable stores and the like are reduced to 10 per cent of their capacity.

(*c*) *Loading conditions,* both (i) on departure, and (ii) on arrival, when loaded to the deepest subdivision load line with cargo filling all spaces available for cargo, cargo for this purpose being taken to be homogeneous cargo except where this is clearly inappropriate, for example in the case of cargo spaces in a ship which are intended to be used exclusively for the carriage of vehicles or containers.

(*d*) *Service loaded conditions,* both (i) on departure and (ii) on arrival.

(*e*) *A worst anticipated service condition* on which the damaged stability require-

ments of regulation 11 and Schedule 3 to these Regulations have been based. This condition shall be clearly marked as such.

(2) (*a*) A profile diagram of the ship drawn to a suitable small scale showing the disposition of all components of the deadweight.

(*b*) A statement showing the lightweight, the disposition and the total weights of all components of the deadweight, the displacement, the corresponding positions of the centre of gravity, the metacentre and also the metacentric height (GM).

(*c*) A diagram showing a curve of righting levers (GZ) derived from the cross curves of stability referred to in paragraph 9 of this Schedule.

(3) The metacentric height and the curve of righting levers (GZ) shall be corrected for liquid free surface.

(4) Where there is a significant amount of trim in any of the conditions referred to in sub-paragraph (1) the metacentric height and the curve of righting levers (GZ) shall be required to be determined from the trimmed waterline.

(5) If, in the opinion of the Secretary of State, the stability characteristics in either or both of the conditions referred to in sub-paragraph (1)(*c*) are not satisfactory, such conditions shall be marked accordingly and an appropriate warning to the master shall be inserted.

11. Where special procedures such as partly filling or completely filling particular spaces designated for cargo, fuel, fresh water or other purposes are necessary to maintain adequate stability, instructions as to the appropriate procedure in each case.

12. Such information as is necessary to enable the master by rapid and simple processes to obtain accurate guidance as to the stability of the ship under varying conditions of service in order that regulations 10 and 11 of these Regulations will be complied with. This information may be presented in the form of either required metacentric height (GM) or maximum allowable vertical centre of gravity (KG) values and may be presented in either graphical or tabular form.

13. A copy of the report on the inclining test and of the calculation therefrom of the light condition particulars.

SCHEDULE 3

Regulation 11.

Stability in Damaged Condition

1. *Calculations of stability in damaged condition*

The sufficiency of intact stability of every ship to which Part II of these Regulations applies shall be determined by calculation which has regard to the design and construction of the ship, and the damaged compartments, and which is in accordance with the following assumptions:—

(*a*) the ship shall be assumed to be in the worst condition as regards stability which is likely to be experienced having regard to the intended service of the ship;

(*b*) the volume permeabilities and surface permeabilities shall be assumed to be as follows:—

(i) Spaces	Permeability
Occupied by cargo, coal or stores	60
Appropriated for cargo, coal or stores but not occupied by substantial quantities thereof...	95
Appropriated as accommodation for passengers and crew	95
Appropriated for machinery	85
Appropriated for liquids	0 or 95, whichever results in the more onerous requirements.

(ii) Higher surface permeabilities shall be assumed in respect of spaces which, in the vicinity of the damaged water plane, contain no substantial quantity of accommodation or machinery and spaces which are not generally occupied by any substantial quantity of cargo or stores.

(*c*) The extent of damage shall be assumed to be as follows:—

(i) longitudinal extent: 3·05 metres plus 3 per cent of the length of the ship, or 10·67 metres or 10 per cent of the length of the ship, whichever is the least. Provided that where the required factor of subdivision is ·33 or less, the assumed longitudinal extent of damage shall be increased as necessary so as to include any two consecutive main transverse watertight bulkheads;

(ii) transverse extent: 20 per cent of the breadth of the ship, measured inboard from the ship's side at right angles to the centre line at the level of the deepest subdivision load water line;

(iii) vertical extent: from the base line upwards without limit;

(iv) if any damage of lesser extent than that indicated in the foregoing sub-paragraphs (i), (ii) and (iii) would result in a more severe condition regarding heel or loss of metacentric height, such damage shall be assumed for the purposes of the calculation.

(*d*) Where the ship is fitted with decks, inner skins or longitudinal bulkheads of sufficient tightness to restrict the flow of water, regard shall be had to such restrictions in the calculation.

2. The range of stability in the damaged condition shall be investigated to the satisfaction of the Secretary of State.

3. *Sufficiency of stability in damaged condition*

The intact stability of the ship shall be deemed to be sufficient if the calculation specified in paragraph 1 of this Schedule shows that, after the assumed damage, the condition of the ship is as follows:—

(*a*) In the event of symmetrical flooding—

(i) at all stages of flooding there shall be sufficient positive residual stability;

(ii) at intermediate stages of flooding the margin line is not to be submerged unless partial subdivision above the margin line in accordance with regulation 22 limits sufficiently the spread of water along the bulkhead deck and results in an angle of heel not exceeding 20 degrees. In the case of ships carrying vehicles on the bulkhead deck, the angle of heel at intermediate stages of flooding shall not be greater than that which will submerge the margin line;

(iii) at the final stage of flooding the margin line shall not be submerged and there shall be a positive residual metacentric height of at least 50 millimetres as calculated by the constant displacement method.

(*b*) In the event of unsymmetrical flooding—

(i) the provisions of sub-paragraph (*a*)(i) shall apply;

(ii) the provisions of sub-paragraph (*a*)(ii) shall apply;

(iii) at the final stage of flooding, and after equalization measures, if any, have been taken the angle of heel is not to exceed 7 degrees and the margin line is not to be submerged.

Regulation 13.

SCHEDULE 4

CONSTRUCTION OF WATERTIGHT BULKHEADS, ETC.

