
STATUTORY INSTRUMENTS

1984 No. 1216**MERCHANT SHIPPING****The Merchant Shipping (Passenger Ship Construction and Survey)
Regulations 1984***Made* 2nd August 1984*Laid before Parliament* 10th August 1984*Coming into Operation* 1st September 1984**ARRANGEMENT OF REGULATIONS****PART I — GENERAL***Regulation No*

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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 (1), paragraphs (a), (d), (f), (g), (h), (i), (j), (o) and (q) of subsection (3) and subsections (4)(a) and (b), (5), (6)(a), (ba) and (bb) of section 21 and by section 22(1)(a), (b) 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 application

1.—(1) These Regulations may be cited as the Merchant Shipping (Passenger Ship Construction and Survey) Regulations 1984 and shall come into operation on 1st September 1984.

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

“Accommodation spaces” means:

- (a) public spaces;
- (b) corridors and lobbies;
- (c) stairways;
- (d) lavatories;
- (e) cabins;
- (f) offices;
- (g) crew spaces;
- (h) hairdressing salons;
- (i) pantries not containing cooking appliances;
- (j) lockers; and
- (k) space similar to any of the foregoing and trunks to such space;

“Approved” means approved by the Secretary of State;

“Auxiliary steering gear” means the equipment, other than any part of the main steering gear, necessary to steer the ship in the event of failure of the main steering gear but not including the tiller, quadrant or components serving the same purpose;

“Breadth of the ship” means the greatest moulded breadth at or below the ship’s deepest subdivision load waterline;

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

“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(b);

(a) 1979 c.39

(b) 1970 c.36

“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;

“Dangerous Goods” means goods defined as such in the Merchant Shipping (Dangerous Goods) Regulations 1981(a);

“Dead ship condition” means the condition under which the main propulsion plant, boilers and auxiliaries are not in operation due to the absence of power;

“Deadweight” means the difference in tonnes between the displacement of a ship in water of a specific gravity of 1.025 and the lightweight of the ship;

“Emergency condition” means a condition under which any services needed for normal operational and habitable conditions are not in working order due to failure of the main source of electrical power;

“Emergency source of electrical power” means a source of electrical power intended to supply the emergency switchboard in the event of failure of the supply from the main source of electrical power;

“Emergency switchboard” means a switchboard which in the event of a failure of the main electrical power supply system is directly supplied by the emergency source of electrical power or the transitional source of emergency electrical power and is intended to distribute electrical energy to the emergency services;

“Enclosed superstructure” means a superstructure:

- (a) which has enclosing bulkheads of efficient construction in which all access openings are fitted with sills and weathertight doors, and
- (b) in which all other openings in the sides or ends thereof are fitted with efficient weathertight means of closing,

however it should not include a bridge or poop fulfilling these requirements unless access is provided by which the crew can reach machinery and other working spaces within the bridge or poop by alternative means which are available for the purpose at all times when access openings in the bulkheads of the bridge or poop are closed;

“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;

(a) S.I. 1981/1747.

“Favourable weather” means fine, clear settled weather with a sea state such as to cause only moderate rolling and/or pitching;

“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;

“Forward perpendicular” means the forward extremity of the length of the ship as defined in this regulation;

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

“Hazardous area” means an area in which explosive gas-air mixtures are, or may be expected to be, present in quantities such as to require special precautions for the construction and use of electrical apparatus or other apparatus which otherwise would constitute a source of ignition;

“IMO Resolution A.265 (VIII)” means Resolution A.265 (VIII) adopted by the International Maritime 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 or a publication of the International Electrotechnical Commission (IEC), obtainable from the British Standards Institution;

“Length” in relation to a ship, except for the purposes of regulation 20(4)(b)(ii) and (c)(iii); means the length of a ship measured between perpendiculars taken at the extremities of the deepest subdivision load waterline;

“Lightweight” means the displacement of a ship in tonnes without cargo, fuel, lubricating oil, ballast water, fresh water and feed water in tanks, consumable stores and passengers and crew and their effects;

“Machinery space” in every Part of these Regulations except Parts IIA and IIB and Schedule I to these Regulations means any space which contains 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 where the context so admits any trunk to such a space;

“Machinery space” in Parts IIA and IIB and Schedule I to these Regulations means any 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, generators and boilers serving the needs of propulsion, when installed;

(a) S.I. 1968/1053, to which there are amendments not relevant to these Regulations.

“Machinery space of Category A” means a machinery 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 375 kilowatts; or
- (b) any oil fired boiler or oil fuel unit;
and any trunk to such a space

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

“Main generating station” means the space in which the main source of electrical power is situated;

“Main source of electrical power” means a source intended to supply electrical power to the main switchboard for distribution to all services necessary for maintaining the ship in a normal operational and habitable condition;

“Main steering gear” means the machinery, rudder actuators, steering gear power units, if any, and auxiliary equipment and the means of applying torque to the rudder stock, such as the tiller or quadrant, necessary for effecting movement of the rudder for the purpose of steering the ship under normal service conditions;

“Main switchboard” means a switchboard which is directly supplied by the main source of electrical power and is intended to distribute electrical energy to the ship’s services;

“Margin line” means a line drawn at least 76 millimetres below the upper surface of the bulkhead deck at the side of the ship;

“Maximum ahead service speed” means the greatest speed which the ship is designed to maintain in service at sea at her deepest seagoing draught;

“Maximum astern speed” means the greatest speed which it is estimated the ship can attain at the designed maximum astern power at the deepest seagoing draught;

“Merchant Shipping Notice” means a Notice described as such and issued by the Department of Transport; and any reference to a particular Merchant Shipping Notice includes a reference to any document amending or replacing that Notice which is considered by the Secretary of State to be relevant from time to time and is specified in a Merchant Shipping Notice;

“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 1st September 1984 or a cargo ship which is converted to a passenger ship on or after that date;

“Noise level” means ‘A’ weighted sound pressure level in decibels dB(A) as defined and tabulated in the British Standards specification number BS 5969 : 1981;

“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;

“Normal operational and habitable condition” means a condition under which the ship as a whole, the machinery, services, means and aids ensuring propulsion, ability to steer, safe navigation, fire and flooding safety, internal and external communications and signals, means of escape, and winches for emergency boats, as well as the designed comfortable conditions of habitability are in working order and functioning normally;

“Oil fuel unit” means the equipment used for the preparation of oil fuel for delivery to an oil-fired boiler or the 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;

“Open ro/ro cargo spaces” means ro/ro cargo spaces either open at both ends, or open at one end and provided with adequate natural ventilation effective over their entire length through permanent openings in the side plating or deckhead;

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

“Passenger space” means a space provided for the use of passengers except as otherwise defined in paragraph 1(3) of Schedule 1 to these Regulations;

“Permeability” in relation to a space means the percentage of that space 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;

“Power actuating system” means the hydraulic equipment provided for supplying power to turn the rudder stock, comprising a steering gear power unit or units, together with the associated pipes and fittings, and a rudder actuator. The power actuating systems may share common mechanical components, that is, tiller, quadrant and rudder stock, or components serving the same purpose;

“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);

“Ro/ro cargo spaces” means spaces not normally subdivided in any way and extending to either a substantial length or the entire length of the ship in which goods (packaged or in bulk, in or on rail or road cars, vehicles (including road or rail tankers), trailers, containers, pallets, demountable tanks or in or on similar stowage units or other receptacles) can be loaded and unloaded normally in a horizontal direction;

“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;

“Similar stage of construction” means the stage at which:

- (a) construction identifiable with a specific ship begins; and
- (b) assembly of that ship has commenced comprising at least 50 tonnes or one per cent of the estimated mass of all structural material, whichever is less;

“Special category space” means any enclosed space above or below the bulkhead deck 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;

“Steering gear control system” means the equipment by which orders are transmitted from the navigating bridge to the steering gear power units. Steering gear control systems comprise transmitters, receivers, hydraulic control pumps and their associated motors, motor controllers, piping and cables;

“Steering gear power unit” means:

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

(a) S.I. 1980/529, as amended by S.I. 1981/582

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

“Tons” means gross tons and a reference to tons:

- (a) in relation to a ship having alternative gross tonnages under paragraph 13 of Schedule 5 of the Merchant Shipping (Tonnage) Regulations 1982(a) is a reference to the larger of those tonnages; and
- (b) in relation to a ship having its tonnage determined both under Part II and regulation 16 of those Regulations is a reference to its gross tonnage as determined under regulation 16 of those Regulations;

“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 the worst sea and weather conditions likely to be encountered by the ship.

(3) These Regulations apply to new United Kingdom passenger ships and, to the extent that the Secretary of State deems reasonable and practical, to any major repairs, alterations or modifications to existing United Kingdom passenger ships commencing on or after 1st September 1984; provided that any such repairs, alterations and modifications carried out pursuant to a contract entered into before 1st September 1984 shall be deemed to have commenced before that date.

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 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 satisfied that compliance therewith is unreasonable or unnecessary by reason of the sheltered nature and conditions of the intended services of the ship;
- (b) 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;
- (c) 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

(a) S.I. 1982/841.

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;

- (d) 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 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 favourable 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 favourable 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 the United Kingdom and which do not proceed for a distance of more than 3 miles from land; subject to any conditions which the Secretary of State may impose.

(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 any 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 shall be sufficient for the service for which the ship is intended.

(a) 1949 c.43.

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

PART IIA — WATERTIGHT SUBDIVISION

Application of Part IIA

5. This Part of these Regulations applies to every ship 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 which complies fully with regulations 2 to 8, 11 and 13 of IMO Resolution A.265(VIII) need not comply with the requirements of this Part, except that regulations 7, 10, 12 and 14 to 26 inclusive of these Regulations shall apply.

Watertight subdivision

6. Every ship 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.

Peak and machinery space bulkheads, shaft tunnels, etc.

7.—(1) Every ship 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 3.0 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 fitted at a distance of at least 5 per cent but not more than 3.0 metres plus 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 an 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) Where any part of the ship below the waterline extends forward of the forward perpendicular, the distances specified in paragraph (1) of this regulation shall be measured from a point either:

- (a) at the mid point of the maximum length forward of the forward perpendicular of such an extension; or
- (b) at a horizontal distance forward of the forward perpendicular equal to 1.5% of the length of the ship; or
- (c) at a horizontal distance 3.0 metres forward of the forward perpendicular;

whichever gives the smallest measurement.

(3) Where bow doors are fitted and a sloping loading ramp forms part of the extension of the collision bulkhead above the bulkhead deck, any part of the ramp structure which is more than 2.3 metres above the bulkhead deck may extend forward of the limit specified in paragraph (1) as amended in paragraph (2), if applicable. The ramp shall form a complete weathertight closure of the collision bulkhead extension above the bulkhead deck.

(4) 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 and boilers, 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 as regards subdivision is not thereby impaired.

(5) 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, II(A) shall be fitted with a watertight double bottom which shall extend from the forepeak bulkhead to the afterpeak bulkhead, provided that the Secretary of State may permit a double bottom to be dispensed with in compartments where its fitting would not be compatible with the design and proper working of the ship, subject to compliance with the following minimum requirements for fitting such a double bottom:

- (a) in ships of 50 metres but less than 61 metres in length, from the forward bulkhead of 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 a double bottom shall be fitted amidships and shall extend from the collision bulkhead to the afterpeak bulkhead or as near to those bulkheads as is practicable.
- (2) 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 .50, 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.

