DRAFT

MINISTRY OF PORTS, SHIPPING AND WATERWAYS

NOTIFICATION

New Delhi, the_____ 2026

G.S.R…….“In exercise of the powers powers conferred by sub-section (1) and (2) of section 116, sub-section (2) of section 121 and sub-section (2) of section 130 of the Merchant Shipping Act, 2025, and in supersession of the Merchant Shipping (Cargo ship Construction and Survey Rules, 1991, except as respects things done or omitted to be done before such supersession, the Central Government hereby makes the following rules, namely: –“

1. Short title, commencement and application.

(1) These rules may be called the **Merchant Shipping (Cargo Ship Construction and Survey) Rules 2025.**

(2) They will come into force on the date of their publication in the Official Gazette.

Unless expressly provided otherwise, this Rules will apply to ships the keel of which are laid or which are at a similar stage of construction on or after 1 January 2026.

(3) Applicability- Unless expressly provided, they will apply to--

(a) Unless expressly provided otherwise, the present rules shall apply to all sea-going cargo ships of 500 ton gross or more, registered in India.

(b) The types of ships to which each part of the Schedule applies are more precisely defined, and the extent of the application is shown in each schedule

(c) Existing Ships:

Rule will not apply in the case of ships the keel of which was laid or was at a similar stage of construction before the coming into force of these rules provided that such ships comply with the requirements specified in the Merchant Shipping (Cargo ship construction and survey) Rules 1991 and safety convention as in force before the coming into force of these rules and comply with such other requirements as to improve or modify in standards as may be specified by the Director General having regard to the ship was built and the extent of major structural alternative involved.

Explanations; For the purpose of this rule " similar stage construction" means a stage at which-

(i) construction identifiable with a specific ship begins and

(ii) assembly of that ship has commenced comprising of at least 50 tonnes or more

percent of the estimated mass of all structural material, whichever is less.

2. Definitions: In these rules, unless the context otherwise requires:

In these rules, Words and expressions used in these rules but not defined herein will have the meanings respectively assigned to them in the Act, and in the applicable Codes and Conventions

(1) "**A Class division**" means the divisions formed by bulkhead and decks and are:-

(a) constructed of steel or other equivalent material;

(b) suitably stiffened;

(c) so constructed as to be capable of preventing the passage of smoke and flame to the end of the one-hour standard fire test;

(d) insulated with approved non-combustible materials in a manner that the average temperature of the unexposed side does not rise more than 140^0C above the initial temperature, nor does the temperature, at any one point, including any joint, rise more than 180^0C above the initial temperature, within the time specified in column (2) of the Table below in relation to the classes specified in the corresponding entry in column (1) of the said table

(1)	**(2)**
class "A-60"	60 minutes
class "A-30"	30 minutes
class "A-15"	15 minutes
class "A-0"	0 minutes

(e) The Director General has required a test of a prototype bulkhead or deck in accordance with the Fire Test Procedures Code to ensure that it meets the above requirements for integrity and temperature rise.

(2) "**Accommodation space**" means spaces used for public spaces, corridors, lavatories, cabins, offices hospitals, games and hobbies rooms, pantries containing no cooking appliances and similar spaces;

(3) "**Act**" means the Merchant Shipping Act, 2025 (24 of 2025);

(4) "**Anniversary date**" in relation to a cargo ship, means the date in each year corresponding to the date of expiry of the Cargo Ship safety Construction Certificate or the Cargo Ship Construction Certificate;

(5) "**Approved**" means approved by the Director General

(6) "**Atriums**" are public spaces within a single main vertical zone spanning three or more open decks.

(7) "**Auxiliary steering gear**" means the equipment, not being any part of the main steering gear, necessary to steer a ship in the event of failure of the main general of Shipping unless expressly stated otherwise; steering gear but does not include the tiller, quadrant or components serving the same purpose;

(8) **Aft terminal** is the aft limit of the subdivision length.

(9) "**B class** division" means the divisions formed by bulkheads, decks ceilings or lining which :

(a) are so constructed as to be capable of preventing by passage of flame at the end of the first half-hour of the standard fire test;

(b) Have an insulation value so that if the division is exposed to a standard fire test, the average temperature on the unexposed side does not rise more than 140^0C above the original temperature, or does the temperature at any one point including any joint, wrist more than 225^0C above the original temperature, within the time listed below

class "B-15"	15minutes
class "B-0",	0 minute; and

(c) they are constructed of approved non-combustible materials and all materials used in the construction and erection of "B" class divisions are non-combustible, with the exception that combustible veneers may be permitted provided they meet other appropriate requirements

(d) the Director General has required a test of a prototype division in accordance with the Fire Test Procedures Code to ensure that it meets the above requirements for integrity and temperature rise.

(10) ***Breadth (B) of a ship*** is the greatest moulded breadth of the ship at or below the deepest subdivision draught

(11) "**Bulk Chemical Code**" means the Code for construction and equipment of ships carrying dangerous chemicals in bulk adopted by the Assembly of the International Maritime organization by resolution A 212(VII);

(12) **Bulk carrier** means a bulk carrier as defined in regulation XII/1.1 of SOLAS.

(13) "**Bulkhead deck**" means the upper most deck upto which the transverse watertight bulkheads are carried;

(14) "**Cargo** area" means the part of a ship which contains cargo spaces, slop tanks and cargo pump rooms, cofferdams, ballast and void spaces adjacent to cargo tanks and also deck areas throughout the length and breadth of the part of the ship over such spaces;

(15) "**C class divisions**" means the divisions constructed have approved non-combustible materials. They need meet neither requirement relative to the passage of smoke and flame nor limitations relative to the temperature rise. Combustible veneers are permitted provided they meet other requirements of these rules;

(16) "**Cargo control station**" means a space from which the loading, discharging or transferring of any cargo may be controlled;

(17) "**Cargo** ship "means a ship which is not a passenger ship;

(18) "**Cargo** pump **room**" means the room in which pumps used for loading, discharge or transferring oil cargoes are located;

(19) "**Cargo** spaces" means all spaces used for cargo (including cargo oil tanks) and trunks to such spaces;

(20) **"Central Control Station"** is a control station in which the following control and indicator functions are centralized:

(a) Fixed fire detection and alarm systems;

(b) Automatic sprinkler, fire detection and fire alarm systems;

(c) Fire door indicator panels;

(d) Fire door closure;

(e) Watertight door indicator panels;

(f) Watertight door closures;

(g) Ventilation fans;

(h) General/fire alarms;

(i) Communication systems including telephones; and

(j) Microphones to public address system.

(21) "**Chemical tanker**" means a tanker constructed or adopted and used for the carriage in bulk of any liquid product listed in-

(a) chapter 17 of the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk or

(b) Chapter VI of the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk ;

(22) "**Closed RO/RO cargo spaces**" means RO/RO cargo spaces which are neither open RO/RO spaces nor whether deck;

(23) ***Closed vehicle*** *spaces* are vehicle spaces which are neither open vehicle spaces nor weather decks.

(24) "Combination **carrier**" means a tanker designed to carry oil or solid cargoes in bulk;

(25) "Combustible **material**" is any material other than a non-combustible material;

(26) "***Control stations*** are those spaces in which the ship's radio or main navigating equipment or the emergency source of power is located or where the fire recording or fire control equipment is centralized.

(27) ***Continuous "B" class ceilings or linings*** are those "B" class ceilings or linings which terminate at an "A" or "B" class division.

(28) "**Crew** spaces" means accommodation provided exclusively for the use of crew;

(29) "**Crude** oil" means oil occurring naturally in the earth whether or not treated to render it suitable for transportation and includes crude oil from which certain distillate fractions may have been removed and to crude oil to which certain distillate fractions may have been made;

(30) "Dangerous **goods**" means those goods referred to in International Maritime Dangerous goods Code, as amended from time to time;

(31) "**Dead** ship **condition**" means the condition under which the main propulsion and the boilers and auxiliaries are not in operation due to the absence of power;

(32) "**Dead** weight" means the difference in metric tons between the displacement of a ship in water of a specific gravity of 1.025 at the load water line corresponding to the assigned summer free-board and the lightweight of the ship;

(33) *Deepest subdivision draught (ds)* is the summer load line draught of the ship

(34) *Design pressure* means the hydrostatic pressure for which each structure or appliance assumed watertight in the intact and damage stability calculations is designed to withstand.

(35) "**Director General**" means the Director General of shipping of with the Government of India;

(36) *Draught (d)* is the vertical distance from the keel line at:

(a) amidships, for ships subject to the provisions of regulation II-1/1.1.1.1 of SOLAS; and

(b) the mid-point of the subdivision length (Ls), for ships do not subject to the provisions of regulation II-1/1.1.1.1 of SOLAS but constructed on or after 1 January 2009;

to the waterline in question.

(37) "**Emergency condition**" means the 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;

(38) "**Emergency source of electrical power**" means the 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;

(39) "Emergency **switch board**" means the switch board which in the event of failure of the main electrical power supply system is directly supplied by the emergency source of electrical power or the transitional source of emergency power and is intended to distribute electrical energy to the emergency services;

(40) "**Flammable**" means substances capable of being ignited and of burning in air;

(41) "**Forward** perpendicular" as defined in the Merchant Shipping (Loadline) Rules 2026.

(42) *Forward terminal* is the forward limit of the subdivision length.

(43) "**Freeboard deck**" as defined in the Merchant Shipping (Loadline) Rules 2026.

(44) Fire Safety Systems Code means the International Code for Fire Safety Systems as adopted by the Maritime Safety Committee of the IMO by resolution MSC.98(73), as may be amended by the IMO, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable

(45) Fire Test Procedures Code means the International Code for Application of Fire Test Procedures, 2010 (2010 FTP Code) as adopted by the Maritime Safety Committee of the IMO by resolution MSC.307(88), as may be amended by the IMO, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable.

(46) Fire damper is, for the purpose of implementing Rule 76 sub-rule (7) adopted by resolution MSC.365(93), as may be amended, a device installed in a ventilation duct, which under normal conditions remains open allowing flow in the duct, and is closed during a fire, preventing the flow in the duct to restrict the passage of fire. In using the above definition, the following terms may be associated:

(a) automatic fire damper is a fire damper that closes independently in response to exposure to fire products.
(b) manual fire damper is a fire damper that is intended to be opened or closed by the crew by hand at the damper itself; and
(c) remotely operated fire damper is a fire damper that is closed by the crew through a control located at a distance away from the controlled damper.

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

(48) **Gas carrier** is a cargo ship constructed or adapted and used for the carriage in bulk of any liquefied gas or other products of a flammable nature listed in chapter 19 of the International Gas Carrier Code, as defined in regulation VII/11.1 of SOLAS.

(49) "**Hazardous area**" means an area in which explosive gas-air mixture are, or may be expected to be present in quantities such as to require special

precaution for the construction and use of electrical apparatus or other apparatus which otherwise would constitute a source of ignition;

(50) "**Hazardous zone or space**" means

(a) spaces containing flammable cargo or spaces adjacent to cargo tanks;

(b) all enclosed and semi-enclosed space with direct access to hazardous zones or spaces;

(c) an enclosed space situated in a hazardous zone or space may be regarded as non-hazardous provided it is separated from liquid cargo spaces by at least two gas tight steel bullheads or decks, with no direct opening into hazardous zone or space and is mechanically ventilated.

(51) "**Helideck"** is a purpose-built helicopter landing area located on a ship including all structures, fire-fighting appliances and other equipment necessary for the safe operation of helicopters.

(52) ***Helicopter*** *facility* is a helideck including any refuelling and hangar facilities.

(53) **Helicopter landing area** is an area on a ship designated for occasional or emergency landing of helicopters but noy designed for routine helicopter operations.

(54) "**IMO"** means the International Maritime Organization;

(55) " "International **Bulk Chemical Code**" means the code for the construction and equipment of ships carrying dangerous chemicals in bulk adopted by the IMO by resolution MSC 4(48), as amended from time to time;

(56) "**International Gas Carrier Code**" means the code for the construction and equipment of ships carrying liquified gas in bulk adopted by the IMO by resolution MSC 5(48), as amended from time to time;

(57) "International **voyage**" means a voyage from any port in India to any other port outside India; or conversely;

(58) "**Length**" is the length as defined in the Merchant Shipping (Loadline) Rules 2026.

(59) "**Light weight**" means the displacement of the ship in metric tons without cargo, fuel, lubricating oil, ballast water, fresh water and feed water in tanks, consumable stores, and passengers and crew and their effects;

(60) ***Light service draught (dl)*** is the service draught corresponding to the lightest anticipated loading and associated tankage, including, however, such

ballast as may be necessary for stability and/or immersion. Passenger ships should include the full complement of passengers and crew on board.

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

(62) " "**Machinery control room**" means a room from which the propelling machinery and boiler serving the needs of propulsion may be controlled;

(63) "**Machinery space**" means all machinery spaces of category "A" and all other spaces containing propelling machinery, boiler, oil fuel units, steam or internal combustion engines, generators, and major electrical machinery oil filling stations, refrigerating, stabilizing, ventilation and air conditioning machinery and similar spaces and trunks to such spaces;

(64) "**Machinery spaces of category A**" means a machinery space which contains;

(a) internal combustion machinery used for main propulsion

(b) internal combustion type machinery used either for main propulsion purposes, or for any other purposes when such machinery has in the aggregate a total power output of not less than 375 kilowatts, or

(c) any oil-fired boiler or oil fuel unit any oil fired boiler or oil fuel or any oil fired equipment other than boilers, such as inert gas generator, incinerators etc.

(65) "**Main** generating **station**" means the space in which the main source of electrical power is situated;

(66) "**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 normal operational and habitable conditions;

(67) "**Main** steering **gear**" means the machinery, rudder actuators, steering gear power units, if any, and ancillary equipment and the means of applying torque to the rudder for the purpose of steering the ship under normal service conditions;

(68) "**Main** switch **board**" means the switch board which is directly supplied by the main source of electrical power and is intended to distribute electrical energy to the ships service;

(69) **“Main** vertical **zones”** are those sections into which the hull, superstructure and deckhouses are divided by ‘A’ class divisions, the mean length and width of which on any deck does not in general exceed 40m;

(70) “MARPOL” means MARPOL 73/78 Convention of IMO along with its Protocols and Amendments as applicable;

(71) **"Maximum ahead service speed"** means the greatest speed the ship is designed to maintain at sea at her deepest seagoing draft;

(72) **"Maximum** astern **speed"** means the speed which it is estimated the ship can attain at the design maximum astern power at the deepest sea-going draught;

(73) “**Mile**” means 6080 feet or 1852 meters;

(74) **"Motor** ship**"** means a ship propelled by internal combustion engine;

(75) **MS** Notice” *notice’ means any notice issued by the Director-General under section 301 of the Act’.*

(76) “**"Navigable** speed**"** means the minimum speed at which the ship can be effectively steered in the ahead direction;

(77) **" "Non-**combustible **material"** means material which neither burns nor gives off flammable vapors in sufficient quantity for self-ignition when heated to approximately 750.C this being determined by an established test procedure to the satisfaction of the Directorate General of Shipping

(78) **"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 an flooding safety, internal and external communications and signals, means of escape, and emergency boat winches as well as the designed comfortable conditions of habitability are in working order and functioning normally;

(79) **"Oil fuel unit"** means the equipment used for the operation of oil fuel for delivery to an oil fired boiler, or equipment used for the preparation for delivery of heated oil to internal combustion engines, and includes any oil at a pressure pumps, filters and heaters, dealing with oil at pressure of more than 1.8 kilograms/cm;

(80) ***Oil tanker*** is the oil tanker defined in regulation 1 of Annex I of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973.

(81) "**Open RO/RO**" 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 or from above, having a total area of at least 10% of the total area of the space sides.

(82) **"Passenger ship"** is a ship which carries more than twelve passengers;

(83) ***Partial subdivision draught* (*dp*)** is the light service draught plus 60% of the difference between the light service draught and the deepest subdivision draught.

(84) "**Power actuating** system" means hydraulic equipment provided for supplying power to turn the rudderstock comprising a steering gear unit or units together with the associated pipes and fittings and a rudder actuator. The power actuating system may share common mechanical components serving the same purpose;

(85) **Principal officer**" means an officer referred to in sub-section (2) of section 8 of the Act;

(86) "**Public spaces**" are those portions of the accommodation spaces which are used for halls, dining rooms, lounges and similar permanently enclosed spaces;

(87) ***Permeability (μ)*** of a space is the proportion of the immersed volume of that space which can be occupied by water.

(88) Prescriptive requirements means the construction characteristics, limiting dimensions, or fire safety systems specified in Schedules.

(89) "**Reid vapour pressure**" means the vapour pressure of a liquid as determined by laboratory testing in a standard manner in the Reid apparatus;

(90) **"Rooms** containing **furniture and furnishings of restricted fire risk",** for the purpose of regulation 9, are those rooms containing furniture and furnishings of restricted fire risk (whether cabins, public spaces, offices or other types of accommodation) in which:

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

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

(c) draperies, curtains and other suspended textile materials have qualities of resistance to the propagation of flame not inferior to those of wool having a mass of 0.8 kg/m2, this being determined in accordance with the Fire Test Procedures Code;

(d) floor coverings have low flame-spread characteristics;

(e) exposed surfaces of bulkheads, linings and ceilings have low flame-spread characteristics;

(f) upholstered furniture has qualities of resistance to the ignition and propagation of flame, this being determined in accordance with the Fire Test Procedures Code; and

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

(91) "**RO/RO cargo spaces**" means spaces not normally sub-divided in anyway and extending to either a substantial length or the entire length of the ship in which goods (package or in bulk) in or on rail or road cars, vehicles (including road and rail tankers, trailers, containers, pallets dismountable tanks or in or on similar stowage units or other receptacles) can be loaded and unloaded normally in a horizontal direction;

(92) **"RO/RO spaces"** are spaces not normally subdivided in any way and normally extending to either a substantial length or the entire length of the ship in which motor vehicles with fuel in their tanks for their own propulsion and/or goods (packaged or in bulk, in or on rail or road cars, vehicles (including road 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.

(93) "**Sauna"** is a hot room with temperatures normally varying between 80^0C and 120^0C where the heat is provided by a hot surface (e.g., by an electrically heated oven). The hot room may also include the space where the oven is located and adjacent bathrooms.

(94) "**Schedule**" means the Schedule annexed to these rules;

(95) "**Service Spaces**" means those spaces used for galleys, pantries containing cooking appliances, lockers, main and specie room, store room, workshops other than those forming part of the machinery spaces and similar spaces and trunks to such spaces;

(96) "**Settling tank**" means an oil storage tank having a heating surface of not less than 0.183 m/tone of oil capacity.

(97) "**Special** category **spaces**" means those enclosed vehicle spaces above and below the bulkhead deck, into and from which vehicles can be driven and to which passengers have access. Special category spaces may be accommodated on more than one deck provided that the overall clear height for vehicles does not exceed 10m;

(98) "**Standard fire test**" means a test in which specimens of the relevant bulkheads or decks are exposed in a test furnace to temperatures corresponding to the standard time-temperature curve in accordance with the test method specified in the Fire Test Procedure Code.

(99) "**Steel or other equivalent material**" means any non combustible material which by itself or due to insulation provided has structural and integrity properties equivalent to steel at the end of the applicable fire exposure to the standard fire test;

(100) "**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 system comprise transmitters, receivers, hydraulic control pumps and their associated motors, motor controllers, piping and cables;

(101) "**Steering gear power unit**" means,-

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

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

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

(102) "**SOLAS**" means the International Convention of Safety of Life at Sea,1974 of the IMO with its Protocols and Amendments as applicable;

(103) Smoke damper is, for the purpose of implementing Rule 76 Sub-rule(7) adopted by resolution MSC.365(93) of IMO, as may be amended, a device installed in a ventilation duct, which under normal conditions remains open allowing flow in the duct, and is closed during a fire, preventing the flow in the duct to restrict the passage of smoke and hot gases. A smoke damper is not expected to contribute to the integrity of a fire rated division penetrated by a ventilation duct. In using the above definition, the following terms may be associated:

(a) automatic smoke damper is a smoke damper that closes independently in response to exposure to smoke or hot gases.

(b) manual smoke damper is a smoke damper intended to be opened or closed by the crew by hand at the damper itself; and

(c) remotely operated smoke damper is a smoke damper that is closed by the crew through a control located at a distance away from the controlled damper.

(104) "**Surveyor**" means a person appointed or authorized in this behalf by the Central Government under Section 8 of the Act;

(105) **Subdivision length (Ls)** of the ship is the greatest projected moulded of that part of the ship at or below deck or decks limiting the vertical extent of flooding with the ship at deepest subdivision draught.

(106) "**Ton**" means gross ton;

(107) **Trim** is the difference between the draught forward and the draught aft, where the draughts are measured at the forward and aft:

(a) perpendiculars respectively, as defined in the International Convention on Load Lines in force, for ships subject to the provisions of regulation II-1/1.1.1.1 of SOLAS; and

(b) terminals respectively, for ships not subject to the provisions of regulation II-1/1.1.1.1 of SOLAS but constructed on or after 1 January 2009; disregarding any rake of keel.

(108) **"Vehicle spaces"** are cargo spaces intended for carriage of motor vehicles with fuel in their tanks for their own propulsion.

(109) **Vehicle carrier** means a cargo ship which only carries cargo in ro-ro spaces or vehicle spaces, and which is designed for the carriage of unoccupied motor vehicles without cargo, as cargo.

(110) "***Watertight*** means having scantling and arrangements capable of preventing the passage of water in any direction under the head of water likely to occur in intact and damaged conditions. In the damaged condition, the head of water is to be considered in the worst situation at equilibrium, including intermediate stages of flooding

(111) "**Weather deck**" means the deck which is completely exposed to the weather from above and from atleast two sides;

(112) **Winching area** is a pick-up area provided for the transfer by personnel or stores to or from the ship, while the helicopter hovers above the deck.

(113) ***Weathertight*** means that in any sea conditions water will not penetrate into the ship ;

3. Exceptions-

The present rules, unless expressly provided otherwise, do not apply to:

(1) Ships of war and troopships.

(2) Cargo ships of less than 500 gross tonnage

(3) Ships not propelled by mechanical means.

(4) Wooden ships of primitive build.

(5) Pleasure yachts are not engaged in trade.

(6) Vessels covered under Part XIII of the Merchant shipping Act 2025

4. **Exemptions-**

(1) A ship which is not normally engaged on international voyages but which, in exceptional circumstances, is required to undertake a single international voyage may be exempted by the Director General from any of the requirements of the present rules provided that it complies with safety requirements which are adequate in the opinion of the Director General for the voyage which is to be undertaken by the ship.

(2) The Director General may exempt any ship which embodies features of a novel kind from any of the provisions of chapters II, III of Part II of these rules the application of which might seriously impede research into the development of such features and their incorporation in ships engaged on international voyages. Any such ship will, however, comply with safety requirements which, in the opinion of the Director General, are adequate for the service for which it is intended and are such as to ensure the overall safety of the ship and which are acceptable to the Governments of the States to be visited by the ship. The Director General which allows any such exemption will communicate to the IMO particulars of same and the reasons thereof, which the IMO will circulate to the Contracting Governments for their information.

(3) The Director General may, if it considers that the sheltered nature and conditions of the voyage are such as to render the application of any specific requirements of this chapter unreasonable or unnecessary, exempt from those requirements individual ships or classes of ships entitled to fly the flag of that

State which, in the course of their voyage, do not proceed more than 20 miles from the nearest land.

5. **Equivalents with respect to material, appliances or apparatus**-

(1) Where the present rules require that a particular fitting, material, appliance or apparatus, or type thereof, will be fitted or carried in a ship, or that any particular provision will be made, the Director General may allow any other fitting, material, appliance or apparatus, or type thereof, to be fitted or carried, or any other provision to be made in that ship, if it is satisfied by trial thereof or otherwise that such fitting, material, appliance or apparatus, or type thereof, or provision, is at least as effective as that required by the present rules.

(2) The Director General upon allowing, in substitution, a fitting, material, appliance or apparatus, or type thereof, or provision, will communicate to the IMO particulars thereof together with a report on any trials made and the IMO will furnish such particulars to other Contracting Governments for the information of their officers.

6. **Construction of Ships**-

(1) The requirements for construction, including structural arrangements, subdivision and stability, machinery and electrical installations, as well as fire protection, fire detection and fire extinction, shall comply with the provisions specified in Schedule 1.

7. Application of Rules to ships of under 500GT-

(1) Ships under 500 gross tonnage will comply with the requirements stipulated in Paragraph 89 of Schedule 1.

Schedule 1

CONSTRUCTION - SUBDIVISION AND STABILITY, MACHINERY AND ELECTRICAL INSTALLATIONS.

CHAPTER-I

GENERAL

1. **Application**. -

(1) Unless expressly provided otherwise, this Chapter will apply to all cargo ships.

(2) For the purpose of this Chapter, the term “a 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.

(3) For the purpose of this Chapter:

(a) the expression “ships constructed” means “ships the keels of which are laid or which are at a similar stage of construction”;

(b) the expression ships constructed on or after 1 January 2026 means ships:

(i) for which the building contract is placed on or after 1 January 2026; or

(ii) in the absence of a building contract, the keel of which is laid, or which are at a similar stage of construction on or after 1 July 2026; or

(c) a cargo ship, whenever built, which is converted to a passenger ship will be treated as a passenger ship constructed on the date on which such a conversion commences.

(4) All ships which undergo repairs, alterations, modifications and outfitting related thereto will continue to comply with at least the requirements previously applicable to these ships. Such ships if constructed before the date on which any relevant amendments enter into force will, as a rule, comply with the requirements for ships constructed on or after that date to at least the same extent as they did before undergoing such repairs, alterations, modifications or outfitting. Repairs, alterations and modifications of a major character and outfitting related thereto will meet the requirements for ships constructed on or

after the date on which the relevant amendments enter into force in so far as the Director General deems reasonable and practicable.

CHAPTER-II

STRUCTURE OF SHIPS

2. **Structural, mechanical and electrical requirements for ships**. - In addition to the requirements contained elsewhere in the present rules, ships will be designed, constructed and maintained in compliance with the structural, mechanical and electrical requirements of a classification society which is recognized by the Central Government in accordance with the provisions of regulation XI-1/1 of SOLAS or with applicable national standards prescribed by the Central Government which provide an equivalent level of safety.

3. **Corrosion prevention of seawater ballast tanks.-**

(1) Sub-rule 2 and 4 of this Rule apply to ships of not less than 500 gross tonnage:

(2) All dedicated seawater ballast tanks and double-side skin spaces arranged in bulk carriers of 150 m in length and upwards will be coated during construction in accordance with the Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces for bulk carriers, adopted by the Maritime Safety Committee by resolution MSC.215(82), as may be amended by the IMO, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of Article VIII of SOLAS 1974 concerning the amendment procedures applicable to the Annex other than chapter I of the SOLAS.

(3) All dedicated seawater ballast tanks arranged in oil tankers and bulk carriers constructed on or after 1 July 1998, for which sub-rule (2) is not applicable, will comply with the requirements of regulation II-1/3-2 adopted by resolution MSC. 47(66).

(4) Maintenance of the protective coating system will be included in the overall ship's maintenance scheme. The effectiveness of the protective coating system will be verified during the life of a ship by the Director General or an organization recognized by the Central Government, based on the guidelines developed by the Director General.

4. **Safe access to tanker bows**. -

(1) For the purpose of this rule and rule 5 (Emergency Towing Arrangement), tankers include oil tankers as defined in Part 1 rule 2, chemical tankers as defined part 1 rule 2(21) and gas carriers as defined in Part 1 rule 2(48).

(2) Every tanker will be provided with the means to enable the crew to gain safe access to the bow even in severe weather conditions. Such means of access

will be approved by the Director General based on the guidelines developed by IMO.

5. **Emergency towing arrangements on tankers**.-

(1) Emergency towing arrangements will be fitted at both ends on board every tanker of not less than 20,000 tonnes deadweight.

(2) For tankers constructed on or after 1 July 2002:

(a) the arrangements will, at all times, be capable of rapid deployment in the absence of main power on the ship to be towed and easy connection to the towing ship. At least one of the emergency towing arrangements will be pre-rigged ready for rapid deployment; and

(b) emergency towing arrangements at both ends will be of adequate strength taking into account the size and deadweight of the ship, and the expected forces during bad weather conditions. The design and construction and prototype testing of emergency towing arrangements will be approved by the Director General, based on the Guidelines developed by the IMO.

(3) For tankers constructed before 1 July 2002, the design and construction of emergency towing arrangements will be approved by the Director General, based on the Guidelines developed by the IMO.

6. **Emergency towing arrangements on ships other than tankers**.-

(1) Emergency towing arrangements will be fitted on ships, other than tankers, of not less than 20,000 gross tonnage, constructed on or after 1 January 2028.

(2) For ships, other than tankers, constructed on or after 1 January 2028:

(a) The arrangements will be , at all times, be capable of rapid deployment in the absence of main power on the ship to be towed and easy connection to the towing ship; and

(b) Emergency towing arrangements will have to be of adequate strength taking into account the size of the ship, and the expected forces during bad weather conditions. The design and construction and prototype testing of emergency towing arrangements will be approved by the Director General, based on the guidelines developed by the IMO.

7. Emergency Towing Procedure on Ships

(1) This paragraph applies to:

(a) Cargo ships constructed on or after 1 January 2010; and

(b) Cargo ships constructed before 1 January 2010, not later than 1 January 2012.

(2) Ships will be provided with a ship-specific emergency towing procedure. Such a procedure will be carried aboard the ship for use in emergency situations and will be based on existing arrangements and equipment available on board the ship.

(3) The procedure will include

(a) drawings of fore and aft deck showing possible emergency towing arrangements;

(b) inventory of equipment on board that can be used for emergency towing;

(c) means and methods of communication; and

(d) sample procedures to facilitate the preparation for and conducting of emergency towing operations.

(e) Additional requirements stipulated in MSC.1/Circ.1255

8. **New installation of materials containing asbestos**. –

(1) This rule will apply to materials used for the structure, machinery, electrical installations and equipment covered by the present rules.

(2) For all ships, new installation of materials which contain asbestos will be prohibited except for:

(a) vanes used in rotary vane compressors and rotary vane vacuum pumps;

(b) watertight joints and linings used for the circulation of fluids when, at high temperature (in excess of 350°C) or pressure (in excess of 7 × 106 Pa), there is a risk of fire, corrosion or toxicity; and

(c) supple and flexible thermal insulation assemblies used for temperatures above 1,000°C.

9. Access to and within spaces in, and forward of, the cargo area of oil tankers and bulk carriers.-

(1) Application:

(a) Except as provided for in clause (b) of sub-rule (1), this rule applies to oil tankers of 500 gross tonnage and over and bulk carriers, as defined in regulation IX/1, of 20,000 gross tonnage and over, constructed on or after 1 January 2006.

(b) Oil tankers of 500 gross tonnage and over constructed on or after 1 October 1994 but before 1 January 2005 will comply with the provisions of regulation II/12-2 adopted by resolution MSC.27(61) of these rules.

(2) Means of access to cargo and other spaces

(a) Each space will be provided with means of access to enable, throughout the life of a ship, overall and close-up inspections and thickness measurements of the ship's structures to be carried out by the Director General, the Company as defined in regulation IX/1 of SOLAS, and the ship's personnel and others as necessary. Such means of access will comply with the requirements of sub-rule (5) and with the Technical provisions for means of access for inspections, adopted by IMO through resolution MSC.133(76) as may be amended by the IMO, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable.

(b) Where a permanent means of access may be susceptible to damage during normal cargo loading and unloading operations or where it is impracticable to fit permanent means of access, the Director General may allow, in lieu thereof, the provision of movable or portable means of access, as specified in the Technical provisions, provided that the means of attaching, rigging, suspending or supporting the portable means of access forms a permanent part of the ships structure. All portable equipment will be capable of being readily erected or deployed by ship's personnel.

(c) The construction and materials of all means of access and their attachment to the ship's structure will be to the satisfaction of the Director General. The means of access will be subject to survey prior to, or in conjunction with, its use in carrying out surveys in accordance with MS Act (Survey, Audit and Certification 2025)

(3) Safe access to cargo holds, cargo tanks, ballast tanks and other spaces

(a) Safe access to cargo holds, cofferdams, ballast tanks, cargo tanks and other spaces in the cargo area will be direct from the open deck and such as to ensure their complete inspection. Safe access to double bottom spaces or to forward ballast tanks may be from a pump-room, deep cofferdam, pipe tunnel, cargo hold, double hull space or similar compartment not intended for the carriage of oil or hazardous cargoes.

(b) Tanks, and subdivisions of tanks, having a length of 35 m or more, will be fitted with at least two access hatchways and ladders, as far apart as practicable. Tanks less than 35 m in length will be served by at least one access hatchway and ladder. When a tank is subdivided by one or more swash bulkheads or similar obstructions which do not allow ready means of access to the other parts of the tank, at least two hatchways and ladders will be fitted.

(c) Each cargo hold will be provided with at least two means of access as far apart as practicable. In general, these accesses should be arranged diagonally, for example one access near the forward bulkhead on the port side, the other one near the aft bulkhead on the starboard side.