PART I

SHIPS OF CLASS I

1. *Strength and construction*

(1) Every bulkhead and other portion of the internal structure forming part of the watertight subdivision of the ship shall be of such strength and so constructed as to

be capable of supporting, with an adequate 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 not being less than the pressure due to a head of water up to the margin line. Such maximum head shall include any additional head estimated under regulation 11 of these Regulations to result from flooding or heeling.

(2) (*a*) Every such bulkhead and portion shall be constructed of mild steel and, if of riveted construction, shall comply with the requirements of paragraphs 2 to 6 inclusive of this Schedule and if of welded construction shall not be of less strength, stiffness or efficiency than if it had been riveted and had complied with the requirements of paragraph 11(4) of Part IV of this Schedule.

(*b*) In the case of ships which are classed with a classification society approved by the Secretary of State, and which are built to their survey requirements, it shall be sufficient compliance with the requirements of this paragraph, if that classification society certifies that the watertight bulkheads and portions thereof are constructed in accordance with all the requirements of paragraph 1(1) of this Schedule.

2. *Bulkheads*

(1) Every bulkhead required by these Regulations to be watertight shall be constructed with plating of thicknesses not less than those indicated in Table 1 of Part IV of this Schedule. If a bulkhead is at the end of a stokehold space in a coal burning ship, the lower part of the bulkhead plating to a height of at least 610 millimetres above the stokehold floor shall be at least 2·5 millimetres thicker than is required by the said Table. If a bulkhead is at the end of a coal bunker space,the lowest strake thereof shall be at least 914 millimetres high and 2·5 millimetres thicker than is required by the said Table. In all other bulkheads the lowest strake shall be at least 1 millimetre thicker than is required by the said Table and any limber plates shall be at least 2·5 millimetres thicker.

(2) Every boundary angle shall be at least 2·5 millimetres thicker than the thickness required by the said Table for the bulkhead plating to which it is attached.

(3) (*a*) Save as provided in Table 3 of Part IV of this Schedule, every such bulkhead shall be fitted with stiffeners which shall have brackets or lug end connections. If the stiffeners are spaced 762 millimetres apart, they shall comply with such of the specifications in Tables 2 and 3 of the said Part as apply to them in the circumstances. Provided that other forms of stiffeners may be used if they afford not less strength and stiffness than the stiffeners indicated in the said Tables. If any stiffeners are spaced otherwise than 762 millimetres apart on such a bulkhead, their strength and stiffness shall be increased or decreased, as the case may be, in direct proportion to their distance apart. Stiffeners shall not be spaced more than 610 millimetres apart on a collision bulkhead, or more than 914 millimetres apart on any other bulkhead.

(*b*) The lower end of each stiffener shall be attached to the shell plating, to the inner bottom plating or to horizontal plating which will support it properly.

(*c*) At each deck level which forms the top of a system of stiffeners plating shall be so provided as to ensure horizontal rigidity in the bulkhead.

(*d*) In the case of bracketed hold stiffeners the lower bracket or its connecting angle shall extend over the floor adjacent to the bulkhead and the upper bracket shall be connected to an angle which extends over the beam space, or other equally effective means shall be adopted for securing structural rigidity.

(*e*) Where stiffeners are cut in way of watertight doors in the lower part of a bulkhead, the opening shall be properly framed and bracketed, and a tapered web plate or buttress, stiffened on its edge, shall be fitted at each side of the door from the base of the bulkhead to above the door opening.

(*f*) All brackets, lugs and other end connections for stiffeners shall comply with the requirements of Table 4 of Part IV of this Schedule.

(4) (*a*) The rivets in seams and connections of plating and boundary bars of all bulkheads required by these Regulations to be watertight shall be spaced not more than 4½ diameters apart centre to centre, except in the case of the flange of a boundary

angle, being the flange connected to the inner bottom plating, shell plating or deck plating, in which case they shall be spaced 5 diameters apart centre to centre.

(*b*) Boundary angles fitted more than 10·67 metres below the bulkhead deck shall be double riveted in both flanges except on parts of a bulkhead within a double bottom, and the vertical connection of plates so fitted shall be double riveted.

(*c*) The rivets connecting stiffeners, having bracket end connections, to bulkhead plating shall be spaced not more than 7 diameters apart centre to centre. All other stiffeners shall be connected to the bulkhead plating by rivets spaced not more than 4 diameters apart centre to centre for 15 per cent of the length of the stiffeners at each end thereof and not more than 7 diameters apart centre to centre elsewhere.

(*d*) Where frames or beams pass through a bulkhead required by these Regulations to be watertight, the bulkhead shall be made watertight without the use of wood or cement.

3. *Watertight decks, steps and flats*

(1) The horizontal plating of decks, steps and flats required by these Regulations to be watertight shall be at least 1 millimetre thicker than that required for watertight bulkheads at corresponding levels.

(2) The beams of such decks, steps and flats shall be of sizes indicated for stiffeners spaced 762 millimetres apart in Table 3 of Part IV of this Schedule. Provided that beams divided into portions which are bracketed at each end may be of the sizes indicated for such stiffeners in Table 2 of Part IV of this Schedule. If any beams are spaced otherwise than 762 millimetres apart, their strength and stiffness shall be increased or decreased, as the case may be, in direct proportion to their distance apart.

For the purposes of the said Tables the greatest distance between the points of support shall be deemed to be the length of the beam. Provided that, if a beam is bracketed, the length thereof for the purposes of the said Table 3 shall be reduced by the width of the brackets. The distance from the bulkhead deck to the deck, step or flat concerned, minus half the length of the beam, shall be deemed to be the height for the purposes of the said Tables.

(3) Adequate supports for such beams shall be provided by bulkheads, or by girders pillared where necessary, and the rivet connections of the pillars shall be sufficient to withstand the load due to water pressure.

(4) Where frames pass through a deck, step or flat required by these Regulations to be watertight, such deck, step or flat shall be made watertight without the use of wood or cement.