(3) 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.

(4) 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 460 millimetres, nor shall the well extend below the horizontal plane referred to in paragraph (3) of this regulation, provided that a well extending to the outer bottom may be constructed at the after end of a watertight shaft tunnel fitted in accordance with regulation 7(5) of these Regulations.

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

(6) 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.

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. The information relating to stability shall, before issue to the master, be submitted to the Secretary of State for approval, together with a copy thereof for his retention and shall incorporate such additions and amendments as the Secretary of State may in any particular case require.

(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. The ship shall be re-inclined if the Secretary of State so requires.

(3) Stability information provided pursuant to paragraphs (1) and (2) of this regulation 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 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) 0.090 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) 0.030 metre-radian between the angles of heel of 30 degrees and 40 degrees or such lesser angle as is referred to in sub-paragraph (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 provided that the Secretary of State may permit this angle to be reduced to 25 degrees having regard to the design of a particular ship;
- (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 and 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 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 provision of regulation 6 of these Regulations. The sufficiency of intact stability required shall be calculated in accordance with Schedule 3 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 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 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 (2)(c) of paragraph 2 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 shall 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, other than ships of Classes IV, V and VI for the use of the master of the ship, 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.

This additional information shall be included in the books required by regulation 9(3) of these Regulations.

Ballasting

12. The arrangements for segregation of oil fuel and water ballast shall be in accordance with regulation 24 of the Merchant Shipping (Prevention of Oil Pollution) Regulations 1983(a).

Construction of watertight bulkheads, etc.

13.—(1) 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) 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 watertight bulkheads shall be reduced to the minimum compatible with the design and proper working of the ship and means shall be provided for closing these openings to the satisfaction of the Secretary of State.

(2) 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.

(3) 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 doorway to shaft tunnels, may be fitted in each main transverse bulkhead. Where two or more shafts are fitted, the tunnels shall be connected by an 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.

(4) 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 waterline;

provided also that in ships carrying goods vehicles and accompanying personnel doorways may be fitted in bulkheads dividing cargo spaces at any level, subject to compliance with regulation 19(1) of these Regulations.

(5) 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.

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

(7)(a) In every ship:

- (i) valves and cocks not forming part of a pipe system other than the self closing oil fuel drain valves required by regulation 64(12) of these Regulations shall not be fitted in any bulkhead or other division required by these Regulations to be watertight;
 - (ii) if any such bulkhead or other division is pierced by pipes, scuppers, electric cables or other similar fittings, provision shall be made which will ensure that its watertightness is not thereby impaired;
 - (iii) valves which are fitted in piping systems in order to maintain the integrity of the watertight bulkheads in the event of damage, should be screw-down valves capable of being controlled manually at the valve, and from a position above the bulkhead deck;
 - (iv) lead or other heat sensitive materials shall not be used in systems which penetrate watertight subdivision bulkheads or other watertight divisions where deterioration of such systems in the event of fire would impair the watertight integrity of the division unless measures which are acceptable to the Secretary of State 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 if the Secretary of State is satisfied that there is no practicable alternative to the fitting of such a second pipe and that having regard to the additional subdivision provided in the forepeak, the safety of the ship is maintained. 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 divisions required by these Regulations to be watertight.

(2) Every door fitted to any such opening shall be a sliding watertight door; provided that any door permitted by the Secretary of State to be fitted in any bulkhead in accordance with regulation 14 (4) may be a hinged or rolling watertight door subject to the requirements of paragraph (5) of this regulation.

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

- (a) hand operated; or
- (b) power operated, as well as hand operated.

(4) Hinged and rolling watertight doors fitted in accordance with 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) Any watertight door which is —

- (a) fitted in any bulkhead, not being a collision bulkhead, which separates two cargo between deck spaces, or
- (b) fitted, pursuant to regulation 19(1) in a watertight bulkhead at any level shall be capable of being opened and closed from a local position only and every hinged, rolling or sliding watertight door which is fitted in such a position 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.

Means of operating sliding watertight doors

16.—(1) In every ship of Classes I, II or II(A) all sliding watertight doors, except sliding watertight doors which are fitted in accordance with paragraph (4) of regulation 14 of these Regulations, shall be operated by power and shall be capable of being simultaneously closed from a single position situated on the navigating bridge.

- (2)(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, provided that the maximum period for closure in sub-paragraph 3(a) of this regulation shall not be exceeded.
- (3)(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 source 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. The watertight doors shall be capable of being closed simultaneously from the navigating bridge in not more than 60 seconds.
- (b) Where the sources of power are hydraulic, there shall be two pumps each of which shall be capable of closing all watertight doors simultaneously 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.
- (4) Watertight door controls, including hydraulic piping and electric cables, shall be kept as close as practicable to the bulkhead in which the doors are fitted, in order to minimise the likelihood of them being involved in any damage which the ship may sustain. The positioning of watertight doors and their controls shall be such that if the ship sustains damage to the extent described in paragraph 1(3)(b) of Schedule 3 to these Regulations, the operation of the watertight doors clear of the damaged portion of the ship is not impaired.
- (5) 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.
- (6)(a) 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.

(7) 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.

(8) 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 actuate the signal and to close the door, the signal preceding the movement of the door by an interval of about 10 seconds in order to allow the movement of persons and articles away from the door. The signal shall continue to operate until the door is completely closed. The audible warning signal shall be supplemented with an intermittent visual warning signal in any space where the noise level exceeds 85dB(A).

Construction and testing 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 watertight bulkhead in which it is fitted. Any such door shall, together with its frame, be made of cast or mild steel.

(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 and nut shall be of suitable metals which are 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 shall be tested by water pressure to a head of water measured from the bottom of the door up to the bulkhead deck or the freeboard deck whichever is higher in way of the bulkhead to which the door is to be fitted, but in no case should the test head be less than 6 metres for sliding doors or less than 3 metres for hinged or rolling doors.

Ships carrying goods vehicles and accompanying personnel

19.—(1) (a) In every ship designed or adapted for the carriage of goods vehicles and accompanying personnel, hinged, rolling or sliding watertight doors may be fitted at any level in watertight bulkheads dividing cargo spaces intended for such vehicles, if the total number of passengers, including the personnel accompanying the goods vehicles, which the ship is intended to carry does not exceed $12 + \frac{A}{25}$;

where:

A = the total deck area in square metres available in any spaces for the stowage of goods vehicles which has a clear height of not less than 4 metres and has a clear height at the entrance or access of not less than 4 metres; provided that in calculating A any part of any space which does not have a clear height of 4 metres and any part of space, of whatever height, which does not have a clear height at the entrance or access of 4 metres shall be excluded from the calculation.

(b) Every watertight door fitted in accordance with this regulation shall comply with the requirements of paragraph (5) of regulation 15 of these regulations and every such door shall be connected with an indicator on the navigating bridge showing when the door is closed and all the door fastenings are secured.

(2) In applying paragraph 1(2)(a) of Schedule 3 to these Regulations for the worst operating condition, the permeability for cargo spaces used for the stowage of goods vehicles and containers shall be derived by calculation in which the goods vehicles or containers shall be assumed to be non-watertight and their permeability taken as 65. For ships which are dedicated to a particular trade or trades the actual value of permeability for goods vehicles and containers may be applied, if the Secretary of State so permits. In no case shall the permeability of the cargo spaces in which the goods vehicles and containers are carried be taken as less than 60.

Openings in the shell plating below the margin line

20.—(1) 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) Sidescuttles below the margin line shall be of a non-opening type and be constructed to British Standards specification (BS MA 24: October 1974), or an equivalent standard acceptable to the Secretary of State.
- (b) In every ship of Classes I, II, II(A) and III which is marked with a summer load line no sidescuttle 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 which has its lowest point either:
- (i) at a distance equal to 2.5 per cent of the breadth of the ship measured vertically above the summer load waterline; or
 - (ii) 500 millimetres above the summer load waterline;
- whichever is the greater.

In every ship of Classes IIA and III which is not marked with a summer load line no sidescuttle shall be fitted in a between-decks such that its sill will be below a line drawn parallel to the bulkhead deck at its side which has its lowest point at a distance equal to 2.5 per cent of the breadth of the ship measured vertically above the deepest subdivision load waterline.

- (c) In every ship of Classes IV, V and VI no sidescuttle shall be fitted such that its sill will be below a line drawn parallel to the bulkhead deck at its side and which has its lowest point at a distance of 150 millimetres above the deepest subdivision load waterline.
- (d) 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.
- (e) Sidescuttles shall not be fitted below the margin line to any space appropriated solely for the carriage of cargo. If sidescuttles are fitted below the margin line to spaces appropriated to carry either cargo or passengers, their deadlights shall be fitted with approved locking arrangements.

Inlets and discharges

- (4)(a) 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:

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- (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 bulkhead deck or the freeboard deck, whichever is the higher. Such positions shall be readily accessible at all times under service conditions. The means of closure shall be provided with an indicator showing whether the valve is open or closed; or
 - (ii) two automatic non-return valves having no positive means of closure where the vertical distance from the inboard end of the discharge pipe in which those valves are fitted to the summer load waterline exceeds $.01L$, (where L is the length of the ship as defined in the Merchant Shipping (Load Lines) (Length of Ship) Regulations 1968(a); in any ship which is not marked with a summer load waterline the vertical distance shall be measured to the ship's deepest subdivision load waterline; one such valve shall be situated as close to the ship's shell as practicable and substantially connected thereto and the inboard valve shall where practicable be fitted above the deepest load waterline; where that is not practicable a locally controlled sluice valve interposed between them two automatic non-return valves shall be fitted; the inboard valve shall in every case be in such a position 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, other than an enclosed cargo space situated on the bulkhead deck, 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 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 efficient drainage from any enclosed cargo space on the bulkhead deck shall be provided. Every discharge shall be in compliance with the requirements of sub-paragraph (b)(i), (b)(ii) or (c)(iii) of this regulation provided that where the freeboard to the bulkhead deck is such that the deck

(a) S.I. 1968/1072.

edge is immersed when the ship heels 5 degrees either way, other arrangements shall be provided to drain such spaces which shall be to the satisfaction of the Secretary of State, provided that the Secretary of State may permit the means of drainage to be dispensed with in any particular compartments of any ship if he is satisfied that by reason of the size or internal subdivision of those spaces, the safety of the ship is not thereby impaired.

- (e) In every ship which is marked with a summer load line every scupper and discharge originating at any level above those described in sub-paragraphs (c) and (d) 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
 - (bb) in any case in which the piping of the scupper, or discharge pipe is of adequately increased thickness.
- (f) All cocks and valves attached to inlets or discharges, other than inlets or discharges connected with machinery, the failure of which may give rise to the danger of flooding, shall be made of steel, bronze or other equivalent material.
- (g) 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.
- (h) 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.
- (i) All discharge pipes led through the shell below the margin line and the valves relating thereto shall be protected from damage.
- (j) 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) The inboard opening of every 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.
- (l) (i) Each gangway port and cargo 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 or cargo port below the freeboard deck shall, unless the Secretary of State otherwise permits, 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 waterline corresponding with 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.