(4) Ship Structure Access Manual

(a) A ship's means of access to carry out overall and close-up inspections and thickness measurements will be described in a Ship Structure Access Manual approved by the Director General , an updated copy of which will be kept on board. The Ship Structure Access Manual will include the following for each space:

(i) plans showing the means of access to the space, with appropriate technical specifications and dimensions;

(ii) plans showing the means of access within each space to enable an overall inspection to be carried out, with appropriate technical specifications and dimensions. The plans will indicate from where each area in the space can be inspected;

(iii) plans showing the means of access within the space to enable close-up inspections to be carried out, with appropriate technical specifications and dimensions. The plans will indicate the positions of critical structural areas, whether the means of access is permanent or portable and from where each area can be inspected;

(iv) instructions for inspecting and maintaining the structural strength of all means of access and means of attachment, taking into account any corrosive atmosphere that may be within the space;

(v) instructions for safety guidance when rafting is used for close-up inspections and thickness measurements;

(vi) instructions for the rigging and use of any portable means of access in a safe manner;

(vii) an inventory of all portable means of access; and

(viii) records of periodical inspections and maintenance of the ships means of access.

(b) For the purpose of this rule “critical structural areas” are locations which have been identified from calculations to require monitoring or from the service history of similar or sister ships to be sensitive to cracking, buckling, deformation or corrosion which would impair the structural integrity of the ship.

(5) General technical specifications

(a) For access through horizontal openings, hatches or manholes, the dimensions will be sufficient to allow a person wearing a self-contained air-breathing apparatus and protective equipment to ascend or descend any ladder without obstruction and also provide a clear opening to facilitate the hoisting of an injured person from the bottom of the space. The minimum clear opening will not be less than 600 mm x 600 mm. When access to a cargo hold is arranged through the cargo hatch, the top of the ladder will be placed as close as possible to the hatch coaming. Access hatch coamings having a height greater than 900 mm will also have steps on the outside in conjunction with the ladder.

(b) For access through vertical openings, or manholes, in swash bulkheads, floors, girders and web frames providing passage through the length and breadth of the space, the minimum opening will be not less than 600 mm x 800 mm at a height of not more than 600 mm from the bottom shell plating unless gratings or other foot holds are provided.

(c) For oil tankers of less than 5,000 tonnes deadweight, the Director General may approve, in special circumstances, smaller dimensions for the openings referred to in clauses (a) and (b) of sub-rule (5), if the ability to traverse such openings or to remove an injured person can be proved to the satisfaction of the Director General.

10. **Construction drawings maintained on board and ashore**.-

(1) A set of as-built construction drawings and other plans showing any subsequent structural alterations will be kept on board a ship constructed on or after 1 January 2007.

(2) An additional set of such drawings will be kept ashore by the Company, as defined in regulation IX/1.2 of SOLAS.

11. **Towing and mooring equipment**.-

(1) Sub-rule (4) to (6) applies to ships constructed on or after 1 January 2007.

(2) Sub-rule (7) and (8) of this rule only apply to ships:

(a) For which the building contract is placed on or after 1 January 2026; or

(b) In the absence of a building contract, the keel of which is laid or which is at a similar stage of construction on or after 1 July 2026; or

(c) The delivery of which is on or after 1 January 2029.

(3) This rule does not apply to towing arrangement provided in accordance with Rule 5, 6 and 7 of this Chapter.

(4) Ships will be provided with arrangements, equipment and fittings of sufficient safe working load to enable the safe conduct of all towing and mooring operations associated with the normal operation of the ship.

(5) Arrangements, equipment and fittings provided in accordance with sub-rule (4) will meet the appropriate requirements of the Director General or an organization recognized by the Director General under rule MS Act (Survey, Audit and Certification 2025)

(6) Each fitting or item of equipment provided under this rule will be clearly marked with any restrictions associated with its safe operation, taking into account the strength of its attachment to the ship's structure.

(7) For ships of 3,000 gross tonnage and above, the mooring arrangement will be designed, and the mooring equipment including lines will be selected, in order to ensure occupational safety and safe mooring of the ship, based on the guidelines developed by the Director General Ship-specific information will be provided and kept on board.

(8) Ships of less than 3,000 gross tonnage should comply with the requirement in paragraph 7 above as far as reasonably practicable, or with applicable national standards of the Director General.

(9) For all ships, mooring equipment, including lines, will be inspected and maintained in a suitable condition for their intended purposes.

12. Means of Embarkation on and Disembarkation from ship

(1) Ships constructed on or after 1 January 2010 will be provided with means of embarkation on and disembarkation from ships for use in port and in port related operations, such as gangways and accommodation ladders, in

accordance with Sub-rule (2), unless the Director General deems that compliance with a particular provision is unreasonable or impractical.

Circumstances where compliance may be deemed unreasonable or impractical may include where the ship:

(a) Has small freeboards and is provided with boarding ramps; or

(b) Is engaged in voyages between designated ports where appropriate shore accommodation/embarkation ladders (platforms) are provided.

(2) The means of embarkation and disembarkation required in Sub-rule (1) will be constructed and installed based on the guidelines developed by the IMO.

(3) For all ships the means of embarkation and disembarkation will be inspected and maintained in suitable condition for their intended purpose, taking into account any restrictions related to safe loading. All wires used to support the means of embarkation and disembarkation will be maintained as specified in regulation III/20.4 of SOLAS.

13. Goal based ship construction standards for Bulk Carriers and Oil Tankers

(1) This regulation will apply to oil tankers of 150 m in length and above and to bulk carriers of 150 m in length and above, constructed with single deck, top-side tanks and hopper side tanks in cargo spaces, excluding ore carriers and combination carriers:

(a) for which the building contract is placed on or after 1 July 2016;

(b) in the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after 1 July 2017; or

(c) the delivery of which is on or after 1 July 2020.

(2) Ships will be designed and constructed for a specified design life to be safe and environmentally friendly, when properly operated and maintained under the specified operating and environmental conditions, in intact and specified damage conditions, throughout their life.

(a) Safe and environmentally friendly means the ship will have adequate strength, integrity and stability to minimize the risk of loss of the ship or pollution to the marine environment due to structural failure, including collapse, resulting in flooding or loss of watertight integrity.

(b) Environmentally friendly also includes the ship being constructed of materials for environmentally acceptable recycling.

(c) Safety also includes the ship's structure, fittings and arrangements providing for safe access, escape, inspection and proper maintenance and facilitating safe operation.

(d) Specified operating and environmental conditions are defined by the intended operating area for the ship throughout its life and cover the conditions, including intermediate conditions, arising from cargo and ballast operations in port, waterways and at sea.

(e) Specified design life is the nominal period that the ship is assumed to be exposed to operating and/or environmental conditions and/or the corrosive environment and is used for selecting appropriate ship design parameters. However, the ship's actual service life may be longer or shorter depending on the actual operating conditions and maintenance of the ship throughout its life cycle.

(3) The requirements of Sub-rule (2) to (2e) will be achieved through satisfying applicable structural requirements of an IMO which is recognized by the Director General in accordance with the provisions of regulation XI-1/1, or rules provided by Director General, conforming to the functional requirements of the Goal-based Ship Construction Standards for Bulk Carriers and Oil Tankers.

(4) A Ship Construction File with specific information on how the functional requirements of the Goal-based Ship Construction Standards for Bulk Carriers and Oil Tankers have been applied in the ship design and construction will be provided upon delivery of a new ship, and kept on board the ship and/or ashore and updated as appropriate throughout the ship's service. The contents of the Ship Construction File will, at least, conform to the guidelines developed by the IMO.

14. Corrosion protection of cargo oil tanks of crude oil tankers

(1) Sub-rule (3) will apply to crude oil tankers, as defined in regulation 1 of Annex I to the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, of 5,000 tonnes deadweight and above:

(a) for which the building contract is placed on or after 1 January 2013; or

(b) in the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after 1 July 2013; or

(c) the delivery of which is on or after 1 January 2016.

(2) Sub-rule (3) will not apply to combination carriers or chemical tankers as defined in regulations 1 of Annexes I and II, respectively, to the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto. For the purpose of this regulation, chemical tankers also include chemical tankers certified to carry oil.

(3) All cargo oil tanks of crude oil tankers will be:

(a) Coated during the construction of the ship in accordance with the Performance standard for protective coatings for cargo oil tanks of crude oil tankers, adopted by the Maritime Safety Committee by resolution MSC.288(87), as may be amended by the IMO, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the Convention concerning the amendment procedures applicable; or

(b) protected by alternative means of corrosion protection or utilization of corrosion resistance material to maintain required structural integrity for 25 years in accordance with the Performance standard for alternative means of corrosion protection for cargo oil tanks of crude oil tankers, adopted by the Maritime Safety Committee by resolution MSC.289(87), as may be amended by the IMO, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the Annex other than chapter I.

(4) The Director General may exempt a crude oil tanker from the requirements of Sub-rule (3) to allow the use of novel prototype alternatives to the coating system specified in Sub-rule (3a), for testing, provided they are subject to suitable controls, regular assessment and acknowledgement of the need for immediate remedial action if the system fails or is shown to be failing. Such exemption will be recorded on an exemption certificate.

(5) The Director General may exempt a crude oil tanker from the requirements of Sub-rule (3) if the ship is built to be engaged solely in the carriage of cargoes and cargo handling operations not causing corrosion. Such exemption and conditions for which it is granted will be recorded on an exemption certificate.

15. Protection against noise

(1) This regulation will be applicable to ships of 1,600 gross tonnage and above:

(a) for which the building contract is placed on or after 1 July 2014; or

(b) in the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after 1 January 2015; or

(c) the delivery of which is on or after 1 July 2018,

unless the Director General deems that compliance with a particular provision is unreasonable or impractical.

(2) On ships delivered before 1 July 2018 and:

(a) contracted for construction before 1 July 2014 and the keels of which are laid or which are at a similar stage of construction on or after 1 January 2009; or

(b) in the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after 1 January 2009 but before 1 January 2015,

measures will be taken to reduce machinery noise in machinery spaces to acceptable levels as determined by the Director General. If this noise cannot be sufficiently reduced the source of excessive noise will be suitably insulated or isolated or a refuge from noise will be provided if the space is required to be manned. Ear protectors will be provided for personnel required to enter such spaces, if necessary.

(3) Ships will be constructed to reduce onboard noise and to protect personnel from the noise in accordance with the Code on noise levels on board ships, adopted by the Maritime Safety Committee by resolution MSC.337(91), as may be amended by the IMO, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of Article VIII of the present Convention concerning the amendment procedures applicable to the annex other than chapter I. For the purpose of this regulation, although the Code on noise levels on board ships is treated as a mandatory instrument, recommendatory parts as specified in chapter I of the Code will be treated as non-mandatory, provided that amendments to such recommendatory parts are adopted by the Maritime Safety Committee in accordance with its Rules of Procedure.

(4) Notwithstanding the requirements of paragraph 1, this regulation does not apply to types of ships listed in paragraph 1.3.4 of the Code on noise levels on board ships.

16. Lifting appliances and anchor handling winches

(1) Application

(a) Unless expressly provided otherwise, this regulation will apply to lifting appliances and anchor handling winches, and loose gear utilized with the lifting appliances and the anchor handling winches.

(b) Notwithstanding the above, this regulation does not apply to:

(i) lifting appliances on ships certified as MODUs

(ii) lifting appliances used on offshore construction ships, such as pipe/cable laying/repair or offshore installation vessels, including ships for decommissioning work, which comply with standards acceptable to the Director General

(iii) integrated mechanical equipment for opening and closing hold hatch covers; and

(iv) life-saving launching appliances complying with the International Life-Saving Appliance (LSA) Code.

(c) The Director General will determine to what extent the provisions of Sub-rule (2)(a) and (2)(d) do not apply to lifting appliances which have a safe working load below 1,000 kg.

(2) Design, construction and installation

(a) Lifting appliances installed on or after 1 January 2026 will be

(i) designed, constructed and installed in accordance with the requirements of a classification society which is recognized by the Director General in accordance with the provisions of regulation XI-1/1 of SOLAS or standards acceptable to the Director General which provide an equivalent level of safety; and

(ii) load tested and thoroughly examined after installation and before being taken into use for the first time and after repairs, modifications or alterations of major character.

(b) Anchor handling winches installed on or after 1 January 2026 will be designed, constructed, installed and tested to the satisfaction of the Director General, based on the Guidelines developed by the IMO.

(c) Lifting appliances installed on or after 1 January 2026 will be permanently marked and provided with documentary evidence for the safe working load (SWL).

(d) Lifting appliances installed before 1 January 2026 will be tested and thoroughly examined, based on the Guidelines developed by the IMO and comply with Sub-rule (2)(c) no later than the date of the first renewal survey on or after 1 January 2026.

(e) Anchor handling winches installed before 1 January 2026 will be tested and thoroughly examined, based on the Guidelines developed by the

IMO no later than the date of the first renewal survey on or after 1 January 2026.

(3) Maintenance, operation, inspection and testing

All lifting appliances and anchor handling winches, regardless of installation date, and all loose gear utilized with any lifting appliances and anchor handling winches, will be operationally tested, thoroughly examined, inspected, operated and maintained, based on the Guidelines developed by the IMO.

(4) Inoperative lifting appliances and anchor handling winches

Except as provided in regulation I/11(c), while all reasonable steps will be taken to maintain lifting appliances, anchor handling winches and loose gear to which this regulation applies in working order, malfunctions of that equipment will not be assumed as making the ship unseaworthy or as a reason for delaying the ship in ports, provided that action has been taken by the master to take the inoperative lifting appliance or anchor handling winch into account in planning and executing a safe voyage.

CHAPTER-III

SUBDIVISION AND STABILITY

17. General.-

(1) The damage stability requirements in chapter-I through chapter-II will apply to cargo ships of 80 m in length (L) and upwards but will exclude those cargo ships which are shown to comply with subdivision and damage stability regulations in other instruments developed by the IMO.

(2) The Director General may, for a particular ship or group of ships, accept alternative methodologies if it is satisfied that at least the same degree of safety as represented by these rules is achieved. The Director General upon allowing such alternative methodologies will communicate to the IMO the particulars thereof.

(3) Ships will be as efficiently subdivided as is possible having regard to the nature of the service for which they are intended. The degree of subdivision will vary with the subdivision length (Ls) of the ship and with the service, in such manner that the highest degree of subdivision corresponds with the ships of greatest subdivision length (Ls), primarily engaged in the carriage of passengers.

(4) Where it is proposed to fit decks, inner skins or longitudinal bulkheads of sufficient tightness to seriously restrict the flow of water, Director General will

be satisfied that proper consideration is given to beneficial or adverse effects of such structures in the calculations.

CHAPTER-IV

Stability of cargo ships

18. Intact stability information-

(1) Every cargo ship having a length (L) of 24 m and upwards, will be inclined upon its completion. The lightship displacement and the longitudinal, transverse and vertical position of its centre of gravity will be determined. In addition to any other applicable requirements of the present regulations, ships having a length of 24 m and upwards will as a minimum comply with the requirements of part A of the 2008 IS Code.

(2) The Director General may allow the inclining test of an individual cargo ship to be dispensed with, provided basic stability data are available from the inclining test of a sister ship and it is shown to the satisfaction of the Director General that reliable stability information for the exempted ship can be obtained from such basic data, as required by Sub-rule (1) . A weight survey will be carried out upon completion and the ship will be inclined whenever, in comparison with the data derived from the sister ship, a deviation from the lightship displacement exceeding 1% for ships of 160 m or more in length and 2% for ships of 50 m or less in length and as determined by linear interpolation for intermediate lengths or a deviation from the lightship longitudinal center of gravity exceeding 0.5% of L is found.

(3) The Director General may also allow the inclining test of an individual ship or class of ships especially designed for the carriage of liquids or ore in bulk to be dispensed with when reference to existing data for similar ships clearly indicates that, due to the ship's proportions and arrangements more than sufficient metacentric height will be available in all probable loading conditions.

(4) Where any alterations are made to a ship so as to materially affect the stability information supplied to the master, amended stability information will be provided. If necessary, the ship will be re-inclined. The ship will be re-inclined if anticipated deviations exceed one of the values specified in sub-rule (5).

(5) At periodical intervals not exceeding five years, a lightweight survey will be carried out on all passenger ships to verify any changes in lightship displacement and longitudinal center of gravity. The ship will be re-inclined whenever, in comparison with the approved stability information, a deviation

from the lightship displacement exceeding 2% or a deviation of the longitudinal center of gravity exceeding 1% of L is found or anticipated.

(6) Every ship will have scales of draughts marked clearly at the bow and stern. In the case where the draught marks are not located where they are easily readable, or operational constraints for a particular trade make it difficult to read the draught marks, then the ship will also be fitted with a reliable draught indicating system by which the bow and stern draughts can be determined.

19. Stability information to be supplied to the master-

(1) The master will be supplied with such information satisfactory to the Director General as is necessary to enable him by rapid and simple processes to obtain accurate guidance as to the stability of the ship under varying conditions of service. A copy of the stability information will be furnished to the Director General.

(2) The information should include:

(a) curves or tables of minimum operational metacentric height (GM) and maximum permissible trim versus draught which assures compliance with the intact and damage stability requirements, alternatively corresponding curves or tables of the maximum allowable vertical center of gravity (KG) versus draught, or with the equivalents of either of these curves or table;

(b) instructions concerning the operation of cross-flooding arrangements; and

(c) all other data and aids which might be necessary to maintain the required intact stability and stability after damage.

(3) The intact and damage stability information required by Sub-rule (2) will be presented as consolidated data and encompass the full operating range of draught and trim. Applied trim values will coincide in all stability information intended for use on board. Information not required for determination of stability and trim limits should be excluded from this information.

(4) If the damage stability is calculated in accordance with rule 20 to rule 24 and, if applicable, with rule 25, a stability limit curve is to be determined using linear interpolation between the minimum required GM assumed for each of the three draughts ds, dp and dl. When additional subdivision indices are calculated for different trims, a single envelope curve based on the minimum values from these calculations will be presented. When it is intended to develop curves of maximum permissible KG it will be ensured that the resulting maximum KG curves correspond with a linear variation of GM.

(5) As an alternative to a single envelope curve, the calculations for additional trims may be carried out with one common GM for all of the trims assumed at each subdivision draught. The lowest values of each partial index As, Ap and Al across these trims will then be used in the summation of the attained subdivision index A according to rule 22. This will result in one GM limit curve based on the GM used at each draught. A trim limit diagram showing the assumed trim range will be developed.

(6) When curves or tables of minimum operational metacentric height (GM) versus draught are not appropriate, the master should ensure that the operating condition does not deviate from a studied loading condition or verify by calculation that the stability criteria are satisfied for this loading condition.

20. **Required subdivision index R**.-

(1) The subdivision of a ship is considered sufficient if the attained subdivision index A, determined in accordance with rule 21, is not less than the required subdivision index R calculated in accordance with this rule and if, in addition, the partial indices As, Ap and Al are not less than 0.5R for cargo ships.

(2) For all ships to which the damage stability requirements of this chapter apply, the degree of subdivision to be provided will be determined by the required subdivision index R, as follows:

(a) In the case of cargo ships greater than 100 m in length (Ls):

$$R = 1 - \frac{128}{L_s + 152}$$

(b) In the case of cargo ships not less than 80 m in length (Ls) and not greater than 100 m in length (Ls):

$$R = 1 - \left[\frac{1}{1+\frac{L_S}{100}\times\frac{R_O}{1-R_0}}\right]$$

Where Ro is the value R as calculated in accordance with the formula in clause(a).

21. **Attained subdivision index A** .-

(1) The attained subdivision index A is obtained by the summation of the partial indices As, Ap and Al, (weighted as shown) calculated for the draughts ds, dp and dl defined in Part I rule 2 in accordance with the following formula:

$$A = 0.4A_S + 0.4A_P + 0.2A_I$$

Each partial index is a summation of contributions from all damage cases taken in consideration, using the following formula:

$$A = \sum(p_i \times s_i)$$

where:

i represents each compartment or group of compartments under consideration,

pi accounts for the probability that only the compartment or group of compartments under consideration may be flooded, disregarding any horizontal subdivision, as defined in rule 22,

si accounts for the probability of survival after flooding the compartment or group of compartments under consideration, and includes the effect of any horizontal subdivision, as defined in rule 23.

(2) As a minimum, the calculation of A will be carried out at the level trim for the deepest subdivision draught ds and the partial subdivision draught dp. The estimated service trim may be used for the light service draught dl. If, in any anticipated service condition within the draught range from ds to dl, the trim variation in comparison with the calculated trims is greater than 0.5% of L, one or more additional calculations of A are to be performed for the same draughts but including sufficient trims to ensure that, for all intended service conditions, the difference in trim in comparison with the reference trim used for one calculation will be not more than 0.5% of L. Each additional calculation of A will comply with rule 20 sub-rule(1).

(3) When determining the positive righting lever (GZ) of the residual stability curve in the intermediate and final equilibrium stages of flooding, the displacement used should be that of the intact loading condition. All calculations should be done with the ship freely trimming.

(4) The summation indicated by the above formula will be taken over the ship's subdivision length (Ls) for all cases of flooding in which a single compartment or two or more adjacent compartments are involved. In the case of unsymmetrical arrangements, the calculated A value should be the mean value obtained from calculations involving both sides. Alternatively, it should be taken as that corresponding to the side which evidently gives the least favourable result.

(5) Wherever wing compartments are fitted, contribution to the summation indicated by the formula will be taken for all cases of flooding in which wing compartments are involved. Additionally, cases of simultaneous flooding of a wing compartment or group of compartments and the adjacent inboard compartment or group of compartments, but excluding damage of transverse

extent greater than one half of the ship breadth B, may be added. For the purpose of this rule, transverse extent is measured inboard from ship's side, at right angles to the centreline at the level of the deepest subdivision draught.

(6) In the flooding calculations carried out according to the rules, only one breach of the hull and only one free surface need to be assumed. The assumed vertical extent of damage is to extend from the baseline upwards to any watertight horizontal subdivision above the waterline or higher. However, if a lesser extent of damage will give a more severe result; such extent is to be assumed.

(7) If pipes, ducts or tunnels are situated within the assumed extent of damage, arrangements are to be made to ensure that progressive flooding cannot thereby extend to compartments other than those assumed flooded. However, the Director General may permit minor progressive flooding if it is demonstrated that its effects can be easily controlled and the safety of the ship is not impaired.

22. **Calculation of the factor pi**.-

(1) The factor pi for a compartment or group of compartments will be calculated in accordance with (1), (2) and (3) using the following notations:

j = the aftmost damage zone number involved in the damage starting with No.1 at the stern;
n = the number of adjacent damage zones involved in the damage;
k = is the number of a particular longitudinal bulkhead as barrier for transverse penetration in a damage zone counted from shell towards the centre line. The shell has k = 0;
x1 = the distance from the aft terminal of Ls to the aft end of the zone in question;
x2 = the distance from the aft terminal of Ls to the forward end of the zone in question;
b = the mean transverse distance in metres measured at right angles to the centreline at the deepest subdivision loadline between the shell and an assumed vertical plane extended between the longitudinal limits used in calculating the factor pi and which is a tangent to, or common with, all or part of the outermost portion of the longitudinal bulkhead under consideration. This vertical plane will be so orientated that the mean transverse distance to the shell is a maximum, but not more than twice the least distance between the plane and the shell. If the upper part of a longitudinal bulkhead is below the deepest subdivision loadline the vertical plane used for determination of b

is assumed to extend upwards to the deepest subdivision waterline. In any case, b is not to be taken greater than B/2.

If the damage involves a single zone only:

$$p_i = p(x1_j, x2_j) \times [r(x1_j, x2_j, b_k) - r(x1_{j,} x2_{j,} b_{k-1})]$$

If the damage involves two adjacent zones:

$$\begin{aligned} p_i = p(x1_j, x2_{j+1}) \times [r(x1_j, x2_{j+1}, b_k) - r\left((x1_j, x2_{j+1}, b_{k-1})\right] - p(x1_j, x2_j) \\ \times [r(x1_{j+1}, x2_j, b_k) - r\left((x1_j, x2_j, b_{k-1})\right] - p(x1_{j+1}, x2_{j+1}) \\ \times [r(x1_{j+1}, x2_{j+1}, b_k) - r\left((x1_{j+1}, x2_{j+1}, b_{k-1})\right] \end{aligned}$$

If the damage involves three or more adjacent zones:

$$\begin{aligned} &p_i = p(x1_j, x2_{j+n-1}) \times [r(x1_j, x2_{j+n-1}, b_k) - r\left((x1_j, x2_{j+n-1}, b_{k-1})\right] - \\ &p(x1_j, x2_{j+n-2}) \times [r(x1_j, x2_{j+n-2}, b_k) - r\left((x1_j, x2_{j+n-2}, b_{k-1})\right] - \\ &p(x1_{j+1}, x2_{j+n-1}) \times [r(x1_{j+1}, x2_{j+n-1}, b_k) - r\left((x1_{j+1}, x2_{j+n-1}, b_{k-1})\right] + \\ &p(x1_{j+1}, x2_{j+n-2}) \times [r(x1_{j+1}, x2_{j+n-2}, b_k) - r\left((x1_{j+1}, x2_{j+n-2}, b_{k-1})\right] \end{aligned}$$

and where r(x1, x2, b0) = 0

(2) The factor *p*(*x1*, *x2*) is to be calculated according to the following formulae:

Overall normalized max damage length: *J*max = 10/33
Knuckle point in the distribution: *Jkn* = 5/33
Cumulative probability at *Jkn*: *pk* = 11/12
Maximum absolute damage length: *l*max = 60 m
Length where normalized distribution ends: *L** = 260 m
Probability density at *J* = 0:

$$b_o = 2\left(\frac{p_k}{J_{kn}} - \frac{1 - p_k}{J_{max} - J_{kn}}\right)$$

When $L_s \leq L^*$:

$$J_m = \min\left\{J_{max}, \frac{l_{max}}{L_s}\right\}$$

$$J_k = \frac{J_m}{2} + \frac{1 - \sqrt{1 + (1 - 2p_k)b_o J_m + {}^1\!/_4\, b_o^2 J_m^2}}{b_o}$$

$b_{12} = b_o$

When $L_s > L^*$:

$$J_m^* = \min\left\{J_{max}, \frac{l_{max}}{L^*}\right\}$$

$$J_k^* = \frac{J_m^*}{2} + \frac{1 - \sqrt{1 + (1 - 2p_k)b_o J_m^* + {}^1\!/_4\, b_o^2 J_m^{*2}}}{b_o}$$

$$J_m = \frac{J_m^* . L^*}{L_s}$$

$$J_k = \frac{J_k^* . L^*}{L_s}$$

$$b_{12} = 2\left(\frac{p_k}{J_k} - \frac{1 - p_k}{J_m - J_k}\right)$$

$$b_{11} = 4\left(\frac{1 - p_k}{(J_m - J_k)J_k} - 2\frac{p_k}{J_k^2}\right)$$

$$b_{21} = -2\left(\frac{1 - p_k}{(J_m - J_k)^2}\right)$$

$$b_{22} = -b_{21} J_m$$

The non-dimensional damage length:

$$J = \frac{(x2 - x1)}{L_s}$$

The normalized length of a compartment or group of compartments:
J_n is to be taken as the lesser of J and J_m.

(3) Where neither limit of the compartment or group of compartments under consideration coincides with the aft or forward terminals:

$J \leq J_k$:

$$p(x1, x2) = p_1 = \frac{1}{6}J^2(b_{11}J + 3b_{12})$$

$J > J_k$:

$$p(x1, x2) = p_2$$
$$= -\frac{1}{3}b_{11}J_k^3 + \frac{1}{2}(b_{11}J - b_{12})J_k^2 + b_{12}JJ_k - \frac{1}{3}b_{21}(J_n^3 - J_k^3)$$
$$+ \frac{1}{2}(b_{21}J - b_{22})(J_n^2 - J_k^2) + b_{22}J(J_n - J_k)$$

(4) Where the aft limit of the compartment or group of compartments under consideration coincides with the aft terminal or the forward limit of the compartment or group of compartments under consideration coincides with the forward terminal:

$J \leq J_k$:

$$p(x1, x2) = \frac{1}{2}(p_1 + J)$$

$J \leq J_k$:

$$p(x1, x2) = \frac{1}{2}(p_2 + J)$$

(5) Where the compartment or groups of compartments considered extends over the entire subdivision length (L_s):

p (x1, x2) = 1

1The factor r(x1, x2, b) will be determined by the following formulae:

$$r(x1, x2, b) = 1 - (1 - C)[1 - \frac{G}{p(x1, x2)}]$$

Where,

$$C = 12J_b(-45J_b + 4)$$

where,

$$J_b = \frac{b}{15B}$$

(6) Where the compartment or groups of compartments considered extends over the entire subdivision length (L_s);

$$G = G_1 = \frac{1}{2}b_{11}J_b^2 + b_{12}J_b$$

(7) Where neither limit of the compartment or group of compartments under consideration coincides with the aft or forward terminals:

$$G = G_2 = -\frac{1}{3}b_{11}J_0^3 + \frac{1}{2}(b_{11}J - b_{12})J_o^2 + b_{12}JJ_o$$

$$J_o = \min(J, J_b)$$

(8) Where the aft limit of the compartment or group of compartments under consideration coincodes with the aft terminal or the forward limit of the compartment or group of compartments under consideration coincides with the forward terminal:

$$G = \frac{1}{2}(G_2 + G_1.J)$$

23. Calculation of the factor si

(1) The factor *si* will be determined for each case of assumed flooding, involving a compartment or group of compartments, in accordance with the following notations and the provisions in this regulation.

θ_e is the equilibrium heel angle in any stage of flooding, in degrees;

θ_v is the angle, in any stage of flooding, where the righting lever becomes negative, or the angle at which an opening incapable of being closed weathertight becomes submerged;
GZ_{max} is the maximum positive righting lever, in metres, up to the angle θv;
Range is the range of positive righting levers, in degrees, measured from the angle θ_e. The positive range is to be taken up to the angle θv;
Flooding stage is any discrete step during the flooding process, including the stage before equalization (if any) until final equilibrium has been reached.

The factor *si*, for any damage case at any initial loading condition, *di*, will be obtained from the formula:

$$s_i = minimum\ \{s_{intermediate}, i\ or\ s_{final}, i\ s_{mom}, i\}$$

where:
$S_{intermediate}$,i is the probability to survive all intermediate flooding stages until the final equilibrium stage, and is calculated in accordance with Sub-rule (2)
S_{final}l,i is the probability to survive in the final equilibrium stage of flooding. It is calculated in accordance with Sub-rule (3)
*s*mom,i is the probability to survive heeling moments, and is calculated in accordance with Sub-rule (4)

(2) cargo ships fitted with cross-flooding devices, the factor $S_{intermediate,I}$ is taken as the least of the s-factors obtained from all flooding stages including the stage before equalization, if any, and is to be calculated as follows:

$$S_{intermediate,i} = \left[\frac{GZ_{max}}{0.05} \times \frac{Range}{7}\right]^{1/4}$$

where GZ_{max} is not to be taken as more than 0.05 m and Range as not more than 7°. $s_{intermediate,i}$ = 0, if the intermediate heel angle 30° for cargo ships.

For cargo ships not fitted with cross-flooding devices the factor $s_{intermediate,i}$ is taken as unity, except if the Director General considers that the stability in intermediate stages of flooding may be insufficient, it should require further investigation thereof.

(3) The factor *s*final,i will be obtained from the formula:

$$s_{final,i} = K\left[\frac{GZ_{max}}{TGZ_{max}} \times \frac{Range}{TRange}\right]^{\frac{1}{4}}$$

where,

GZ_{max} is not to be taken as more than TGZ_{max};
Range is not to be taken as more than TRange;
TGZ_{max} = 0.12 m, otherwise;
TRange = 16º, otherwise;

$k = 1\ if\ \theta_e \leq \theta_{min}$
$k = 0\ if\ \theta_e \geq \theta_{min}$

$k = \sqrt{\frac{\theta_{max} - \theta_e}{\theta_{max} - \theta_{min}}}$ otherwise,

θ_{min} 25° for cargo ships; and
θ_{max} 30° for cargo ships.

(4) The factor *s*mom,i is applicable only to passenger ships (for cargo ships *s*mom,i will be taken as unity) and will be calculated at the final equilibrium from the formula:

$$s_{mom,i} = \frac{(GZ_{max} - 0.04) \times Displacement}{M_{heel}}$$

where:

Displacement is the intact displacement at the subdivision draught;

*M*heel is the maximum assumed heeling moment as calculated in accordance with
Sub-rule (4) clause (a) and,

(a) *s*mom,i ≤ 1The heeling moment *M*heel is to be calculated as follows:

*M*heel = maximum { *M*wind or *M*Survivalcraft}

(i) *M*wind is the maximum assumed wind force acting in a damage situation:

*M*wind = (*P* · *A* · *Z*) / 9.806 (tm)
where:
P = 120 N/ m2;
A = projected lateral area above waterline;
Z = distance from centre of lateral projected area above waterline to *T*/2; and
T = ship's draught, *di*.