4. *Watertight recesses and trunkways*

Every recess and trunkway required by these Regulations to be watertight shall be so constructed as to provide strength and stiffness at all parts not less than that required for watertight bulkheads at a corresponding level.

5. *Watertight tunnels*

(1) Every tunnel required by these Regulations to be watertight shall be constructed with plating of thicknesses not less than those indicated in Table 1 of Part IV of this Schedule.

(2) Every such tunnel shall be fitted with stiffeners which, if spaced 914 millimetres apart, shall comply with such of the specifications in Table 5 of Part IV of this Schedule as apply to them in the circumstances. Provided that other forms of stiffeners may be used if they afford not less strength and stiffness than the stiffeners indicated in the said Table. If any stiffeners are spaced otherwise than 914 millimetres apart on such a tunnel their strength and stiffness shall be increased or decreased, as the case may be, in direct proportion to their distance apart. The feet of all stiffeners, however spaced, shall overlap the tunnel base angle, and shall be attached thereto.

6. *Watertight inner skins*

Every inner skin required by these Regulations to be watertight shall be of such strength and construction as will enable it to withstand a head of water up to the margin line.

PART II

SHIPS OF CLASSES II AND II(A)

7. *General*

Subject to the modifications set out in this Part of this Schedule, Part I of this Schedule shall apply in relation to ships of Classes II and II(A) as it applies in relation to ships of Class I.

8. *Bulkheads, etc.*

(1) Every riveted portion of the ship's internal structure required by these Regulations to be watertight shall be constructed as follows:—

(*a*) In ships not exceeding 45·7 metres in length, in accordance with Tables 1A, 2A, 3A, 4 and 5A of Part IV of this Schedule.

(*b*) In ships 76·2 metres in length and upwards, in accordance with Tables 1, 2, 3, 4 and 5 of Part IV of this Schedule.

(*c*) In ships between 45·7 metres and 76·2 metres in length, in a manner determined by interpolation between the two foregoing standards. Provided that in ships of any length the subdivision of which is determined in accordance with sub-paragraph (1) of paragraph 9 of Schedule 1 to these Regulations, every riveted portion of such internal structure may be constructed in accordance with Tables 1A, 2A, 3A, 4 and 5A of Part IV of this Schedule.

(2) Any bulkheads required by these Regulations to be watertight in ships not exceeding 45·7 metres in length and in ships the subdivision of which is determined in accordance with sub-paragraph (1) of paragraph 9 of Schedule 1 to these Regulations may, if the stiffeners comply with the specifications in Table 3B of Part IV of this Schedule, be fitted with stiffeners not having bracket or lug end connections.

PART III

SHIPS OF CLASSES III TO VI INCLUSIVE

9. *General*

Subject to the modifications set out in this Part of this Schedule, Part I of this Schedule shall apply in relation to ships of Classes III to VI, inclusive, as it applies in relation to ships of Class I.

10. *Bulkheads, etc.*

(1) Any bulkheads required by these Regulations to be watertight may be fitted with stiffeners not having bracket or lug end connections.

(2) Every riveted portion of the ship's internal structure required by these Regulations to be watertight shall be constructed in accordance with such of the provisions of Tables 1A, 2A, 3A, 3B, 4 and 5A of Part IV of this Schedule as apply to it in the circumstances.

PART IV

11. *Scantlings of watertight bulkheads, etc.* (paragraphs 1, 2, 3, 5, 8 and 10 of this Schedule)

(1) The following tables are to be used to obtain the thickness of plating, size of stiffeners and end connections for watertight bulkheads and tunnels.

(2) The depth at middle line from bulkhead deck to lower edge of plate in Tables 1 and 1A, the height of bulkhead deck above top of stiffener in Tables 2, 3, 2A, 3A and 3B, and, the mean height from base of tunnel to bulkhead deck in Tables 5 and 5A shall in all cases be adjusted where necessary to satisfy the requirements of paragraph 1(1) of this Schedule.

(3) Tables 2, 2A, 3, 3A, 3B, 5 and 5A show the moduli (I/y) and moments of inertia (I) of bulkhead stiffeners and tunnel stiffeners respectively.

Moduli and moments of inertia of intermediate lengths of stiffeners, and heights of bulkhead deck above top of stiffeners shall be determined by interpolation. Where the spacing of bulkhead stiffeners differs from 762 mm and tunnel stiffeners differs from 914 mm, the moduli and moments of inertia of the stiffeners shall be increased or decreased accordingly, in direct proportion to these spacings.

Stiffeners shall not be spaced more than 610 mm apart on a collision bulkhead, or more than 914 mm on any other watertight bulkhead.

(4) (*a*) In the case of welded construction, the moduli (I/y) and moments of inertia (I) of the riveted stiffeners obtained by interpolation from the Tables referred to in paragraph 11(3) of this Schedule shall be reduced by the amounts given in the following table:—

Type of Stiffener	Table No.	Maximum allowable percentage reduction of	
		Moduli (I/y)	Moments of Inertia (I)
BRACKETED ENDS*			
All sections, excluding flats, with all-welded brackets	Table 2	15%	25%
Flats with all-welded brackets	„	5%	15%
Riveted stiffeners with closely spaced end rivets and all-welded brackets	„	10%	15%
LUGGED ENDS			
Stiffeners with efficiently welded ends in lieu of lugs, or with all-welded lugs	Table 3	5%	15%
Stiffeners with all-welded lugs of same section extended to adjacent floor or frame	„	10%	15%
EXTENDED ENDS			
Stiffeners with efficiently welded ends continued by similar sections in between stiffeners of approximately decks above, in between decks or double bottom below, and welded at ends or ends	Table 3	10%	15%
UNATTACHED ENDS			
Stiffeners without end connections	Table 3	Nil	15%
CONTINUOUS STIFFENERS			
Stiffeners where extreme ends are bracketed, and where intermediate points of support are firm	Table 2	Nil	15%
Stiffeners where extreme ends are lugged	Tables 2 and 3	Nil	15%

*Brackets not extended to adjacent floor or beam should be treated as equivalent to lugs.