(5) The Secretary of State may exempt any ship of Classes IV to VI, inclusive, from the requirements of paragraph (4) 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

21.—(1) 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. All sidescuttles and windows shall be to British Standards specification Numbers BS MA 24: October 1974, BS MA 25: October 1973 as amended by AMD 2060 Amendment Slip No. 1, published 30th July 1976 to BS MA 25 1973, or an equivalent standard acceptable to the Secretary of State.

(2) 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 20(4)(b)(i), (ii) or (c)(iii) of these Regulations with efficient means for preventing water from passing inboard.

Marking of valves, doors and mechanisms

22. All doors valves and mechanisms connected with the damage control and watertight integrity of the ship shall be suitably marked to ensure that they may be properly used to provide maximum safety.

Weather deck

23. 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

24. All reasonable and practicable measures shall be taken to limit where necessary the entry and spread of water above the bulkhead deck, such measures may include partial bulkheads or webs. Where such partial watertight bulkheads and webs are fitted on the bulkhead deck, above or in the immediate vicinity of main subdivision bulkheads, they shall have watertight shell and bulkhead deck connections so as to restrict the flow of water along the deck when the ship is 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

25.—(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 300 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.

(a) 1967 c.27

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.

(3) Ships which are assigned freeboards and are required to be marked with load lines under the Merchant Shipping (Load Line) Rules 1968(a) 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 or C 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 or C on the after side of the vertical line.

Exhibition of damage control plans

26. There shall be permanently exhibited, for the information of the officer in charge of the ship, plans showing clearly for each level the boundaries of the watertight compartments, the openings therein, the means of closing such openings and 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 IIB — SHIPS NOT REQUIRED TO COMPLY WITH PART IIA

Application of Part IIB

27. 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

28. The stability of every ship shall be determined to the satisfaction of the Secretary of State. Where hydrostatic data is available the vessel shall be inclined and the elements of her stability determined. 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.

(a) S.I. 1968/1053, as amended by S.I. 1979/1267.

Openings in the sides of the ship

29.—(1) Efficient means shall be provided for preventing the accidental admission of water into any ship through any openings in the sides of the ship.

(2) Every sidescuttle 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

30. This Part of these Regulations applies to every ship to which these Regulations apply provided that a ship which complies with the requirements of IMO Resolution A.265(VIII) specified in the proviso to regulation 5 of these Regulations need not comply with regulation 32 (1) of these Regulations if it complies with regulation 19(b)(i) and (ii) of that Resolution.

General

31.—(1) 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.

(2) Sanitary, ballast and general service pumps having a capacity in accordance with regulation 35(3) may be accepted as independent power pumps if fitted with necessary connections to the bilge pump systems.

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

32.—(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:

	Number of Pumps	
	Criterion Numeral (Less than 30)	Criterion Numeral (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 waterline; 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

33.—(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 32(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

34.—(1) Every ship of Class IV shall be provided with a power bilge pump, which may be worked by the ship's main engine 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 or open 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.

The Secretary of State may permit other arrangements where the conditions of service such as the depth of water in which the ship will ply make the application of these requirements unreasonable.

Requirements for bilge pumps and bilge suction

35.—(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 machinery essential for propulsion is 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 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 31 of these Regulations to be drained.

(3) Every independent power bilge pump shall be capable of giving a speed of water of not less than 2 metres per second through the ship's main bilge pipe when its diameter is that determined by regulation 37(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 suction 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 suction in the ship's machinery space shall be so arranged that water may be pumped from each side of the space through direct suction to independent power bilge pumps.

(4) One of the sea water pumps circulating each main engine 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 main circulating pump inlet, and in motor ships of the same diameter as the main seawater circulating 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 suction or the strainer, if any, attached thereto shall be accessible for clearing. The spindles of the ship's main sea inlet and of the direct suction valves shall extend well above the engine room platform.

(5) The hand bilge pumps 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

36.—(1) In every ship all bilge suction pipes up to the connection to the pumps shall be independent of other piping.

(2) All bilge pipes used in or under fuel storage tanks or in boiler or machinery spaces, including spaces in which oil-settling tanks or oil fuel pumping units are situated, shall be of steel or other suitable material.

(3) Bilge suction pipes 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. Where bilge suction pipes pass through deep ballast water tanks, such pipes should be of heavy gauge and the number of pipe joints kept to a minimum. The pipes shall be led above the line of the double bottom.

(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.

(5) The bilge pumping arrangements for cargo spaces containing flammable or toxic liquids shall be designed so that inadvertent pumping of such liquids through the main bilge system or any other system connected to a pump located in a machinery space can be prevented. Additional means of draining such cargo spaces shall be provided if the Secretary of State considers their provision necessary taking into consideration the quantity and characteristics of the liquids and their location.

Diameter of bilge suction pipes

37.—(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 34 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:

$$d_m = 25 + [1.68\sqrt{L(B+D)}]$$

$$d_b = 25 + [2.15\sqrt{l(B+D)}]$$

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 as defined in regulation 1.

B = breadth of ship in metres as defined in regulation 1.

D = moulded depth of ship amidships 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 34 of these Regulations to be provided with a pump, shall be less than 32 millimetres in bore.

Precautions against flooding through bilge pipes

38.—(1) In every ship to which Part IIA 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) 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 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 waterline, 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 such distance being measured at right angles to the centre line of the ship at the level of the deepest subdivision load waterline, 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.

39.—(1) In every ship to which Part IIA 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 suction 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 33(1) of these Regulations, the valves and cocks on the bilge main for controlling the bilge suction 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) Any remote operating system for bilge suction valves or cocks shall be led as directly as possible. Every such operating system passing through a cargo space shall be protected against damage in such a space.

(3) 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

40. Bilge suction in the machinery space of every ship 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

41. In every ship to which Part IIA 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

Application of Part IV

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

General

43.—(1) The electrical equipment and installations in every ship shall be such that:

- (a) all electrical auxiliary services necessary for maintaining the ship in normal operational and habitable condition will be ensured without recourse to the emergency source of electrical power; and
- (b) the electrical services essential for safety will be ensured under emergency conditions.

(2) 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 1132.

Main source of electrical power and main switchboards: ships of Classes I to III inclusive

44.—(1) In every ship of Classes I to III inclusive a main source of electrical power shall be provided of sufficient capacity to supply all the services referred to in regulations 43(1)(a) and (b) of these Regulations. The main source of electrical power shall be arranged so that such services can be maintained regardless of the speed and direction of rotation of the propulsion machinery or shafting. The main source of electrical power shall consist of at least two generating sets. Arrangements shall be made which will safeguard the main generating sets and main switchboards from being rendered inoperative in the event of the partial flooding of the machinery space through leakage from a damaged compartment or otherwise.

(2) The arrangement of the generating sets required by paragraph (1) of this regulation shall be such that with any one of the sets out of service:

- (a) normal operational conditions of propulsion and safety of the ship and minimum comfortable conditions of habitability including those for cooking, heating, domestic refrigeration, mechanical ventilation, sanitary and fresh water can be maintained; and
- (b) from a dead ship condition, the remaining sets are capable of providing the electrical services necessary to start the main propulsion plant. The emergency source of electrical power may be used for this purpose if it is capable of simultaneously supplying the emergency supplies required by these Regulations or it is capable of supplying such services when combined with any other source of electrical power.

(3)(a) Load shedding or other equivalent arrangements shall be provided to protect the generators required by paragraph (1) of this regulation against sustained overload.

(b) Where 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.

(4) Any transforming equipment supplying an electrical system referred to in this regulation shall be arranged to ensure the same continuity of supply as that required for generating sets by this regulation.

(5) In any ship with only one main generating station the main switchboard shall be located in the same space as the main generating sets. Where there is more than one main generating station and only one main switchboard, that switchboard shall be located in the same space as one of the main generating stations. Where other essential features of the ship render the application of this requirement impracticable the Secretary of State may permit the provision of equivalent arrangements. For the purpose of this paragraph an environmental enclosure for the main switchboard, such as a machinery control room fitted within the main boundary of the space, does not provide separation between the generating sets and switchboards.

(6) The main busbars shall be subdivided in every ship which has a total installed electrical power of the main generating sets in excess of 3 megawatts. Each section of the busbars shall be interconnected by removable links or other suitable means such that the main generating sets and any supplies to duplicated services which are directly connected to the busbars are, so far as is practicable, equally divided between the sections. The Secretary of State may permit other arrangements which provide equivalent system redundancy.

Lighting Systems

45. In every ship:

(1) The main source of electrical power shall be capable of illuminating any part of the ship normally accessible to and used by the passengers or the crew.

(2) Emergency electric lighting provided in accordance with these Regulations shall be arranged so that a fire or other casualty in spaces containing the emergency source of electrical power, the associated transforming equipment, if any, the emergency switchboard and the emergency lighting switchboard will not render inoperative the main electric lighting system required by paragraph (1) of this regulation.

(3) Lighting fittings shall be arranged to prevent rises in temperature which would be injurious to the fitting or the electric wiring or which would result in a risk of fire.

Emergency and transitional source of electrical power and emergency switchboards: ships of Classes I, II and II(A)

46.—(1) In every ship of Classes I, II and II(A) there shall be provided a self contained emergency source of electrical power which shall be so designed and arranged that it will operate at full rated power when the ship is listed $22\frac{1}{2}$ degrees and when the trim of the ship is 10 degrees from an even keel or any combination of heel and trim within these limits.

(2) The emergency source of electrical power, the associated transforming equipment, any transitional source of emergency electrical power required by paragraph (4)(c) of this regulation, the emergency switchboard and the emergency lighting switchboard shall all be:

- (a) located above the uppermost continuous deck;
- (b) readily accessible from the open deck;
- (c) located aft of the collision bulkhead or its extension above the bulkhead deck when fitted above that deck;
- (d) so arranged that a fire or other casualty in the spaces containing the main source of electrical power, the associated transforming equipment, the main switchboard or in any machinery space of Category A will not interfere with the supply, control and distribution of emergency electrical supplies; and
- (e) located where practicable in a space which is not contiguous to the boundaries of a machinery space of Category A or any other space containing the main source of electrical power, the main switchboard or any associated transforming equipment.

(3) The emergency source of electrical power shall be a generating set complying with the requirements of paragraph (4) of this regulation or an accumulator battery complying with the requirements of paragraph (6) of this regulation.

(4) Where the emergency source of electrical power is a generator it shall:

- (a) be driven by internal combustion machinery with an independent fuel supply, having a flash point of not less than 43°C (Closed Cup Test);
- (b) be started automatically upon failure of the main source of electrical power and be automatically connected to the emergency switchboard; those services referred to in paragraph (7) of this regulation shall thereupon be transferred automatically to the emergency generating set. The automatic starting system and the characteristic of the prime-mover shall be such as to permit the emergency generator to carry its full rated load as quickly as is safe and practicable, subject to a maximum of 45 seconds; and
- (c) be provided with a transitional source of emergency electrical power complying with paragraph (7) of this regulation.

(5) The emergency generating set may be used to supply services other than emergency supplies exceptionally for short periods provided that the independent operation of the emergency source of electrical power is safeguarded in all circumstances.