(b) *M*Survivalcraft is the maximum assumed heeling moment due to the launching of all

fully loaded davit-launched survival craft on one side of the ship. It will be calculated using the following assumptions:

(i) all lifeboats and rescue boats fitted on the side to which the ship has heeled after having sustained damage will be assumed to be swung out fully loaded and ready for lowering;

(ii) for lifeboats which are arranged to be launched fully loaded from the stowed position, the maximum heeling moment during launching will be taken;

(iii) a fully loaded davit-launched liferaft attached to each davit on the side to which the ship has heeled after having sustained damage will be assumed to be swung out ready for lowering;

(iv) persons not in the life-saving appliances which are swung out will not provide either additional heeling or righting moment; and

(v) life-saving appliances on the side of the ship opposite to the side to which the ship has heeled will be assumed to be in a stowed position.

(5) Unsymmetrical flooding is to be kept to a minimum consistent with the efficient arrangements. Where it is necessary to correct large angles of heel, the means adopted will, where practicable, be self-acting, but in any case where controls to equalization devices are provided they will be operable from above the Freeboard deck. These fittings together with their controls will be acceptable to the Director General. Suitable information concerning the use of equalization devices will be supplied to the master of the ship.

(a) Tanks and compartments taking part in such equalization will be fitted with air pipes or equivalent means of sufficient cross-section to ensure that the flow of water into the equalization compartments is not delayed.

(b) In all cases, si is to be taken as zero in those cases where the final waterline, taking into account sinkage, heel and trim, immerses:

(i) the lower edge of openings through which progressive flooding may take place and such flooding is not accounted for in the calculation of factor *si*. Such openings will include air-pipes, ventilators and openings which are closed by means of weathertight doors or hatch covers; and

(c) The factor *si* is to be taken as zero if, taking into account sinkage, heel and trim, any of the following occur in any intermediate stage or in the final stage of flooding:

(i) immersion of any vertical escape hatch in the freeboard deck intended for compliance with chapter III;

(ii) any controls intended for the operation of watertight doors, equalization devices, valves on piping or on ventilation ducts intended to maintain the integrity of watertight bulkheads from above the freeboard deck become inaccessible or inoperable;

(iii) immersion of any part of piping or ventilation ducts carried through a watertight boundary that is located within any compartment included in damage cases contributing to the attained index *A*, if not fitted with watertight means of closure at each boundary.

(d) However, where compartments assumed flooded due to progressive flooding are taken into account in the damage stability calculations multiple values of *s*intermediate,i may be calculated assuming equalization in additional flooding phases.

(e) Except as provided in sub-rule (5)(c), openings closed by means of watertight manhole covers and flush scuttles, small watertight hatch covers, remotely operated sliding watertight doors, side scuttles of the non-opening type as well as watertight access doors and hatch covers required to be kept closed at sea need not be considered.

(6) Where horizontal watertight boundaries are fitted above the waterline under consideration the s-value calculated for the lower compartment or group of compartments will be obtained by multiplying the value as determined in Sub-rule (1)(a) by the reduction factor *vm* according to Sub-rule (6) clause (a), which represents the probability that the spaces above the horizontal subdivision will not be flooded.

(a) The factor *vm* will be obtained from the formula:

$$v_m = v\left(H_{j,n,m,}d\right) - v(H_{j,n,m-1,}d)$$

where:
Hj, *n*, *m* is the least height above the baseline, in metres, within the longitudinal range of *x1*(*j*)...*x2*(*j*+*n*-1) of the *m*th horizontal boundary which is assumed to limit the
vertical extent of flooding for the damaged compartments under consideration;

Hj, *n*, *m*-1 is the least height above the baseline, in metres, within the longitudinal
range of *x1*(*j*)...*x2*(*j*+*n*-1) of the (*m*-1)th horizontal boundary which is assumed to limit
the vertical extent of flooding for the damaged compartments under consideration;

j signifies the aft terminal of the damaged compartments under consideration;
m represents each horizontal boundary counted upwards from the waterline under
consideration;
d is the draught in question as defined in Part I Sub-rule (2); and
x1 and *x2* represent the terminals of the compartment or group of compartments
considered in rule 22.

(7) The factors $v\left(H_{j,n,m,}d\right)$ and $v(H_{j,n,m-1,}d)$will be obtained from the formulae:

$v(H,d) = 0.8\frac{(H-d)}{7.8}$ if (*Hm*-*d*) is less than, or equal to, 7.8 m;

$v(H,d) = 0.8 + 0.2\frac{(H-d)-7.8}{4.7}$ in all other cases

where:
v(*Hj*, *n*, *m*, *d*) is to be taken as 1, if *Hm* coincides with the uppermost watertight boundary of the ship within the range (*x*1(*j*)...*x*2(*j*+*n*-1)), and
v(*Hj*, *n*, *0*, *d*) is to be taken as 0.
In no case is *vm* to be taken as less than zero or more than 1.

(8) In general, each contribution *dA* to the index *A* in the case of horizontal subdivisions is obtained from the formula:

$$dA = p_i \cdot [v_1 \cdot s_{min1} + (v_2 - v_1) \cdot s_{min2} + \ldots + /(1-v_{m-1}) \cdot s_{minm}]$$

where:
vm = the *v*-value calculated in accordance with paragraph 11.6.1;
*s*min = the least *s*-factor for all combinations of damages obtained when the assumed damage extends from the assumed damage height *Hm* downwards.

24. **Permeability** .-

(1) For the purpose of the subdivision and damage stability calculations of the rules, the permeability of each general compartment or part of a compartment will be as follows:

Spaces	Permeability
Appropriated to stores	0.60
Occupied by accommodation	0.95
Occupied by machinery	0.85
Void spaces	0.95
Intended for liquids	0 or 0.95*

[*Whichever results in the more severe requirement.]

(2) For the purpose of the subdivision and damage stability calculations of the rules, the permeability of each cargo compartment or part of a compartment will be as follows:

Spaces	Permeability at draught ds	Permeability at draught dp	Permeability at draught dl
Dry Cargo spaces	0.70	0.80	0.95
Container spaces	0.70	0.80	0.95
Ro-ro spaces	0.90	0.90	0.95
Cargo liquids	0.70	0.80	0.95

(3) Other figures for permeability may be used if substantiated by calculations.

25. **Double bottoms in cargo ships other than tankers** .-

(1) A double bottom will be fitted extending from the collision bulkhead to the afterpeak bulkhead, as far as this is practicable and compatible with the design and proper working of the ship.

(2) Where a double bottom is required to be fitted the inner bottom will be continued out to the ship's sides in such a manner as to protect the bottom to the turn of the bilge. Such protection will be deemed satisfactory if the inner bottom is not lower at any part than a plane parallel with the keel line and which is located not less than a vertical distance h measured from the keel line, as calculated by the formula:

$$h = B/20$$

However, in no case is the value of h to be less than 760 mm, and need not be taken as more than 2,000 mm.

(3) Small wells constructed in the double bottom in connection with drainage arrangements will not extend downward more than necessary. The vertical distance from the bottom of such a well to a plane coinciding with the keel line will not be less than h/2 or 500 mm, whichever is greater, or compliance with Sub-rule (7) of this regulation will be shown for that part of the ship.

Other wells (e.g. for lubricating oil under main engines) may be permitted by the Director General if satisfied that the arrangements give protection equivalent to that afforded by a double bottom complying with this rule.

(a) For a cargo ship of 80 m in length and upwards, proof of equivalent protection is to be shown by demonstrating that the ship is capable of withstanding bottom damages as specified in Sub-rule (7). Alternatively, wells for lubricating oil below main engines may protrude into the double bottom below the boundary line defined by the distance h provided that the vertical distance between the well bottom and a plane coinciding with the keel line is not less than h/2 or 500 mm, whichever is greater.

(b) For cargo ships of less than 80 m in length the arrangements will provide a level of safety to the satisfaction of the Director Geneal.

(4) A double bottom need not be fitted in way of watertight tanks, including dry tanks of moderate size, provided the safety of the ship is not impaired in the event of bottom or side damage.

(5) Any part of a cargo ship of 80 m in length and upwards that is not fitted with a double bottom in accordance with Sub-rule (1), (4), as specified in Sub-rule (2), will be capable of withstanding bottom damages, as specified in Sub-rule (7), in that part of the ship. For cargo ships of less than 80 m in length the alternative arrangements will provide a level of safety to the satisfaction of the Director General.

(6) In the case of unusual bottom arrangements in a cargo ship of 80 m in length and upwards, it will be demonstrated that the ship is capable of withstanding bottom damages as specified in Sub-rule (7). For cargo ships of less than 80 m in length the alternative arrangements will provide a level of safety to the satisfaction of the Director General.

(7) Compliance with sub-rule (3), (3)(b)(i), sub-rules (5) or (6) is to be achieved by demonstrating that si, when calculated in accordance with rule 23, is not less than 1 for all service conditions when subject to a bottom damage assumed at any position along the ship's bottom and with an extent specified in clause (b) below for the affected part of the ship:

(a) Flooding of such spaces will not render emergency power and lighting, internal communication, signals or other emergency devices inoperable in other parts of the ship.

(b) Assumed extent of damage will be as follows:

	For 0.3 from the forward Perpendicular of the ship	Any other part of the ship
Longitudinal extent	1/3 $L^{2/3}$ or 14.5 m whichever is less	1/3 $L^{2/3}$ or 14.5 m whichever is less
Transverse extent	B/6 or 10 m, whichever is less	B/6 or 5 m whichever is less
Vertical extent measure from the keel line	B/20, to be taken not less than 0.76 m and not more than 2 m	B/20, to be taken not less than 0.76 m and not more than 2 m

(c) If any damage of a lesser extent than the maximum damage specified in clause (b) would result in a more severe condition, such damage should be considered.

26. **Construction of watertight bulkheads** .-

(1) Each watertight subdivision bulkhead, whether transverse or longitudinal, will be constructed having scantlings as specified in Part 1 Rule 2 Sub-rule (110). In all cases, watertight subdivision bulkheads will be capable of supporting at least the pressure due to a head of water up to the Freeboard deck.

(2) Steps and recesses in watertight bulkheads will be as strong as the bulkhead at the place where each occurs.

27. **Initial testing of watertight bulkheads, etc.** .-

(1) Testing watertight spaces not intended to hold liquids and cargo holds intended to hold ballast by filling them with water is not compulsory. When testing by filling with water is not carried out, a hose test will be carried out where practicable. This test will be carried out in the most advanced stage of the fitting out of the ship. Where a hose test is not practicable because of possible damage to machinery, electrical equipment insulation or outfitting items, it may be replaced by a careful visual examination of welded connections, supported where deemed necessary by means such as a dye penetrant test or an ultrasonic leak test or an equivalent test. In any case a thorough inspection of the watertight bulkheads will be carried out.

(2) The forepeak, double bottom (including duct keels) and inner skins will be tested with water to a head corresponding to the requirements of sub-rule (1) of rule 26.

(3) Tanks which are intended to hold liquids, and which form part of the watertight subdivision of the ship, will be tested for tightness and structural strength with water to a head corresponding to its design pressure. The water head is in no case to be less than the top of the air pipes or to a level of 2.4 m above the top of the tank, whichever is the greater.

(4) The tests referred to in sub-rules (2) and (3) are for the purpose of ensuring that the subdivision structural arrangements are watertight and are not to be regarded as a test of the fitness of any compartment for the storage of oil fuel or for other special purposes for which a test of a superior character may be required depending on the height to which the liquid has access in the tank or its connections.

28. **Peak and machinery space bulkheads, shaft tunnels, etc**.-

(1) A collision bulkhead will be fitted which will be watertight up to the freeboard deck. This bulkhead will be located at a distance from the forward perpendicular of not less than 0.05L or 10 m, whichever is the less, and, except as may be permitted by the Director General, not more than 0.08L or 0.05L + 3 m, whichever is the greater.

(2) The ship will be so designed that si calculated in accordance with rule 23 will not be less than 1 at the deepest subdivision draught loading condition, level trim or any forward trim loading conditions, if any part of the ship forward of the collision bulkhead is flooded without vertical limits.

(3) Where any part of the ship below the waterline extends forward of the forward perpendicular, e.g. a bulbous bow, the distances stipulated in sub-rule (1) will be measured from a point either:

(a) at the mid-length of such extension;

(b) at a distance 0.015L forward of the forward perpendicular; or

(c) at a distance 3 m forward of the forward perpendicular,

whichever gives the smallest measurement.

(4) The bulkhead may have steps or recesses provided they are within the limits prescribed in sub-rule (1) or (3).

(5) No doors, manholes, access openings, ventilation ducts or any other openings will be fitted in the collision bulkhead below the bulkhead deck.

(6) Except as provided in clause(b) of sub-rule(6), the collision bulkhead may be pierced below the freeboard deck by not more than one pipe for dealing with fluid in the forepeak tank, provided that the pipe is fitted with a screw-down valve capable of being operated from above the freeboard deck, the valve chest being secured inside the forepeak to the collision bulkhead. The Director General may, however, authorize the fitting of this valve on the after side of the collision bulkhead provided that the valve is readily accessible under all service conditions and the space in which it is located is not a cargo space. All valves will be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable.

(a) For ships constructed on or after 1 January 2024, except as provided in Sub-rule 6(b), the collision bulkhead may be pierced below the the freeboard deck by not more than one pipe for dealing with fluid in the forepeak tank, provided that the pipe is fitted with a remotely controlled valve capable of being operated from above the freeboard deck. The valve will be normally closed. If the remote-control system fail during operation of the valve, the valve will close automatically or be capable of being closed manually from a position above the freeboard deck. The valve will be located at the collision bulkhead on either the forward or aft side, provided the space on the aft side is not a cargo space. The valve will be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable.

(b) If the forepeak is divided to hold two different kinds of liquids, the Director General may allow the collision bulkhead to be pierced below the bulkhead deck by two pipes, each of which is fitted as required by clause (a) of sub-

rule (6), provided the Director General is satisfied that there is no practical alternative to the fitting of such a second pipe and that, having regard to the additional subdivision provided in the forepeak, the safety of the ship is maintained.

(7) Where a long forward superstructure is fitted the collision bulkhead will be extended weathertight to the deck next above the Freeboard deck. The extension need not be fitted directly above the bulkhead below provided that all parts of the extension, including any part of the ramp attached to it are located within the limits prescribed in sub-rule (1) or (3) with the exception permitted by sub-rule (8) and that the part of the deck which forms the step is made effectively weathertight. The extension will be so arranged as to preclude the possibility of the bow door causing damage to it in the case of damage to, or detachment of, a bow door.

(8) Where bow doors are fitted and a sloping loading ramp forms part of the extension of the collision bulkhead above the Freeboard deck the ramp will be weathertight over its complete length. In cargo ships the part of the ramp which is more than 2.3 m above the freeboard deck may extend forward of the limit specified in sub-rule (1) or (3). Ramps not meeting the above requirements will be disregarded as an extension of the collision bulkhead.

(9) The number of openings in the extension of the collision bulkhead above the freeboard deck will be restricted to the minimum compatible with the design and normal operation of the ship. All such openings will be capable of being closed weathertight.

(10) Bulkheads will be fitted separating the machinery space from cargo and accommodation spaces forward and aft and made watertight up to the Freeboard deck. An afterpeak bulkhead will also be fitted and made watertight up to the freeboard deck. The afterpeak bulkhead may, however, be stepped below the freeboard deck, provided the degree of safety of the ship as regards subdivision is not thereby diminished

(11) In all cases stern tubes will be enclosed in watertight spaces of moderate volume. In cargo ships other measures to minimize the danger of water penetrating into the ship in case of damage to stern tube arrangements may be taken at the discretion of the Director General.

29. **Openings in watertight bulkheads and internal decks in cargo ships**. -

(1) The number of openings in watertight subdivisions is to be kept to a minimum compatible with the design and proper working of the ship. Where penetrations

of watertight bulkheads and internal decks are necessary for access, piping, ventilation, electrical cables, etc., arrangements are to be made to maintain the watertight integrity. The Director General may permit relaxation in the water tightness of openings above the freeboard deck, provided that it is demonstrated that any progressive flooding can be easily controlled and that the safety of the ship is not impaired.

(2) Doors provided to ensure the watertight integrity of internal openings which are used while at sea are to be sliding watertight doors capable of being remotely closed from the bridge and are also to be operable locally from each side of the bulkhead. Indicators are to be provided at the control position showing whether the doors are open or closed, and an audible alarm is to be provided at the door closure. The power, control and indicators are to be operable in the event of main power failure. Particular attention is to be paid to minimizing the effect of control system failure. Each power-operated sliding watertight door will be provided with an individual hand-operated mechanism. It will be possible to open and close the door by hand at the door itself from both sides.

(3) Access doors and access hatch covers normally closed at sea, intended to ensure the watertight integrity of internal openings, will be provided with means of indication locally and on the bridge showing whether these doors or hatch covers are open or closed. A notice is to be affixed to each such door or hatch cover to the effect that it is not to be left open.

(4) Watertight doors or ramps of satisfactory construction may be fitted to internally subdivide large cargo spaces, provided that the Director General is satisfied that such doors or ramps are essential. These doors or ramps may be hinged, rolling or sliding doors or ramps, but will not be remotely controlled. Should any of the doors or ramps be accessible during the voyage, they will be fitted with a device which prevents unauthorized opening.

(5) Other closing appliances which are kept permanently closed at sea to ensure the watertight integrity of internal openings will be provided with a notice which is to be affixed to each such closing appliance to the effect that it is to be kept closed. Manholes fitted with closely bolted covers need not be so marked.

30. **Openings in the shell plating below the freeboard deck of cargo ships**. -

(1) The number of openings in the shell plating will be reduced to the minimum compatible with the design and proper working of the ship.

(2) The arrangement and efficiency of the means for closing any opening in the shell plating will be consistent with its intended purpose and the position in which it is fitted and generally to the satisfaction of the Director General.

(3) Subject to the requirements of the International Convention on Load Lines in force, no sidescuttle will be fitted in such a position that its sill is below a line drawn parallel to the bulkhead deck at side and having its lowest point 2.5% of the breadth of the ship above the deepest subdivision draught, or 500 mm, whichever is the greater.

(a) All sidescuttles the sills of which are below the freeboard deck of cargo ships, as permitted by of sub-rule(3), will be of such construction as will effectively prevent any person opening them without the consent of the master of the ship.

(4) Efficient hinged inside deadlights so arranged that they can be easily and effectively closed and secured watertight, will be fitted to all sidescuttles except that abaft one eighth of the ship's length from the forward perpendicular and above a line drawn parallel to the bulkhead deck at side and having its lowest point at a height of 3.7 m plus 2.5% of the breadth of the ship above the deepest subdivision draught .

(5) No sidescuttles will be fitted in any spaces which are appropriated exclusively to the carriage of cargo or coal.

Sidescuttles may, however, be fitted in spaces appropriated alternatively to the carriage of cargo or passengers, but they will be of such construction as will effectively prevent any person opening them or their deadlights without the consent of the master.

(6) Automatic ventilating sidescuttles will not be fitted in the shell plating below the freeboard deck of cargo ships without the special sanction of the Director General.

(7) The number of scuppers, sanitary discharges and other similar openings in the shell plating will be reduced to the minimum either by making each discharge serve for as many as possible of the sanitary and other pipes, or in any other satisfactory manner.

(8) All inlets and discharges in the shell plating will be fitted with efficient and accessible arrangements for preventing the accidental admission of water into the ship.

Subject to the requirements of the International Convention on Load Lines in force and MS Act (Load line rules 2025), and except as provided in clause(c)

of sub-rule(8), each separate discharge led through the shell plating from spaces below the freeboard deck of cargo ships will be provided with either one automatic non-return valve fitted with a positive means of closing it from above the bulkhead deck or with two automatic non-return valves without positive means of closing, provided that the inboard valve is situated above the deepest subdivision draught and is always accessible for examination under service conditions. Where a valve with positive means of closing is fitted, the operating position above the bulkhead deck will always be readily accessible and means will be provided for indicating whether the valve is open or closed.

The requirements of the International Convention on Load Lines in force will apply to discharges led through the shell plating from spaces above the freeboard deck of cargo ships.

Machinery space, main and auxiliary sea inlets and discharges in connection with the operation of machinery will be fitted with readily accessible valves between the pipes and the shell plating or between the pipes and fabricated boxes attached to the shell plating. In manned machinery spaces the valves may be controlled locally and will be provided with indicators showing whether they are open or closed.

Moving parts penetrating the shell plating below the deepest subdivision draught will be fitted with a watertight sealing arrangement acceptable to the Director General. The inboard gland will be located within a watertight space of such volume that, if flooded, the bulkhead deck will not be submerged. The Director General may require that if such compartment is flooded, essential or emergency power and lighting, internal communication, signals or other emergency devices must remain available in other parts of the ship.

All shell fittings and valves required by this rule will be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable. All pipes to which this rule refers will be of steel or other equivalent material to the satisfaction of the Director General.

(9) Gangway, cargo and fuelling ports fitted below the freeboard deck of cargo ships will be watertight and in no case be so fitted as to have their lowest point below the deepest subdivision draught.

(10) For ships constructed on or after 1 January 2024, cargo ports and other similar openings (e.g. gangway and fuelling ports) in the side of ships below the freeboard deck of cargo ships will be fitted with doors so designed as to ensure the same watertightness and structural integrity as the surrounding shell plating. Unless otherwise granted by the Director General, these openings will open outwards. The number of such openings will be the minimum compatible with the design and proper working of the ship. In no case will these openings be so fitted as to have their lowest point below the deepest subdivision draught.

31. **External openings in cargo ships** .-

(1) All external openings leading to compartments assumed intact in the damage analysis, which are below the final damage waterline, are required to be watertight.

(2) External openings required to be watertight in accordance with sub-rule (1) will, except for cargo hatch covers, be fitted with indicators on the bridge.

(3) Openings in the shell plating below the deck limiting the vertical extent of damage will be fitted with a device that prevents unauthorized opening if they are accessible during the voyage.

(4) Other closing appliances which are kept permanently closed at sea to ensure the watertight integrity of external openings will be provided with a notice affixed to each appliance to the effect that it is to be kept closed. Manholes fitted with closely bolted covers need not be so marked.

32. Construction and initial tests of watertight Closures-

(1) In all ships:

(a) the design, materials and construction of all watertight doors, sidescuttles, gangway and cargo ports, valves, pipes, ash-chutes and rubbish-chutes referred to in these rules will be to the satisfaction of the Director General;

(b) such valves, doors and mechanisms will be suitably marked to ensure that they may be properly used to provide maximum safety; and

(c) the frames of vertical watertight doors will have no groove at the bottom in which dirt might lodge and prevent the door closing properly.

(2) Watertight doors and hatches will be tested by water pressure to the maximum head of water they might sustain in a final or intermediate stage of flooding. For cargo ships not covered by damage stability requirements, watertight doors and hatches will be tested by water pressure to a head of water measured from the lower edge of the opening to one meter above the freeboard deck. Where

testing of individual doors and hatches is not carried out because of possible damage to insulation or outfitting items, testing of individual doors and hatches may be replaced by a prototype pressure test of each type and size of door or hatch with a test pressure corresponding at least to the head required for the individual location. The prototype test will be carried out before the door or hatch is fitted. The installation method and procedure for fitting the door or hatch on board will correspond to that of the prototype test. When fitted on board, each door or hatch will be checked for proper seating between the bulkhead, the frame and the door or between deck, the coaming and the hatch.

33. **Construction and initial tests of watertight decks, trunks, etc**

(1) Watertight decks, trunks, tunnels, duct keels and ventilators will be of the same strength as watertight bulkheads at corresponding levels. The means used for making them watertight, and the arrangements adopted for closing openings in them, will be to the satisfaction of the Director General. Watertight ventilators and trunks will be carried at least up to the freeboard deck in cargo ships.

(2) After completion, a hose or flooding test will be applied to watertight decks and a hose test to watertight trunks, tunnels and ventilators.

34. Loading of Ships

(1) On completion of loading of the ship and prior to its departure, the master will determine the ship's trim and stability and also ascertain and record that the ship is upright and in compliance with stability criteria in relevant regulations. The determination of the ship's stability will always be made by calculation or by ensuring that the ship is loaded according to one of the precalculated loading conditions within the approved stability information. The Director General may accept the use of an electronic loading and stability computer or equivalent means for this purpose.

(2) Water ballast should not in general be carried in tanks intended for oil fuel. In ships in which it is not practicable to avoid putting water in oil fuel tanks, oily-water separating equipment to the satisfaction of the Director General will be fitted, or other alternative means, such as discharge to shore facilities, acceptable to the Director General will be provided for disposing of the oily-water ballast.

(3) The provisions of this regulation are without prejudice to the provisions of the International Convention for the Prevention of Pollution from Ships in force.

CHAPTER- V

Stability management

35. **Damage control information** .-

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

(2) General precautions to be included will consist of a listing of equipment, conditions, and operational procedures, considered by the Director General to be necessary to maintain watertight integrity under normal ship operations.

(3) Specific precautions to be included will consist of a listing of elements (i.e. closures, security of cargo, sounding of alarms, etc.) considered by the Director General to be vital to the survival of the ship, passengers and crew.

(4) In case of ships to which damage stability requirements of part III-A apply, damage stability information will provide the master a simple and easily understandable way of assessing the ship's survivability in all damage cases involving a compartment or group of compartments.

36. Prevention and control of water ingress, etc.

(1) All watertight doors will be kept closed during navigation except that they may be opened during navigation as specified in Sub-rule (3). Any door which is opened in accordance with this rule will be ready to be immediately closed.

(2) Watertight doors located below the freeboard deck of cargo ships having a maximum clear opening width of more than 1.2 m will be kept closed during navigation, except for limited periods when absolutely necessary as determined by the Director General.

(3) A watertight door may be opened during navigation to permit the passage of passengers or crew, or when work in the immediate vicinity of the door necessitates it being opened. The door must be immediately closed when transit through the door is complete or when the task which necessitated it being open is finished. The Director General will authorize that such a watertight door may be opened during navigation only after careful consideration of the impact on ship operations and survivability taking into account guidance issued by the IMO. A watertight door permitted to be opened

during navigation will be clearly indicated in the ship's stability information and will always be ready to be immediately closed.

(4) Portable plates on bulkheads will always be in place before the voyage commences, and will not be removed during navigation except in case of urgent necessity at the discretion of the master. The necessary precautions will be taken in replacing them to ensure that the joints are watertight. Power-operated sliding watertight doors permitted in machinery spaces will be closed before the voyage commences and will remain closed during navigation except in case of urgent necessity at the discretion of the master.

(5) Watertight doors fitted in watertight bulkheads dividing cargo spaces on tween decks will be closed before the voyage commences and will be kept closed during navigation. The time at which such doors are opened or closed will be recorded in such logbook as may be prescribed by the Director General.

(6) For ships subject to the provisions of regulation 1.1.1.1 of SOLAS and constructed before 1 January 2024, gangway, cargo and fuelling ports fitted below the bulkhead deck of passenger ships and the freeboard deck of cargo ships will be effectively closed and secured watertight before the voyage commences, and will be kept closed during navigation.

(7) For ships constructed on or after 1 January 2024, gangway, cargo and fuelling ports fitted below the bulkhead deck of passenger ships and the freeboard deck of cargo ships and all watertight hatches will be effectively closed and secured watertight before the voyage commences, and will be kept closed during navigation. However, the master may permit a watertight hatch to be opened during navigation for a limited period of time sufficient to permit passage or for access. It will then be closed.

(8) The following doors, located above the freeboard deck of cargo ships, will be closed and locked before the voyage commences and will remain closed and locked until the ship is at its next berth:

(a) cargo loading doors in the shell or the boundaries of enclosed superstructures;

(b) bow visors fitted in positions as indicated in Sub-rule (8)(a)

(c) cargo loading doors in the collision bulkhead; and

(d) ramps forming an alternative closure to those defined Sub-rule (8)(a) to (c) inclusive

(9) Provided that where a door cannot be opened or closed while the ship is at the berth such a door may be opened or left open while the ship approaches or draws away from the berth, but only so far as may be necessary to enable the door to be immediately operated. In any case, the inner bow door must be kept closed.

(10) Notwithstanding the requirements of Sub-rule (8), the Director General may authorize that particular doors can be opened at the discretion of the master, if necessary for the operation of the ship or the embarking and disembarking of passengers when the ship is at safe anchorage and provided that the safety of the ship is not impaired.

(11) The master will ensure that an effective system of supervision and reporting of the closing and opening of the doors referred to in Sub-rule (8) is implemented.

(12) The master will ensure, before any voyage commences, that an entry in such log-book as may be prescribed by the Director General is made of the time the doors specified in Sub-rule (13) are closed and the time at which particular doors are opened in accordance with Sub-rule (14)

(13) Hinged doors, portable plates, sidescuttles, gangway, cargo and bunkering ports and other openings, which are required by these regulations to be kept closed during navigation, will be closed before the voyage commences. The time at which such doors are opened and closed (if permissible under these regulations) will be recorded in such log-book as may be prescribed by the Director General.

(14) Where in a between-deck, the sills of any of the sidescuttles referred to in rule 30 Sub-rule(3)(a) are below a line drawn parallel to the freeboard deck at side of cargo ships, and having its lowest point 1.4 m plus 2.5% of the breadth of the ship above the water when the voyage commences, all the sidescuttles in that between-deck will be closed watertight and locked before the voyage commences, and they will not be opened before the ship arrives at the next port. In the application of this paragraph the appropriate allowance for fresh water may be made when applicable.

(a) The time at which such sidescuttles are opened in port and closed and locked before the voyage commences will be recorded in such log-book as may be prescribed by the Director General.

(b) For any ship that has one or more sidescuttles so placed that the requirements of Sub-rule(14) would apply when it was floating at its deepest

subdivision draught, the Director General may indicate the limiting mean draught at which these sidescuttles will have their sills above the line drawn parallel to the freeboard deck at side of cargo ships, and having its lowest point 1.4 m plus 2.5% of the breadth of the ship above the waterline corresponding to the limiting mean draught, and at which it will therefore be permissible for the voyage to commence without them being closed and locked and to be opened during navigation on the responsibility of the master. In tropical zones as defined in the International Convention on Load Lines, 1966, this limiting draught may be increased by 0.3 m.

(15) Sidescuttles and their deadlights which will not be accessible during navigation will be closed and secured before the voyage commences.

(16) If cargo is carried in spaces referred to in Rule 30 Sub-rule(5)(b), the sidescuttles and their deadlights will be closed watertight and locked before the cargo is shipped and the time at which such scuttles and deadlights are closed and locked will be recorded in such log-book as may be prescribed by the Director General.

37. **Prevention and control of water ingress, etc. in cargo ships**-

(1) Openings in the shell plating below the deck limiting the vertical extent of damage will be kept permanently closed while at sea.

(2) Notwithstanding the requirements of sub-rule (3), the Director General may authorize that particular doors may be opened at the discretion of the master, if necessary for the operation of the ship and provided that the safety of the ship is not impaired.

(3) Watertight doors or ramps fitted internally subdivide large cargo spaces will be closed before the voyage commences and will be kept closed during navigation. The time at which such doors are opened or closed will be recorded in such log-book as may be prescribed by the Director General.

(4) The use of access doors and hatch covers intended to ensure the watertight integrity of internal openings will be authorized by the officer of the watch.

38. **Water level detectors on single hold cargo ships other than bulk carriers**.-

(1) Single hold cargo ships other than bulk carriers constructed before 1 January 2007 will comply with the requirements of this rule not later than 31 December 2009.

(2) Ships having a length (L) of less than 80 m, or 100 m if constructed before 1 July 1998, and a single cargo hold below the freeboard deck or cargo holds

below the freeboard deck which are not separated by at least one bulkhead made watertight up to that deck, will be fitted in such space or spaces with water level detectors.

(3) The water level detectors required by sub-rule (2) will:

(a) give an audible and visual alarm at the navigation bridge when the water level above the inner bottom in the cargo hold reaches a height of not less than 0.3 m, and another when such level reaches not more than 15% of the mean depth of the cargo hold; and

(b) be fitted at the aft end of the hold, or above its lowest part where the inner bottom is not parallel to the designed waterline. Where webs or partial watertight bulkheads are fitted above the inner bottom, Director General's may require the fitting of additional detectors.

(4) The water level detectors required by sub-rule (2) need not be fitted in ships complying regulation XII/12 of SOLAS, or in ships having watertight side compartments each side of the cargo hold length extending vertically at least from inner bottom to freeboard deck.

39. Water level detectors on Multiple holds cargo ships other than bulk carriers and tankers-

(1) Multiple hold cargo ships other than bulk carriers and tankers constructed on or after 1 January 2024 will be fitted with water level detectors in each cargo hold intended for dry cargoes. Water level detectors are not required for cargo holds located entirely above the freeboard deck.

(2) The water level detectors required by Sub-rule (1) will

(a) give audible and visual alarms at the navigation bridge, one when the water level above the bottom of the cargo hold reaches a height of not less than 0.3 m, and another at a height not less than 15% of the depth of the cargo hold but not more than 2 m; and

(b) be fitted at the aft end of the cargo holds. For cargo holds which are occasionally used for water ballast, an alarm overriding device may be installed. The visual alarms will clearly discriminate between the two different water levels detected in each hold.