(*b*) Obtain the moduli (I/y) and moments of inertia (I) of the proposed welded stiffeners by calculating them in conjunction with the same amount and thickness of plating as assumed for the Tables in this Part of this Schedule. These values should not

be less than the reduced (I/y) and (I) values obtained in accordance with sub-paragraph (*a*) above.

(*c*) Similar percentage reductions to those given in sub-paragraph (*a*) above may be made to the moduli (I/y), and moments of inertia (I), of the scantlings specified for riveted tunnel stiffeners in Table 5, having regard to the type of end connections. No reductions are permitted in the moduli (I/y) of the scantlings of riveted stiffeners specified in Tables 2A, 3A, 3B and 5A, but the moments of inertia of such scantlings may be reduced up to a maximum of 15 per cent.

TABLE 1
(paragraphs 2, 5 and 8 of this Schedule)
THICKNESSES OF BULKHEAD AND TUNNEL PLATING

Plating of Collision Bulkhead: Stiffeners spaced 610 mm apart. Plating of Bulkheads (other than the Collision Bulkhead) and Flat Plating of Tunnels: Stiffeners spaced 762 mm apart. Curved Plating of Tunnels: Stiffeners spaced 914 mm apart.			Plating of Bulkheads (other than the Collision Bulkhead) and Flat Plating of Tunnels: Stiffeners spaced 914 mm apart.		
Depth at Middle Line from Bulkhead Deck to Lower Edge of Plate in metres		Thickness in millimetres	Depth at Middle Line from Bulkhead Deck to Lower Edge of Plate in metres		Thickness in millimetres
Above	*Not Above*		*Above*	*Not Above*	
—	2·2	6·5	—	1·9	7·0
2·2	3·4	7·0	1·9	2·95	7·5
3·4	4·6	7·5	2·95	4·0	8·0
4·6	5·8	8·0	4·0	5·05	8·5
5·8	7·0	8·5	5·05	6·1	9·0
7·0	8·2	9·0	6·1	7·15	9·5
8·2	9·4	9·5	7·15	8·2	10·0
9·4	10·6	10·0	8·2	9·25	10·5
10·6	11·8	10·5	9·25	10·3	11·0
11·8	13·0	11·0	10·3	11·35	11·5
13·0	14·2	11·5	11·35	12·4	12·0
14·2	15·4	12·0	12·4	13·45	12·5
15·4	16·6	12·5	13·45	14·5	13·0
16·6	17·8	13·0	14·5	15·55	13·5
17·8	19·0	13·5	15·55	16·6	14·0
			16·6	17·65	14·5

If the stiffeners are spaced otherwise than is specified above, the thicknesses of the plating shall be such as will result in a strength equivalent to that resulting from the thicknesses and spacings specified above.

TABLE 2
(paragraphs 2, 3 and 8 of this Schedule)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and fitted with bracket end connections at top and bottom in accordance with Table 4

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*									
		0		0·61		1·22		1·83		2·44	
2·44	↑	27·4	275	34·1	383	38·3	429	44·2	541	63·7	920
2·74		36·2	404	44·2	541	49·3	604	63·7	920	70·6	1011
3·05	*Angles*	46·9	572	63·7	920	67·0	966	74·2	1057	89	1200
3·35		63·7	920	67·0	966	89	1200	99	1340	111	1625
3·66		74·2	1045	92	1245	111	1625	114	1670	155	2570
3·96	↓	97	1315	114	1655	155	2570	157	2610	168	2775
4·27	↑	114	1655	155	2570	163	2695	174	2865	217	4010
4·57		154	2570	163	2695	217	4010	224	4125	234	4305
4·88		163	2695	217	4010	224	4125	242	4435	302	6160
5·18		217	4010	224	4125	258	4710	302	6160	310	6305
5·49	*Bulb Angles*	224	4125	258	4710	302	6160	326	6620	359	7200
5.79		258	4710	302	6160	331	6700	397	8780	406	8970
6·10		302	6160	359	7200	397	8780	511	12035	514	12095
6·40		359	7200	397	8780	449	9800	514	12095	517	12155
6·71		397	8780	449	9800	511	12035	554	12915	587	15025
7.01		449	9800	511	12035	554	12915	587	15025	615	15610
7·31	↓	511	12035	554	12915	587	15025	677	16940	691	17210
		← *Channels* →									

*Calculated in conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

TABLE 2 (*continued*)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and fitted with bracket end connections at top and bottom in accordance with Table 4

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*							
		3·05		3·66		4·27		4·88	
2·44	*Angles*	65·4	943	67·0	966	70·6	1011	88	1200
2·74		74·2	1057	88	1200	97	1315	111	1625
3·05		111	1625	114	1655	115	1670	154	2570
3·35		154	2570	156	2595	157	2610	168	2775
3·66		163	2695	168	2775	217	4010	220	4065
3·96		217	4010	220	4065	224	4125	242	4435
4.27		224	4125	242	4435	258	4710	302	6160
4.57	*Bulb Angles*	258	4710	302	6160	310	6305	331	6700
4·88		302	6160	326	6620	359	7200	397	8780
5·18		359	7200	397	8780	406	8970	511	12035
5.49		397	8780	449	9800	511	12035	517	12155
5·79		511	12035	540	12635	566	13180	587	15025
6·10		540	12635	566	13180	587	15025	615	15610
6·40		580	13455	587	15025	677	16940	691	17210
6.71	*Channels*	593	15170	677	16940	705	17605	757	18645
7.01		677	16940	705	17605	770	18920	881	20970
7.31		757	18645	796	19415	900	21330	989	30065

*Calculated in conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

TABLE 2 (*continued*)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and fitted with bracket end connections at top and bottom in accordance with Table 4