(6) Where the emergency source of power is an accumulator battery it shall:

- (a) be capable of supplying the emergency electrical load without being recharged, whilst maintaining the voltage of the battery throughout the required discharge period within 12 per cent of its nominal voltage;

- (b) be automatically connected to the emergency switchboard in the event of the failure of the main source of electrical power; and
- (c) be capable of immediately supplying the services specified in paragraph (7) of this regulation.

(7) The transitional source of emergency electrical power required by this regulation shall:

- (a) consist of an accumulator battery capable of supplying the services required by sub-paragraph (c) and (d) of this paragraph without being recharged, whilst maintaining the voltage of the battery throughout the required discharge period within 12 per cent of its nominal voltage;
- (b) be arranged to supply automatically the services required by sub-paragraph (c) and (d) of this paragraph for at least half an hour in the event of the failure of either the main or emergency source of electrical power;
- (c) supply the lighting required by regulation 48(1)(a) and (b) of these Regulations;
- (d) supply the services required by regulation 48(1)(c)(i), (iii) and (iv) of these Regulations unless a suitably located independent accumulator battery is provided capable of supplying such services for the period of time required by those regulations; and
- (e) supply power to close the watertight doors but not necessarily all of them simultaneously together with their indicators and warning signals as required by regulation 48(3)(a), of these Regulations.

(8) Discharge of accumulator batteries that constitute either the emergency source of electrical power or transitional source of electrical power shall be indicated on the main switchboard or in the machinery control room. Discharge of any independent accumulator batteries provided in compliance with regulation 48(1)(c) of these Regulations shall be indicated at the appropriate control station.

(9) The emergency switchboard shall be situated as near as practicable to the emergency source of emergency electrical power. If the emergency source of electrical power is a generating set the emergency switchboard shall be situated in the same space as the generator unless the operation of the emergency switchboard would be thereby impaired. For the purposes of this paragraph an environmental enclosure within the main boundaries of the space does not provide separation between the emergency generator and the emergency switchboard. Any accumulator battery required by this regulation shall not be installed in the same space as the emergency generator.

(10) The emergency switchboard shall be supplied during normal operation from the main switchboard by an interconnector feeder which shall be:

- (a) adequately protected at the main switchboard against overload and short circuit;
- (b) disconnected automatically at the emergency switchboard upon the failure of the main source of electrical power; and

(c) be at least protected against short circuit at the emergency switchboard if the system is arranged for the main switchboard to be supplied from the emergency switchboard.

(11) Arrangements shall be made to disconnect non-emergency circuits from the emergency switchboard automatically, if necessary, to ensure that electric power is available for the required emergency supplies.

(12) Means shall be provided for periodically testing the complete emergency electrical system including any automatic starting arrangements provided.

Starting arrangements for emergency generating sets: ships of Classes I, II and IIA

47.—(1) In every ship of Classes I, II and IIA the emergency generating sets shall be capable of being readily started at a temperature of 0°C. If temperatures below 0°C are anticipated provision shall be made for heating the engine so that it will start readily.

(2) The starting, charging and energy storing devices provided, which shall not be used for any purpose other than the operation of the emergency generating set, shall be located in the emergency generating set space except that the air receiver of the emergency generating set may be supplied from the main or auxiliary compressed air system through a non-return valve installed in the emergency generating set space.

(3) The stored energy required for starting shall be maintained at all times:

- (a) in electric and electro-hydraulic systems, from the emergency switchboard; and
- (b) in compressed air systems, by the main or auxiliary compressed air system or by an emergency air compressor which, if it is electrically driven, shall be supplied from the emergency switchboard.

(4) The emergency generating set shall:

- (a) be equipped with a starting system having sufficient stored energy for twelve consecutive starts; and
- (b) be provided with an additional source of stored energy independent of the starting system required by sub-paragraph (4)(a) of this regulation capable of producing a further twelve starts within 30 minutes unless an alternative and independent starting system is provided or effective manual starting can be demonstrated.

Emergency electric power services supplies; ships of Classes I, II and IIA

48.—(1) In every ship of Classes I, II and IIA the emergency source of electrical power required by regulation 46 shall be capable of simultaneously supplying the following services, including any starting currents, for a period of 36 hours or for such shorter period (being not less than 12 hours) as the Secretary of State may permit in the case of any ship regularly engaged on voyages of short duration:

-
- (a) Emergency lighting:
- (i) at every muster and embarkation station on deck and over sides as required by the Merchant Shipping (Life-Saving Appliances) Regulations 1980(a);
 - (ii) in alleyways, stairways and exits giving access to the muster and embarkation stations;
 - (iii) in all service and accommodation alleyways, stairways and exits and personnel lift cars;
 - (iv) in the machinery spaces, main generating stations and emergency generating set position including their control positions;
 - (v) in all control stations, machinery control rooms and at each main and emergency switchboard;
 - (vi) at all stowage positions for firemen's outfits;
 - (vii) at the steering gear; and
 - (viii) at the fire pumps, the sprinkler pump, the emergency bilge pump and at the starting position of their motors.
- (b) navigation lights and other lights required by the Merchant Shipping (Distress Signals and Prevention of Collisions) Regulations (b);
- (c) miscellaneous services:
- (i) all internal communication equipment required in an emergency;
 - (ii) the navigational aids required by the Merchant Shipping (Navigational Equipment) Regulations 1984(c). Where such provision is unreasonable or impracticable the Secretary of State may waive this requirement for ships of less than 5,000 tons;
 - (iii) the fire detection and fire alarm system, and the fire door holding and release system; and
 - (iv) for intermittent operation of the daylight signalling lamp, the ship's whistle, the manually operated call points and all internal signals that are required in an emergency;
- unless such services have an independent supply for the period of 36 hours from an accumulator battery suitably located for use in an emergency.
- (d) pumps and associated equipment as follows:
- (i) one of fire pumps required by the Merchant Shipping (Fire Protection) Regulations 1984(d);
 - (ii) the automatic sprinkler pump, if any; and
 - (iii) the emergency bilge pump and all the equipment essential for the operation of electrically powered remote controlled bilge valves.

(a) S.I. 1980/538, as amended by S.I. 1981/577.

(b) S.I. 1983/708.

(c) S.I. 1984/1203.

(d) S.I. 1984/1218.

(2) The emergency source of electrical power referred to in paragraph (1) of this regulation shall also be capable of supplying simultaneously with the services required by paragraph (1) of this regulation the steering gear for the period of time required by regulation 68(16) of these regulations.

(3) In addition to fulfilling the requirements of regulation 48(1) of these Regulations the emergency source of electrical power shall be capable of supplying simultaneously for a period of 30 minutes:

- (a) 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, and
- (b) the emergency arrangements to bring the lift cars to deck level for the escape of persons; the passenger lift cars may be brought to deck level sequentially in an emergency.

Emergency source of electrical power and emergency switchboard: Ships of Class III

49.—(1) In a ship of Class III which is provided with an emergency bilge pump in compliance with regulation 33(2) of these Regulations, or an emergency fire pump, being an electrically operated pump, there shall be provided a self-contained energy source of electrical power, which shall be a generator complying with regulation 46(4)(a) of these Regulations or an accumulator complying with regulation 46(6)(a) of these Regulations, capable of operating the pump for a period of 24 hours.

(2) The emergency source of electrical power required by paragraph (1) of this regulation shall comply with the requirements of regulation 46(1), (2)(a) to (d) inclusive, (5), (8), (9), (10) and (11) and if the emergency source of electrical power is a generating set, regulation 47 of these Regulations.

Distribution systems

50. In every ship distribution systems shall be so arranged that a fire in any main fire zone will not interfere with essential 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.

Location and construction of electric cables

51.— (1) All electric cables external to equipment shall be flame retardant and shall be installed so that their flame retarding or equivalent properties are not impaired. The Secretary of State may permit installation of cables which do not comply with the foregoing for particular purposes, such as radio frequency cables, where compliance would be impracticable.

(2) Cables shall be installed and supported in such a manner as to avoid chafing and other damage. All metal sheaths and metal armour of cables shall be electrically continuous and shall be earthed except that the Secretary of State may permit such earthing to be omitted for particular purposes.

(3) Cables serving emergency services shall not so far as is practicable be routed through galleys, laundries, machinery spaces of Category A and their casings or other high fire risk areas except insofar as it is necessary to provide emergency services in such areas. Cables connecting fire pumps to the emergency switchboard shall be of a fire resistant type where they pass through high fire risk areas.

(4) Cables serving emergency services shall where practicable be installed in such a manner as to preclude them being rendered unserviceable by the effect of a fire in an adjacent space and subsequent heating of the dividing bulkhead.

(5) The electrical, mechanical, flame retarding and, where applicable, fire resisting properties of the terminations and joints in any conductor shall be at least equivalent to those of the conductor.

General precautions against shock, fire and other hazards

52.—(1) 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. Exposed metal parts of electrical 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 unless such equipment is:

- (a) supplied at a voltage not exceeding 55 volts direct current or 55 volts root mean square alternating current between conductors hereinafter referred to as “RMS ac”, from a source other than an auto-transformer; or
- (b) supplied at a voltage not exceeding 250 volts RMS ac by safety isolating transformers supplying only one consuming device; or
- (c) of double insulation construction.

(2) All electrical apparatus shall be constructed and installed so that it will not cause injury when handled or touched in the normal manner. In particular when electric lamps, welding equipment, tools or other apparatus are used in confined or damp spaces or spaces with large exposed conductive surfaces, special provision shall be made so far as practicable, to ensure that the danger of electric shock is reduced to a minimum. Such spaces shall at least include open decks and machinery spaces.

(3) Every main and emergency switchboard shall be so arranged as to give easy access for operation and sufficient access for maintenance without danger to any person. Every such switchboard shall be suitably guarded and 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 RMS ac shall be installed on the face of any switchboard or control panel.

(4) Subject to paragraph (6) of this regulation the hull return system shall not be used in any such ship for the power, heat and light distribution systems thereof.

(5) The final sub-circuits of any hull return system of distribution shall be two wire.

(6) The requirements of paragraph (4) and (5) of this regulation do not preclude the use of:

- (a) impressed current cathodic protection systems;
- (b) limited and locally earthed systems; and
- (c) insulation monitoring devices with a maximum circulation current of 30 milli-amperes.

(7) The insulation of any distribution system that is not earthed shall be continuously monitored by a system capable of giving audible and visual indication of abnormally low insulation values.

(8) Every separate electrical circuit shall be protected against short circuits.

(9) Each separate electrical circuit, other than a circuit which operates the ship's steering gear, shall unless the Secretary of State otherwise permits be protected against overload. 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.

(10) All lighting and power circuits terminating in a cargo space shall be provided with a multiple pole switch outside the space for disconnecting all such circuits.

(11) Accumulator batteries shall be housed in boxes or compartments which are constructed to protect the batteries from damage and are so ventilated as to minimise the accumulation of explosive gas. Subject to regulation 53(1) of these regulations, electrical or other equipment which may constitute a source of ignition of flammable vapours shall not be installed in any compartment assigned to accumulator batteries. Accumulator batteries shall not be installed in sleeping accommodation spaces.

(12) Every electric space-heater forming part of the equipment of 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.