(3) As an alternative to the water level detector at a height of not less than 0.3 m as per Sub-rule (2) (a) a bilge level sensor serving the bilge pumping arrangements required by rule (50) and installed in the cargo hold bilge wells or other suitable location is considered acceptable, subject to:

(a) the fitting of the bilge level sensor at a height of not less than 0.3 m at the aft end of the cargo hold; and

(b) the bilge level sensor giving audible and visual alarm at the navigation bridge which is clearly distinctive from the alarm given by the other water level detector fitted in the cargo hold.

CHAPTER- VI

MACHINERY INSTALLATIONS

40. **General**.-

(1) The machinery, boilers and other pressure vessels, associated piping systems and fittings will be of a design and construction adequate for the service for which they are intended and will 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 will have regard to 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) The Director General will give special consideration to the reliability of single essential propulsion components and may require a separate source of propulsion power sufficient to give the ship a navigable speed, especially in the case of unconventional arrangements.

(3) Means will be provided whereby normal operation of propulsion machinery can be sustained or restored even though one of the essential auxiliaries becomes inoperative. Special consideration will be given to the malfunctioning of:

(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;

(j) the hydraulic, pneumatic or electrical means for control in main propulsion machinery including controllable pitch propellers.

However, the Director General, having regard to overall safety considerations, may accept a partial reduction in propulsion capability from normal operation.

(4) Means will be provided to ensure that the machinery can be brought into operation from the dead ship condition without external aid.

(5) All boilers, all parts of machinery, all steam, hydraulic, pneumatic and other systems and their associated fittings which are under internal pressure will be subjected to appropriate tests including a pressure test before being put into service for the first time.

(6) Main propulsion machinery and all auxiliary machinery essential to the propulsion and the safety of the ship will, as fitted in the ship, be designed to operate when the ship is upright and when inclined at any angle of list up to and including 15° either way under static conditions and 22.5° under dynamic conditions (rolling) either way and simultaneously inclined dynamically (pitching) 7.5° by bow or stern. The Director General may permit deviation from these angles, taking into consideration the type, size and service conditions of the ship.

(7) Provision will be made to facilitate cleaning, inspection and maintenance of main propulsion and auxiliary machinery including boilers and pressure vessels

(8) Special consideration will be given to the design, construction and installation of propulsion machinery systems so that any mode of their vibrations will not cause undue stresses in this machinery in the normal operating ranges.

(9) Non-metallic expansion joints in piping systems, if located in a system which penetrates the ship’s side and both the penetration and the non-metallic expansion joint are located below the deepest load waterline, will be inspected as part of the surveys prescribed in MS Act 2025 (Draft merchant shipping Survey, Audit and certification rule) and replaced as necessary, or at an interval recommended by the manufacturer.

(10) Operating and maintenance instructions and engineering drawings for ship machinery and equipment essential to the safe operation of the ship will be written in a language understandable by those officers and crew members who are required to understand such information in the performance of their duties.

(11) Location and arrangement of vent pipes for fuel oil service, settling and lubrication oil tanks will be such that in the event of a broken vent pipe this will not directly lead to the risk of ingress of seawater splashes or rainwater. Two

fuel oil service tanks for each type of fuel used on board necessary for propulsion and vital systems or equivalent arrangements will be provided on each new ship, with a capacity of at least 8 h at maximum continuous rating of the propulsion plant and normal operating load at sea of the generator plant. Note: This sub-rule applies only to ships constructed on or after 1 July 1998.

41. **Machinery**. –

(1) Where risk from over speeding of machinery exists, means will be provided to ensure that the safe speed is not exceeded.

(2) Where main or auxiliary machinery including pressure vessels or any parts of such machinery are subject to internal pressure and may be subject to dangerous overpressure, means will be provided where practicable to protect against such excessive pressure.

(3) All gearing and every shaft and coupling used for transmission of power to machinery essential for the propulsion and safety of the ship or for the safety of persons on board will be so designed and constructed that they will withstand the maximum working stresses to which they may be subjected in all service conditions, and due consideration will be given to the type of engines by which they are driven or of which they form part.

(4) Internal combustion engines of a cylinder diameter of 200 mm or a crankcase volume of 0.6 m^3 and above will be provided with crankcase explosion relief valves of a suitable type with sufficient relief area. The relief valves will be arranged or provided with means to ensure that discharge from them is so directed as to minimize the possibility of injury to personnel.

(5) Main turbine propulsion machinery and, where applicable, main internal combustion propulsion machinery and auxiliary machinery will be provided with automatic shutoff arrangements in the case of failures such as lubricating oil supply failure which could lead rapidly to complete breakdown, serious damage or explosion.

(6) The Director General may permit provisions for overriding automatic shutoff devices.

42. **Means of going astern**-

(1) Sufficient power for going astern will be provided to secure proper control of the ship in all normal circumstances.

(2) The ability of the machinery to reverse the direction of thrust of the propeller in sufficient time, and so to bring the ship to rest within a reasonable distance from maximum ahead service speed, will be demonstrated and recorded.

(3) The stopping times, ship headings and distances recorded on trials, together with the results of trials to determine the ability of ships having multiple propellers to navigate and manoeuvre with one or more propellers inoperative, will be available on board for the use of the master or designated personnel.

(4) Where the ship is provided with supplementary means for manoeuvring or stopping, the effectiveness of such means will be demonstrated and recorded as referred to in sub-rules (2) and (3).

43. **Steering gear**-

(1) Unless expressly provided otherwise, every ship will be provided with a main steering gear and an auxiliary steering gear to the satisfaction of the Director General. The main steering gear and the auxiliary steering gear will be so arranged that the failure of one of them will not render the other one inoperative.

(2) All the steering gear components and the rudder stock will be of sound and reliable construction to the satisfaction of the Director General. Special consideration will be given to the suitability of any essential component which is not duplicated. Any such essential component will, where appropriate, utilize antifriction bearings such as ball-bearings, roller-bearings or sleeve-bearings which will be permanently lubricated or provided with lubrication fittings.

The design pressure for calculations to determine the scantlings of piping and other steering gear components subjected to internal hydraulic pressure will be at least 1.25 times the maximum working pressure to be expected under the operational conditions specified in clause(b) of sub-rule (3), taking into account any pressure which may exist in the low-pressure side of the system. At the discretion of the Director General, fatigue criteria will be applied for the design of piping and components, taking into account pulsating pressures due to dynamic loads.

Relief valves will be fitted to any part of the hydraulic system which can be isolated and in which pressure can be generated from the power source or from external forces. The setting of the relief valves will not exceed the design pressure. The valves will be of adequate size and so arranged as to avoid an undue rise in pressure above the design pressure.

(3) The main steering gear and rudder stock will be:

(a) of adequate strength and capable of steering the ship at maximum ahead service speed which will be demonstrated;

(b) capable of putting the rudder over from 35° on one side to 35° on the other side with the ship at its deepest seagoing draught and running ahead at maximum ahead service speed and, under the same conditions, from 35° on either side to 30° on the other side in not more than 28 s;

Where it is impractical to demonstrate compliance with this requirement during sea trials with the ship at its deepest seagoing draught and running ahead at the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch, ships regardless of date of construction may demonstrate compliance with this requirement by one of the following methods:

(i) During sea trials the ship is at even keel and the rudder fully submerged whilst running ahead at the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch; or

(ii) where full rudder immersion during sea trials cannot be achieved, an appropriate ahead speed will be calculated using the submerged rudder blade area in the proposed sea trial loading condition. The calculated ahead speed will result in a force and torque applied to the main steering gear which is at least as great as if it was being tested with the ship at its deepest seagoing draught and running ahead at the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch; or

(iii) the rudder force and torque at the sea trial loading condition have been reliably predicted and extrapolated to the full load condition. The speed of the ship will correspond to the number of maximum continuous revolutions of the main engine and maximum design pitch of the propeller.

(c) operated by power where necessary to meet the requirements of clause (b) of sub-rule (3) and in any case when the Director General requires a rudder stock of over 120 mm diameter in way of the tiller, excluding strengthening for navigation in ice; and

(d) so designed that they will not be damaged at maximum astern speed; however, this design requirement need not be proved by trials at maximum astern speed and maximum rudder angle.

(4) The auxiliary steering gear will be:

(a) of adequate strength and capable of steering the ship at navigable speed and of being brought speedily into action in an emergency;

(b) capable of putting the rudder over from 15° on one side to 15° on the other side in not more than 60 s with the ship at its deepest seagoing draught and running ahead at one half of the maximum ahead service speed or 7 knots, whichever is the greater; and

where it is impractical to demonstrate compliance with this requirement during sea trials with the ship at its deepest seagoing draught and running ahead at one half of the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch or 7 knots, whichever is greater, ships regardless of date of construction, including those constructed before 1 January 2009, may demonstrate compliance with this requirement by one of the following methods:

(i) During sea trials the ship is at even keel and the rudder fully submerged whilst running ahead at one half of the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch or 7 knots, whichever is greater: or

(ii) where full rudder immersion during sea trials cannot be achieved, an appropriate ahead speed will be calculated using the submerged rudder blade area in the proposed sea trial loading condition. The calculated ahead speed will result in a force and torque applied to the auxiliary steering gear which is at least as great as if it was being tested with the ship at its deepest seagoing draught and running ahead at one half of the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch or 7 knots, whichever is greater; or

(iii) the rudder force and torque at the sea trial loading condition have been reliably predicted and extrapolated to the full load condition; and

(c) operated by power where necessary to meet the requirements of clause(b) of sub-rule (4) and in any case when the Director General requires a rudder stock of over 230 mm diameter in way of the tiller, excluding strengthening for navigation in ice.

(5) Main and auxiliary steering gear power units will be:

(a) arranged to restart automatically when power is restored after a power failure; and

(b) capable of being brought into operation from a position on the navigation bridge. In the event of a power failure to any one of the steering gear power units, an audible and visual alarm will be given on the navigation bridge.

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

(i) The main steering gear is capable of operating the rudder as required by clause(b) of sub-rule (3) while operating with all power units;

(ii) 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.

(b) The Director General may, until 1 September 1986, accept the fitting of a steering gear which has a proven record of reliability but does not comply with the requirements of sub- clause (iii) of clause (a) of sub-rule (6) for a hydraulic system.

(c) Steering gears, other than of the hydraulic type, will achieve standards equivalent to the requirements of this sub-rule to the satisfaction of the Director General.

(7) Steering gear control will be provided:

(a) for the main steering gear, both on the navigation bridge and in the steering gear compartment;

(b) where the main steering gear is arranged in accordance with sub-rule (6), by two independent control systems, both operable from the navigation bridge. This does not require duplication of the steering wheel or steering lever. Where the control system consists of a hydraulic telemotor, a second independent system need not be fitted, except in a tanker, chemical tanker or gas carrier of 10,000 tons gross tonnage and upwards;

(c) for the auxiliary steering gear, in the steering gear compartment and, if power-operated, it will also be operable from the navigation bridge and will be independent of the control system for the main steering gear.

(8) Any main and auxiliary steering gear control system operable from the navigation bridge will comply with the following:

(a) if electric, it will 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) means will be provided in the steering gear compartment for disconnecting any control system operable from the navigation bridge from the steering gear it serves;

(c) the system will be capable of being brought into operation from a position on the navigation bridge;

(d) in the event of a failure of electrical power supply to the control system, an audible and visual alarm will be given on the navigation bridge; and

(e) short circuit protection only will be provided for steering gear control supply circuits.

(9) The electrical power circuits and the steering gear control systems with their associated components, cables and pipes required by this rule and by rule 44 will be separated as far as is practicable throughout their length.

(10) A means of communication will be provided between the navigation bridge and the steering gear compartment.

(11) The angular position of the rudder will:

(a) if the main steering gear is power-operated, be indicated on the navigation bridge. The rudder angle indication will be independent of the steering gear control system;

(b) be recognizable in the steering gear compartment.

(12) Hydraulic power-operated steering gear will be provided with the following:

(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 to give the earliest practicable indication of hydraulic fluid leakage. Audible and visual alarms will be given on the navigation bridge and in the machinery space where they can be readily observed; and

(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 will 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 and will be provided with a contents gauge.

(13) The steering gear compartments will be:

(a) readily accessible and, as far as practicable, separated from machinery spaces; and

(b) provided with suitable arrangements to ensure working access to steering gear machinery and controls. These arrangements will include handrails and gratings or other non slip surfaces to ensure suitable working conditions in the event of hydraulic fluid leakage.

(14) Where the rudder stock is required to be over 230 mm diameter in way of the tiller, excluding strengthening for navigation in ice, an alternative power supply, sufficient at least to supply the steering gear power unit which complies with the requirements of clause(b) of sub-rule(4)and also its associated control system and the rudder angle indicator, will be provided automatically, within 45 s, either from the emergency source of electrical power or from an independent source of power located in the steering gear compartment. This independent source of power will be used only for this purpose. In every ship of 10,000 tons gross tonnage and upwards, the alternative power supply will have a capacity for at least 30 min of continuous operation and in any other ship for at least 10 min.

(15) In every tanker, chemical tanker or gas carrier of 10,000 tons gross tonnage and upwards and in every other ship of 70,000 tons gross tonnage and upwards, the main steering gear will comprise two or more identical power units complying with the provisions of sub-rule (6).

(16) Every tanker, chemical tanker or gas carrier of 10,000 tons gross tonnage and upwards will, subject to sub-rule (17), comply with the following:

(a) the main steering gear will be so arranged that in the event of loss of steering capability due to a single failure in any part of one of the power actuating systems of the main steering gear, excluding the tiller, quadrant or components serving the same purpose, or seizure of the rudder actuators, steering capability will be regained in not more than 45 s after the loss of one power actuating system;

(b) the main steering gear will comprise either:

(i) two independent and separate power actuating systems, each capable of meeting the requirements of clause(b) of sub-rule (3); or

(ii) at least two identical power actuating systems which, acting simultaneously in normal operation, will be capable of meeting the requirements of clause(b) of sub-rule(3); Where necessary to comply with this requirement, interconnection of hydraulic power actuating systems will be provided. Loss of hydraulic fluid from one system will be capable of being detected and the defective system automatically isolated so that the other actuating system or systems will remain fully operational;

(c) steering gears other than of the hydraulic type will achieve equivalent standards.

(17) For tankers, chemical tankers or gas carriers of 10,000 tons gross tonnage and upwards, but of less than 100,000 tonnes deadweight, solutions other than those set out in sub-rule (16), which need not apply the single failure criterion to the rudder actuator or actuators, may be permitted provided that an equivalent safety standard is achieved and that:

(a) following loss of steering capability due to a single failure of any part of the piping system or in one of the power units, steering capability will be regained within 45 s; and

(b) where the steering gear includes only a single rudder actuator, special consideration is given to stress analysis for the design including fatigue analysis and fracture mechanics analysis, as appropriate, to the material used, to the installation of sealing arrangements and to testing and inspection and to the provision of effective maintenance. In consideration of the foregoing, the Director General will adopt rules which include the provisions of the Guidelines for acceptance of non-duplicated rudder actuators for tankers, chemical tankers and gas carriers of 10,000 gross tonnage and above but less than 100,000 tonnes deadweight, adopted by the IMO.

(18) For a tanker, chemical tanker or gas carrier of 10,000 gross tonnage and upwards, but less than 70,000 tonnes deadweight, the Director General may, until 1 September 1986, accept a steering gear system with a proven record of reliability which does not comply with the single failure criterion required for a hydraulic system in sub-rule (16).

(19) Every tanker, chemical tanker or gas carrier of 10,000 gross tonnage and upwards, constructed before 1 September 1984, will comply, not later than 1 September 1986, with the following:

(a) the requirements of clause (a) of sub-rule (7), clause (b) and (d) of sub-rule (8), sub-rules (10) and (11), clause (b) and (c) of sub-rule (12), clause (b) of sub-rule (13);

(b) two independent steering gear control systems will be provided each of which can be operated from the navigation bridge. This does not require duplication of the steering wheel or steering lever;

(c) if the steering gear control system in operation fails, the second system will be capable of being brought into immediate operation from the navigation bridge; and

(d) each steering gear control system, if electric, will be served by its own separate circuit supplied from the steering gear power circuit 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.

(20) In addition to the requirements of sub-rule (19), in every tanker, chemical tanker or gas carrier of 40,000 gross tonnage and upwards, constructed before 1 September 1984, the steering gear will, not later than 1 September 1988, be so arranged that, in the event of a single failure of the piping or of one of the power units, steering capability can be maintained or the rudder movement can be limited so that steering capability can be speedily regained. This will be achieved by:

(a) an independent means of restraining the rudder; or

(b) fast-acting valves which may be manually operated to isolate the actuator or actuators from the external hydraulic piping together with a means of directly refilling the actuators by a fixed independent power-operated pump and piping system; or

(c) an arrangement such that, where hydraulic power systems are interconnected, loss of hydraulic fluid from one system will be detected and the defective system isolated either automatically or from the navigation bridge so that the other system remains fully operational.

44. **Additional requirements for electric and electrohydraulic steering gear**-

(1) Means for indicating that the motors of electric and electro-hydraulic steering gear are running will be installed on the navigation bridge and at a suitable main machinery control position.

(2) Each electric or electro-hydraulic steering gear comprising one or more power units will be served by at least two exclusive circuits fed directly from the main

switchboard; however, one of the circuits may be supplied through the emergency switchboard. An auxiliary electric or electro-hydraulic steering gear associated with a main electric or electro-hydraulic steering gear may be connected to one of the circuits supplying this main steering gear. The circuits supplying an electric or electro-hydraulic steering gear will have adequate rating for supplying all motors which can be simultaneously connected to them and may be required to operate simultaneously.

(3) Short circuit protection and an overload alarm will be provided for such circuits and motors. Protection against excess current, including starting current, if provided, will be for not less than twice the full load current of the motor or circuit so protected, and will be arranged to permit the passage of the appropriate starting currents. Where a three-phase supply is used an alarm will be provided that will indicate failure of any one of the supply phases. The alarms required in this sub-rule will be both audible and visual and will be situated in a conspicuous position in the main machinery space or control room from which the main machinery is normally controlled and as may be required by rule 63.

(4) When in a ship of less than 16,000 gross tonnage an auxiliary steering gear which is required by rule 43 (4) (c) to be operated by power is not electrically powered or is powered by an electric motor primarily intended for other services, the main steering gear may be fed by one circuit from the main switchboard. Where such an electric motor primarily intended for other services is arranged to power such an auxiliary steering gear, the requirement of sub-rule (3) may be waived by the Director General if satisfied with the protection arrangement together with the requirements of clauses (a) and (b)of sub-rule(5)and clause(c) of sub-rule(7) of rule 43 applicable to auxiliary steering gear.

45. **Machinery controls**.-

(1) Main and auxiliary machinery essential for the propulsion and safety of the ship will be provided with effective means for its operation and control.

(2) Where remote control of propulsion machinery from the navigation bridge is provided and the machinery spaces are intended to be manned, the following will apply:

(a) the speed, direction of thrust and, if applicable, the pitch of the propeller will be fully controllable from the navigation bridge under all sailing conditions, including manoeuvring;

(b) the remote control will be performed, for each independent propeller, by a control device so designed and constructed that its operation does not require particular attention to the operational details of the machinery. Where multiple propellers are designed to operate simultaneously, they may be controlled by one control device;

(c) the main propulsion machinery will be provided with an emergency stopping device on the navigation bridge which will be independent of the navigation bridge control system;

(d) propulsion machinery orders from the navigation bridge will be indicated in the main machinery control room or at the manoeuvring platform as appropriate;

(e) remote control of the propulsion machinery will be possible only from one location at a time; at such locations interconnected control positions are permitted. At each location there will be an indicator showing which location is in control of the propulsion machinery. The transfer of control between the navigation bridge and machinery spaces will be possible only in the main machinery space or the main machinery control room. This system will include means to prevent the propelling thrust from altering significantly when transferring control from one location to another;

(f) it will be possible to control the propulsion machinery locally, even in the case of failure in any part of the remote control system;

(g) the design of the remote control system will be such that in case of its failure an alarm will be given. Unless the Director General considers it impracticable the preset speed and direction of thrust of the propellers will be maintained until local control is in operation;

(h) indicators will be fitted on the navigation bridge for:

  (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) an alarm will be provided on the navigation bridge and in the machinery space to indicate low starting air pressure which will be set at a level to permit further main engine starting operations. If the remote control system of the propulsion machinery is designed for automatic starting, the number of automatic consecutive attempts which fail to produce a start will be limited in order to safeguard sufficient starting air pressure for starting locally.

(3) Where the main propulsion and associated machinery, including sources of main electrical supply, are provided with various degrees of automatic or remote control and are under continuous manual supervision from a control room the arrangements and controls will be so designed, equipped and installed that the machinery operation will be as safe and effective as if it were under direct supervision; for this purpose rules 58 to 62 will apply as appropriate. Particular consideration will be given to protect such spaces against fire and flooding.

(4) In general, automatic starting, operational and control systems will include provisions for manually overriding the automatic controls. Failure of any part of such systems will not prevent the use of the manual override.

(5) Notwithstanding the requirements of Sub-rule (1) to (4), ships constructed on or after 1 July 1998 will comply with the following requirements:

(a) Main and auxiliary machinery essential for the propulsion, control and safety of the ship will be provided with effective means for its operation and control. All control systems essential for the propulsion, control and safety of the ship will be independent or designed such that failure of one system does not degrade the performance of another system."

(b) Where remote control of propulsion machinery from the navigating bridge is provided, the following will apply:

(i) the speed, direction of thrust and, if applicable, the pitch of the propeller will be fully controllable from the navigating bridge under all sailing conditions, including manoeuvring;

(ii) The control will be performed by a single control device for each independent propeller, with automatic performance of all associated services, including, where necessary, means of preventing overload of the propulsion machinery.

(iii) The main propulsion machinery will be provided with an emergency stopping device on the navigating bridge which will be independent of the navigating bridge control system.

(iv) Propulsion machinery orders from the navigation bridge will be indicated in the main machinery control room and at the manoeuvring platform.

(v) remote control of the propulsion machinery will be possible only from one location at a time; at such locations interconnected control positions are permitted. At each location there will be an indicator showing which location is in control of the propulsion machinery. The transfer of control

between the navigating bridge and machinery spaces will be possible only in the main machinery space or the main machinery control room. This system will include means to prevent the propelling thrust from altering significantly when transferring control from one location to another.

(vi) It will be possible to control the propulsion machinery locally, even in the case of failure in any part of the remote-control system. It will also be possible to control the auxiliary machinery, essential for the propulsion and safety of the ship, at or near the machinery concerned.

(vii) The design of the remote-control system will be such that in case of its failure an alarm will be given. Unless the Director General considers it impracticable the preset speed and direction of thrust of the propellers will be maintained until local control is in operation.

(viii) indicators will be fitted on the navigation bridge, the main machinery control room and at the manoeuvring platform, for:

- propeller speed and direction of rotation in the case of fixed pitch propellers; and
- propeller speed and pitch position in the case of controllable pitch propellers.

(ix) An alarm will be provided on the navigating bridge and in the machinery space to indicate low starting air pressure which will be set at a level to permit further main engine starting operations. If the remote-control system of the propulsion machinery is designed for automatic starting, the number of automatic consecutive attempts which fail to produce a start will be limited in order to safeguard sufficient starting air pressure for starting locally.

(c) Where the main propulsion and associated machinery, including sources of main electrical supply, are provided with various degrees of automatic or remote control and are under continuous manual supervision from a control room, the arrangements and controls will be so designed, equipped and installed that the machinery operation will be as safe and effective as if it were under direct supervision; for this purpose rules 58 to 62 will apply as appropriate. Particular consideration will be given to protect such spaces against fire and flooding.

(d) In general, automatic starting, operational and control systems will include provisions for manually overriding the automatic controls. Failure of any part of such systems will not prevent the use of the manual override.

(6) Ships constructed on or after 1 July 2004 will comply with the requirements of Sub-rule (1) to (5), as amended, as follows:

(a) a new subparagraph (j) is added to sub-rule (2) to read as follows:

"(j) automation systems will be designed in a manner which ensures that threshold warning of impending or imminent slowdown or shutdown of the propulsion system is given to the officer in charge of the navigational watch in time to assess navigational circumstances in an emergency. In particular, the systems will control, monitor, report, alert and take safety action to slow down or stop propulsion while providing the officer in charge of the navigational watch an opportunity to manually intervene, except for those cases where manual intervention will result in total failure of the engine and/or propulsion equipment within a short time, for example in the case of overspeed."

46. **Steam boilers and boiler feed systems** -

(1) Every steam boiler and every unfired steam generator will be provided with not less than two safety valves of adequate capacity. However, having regard to the output or any other features of any boiler or unfired steam generator, the Director General may permit only one safety valve to be fitted if it is satisfied that adequate protection against overpressure is thereby provided.

(2) Each oil-fired boiler which is intended to operate without manual supervision will have safety arrangements which shut off the fuel supply and give an alarm in the case of low water level, air supply failure or flame failure.

(3) Water tube boilers serving turbine propulsion machinery will be fitted with a high-water-level alarm.

(4) Every steam generating system which provides services essential for the safety of the ship, or which could be rendered dangerous by the failure of its feedwater supply, will be provided with not less than two separate feedwater systems from and including the feed pumps, noting that a single penetration of the steam drum is acceptable. Unless overpressure is prevented by the pump characteristics, means will be provided which will prevent over-pressure in any part of the systems.

(5) Boilers will be provided with means to supervise and control the quality of the feedwater. Suitable arrangements will be provided to preclude, as far as

practicable, the entry of oil or other contaminants which may adversely affect the boiler.

(6) Every boiler essential for the safety of the ship and designed to contain water at a specified level will be provided with at least two means for indicating its water level, at least one of which will be a direct reading gauge glass.

47. **Steam pipe systems**.-

(1) Every steam pipe and every fitting connected thereto through which steam may pass will be so designed, constructed and installed as to withstand the maximum working stresses to which it may be subjected.

(2) Means will be provided for draining every steam pipe in which dangerous water hammer action might otherwise occur.

(3) If a steam pipe or fitting may receive steam from any source at a higher pressure than that for which it is designed a suitable reducing valve, relief valve and pressure gauge will be fitted.

48. **Air pressure systems**.-

(1) In every ship means will be provided to prevent overpressure in any part of compressed air systems and wherever water jackets or casings of air compressors and coolers might be subjected to dangerous overpressure due to leakage into them from air pressure parts. Suitable pressure relief arrangements will be provided for all systems.

(2) The main starting air arrangements for main propulsion internal combustion engines will be adequately protected against the effects of backfiring and internal explosion in the starting air pipes.

(3) All discharge pipes from starting air compressors will lead directly to the starting air receivers, and all starting pipes from the air receivers to main or auxiliary engines will be entirely separate from the compressor discharge pipe system.

(4) Provision will be made to reduce to a minimum the entry of oil into the air pressure systems and to drain these systems.

49. **Ventilating systems in machinery spaces**.-

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

50. **Bilge Pumping arrangements in Cargo Ships**:

(1) This rule applies to ships constructed on or after 1 January, 2009.

(2) An efficient bilge pumping system will be provided, capable of pumping from and draining any watertight compartment other than a space permanently appropriated for the carriage of fresh water, water ballast, oil fuel or liquid cargo and for which other efficient means will be provided, under all practical conditions. Efficient means will be provided for draining water from insulated holds.

(3) Sanitary, ballast and general service pumps may be accepted as independent powered bilge pumps if fitted with necessary connections to the bilge pumping system.

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

(5) The arrangement of the bilge and ballast pumping system will be such as to prevent the possibility of water passing from the sea and from water ballast spaces into the cargo and machinery spaces, or from one compartment to another. Provision will be made to prevent any deep tank having bilge and ballast connections being inadvertently flooded from the sea when containing cargo or being discharged through a bilge pump when containing water ballast.

(6) The distribution boxes and manually operated valves in connection with the bilge pumping arrangements will be placed in accessible positions.

(7) Provision will be made for the drainage of enclosed cargo spaces situated on the freeboard deck of a cargo ship, provided that the Director general may permit the means of drainage to be dispensed with in any particular compartment of any ship or class of ship if it is satisfied that by reason of size or internal subdivision of those spaces the safety of the ship is not thereby impaired. For ships subject to the provisions of Chapter I Sub-rule (2), for the

special hazards associated with loss of stability when fitted with fixed pressure water-spraying fire-extinguishing systems refer to Rule 87 Sub-rule (6).

(8) Where the freeboard to the freeboard deck is such that the deck edge is immersed when the ship heels more than 5 degrees, then the drainage will be by scuppers of suitable size discharging directly overboard, where the scuppers will be as per International Convention on Load Lines in force.

(9) Where the freeboard is such that the edge of the bulkhead deck or the edge of the freeboard deck, is immersed when the ship heels 5 degree or less, the drainage of the enclosed spaces on the bulkhead deck or on the freeboard deck, will be led to a suitable space, or spaces, of adequate capacity, having a higher water level alarm and provided with suitable arrangements for discharge overboard and will also ensure that:

(a) the number, size and disposition of the scuppers are such as to prevent unreasonable accumulation of free water;

(b) the pumping arrangements required by this rule take account of the requirements for any fixed pressure water-spraying fire-extinguishing system;

(c) water contaminated with petrol or other dangerous substances is not drained to machinery spaces or other spaces where sources of ignition may be present; and

(d) where the enclosed cargo space is protected by a carbon dioxide fire-extinguishing system the deck scuppers are fitted with means to prevent the escape of the smothering gas.

(10) At least two power pumps connected to the main bilge system will be provided, one of which may be driven by the propulsion machinery. If the Director General is satisfied that the safety of the ship is not impaired, bilge pumping arrangements may be dispensed with in particular compartments.

51. **Communication between navigation bridge and machinery space**.-

(1) At least two independent means will be provided for communicating orders from the navigation bridge to the position in the machinery space or in the control room from which the engines are normally controlled: one of these will be an engine-room telegraph which provides visual indication of the orders and responses both in the machinery space and on the navigation bridge. Appropriate means of communication will be provided to any other positions from which the engines may be controlled.

(2) For ships constructed on or after 1 October 1994 the following requirements apply in lieu of the provisions of sub-rule (1):

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

52. **Engineers' alarm**.- An engineers' alarm will be provided to be operated from the engine control room or at the manoeuvring platform as appropriate, and will be clearly audible in the engineers' accommodation.

CHAPTER – VII

ELECTRICAL INSTALLATIONS

PART D

53. **General**.-

(1) Electrical installations will be such that:

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

(b) electrical services essential for safety will be ensured under various emergency conditions; and

(c) the safety of crew and ship from electrical hazards will be ensured.

(2) The Director General will take appropriate steps to ensure uniformity in the implementation and application of the provisions of this part in respect of electrical installations.

54. **Main source of electrical power and lighting systems**.-

(1) A main source of electrical power of sufficient capacity to supply all those services mentioned in clause(a) of sub-rule(1) of rule 53; will be provided. This main source of electrical power will consist of at least two generating sets.

(b) The capacity of these generating sets will be such that in the event of any one generating set being stopped it will still be possible to supply those services necessary to provide normal operational conditions of propulsion and safety. Minimum comfortable conditions of habitability will also be ensured which include at least adequate services for cooking, heating, domestic refrigeration, mechanical ventilation, sanitary and fresh water.

(c) The arrangements of the ship's main source of electrical power will be such that the services referred to in clause(a) of sub-rule (1) of rule 53 can be maintained regardless of the speed and direction of rotation of the propulsion machinery or shafting.

(d) In addition, the generating sets will be such as to ensure that with any one generator or its primary source of power out of operation, the remaining generating sets will be capable of providing the electrical services necessary to start the main propulsion plant from a dead ship condition. The emergency source of electrical power may be used for the purpose of starting from a dead ship condition if its capability either alone or combined with that of any other source of electrical power is sufficient to provide at the same time those services required to be supplied by clause(a) and clause(d)of sub-rule (2) of rule 55.

(e) Where transformers constitute an essential part of the electrical supply system required by this sub-rule, the system will be so arranged as to ensure the same continuity of the supply as is stated in this sub-rule.

(2) (a) A main electric lighting system which will provide illumination throughout those parts of the ship normally accessible to and used by crew will be supplied from the main source of electrical power.

(b) The arrangement of the main electric lighting system will be such that a fire or other casualty in spaces containing the main source of electrical power, associated transforming equipment, if any, the main switchboard and the main lighting switchboard, will not render the emergency electric lighting system required by clause(a) clause(b) and clause(c)of sub-rule(2) of rule 55 inoperative.

(c) The arrangement of the emergency electric lighting system will be such that a fire or other casualty in spaces containing the emergency source of electrical power, associated transforming equipment, if any, the emergency switchboard and the emergency lighting switchboard will not render the main electric lighting system required by this rule inoperative.

(3) The main switchboard will be so placed relative to one main generating station that, as far as is practicable, the integrity of the normal electrical supply may be affected only by a fire or other casualty in one space. An environmental enclosure for the main switchboard, such as may be provided by a machinery control room situated within the main boundaries of the space, is not to be considered as separating the switchboards from the generators.

(4) Where the total installed electrical power of the main generating sets is in excess of 3 MW, the main busbars will be subdivided into at least two parts which will normally be connected by removable links or other approved means; so far as is practicable, the connection of generating sets and any other duplicated equipment will be equally divided between the parts. Equivalent arrangements may be permitted to the satisfaction of the Director General.