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*							
		5·49		6·10		6·71		7·31	
2·44	*Bulb angles*	92	1245	97	1315	111	1625	114	1655
2·74		114	1655	155	2570	157	2610	163	2695
3.05		157	2610	163	2695	174	2865	217	4010
3·35		217	4010	220	4065	224	4125	227	4185
3·66		224	4125	234	4305	258	4710	302	6160
3·96		258	4710	302	6160	310	6305	326	6620
4·27		310	6305	359	7200	364	7285	397	8780
4·57		359	7200	397	8780	449	9800	511	12035
4·88		449	9800	511	12035	514	12095	517	12155
5·18		517	12155	566	13180	580	13455	587	15025
5·49		566	13180	587	15025	600	15315	677	16940
5·79	*Channels*	600	15315	677	16940	691	17210	705	17605
6.10		677	16940	705	17605	757	18645	783	19165
6·40		757	18645	770	18920	881	20970	900	21330
6·71		881	20970	900	21330	989	30065	999	30300
7·01		989	30065	999	30300	1038	31260	1079	32195
7.31		1038	31260	1059	31740				

*Calculated in conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

TABLE 2 (*continued*)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and fitted with bracket end connections at top and bottom in accordance with Table 4

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*							
		7·92		8·53		9·14		9·75	
2·44	*Bulb angles*	123	1785	155	2570	157	2610	160	2650
2·74		163	2695	174	2865	217	4010	219	4050
3·05		219	4050	221	4085	224	4125	234	4305
3·35		242	4435	258	4710	302	6160	306	6235
3·66		306	6235	310	6305	331	6700	359	7200
3·96		359	7200	397	8780	401	8880	406	8970
4·27		406	8970	449	9800	511	12035	514	12095
4·57		514	12095	517	12155	554	12915	580	13455
4·88		566	13180	587	15025	590	15100	593	15170
5·18	*Channels*	590	15100	677	16940	684	17080	691	17210
5·49		684	17080	705	17605	757	18645	770	18920
5.79		757	18645	783	19165	881	20970	900	21330
6.10		881	20970	900	21330	989	30065	999	30300
6.40		989	30065	999	30300	1038	31260	1079	32195
6.71		1038	31260	1079	32195				

*Calculated in conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

TABLE 2 (*continued*)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and fitted with bracket end connections at top and bottom in accordance with Table 4

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*							
		10·36		10·97		11·58		12·19	
2·44	*Bulb angles*	163	2695	166	2735	174	2865	217	4010
2·74		221	4085	224	4125	227	4185	234	4305
3.05		250	4585	258	4710	302	6160	306	6235
3.35		310	6305	326	6620	331	6700	359	7200
3·66		364	7285	397	8780	401	8880	449	9800
3·96		449	9800	511	12035	514	12095	517	12155
4·27		517	12155	554	12915	580	13455	587	15025
4·57	*Channels*	587	15025	590	15100	593	15170	677	16940
4·88		677	16940	691	17210	705	17605	757	18645
5·18		757	18645	770	18920	783	19165	881	20970
5·49		881	20970	887	21080	900	21330	989	30065
5·79		989	30065	999	30300	1038	31260	1059	31740
6·10		1038	31260	1059	31740				

*Calculated in conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

TABLE 3
(paragraphs 2, 3 and 8 of this Schedule)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and fitted with lug end connections at top and bottom in accordance with Table 4

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*									
		0		0·61		1·22		1·83		2·44	
2·44	*Angles*	†38·3	429	49·3	604	63·7	920	74·2	1045	92	1245
2·74		†63·7	920	67·0	966	92	1245	99	1340	111	1625
3·05		†74·2	1045	97	1315	111	1625	155	2570	157	2610
3·35	*Bulb angles*	99	1340	114	1670	155	2570	163	2695	174	2865
3·66		123	1785	155	2570	168	2775	217	4010	220	4065
3·96		155	2570	174	2865	217	4010	234	4305	258	4710
4·27		177	2910	217	4010	258	4710	302	6160	310	6305
4·57		217	4010	260	4755	302	6160	331	6700	397	8780
4·88		258	4710	302	6160	359	7200	397	8780	439	9595
5·18		310	6305	359	7200	406	8970	511	12035	517	12155
5·49		359	7200	422	9280	511	12035	517	12155	593	13725
5·79		406	8970	511	12035	523	12285	587	15025	600	15170
6·10		511	12035	542	12660	587	15025	677	16940	691	17210
6·40		542	12660	587	15025	677	16940	705	17605	757	18645
6·71	*Channels*	587	15025	677	16940	705	17605	783	19165	881	20970
7·01		677	16940	705	17605	796	19415	900	21330	989	30065
7·31		705	17605	810	19645	925	21770	989	30065	1059	31740

*Calculated in conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

The ends of upper between deck stiffeners marked † may be riveted to boundary bars only without lug end connections.

TABLE 3 (*continued*)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and fitted with lug end connections at top and bottom in accordance with Table 4

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*							
		3·05		3·66		4·27		4·88	
2·44	*Bulb angles*	99	1340	111	1625	125	1820	155	2570
2·74		123	1785	155	2570	163	2695	168	2775
3·05		163	2695	174	2865	217	4010	220	4065
3·35		217	4010	224	4125	242	4435	258	4710
3·66		242	4435	302	6160	306	6235	310	6305
3·96		302	6160	326	6620	359	7200	397	8780
4·27		359	7200	397	8780	422	9280	511	12035
4·57		406	8970	449	9800	511	12035	523	12285
4·88		511	12035	517	12155	523	12285	587	15025
5·18		542	12660	593	13725	593	15170	677	16940
5·49	*Channels*	587	15025	677	16940	705	17605	757	18645
5·79		677	16940	757	18645	783	19165	881	20970
6·10		757	18645	881	20970	900	21330	989	30065
6.40		881	20970	989	30065	999	30300	1079	32195
6.71		989	30065	1038	31260				
7·01		1038	31260						

*Calculated in conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

TABLE 3 (*continued*)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and fitted with lug end connections at top and bottom in accordance with Table 4.