Electrical equipment in hazardous areas and spaces

53. In every ship to which these Regulations apply:

(1) electrical equipment shall not be installed in any hazardous area unless the Secretary of State is satisfied that such equipment is:

- (a) essential for operational or safety purposes;
- (b) of a type that is certified for use in the flammable dusts, gases or vapours to which it may be subjected; and
- (c) appropriate to the space concerned.

(2) Cables passing through any hazardous areas or serving electrical equipment in such areas shall:

- (a) be appropriate having regard to the dusts, gases or vapours to which they may be subjected, and;
- (b) unless they form part of intrinsically safe circuits be enclosed in a gas-tight steel conduit or include a metallic sheath braid or wire armour for earth leakage detection. Additional protection against mechanical damage shall be provided in locations where such damage may occur.

(3) In special category spaces the electrical equipment shall be certified for use in explosive petrol and air mixtures and the cables shall be appropriate for use in such mixtures provided that in such spaces above the bulkhead deck electrical equipment that is enclosed and protected to prevent discharge of sparks may be installed more than 450 millimetres above any deck on which vapours may accumulate if the atmosphere within the special category space is changed at least ten times per hour based upon the gross volume of the space.

(4) In cargo spaces, other than special category spaces, intended for the carriage of motor vehicles with fuel in their tanks for their propulsion the electrical equipment shall be certified for use in explosive petrol and air mixtures and the cables shall be appropriate for use in such mixtures.

(5) In any ventilation trunk connected to any enclosed space for the carriage of motor vehicles with fuel in their tanks for their propulsion, including a special category space, electrical equipment shall be certified for use in explosive petrol and air mixtures and the cables shall be appropriate for use in such mixtures.

(6) Electrical equipment and cables shall not be installed in enclosed cargo spaces, special category spaces or open ro/ro cargo spaces intended for the carriage of dangerous goods which are flammable liquids with a flash point below 23°C (Closed Cup Test) or flammable gases unless the Secretary of State considers the location therein essential. If permitted, any electrical equipment installed in such spaces shall be certified for, and cables shall be appropriate for, use with the flammable dusts, gases or vapours to which it may be exposed. Cable penetrations of the decks and bulkheads of such spaces shall be sealed against the passage of gas or vapour. The Secretary of State may permit the installation of electrical equipment and cables which do not comply with the foregoing for particular applications provided such equipment and cables are capable of being electrically isolated by the removal of links or the operation of lockable switches.

Spare parts and tools

54. 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 V — BOILERS AND MACHINERY

Application of Part V

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

General

56.—(1) In every ship to which these Regulations apply the machinery, boilers and other pressure vessels, associated piping systems and fittings 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 reduce to a minimum any danger to persons on board, due regard being paid to moving parts, hot surfaces and other hazards. The design shall have regard to the materials used in construction, the purpose for which the equipment is intended, the working conditions to which it will be subjected and the environmental conditions on board.

(2) Where the arrangements of the main propulsion machinery are unconventional the Secretary of State may require a separate source of propulsion power to be provided sufficient to give the ship a navigable speed.

(3) Means shall be provided whereby the normal operation of propulsion machinery can be sustained or restored when there is a breakdown of:

- (a) a generating set which serves as a main source of electrical power;
- (b) the sources of steam supply;
- (c) the boiler feed water systems;
- (d) the fuel oil supply systems for boilers or engines;
- (e) the sources of lubricating oil pressure;
- (f) the sources of water pressure;
- (g) a condensate pump and the arrangements to maintain vacuum in condensers;
- (h) the mechanical air supply for boilers;
- (i) an air compressor and receiver for starting or control purposes; and
- (j) the hydraulic, pneumatic or electrical means for control of main propulsion machinery including controllable pitch propellers; or any other auxiliary system essential for propulsion

The Secretary of State may for the purposes of this paragraph, if he considers it safe to do so, permit a partial reduction in propulsion capability from normal operation.

(4) The main and auxiliary machinery essential 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.

(5) Where risk from over-speeding of machinery would otherwise exist, two independent means of control shall be provided to ensure that the safe speed is not exceeded; provided that the the Secretary of State may permit a single means of limiting the speed of machinery where he considers it safe to do so.

(6) 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 be maintained in an efficient condition.

(7) Main propulsion machinery and all auxiliary machinery essential to the propulsion and the safety of the ship shall be designed to operate when the ship is upright and when inclined at any angle of list up to and including 15 degrees either way under static conditions and 22.5 degrees either way under dynamic conditions (rolling) and simultaneously inclined dynamically (pitching) 7.5 degrees by bow or stern. The Secretary of State may permit a reduction in these angles taking into consideration the type, size and service conditions of the ship.

(8) Access shall be provided to facilitate the cleaning, inspection and maintenance of main propulsion and auxiliary machinery including boilers and pressure vessels.

Machinery

57.—(1) In every ship to which these Regulations apply the propulsion machinery systems shall be designed, constructed and installed so that undue stress due to vibration is not induced during normal operation.

(2) All gearing and every shaft and coupling used for transmission of power essential for the propulsion and safety of the ship or for the safety of persons on board shall be so designed and constructed that they will withstand the maximum working stresses to which they will be subjected in all service conditions taking into account the type of engines by which these components are driven or of which they form part.

(3) Every internal combustion engine having a cylinder diameter of 200 millimetres or greater, or a crankcase volume of 0.6 cubic metres or greater, shall be provided with crankcase explosion relief valves of a suitable type having sufficient area to relieve abnormal pressure in the crankcase. The explosion relief valves shall be arranged or provided with means to ensure that any discharge from them is so directed as to minimise the possibility of injury to personnel.

(4) Every main propulsion turbine and, where applicable main internal combustion propulsion machinery and auxiliary machinery shall be provided with automatic shut-off arrangements that will operate in the case of failures, such as lubricating oil supply failure, which could lead rapidly to complete breakdown, serious damage or explosion, provided that the Secretary of State may permit arrangements that over-ride the automatic shut-off devices.

Means of manoeuvring and going astern

58.—(1) Every ship shall have sufficient power for going astern to secure proper control of the ship in all normal circumstances. The ability of the machinery to reverse the direction of thrust of the propeller in sufficient time, and so to bring the ship to rest from maximum ahead service speed shall be demonstrated and recorded.

(2) The effectiveness of any supplementary means of stopping or manoeuvring the ship shall be demonstrated and recorded.

(3) Every ship with multiple propellers shall undergo trials to determine the ability of the ship to manoeuvre with one propeller inoperative.

(4) The trial records including the records required by paragraphs (1), (2) and (3) of this regulation shall be available on the ship.

Boilers and other pressure vessels

59.—(1) 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 service for which it is intended and having regard to:

- (a) the design and the 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 and its respective mountings shall at any time thereafter be capable of withstanding such a test and shall be maintained in an efficient condition.

(2) Means shall be provided which will prevent overpressure in any part of 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 feature 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 provided.

3) Every oil fired boiler which is not continuously attended shall be provided with arrangements to shut off the fuel supply and give an alarm at an attended location in the event of low boiler water level, combustion air supply failure or flame failure.

(4) Every boiler designed to contain water at a specific level shall be provided with at least two means for indicating the water level, at least one of which shall be a direct reading gauge glass.

(5) Every water tube boiler serving turbine machinery shall be fitted with a high water level alarm.

(6) Means shall be provided to test and control the quality of the water in the boilers.

Boiler feed systems

60.—(1) Every boiler shall be provided with not less than two efficient and separate feed water systems so arranged that either of such systems may be opened 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) Every ship in which boilers are fitted 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) If it is possible for oil to enter the feed water system of a boiler, the arrangements for supplying boiler feed water shall provide for the interception of oil in the feed water.

(4) Every feed check valve, fitting or pipe through which feed water passes from a pump to such boilers 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 be maintained in an efficient condition. The feed pipes shall be adequately supported.

(5) Means shall be provided to test and control the quality of the feed water to the boilers.

(6) In every 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.

Steam pipe systems

61.—(1) Every steam pipe and every 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 is intended to be used.

(2) Without prejudice to the generality of the foregoing, every 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 matters referred to in 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 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 condition likely to arise in the course of the intended service of the ship.

(6) If any steam pipe can receive steam from any source at a higher pressure than it can otherwise 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

62.—(1) In every 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 which is 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 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 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 air pressure 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) 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 otherwise 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

63.—(1) In every ship 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.

(2) If direct sea water cooling is used for essential internal combustion machinery the sea water suction 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 shall be efficiently cooled or lagged.

Oil fuel installations: (boilers and machinery)

64. 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) any oil fuel used in boilers or machinery shall, except as allowed for a generator by regulation 46(4)(a) of these Regulations have a flash point of not less than 60°C (Closed Cup Test);

(2) 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 or within machinery spaces of Category A at least one of their vertical sides shall be contiguous to the machinery space boundaries and they shall have a boundary common with the double bottom tanks; 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; any oil fuel tank located within the boundaries of machinery spaces of Category A shall not contain fuel having a flash point of less than 60°C. (Closed Cup Test); where it is impracticable to meet the requirements of this sub-paragraph, the Secretary of State may permit other arrangements;

(3) oil fuel tanks shall not be situated directly above boilers or other heated surfaces;

(4) oil fuel shall not be carried in forepeak tanks or in any tank forward of the collision bulkhead;

(5) every oil fuel tank shall, where necessary, be provided with save-alls or gutters which will catch any oil which may leak therefrom;

(6) 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 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 which is 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;

(7) the oil fuel shall be effectively isolated from water ballast; 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;

(8) 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, and 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, equal to not less than 1 bar; every such tank shall at any time thereafter be capable of withstanding such a test;

(9) provision shall be made which will prevent overpressure in any oil fuel tank, oil fuel filling pipe or any part of the oil fuel system;

(10) safe and efficient means of ascertaining the amount of oil fuel contained in any oil fuel tank shall be provided; sounding pipes shall not terminate in any space where the risk of ignition of spillage therefrom could arise; in particular, sounding pipes shall not terminate in passengers spaces or crew spaces; other means of ascertaining the amount of oil fuel may be permitted provided that such means do not require penetration below the top of the tank and in the event of overflowing the tank or failure of the capacity determining device, fuel will not be released;

(11) 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;

(12) means shall be provided for the removal of water from fuel oil; such means shall include the fitting of water drain valves to daily service tanks, settling tanks and where practicable to other fuel oil tanks; where the removal of water by drain valves is impracticable water separators shall be fitted in the supply lines to propulsion machinery;

(13) every drain provided for the purpose of removing water from fuel oil in storage or settling tanks or in separators shall be of the self-closing type;

(14) the oil fuel filling stations 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;

(15) (a) 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) flexible oil pressure pipes of suitable materials and construction may be permitted by the Secretary of State provided that their location is in accordance with sub-paragraph (a);

(16) 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;

(17) 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 be at any time thereafter be capable of withstanding such a test;

(18) 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;

(19) 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;

(20) 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;

(21) every 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 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; every fitting connected to oil pressure 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 twice their maximum working pressure; every oil pressure pipe, joint fitting and pressure part of an oil fuel unit shall at any time thereafter be capable of withstanding the relevant hydraulic test stated above; 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, exhaust drains shall be provided to discharge the water or condensate into an observation tank;

(22) 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;

(23) every oil fuel separator shall be of efficient design and substantial construction; provision shall be made which will prevent over-pressure in any part thereof and which will prevent the discharge of oil vapour therefrom into confined spaces;

(24) if in any ship 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; and

(25) 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)

65.—(1) If 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. (Closed Cup Test).