(5) Ships constructed on or after 1 July 1998:

(a) in addition to sub-rules (1), (2) and (3), will comply with the following:

(i) where the main source of electrical power is necessary for propulsion and steering of the ship, the system will be so arranged that the electrical supply to equipment necessary for propulsion and steering and to ensure safety of the ship will be maintained or immediately restored in the case of loss of any one of the generators in service;

(ii) load shedding or other equivalent arrangements will be provided to protect the generators required by this rule against sustained overload;

(iii) where the main source of electrical power is necessary for propulsion of the ship, the main busbar will be subdivided into at least two parts which will normally be connected by circuit breakers or other approved means; so far as is practicable, the connection of generating sets and other duplicated equipment will be equally divided between the parts; and

(b) need not comply with sub-rule (4).

55. **Emergency source of electrical power in cargo ships**.-

(1) (a) A self-contained emergency source of electrical power will be provided.

(b) The emergency source of electrical power, associated transforming equipment, if any, transitional source of emergency power, emergency switchboard and emergency lighting switchboard will be located above the uppermost continuous deck and will be readily accessible from the open deck. They will not be located forward of the collision bulkhead, except where permitted by the Director General in exceptional circumstances.

(c) The location of the emergency source of electrical power, associated transforming equipment, if any, the transitional source of emergency power, the emergency switchboard and the emergency lighting switchboard in relation to the main source of electrical power, associated transforming equipment, if any, and the main switchboard will be such as to ensure to the satisfaction of the Director General that a fire or other casualty in the space containing the main source of electrical power, associated transforming equipment, if any, and the main switchboard, or in any machinery space of category A will not interfere with the supply, control and distribution of emergency electrical power. As far as practicable the space containing the emergency source of electrical power, associated transforming equipment, if any, the transitional source of emergency electrical power and the emergency switchboard will not be contiguous to the boundaries of machinery spaces of category A or those spaces containing the main source of electrical power, associated transforming equipment, if any, and the main switchboard.

(d) Provided that suitable measures are taken for safeguarding independent emergency operation under all circumstances, the emergency generator may be used, exceptionally, and for short periods, to supply non-emergency circuits.

(2) The electrical power available will be sufficient to supply all those services that are essential for safety in an emergency, due regard being paid to such services as may have to be operated simultaneously. The emergency source of electrical power will be capable, having regard to starting currents and the transitory nature of certain loads, of supplying simultaneously at least the following services for the periods specified hereinafter, if they depend upon an electrical source for their operation:

(a) For a period of 3 h, emergency lighting at every muster and embarkation station and over the sides as required by regulations III/11.4 and III/16.7 of SOLAS.

(b) For a period of 18 h, emergency lighting:

(i) in all service and accommodation alleyways, stairways and exits, personnel lift cars and personnel lift trunks;

(ii) in the machinery spaces and main generating stations including their control positions;

(iii) in all control stations, machinery control rooms, and at each main and emergency switchboard;

(iv) at all stowage positions for firemen's outfits;

(v) at the steering gear;

(vi) at the fire pump referred to in clause (e) of sub-rule (2), at the sprinkler pump, if any, and at the emergency bilge pump, if any, and at the starting positions of their motors; and

(vii) in all cargo pump-rooms of tankers constructed on or after 1 July 2002

(c) For a period of 18 h:

(i) the navigation lights and other lights required by the International Regulations for Preventing Collisions at Sea in force;

(ii) on ships constructed on or after 1 February 1995 the VHF radio installation required by regulation IV/7.1.1 and IV/7.1.2 of SOLAS ; and, if applicable:

(A). the MF radio installation required by regulations IV/9.1.1, IV/9.1.2, IV/10.1.2 and IV/10.1.3; of SOLAS;

(B) the ship earth station required by regulation IV/10.1.1 of SOLAS; and

(C) the MF/HF radio installation required by regulation IV/11.1.1 and IV/11.1.2 of SOLAS.

(d) For a period of 18 h:

(i) all internal communication equipment as required in an emergency;

(ii) the shipborne navigational equipment as required by regulation V/12 of SOLAS; where such provision is unreasonable or impracticable the Director General may waive this requirement for ships of less than 5,000 gross tonnage;

(iii) the fire detection and fire alarm system; and

(iv) 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 18 h from an accumulator battery suitably located for use in an emergency.

(e) For a period of 18 h one of the fire pumps required by sub- clause (ii) and (iii) of Rule 71 Sub-rule (4) if dependent upon the emergency generator for its source of power.

(f) For the period of time required by sub-rule(14) of rule 43 the steering gear where it is required to be so supplied by that rule.

(ii) In a ship engaged regularly in voyages of short duration, the Director General if satisfied that an adequate standard of safety would be attained may accept a lesser period than the 18 h period specified in clauses (b) to (e) of sub-rule (2) but not less than 12 h.

(3) The emergency source of electrical power may be either a generator or an accumulator battery, which will comply with the following:

(a) Where the emergency source of electrical power is a generator, it will be:

(i). driven by a suitable prime mover with an independent supply of fuel, having flashpoint (closed cup test) of not less than 43°C;

(ii). started automatically upon failure of the main source of electrical power supply unless a transitional source of emergency electrical power in accordance with in sub clause (iii) of clause(a) of sub-rule(3) is provided; where the emergency generator is automatically started, it will be automatically connected to the emergency switchboard; those services referred to in sub-rule (4) will then be connected automatically to the emergency generator; and unless a second independent means of starting the emergency generator is provided the single source of stored energy will be protected to preclude its complete depletion by the automatic starting system; and

(iii) provided with a transitional source of emergency electrical power as specified in sub-rule (4) unless an emergency generator is provided capable both of supplying the services mentioned in that sub-rule and of being automatically started and supplying the required load as quickly as is safe and practicable subject to a maximum of 45 s.

(b) Where the emergency source of electrical power is an accumulator battery it will be capable of:

(i) carrying the emergency electrical load without recharging while maintaining the voltage of the battery throughout the discharge period within 12% above or below its nominal voltage;

(ii) automatically connecting to the emergency switchboard in the event of failure of the main source of electrical power; and

(iii) immediately supplying at least those services specified in sub-rule (4).

(c) The following provision in sub-clause(ii) clause(a) of sub-rule (3) will not apply to ships constructed on or after 1 October 1994:

Unless a second independent means of starting the emergency generating set is provided, the single source of stored energy will be protected to preclude its complete depletion by the automatic starting system.

(d) For ships constructed on or after 1 July 1998, where electrical power is necessary to restore propulsion, the capacity will be sufficient to restore propulsion to the ship in conjunction with other machinery, as appropriate, from a dead ship condition within 30 min after blackout.

(4) The transitional source of emergency electrical power where required by sub-clause(iii) clause(a) of sub-rule(3) will consist of an accumulator battery suitably located for use in an emergency which will operate without recharging while maintaining the voltage of the battery throughout the discharge period within 12% above or below its nominal voltage and be of sufficient capacity and will be so arranged as to supply automatically in the event of failure of either the main or the emergency source of electrical power for half an hour at least the following services if they depend upon an electrical source for their operation:

(a) the lighting required by clause(a),(b) and 3(i) of sub-rule(2) For this transitional phase, the required emergency electric lighting, in respect of the machinery space and accommodation and service spaces may be provided by permanently fixed, individual, automatically charged, relay operated accumulator lamps; and

(b) all services required by sub-clause(i),(ii),(iii) clause(d) of sub-rule(2) unless such services have an independent supply for the period specified from an accumulator battery suitably located for use in an emergency.

(5) (a) The emergency switchboard will be installed as near as is practicable to the emergency source of electrical power.

(b) Where the emergency source of electrical power is a generator, the emergency switchboard will be located in the same space unless the operation of the emergency switchboard would thereby be impaired.

(c) No accumulator battery fitted in accordance with this rule will be installed in the same space as the emergency switchboard. An indicator will be mounted in a suitable place on the main switchboard or in the machinery control room to indicate when the batteries constituting either the emergency source of electrical power or the transitional source of electrical power referred to in clause(b) of sub-rule (3) or sub-rule (4) are being discharged.

(d) The emergency switchboard will be supplied during normal operation from the main switchboard by an interconnector feeder which is to be adequately protected at the main switchboard against overload and short circuit and which is to be disconnected automatically at the emergency switchboard upon failure of the main source of electrical power. Where the system is arranged for feedback operation, the interconnector feeder is also to be protected at the emergency switchboard at least against short circuit.

(e) In order to ensure ready availability of the emergency source of electrical power, arrangements will be made where necessary to disconnect automatically non-emergency circuits from the emergency switchboard to ensure that electrical power will be available automatically to the emergency circuits.

(6) The emergency generator and its prime mover and any emergency accumulator battery will be so designed and arranged as to ensure that they will function at full rated power when the ship is upright and when inclined at any angle of list up to 22.5° or when inclined up to 10° either in the fore or aft direction, or is in any combination of angles within those limits.

(7) Provision will be made for the periodic testing of the complete emergency system and will include the testing of automatic starting arrangements

56. **Starting arrangements for emergency generating sets**.-

(1) Emergency generating sets will be capable of being readily started in their cold condition at a temperature of 0°C. If this is impracticable, or if lower temperatures are likely to be encountered, provision acceptable to the Director General will be made for the maintenance of heating arrangements, to ensure ready starting of the generating sets.

(2) Each emergency generating set arranged to be automatically started will be equipped with starting devices approved by the Director General with a stored energy capability of at least three consecutive starts. A second source of energy will be provided for an additional three starts within 30 min unless manual starting can be demonstrated to be effective.

(a) Ships constructed on or after 1 October 1994, in lieu of the provision of the second sentence of sub-rule (2), will comply with the following requirements:

The source of stored energy will be protected to preclude critical depletion by the automatic starting system, unless a second independent means of starting is provided. In addition, a second source of energy will be provided

for an additional three starts within 30 min unless manual starting can be demonstrated to be effective.

(3) The stored energy will be maintained at all times, as follows:

(a) electrical and hydraulic starting systems will be maintained from the emergency switchboard;

(b) compressed air starting systems may be maintained by the main or auxiliary compressed air receivers through a suitable non-return valve or by an emergency air compressor which, if electrically driven, is supplied from the emergency switchboard;

(c) all of these starting, charging and energy storing devices will be located in the emergency generator space; these devices are not to be used for any purpose other than the operation of the emergency generating set. This does not preclude the supply to the air receiver of the emergency generating set from the main or auxiliary compressed air system through the non-return valve fitted in the emergency generator space.

(4) (a) Where automatic starting is not required, manual starting is permissible, such as manual cranking, inertia starters, manually charged hydraulic accumulators, or powder charge cartridges, where they can be demonstrated as being effective.

(b) When manual starting is not practicable, the requirements of sub-rules (2) and (3) will be complied with except that starting may be manually initiated.

57. Precautions against shock, fire and other hazards of electrical origin

(sub- rules (10) and (11) of this rule apply to ships constructed on or after January 2007)

(1) (a) Exposed metal parts of electrical machines or equipment which are not intended to be live but which are liable under fault conditions to become live will be earthed unless the machines or equipment are:

(i) supplied at a voltage not exceeding 50 V direct current or 50 V root mean square between conductors; auto-transformers will not be used for the purpose of achieving this voltage; or

(ii) supplied at a voltage not exceeding 250 V by safety isolating transformers supplying only one consuming device; or

(iii). constructed in accordance with the principle of double insulation.

(b) The Director General may require additional precautions for portable electrical equipment for use in confined or exceptionally damp spaces where particular risks due to conductivity may exist.

(c) All electrical apparatus will be so constructed and so installed as not to cause injury when handled or touched in the normal manner.

(2) Main and emergency switchboards will be so arranged as to give easy access as may be needed to apparatus and equipment, without danger to personnel. The sides and the rear and, where necessary, the front of switchboards will be suitably guarded. Exposed live parts having voltages to earth exceeding a voltage to be specified by the Director General will not be installed on the front of such switchboards. Where necessary, nonconducting mats or gratings will be provided at the front and rear of the switchboard.

(3) (a) The hull return system of distribution will not be used for any purpose in a tanker, or for power, heating, or lighting in any other ship of 1,600 gross tonnage and upwards.

(b) The requirement of clause (a) of sub-rule(3) does not preclude under conditions approved by the Director General the use of:

(i) impressed current cathodic protective systems;

(ii) limited and locally earthed systems; or

(iii) insulation level monitoring devices provided the circulation current does not exceed 30 mA under the most unfavourable conditions.

(c) For ships constructed on or after 1 October 1994, the requirement of clause(a) of sub-rule(3) does not preclude the use of limited and locally earthed systems, provided that any possible resulting current does not flow directly through any dangerous spaces.

(d) Where the hull return system is used, all final subcircuits, i.e. all circuits fitted after the last protective device, will be two-wire and special precautions will be taken to the satisfaction of the Director General.

(4) (a). Earthed distribution systems will not be used in a tanker. The Director General may exceptionally permit in a tanker the earthing of the neutral for alternating current power networks of 3,000 V (line to line) and over, provided that any possible resulting current does not flow directly through any of the dangerous spaces.

(b) When a distribution system, whether primary or secondary, for power, heating or lighting, with no connection to earth is used, a device capable of

continuously monitoring the insulation level to earth and of giving an audible or visual indication of abnormally low insulation values will be provided.

(c) Ships constructed on or after 1 October 1994, in lieu of the provisions of clause(a) of sub-rule (4), will comply with the following requirements:

(i) Except as permitted by sub- clause (ii) clause(c) of sub-rule (4) earthed distribution systems will not be used in a tanker.

(ii) The requirement of sub- clause (i) clause(c) of sub-rule (4) does not preclude the use of earthed intrinsically safe circuits and in addition, under conditions approved by the Director General, the use of the following earthed systems:

(A) power-supplied control circuits and instrumentation circuits where technical or safety reasons preclude the use of a system with no connection to earth, provided the current in the hull is limited to not more than 5 A in both normal and fault conditions; or

(B) limited and locally earthed systems, provided that any possible resulting current does not flow directly through any of the dangerous spaces; or

(C) alternating current power networks of 1,000 V root mean square (line to line) and over, provided that any possible resulting current does not flow directly through any of the dangerous spaces.

(5) (a) Except as permitted by the Director General in exceptional circumstances, all metal sheaths and armour of cables will be electrically continuous and will be earthed.

(b) All electric cables and wiring external to equipment will be at least of a flame-retardant type and will be so installed as not to impair their original flame-retarding properties. Where necessary for particular applications the Director General may permit the use of special types of cables such as radio frequency cables, which do not comply with the foregoing.

(c) Cables and wiring serving essential or emergency power, lighting, internal communications or signals will so far as practicable be routed clear of galleys, laundries, machinery spaces of category A and their casings and other high fire risk areas. Cables connecting fire pumps to the emergency switchboard will be of a fire-resistant type where they pass through high fire risk areas. Where practicable all such cables should be run in such a manner as to preclude their being rendered unserviceable by heating of the bulkheads that may be caused by a fire in an adjacent space.

(d) Where cables which are installed in hazardous areas introduce the risk of fire or explosion in the event of an electrical fault in such areas, special precautions against such risks will be taken to the satisfaction of the Director General.

(e) Cables and wiring will be installed and supported in such a manner as to avoid chafing or other damage.

(f) Terminations and joints in all conductors will be so made as to retain the original electrical, mechanical, flame-retarding and, where necessary, fire-resisting properties of the cable.

(6) (a) Each separate circuit will be protected against short circuit and against overload, except as permitted in rules 43 and 44 or where the Director General may exceptionally otherwise permit.

(b) The rating or appropriate setting of the overload protective device for each circuit will be permanently indicated at the location of the protective device.

(7) Lighting fittings will be so arranged as to prevent temperature rises which could damage the cables and wiring, and to prevent surrounding material from becoming excessively hot.

(8) All lighting and power circuits terminating in a bunker or cargo space will be provided with a multiple-pole switch outside the space for disconnecting such circuits.

(9) (a) Accumulator batteries will be suitably housed, and compartments used primarily for their accommodation will be properly constructed and efficiently ventilated.

(b) Electrical or other equipment which may constitute a source of ignition of flammable vapours will not be permitted in these compartments except as permitted in sub-rule (10).

(c) Accumulator batteries will not be located in sleeping quarters except where hermetically sealed to the satisfaction of the Director General.

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

(a) essential for operational purposes;

(b) of a type which will not ignite the mixture concerned;

(c) appropriate to the space concerned; and

(d) appropriately certified for safe usage in the dusts, vapours or gases likely to be encountered.

(11) In tankers, electrical equipment, cables and wiring will not be installed in hazardous locations unless it conforms with standards not inferior to those acceptable to the IMO. However, for locations not covered by such standards, electrical equipment, cables and wiring which do not conform to the standards may be installed in hazardous locations based on a risk assessment to the satisfaction of the Director General, to ensure that an equivalent level of safety is assured.

CHAPTER- VIII

ADDITIONAL REQUIREMENTS FOR PERIODICALLY UNATTENDED MACHINERY SPACES

58. **General**. -

(1) The arrangements provided will be such as to ensure that the safety of the ship in all sailing conditions, including manoeuvring, is equivalent to that of a ship having the machinery spaces manned.

(2) Measures will be taken to the satisfaction of the Director General to ensure that the equipment is functioning in a reliable manner and that satisfactory arrangements are made for regular inspections and routine tests to ensure continuous reliable operation.

(3) Every ship will be provided with documentary evidence, to the satisfaction of the Director General, of its fitness to operate with periodically unattended machinery spaces.

59. **Fire precautions**.-

(1) Means will be provided to detect and give alarms at an early stage in case of fires:

(a) in boiler air supply casings and exhausts (uptakes); and

(b) in scavenging air belts of propulsion machinery, unless the Director General considers this to be unnecessary in a particular case.

(2) Internal combustion engines of 2,250 kW and above or having cylinders of more than 300 mm bore will be provided with crankcase oil mist detectors or engine bearing temperature monitors or equivalent devices.

60. **Protection against flooding**.-

(1) Bilge wells in periodically unattended machinery spaces will be located and monitored in such a way that the accumulation of liquids is detected at normal angles of trim and heel, and will be large enough to accommodate easily the normal drainage during the unattended period.

(2) Where the bilge pumps are capable of being started automatically, means will be provided to indicate when the influx of liquid is greater than the pump capacity or when the pump is operating more frequently than would normally be expected. In these cases, smaller bilge wells to cover a reasonable period of time may be permitted. Where automatically controlled bilge pumps are provided, special attention will be given to oil pollution prevention requirements.

(3) The location of the controls of any valve serving a sea inlet, a discharge below the waterline or a bilge injection system will be so sited as to allow adequate time for operation in case of influx of water to the space, having regard to the time likely to be required in order to reach and operate such controls. If the level to which the space could become flooded with the ship in the fully loaded condition so requires, arrangements will be made to operate the controls from a position above such level.

61. **Control of propulsion machinery from the navigation bridge**.-

(1) Under all sailing conditions, including manoeuvring, the speed, direction of thrust and, if applicable, the pitch of the propeller will be fully controllable from the navigation bridge.

(a) Such remote control will be performed by a single control device for each independent propeller, with automatic performance of all associated services, including, where necessary, means of preventing overload of the propulsion machinery.

(b) The main propulsion machinery will be provided with an emergency stopping device on the navigation bridge which will be independent of the navigation bridge control system.

(2) Propulsion machinery orders from the navigation bridge will be indicated in the main machinery control room or at the propulsion machinery control position as appropriate.

(3) Remote control of the propulsion machinery will be possible only from one location at a time; at such locations interconnected control positions are permitted. At each location there will be an indicator showing which location is in control of the propulsion machinery. The transfer of control between the

navigation bridge and machinery spaces will be possible only in the main machinery space or in the main machinery control room. The system will include means to prevent the propelling thrust from altering significantly when transferring control from one location to another.

(4) It will be possible for all machinery essential for the safe operation of the ship to be controlled from a local position, even in the case of failure in any part of the automatic or remote control systems.

(5) The design of the remote automatic control system will be such that in case of its failure an alarm will be given. Unless the Director General considers it impracticable, the preset speed and direction of thrust of the propeller will be maintained until local control is in operation.

(6) Indicators will be fitted on the navigation bridge for:

(a) propeller speed and direction of rotation in the case of fixed pitch propellers; or

(b) propeller speed and pitch position in the case of controllable pitch propellers.

(7) The number of consecutive automatic attempts which fail to produce a start will be limited to safeguard sufficient starting air pressure. An alarm will be provided to indicate low starting air pressure set at a level which still permits starting operations of the propulsion machinery.

62. **Communication**.- A reliable means of vocal communication will be provided between the main machinery control room or the propulsion machinery control position as appropriate, the navigation bridge and the engineer officers' accommodation

63. **Alarm system**.-

(1) An alarm system will be provided indicating any fault requiring attention and will:

(a) be capable of sounding an audible alarm in the main machinery control room or at the propulsion machinery control position, and indicate visually each separate alarm function at a suitable position;

(b) have a connection to the engineers' public rooms and to each of the engineers' cabins through a selector switch, to ensure connection to at least one of those cabins. Director Generals may permit equivalent arrangements;

(c) activate an audible and visual alarm on the navigation bridge for any situation which requires action by or attention of the officer on watch;

(d) as far as is practicable be designed on the fail-to-safety principle; and

(e) activate the engineers' alarm required by rule 52 if an alarm function has not received attention locally within a limited time.

(2) (a). The alarm system will be continuously powered and will have an automatic change-over to a stand-by power supply in case of loss of normal power supply.

(b) Failure of the normal power supply of the alarm system will be indicated by an alarm.

(3) (a) The alarm system will be able to indicate at the same time more than one fault and the acceptance of any alarm will not inhibit another alarm.

(b) Acceptance at the position referred to in sub-rule (1) of any alarm condition will be indicated at the positions where it was shown. Alarms will be maintained until they are accepted and the visual indications of individual alarms will remain until the fault has been corrected, when the alarm system will automatically reset to the normal operating condition.

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

65. **Special requirements for machinery, boiler and electrical installations**.-

(1) The special requirements for the machinery, boiler and electrical installations will be to the satisfaction of the Director General and will include at least the requirements of this rule.

(2) The main source of electrical power will comply with the following:

(a) Where the electrical power can normally be supplied by one generator, suitable load-shedding arrangements will be provided to ensure the integrity of supplies to services required for propulsion and steering as well as the safety of the ship. In the case of loss of the generator in operation, adequate provision will be made for automatic starting and connecting to the main switchboard of a stand-by generator of sufficient capacity to permit propulsion and steering and to ensure the safety of the ship with automatic restarting of the essential auxiliaries including, where necessary, sequential operations. The Director General may dispense with this requirement for a ship of less than 1,600 gross tonnage, if it is considered impracticable.

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

(3) Where stand-by machines are required for other auxiliary machinery essential to propulsion, automatic change-over devices will be provided.

(4) Automatic control and alarm system

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

(b) An alarm will be given on the automatic change-over.

(c) An alarm system complying with rule 60 will be provided for all important pressures, temperatures and fluid levels and other essential parameters.

(d). A centralized control position will be arranged with the necessary alarm panels and instrumentation indicating any alarm.

(5) Means will be provided to keep the starting air pressure at the required level where internal combustion engines are used for main propulsion.

66. Alternative design and arrangements

(1) The purpose of this regulation is to provide a methodology for alternative design and arrangements for machinery, electrical installations and low-flashpoint fuel storage and distribution systems.

(2) (a) Machinery, electrical installation and low-flashpoint fuel storage and distribution systems design and arrangements may deviate from the requirements set out in parts C, D, E or G, provided that the alternative design and arrangements meet the intent of the requirements concerned and provide an equivalent level of safety to this chapter.

(b) When alternative design or arrangements deviate from the prescriptive requirements of parts C, D, E or G, an engineering analysis, evaluation and approval of the design and arrangements will be carried out in accordance with this rule.

(3) The engineering analysis will be prepared and submitted to the Director general, based on the guidelines developed by the IMO and will include, as a minimum, the following elements:

(a) determination of the ship type, machinery, electrical installations, low-flashpoint fuel storage and distribution systems and space(s) concerned;

(b) Identification of the prescriptive requirement(s) with which the machinery, electrical installations and low-flashpoint fuel storage and distribution systems will not comply;

(c) identification of the reason the proposed design will not meet the prescriptive requirements supported by compliance with other recognized engineering or industry standards;

(d) determination of the performance criteria for the ship, machinery, electrical installation, low-flashpoint fuel storage and distribution system or the space(s) concerned addressed by the relevant prescriptive requirement(s):

(i) Performance criteria will provide a level of safety not inferior to the relevant prescriptive requirements contained in parts C, D, E or G; and

(ii) performance criteria will be quantifiable and measurable.

(e) detailed description of the alternative design and arrangements, including a list of the assumptions used in the design and any proposed operational restrictions or conditions;

(f) technical justification demonstrating that the alternative design and arrangements meet the safety performance criteria; and

(g) risk assessment based on identification of the potential faults and hazards associated with the proposal.

(4) Evaluation of the alternative design and arrangements

(a) The engineering analysis required in Sub-rule (3) willl be evaluated and approved by the Director General, taking into account the guidelines developed by the IMO.

(b) A copy of the documentation, as approved by the Director General, indicating that the alternative design and arrangements comply with this regulation, will be carried on board the ship.

(5) The Director General will communicate to the IMO pertinent information concerning alternative design and arrangements approved by them for circulation to all Contracting Governments.

(6) If the assumptions and operational restrictions that were stipulated in the alternative design and arrangements are changed, the engineering analysis will be carried out under the changed condition and will be approved by the Direcor General.

67. Application (Ships using low-flashpoint fuels)

(1) Except as provided for in Sub-rule (4) and (5), this part will apply to ships using low-flashpoint fuels:

(a) for which the building contract is placed on or after 1 January 2017;

(b) in the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after 1 July 2017; or

(c) the delivery of which is on or after 1 January 2021.

Such ships using low-flashpoint fuels will comply with the requirements of this part in addition to any other applicable requirements of the present rules.

(2) Except as provided for in Sub-rule (4) and (5), a ship, irrespective of the date of construction, including one constructed before 1 January 2009, which converts to using low-flashpoint fuels on or after 1 January 2017 will be treated as a ship using low-flashpoint fuels on the date on which such conversion commenced.

(3) Except as provided for in Sub-rule (4) and (5), a ship using low-flashpoint fuels, irrespective of the date of construction, including one constructed before 1 January 2009, which, on or after 1 January 2017, undertakes to use low-flashpoint fuels different from those which it was originally approved to use before 1 January 2017 will be treated as a ship using low-flashpoint fuels on the date on which such undertaking commenced.

(4) This part will not apply to gas carriers, as defined in regulation VII/11.2 of SOLAS:

(a) using their cargoes as fuel and complying with the requirements of the IGC Code, as defined in regulation VII/11.1 of SOLAS; or

(b) using other low-flashpoint gaseous fuels provided that the fuel storage and distribution systems design and arrangements for such gaseous fuels comply with the requirements of the IGC Code for gas as a cargo.

(5) This part will not apply to ships owned or operated by a Contracting Government and used, for the time being, only in Government non-commercial service. However, ships owned or operated by a Contracting Government and used, for the time being, only in Government non-commercial service are encouraged to act in a manner consistent, so far as reasonable and practicable, with this part.

68. Requirements for ships using low-flashpoint fuels

(1) Except as provided in rule 64 Sub-rule (4) and (5), ships using low-flashpoint fuels will comply with the requirements of the IGF Code.

PART-III

Construction - Fire protection, fire detection and fire extinction

CHAPTER I – General

69. **Application**.-

(1) (a) Unless expressly provided otherwise, this chapter will apply to ships constructed on or after 1 July 2012.

(b) For the purpose of this chapter:

(i) the expression ships constructed means ships the keels of which are laid or which are at a similar stage of construction;

(ii) the expression all ships means ships, irrespective of type, constructed before, on or after 1 July 2012; and

(c) For the purpose of this chapter, the expression a similar stage of construction means the stage at which:

(i) construction identifiable with a specific ship begins; and

(ii) assembly of that ship has commenced comprising at least 50 tonnes or 1% of the estimated mass of all structural material, whichever is less.

(2) Applicable requirements to existing ships

(a) Unless expressly provided otherwise, for ships constructed before 1 July 2012 the Director General will ensure that the requirements which are applicable under chapter II-2 of the International Convention for the Safety of Life at Sea, 1974, as amended by resolutions MSC.1 (45), MSC.6(48), MSC.13(57), MSC.22(59), MSC.24(60), MSC.27(61), MSC.31(63) and MSC.57(67), MSC.99(73),MSC.134(76),MSC.194(80),MSC.201(81),MSC.216(82),MSC.256(84),MSC.269(85) and MSC.291(87) are complied with.

(b) Ships constructed before 1 July 2002 will also comply with:

(i) sub-rule (3), clauses (e) and(g) of sub-rule (6) as appropriate;

(ii) rules80(3)(d)(ii) to 80(3)(d)(v),80(4)(c) and Part E, except rules 83(3)(b)(ii) and 20(3)(b)(iii) thereof, as appropriate, not later than the date of the first survey after 1 July 2002;

(iii) rule 77 (4) (a) (iii) and 71 (6)(d) for new installations only; and

(iv) Rule 71 sub-rule (5)(g)(i)regulation 4.5.7.1.

(c) Ships constructed on or after 1 July 2002 and before 1 July 2010 will comply with sub-rule (7)(a)(i), (7)(d)(iv)(B) and (C), (7)(e) of Rule 76, as adopted by resolution MSC.99(73).

(d) The following ships, with cargo spaces intended for the carriage of packaged dangerous goods, will comply with Rule 86 sub-rule(3), except when carrying dangerous goods specified as classes 6.2 and 7 and dangerous goods in limited quantities and excepted quantities in accordance with tables 1 and 3, not later than the date of the first renewal survey on or after the 1 January 2011:

(i) cargo ships of 500 gross tonnage and upwards constructed on or after 1 September 1984 but before 1 January 2011; and

(ii) cargo ships of less than 500 gross tonnage constructed on or after 1 February 1992 but before 1 January 2011, and notwithstanding these provisions:

(iii) cargo ships of 500 gross tonnage and upwards constructed on or after 1 September 1984 but before 1 July 1986 need not comply with Rule 86 Sub-rule (3)(iii) provided that they comply with regulation 54.2.3 as adopted by resolution MSC.1(45);

(iv) cargo ships of 500 gross tonnage and upwards constructed on or after 1 July 1986 but before 1 February 1992 need not comply with Rule 86 Sub-rule (3)(iii) provided that they comply with regulation 54.2.3 as adopted by resolution MSC.6(48);

(v) cargo ships of 500 gross tonnage and upwards constructed on or after 1 September 1984 but before 1 July 1998 need not comply with Rule 86 Sub-rule (3)(iii)

(vi) cargo ships of less than 500 gross tonnage constructed on or after 1 February 1992 but before 1 July 1998 need not comply with Rule 86 Sub-rule (3)(iii)

(vii) cargo ships of 500 gross tonnage and upwards constructed on or after 1 February 1992 but before 1 July 2002 need not comply with Rule 86 Sub-rule (3)(iii) provided that they comply with regulation 54.2.3 as adopted by resolution MSC.13(57); and

(viii) cargo ships of 500 gross tonnage and upwards constructed on or after 1 September 1984 but before 1 July 2002 need not comply with Rule 86 Sub-rule (iii), provided that they comply with regulations 54.2.1, 54.2.5, 54.2.6, 54.2.9 as adopted by resolution MSC.1(45);

(e) Ships constructed before 1 July 2012 will also comply with Rule 77 Sub-rule (10)(a)(ii), as adopted by resolution MSC.338(91) and regulations 4.2.1.6 to 4.2.1.8, as amended by resolution MSC.520(106)

(f) Tankers constructed before 1 January 2016, including those constructed before 1 July 2012, will comply with Rule 83 Sub-rule (3)(c) except Rule 83 Sub-rule (3)(c)(iii).

(g) Rule 71 Sub-rule (5) apply to ships constructed on or after 1 July 2002 but before 1 January 2016, and Rule 71 Sub-rule (5) applies to all ships constructed before 1 January 2016.

(h) Rule 77 sub-rule (5) (a)(ii)(B) as amended by resolution MSC.409(97), applies to ships constructed before 1 January 2020, including those constructed before 1 July 2012.

(i) All ships constructed before 1 January 2026 will comply with Rule 77 sub-rule(11) (b), as adopted by resolution MSC.532(107), not later than the date of the first survey on or after 1 January 2026.

(3) Repairs, alterations, modifications and outfitting

(a) All ships which undergo repairs, alterations, modifications and outfitting related thereto will continue to comply with at least the requirements previously applicable to these ships. Such ships, if constructed before 1 July 2012, will, as a rule, comply with the requirements for ships constructed on or after that date to at least the same extent as they did before undergoing such repairs, alterations, modifications or outfitting.

(b) Repairs, alterations and modifications which substantially alter the dimensions of a ship or substantially increase a ship’s service life and outfitting related thereto will meet the requirements for ships, constructed on or after 1 July 2012 in so far as the Director General deems reasonable and practicable.