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*							
		5·49		6·10		6·71		7·31	
2·44	*Bulb angles*	157	2610	163	2695	168	2775	177	2910
2·74		191	3130	217	4010	224	4125	234	4305
3·05		234	4305	258	4710	302	6160	306	6235
3·35		302	6160	310	6305	331	6700	359	7200
3·66		359	7200	397	8780	406	8970	428	9385
3·96		422	9280	511	12035	514	12095	517	12155
4·27		511	12035	523	12285	587	13590	593	15025
4·57		593	13725	587	15025	677	16940	691	17210
4·88	*Channels*	615	15610	677	16940	705	17605	757	18645
5·18		705	17605	757	18645	881	20970	900	21330
5·49		881	20970	900	21330	989	30065	999	30300
5·79		989	30065	999	30300	1038	31260		
6·10		1038	31260	1110	32875				

*Calculated in conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

TABLE 3 (*continued*)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and fitted with lug end connections at top and bottom in accordance with Table 4

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*							
		7·92		8·53		9·14		9·75	
2·44	*Bulb angles*	217	4010	220	4065	224	4125	234	4305
2·74		258	4710	302	6160	304	6210	307	6260
3·05		310	6305	331	6700	359	7200	397	8780
3·35		397	8780	406	8970	449	9800	511	12035
3·66		449	9800	511	12035	523	12285	566	13180
3·96		566	13180	587	13590	601	15025	615	15610
4·27	*Channels*	615	15610	677	16940	691	17275	705	17605
4·57		705	17605	757	18645	783	19165	881	20970
4·88		881	20970	887	21080	989	30065	999	30300
5·18		989	30065	999	30300	1038	31260	1079	32195
5·49		1038	31260	1109	32875				

*Calculated in conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

TABLE 3 (*continued*)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and fitted with lug end connections at top and bottom in accordance with Table 4

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*							
		10·36		10·97		11·58		12·19	
2·44	*Bulb angles*	249	4560	302	6160	306	6235	310	6305
2·74		310	6305	331	6700	359	7200	397	8780
3·05		401	8880	406	8970	449	9800	511	12035
3·35		514	12095	517	12155	523	12285	566	13180
3·66		587	13590	590	15025	593	15170	677	16940
3·96	*Channels*	677	16940	684	17080	691	17210	757	18645
4·27		757	18645	770	18920	881	20970	887	21080
4.57		887	21080	989	30065	999	30300	1038	31260
4·88		1038	31260	1048	31495	1079	32195		

*Calculated in conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moments of inertia in centimetre^3 and centimetres^4 respectively.

TABLE 4
(paragraphs 2, 8 and 10 of this Schedule)

END CONNECTIONS FOR STIFFENERS

Type and Depth of Stiffener dimensions in millimetres		Bracket End Connections			Lug End Connections
		Thickness of Bracket in mms	Width of Flange in mms	Number and Size of Rivets in each arm of Bracket diameter in mm	Number and Size of Rivets in Lugs diameter in mm
Angles 150 and under ...		8·5		3 @ 19 diameter	2 @ 19 diameter
Bulb Angles 150 and under		9·0		3 @ 19 „	2 @ 19 „
Bulb Angles 180 „ „		10·0		4 @ 19 „	3 @ 19 „
„ „ 200 „ „		10·5		5 @ 19 „	3 @ 19 „
„ „ 230 „ „	Flanged	8·5	55	6 @ 19 „	4 @ 19 „
„ „ 250 „ „		9	65	7 @ 19 „	4 @ 19 „
„ „ 280 „ „		10	70	7 @ 22 „	4 @ 22 „
„ „ 300 „ „		10	75	8 @ 22 „	5 @ 22 „
Channels 300×90×90 ...		10	75	9 @ 22 „	6 @ 22 „
„ 300×100×100		10	75	10 @ 22 „	7 @ 22 „
„ 380×100×100		11	90	13 @ 22 „	8 @ 22 „

(1) The distance from the heel of the boundary bar to the extremities of the arms of the bracket shall not be less than two and one-half times the depth of the stiffener to which the bracket is connected.

(2) The overlap of stiffeners on brackets shall not be less than ·12 of the span.

TABLE 5
(paragraphs 5 and 8 of this Schedule)

*Moduli and moments of inertia of tunnel stiffeners spaced 914 mm apart.

Mean height from base of tunnel to bulkhead deck in metres	*Height from base of tunnel to the top of flat side in metres*											
	0·91		1·22		1·52		1·83		2·13		2·44	
3·66	12·8	104	23·6	239	34·1	383	46·9	572	63·7	920	88	1200
4·88	17·9	159	27·4	275	44·2	541	63·7	920	88	1200	111	1625
6·10	18·5	164	34·1	383	63·7	920	74·2	1045	111	1625	155	2570
7·31	25·4	256	44·2	541	67·0	966	97	1315	114	1670	163	2695
8·53	27·4	275	49·3	604	77·8	1103	111	1625	155	2570	217	4010
9·75	34·1	383	63·7	920	97	1315	155	2570	168	2775	224	4125
10·97	36·2	404	67·0	966	111	1625	159	2630	188	3085	242	4435
12·19	38·3	429	74·2	1057	114	1655	163	2695	224	4125	302	6160
13·41	44·2	541	77·8	1103	155	2570	217	4010	242	4435	310	6305
14·63	49·3	604	88	1200	159	2630	220	4065	258	4710	331	6700
15·85	63·7	920	97	1315	163	2695	224	4125	302	6160	397	8780
17·07	65·4	943	111	1625	168	2775	242	4435	310	6305	406	8970
18·29	67·0	966	114	1655	217	4010	258	4710	359	7200	449	9800
	← *Angles* →		← *Bulb angles* →									

*In conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

TABLE 1A
(paragraphs 8 and 10 of this Schedule)