(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.

Oil systems for lubricating, heating, cooling and control

66.—(1) In every ship in which oil is circulated under pressure for lubrication, heating or cooling or as the sole means of control of machinery essential for the propulsion or safety of the ship or persons 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 longer 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 64(3), (5), (6), (10), (15) and (22) as they apply to oil fuel installations except that sight flow glasses having an acceptable degree of fire resistance may be permitted. Alternative 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.

Machinery Controls

67.—(1) Effective means shall be provided for the operation and control of main and auxiliary machinery essential for the propulsion and safety of the ship.

(2) In every ship provided with remote control of the propulsion machinery from the navigating bridge the following provisions shall apply:

- (a) the speed, direction of thrust and, if variable, the pitch of the propeller shall be fully controllable from the navigating bridge under any sailing condition including manoeuvring;
- (b) the remote control from the navigating bridge shall be performed by a single control device for each independent propeller where necessary each such device shall be provided with means of preventing overload of the propulsion machinery; provided that multiple propeller installations may be controlled by a single control device;
- (c) propulsion machinery movements selected at the navigating bridge shall be indicated in the main machinery control room or at the manoeuvring platform as appropriate;
- (d) the main propulsion machinery shall be provided with an emergency stopping device, located on the navigating bridge, which shall be independent of the controls otherwise required by this regulation;
- (e) remote control of the propulsion machinery shall be possible from only one location at a time. Inter-connected control units may be permitted at such locations. There shall be provided at each location an indicator showing which location is in control of the propulsion machinery. Transfer of control between the navigating bridge and the machinery spaces shall only be possible from the machinery space or the main machinery control room. The control system shall be arranged so that the propeller thrust does not alter significantly when control is transferred from one station to another;
- (f) means shall be provided to control the propulsion machinery locally in the event of failure of the remote control system;
- (g) the design of the propulsion machinery remote control system shall be such that in the event of its failure an alarm will be given and the pre-set speed and direction of thrust maintained until local control is in operation. The Secretary of State may waive this requirement where other essential features of the system design render compliance impracticable, subject to such alternative provisions as he may require;
- (h) indication shall be given on the navigating bridge of:
 - (i) propeller speed and direction of rotation in the case of fixed pitch propellers;
 - (ii) propeller speed and pitch position in the case of controllable pitch propellers;

- (i) the number of automatic and consecutive attempts which fail to start any internal combustion propulsion engine shall be limited so as to maintain sufficient air pressure for further attempts under local control;
- (j) an alarm shall be provided on the navigating bridge and in the machinery space to indicate low starting air pressure at a level which still permits main propulsion machinery starting operations.

(3) Every ship provided with remote or automatic control of the main propulsion and its associated machinery, including the sources of main electric supply, enabling that machinery to be operated and supervised from a control room shall be as safe as if the machinery is under direct supervision.

(4) Any automatic starting, operating or control systems shall be so designed that the failure of any part of such systems shall not prevent their operation manually.

Steering Gear

68.—(1) Every ship shall be provided with an efficient main steering gear and, subject to paragraph (7) of this regulation, an efficient auxiliary steering gear. The main steering gear and the auxiliary steering gear shall be arranged so that the failure of one of them will not render the other one inoperative.

- (2) (a) the steering gear components, the rudder stock, the rudder and associated fittings shall be of sound and reliable construction. In particular, single essential components such as tillers and hunting gear shall be designed and constructed to withstand, with an adequate factor of safety, the maximum working stresses to which they may be subjected. Any bearings for such essential components shall be of a suitable type which shall be permanently lubricated or provided with lubrication fittings;
- (b) the design pressure for steering gear components and piping subject to internal hydraulic pressure shall be at least 1.25 times the maximum working pressure anticipated when the steering gear is operating taking into account any pressure which may exist in the low pressure side of the system. Fatigue criteria, taking into account pulsating pressure due to dynamic loads, shall be taken into account for the design of piping and components if the Secretary of State considers it appropriate;
- (c) relief valves shall be fitted to any part of the hydraulic system which can be isolated and in which pressure can be generated from a power unit or from external forces. The pressure at which relief valves operate shall not exceed the design pressure. The valves shall be of adequate size so as to avoid an undue rise in pressure above the design pressure.

(3) Steering gears other than of the hydraulic type shall achieve equivalent standards to those required by this regulation.

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- (4) The main steering gear and rudder stock shall:
- (a) be of adequate strength and sufficient to steer the ship at maximum ahead service speed;
 - (b) 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 and, under the same conditions, from 35 degrees on either side to 30 degrees on the other side in not more than 28 seconds;
 - (c) be operated by power if necessary to meet the requirements of sub-paragraph (b) of this regulation and in any case in which the diameter of the rudder stock in way of the tiller is required to be greater than 120 millimetres excluding additional strengthening for navigation in ice; and
 - (d) be designed so that they will not be damaged at maximum astern speed.
- (5) The auxiliary steering gear shall:
- (a) be of adequate strength and capable of being brought speedily into action in an emergency;
 - (b) be capable of putting the rudder over from 15 degrees on one side to 15 degrees on the other side in not more than 60 seconds with the ship at its deepest seagoing draught and running ahead at one half of the maximum ahead service speed or 7 knots, whichever is the greater;
 - (c) be operated by power if necessary to meet the requirements of sub-paragraph (b) of this paragraph and in any case in which the diameter of the rudder stock in way of the tiller is required to be greater than 230 millimetres diameter excluding additional strengthening for ice.
- (6) Main and auxiliary steering gear power units shall:
- (a) be arranged to re-start automatically when power is restored after a power failure;
 - (b) be capable of being brought into operation from a position on the navigating bridge; and
 - (c) be provided with an audible and visual alarm on the navigating bridge that will operate in the event of a power failure to any steering gear power unit.
- (7) An auxiliary steering gear need not be fitted if:
- (a) two or more identical gear power units are fitted and which in the event of failure of any one of these units the remaining units are capable of operating the rudder in accordance with the requirements of sub-paragraph (4)(b) of this regulation; and
 - (b) the main steering gear is so arranged that after a single failure in its piping system or in one of the power units the defect can be isolated so that steering capability can be maintained or speedily regained. A steering gear with a proven record of reliability that does not comply with this sub-paragraph may be accepted by the Secretary of State on

any ship the keel of which is laid, or which is at a similar stage of construction, before 1st September 1986 or on a cargo ship which is converted to a passenger ship before that date.

- (8) (a) main steering gear control shall be provided on the navigating bridge and in the steering gear compartment. Two independent control systems operable from the navigating bridge shall be provided for a steering gear arranged in accordance with paragraph (7) of this regulation except that when the control system consists of a hydraulic telemotor, a second independent system need not be fitted. The steering wheel or steering lever need not be duplicated;
- (b) auxiliary steering gear control shall be provided in the steering gear compartment and, if the auxiliary steering gear is power operated, from the navigating bridge. Any auxiliary steering gear control system provided on the navigating bridge shall be independent of the control system for the main steering gear.
- (9) Every main and auxiliary steering gear control system shall:
- (a) if electric, be served by its own separate circuit supplied from a steering gear power circuit from a point within the steering gear compartment or directly from switchboard busbars supplying that steering gear power circuit at a point on the switchboard adjacent to the supply to the steering gear power circuit;
- (b) be provided in the steering gear compartment with means for disconnecting the control system from the steering gear it serves;
- (c) be capable of being brought into operation from a position on the navigating bridge;
- (d) be provided with an audible and visual alarm on the navigating bridge that will operate in the event of a failure of the electric power supply to the control system; and
- (e) be provided only with short circuit protection for the electric supply circuits.
- (10) The electric power circuits and the steering gear control system with the associated components, cables and pipes required by this regulation and regulation 69 of these Regulations shall be separated as far as is practicable throughout their length.
- (11) A means of communication shall be provided between the navigating bridge and the steering gear compartment.
- (12) The angular position of the rudder shall be indicated in the steering gear compartment and, if the main steering gear is power operated, at the steering position on the navigating bridge. The rudder angle indicator system shall be independent of any steering gear control system.
- (13) Hydraulic power operated steering gear shall be provided with:
- (a) arrangements to maintain the cleanliness of the hydraulic fluid taking into consideration the type and design of the hydraulic system;
- (b) a low level alarm for each hydraulic fluid reservoir arranged to give audible and visual alarms on the navigating bridge and in the

machinery space in the event of leakage of the hydraulic fluid;

- (c) a fixed storage tank having sufficient capacity to recharge at least one power actuating system, including the reservoir, where the main steering gear is required to be power operated. The storage tank shall be provided with a contents gauge and shall be permanently connected by piping in such a manner that the hydraulic systems can be readily recharged from a position within the steering gear compartment.

(14) The steering gear compartment shall be readily accessible and, as far as is practicable, separated from the machinery spaces. Handrails and gratings or other non-slip surfaces shall be provided to ensure suitable working conditions at the steering gear machinery and controls in the event of hydraulic fluid leakage.

(15) Simple operating instructions with a block diagram showing the change over procedures for remote steering gear control systems and steering gear power units shall, where applicable, be permanently displayed on the navigating bridge and in the steering gear compartment.

(16) An alternative power supply shall be provided in every ship where the rudder stock is required to be 230 millimetres diameter or over excluding any strengthening for navigation in ice. The alternative power supply shall be provided automatically within 45 seconds either from the emergency source of electric power or from an independent source of power located in the steering gear compartment. The independent source of power shall be used for this purpose only. The alternative power supply shall be at least sufficient to provide power for the steering gear to comply with the performance requirements of sub-paragraph 5(b) of this regulation and its associated control system and rudder angle indicator. The alternative power supply shall have a capacity sufficient for at least 30 minutes of continuous operation in every ship of 10,000 tons or over and at least 10 minutes of continuous operation in any other ship.

(17) The main steering gear in every ship of 70,000 tons or over shall have two or more identical power units complying with the requirements of sub-paragraphs (7)(a) and 7(b) of this regulation.

Electric and electro-hydraulic steering gear

69.—(1) Every 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 the machinery control room or in such other position or positions as the Secretary of State may approve and on the navigating bridge.

(2) Every such steering gear shall;

- (a) be served by at least two exclusive circuits fed from the main switchboard one of which may pass through the emergency switchboard where 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 compartment 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; an auxiliary electric or electro-hydraulic steering gear may be connected to one of the circuits supplying the main steering gear;

- (b) be provided with short circuit protection and an overload alarm for the protection of the circuits and motors; any protection provided against excess current shall be capable of conducting at least twice the full load current of the motor or motors taking into consideration the motor starting currents; where a three phase supply is used an alarm shall be provided that will indicate the failure of any one of the supply phases; the alarms required by this sub-paragraph shall be both audible and visual and located in a conspicuous position in the main machinery space or in the control room from which the main machinery is normally controlled.

Ventilating systems in machinery spaces

70. Machinery spaces of Category A shall be ventilated so that an adequate supply of air is maintained for the safety and well-being of personnel and the operation of machinery, including boilers, at full power in all weather conditions. Any other machinery space shall be adequately ventilated having regard in particular to the prevention of an accumulation of oil vapour under all normal conditions.