(4) Exemptions

The Director General may, if it considers that the sheltered nature and conditions of the voyage are such as to render the application of any specific requirements of this chapter unreasonable or unnecessary, exempt from those

requirements individual ships or classes of ships entitled to fly the flag of its State, provided that such ships, in the course of their voyage, do not sail at distances of more than 20 miles from the nearest land.

(5) Applicable requirements depending on ship type.

Unless expressly provided otherwise:

(a) requirements not referring to a specific ship type will apply to ships of all types; and

(b) requirements referring to "tankers" will apply to tankers subject to the requirements specified in sub- rule (6) below.

(6) Application of requirements for tankers

(a) Requirements for tankers in this chapter will apply to tankers carrying crude oil or petroleum products having a flashpoint not exceeding 60°C (closed cup test), as determined by an approved flashpoint apparatus, and a Reid vapour pressure which is below the atmospheric pressure or other liquid products having a similar fire hazard.

(b) Where liquid cargoes other than those referred to in clause(a) of sub-rule(6) or liquefied gases which introduce additional fire hazards are intended to be carried, additional safety measures will be required, having due regard to the provisions of the International Bulk Chemical Code, as defined in regulation VII/8.1, the Bulk Chemical Code, the International Gas Carrier Code, as defined in regulation VII/11.1, and the Gas Carrier Code, of SOLAS as appropriate.

(i) A liquid cargo with a flashpoint of less than 60°C for which a regular foam fire-fighting system complying with the Fire Safety Systems Code is not effective, is considered to be a cargo introducing additional fire hazards in this context. The following additional measures are required:

(A) The foam will be of alcohol-resistant type;

(B) The type of foam concentrates for use in chemical tankers will be to the satisfaction of the Director General taking into account the guidelines developed by the IMO; and

(C) The capacity and application rates of the foam extinguishing system will comply with chapter 11 of the International Bulk Chemical Code of SOLAS , except that lower application rates may be accepted based on performance tests. For tankers fitted with inert gas systems, a quantity of foam concentrate sufficient for 20 min of foam generation may be accepted.

(ii) For the purpose of this rule, a liquid cargo with a vapour pressure greater than 1.013 bar absolute at 37.8°C is considered to be a cargo introducing additional fire hazards. Ships carrying such substances will comply with paragraph 15.14 of the International Bulk Chemical Code. When ships operate in restricted areas and at restricted times, the Director General concerned may agree to waive the requirements for refrigeration systems in accordance with paragraph 15.14.3 of the International Bulk Chemical Code

(c) Liquid cargoes with a flashpoint exceeding 60°C other than oil products or liquid cargoes subject to the requirements of the International Bulk Chemical Code are considered to constitute a low fire risk, not requiring the protection of a fixed foam extinguishing system.

(d) Tankers carrying petroleum products with a flashpoint exceeding 60°C (closed cup test), as determined by an approved flashpoint apparatus, will comply with the requirements provided in rule 77 clause(3) (4) (d) and clause (12) (12.2.1) the requirements for cargo ships other than tankers, except that, in lieu of the fixed fire extinguishing system required in sub-rule(7) of rule 77, they will be fitted with a fixed deck foam system which will comply with the provisions of the Fire Safety Systems Code.

(e) Combination carriers constructed before, on or after 1 July 2002 will not carry cargoes other than oil unless all cargo spaces are empty of oil and gas-freed or unless the arrangements provided in each case have been approved by the Director General taking into account the guidelines developed by the IMO.

(f) Chemical tankers and gas carriers will comply with the requirements for tankers, except where alternative and supplementary arrangements are provided to the satisfaction of the Director General, having due regard to the provisions of the International Bulk Chemical Code and the International Gas Carrier Code, as appropriate.

(g) The requirements of rule 71 clause (5)(j)(i)(A) and clause (5)(j)(i)(D) and a system for continuous monitoring of the concentration of hydrocarbon gases will be fitted on all tankers constructed before 1 July 2002 by the date of the first scheduled dry-docking after 1 July 2002, but not later than 1 July 2005. Sampling points or detector heads will be located in suitable positions in order that potentially dangerous leakages are readily detected. When the hydrocarbon gas concentration reaches a pre-set level which will not be higher than 10% of the lower flammable limit, a continuous audible and

visual alarm signal will be automatically effected in the pump-room and cargo control room to alert personnel to the potential hazard. However, existing monitoring systems already fitted having a pre-set level not greater than 30% of the lower flammable limit may be accepted.

70. Fire safety objectives and functional requirements.-

(1) Fire safety objectives

(a) The fire safety objectives of this rule are to:

(i) prevent the occurrence of fire and explosion;

(ii) reduce the risk to life caused by fire;

(iii) (reduce the risk of damage caused by fire to the ship, its cargo and the environment;

(iv) contain, control and suppress fire and explosion in the compartment of origin; and

(v) provide adequate and readily accessible means of escape for crew.

(2) Functional requirements

(a) In order to achieve the fire safety objectives set out in sub-rule (1), the following functional requirements are embodied in the rules of this chapter as appropriate:

(i) division of the ship into main vertical and horizontal zones by thermal and structural boundaries;

(ii) separation of accommodation spaces from the remainder of the ship by thermal and structural boundaries;

(iii) restricted use of combustible materials;

(iv) detection of any fire in the zone of origin;

(v) containment and extinction of any fire in the space of origin;

(vi) protection of means of escape and access for fire-fighting;

(vii) ready availability of fire-extinguishing appliances; and

(viii) minimization of possibility of ignition of flammable cargo vapour

(3) Achievement of the fire safety objectives

The fire safety objectives set out in sub-rule (1) will be achieved by ensuring compliance with the prescriptive requirements specified in parts II [B], IIIC, IV D, V E or VI G, or by alternative design and arrangements which comply

with Part F. A ship will be considered to meet the functional requirements set out in sub-rule (2) and to achieve the fire safety objectives set out in sub-rule (1) when either:

(a) the ship's design and arrangements, as a whole, comply with the relevant prescriptive requirements in parts II , III, IV, V or VII;

(b) the ship's design and arrangements, as a whole, have been reviewed and approved in accordance with part VI ; or

(c) part(s) of the ship's design and arrangements have been reviewed and approved in accordance with part F and the remaining parts of the ship comply with the relevant prescriptive requirements in parts II , III, IV, V or VI.

CHAPTER-II

Prevention of fire and explosion

71. **Probability of ignition**.-

(1) The purpose of this rule is to prevent the ignition of combustible materials or flammable liquids. For this purpose, the following functional requirements will be met:

(a) means will be provided to control leaks of flammable liquids;

(b) means will be provided to limit the accumulation of flammable vapours;

(c) the ignitability of combustible materials will be restricted;

(d) ignition sources will be restricted;

(e) ignition sources will be separated from combustible materials and flammable liquids; and

(f) the atmosphere in cargo tanks will be maintained out of the explosive range.

(2) Arrangements for oil fuel, lubrication oil and other flammable oils

(a) Limitations in the use of oils as fuel

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

(i) except as otherwise permitted by this sub-rule, no oil fuel with a flashpoint of less than 60°C will be used;

(ii) in emergency generators oil fuel with a flashpoint of not less than 43°C may be used;

(iii) the use of oil fuel having a flashpoint of less than 60°C but not less than 43°C may be permitted (e.g., for feeding the emergency fire pump's engines and the auxiliary machines which are not located in the machinery spaces of category A) subject to the following:

(A) fuel oil tanks except those arranged in double bottom compartments will be located outside of machinery spaces of category A;

(B) provisions for the measurement of oil temperature are provided on the suction pipe of the oil fuel pump;

(C) stop valves and/or cocks are provided on the inlet side and outlet side of the oil fuel strainers; and

(D) pipe joints of welded construction or of circular cone type or spherical type union joint are applied as much as possible; and

(iv) in cargo ships, to which Chapter VII is not applicable, the use of fuel having a lower flashpoint than otherwise specified in clause (a) (i) of sub-rule(2) for example crude oil, may be permitted provided that such fuel is not stored in any machinery space and subject to the approval by the Director General of the complete installation.

(v) in ships, to which Chapter VII is applicable, the use of oil fuel having a lower flashpoint than otherwise specified in clause (a) (i) of sub-rule (2) is permitted.

(vi) Ships carrying oil fuel will prior to bunkering be provided with a declaration signed and certified by the oil fuel supplier's representative that the oil fuel to be supplied is in conformity with Sub-rule (2), and the test method used for determining the flashpoint. A bunker delivery note for the oil fuel delivered to the ship will contain either the flashpoint specified in accordance with standards acceptable to the IMO or a statement that the flashpoint has been measured at or above 70ºC

(vii) Contracting Governments undertake to ensure that appropriate authorities designated by them inform the IMO, for transmission to Contracting Governments and Member States thereof, of all confirmed cases (flashpoint) where oil fuel suppliers have failed to meet the requirements specified in Sub-rule (2) of this regulation

(viii) Contracting Governments undertake to ensure that appropriate authorities designated by them take action, as appropriate, against oil fuel suppliers that have been found to deliver oil fuel that does not comply with sub-rule (2)(a) of this regulation; and

(ix) oil fuel delivered to and used on board ships will not jeopardize the safety of ships or adversely affect the performance of the machinery or be harmful to personnel.

(b) Arrangements for oil fuel

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

(i) Location of oil fuel systems

As far as practicable, parts of the oil fuel system containing heated oil under pressure exceeding 0.18 N/mm^2 will not be placed in a concealed position such that defects and leakage cannot readily be observed. The machinery spaces in way of such parts of the oil fuel system will be adequately illuminated.

(ii) Ventilation of machinery spaces

The ventilation of machinery spaces will be sufficient under normal conditions to prevent accumulation of oil vapour.

(iii) Oil fuel tanks

(A) Fuel oil, lubrication oil and other flammable oils will not be carried in forepeak tanks.

(B) As far as practicable, oil fuel tanks will be part of the ship's structure and will be located outside machinery spaces of category A. Where oil fuel tanks, other than double bottom tanks, are necessarily located adjacent to or within machinery spaces of category A, at least one of their vertical sides will be contiguous to the machinery space boundaries, and will preferably have a common boundary with the double bottom tanks, and the area of the tank boundary common with the machinery spaces will be kept to a minimum. Where such tanks are situated within the boundaries of machinery spaces of category A they will not contain oil fuel having a flashpoint of less than 60°C. In general, the use of free-standing oil fuel tanks will be avoided. Where permitted, they will be placed in an oil-tight spill tray of ample size having a suitable drain pipe leading to a suitably sized spill oil tank.

(C) No oil fuel tank will be situated where spillage or leakage therefrom can constitute a fire or explosion hazard by falling on heated surfaces.

(D) Oil fuel pipes, which, if damaged, would allow oil to escape from a storage, settling or daily service tank having a capacity of 500 l and above situated above the double bottom, will be fitted with a cock or valve directly on the tank capable of being closed from a safe position outside the space concerned in the event of a fire occurring in the space in which such tanks are situated. In the special case of deep tanks situated in any shaft or pipe tunnel or similar space, valves on the tank will be fitted, but control in the event of fire may be effected by means of an additional valve on the pipe or pipes outside the tunnel or similar space. If such an additional valve is fitted in the machinery space it will be operated from a position outside this space. The controls for remote operation of the valve for the emergency generator fuel tank will be in a separate location from the controls for remote operation of other valves for tanks located in machinery spaces.

(E) Safe and efficient means of ascertaining the amount of oil fuel contained in any oil fuel tank will be provided.

(I) Where sounding pipes are used, they will not terminate in any space where the risk of ignition of spillage from the sounding pipe might arise. In particular, they will not terminate in crew spaces. As a general rule, they will not terminate in machinery spaces. However, where the Director General considers that these latter requirements are impracticable, it may permit termination of sounding pipes in machinery spaces on condition that all of the following requirements are met:

(aa) an oil-level gauge is provided meeting the requirements of sub-rule 2(b)(iii)(E)(II);

(ab) the sounding pipes terminate in locations remote from ignition hazards unless precautions are taken, such as the fitting of effective screens, to prevent the oil fuel in the case of spillage through the terminations of the sounding pipes from coming into contact with a source of ignition; and

(ac) the termination of sounding pipes are fitted with self-closing blanking devices and with a small-diameter self-closing control cock located below

the blanking device for the purpose of ascertaining before the blanking device is opened that oil fuel is not present. Provisions will be made so as to ensure that any spillage of oil fuel through the control cock involves no ignition hazard.

(II) Other oil-level gauges may be used in place of sounding pipes subject to the following conditions:

The failure of such gauges or overfilling of the tank will not permit release of fuel into the space. The use of cylindrical gauge glasses is prohibited. The Director General may permit the use of oil-level gauges with flat glasses and self-closing valves between the gauges and fuel tanks.

(III) The means prescribed in sub-rule (2)(b)(iii)(E)(II) which are acceptable to the Director General will be maintained in the proper condition to ensure their continued accurate functioning in service.

(iv) Prevention of overpressure

Provisions will be made to prevent overpressure in any oil tank or in any part of the oil fuel system, including the filling pipes served by pumps on board. Air and overflow pipes and relief valves will discharge to a position where there is no risk of fire or explosion from the emergence of oils and vapour and will not lead into crew spaces, nor into special category spaces, closed ro-ro cargo spaces, machinery spaces or similar spaces.

(v) Oil fuel piping

(A) Oil fuel pipes and their valves and fittings will be of steel or other approved material, except that restricted use of flexible pipes will be permissible in positions where the Director General is satisfied that they are necessary. Such flexible pipes and end attachments will be of approved fire-resisting materials of adequate strength and will be constructed to the satisfaction of the Director General. For valves fitted to oil fuel tanks and under static pressure, steel or spheroidal-graphite cast iron may be accepted. However, ordinary cast iron valves may be used in piping systems where the design pressure is lower than 7 bar and the design temperature is below 60°C.

(B) External high-pressure fuel delivery lines between the high-pressure fuel pumps and fuel injectors will be protected with a jacketed piping system capable of containing fuel from a high-pressure line failure. A jacketed pipe incorporates an outer pipe into which the high-pressure fuel pipe is placed, forming a permanent assembly. The jacketed piping system will include a means for collection of leakages and arrangements will be provided with an alarm in case of a fuel line failure.

(C) Oil fuel lines will not be located immediately above or near units of high temperature including boilers, steam pipelines, exhaust manifolds, silencers or other equipment required to be insulated by sub- clause (vi) of clause(b) of sub-rule (2). As far as practicable, oil fuel lines will be arranged far apart from hot surfaces, electrical installations or other sources of ignition and will be screened or otherwise suitably protected to avoid oil spray or oil leakage onto the sources of ignition. The number of joints in such piping systems will be kept to a minimum.

(D) Components of a diesel engine fuel system will be designed considering the maximum peak pressure which will be experienced in service, including any high pressure pulses which are generated and transmitted back into the fuel supply and spill lines by the action of fuel injection pumps. Connections within the fuel supply and spill lines will be constructed having regard to their ability to prevent pressurized oil fuel leaks while in service and after maintenance.

(E) In multi-engine installations which are supplied from the same fuel source, means of isolating the fuel supply and spill piping to individual engines, will be provided. The means of isolation will not affect the operation of the other engines and will be operable from a position not rendered inaccessible by a fire on any of the engines.

(F) Where the Director General may permit the conveying of oil and combustible liquids through accommodation and service spaces, the pipes conveying oil or combustible liquids will be of a material approved by the Director General having regard to the fire risk.

(vi) Protection of high temperature surfaces

(A) Surfaces with temperatures above 220°C which may be impinged as a result of a fuel system failure will be properly insulated.

(B) Precautions will be taken to prevent any oil that may escape under pressure from any pump, filter or heater from coming into contact with heated surfaces.

(vii) Arrangements for lubricating oil

(A) The arrangements for the storage, distribution and utilization of oil used in pressure lubrication systems will be such as to ensure the safety of the ship and persons on board. The arrangements made in machinery spaces of category A, and whenever practicable in other machinery spaces, will at least comply with the provisions of sub-rules 2(b)(i) (2)(b)(iii)(C),(2)(b)(iii)(D), (2)(b)(E),(2)(b)(iv),(2)(b)(v)(A), 2)(b)(v)(C),(2)(b)(vi) except that:

(I) this does not preclude the use of sight-flow glasses in lubricating systems provided that they are shown by testing to have a suitable degree of fire resistance; and

(II) sounding pipes may be authorized in machinery spaces; however, the requirements of sub-rule(2)(b)(iii)(E)(I)(aa)and (2)(b)(iii)(E)(I)(ac) need not be applied on condition that the sounding pipes are fitted with appropriate means of closure.

(B) The provisions of sub-rule (2)(b)(iii)(D) will also apply to lubricating oil tanks except those having a capacity less than 500 l, storage tanks on which valves are closed during the normal operation mode of the ship, or where it is determined that an unintended operation of a quick closing valve on the oil lubricating tank would endanger the safe operation of the main propulsion and essential auxiliary machinery.

(c) Arrangements for other flammable oils

The arrangements for the storage, distribution and utilization of other flammable oils employed under pressure in power transmission systems, control and activating systems and heating systems will be such as to ensure the safety of the ship and persons on board. Suitable oil collecting arrangements for leaks will be fitted below hydraulic valves and cylinders. In locations where means of ignition are present, such arrangements will at least comply with the provisions of sub-rules (2)(b)(iii)(c),(2)(b)(iii)(E),(2)(b)(v)(C), (2)(b)(vi) and with the provisions of sub-rules (2)(b)(iv) and)(2)(b)(v)(A) in respect of strength and construction.

(d) Arrangements for oil fuels in periodically unattended machinery spaces

In addition to the requirements of clauses (a) to (d) of sub-rule(2), the oil fuel and lubricating oil systems in a periodically unattended machinery space will comply with the following:

(i) where daily service oil fuel tanks are filled automatically, or by remote control, means will be provided to prevent overflow spillages. Other equipment which treats flammable liquids automatically (e.g. oil fuel purifiers) which, whenever practicable, will be installed in a special space reserved for purifiers and their heaters, will have arrangements to prevent overflow spillages; and

(ii) where daily service oil fuel tanks or settling tanks are fitted with heating arrangements, a high temperature alarm will be provided if the flashpoint of the oil fuel can be exceeded.

(3) Arrangements for gaseous fuel for domestic purposes

Gaseous fuel systems used for domestic purposes will be approved by the Director General. Storage of gas bottles will be located on the open deck or in a well ventilated space which opens only to the open deck.

(4) Miscellaneous items of ignition and ignitability

(a) Electric radiators

Electric radiators, if used, will be fixed in position and so constructed as to reduce fire risks to a minimum. No such radiators will be fitted with an element so exposed that clothing, curtains, or other similar materials can be scorched or set on fire by heat from the element.

(b) Waste receptacles

Waste receptacles will be constructed of non-combustible materials with no openings in the sides or bottom.

(c) Insulation surfaces protected against oil penetration

In spaces where penetration of oil products is possible, the surface of insulation will be impervious to oil or oil vapours.

(d) Primary deck coverings

Primary deck coverings, if applied within accommodation and service spaces and control stations, will be of approved material which will not readily ignite, this being determined in accordance with the Fire Test Procedures Code.

(5) Cargo areas of tankers

(a) Separation of cargo oil tanks

(i) Cargo pump-rooms, cargo tanks, slop tanks and cofferdams will be positioned forward of machinery spaces. However, oil fuel bunker tanks need not be forward of machinery spaces. Cargo tanks and slop tanks will be isolated from machinery spaces by cofferdams, cargo pump-rooms, oil bunker tanks or ballast tanks. Pump-rooms containing pumps and their accessories for ballasting those spaces situated adjacent to cargo tanks and slop tanks and pumps for oil fuel transfer, will be considered as equivalent to a cargo pump-room within the context of this rule provided that such pump-rooms have the same safety standard as that required for cargo pump-rooms. Pump-rooms intended solely for ballast or oil fuel transfer, however, need not comply with the requirements of sub-rule (9) of rule 77. The lower portion of the pump-room may be recessed into machinery spaces of category A to accommodate pumps, provided that the deck head of the recess is in general not more than one third of the moulded depth above the keel, except that in the case of ships of not more than 25,000 tonnes deadweight, where it can be demonstrated that for reasons of access and satisfactory piping arrangements this is impracticable, the Director General may permit a recess in excess of such height, but not exceeding one half of the moulded depth above the keel.

(ii) Main cargo control stations, control stations, accommodation and service spaces (excluding isolated cargo handling gear lockers) will be positioned aft of cargo tanks, slop tanks, and spaces which isolate cargo or slop tanks from machinery spaces, but not necessarily aft of the oil fuel bunker tanks and ballast tanks, and will be arranged in such a way that a single failure of a deck or bulkhead will not permit the entry of gas or fumes from the cargo tanks into an accommodation spaces, main cargo control stations, control stations, or service spaces. A recess provided in accordance with sub- clause (i) of clause (a) sub-rule (5) need not be taken into account when the position of these spaces is being determined.

(iii) However, where deemed necessary, the Director General may permit main cargo control stations, control stations, accommodation and service spaces forward of the cargo tanks, slop tanks and spaces which isolate cargo and slop tanks from machinery spaces, but not necessarily forward of oil fuel bunker tanks or ballast tanks. Machinery spaces, other than those of category A, may be permitted forward of the cargo tanks

and slop tanks provided they are isolated from the cargo tanks and slop tanks by cofferdams, cargo pump-rooms, oil fuel bunker tanks or ballast tanks, and have at least one portable fire extinguisher. In cases where they contain internal combustion machinery, one approved foam-type extinguisher of at least 45 l capacity or equivalent will be arranged in addition to portable fire extinguishers. If operation of a semi-portable fire extinguisher is impracticable, this fire extinguisher may be replaced by two additional portable fire extinguishers. Main cargo control stations, control stations and accommodation and service spaces will be arranged in such a way that a single failure of a deck or bulkhead will not permit the entry of gas or fumes from the cargo tanks into such spaces. In addition, where deemed necessary for the safety or navigation of the ship, the Director General may permit machinery spaces containing internal combustion machinery not being main propulsion machinery having an output greater than 375 kW to be located forward of the cargo area provided the arrangements are in accordance with the provisions of this sub-rule.

(iv) In combination carriers only:

(A) The slop tanks will be surrounded by cofferdams except where the boundaries of the slop tanks are part of the hull, main cargo deck, cargo pump-room bulkhead or oil fuel bunker tank. These cofferdams will not be open to a double bottom, pipe tunnel, pump-room or other enclosed space, nor will they be used for cargo or ballast and will not be connected to piping systems serving oil cargo or ballast. Means will be provided for filling the cofferdams with water and for draining them. Where the boundary of a slop tank is part of the cargo pump-room bulkhead, the pump-room will not be open to the double bottom, pipe tunnel or other enclosed space; however, openings provided with gastight bolted covers may be permitted;

(B) Means will be provided for isolating the piping connecting the pump-room with the slop tanks referred to in sub-rule (5)(a)(iv)(A). The means of isolation will consist of a valve followed by a spectacle flange or a spool piece with appropriate blank flanges. This arrangement will be located adjacent to the slop tanks, but where this is unreasonable or impracticable, it may be located within the pump-room directly after the piping penetrates the bulkhead. A separate permanently installed pumping and piping arrangement incorporating a manifold,

provided with a shut-off valve and a blank flange, will be provided for discharging the contents of the slop tanks directly to the open deck for disposal to shore reception facilities when the ship is in the dry cargo mode. When the transfer system is used for slop transfer in the dry cargo mode, it will have no connection to other systems. Separation from other systems by means of removal of spool pieces may be accepted;

(C) Hatches and tank cleaning openings to slop tanks will only be permitted on the open deck and will be fitted with closing arrangements. Except where they consist of bolted plates with bolts at watertight spacing, these closing arrangements will be provided with locking arrangements under the control of the responsible ship's officer; and

(D) Where cargo wing tanks are provided, cargo oil lines below deck will be installed inside these tanks. However, the Director General may permit cargo oil lines to be placed in special ducts provided they are capable of being adequately cleaned and ventilated to the satisfaction of the Director General. Where cargo wing tanks are not provided, cargo oil lines below deck will be placed in special ducts.

(v) Where the fitting of a navigation position above the cargo area is shown to be necessary, it will be for navigation purposes only and it will be separated from the cargo tank deck by means of an open space with a height of at least 2 m. The fire protection requirements for such a navigation position will be that required for control stations, as specified in sub- clause (ii) of clause(c) of sub-rule(2) of rule 76 and other provisions for tankers, as applicable.

(vi) Means will be provided to keep deck spills away from the accommodation and service areas. This may be accomplished by provision of a permanent continuous coaming of a height of at least 300 mm, extending from side to side. Special consideration will be given to the arrangements associated with stern loading.

(b) Restriction on boundary openings

(i) Except as permitted in in sub- clause (ii) of clause(b) of sub-rule (5), access doors, air inlets and openings to accommodation spaces, service spaces, control stations and machinery spaces will not face the cargo area. They will be located on the transverse bulkhead not facing the cargo area or on the outboard side of the superstructure or deckhouse

at a distance of at least 4% of the length of the ship but not less than 3 m from the end of the superstructure or deckhouse facing the cargo area. This distance need not exceed 5 m.

(ii) The Director General may permit access doors in boundary bulkheads facing the cargo area or within the 5 m limits specified in in sub- clause (i) of clause(b) of sub-rule(5) , to main cargo control stations and to such service spaces used as provision rooms, store-rooms and lockers, provided they do not give access directly or indirectly to any other space containing or providing for accommodation, control stations or service spaces such as galleys, pantries or workshops, or similar spaces containing sources of vapour ignition. The boundary of such a space will be insulated to “A-60” class standard, with the exception of the boundary facing the cargo area. Bolted plates for the removal of machinery may be fitted within the limits specified in sub- clause (i) of clause(b) of sub-rule (5). Wheelhouse doors and windows may be located within the limits specified in sub- clause (i) of clause(b) of sub-rule (5) so long as they are designed to ensure that the wheelhouse can be made rapidly and efficiently gastight and vapour tight.

(iii) Windows and side scuttles facing the cargo area and on the sides of the superstructures and deckhouses within the limits specified in sub-clause (i) of clause(b) of sub-rule (5) will be of the fixed (non-opening) type. Such windows and side scuttles, except wheelhouse windows, will be constructed to “A-60” class standard except that “A-0” class standard is acceptable for windows and sidescuttles outside the limit specified in Rule 76, Sub-rule 2(c) (10)(E).

(iv) Where there is permanent access from a pipe tunnel to the main pump-room, a watertight door will be fitted complying with the requirements of Rule 28 (2) chapter II, and, in addition, with the following:

(A) in addition to the bridge operation, the watertight door will be capable of being manually closed from outside the main pump-room entrance; and

(B) the watertight door will be kept closed during normal operations of the ship except when access to the pipe tunnel is required.

(v) Permanent approved gastight lighting enclosures for illuminating cargo pump-rooms may be permitted in bulkheads and decks separating cargo pump-rooms and other spaces provided they are of adequate strength and the integrity and gas tightness of the bulkhead or deck are maintained.

(vi) The arrangement of ventilation inlets and outlets and other deckhouse and superstructure boundary space openings will be such as to complement the provisions of clause(c) of sub-rule (5) of this rule and sub-rule (6) of rule 78. Such vents, especially for machinery spaces, will be situated as far aft as practicable. Due consideration in this regard will be given when the ship is equipped to load or discharge at the stern. Sources of ignition such as electrical equipment will be so arranged as to avoid an explosion hazard.

(c) Cargo tank venting

(i) General requirements

The venting systems of cargo tanks will be entirely distinct from the air pipes of the other compartments of the ship. The arrangements and position of openings in the cargo tank deck from which emission of flammable vapours can occur will be such as to minimize the possibility of flammable vapours being admitted to enclosed spaces containing a source of ignition or collecting in the vicinity of deck machinery and equipment which may constitute an ignition hazard. In accordance with this general principle, the criteria in sub- clause (ii) and (v) of clause(c) of sub-rule(5) of this rule and sub-rule(6) of rule 78 will apply.

(ii) Venting arrangements

(A) The venting arrangements in each cargo tank may be independent or combined with other cargo tanks and may be incorporated into the inert gas piping.

(B) Where the arrangements are combined with other cargo tanks, either stop valves or other acceptable means will be provided to isolate each cargo tank. Where stop valves are fitted, they will be provided with locking arrangements which will be under the control of the responsible ship’s officer. There will be a clear visual indication of the operational status of the valves or other acceptable means. Where tanks have been isolated, it will be ensured that relevant isolating valves are opened before cargo loading or ballasting or discharging of those tanks is commenced. Any isolation must continue to permit the flow caused by thermal variations in a cargo tank in accordance with sub- clause (i) of clause(a) of sub-rule (6) of rule78. For tankers

constructed on or after 1 January 2017, any isolation will also continue to permit the passage of large volumes of vapour, air or inert gas mixtures during cargo loading and ballasting, or during discharging in accordance with Rule 78 Sub-rule (6)(a)(ii) regulation 11.6.1.2

(C) If cargo loading and ballasting or discharging of a cargo tank or cargo tank group is intended, which is isolated from a common venting system, that cargo tank or cargo tank group will be fitted with a means for over-pressure or under-pressure protection as required in sub- clause (ii) of clause(c) of sub-rule (6) of rule78.

(D) The venting arrangements will be connected to the top of each cargo tank and will be self-draining to the cargo tanks under all normal conditions of trim and list of the ship. Where it may not be possible to provide self-draining lines, permanent arrangements will be provided to drain the vent lines to a cargo tank.

(iii) Safety devices in venting systems

The venting system will be provided with devices to prevent the passage of flame into the cargo tanks. The design, testing and locating of these devices will comply with the requirements established by the Director General based on the guidelines developed by the IMO. Ullage openings will not be used for pressure equalization. They will be provided with self-closing and tightly sealing covers. Flame arresters and screens are not permitted in these openings.

(iv) Vent outlets for cargo handling and ballasting

(A) Vent outlets for cargo loading, discharging and ballasting required by sub- clause (ii) of clause (a) of sub-rule (6) of rule 78 will:

(I) (aa) permit the free flow of vapour mixtures; or

(bb) permit the throttling of the discharge of the vapour mixtures to achieve a velocity of not less than 30 m/s;

(II) be so arranged that the vapour mixture is discharged vertically upwards;

(III) where the method is by free flow of vapour mixtures, be such that the outlet will be not less than 6 m above the cargo tank deck or fore and aft gangway if situated within 4 m of the gangway and located not less than 10 m measured horizontally from the

nearest air intakes and openings to enclosed spaces containing a source of ignition and from deck machinery, which may include anchor windlass and chain locker openings, and equipment which may constitute an ignition hazard; and

(IV) where the method is by high-velocity discharge, be located at a height not less than 2 m above the cargo tank deck and not less than 10 m measured horizontally from the nearest air intakes and openings to enclosed spaces containing a source of ignition and from deck machinery, which may include anchor windlass and chain locker openings, and equipment which may constitute an ignition hazard. These outlets will be provided with high-velocity devices of an approved type.

(B) The arrangements for the venting of vapours displaced from the cargo tanks during loading and ballasting will comply with clause (c) of sub-rule (5) of this rule and sub-rule (6) of rule 78 and will consist of either one or more mast risers, or a number of high-velocity vents. The inert gas supply main may be used for such venting.

(v) Isolation of slop tanks in combination carriers

In combination carriers, the arrangements for isolating slop tanks containing oil or oil residues from other cargo tanks will consist of blank flanges which will remain in position at all times when cargoes other than liquid cargoes referred to in clause (a) of sub-rule (6) of rule 69 are carried.

(d) Ventilation

(i) Ventilation systems in cargo pump-rooms

Cargo pump-rooms will be mechanically ventilated and discharges from the exhaust fans will be led to a safe place on the open deck. The ventilation of these rooms will have sufficient capacity to minimize the possibility of accumulation of flammable vapours. The number of air changes will be at least 20 per hour, based upon the gross volume of the space. The air ducts will be arranged so that all of the space is effectively ventilated. The ventilation will be of the suction type using fans of the non-sparking type.

(ii) Ventilation systems in combination carriers

In combination carriers, cargo spaces and any enclosed spaces adjacent to cargo spaces will be capable of being mechanically ventilated.

The mechanical ventilation may be provided by portable fans. An approved fixed gas warning system capable of monitoring flammable vapours will be provided in cargo pump-rooms, pipe ducts and cofferdams, as referred to in sub- clause (iv) of clause(a) of sub-rule (5) adjacent to slop tanks. Suitable arrangements will be made to facilitate measurement of flammable vapours in all other spaces within the cargo area. Such measurements will be made possible from the open deck or easily accessible positions

(e) Inert gas systems

(i) Application

(A) For tankers of 20,000 tonnes deadweight and upwards constructed on or after 1 July 2002 but before 1 January 2016, the protection of the cargo tanks will be achieved by a fixed inert gas system in accordance with the requirements of the Fire Safety Systems Code, as adopted by resolution MSC.98(73) except that the Director General may accept other equivalent systems or arrangements, as described in Sub clause (iv) of clause (e) of Sub-rule (5).