THICKNESSES OF BULKHEAD AND TUNNEL PLATING

Plating of Collision Bulkhead: Stiffeners spaced 610 mm apart. Plating of Bulkheads (other than the Collision Bulkhead) and Flat Plating of Tunnels: Stiffeners spaced 762 mm apart. Curved Plating of Tunnels: Stiffeners spaced 914 mm apart.			Plating of Bulkheads (other than the Collision Bulkhead) and Flat Plating of Tunnels: Stiffeners spaced 914 mm apart.		
Depth at Middle Line from Bulkhead Deck to Lower Edge of Plate in metres		Thickness in millimetres	Depth at Middle Line from Bulkhead Deck to Lower Edge of Plate in metres		Thickness in millimetres
Above	*Not Above*		*Above*	*Not Above*	
—	2·0	4·5	—	2·3	5·5
2·0	2·6	5·0	2·3	2·9	6·0
2·6	3·2	5·5	2·9	3·5	6·5
3·2	4·0	6·0	3·5	4·1	7·0
4·0	4·8	6·5	4·1	4·7	7·5
4·8	5·65	7·0	4·7	5·3	8·0
5·65	6·5	7·5	5·3	6·1	8·5
6·5	7·45	8·0	6·1	6·9	9·0
7·45	8·4	8·5	6·9	7·7	9·5
8·4	9·3	9·0	7·7	8·5	10·0
			8·5	9·5	10·5

If the stiffeners are spaced otherwise than is specified above, the thicknesses of the plating shall be such as will result in a strength equivalent to that resulting from the thicknesses and spacings specified above.

TABLE 2A
(paragraphs 8 and 10 of this Schedule)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and fitted with bracket end connections at top and bottom in accordance with Table 4

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*									
		0		0·61		1·22		1·83		2·44	
1·83										22·7	231
2·13										32·0	358
2·44		12·8	104	18·5	164	25·4	256	34·1	383	41·8	510
2·74	*Angles*	18·5	164	25·4	256	34·1	383	41·8	510	63·7	920
3·05		25·4	256	34·1	383	44·2	541	63·7	920	72	1060
3·35		34·1	383	44·2	541	63·7	920	72	1060	88	1200
3·66		44·2	541	63·7	920	72	1060	88	1200	111	1625
3·96		63·7	920	72	1060	88	1200	111	1625	155	2570
4·27		72	1060	88	1200	111	1625	155	2570	163	2695
4·57		88	1200	111	1625	155	2570	163	2695	174	2865
4·88	*Bulb angles*	111	1625	155	2570	163	2695	217	4010	224	4125
5·18		155	2570	163	2695	217	4010	224	4125	258	4710
5·49		163	2695	217	4010	224	4125	258	4710	302	6160
5·79		217	4010	224	4125	258	4710	302	6160	310	6305
6·10		224	4125	258	4710	302	6160	310	6305	359	7200

*In conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figure in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

TABLE 2A (*continued*)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and fitted with bracket end connections at top and bottom in accordance with Table 4

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*									
		3·05		3·66		4·27		4·88		5·49	
1·83	*Angles*	23·6	239	27·4	275	31·0	308	34·1	383	36·2	404
2·13		34·1	383	36·2	404	41·8	510	46·9	572	49·3	604
2·44		63·7	920	65·4	945	67·0	966	72	1040	74	1105
2·74		67·0	966	72	1040	74	1105	88	1200	92	1245
3·05	*Bulb angles*	74	1105	92	1245	97	1315	111	1625	114	1655
3·35		92	1245	111	1625	155	2570	157	2610	163	2695
3·66		114	1655	155	2570	163	2695	168	2775	217	4010
3·96		157	2610	163	2695	217	4010	220	4065		
4·27		168	2775	217	4010	224	4125	227	4185		
4·57		217	4010	224	4125	258	4710				
4·88		227	4185	258	4710	302	6160				
5·18		302	6160	310	6305						
5·49		310	6305	359	7200						
5.79		359	7200								
6.10		397	8780								

*In conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

TABLE 3A
(paragraphs 8 and 10 of this Schedule)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and fitted with lug end connections at top and bottom in accordance with Table 4

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*									
		0		0·61		1·22		1·83		2·44	
2·44	↑									63·7	920
2·74				44·2	541	63·7	920	70·6	1011	88	1200
3·05	*Angles*	41·8	510	63·7	920	74·2	1057	92	1245	114	1670
3·35		63·7	920	88	1200	99	1340	114	1670	115	2570
3·66		70·6	1011	111	1625	123	1780	155	2570	174	2865
3·96	↑	111	1625	155	2570	163	2695	177	2190	217	4010
4·27		155	2570	163	2695	217	4010	224	4125	258	4710
4·57		163	2695	217	4010	224	4125	258	4710	302	6160
4·88	*Bulb angles*	174	2865	224	4125	258	4710	302	6160	359	7200
5·18		217	4010	258	4710	302	6160	359	7200	397	8780
5·49		258	4710	302	6160	359	7200	406	8970	511	12035
5·79		302	6160	359	7200	406	8970	511	12035	542	12660
6·10	↓	359	7200	406	8970	511	12035	542	12660	587	15025
										← *Channels* →	

*Calculated in conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

TABLE 3A (*continued*)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and fitted with lug end connections at top and bottom in accordance with Table 4

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*									
		3·05		3·66		4·27		4·88		5·49	
2·44	*Angles*	74·2	1057	88	1200	93	1270	111	1625	114	1670
2·74		97	1315	111	1625	155	2570	157	2610	163	2695
3.05		155	2570	157	2610	163	2695	177	2910	217	4010
3·35		163	2695	177	2910	217	4010	224	4125	242	4435
3·66		217	4010	227	4185	242	4435	302	6160	310	6305
3·96	*Bulb angles*	234	4305	258	4710	302	6160	326	6620		
4·27		302	6160	310	6305	359	7200	397	8780		
4·57		359	7200	397	8780	406	8970				
4·88		397	8780	449	9800	511	12035				
5·18		511	12035	517	12155						
5.49		523	12285	587	15025						
5·79	*Channels*	587	15025								
6·10		628	15880								
		←——*Channels*——→									

*Calculated in conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

TABLE 3B
(paragraphs 8 and 10 of this Schedule)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and not fitted with bracket or lug end connections.