Protection against noise

71.—(1) In every ship measures shall be taken to reduce noise levels in machinery spaces as far as is reasonable and practicable. On completion of a ship, noise levels in machinery spaces shall be measured in accordance with Schedule 5 to these Regulations.

(2) Noise levels in machinery spaces shall not exceed 110 dB(A) provided that the Secretary of State may, under such conditions as he may specify, permit higher noise levels having regard to the size of ship and the type of machinery installed.

(3) Any machinery space in which the noise level exceeds 90 dB(A) and which is required to be manned shall be provided with a designated refuge from noise.

(4) Every entrance to a machinery space in which the noise level exceeds 85 dB(A) shall be provided with a warning notice comprising a symbol complying with British Standards Institution specification number BS 5378:1980 and a supplementary sign stating 'High Noise Levels. Use Ear Protectors'. Sufficient ear protectors shall be provided for use in such spaces.

Communication between navigating bridge and machinery space

72. Every ship of Classes I, II or IIA shall be provided with two independent means for communicating orders from the navigating bridge to the position in the machinery space or machinery control room from which the main engines are normally controlled. One of the means shall be an engine room telegraph which provides visual indication of the orders and responses both in the machinery space and on the navigating bridge. Means

of communication shall also be provided to any other position from which the main propulsion machinery may be controlled.

Engineers' alarm

73. Every ship of Classes I, II and IIA shall be provided with an engineers' alarm which shall be clearly audible in the engineers' accommodation when operated from a position in the machinery space or machinery control room from which the engines are normally controlled.

Spare gear

74. Every ship of Classes I, II and IIA shall be provided with sufficient spare gear having regard to the intended service of the ship.

PART VI — MISCELLANEOUS

Application of Part VI

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

Means of escape

76.—(1) Every ship which is not an open or partially decked ship of Class V, VI or VI(A) shall be provided with doorways, stairways, ladderways and other ways to provide readily accessible means of escape to the lifeboat and liferaft embarkation decks for all persons in the ship from accommodation spaces, service spaces and other spaces in which the crew is normally employed, other than machinery spaces. 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 the office; the Secretary of State may permit one of these escapes to be an opening type window or sidescuttle of sufficient size;
- (h) dead-end corridors shall not be permitted to exceed 7.0 metres in ships carrying not more than 36 passengers and 13.0 metres in ships carrying more than 36 passengers; a dead-end corridor is a corridor or part of a corridor from which there is only one escape route;
- (i) in special category spaces and ro/ro cargo 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; and
- (j) one of the escape routes from the machinery spaces where the crew is normally employed shall avoid access to any special category space or ro/ro cargo 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 Classes I, II and II(A) 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 means the 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) 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:

- (a) where the space is below the bulkhead deck the two means of escape shall consist of either:
 - (i) 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 be provided with continuous fire shelter from the lower part of the space to a safe position outside the space; or

- (ii) one steel ladder leading to a door in the upper part of the space from which access is provided to such embarkation deck and additionally in the lower part of the space and in a position well separated from the ladder referred to, a steel door capable of being operated from each side and which provides a safe escape route to the appropriate lifeboat and liferaft embarkation decks;
- (b) 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;
- (c) in a ship of less than 1,000 tons the Secretary of State may permit one of the means of escape required by this paragraph to be dispensed with having regard to the width and disposition of the upper part of the machinery space; in a ship of 1,000 tons or over the Secretary of State may permit one of the means of escape required by this paragraph to be dispensed with, provided that either a door or a steel ladder provides a safe escape route to the lifeboat and liferaft embarkation deck having regard to the nature and location of the space and whether persons are normally employed in that space;

(8) in the machinery space in every ship of Classes III to VI(A) inclusive, which is decked in way of a machinery space, there shall be provided from each engine room, shaft tunnel and boiler room two means of escape as widely separated as practicable. 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. In any ship the Secretary of State may permit one of the means of escape required by this paragraph to be dispensed with having regard to the nature and location of the space and whether persons are normally employed in that space.

Guard rails, stanchions and bulwarks

77.—(1) In every ship bulwarks or guard rails shall be provided on every exposed deck to which any passenger or vehicles may have access. Such bulwarks or guard rails, together with stanchions supporting the guard rails shall meet the requirements laid down in Schedule 6 to these Regulations and be so placed, designed and constructed, and in particular shall be of such a height above the deck as to prevent any passenger 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 wash strake, covering board and coaming shall be so placed, designed and constructed and shall be of such a height above the floorboards as to prevent any person from accidentally falling overboard.

Anchor handling equipment, anchors and chain cables

78. Every ship shall be provided with anchor handling equipment, together 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

79. Every ship 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.

Gas welding, flame cutting and domestic gaseous fuel installations

80.—(1) Every gas welding, flame cutting or domestic gaseous fuel installation shall be designed, constructed and installed so that the safety of the ship and of the persons on board is not impaired.

(2) Every domestic liquefied petroleum gas installation shall be at least in accordance with Merchant Shipping notice No. M 984.

PART VII — SURVEYS AND CERTIFICATION

Survey requirements

81.—(1) All ships shall be subjected to the surveys specified below:

- (a) a survey before the ship first enters service;
- (b) a survey at least once every twelve months for the renewal of the Passenger and Safety Certificate, or Passenger Certificate;
- (c) an additional survey, either general or partial according to the circumstances, whenever required by the Secretary of State under regulation 82(3) of these Regulations or whenever any important repairs or renewals are made.

(2) The surveys referred to above shall be carried out by a marine surveyor of the Department of Transport as follows:

- (a) the survey before the ship first enters service shall include a complete inspection of its structure, machinery and equipment, including the outside of the ship's bottom and the inside and outside of the boilers. This survey shall be such as to ensure that the arrangements, material, and scantlings of the structure and as appropriate the boilers and other pressure vessels and their appurtenances, main and auxiliary machinery, electrical installation and other equipment, fully comply with the requirements of the regulations for ships of the service for which it is intended. The survey shall also be such as to ensure that the workmanship of all parts of the ship and its equipment is in all respects satisfactory;
- (b) the survey for the renewal of a Passenger and Safety Certificate or a Passenger Certificate shall include an inspection of the structure, boilers and other pressure vessels, machinery and equipment, including the outside of the ship's bottom. The survey shall be such as to ensure that the ship, as regards the structure, and as appropriate the boilers and other pressure vessels and their appurtenances, main and auxiliary machinery, electrical installation and other equipment is in satisfactory condition and fit for the service for which it is intended, and that it complies with the requirements of the appropriate regulations;
- (c) any additional survey shall be such as to ensure that the necessary repairs or renewals have been effectively made, that the material and workmanship of such repairs or renewals are in all respects satisfactory, and that the ship complies in all respects with the provisions of the appropriate regulations.

Maintenance of conditions after survey

82.—(1) After any survey of a ship required by these Regulations has been completed, and a Passenger and Safety Certificate or a Passenger Certificate, as appropriate, has been issued, the Secretary of State may cancel such Certificate if any material change is made to the structural arrangement, machinery, equipment or any other items required by these Regulations unless such change is approved by him.

(2) Whenever an accident occurs to a ship or a defect is discovered either of which affects the safety of the ship or the efficiency or completeness of its equipment, the master or owner of the ship shall report at the earliest opportunity to the nearest Marine Office of the Department of Transport who will cause investigations to be initiated to determine whether a survey is necessary and may thereafter require an additional survey to be carried out. If the ship is in a port of another country, the master or owner shall also report immediately to the nearest British Consulate.

Issue of Certificates

83.—(1) A certificate called a Passenger and Safety Certificate to ships of Class I and II or a Passenger Certificate to ships of all other classes shall be issued on completion of a satisfactory survey which shows that the ship complies with these and all other relevant regulations and provisions of the Merchant Shipping Acts which are applicable.

(2) When an exemption is granted from a requirement of these Regulations which gives effect to a requirement of the Safety of Life at Sea Convention 1974 or of the first Amendments thereto to a ship of Class I or II under and in accordance with the provisions of regulation 2 a certificate called an Exemption Certificate shall be issued in addition to the certificate referred to in the preceding sub-paragraph.

Duration and validity of certificates

84.—(1) Any of the certificates under regulation 83 shall be valid for a period not exceeding 12 months.

(2) If the ship at the time when her Passenger and Safety Certificate expires is not in the United Kingdom or in a port in which it is to be surveyed, the Secretary of State may extend the certificate, but such extension shall be granted only for the purpose of allowing the ship to complete its voyage to the United Kingdom or in a port in which it is to be surveyed.

(3) No certificate shall be extended under the provisions of paragraph (2) of this regulation for a longer period than five months, and a ship to which an extension is granted shall not, on its arrival in the United Kingdom or the port in which it is to be surveyed, be entitled by virtue of such extension to leave that port without having obtained a new certificate in accordance with regulation 83.

(4) A certificate issued in accordance with regulation 83 which has not been extended under the foregoing provisions of this regulation, may be extended by the Secretary of State for a period of grace up to one month from the date of expiry stated on it.

PART VIII — EQUIVALENTS, PENALTIES AND DETENTION

Alternative construction, equipment and machinery

85. 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

86. If a ship proceeds or attempts to proceed on any voyage without complying with the requirements of these Regulations, the owner and 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 or a fine or both.

Power to detain

87. In any case where a ship 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 (Passenger Ship Construction and Survey) Regulations 1984”.

2nd August 1984

Nicholas Ridley,
Secretary of State for Transport

SCHEDULE 1

Regulation 6

CALCULATION OF MAXIMUM LENGTH OF
WATERTIGHT COMPARTMENTS

PART I

1. *General*

- (1) For the purpose 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 as defined in regulation 1.
- (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 APPLIES3. *Assumptions of permeability*

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:

$$85 + 10 \frac{(a - c)}{v} \text{ where}$$

a = volume of the passenger spaces and crew spaces which are situated 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 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 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 so requires by detailed calculation for the purpose of which the permeability of individual spaces within that portion of the ship shall be assumed to be as follows:

passenger spaces	...	...	...	...	95
crew spaces	...	...	...	...	95
spaces appropriated for machinery				...	85
spaces appropriated for cargo, 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 provision of sub-paragraph (5) 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 (6) 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 F 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 of subdivision F is less than .4 and the Secretary of State is satisfied that it is impracticable to apply the factor of subdivision 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 (5) 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 S, where:

$$S = \frac{3574 - 25L}{13}$$

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 (6) 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 the factor of subdivision F shall be unity.

(4) In the case of ships the length of which is less than 79 metres the factor of subdivision F shall be unity.

(5) In the case of a ship of any length which is intended to carry a number of passengers exceeding 12 but not exceeding:

$$\frac{L^2}{650} \quad \text{or} \quad 50$$

whichever is the lower, the factor of subdivision F shall be determined in the manner provided in sub-paragraphs (3) or (4) of this paragraph.