(B) For tankers of 8,000 tonnes deadweight and upwards constructed on or after 1 January 2016 when carrying cargoes described in Rule 69 sub-rule(6)(i) and (ii), the protection of the cargo tanks will be achieved by a fixed inert gas system in accordance with the requirements of the Fire Safety Systems Code, except that the Director General may accept other equivalent systems or arrangements, as described in Sub-rule(5)(e)(iv)

(C) Tankers operating with a cargo tank cleaning procedure using crude oil washing will be fitted with an inert gas system complying with the Fire Safety Systems Code and with fixed tank washing machines. However, inert gas systems fitted on tankers constructed on or after 1 July 2002 but before 1 January 2016 will comply with the Fire Safety Systems Code, as adopted by resolution MSC.98(73).

(D) Tankers required to be fitted with inert gas systems will comply with the following provisions:

(I) double hull spaces will be fitted with suitable connections for the supply of inert gas;

(II) where hull spaces are connected to a permanently fitted inert gas distribution system, means will be provided to prevent

hydrocarbon gases from the cargo tanks entering the double hull spaces through the system; and

(III) where such spaces are not permanently connected to an inert gas distribution system, appropriate means will be provided to allow connection to the inert gas main.

(ii) Inert gas systems of chemical tankers and gas carriers

(A) The requirements for inert gas systems contained in the Fire Safety Systems Code need not be applied to chemical tankers constructed before 1 January 2016, including those constructed before 1 July 2012, and all gas carriers:

(I) when carrying cargoes described in Rule 69 Sub-rule(6)(i), provided that they comply with the requirements for inert gas systems on chemical tankers established by the Director General, based on the guidelines developed by the IMO; or

(II) when carrying flammable cargoes other than crude oil or petroleum products such as cargoes listed in chapters 17 and 18 of the International Bulk Chemical Code, provided that the capacity of tanks used for their carriage does not exceed 3,000 m^3 and the individual nozzle capacities of tank washing machines do not exceed 17.5 m^3/h and the total combined throughput from the number of machines in use in a cargo tank at any one time does not exceed 110 m^3/h.

(iii) General requirements for inert gas systems

(A) The inert gas system will be capable of inerting, purging and gas-freeing empty tanks and maintaining the atmosphere in cargo tanks with the required oxygen content.

(B) Tankers fitted with a fixed inert gas system will be provided with a closed ullage system.

(iv) Requirements for equivalent systems

(A) The director general may, after having given consideration to the ship's arrangement and equipment, accept other fixed installations, in accordance with regulation I/5 of SOLAS and.sub clause (C) of clause (iv) of (b) of Sub-rule (5).

(B) or tankers of 8,000 tonnes deadweight and upwards but less than 20,000 tonnes deadweight constructed on or after 1 January 2016, in lieu of fixed installations as required by sub clause (A) of clause (iv) of (b) of Sub-rule (5), the Director General may accept other equivalent arrangements or means of

protection in accordance with regulation I/5 of SOLAS and sub clause (C) of clause (iv) of (b) of Sub-rule (5).

(C) Equivalent systems or arrangements will:

(I) be capable of preventing dangerous accumulations of explosive mixtures in intact cargo tanks during normal service throughout the ballast voyage and necessary in-tank operations; and

(II) be so designed as to minimize the risk of ignition from the generation of static electricity by the system itself.

(f) Inerting, purging and gas-freeing

(i) Arrangements for purging and/or gas-freeing will be such as to minimize the hazards due to dispersal of flammable vapours in the atmosphere and to flammable mixtures in a cargo tank.

(ii) The procedure for cargo tank purging and/or gas-freeing will be carried out in accordance with clause(b) of sub-rule (3) of rule 83.

(iii) The arrangements for inerting, purging or gas-freeing of empty tanks as required in sub-rule (5)(e)(iii)(A) will be to the satisfaction of the Director General and will be such that the accumulation of hydrocarbon vapours in pockets formed by the internal structural members in a tank is minimized and that:

(A) on individual cargo tanks, the gas outlet pipe, if fitted, will be positioned as far as practicable from the inert gas/air inlet and in accordance with clause(c) of sub-rule (5) of this rule and sub-rule (6) of rule 83. The inlet of such outlet pipes may be located either at deck level or at not more than 1 m above the bottom of the tank;

(B) the cross-sectional area of such gas outlet pipe referred to in sub-rule (5)(f)(iii)(A) will be such that an exit velocity of at least 20 m/s can be maintained when any three tanks are being simultaneously supplied with inert gas. Their outlets will extend not less than 2 m above deck level; and

(C) each gas outlet referred to in sub-rule (5)(f)(iii)(B) will be fitted with suitable blanking arrangements.

(g) Gas Measurement

(i) Portable instrument

Tankers will be equipped with at least one portable instrument for measuring flammable vapour concentrations, together with a sufficient set

of spares. Suitable means will be provided for the calibration of such instruments.

(ii) Arrangements for gas measurements in double hull and double bottom spaces

(A) Suitable portable instruments for measuring oxygen and flammable vapour concentrations will be provided. In selecting these instruments, due attention will be given to their use in combination with the fixed gas sampling line systems referred to in sub-rule (5)(g)(ii)(B).

(B) Where the atmosphere in double hull spaces cannot be reliably measured using flexible gas sampling hoses, such spaces will be fitted with permanent gas sampling lines. The configuration of gas sampling lines will be adapted to the design of such spaces.

(C) The materials of construction and the dimensions of gas sampling lines will be such as to prevent restriction. Where plastic materials are used, they will be electrically conductive.

(iii) Arrangements for fixed hydrocarbon gas detection systems in double-hull and double-bottom spaces of oil tankers

(A) In addition to the requirements in Sub-rule (5)(g)(i) and Sub-rule (5)(g)(ii), oil tankers of 20,000 tonnes deadweight and above, constructed on or after 1 January 2012, will be provided with a fixed hydrocarbon gas detection system complying with the Fire Safety Systems Code for measuring hydrocarbon gas concentrations in all ballast tanks and void spaces of double-hull and double-bottom spaces adjacent to the cargo tanks, including the forepeak tank and any other tanks and spaces under the bulkhead deck adjacent to cargo tanks.

(B) Oil tankers provided with constant operative inerting systems for such spaces need not be equipped with fixed hydrocarbon gas detection equipment.

(C) Notwithstanding the above, cargo pump-rooms subject to the provisions of Sub-rule (5)(j) need not comply with the requirements of this paragraph.

(h) Air supply to double hull and double bottom spaces

Double hull and double bottom spaces will be fitted with suitable connections for the supply of air.

(i) Protection of cargo area

Drip pans for collecting cargo residues in cargo lines and hoses will be provided in the area of pipe and hose connections under the manifold area. Cargo hoses and tank washing hoses will have electrical continuity over their entire lengths including couplings and flanges (except shore connections), and will be earthed for removal of electrostatic charges.

(j) Protection of cargo pump-rooms

(i) In tankers:

(A) cargo pumps, ballast pumps and stripping pumps, installed in cargo pump-rooms and driven by shafts passing through pump-room bulkheads will be fitted with temperature sensing devices for bulkhead shaft glands, bearings and pump casings. A continuous audible and visual alarm signal will be automatically effected in the cargo control room or the pump control station;

(B) lighting in cargo pump-rooms, except emergency lighting, will be interlocked with ventilation such that the ventilation will be in operation when switching on the lighting. Failure of the ventilation system will not cause the lighting to go out;

(C) a system for continuous monitoring of the concentration of hydrocarbon gases will be fitted. Sampling points or detector heads will be located in suitable positions in order that potentially dangerous leakages are readily detected. When the hydrocarbon gas concentration reaches a pre-set level which will not be higher than 10% of the lower flammable limit, a continuous audible and visual alarm signal will be automatically effected in the pump-room, engine control room, cargo control room and navigation bridge to alert personnel to the potential hazard; and

(D) all pump-rooms will be provided with bilge level monitoring devices together with appropriately located alarms

72. Fire growth potential.-

(1) Purpose

The purpose of this rule is to limit the fire growth potential in every space of the ship. For this purpose, the following functional requirements will be met:

(a) means of control for the air supply to space will be provided;

(b) means of control for flammable liquids in space will be provided; and

(c) the use of combustible materials will be restricted

(2) Control of air supply and flammable liquid to the space

(a) Closing appliances and stopping devices of ventilation

(i) The main inlets and outlets of all ventilation systems will be capable of being closed from outside the spaces being ventilated. The means of closing will be easily accessible as well as prominently and permanently marked and will indicate whether the shut-off is open or closed.

(ii) Power ventilation of accommodation spaces, service spaces, cargo spaces, control stations and machinery spaces will be capable of being stopped from an easily accessible position outside the space being served. This position will not be readily cut off in the event of a fire in the spaces served.

(b) Means of control in machinery spaces

(i) Means of control will be provided for opening and closure of skylights, closure of openings in funnels which normally allow exhaust ventilation and closure of ventilator dampers.

(ii) Means of control will be provided for stopping ventilating fans. Controls provided for the power ventilation serving machinery spaces will be grouped so as to be operable from two positions, one of which will be outside such spaces. The means provided for stopping the power ventilation of the machinery spaces will be entirely separate from the means provided for stopping ventilation of other spaces.

(iii) Means of control will be provided for stopping forced and induced draught fans, oil fuel transfer pumps, oil fuel unit pumps, lubricating oil service pumps, thermal oil circulating pumps and oil separators (purifiers). However, sub- clause (iv) and (v) of clause(b) of sub-rule(2) need not apply to oily water separators.

(iv) The controls required in sub- clause (i) to (iii) of clause(b) of sub-rule (2) and in rule 71 Sub-rule (2)(b)(iii)(D) will be located outside the space concerned so they will not be cut off in the event of fire in the space they serve.

(c) Additional requirements for means of control in periodically unattended machinery spaces

(i) For periodically unattended machinery spaces, the Director General will give special consideration to maintaining the fire integrity of the machinery spaces, the location and centralization of the fire-extinguishing system controls, the required shutdown arrangements

(e.g. ventilation, fuel pumps, etc.) and that additional fire-extinguishing appliances and other fire-fighting equipment and breathing apparatus may be required.

(3) Fire protection materials

(a) Use of non-combustible materials

(i) Insulating materials

Insulating materials will be non-combustible, except in cargo spaces, mail rooms, baggage rooms and refrigerated compartments of service spaces. Vapour barriers and adhesives used in conjunction with insulation, as well as the insulation of pipe fittings for cold service systems, need not be of non-combustible materials, but they will be kept to the minimum quantity practicable and their exposed surfaces will have low flame-spread characteristics.

(ii) Ceilings and linings

In cargo ships, all linings, ceilings, draught stops and their associated grounds will be of non-combustible materials in the following spaces:

(A) in accommodation and service spaces and control stations for ships where method IC is specified as referred to in sub- clause (i) of clause(c) of sub-rule (2) of rule 76; and

(B) in corridors and stairway enclosures serving accommodation and service spaces and control stations for ships where methods IIC and IIIC are specified as referred to sub- clause (i) of clause(c) of sub-rule (2) of rule 76.

(b) Use of combustible materials

(i))General

(A) In cargo ships, non-combustible bulkheads, ceilings and linings fitted in accommodation and service spaces may be faced with combustible materials, facings, mouldings, decorations and veneers provided such spaces are bounded by non-combustible bulkheads, ceilings and linings in accordance with the provisions of sub- clause (ii) to (iv) of clause (b) of sub-rule (3) and rule 73.

(ii) Maximum calorific value of combustible materials

Combustible materials used on the surfaces and linings specified in sub- clause (i) of clause(b) of sub-rule (3) will have a calorific value not exceeding 45 MJ/m2 of the area for the thickness used. The requirements of this sub-rule are not applicable to the surfaces of furniture fixed to linings or bulkheads.

(iii) (iii)Total volume of combustible materials

Where combustible materials are used in accordance with sub- clause (i) of clause (b) of sub-rule (3), they will comply with the following requirements:

(A) The total volume of combustible facings, mouldings, decorations and veneers in accommodation and service spaces will not exceed a volume equivalent to 2.5 mm veneer on the combined area of the walls and ceiling linings. Furniture fixed to linings, bulkheads or decks need not be included in the calculation of the total volume of combustible materials; and

(B) In the case of ships fitted with an automatic sprinkler system complying with the provisions of the Fire Safety Systems Code, the above volume may include some combustible material used for erection of “C” class divisions.

(iv) Low flame-spread characteristics of exposed surfaces

The following surfaces will have low flame-spread characteristics in accordance with the Fire Test Procedures Code:

In cargo ships:

(A) exposed surfaces in corridors and stairway enclosures and of ceilings in accommodation and service spaces (except saunas) and control stations; and

(B) surfaces and grounds in concealed or inaccessible spaces in accommodation and service spaces and control stations.

73. Smoke generation potential and toxicity. -

(1) Purpose -The purpose of this rule is to reduce the hazard to life from smoke and toxic products generated during a fire in spaces where persons normally work or live. For this purpose, the quantity of smoke and toxic products released from combustible materials, including surface finishes, during fire will be limited.

(2) Paints, varnished and other finishes

Paints, varnishes and other finishes used on exposed interior surfaces will not be capable of producing excessive quantities of smoke and toxic products, this being determined in accordance with the Fire Test Procedures Code.

(3) Primary deck coverings

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

CHAPTER-III

Suppression of fire

74. Detection and alarm.-

(1) Purpose : The purpose of this rule is to detect a fire in the space of origin and to provide for alarm for safe escape and fire-fighting activity. For this purpose, the following functional requirements will be met.

(a) fixed fire detection and fire alarm system installations will be suitable for the nature of the space, fire growth potential and potential generation of smoke and gases;

(b) manually operated call points will be placed effectively to ensure a readily accessible means of notification; and

(c) fire patrols will provide an effective means of detecting and locating fires and alerting the navigation bridge and fire teams

(2) General requirements

(a) A fixed fire detection and fire alarm system will be provided in accordance with the provisions of this rule.

(b) A fixed fire detection and fire alarm system and a sample extraction smoke detection system required in this rule and other rules in this part will be of an approved type and comply with the Fire Safety Systems Code.

(c) Where a fixed fire detection and fire alarm system is required for the protection of spaces other than those specified in clause(a) of sub-rule (5) at least one detector complying with the Fire Safety Systems Code will be installed in each such space.

(3) Initial and periodical tests

(a) The function of fixed fire detection and fire alarm systems required by the relevant rules of this chapter will be tested under varying conditions of ventilation after installation.

(b) The function of fixed fire detection and fire alarm systems will be periodically tested to the satisfaction of the Director General by means of equipment producing hot air at the appropriate temperature, or smoke or aerosol particles having the appropriate range of density or particle size, or other phenomena associated with incipient fires to which the detector is designed to respond.

(4) Protection of machinery spaces

(a) Installation

A fixed fire detection and fire alarm system will be installed in:

(i) periodically unattended machinery spaces; and

(ii) machinery spaces where:

(A) the installation of automatic and remote control systems and equipment has been approved in lieu of continuous manning of the space; and

(B) the main propulsion and associated machinery, including sources of the main sources of electrical power are provided with various degrees of automatic or remote control and are under continuous manned supervision from a control room.

(iii) enclosed spaces containing incinerators

(b) Design

The fixed fire detection and fire alarm system required in sub- clause (i) of clause(a) of sub-rule (4) will be so designed and the detectors so positioned as to detect rapidly the onset of fire in any part of those spaces and under any normal conditions of operation of the machinery and variations of ventilation as required by the possible range of ambient temperatures. Except in spaces of restricted height and where their use is specially appropriate, detection systems using only thermal detectors will not be permitted. The detection system will initiate audible and visual alarms distinct in both respects from the alarms of any other system not indicating fire, in sufficient places to ensure that the alarms are heard and observed on the navigating bridge and by a responsible engineer officer. When the navigating bridge is unmanned the alarm will sound in a place where a responsible member of the crew is on duty.

(5) Protection of accommodation and service spaces and control stations

(a) Smoke detectors in accommodation spaces

Smoke detectors will be installed in all stairways, corridors and escape routes within accommodation spaces. Consideration will be given to the installation of special purpose smoke detectors within ventilation ducting.

(b) Cargo ships

The requirements of this rule will apply to ships constructed on or after 1 January 2026. Ships constructed before 1 January 2026 will comply with the previously applicable requirements of this rule. Accommodation and service

spaces and control stations of cargo ships will be protected by a fixed fire detection and fire alarm system and/or an automatic sprinkler, fire detection and fire alarm system as follows depending on a protection method adopted in accordance with sub- clause (i) of clause(c) of sub-rule(2) of rule 76.

(i) Method IC - A fixed fire detection and fire alarm system will be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces.

(ii) Method IIC - An automatic sprinkler, fire detection and fire alarm system of an approved type complying with the relevant requirements of the Fire Safety Systems Code will be so installed and arranged as to protect accommodation spaces, galleys and other service spaces, except spaces which afford no substantial fire risk such as void spaces, sanitary spaces, etc. In addition, a fixed fire detection and fire alarm system will be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces.

(iii) Method IIIC - A fixed fire detection and fire alarm system will be so installed and arranged as to detect the presence of fire in all accommodation spaces and service spaces, providing smoke detection in corridors, stairways and escape routes within accommodation spaces, except spaces which afford no substantial fire risk such as void spaces, sanitary spaces, etc. In addition, a fixed fire detection and fire alarm system will be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces.

(6) Manually operated call points

Manually operated call points complying with the Fire Safety Systems Code will be installed throughout the accommodation spaces, service spaces and control stations. One manually operated call point will be located at each exit. Manually operated call points will be readily accessible in the corridors of each deck such that no part of the corridor is more than 20 m from a manually operated call point.

75. Control of smoke spread-

(1) Purpose:- The purpose of this rule is to control the spread of smoke in order to minimize the hazards from smoke. For this purpose, means for controlling smoke in atriums, control stations, machinery spaces and concealed spaces will be provided.

(2) Protection of control stations outside machinery spaces: Practicable measures will be taken for control stations outside machinery spaces in order to ensure that ventilation, visibility and freedom from smoke are maintained so that, in the event of fire, the machinery and equipment contained therein may be supervised and continue to function effectively. Alternative and separate means of air supply will be provided and air inlets of the two sources of supply will be so disposed that the risk of both inlets drawing in smoke simultaneously is minimized. At the discretion of the Director General, such requirements need not apply to control stations situated on, and opening on to, an open deck or where local closing arrangements would be equally effective.

The ventilation system serving safety centres may be derived from the ventilation system serving the navigation bridge, unless located in an adjacent main vertical zone.

(3) Release of smoke from machinery spaces

(a) The provisions of this sub-rule will apply to machinery spaces of category A and, where the Director General considers desirable, to other machinery spaces.

(b) Suitable arrangements will be made to permit the release of smoke, in the event of fire, from the space to be protected, subject to the provisions of sub- clause (i) of clause(b) of sub-rule (5) of rule 76. The normal ventilation systems may be acceptable for this purpose.

(c) Means of control will be provided for permitting the release of smoke and such controls will be located outside the space concerned so that, in the event of fire, they will not be cut off from the space they serve.

(4) Draught stops: Air spaces enclosed behind ceilings, panelling or linings will be divided by close-fitting draught stops spaced not more than 14 m apart. In the vertical direction, such enclosed air spaces, including those behind linings of stairways, trunks, etc., will be closed at each deck.

76. Containment of fire.-

(1) Purpose: The purpose of this rule is to contain a fire in the space of origin. For this purpose, the following functional requirements will be met:

(a) the ship will be subdivided by thermal and structural boundaries;

(b) thermal insulation of boundaries will have due regard to the fire risk of the space and adjacent spaces;

(c) the fire integrity of the divisions will be maintained at openings and penetrations.

(2) Thermal and structural boundaries

(a) Thermal and structural subdivision

Ships of all types will be subdivided into spaces by thermal and structural divisions having regard to the fire risks of the spaces

(b) Cargo ships except tankers

(i) Methods of protection in accommodation area

(A) One of the following methods of protection will be adopted in accommodation and service spaces and control stations:

(I) Method IC - The construction of internal divisional bulkheads of non-combustible “B” or “C” class divisions generally without the installation of an automatic sprinkler, fire detection and fire alarm system in the accommodation and service spaces, except as required by Rule 74Sub-rule (5) (a); or

(II) Method IIC - The fitting of an automatic sprinkler, fire detection and fire alarm system as required by Rule 74 (5)(b)(ii); or for the detection and extinction of fire in all spaces in which fire might be expected to originate, generally with no restriction on the type of internal divisional bulkheads; or

(III) Method IIIC - The fitting of a fixed fire detection and fire alarm system as required by Rule 74 (5)(b)(iii); in spaces in which a fire might be expected to originate, generally with no restriction on the type of internal divisional bulkheads, except that in no case must the area of any accommodation space or spaces bounded by an “A” or “B” class division exceed 50 m^2. Consideration may be given by the Director General to increasing this area for public spaces.

(B) The requirements for the use of non-combustible materials in the construction and insulation of boundary bulkheads of machinery spaces, control stations, service spaces, etc., and the protection of the above stairway enclosures and corridors will be common to all three methods outlined in sub-rule (2)(b)(i)(A).

(ii) Bulkheads within accommodation area

(A) Bulkheads required to be “B” class divisions will extend from deck to deck and to the shell or other boundaries. However, where a continuous “B” class ceiling or lining is fitted on both sides of the bulkhead, the bulkhead may terminate at the continuous ceiling or lining.

(B) Method IC - Bulkheads not required by this or other rules for cargo ships to be “A” or “B” class divisions, will be of at least “C” class construction.

(C) Method IIC - There will be no restriction on the construction of bulkheads not required by this or other rules for cargo ships to be “A” or “B” class divisions except in individual cases where “C” class bulkheads are required in accordance with table 1.

(D) Method IIIC - There will be no restriction on the construction of bulkheads not required for cargo ships to be “A” or “B” class divisions except that the area of any accommodation space or spaces bounded by a continuous “A” or “B” class division must in no case exceed 50 m^2, except in individual cases where “C” class bulkheads are required in accordance with table 1. Consideration may be given by the Director General to increasing this area for public spaces.

(iii) Fire integrity of bulkheads and decks

(A) In addition to complying with the specific provisions for fire integrity of bulkheads and decks of cargo ships, the minimum fire integrity of bulkheads and decks will be as prescribed in schedule-1, tables 1 and 2

(B) The following requirements will govern application of the tables:

(I) Tables 1 and 2 will apply respectively to the bulkheads and decks separating adjacent spaces;

(II) For determining the appropriate fire integrity standards to be applied to divisions between adjacent spaces, such spaces are classified according to their fire risk as shown in categories (1) to (11) below. Where the contents and use of a space are such that there is a doubt as to its classification for the purpose of this rule, or where it is possible to assign two or more classifications to a space, it will be treated as a space within the relevant category having the most stringent boundary requirements. Smaller, enclosed rooms within a space that have less than 30% communicating openings to that space are considered separate spaces. The fire integrity of the

boundary bulkheads and decks of such smaller rooms will be as prescribed in schedule 1, tables 9.1 and 9.2. The title of each category is intended to be typical rather than restrictive. The number in parentheses preceding each category refers to the applicable column or row in the tables;

(1) Control stations

Spaces containing emergency sources of power and lighting.

Wheelhouse and chartroom.

Spaces containing the ship's radio equipment.

Fire control stations.

Control room for propulsion machinery when located outside the machinery space.

Spaces containing centralized fire alarm equipment.

(2) Corridors

Corridors and lobbies.

(3) Accommodation spaces

Spaces as defined in Part I Rule 2 Sub-rule (2), excluding corridors.

(4) Stairways

Interior stairway, lifts, totally enclosed emergency escape trunks, and escalators (other than those wholly contained within the machinery spaces) and enclosures thereto.

In this connection, a stairway which is enclosed only at one level will be regarded as part of the space from which it is not separated by a fire door.

(5) Service spaces (low risk)

Lockers and store-rooms not having provisions for the storage of flammable liquids and having areas less than 4 m^2 and drying rooms and laundries.

(6) Machinery spaces of category A

Spaces as defined in Part I Rule 2 Sub-rule (67)

(7) Other machinery spaces

Electrical equipment rooms (auto-telephone exchange, air-conditioning duct spaces).

Spaces as defined in Part I Rule 2 Sub-rule (67) excluding machinery spaces of category A.

(8) Cargo spaces

All spaces used for cargo (including cargo oil tanks) and trunkways and hatchways to such spaces.

(9) Service spaces (high risk)

Galleys, pantries containing cooking appliances, saunas, paint lockers and store-rooms having areas of 4 m^2 or more, spaces for the storage of flammable liquids, and workshops other than those forming part of the machinery spaces.

(10) Open decks

Open deck spaces and enclosed promenades having little or no fire risk. To be considered in this category, enclosed promenades will have no significant fire risk, meaning that furnishings will be restricted to deck furniture. In addition, such spaces will be naturally ventilated by permanent openings.

Air spaces (the space outside superstructures and deckhouses).

(11) Ro-ro and vehicle spaces

Ro-ro spaces as defined Part I Rule 2 Sub-rule (82)

Vehicle spaces as defined in Part I Rule 2 Sub-rule (108).

Table 1 Fire integrity of bulkheads separating adjacent spaces

Spaces		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Control stations	(1)	A-0[e]	A-0	A-60	A-0	A-15	A-60	A-15	A-60	A-60	*	A-60
Corridors	(2)		C	B-0	B-0 A-0[c]	B-0	A-60	A-0	A-0	A-0	*	A-30
Accommodation spaces	(3)			C[a,b]	B-0 A-0[c]	B-0	A-60	A-0	A-0	A-0	*	A-30
Stairways	(4)				B-0 A-0[c]	B-0 A-0[c]	A-60	A-0	A-0	A-0	*	A-30
Service spaces (low risk)	(5)					C	A-60	A-0	A-0	A-0	*	A-0
Machinery spaces of category A	(6)						*	A-0	A-0[g]	A-60	*	A-60[f]
Other machinery spaces	(7)							A-0[d]	A-0	A-0	*	A-0
Cargo spaces	(8)								*	A-0	*	A-0
Service spaces (high risk)	(9)									A-0[d]	*	A-30
Open decks	(10)										–	A-0
Ro-ro and vehicle spaces	(11)											A-30[j]

Table 2 Fire integrity of decks separating adjacent spaces

Space below↓	Space above→	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Control stations	(1)	A-0	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0	*	A-60
Corridors	(2)	A-0	*	*	A-0	*	A-60	A-0	A-0	A-0	*	A-30
Accommodation spaces	(3)	A-60	A-0	*	A-0	*	A-60	A-0	A-0	A-0	*	A-30
Stairways	(4)	A-0	A-0	A-0	*	A-0	A-60	A-0	A-0	A-0	*	A-30
Service spaces (low risk)	(5)	A-15	A-0	A-0	A-0	*	A-60	A-0	A-0	A-0	*	A-0
Machinery spaces of category A	(6)	A-60	A-60	A-60	A-60	A-60	*	A-60[i]	A-30	A-60	*	A-60
Other machinery spaces	(7)	A-15	A-0	A-0	A-0	A-0	A-0	*	A-0	A-0	*	A-0
Cargo spaces	(8)	A-60	A-0	A-0	A-0	A-0	A-0	A-0	*	A-0	*	A-0
Service spaces (high risk)	(9)	A-60	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0[d]	*	A-30
Open decks	(10)	*	*	*	*	*	*	*	*	*	–	A-0[j]
Ro-ro and vehicle spaces	(11)	A-60	A-30	A-30	A-30	A-0	A-60	A-0	A-0	A-30	A-0[j]	A-30[j]

Notes:

To be applied to both tables 9.1 and 9.2 as appropriate.

a No special requirements are imposed upon bulkheads in methods IIC and IIIC fire protection.

b In case of method IIIC “B” class bulkheads of “B-0” rating will be provided between spaces or groups of spaces of 50 m^2 and over in area.

c For clarification as to which applies, see sub- clauses (ii) and(iv) of clause (c) of sub-rule (2).

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

e Bulkheads separating the wheelhouse, chartroom and radio room from each other may have a “B-0” rating.

f An “A-0” rating may be used if no dangerous goods are intended to be carried or if such goods are stowed not less than 3 m horizontally from such a bulkhead.

g For cargo spaces in which dangerous goods are intended to be carried, clause(h) of sub-rule(3)of rule86 applies.

i Fire insulation need not be fitted in the machinery space in category (7) if, in the opinion of the Director General, it has little or no fire risk.

j Ships constructed before 1 July 2014 will comply, as a minimum, with the previous requirements applicable at the time the ship was constructed, as specified in rule 66 sub clause (2)

* Where an asterisk appears in the tables, the division is required to be of steel or other equivalent material but is not required to be of “A” class standard. However, where a deck, except an open deck, is penetrated for the passage of electric cables, pipes and vent ducts, such penetrations should be made tight to prevent the passage of flame and smoke. Divisions between control stations (emergency generators) and open decks may have air intake openings without means for closure, unless a fixed gas fire-fighting system is fitted.

(III) Continuous “B” class ceilings or linings, in association with the relevant decks or bulkheads, may be accepted as contributing, wholly or in part, to the required insulation and integrity of a division.

(IV) External boundaries which are required in sub-rule (2) of rule78 to be of steel or other equivalent material may be pierced for the fitting of windows and side scuttles provided that there is no requirement for such boundaries of cargo ships to have “A” class integrity. Similarly, in such boundaries which are not required to have “A” class integrity, doors may be constructed of materials which are to the satisfaction of the Director General.

(iv) Protection of stairways and lift trunks in accommodation spaces, service spaces and control stations

(A) Stairways which penetrate only a single deck will be protected, at a minimum, at one level by at least “B-0” class divisions and self-closing doors. Lifts which penetrate only a single deck will be surrounded by “A-0” class divisions with steel doors at both levels. Stairways and lift trunks which penetrate more than a single deck will be surrounded by at least “A-0” class divisions and be protected by self-closing doors at all levels.

(B) On ships having accommodation for 12 persons or less, where stairways penetrate more than a single deck and where there are at least two escape routes direct to the open deck at every accommodation level, the “A-0” requirements of sub-rule (2)(b)(iv)(A) may be reduced to “B-0”.

(c) **Tankers**

(i) Application

For tankers, only method IC as defined in sub-rule (2)(b)(i)(A) will be used.

(ii) Fire integrity of bulkheads and decks

(A) In lieu of clause (b) of sub-rule (2) and in addition to complying with the specific provisions for fire integrity of bulkheads and decks of tankers, the minimum fire integrity of bulkheads and decks will be as prescribed in tables 3 and 4.

(B) The following requirements will govern application of the tables:

(I) Tables 3 and 4- will apply respectively to the bulkhead and decks separating adjacent spaces;

(II) For determining the appropriate fire integrity standards to be applied to divisions between adjacent spaces, such spaces are classified according to their fire risk as shown in categories (1) to (10) below. Where the contents and

use of a space are such that there is a doubt as to its classification for the purpose of this rule, or where it is possible to assign two or more classifications to a space, it will be treated as a space within the relevant category having the most stringent boundary requirements. Smaller, enclosed areas within a space that have less than 30% communicating openings to that space are considered separate areas. The fire integrity of the boundary bulkheads and decks of such smaller spaces will be as prescribed in tables 3 and 4. The title of each category is intended to be typical rather than restrictive. The number in parentheses preceding each category refers to the applicable column or row in the tables;

(1) Control stations

Spaces containing emergency sources of power and lighting.

Wheelhouse and chartroom.

Spaces containing the ship's radio equipment.

Fire control stations.

Control room for propulsion machinery when located outside the machinery space.

Spaces containing centralized fire alarm equipment.

(2) Corridors

Corridors and lobbies.

(3) Accommodation spaces

Spaces as defined in Part I Rule 2 Sub-rule (2),, excluding corridors.

(4) Stairways

Interior stairways, lifts, totally enclosed emergency escape trunks, and escalators (other than those wholly contained within the machinery spaces) and enclosures thereto.

In this connection, a stairway which is enclosed only at one level will be regarded as part of the space from which it is not separated by a fire door.

(5) Service spaces (low risk)

Lockers and store-rooms not having provisions for the storage of flammable liquids and having areas less than 4 m2 and drying rooms and laundries.

(6) Machinery spaces of category A

Spaces as defined in Part I Rule 2 Sub-rule (64)

(7) Other machinery spaces

Electrical equipment rooms (auto-telephone exchange and air-conditioning duct spaces).

Spaces as defined in Part I Rule 2 Sub-rule (63) excluding machinery spaces of category A.

(8) Cargo pump-rooms

Spaces containing cargo pumps and entrances and trunks to such spaces.

(9) Service spaces (high risk)

Galleys, pantries containing cooking appliances, saunas, paint lockers and store-rooms having areas of 4 m^2 or more, spaces for the storage of flammable liquids and workshops other than those forming part of the machinery spaces.

(10) Open decks

Open deck spaces and enclosed promenades having little or no fire risk. To be considered in this category, enclosed promenades will have no significant fire risk, meaning that furnishings will be restricted to deck furniture. In addition, such spaces will be naturally ventilated by permanent openings.

Air spaces (the space outside superstructures and deckhouses).

(III) Continuous “B” class ceilings or linings, in association with the relevant decks or bulkheads, may be accepted as contributing, wholly or in part, to the required insulation and integrity of a division.

(IV) External boundaries which are required in sub-rule (2) of rule 78 to be of steel or other equivalent material may be pierced for the fitting of windows and side scuttles provided that there is no requirement for such boundaries of tankers to have “A” class integrity. Similarly, in such boundaries which are not required to have “A” class integrity, doors may be constructed of materials which are to the satisfaction of the Director General.