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*									
		0		0·61		1·22		1·83		2·44	
1·83	↑	12·3	99	18·5	164	25·4	256	29·2	291	36·2	404
2·13		17·9	159	25·4	256	34·1	383	44·2	541	63·7	920
2·44		22·7	231	34·1	383	46·9	572	63·7	920	74·2	1057
2·74	*Angles*	34·1	383	63·7	920	67·0	966	88	1200	111	1625
3·05		63·7	920	67·0	966	88	1200	111	1625	155	2570
3·35		67·0	966	88	1200	114	1655	155	2570	163	2695
3·66		88	1200	114	1655	155	2570	174	2865	217	4010
3·96		111	1625	155	2570	174	2865	217	4010	242	4435
4·27		155	2570	174	2865	224	4125	258	4710	302	6160
4·57		168	2775	224	4125	250	4585	302	6160	359	7200
4·88	*Bulb angles*	217	4010	258	4710	302	6160	359	7200	397	8780
5·18		242	4435	302	6160	359	7200	422	9280	511	12035
5·49		302	6160	359	7200	422	9280	511	12035	554	12915
5·79		359	7200	406	8970	511	12035	566	13180	587	15025
6·10	↓	397	8780	511	12035	554	12915	587	15025	677	16940
								← *Channels* →			

*In conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

TABLE 3B (*continued*)

*Moduli and moments of inertia of bulkhead stiffeners spaced 762 mm apart and not fitted with bracket or lug end connections.

Overall length of stiffener including end connections in metres		*Height of bulkhead deck above top of stiffener in metres*									
		3·05		3·66		4·27		4·88		5·49	
1·83	*Angles*	44·2	541	63·7	920	65·4	943	67·0	966	74·2	1057
2·13		67·0	966	74·2	1057	89	1200	92	1245	111	1625
2·44		89	1200	111	1625	114	1655	155	2570	157	2610
2·74		114	1670	155	2570	163	2695	168	2775	217	4010
3·05		163	2695	168	2775	217	4010	220	4065	224	4125
3·35		217	4010	224	4125	234	4305	258	4710	302	6160
3·66	*Bulb angles*	224	4125	234	4305	302	6160	310	6305	359	7200
3·96		302	6160	306	6235	310	6305	397	8780		
4·27		331	6700	397	8780	406	8970	449	9800		
4·57		397	8780	449	9800	511	12035				
4·88		511	12035	554	12915	566	13180				
5·18		554	12915	593	13725						
5·49	*Channels*	587	15025	628	15880						
5.79		677	16940								
6.10		705	17480								

*In conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

TABLE 5A
(paragraphs 8 and 10 of this Schedule)

*Moduli and moments of inertia of tunnel stiffeners spaced 914 mm apart.

Mean height from base of tunnel to bulkhead deck in metres	*Height from base of tunnel to the top of flat side in metres*													
	0·914		1·07		1·22		1·37		1·52		1·68		1·83	
2·44	7·5	50	9·0	60	12·3	99								
3·66	9·0	60	13·9	108	16·4	148	22·8	231	25·4	256	27·4	275		
4·88	12·8	104	18·5	164	23·6	239	29·2	291	36·2	404	44·2	541	51·8	633
6·10	17·9	159	23·6	239	29·2	291	38·3	429	44·2	541	63·7	920	67·0	966
7·31	21·3	187	27·4	275	36·2	404	44·2	541	63·7	920	67·0	966	77·8	1103
8·53	25·4	256	34·1	383	42·6	475	51·8	633	67·0	966	77·8	1103	92	1245

Angles ↑ ↓

← *Bulb angles* →

*In conjunction with 610 mm × 10 mm of plating in the case of angle bar stiffeners and 610 mm × 15 mm of plating in the case of bulb angle and channel bar stiffeners.

The figures in each case are the modulus and moment of inertia in centimetres^3 and centimetres^4 respectively.

EXPLANATORY NOTE

(This Note is not part of the Regulations.)

These Regulations revoke the Merchant Shipping (Passenger Ship Constructions) Rules 1965 to the extent that they apply to United Kingdom passenger ships and other sea-going passenger ships registered in a country to which a Safety of Life at Sea Convention applies while they are within the United Kingdom or territorial waters thereof and re-enact the provisions of those Rules with modifications necessary to give effect to the International Convention for the Safety of Life at Sea 1974 (Cmnd 7874) in respect to United Kingdom passenger ships and other sea-going passenger ships while they are within the United Kingdom or territorial waters thereof.

Those modifications include:

(1) stability information has to be supplied in respect of passenger ships which must undergo an inclining test to determine the elements of stability (Regulations 9, 10, 11 and Schedule 2);

(2) requirements in respect of the openings in the shell plating above and below the margin line, and subdivision load line markings have been updated to conform to the prescribed load line requirements (regulations 19, 20 and 23);

(3) requirements relating to fire protection in new passenger ships of specified classes carrying not more than 36 passengers are prescribed (Part V(A));

(4) requirements are prescribed in respect of watertight subdivision bulkhead plating thicknesses and stiffener scantlings (Schedule 4 Part IV).

The Institute of Electrical Engineers Regulations are obtainable from the Institution at Savoy Place, London WC2; the International Standard is obtainable from the British Standards Institution, 2 Park St, London W1; and the Merchant Shipping Notice is obtainable from the Department of Trade Marine Library, Sunley House, 90 High Holborn, London WC1 and from any Department of Trade mercantile marine office or marine survey office.

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