(6) For the purposes of this paragraph the factors A and B shall be determined by the following formulae:

$$A = \frac{58.2}{L - 60} + .18 \text{ (where } L = 131 \text{ metres and upwards)}$$

$$B = \frac{30.3}{L - 42} + .18 \text{ (where } L = 79 \text{ metres and upwards)}$$

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

$$C_s = 72 \frac{M + 2P_1}{V + P_1 - P}$$

(b) and in all other cases

$$C_s = 72 \frac{M + 2P}{V}$$

where:

C_s = the criterion numeral;

L = the length of the ship (metres) as defined in regulation 1;

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 C_s less than 23 shall be taken as 23; and

(c) values of C_s 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 20 of these Regulations as if they were openings below the margin line.

(2) Additional subdivision at forward end:

In ships of 100 metres in length or over, the watertight bulkhead next abaft the collision bulkhead shall be fitted at a distance from the forward perpendicular or from the point defined having regard to paragraph (2) of regulation 7 where applicable 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 .90, the combined length of the two compartments separated by such a 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 .90, 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 waterline, 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 main transverse bulkheads required by these Regulations to be watertight, or their equivalent plane bulkheads or the distance between the transverse planes passing through the nearest stepped portions of the bulkheads is less than $.03L + 3.00$ metres or 11.00 metres, or $0.1L$, whichever is the least, only one of these bulkheads shall be regarded as forming part of the subdivision of the ship.

(7) Allowances for local subdivision:

Where in a 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 $.03L + 3.00$ metres, or 11.00 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 sub-paragraph 2 (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 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:

(1) by the following formula:

$$93-35 \frac{b}{v} \text{ where}$$

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 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

(2) if the Secretary of State so requires, by detailed calculation for the purpose of which the permeability of individual spaces within that portion of the ship shall be assumed to be as follows:

passenger spaces	...	...	...	...	95
crewspaces	...	...	...	...	95
spaces appropriated for machinery				...	85
spaces appropriated for cargo, 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.

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 .50, 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 .50, 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:

$$A = \frac{58.2}{L-60} + 0.18 \text{ (where } L = 131 \text{ metres and upwards)}$$

$$BB = \frac{17.6}{L-33} + 0.20 \text{ (where } L = 55 \text{ metres and upwards)}$$

$$S_1 = \frac{3712-25L}{19}$$

Cs = the criterion numeral determined in accordance with paragraph 5 of this Schedule where P_1 has the following values:

- (i) .056LN or 3.5N whichever is the greater for berthed passengers;
- (ii) 3.5N 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 , the factor of subdivision F shall be unity;
- (d) in the case of all ships the length of which is less than 55 metres the factor of subdivision F 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:

- (1) of the machinery space 85
- (2) of spaces other than the machinery space ... 95

12. *Factor of subdivision*

The factor of subdivision F 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 ... ..	.50
Over 91.5 but not over 106.7 ... ..	.50 for compartments in machinery space and forward thereof. Unity for all other compartments.
Over 76.2 but not over 91.5 ... ..	.50 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. Metric units shall be used.

1. The ship's name, official number, port of registry, gross and net tonnages, principal dimensions, displacement, deadweight, draught to the summer load line and subdivision load lines.

2. A profile view and 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 25 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 metacentre 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. The cross curves shall be determined taking into account the change in trim due to heel.

(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 to 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*, showing compliance with the curve required by paragraph 10(2) of this Schedule.
- (f) In any case where ballasting/deballasting or loading/unloading takes place at sea, intermediate conditions.

(2) A curve of minimum operational metacentric height versus draught or maximum operational vertical centre of gravity versus draught based upon compliance with the intact stability requirements of regulation 10 and the damage stability requirements of regulation 11 and Schedule III to these Regulations.

(3)(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.

(4) The metacentric height and the curve of righting levers (GZ) shall be corrected for liquid free surface.

(5) 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.

(6) 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) of this paragraph 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 required metacentric height (GM) values or permissible 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 IIA 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:

- (1) the ship shall be assumed to be in the worst service conditions as regards stability which is likely to be experienced having regard to the intended service of the ship, or damage calculations shall be made over the operational draught range as a basis for a curve of required metacentric heights.
- (2) the volume permeabilities and surface permeabilities shall be assumed to be as follows:

(a)	Spaces	Permeability
	Occupied by cargo or stores	60
	(in ships carrying goods vehicles and accompanying personnel the permeability of the cargo spaces shall be assumed in accordance with paragraph (2) of regulation 19)	
	Appropriated for cargo 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.

- (b) 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.
- (3) The extent of damage shall be assumed to be as follows:

- (a) longitudinal extent: 3.00 metres plus 3 per cent of the length of the ship, or 11.00 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;
 - (b) 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 waterline taken parallel to the keel;
 - (c) vertical extent: from the base line upwards without limit;
 - (d) if any damage of lesser extent than that indicated in the foregoing sub-paragraphs (a), (b) and (c) 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.
- (4) 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. 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:

- (1) In the event of symmetrical flooding:
 - (a) at all stages of flooding there shall be sufficient positive residual stability;
 - (b) at intermediate stages of flooding the margin line is not to be submerged unless partial subdivision above the margin line in accordance with regulation 24 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;
 - (c) 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.
- (2) In the event of unsymmetrical flooding:
 - (a) the provisions of sub-paragraph (i)(a) shall apply;
 - (b) the provisions of sub-paragraph (ii)(a) shall apply;
 - (c) 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.
- (3) The range stability in the damaged condition shall be to the satisfaction of the secretary of State.

SCHEDULE 4

Regulation 13

CONSTRUCTION OF WATERTIGHT BULKHEADS, ETC.

SHIPS OF CLASSES I TO VI INCLUSIVE

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) Every such bulkhead and portion shall be constructed of steel and shall comply with the requirements of:

- (a) In the case of ships which are classed with an authorized classification society, and which are built to their survey requirements, it shall be sufficient for 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 their rules.
- (b) In the case of ships which are not classed with an authorized classification society but are built to the survey requirements of the Department of Transport, it shall be considered that compliance with this paragraph will be met if the bulkhead scantlings comply with the appropriate rules of such a classification society.

2. Bulkheads

Bulkhead stiffeners shall not be spaced more than 610 millimetres apart on a collision bulkhead, or more than 914 millimetres on any other watertight bulkhead, unless other structural arrangements can be shown to be equally effective.

2. Watertight decks, steps and flats

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.

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

Every tunnel required by these Regulations to be watertight shall be constructed with plating of thickness not less than that required for bulkheads other than the collision bulkhead.

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.

7. *Initial tests of bulkheads, watertight decks and flats*

All main watertight compartments are to be tested to the satisfaction of a Department of Transport Marine Surveyor in accordance with the following:

- (1) The forepeak, double bottom, duct keel and inner skin must be subjected to a head of water up to the margin line.
- (2) Tanks which are intended to hold liquids, and which form part of the subdivision of the ship, must be tested for tightness with water to a head to the deepest subdivision load line, or to a head corresponding to two-thirds of the depth from the keel to the margin line in way of the tanks, whichever is the greater, provided that in no case should the test head be less than 900 millimetres above the top of the tank.

SCHEDULE 5

Regulation 71

MEASUREMENT OF NOISE LEVELS IN MACHINERY SPACES

1. Noise levels in machinery spaces shall be measured when the largest number of machines that operate simultaneously in service are at their normal service loads. Measurements taken during sea trials at the maximum ahead service speed of the ship will be accepted, as providing the necessary reading.

2. The equipment and procedures for measuring and recording noise levels in machinery spaces shall be generally in accordance with the provisions of the publication entitled "The Code of Practice for Noise Levels in Ships" published by Her Majesty's Stationery Office (published 1978).

SCHEDULE 6

Regulation 77

GUARD RAILS, STANCHIONS AND BULWARKS

In order to comply with Rule 77, ships shall be provided with guard rails and stanchions and bulwarks as follows:

(1) Ships of Class I

Where guard rails and stanchions are fitted, the top of the uppermost rails shall be not less than 1.00 metre high, and the rails shall be not more than 230 millimetres apart, unless strong netting is fitted. Where bulwarks are fitted, they shall be at least 1.00 metre high, and the freeing ports therein shall be fitted with suitable grids, for the protection of the passengers on board.

The height of the rails is to be taken as the distance measured from the top of the uppermost rail to the top of the deck at a point vertically below the inner edge of the rail, or, if the deck has a waterway, to the top of the deck plank next to the waterway.

(2) Ships of Classes II and II(A)

The requirements of sub-paragraph (1) of this Schedule apply subject to the following modifications:

All parts of the freeboard deck to which passengers have access shall be fitted with bulwarks not less than 1.220 metres in height. Other parts of the freeboard deck, and decks above the freeboard deck shall be provided with guard rails and stanchions, or bulwarks not less than 1.00 metre in height.

(3) Ships of Class III

The requirements of sub-paragraph (1) apply except that, if any portion of the main deck or raised quarter deck to which passengers have access is fitted with guard rails instead of close bulwarks, weather cloths shall be fitted to the rails.

(4) Decked ships of Classes IV, V, VI and VI(A)

The height of the bulwarks, or of the uppermost rail on any deck, shall be not less than 1.00 metre. The rails shall not be more than 230 millimetres apart unless fitted with strong netting.

If, in the case of ships of Classes IV and V, the fitting of guard rails or bulwarks to the required height would interfere with the employment of the ship, the Secretary of State may permit alternative arrangements.

(5) Open or partially decked ships of Classes V, VI and VI(A)

Any partial deck to which the passengers on board have access shall be provided with guard rails and stanchions, or bulwarks, in accordance with sub-paragraph (4).

In the open parts of partially decked ships, and in open ships the top of the covering board or of the wash strake, or the upper edge of the coaming of the half-deck, should be not less than 760 millimetres above the flooring in ships which do not exceed 6.0 metres in length, and not less than 1.00 metre for ships of 12.0 metres or more in length. For ships the lengths of which are between 6.0 metres and 12.0 metres, the height shall be in proportion. When the height from the top of the covering board, is less than stated above, a wash-board or rail shall be fitted above the covering board, in such a position that the top of the wash-board or rail is at least the required height above the flooring boards.

EXPLANATORY NOTE

(This Note is not part of the Regulations.)

These Regulations give effect, in relation to new United Kingdom passenger ships, to the International Convention for the Safety of Life at Sea 1974 (CMND. 7824), the Protocol thereto of 1978 (CMND. 8277) and the Amendments thereto adopted by the International Maritime Organisation at its 45th Session by Resolution MSC1(XLV).

They re-enact, with modifications and additions, the provisions of the Merchant Shipping (Passenger Ship Construction) Regulations 1980 (S.I.1980/535) which no longer apply to new United Kingdom ships.

The principal additions to the requirements of those regulations of 1980 relate to steering gear, electrical requirements, construction of watertight bulkheads, protection against noise, guard rails and stanchions; and there are modifications to the requirements for watertight doors, drainage of cargo decks, side scuttles and boilers and machinery. There are also detailed requirements for surveys and there is a change in the limits for the class of small passenger vessels serving isolated communities.

Merchant Shipping Notices are obtainable from the Department of Transport Marine Library, Sunley House, 90 High Holborn, London WC1V 6LP and from any Department of Transport Marine Office.

Copies of the British Standards specifications referred to in these Regulations may be obtained from any of the sales outlets operated by the British Standards Institution, or by post from the British Standards Institution at Linford Wood, Milton Keynes, MK14 6LE (Telephone Number:Milton Keynes (STD 0908) 320066).

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