(V) Exterior boundaries of superstructures and deckhouses enclosing accommodation and including any overhanging decks which support such accommodation will be constructed of steel and insulated to “A-60” standard for the whole of the portions which face the cargo area and on the outward sides for a distance of 3 m from the end boundary facing the cargo area. The distance of 3 m will be measured horizontally and parallel to the middle line of the ship from the boundary which faces the cargo area at each deck level. In the case of the sides of those

superstructures and deckhouses, such insulation will be carried up to the underside of the deck of the navigation bridge.

(VI) Skylights to cargo pump-rooms will be of steel, will not contain any glass and will be capable of being closed from outside the pump-room.

Table 3 Fire integrity of bulkheads separating adjacent spaces

Spaces		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Control stations	(1)	A-0[c]	A-0	A-60	A-0	A-15	A-60	A-15	A-60	A-60	*
Corridors	(2)		C	B-0	B-0 A-0[a]	B-0	A-60	A-0	A-60	A-0	*
Accommodation spaces	(3)			C	B-0 A-0[a]	B-0	A-60	A-0	A-60	A-0	*
Stairways	(4)				B-0 A-0[a]	B-0 A-0[a]	A-60	A-0	A-60	A-0	*
Service spaces (low risk)	(5)					C	A-60	A-0	A-60	A-0	*
Machinery spaces of category A	(6)						*	A-0	A-0[d]	A-60	*
Other machinery spaces	(7)							A-0[b]	A-0	A-0	*
Cargo pump-rooms	(8)								*	A-60	*

Service spaces (high risk)	(9)									A-0[b]	*
Open decks	(10)										-

Table 4 Fire integrity of decks separating adjacent spaces

Space below↓ Space above→		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Control stations	(1)	A-0	A-0	A-0	A-0	A-0	A-60	A-0	-	A-0	*
Corridors	(2)	A-0	*	*	A-0	*	A-60	A-0	-	A-0	*
Accommodation spaces	(3)	A-60	A-0	*	A-0	*	A-60	A-0	-	A-0	*
Stairways	(4)	A-0	A-0	A-0	*	A-0	A-60	A-0	-	A-0	*
Service spaces (low risk)	(5)	A-15	A-0	A-0	A-0	*	A-60	A-0	-	A-0	*
Machinery spaces of category A	(6)	A-60	A-60	A-60	A-60	A-60	*	A-60[e]	A-0	A-60	*
Other machinery spaces	(7)	A-15	A-0	A-0	A-0	A-0	A-0	*	A-0	A-0	*
Cargo pump-rooms	(8)	-	-	-	-	-	A-0[d]	A-0	*	-	*
Service spaces (high risk)	(9)	A-60	A-0	A-0	A-0	A-0	A-60	A-0	-	A-0[b]	*
Open decks	(10)	*	*	*	*	*	*	*	*	*	-
Notes:											

To be applied to tables 3 and 4 as appropriate.

a For clarification as to which applies, see sub- clauses (ii) and (iv) of clause(b) of sub-rule(2)

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

c Bulkheads separating the wheelhouse, chartroom and radio room from each other may have a “B-0” rating.

d Bulkheads and decks between cargo pump-rooms and machinery spaces of category A may be penetrated by cargo pump shaft glands and similar gland penetrations, provided that gastight seals with efficient lubrication or other means of ensuring the permanence of the gas seal are fitted in way of the bulkheads or deck.

e Fire insulation need not be fitted in the machinery space in category (7) if, in the opinion of the Central Government, it has little or no fire risk.

* Where an asterisk appears in the table, the division is required to be of steel or other equivalent material, but is not required to be of “A” class standard. However, where a deck, except an open deck, is penetrated for the passage of electric cables, pipes and vent ducts, such penetrations will be made tight to prevent the passage of flame and smoke. Divisions between control stations (emergency generators) and open decks may have air intake openings without means for closure, unless a fixed gas fire-fighting system is fitted.

(3) Penetrations in fire-resisting divisions and prevention of heat transmission

(a) Where “A” class divisions are penetrated, such penetrations will be tested in accordance with the Fire Test Procedures Code. In the case of ventilation, ducts sub- clause (ii) of clause(a) of sub-rule(7),sub- clause (i) of clause(c) of sub-rule(7), apply. However, where a pipe penetration is made of steel or equivalent material having a thickness of 3 mm or greater and a length of not less than 900 mm (preferably 450 mm on each side of the division), and no openings, testing is not required. Such penetrations will be suitably insulated by extension of the insulation at the same level of the division.

(b) Where “B” class divisions are penetrated for the passage of electric cables, pipes, trunks, ducts, etc., or for the fitting of ventilation terminals, lighting fixtures and similar devices, arrangements will be made to ensure that the fire resistance is not impaired, subject to the provisions of sub- clause (ii) of clause(c) of sub-rule(7). Pipes other than steel or copper that penetrate “B” class divisions will be protected by either:

(i) a fire-tested penetration device, suitable for the fire resistance of the division pierced and the type of pipe used; or

(ii) a steel sleeve, having a thickness of not less than 1.8 mm and a length of not less than 900 mm for pipe diameters of 150 mm or more and not less than 600 mm for pipe diameters of less than 150 mm (preferably equally divided to each side of the division). The pipe will be connected to the ends of the sleeve by flanges or couplings; or the clearance between the sleeve and the pipe will not exceed 2.5 mm; or any clearance between pipe and sleeve will be made tight by means of non-combustible or other suitable material.

(c) Uninsulated metallic pipes penetrating “A” or “B” class divisions will be of materials having a melting temperature which exceeds 950°C for “A-0” and 850°C for “B-0” class divisions.

(d) In approving structural fire protection details, the Director General will have regard to the risk of heat transmission at intersections and terminal points of required thermal barriers. The insulation of a deck or bulkhead will be carried past the penetration, intersection or terminal point for a distance of at least 450 mm in the case of steel and aluminum structures. If a space is divided with a deck or a bulkhead of “A” class standard having insulation of different values, the insulation with the higher value will continue on the deck or bulkhead with the insulation of the lesser value for a distance of at least 450 mm.

(4) Protection of openings in fire – resisting divisions

(a) Doors in fire-resisting divisions in cargo ships

(i) The fire resistance of doors will be equivalent to that of the division in which they are fitted, this being determined in accordance with the Fire Test Procedures Code. Doors approved as "A" class without the sill being part of the frame, which are installed on or after 1 July 2010, will be installed such that the gap under the door does not exceed 12 mm and a non-combustible sill will be installed under the door such that floor

coverings do not extend beneath the closed door. Doors approved as "B" class without the sill being part of the frame, which are installed on or after 1 July 2010, will be installed such that the gap under the door does not exceed 25 mm. Doors and door frames in “A” class divisions will be constructed of steel. Doors in “B” class divisions will be non-combustible. Doors fitted in boundary bulkheads of machinery spaces of category A will be reasonably gastight and self-closing. In ships constructed according to method IC, the Director General may permit the use of combustible materials in doors separating cabins from individual interior sanitary accommodation such as showers.

(ii) Doors required to be self-closing will not be fitted with hold-back hooks. However, hold-back arrangements fitted with remote release devices of the fail-safe type may be utilized.

(iii) In corridor bulkheads, ventilation openings may be permitted in and under the doors of cabins and public spaces. Ventilation openings are also permitted in “B” class doors leading to lavatories, offices, pantries, lockers and store rooms. Except as permitted below, the openings will be provided only in the lower half of a door. Where such an opening is in or under a door the total net area of any such opening or openings will not exceed 0.05 m^2. Alternatively, a non-combustible air balance duct routed between the cabin and the corridor, and located below the sanitary unit is permitted where the cross-sectional area of the duct does not exceed 0.05 m^2. Ventilation openings, except those under the door, will be fitted with a grille made of non-combustible material.

(iv) Watertight doors need not be insulated.

(5) Protection of openings in machinery space boundaries

(a) Application - The provision of this rule will apply to machinery spaces of category A and, where the Director General considers it desirable, to other machinery spaces.

(b) Protection of openings in machinery space boundaries

(i) The number of skylights, doors, ventilators, openings in funnels to permit exhaust ventilation and other openings to machinery spaces will be reduced to a minimum consistent with the needs of ventilation and the proper and safe working of the ship.

(ii) Skylights will be of steel and will not contain glass panels.

(iii) Means of control will be provided for closing power-operated doors or actuating release mechanisms on doors other than power-operated watertight doors. The control will be located outside the space concerned, where they will not be cut off in the event of fire in the space it serves.

(iv) Windows will not be fitted in machinery space boundaries. However, this does not preclude the use of glass in control rooms within the machinery spaces.

(6) Protection of cargo space boundaries:

In tankers, for the protection of cargo tanks carrying crude oil and petroleum products having a flashpoint not exceeding 60°C, materials readily rendered ineffective by heat will not be used for valves, fittings, tank opening covers, cargo vent piping, and cargo piping so as to prevent the spread of fire to the cargo.

(7) Ventilation systems (This rule applies to ships constructed on or after 1 January 2026)

(a) General

(i) Ventilation ducts, including single and double wall ducts, will be of steel or equivalent material except flexible bellows of short length not exceeding 600 mm used for connecting fans to the ducting in air-conditioning rooms. Unless expressly provided otherwise in rule 7(a)(vi), any other material used in the construction of ducts, including insulation, will also be non-combustible. However, short ducts, not generally exceeding 2 m in length and with a free cross-sectional area not exceeding 0.02 m^2, need not be of steel or equivalent material, subject to the following conditions:

(A) the ducts will be made of non-combustible material, which may be faced internally and externally with membranes having low flame-spread characteristics and, in each case, a calorific value not exceeding 45 MJ/m^2 of their surface area for the thickness used;

(B) the ducts are only used at the end of the ventilation device; and

(C) the ducts are not situated less than 600 mm, measured along the duct, from an opening in an “A” or “B” class division including continuous “B” class ceiling.

(ii) The following arrangements will be tested in accordance with the Fire Test Procedures Code:

(A) fire dampers, including their relevant means of operation, however, the testing is not required for dampers located at the lower end of the duct in exhaust ducts for galley ranges, which must be of steel and capable of stopping the draught in the duct; and

(B) duct penetrations through “A” class divisions. However, the test is not required where steel sleeves are directly joined to ventilation ducts by means of riveted or screwed flanges or by welding

(iii) Fire dampers will be easily accessible. Where they are placed behind ceilings or linings, these ceilings or linings will be provided with an inspection hatch on which the identification number of the fire damper is marked. The fire damper identification number will also be marked on any remote controls provided.

(iv) Ventilation ducts will be provided with hatches for inspection and cleaning. The hatches will be located near the fire dampers.

(v) The main inlets and outlets of ventilation systems will be capable of being closed from outside the spaces being ventilated. The means of closing will be easily accessible as well as prominently and permanently marked and will indicate the operating position of the closing device.

(vi) Combustible gaskets in flanged ventilation duct connections are not permitted within 600 mm of openings in "A" or "B" class divisions and in ducts required to be of "A" class construction.

(vii) Ventilation openings or air balance ducts between two enclosed spaces will not be provided except as permitted by Sub-rule 4(a)(ii).

(b) Arrangement of ducts

(i) (i) The ventilation systems for machinery spaces of category A, vehicle spaces, ro-ro spaces, galleys, special category spaces and cargo spaces will, in general, be separated from each other and from the ventilation systems serving other spaces. Except that the galley ventilation systems on cargo ships of less than 4,000 gross tonnage, need not be completely separated, but may be served by separate ducts from a ventilation unit serving other spaces. In any case, an automatic

fire damper will be fitted in the galley ventilation duct near the ventilation unit.

(ii) Ducts provided for the ventilation of machinery spaces of category A, galleys, vehicle spaces, ro-ro spaces or special category spaces will not pass through accommodation spaces, service spaces or control stations unless they comply with the conditions specified in sub-rule (7)(b)(iv)

(iii) Ducts provided for the ventilation of accommodation spaces, service spaces or control stations will not pass through machinery spaces of category A, galleys, vehicle spaces, ro-ro spaces or special category spaces unless they comply with sub-rule (7)(b)(iv)

(iv) As permitted by sub-rules (7)(b)(ii) and (iii) ducts will be either:

(A) constructed of steel having a thickness of at least 3 mm for ducts with a free cross-sectional area of less than 0.075 m^2, at least 4 mm for ducts with a free cross-sectional area of between 0.075 m^2 and 0.45 m^2, and at least 5 mm for ducts with a free cross-sectional area of over 0.45 m^2;

(B) the ducts are suitably supported and stiffened;

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

(D) the ducts are insulated to “A-60” class standard from the machinery spaces, galleys, vehicle spaces, ro-ro spaces or special category spaces to a point at least 5 m beyond each fire damper;

or

(E) the ducts are constructed of steel in accordance with sub-rules (7)(b)(i)(A) and(7)(b)(i)(B)and

(F) insulated to "A-60" class standard throughout the spaces they pass through, except for ducts that pass through spaces of category (9) or (10) as defined above.

(v) For the purposes of sub-rules (7)(b)(ii) (D) and (F) ducts will be insulated over their entire cross-sectional external surface. Ducts that are outside but adjacent to the specified space, and share one or more surfaces with it, will be considered to pass through the specified space, and will be insulated over the surface they share with the space for a distance of 450 mm past the duct.

(vi) Where it is necessary that a ventilation duct passes through a main vertical zone division, an automatic fire damper will be fitted adjacent to the division. The damper will also be capable of being manually closed from each side of the division. The control location will be readily accessible and be clearly and prominently marked. The duct between the division and the damper will be constructed of steel in accordance with sub-rules (7)(b)(ii) (A) and (B) and insulated to at least the same fire integrity as the division penetrated. The damper will be fitted on at least one side of the division with a visible indicator showing the operating position of the damper.

(c) (c) Details of fire dampers and duct penetrations

(i) Ducts passing through "A" class divisions will meet the following requirements:

(A) where a thin plated duct with a free cross sectional area equal to, or less than, 0.02㎡ passes through "A" class divisions, the opening will be fitted with a steel sheet sleeve having a thickness of at least 3 mm and a length of at least 200 mm, divided preferably into 100 mm on each side of a bulkhead or, in the case of a deck, wholly laid on the lower side of the decks penetrated;

(B) where ventilation ducts with a free cross-sectional area exceeding 0.02㎡, but not more than 0.075㎡, pass through "A" class divisions, the openings will be lined with steel sheet sleeves. The ducts and sleeves will have a thickness of at least 3 mm and a length of at least 900 mm. When passing through bulkheads, this length will be divided preferably into 450 mm on each side of the bulkhead. These ducts, or sleeves lining such ducts, will be provided with fire insulation. The insulation will have at least the same fire integrity as the division through which the duct passes; and

(C) automatic fire dampers will be fitted in all ducts with a free cross-sectional area exceeding 0.075㎡ that pass through "A" class divisions. Each damper will be fitted close to the division penetrated and the duct between the damper and the division penetrated will be constructed of steel in accordance with sub-rules (7)(b)(ii) (A) and (B). The fire damper will operate automatically, but will also be capable of being closed manually

from both sides of the division. The damper will be fitted with a visible indicator which shows the operating position of the damper. Automatically but required, however, where ducts pass through spaces surrounded by "A" class divisions, without serving those spaces, provided those ducts have the same fire integrity as the divisions which they penetrate. A duct of cross-sectional area exceeding 0.075㎡ will not be divided into smaller ducts at the penetration of an "A" class division and then recombined into the original duct once through the division to avoid installing the damper required by this provision.

(ii) Ventilation ducts with a free cross-sectional area exceeding 0.02 ㎡ passing through "B" class bulkheads will be lined with steel sheet sleeves of 900 mm in length, divided preferably into 450 mm on each side of the bulkheads unless the duct is of steel for this length.

(iii) All fire dampers will be capable of manual operation. The dampers will have a direct mechanical means of release or, alternatively, be closed by electrical, hydraulic, or pneumatic operation. All dampers will be manually operable from both sides of the division. Automatic fire dampers, including those capable of remote operation, will have a failsafe mechanism that will close the damper in a fire even upon loss of electrical power or hydraulic or pneumatic pressure loss. Remotely operated fire dampers will be capable of being reopened manually at the damper.

(8) Exhaust duct from galleys.

(a) When passing through accommodation spaces or spaces containing combustible materials, the exhaust ducts from galley ranges will be constructed in accordance with sub-rules (7)(b)(ii) (A) and (B). Each exhaust duct will be fitted with:

(A) a grease trap readily removable for cleaning;

(B) an automatically and remotely operated fire damper located in the lower end of the duct at the junction between the duct and the galley range hood and, in addition, a remotely operated fire damper in the upper end of the duct close to the outlet of the duct;

(C) arrangements, operable from within the galley, for shutting off the exhaust fans; and

(D) fixed means for extinguishing a fire within the duct.

(9) Ventilation rooms serving machinery spaces of category A containing internal combustion machinery

(a) Where a ventilation room serves only such an adjacent machinery space and there is no fire division between the ventilation room and the machinery space, the means for closing the ventilation duct or ducts serving the machinery space will be located outside of the ventilation room and machinery space.

(b) Where a ventilation room serves such a machinery space as well as other spaces and is separated from the machinery space by a "A-0" class division, including penetrations, the means for closing the ventilation duct or ducts for the machinery space can be located in the ventilation room.

77. Fire fighting .-

(1) **Purpose :**

(a) The purpose of this rule is to suppress and swiftly extinguish a fire in the space of origin, except for Sub-rule 1(b).For this purpose, the following functional requirements will be met:

(i) fixed fire-extinguishing systems will be installed having due regard to the fire growth potential of the protected spaces; and ‘

(ii) fire-extinguishing appliances will be readily available.

(b) For open-top container holds and on deck container stowage areas on ships designed to carry containers on or above the weather deck, constructed on or after 1 January 2016, fire protection arrangements will be provided for the purpose of containing a fire in the space or area of origin and cooling adjacent areas to prevent fire spread and structural damage.

(2) **Water supply systems**

Ships will be provided with fire pumps, fire mains, hydrants and hoses complying with the applicable requirements. The requirements are to be as per the Merchant Shipping (Fire Appliances) Rules, 1990 as amended.

(a) Fire mains and hydrants:

(i) General;

Materials readily rendered ineffective by heat will not be used for fire mains and hydrants unless adequately protected. The pipes and hydrants will be so placed that the fire hoses may be easily coupled to them. The arrangement of pipes and hydrants will be such as to avoid the possibility of freezing. Suitable drainage provisions will be provided for fire main piping. Isolation valves will be installed for all open deck fire main branches used for purposes other than firefighting. In ships where deck cargo may be carried, the positions of the hydrants will be such that they are always readily accessible, and the pipes will be arranged as far as practicable to avoid risk of damage by such cargo.

(ii) Ready Availability of Water Supply

(A) to the satisfaction of the Director General; and

(B) with a periodically unattended machinery space or when only one person is required on watch, there will be immediate water delivery from the fire main system at a suitable pressure, either by remote starting of one of the main fire pumps with remote starting from the navigation bridge and fire control station, if any, or permanent pressurization of the fire main system by one of the main fire pumps, except that the Director General may waive this requirement for cargo ships of less than 1,600 gross tonnage if the fire pump starting arrangement in the machinery space is in an easily accessible position.

(iii) Diameter of the fire mains

The diameter of the fire main and the water service pipes will be sufficient for the effective distribution of the maximum required discharge from two fire pumps operating simultaneously, except that in the case of cargo ships the diameter need only be sufficient for the discharge of 140m^3/h.

(iv) Isolating valves and relief valves

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

(B) A valve will be fitted to serve each fire hydrant so that any fire hose may be removed while the fire pumps are in operation.

(C) Relief valves will be provided in conjunction with fire pumps if the pumps are capable of developing a pressure exceeding the design pressure of the water service pipes, hydrants and hoses. These valves will be so placed and adjusted as to prevent excessive pressure in any part of the fire main system.

(D) In tankers, isolation valves will be fitted in the fire main at the poop front in a protected position and on the tank deck at intervals of not more than 40 m to preserve the integrity of the fire main system in case of fire or explosion.

(v) Number and position of hydrants

(A) The number and position of hydrants will be such that atleast two jets of water not emanating from the same hydrant, one of which will be from a single length of hose, may reach any part of any cargo space when empty, any ro-ro space or any vehicle space, in which latter case the two jets will reach any part of the space,

each from a single length of hose. Furthermore, such hydrants will be positioned near the access to the protected spaces.

(vi) pressure at hydrants

With the two pumps simultaneously delivering water through the nozzles specified in Sub-rule (2)(c)(iii), with the quantity of water as specified in Sub-rule (2)(a)(iii), through any adjacent hydrants, the following minimum pressures will be maintained at all hydrants:

(A) for cargo ships:

6,000 gross tonnage and upwards

0.27 N/mm^2

Less than 6,000 gross tonnage

0.25 N/mm^2 and

(B) the maximum pressure at any hydrant will not exceed that at which the effective control of a fire hose can be demonstrated.

(vii) International shore connection

(A) Ships of 500 gross tonnage and upwards will be provided with at least one international shore connection complying with the Fire Safety Systems Code.

(B) Facilities will be available enabling such a connection to be used on either side of the ship.

(b) Fire pumps.

(i) Pumps accepted as fire pumps

Sanitary, ballast, bilge or general service pumps may be accepted as fire pumps, provided that they are not normally used for pumping oil and that if they are subject to occasional duty for the transfer or pumping of oil fuel, suitable change-over arrangements are fitted.

(ii) Number of fire pumps

Ships will be provided with independently driven fire pumps as follows:

in cargo ships of:

1,000 gross tonnage and upwards

-----at least two

Less than 1,000 gross tonnage

-----at least two power-driven pumps, one of which will be independently driven.

(iii)Arrangements of fire pumps and fire mains

(A) Fire Pumps.

The arrangements of sea connections, fire pumps and their sources of power will be as to ensure that:

(I) in cargo ships of less than 1,000 gross tonnage, if a fire in any one compartment could put all the pumps out of action, there will be an alternative means consisting of an emergency fire pump complying with the provisions of the Fire Safety Systems Code with its source of power and sea connection located outside the space where the main fire pumps or their sources of power are located.

(B) Requirements for the space containing the emergency fire pump.

(I) location of the space

The space containing the fire pump will not be contiguous to the boundaries of machinery spaces of category A or those spaces containing main fire pumps. Where this is not practicable, the common bulkhead between the two spaces will be insulated to standard of structural fire protection equivalent to that required for a control station.

(II) Access to the emergency fire pump.

No direct access will be permitted between the machinery space and the space containing the emergency fire pump and its source of power. When this is impracticable, the Director General may accept an arrangement where the access is by means of an airlock with the door of the machinery space being of “A-60” class standard and the other door being at least steel, both reasonable gastight, self-closing and without any hold-back arrangements. Alternatively, the access may be through a watertight door capable of being operated from a space remote from the machinery space and the space containing the emergency fire pump and unlikely to be cut off in the event of fire in those spaces. In such cases, a second means of access to the space containing the emergency fire pump and its source of power will be provided.

(III) Ventilation of the emergency fire pump space

Ventilation arrangements to the space containing the independence source of power for the emergency fire pump will be such as to preclude, as far as practicable, the possibility of smoke from a machinery space fire entering or being drawn into that space.

(IV) Additional pumps for cargo ships

In addition, in cargo ships where other pumps such as general service, bilge and ballast, etc., are fitted in a machinery space, arrangements will be made to ensure that at least one of these pumps, having the capacity and pressure required by Rule 2 (a)(vi)(B) and Rule 2 (b)(iv)(B), is capable of providing water to the fire main.

(iv) Capacity of fire pumps

(A) The capacity of required fire pumps

The required fire pumps will be capable of delivering for fire-fighting purposes a quantity of water, at the pressure specified in Rule (2)(a)(vi),as follows:

(I) pumps in cargo ships, other than any emergency pump: the quantity of water is not less than four thirds of the quantity required under chapter VI rule 47 to be dealt with by each of the independent bilge pumps in a passenger ship of the same dimension when employed in bilge pumping, provided that in no cargo ship other than those included in Sub-rule (7)(c)(ii), need the total required capacity of the fire pumps exceed 180m3/h.

(v) Capacity of each fire pump

Each of the required fire pumps (other than any emergency pump required in rule (2)(b)(iii)(A)(II) for cargo ships will have a capacity not less than 80% of the total required capacity divided by the minimum number of required fire pumps, but in any case not less than 25 m^3/h, and each pump will in any event be capable of delivering at least the two required jets of water. These fire pumps will be capable of supplying the fire main system under the required conditions. Where more pumps than the minimum of required pumps are installed, such additional pumps will have a capacity of at least 25 m3/h and will be capable of delivering at least two jets of water required in Sub-rule (2)(a)(v)(A)

(c) Fire hoses and nozzles.

(i) General specifications

(A) Fire hoses will be of non-perishable material approved by the Director General and will be sufficient in length to project a jet of water to any of the spaces in which they may be required to be used. Each hose will be provided with a nozzle and the necessary couplings.. Hoses specified in this chapter as “ fire

hoses" will, together with any necessary fittings and tools, be ready for use in conspicuous positions near the water service hydrants or connections. Fire hoses will have a length of at least 10m,but more than

(I) 15 m in machinery spaces;

(II) 20 m in other spaces and open decks; and

(III) 25 m for open decks on ships with a maximum breadth in excess of 30 m.

(B) Unless one hose and nozzle is provided for each hydrant in the ship, there will be complete interchangeability of hose couplings and nozzles.

(ii) Number and diameter of fire hoses

(A) Ships will be provided with fire hoses, the number and diameter of which will be to the satisfaction of the Director General.

(B) In Cargo ships:

(I) of 1,000 gross tonnage and upwards, the number of fire hoses to be provided will be one for each 30 m length of the ship and one spare, but in no case less than five in all. This number does not include any hoses required in any engine-room or boiler room. The Director General may increase the number of hoses required so as to ensure that hoses in sufficient number are available and accessible at all times, having regard to the type of ship and the nature of trade in which the ship is employed. Ships carrying dangerous goods in accordance with regulation 80 will be provided with three hoses and nozzles, in addition to those required above; and

(II) of less than 1,000 gross tonnage, the number of fire hoses to be provided will be calculated in accordance with the provisions of above clause. However, the number of hoses will in no case be less than three.

(iii) Size and types of nozzles

(A) For the purpose of this chapter, standard nozzle sizes will be 12 mm, 16 mm and 19 mm or as near thereto as possible. Larger diameter nozzles may be permitted at the discretion of the Director General.

(B) For accommodation and service spaces, a nozzle size greater than 12 mm need not be used.

(C) For machinery spaces and exterior locations, the nozzle size will be as such to obtain the maximum discharge possible from two jets at the pressure mentioned in Sub-rule (2)(a)(vi) from the smallest pump, provided that a nozzle size greater than 19 mm need not be used.

(D) Nozzles will be of an approved dual-purpose type (I.e spray/jet type) incorporating a shutoff.

(3) Portable Fire Extinguishers.

(a) Type and design

Portable fire extinguishers will comply with requirements of the Fire Safety Systems Code.

(b) Arrangement of fire extinguishers

(i) Accommodation spaces, service spaces and control stations will be provided with portable fire extinguishers of appropriate types and in sufficient number to the satisfaction of the Director General. Ships of 1,000 gross tonnage and upwards will carry at least five portable fire extinguishers.

(ii) One of the portable fire extinguishers intended for use in any space will be stowed near the entrance to that space.

(iii) Carbon dioxide fire extinguishers will be placed in accommodation spaces. In control stations and other spaces containing electrical or electronic equipment or appliances necessary for the safety of the ship, fire extinguishers will be provided whose extinguishing media are neither electrically conducive nor harmful to the equipment and appliances.

(iv) Fire extinguishers will be situated ready for use at easily visible places, which can be reached quickly and easily at any time in the event of a fire, and in such a way that their serviceability is not impaired by the weather vibration or other external factors. Portable fire extinguishers will be provided with devices which indicate whether they have been used.

(c) Spare charges

(i) Spare charges will be provided for 100% of the first ten extinguishers and 50% of the remaining fire extinguishers capable of being recharged

on board. Not more than sixty total spare charges are required. Instructions for recharging will be carried on board.

(ii) For fire extinguishers which cannot be recharged on board, additional portable fire extinguishers of the same quantity, type, capacity and number as determined in clause (i) above will be provided in lieu of spare charges.

(4) Fixed Fire Extinguishing Systems.

(a) Types of fixed fire-extinguishing systems.

(i) a fixed fire-extinguishing system required by Sub-rule (5) below may be any of the following systems:

(A) a fixed gas fire-extinguishing system complying with the provisions of the Fire Safety Systems Code;

(B) a fixed high-expansion foam fire-extinguishing system complying with the provisions of the Fire Safety systems Code; and

(C) a fixed pressure water-spraying fire-extinguishing system complying with the provisions of the Fire Safety Systems Code.

(ii) Where a fixed fire-extinguishing system not required by this chapter is installed, it will meet the requirements of the relevant rules of this chapter and the Fire Safety Systems Code.

(iii) Fire-extinguishing systems using Halon 1211,1301, and 2402 and perfluorocarbons will be prohibited.

(iv) In general, the Director General will not permit the use of steam as a fire-extinguishing medium in fixed fire-extinguishing systems. Where the use of steam is permitted by the Director General, it will be used only in restricted areas as an addition to the required fire-extinguishing system and will comply with the requirements of the Fire- Safety System Code.

(b) By the first scheduled dry-docking after 1 January 2010, fixed carbon dioxide fire-extinguishing systems for the protection of machinery spaces and cargo pump-rooms on ships constructed before 1 July 2002 will comply with the provisions of the Fire Safety Systems Code.

(c) Closing appliances for fixed gas fire-extinguishing systems

Where a fixed gas fire-extinguishing system is used, openings which may admit air to, or allow gas to escape from, a protected space will be capable of being closed from outside the protected space.

(d) Storage rooms of fire-extinguishing medium

When the fire-extinguishing medium is stored outside a protected space, it will be stored outside a protected space, it will be stored in a room which is located behind the forward collision bulkhead and is used for no other purposes. Any entrance to such a storage room will preferably be from the open deck and will be independent of the protected space. If the storage space is located below deck, it will be located no more than one deck below the open deck and will be directly accessible by a stairway or ladder from the open deck. Spaces which are located below deck or spaces where access from the open deck is provided will be fitted with a mechanical ventilation system designed to take exhaust air from the bottom of the space and will be sized to provide at least 6 air changes per hour. Access doors will open outwards, and bulkheads and decks, including doors and other means of closing any opening therein, which form the boundaries between such rooms and adjacent enclosed spaces will be gastight. For the purpose of the application of table 1 to 4, such storage rooms will be treated as fire control stations.

(e) Water pumps for other fire-extinguishing systems.

Pumps, other than those serving the fire main, required for the provision of water for fire-extinguishing systems required by this chapter, their sources of power and their controls will be installed outside the space or spaces protected by such systems and will be so arranged that a fire in the space or spaces protected will not put any such system out of action.

(5) Fire-extinguishing arrangements in machinery spaces

(a) Machinery spaces containing oil-fired boilers or oil fuel units

(i) Fixed fire-extinguishing systems

Machinery spaces of category A containing oil-fired boilers or oil fuel units will be provided with any one of the fixed fire-extinguishing systems in Sub-rule 4 clause (a). In each case, if the engine-room and boiler room are not entirely separate, or if fuel oil can drain from the boiler room into the engine-room, the combined engine and boiler rooms will be considered as one compartment.

(ii) Additional fire-extinguishing arrangements

(A) There will be in each boiler room or at an entrance outside of the boiler room at least one portable foam applicator unit complying with the provisions of the Fire Safety Systems Code.

(B) There will be at least two portable foam extinguishers or equivalent in each firing space in each boiler room and in each space in which a part of the oil fuel installation is situated. There will be not less than

one approved foam-type extinguisher of at least 135 l capacity or equivalent in each boiler room. These extinguishers will be provided with hoses on reels suitable for reaching any part of the boiler room. In the case of domestic boilers of less than 175 kW, or boilers protected by fixed water-based local application fire-extinguishing systems as required by Sub-rule (5) (e), an approved foam-type extinguisher of at least 135 l capacity is not required.

(C) In each firing space there will be a receptacle containing at least 0.1 m3 sand, sawdust impregnated with soda, or other approved dry material, along with a suitable shovel for spreading the material. An approved portable extinguisher may be substituted as an alternative.

(b) Machinery spaces of category A containing internal combustion machinery

(i) Fixed fire-extinguishing systems

Machinery spaces of category A containing internal combustion machinery will be provided with one of the fixed fire-extinguishing systems Sub-rule (4) (a)

(ii) Additional fire-extinguishing arrangements

(A) There will be at least one portable foam applicator unit complying with the provision of the Fire Safety Systems Code.

(B) There will be in each such space approved foam-type fire extinguishers, each of at least 45 l capacity or equivalent, sufficient in number to enable foam or its equivalent to be directed onto any part of the fuel and lubricating oil pressure systems, gearing and other fire hazards. In addition, there will be provided a sufficient number of portable foam extinguishers or equivalent which will be so located that no point in the space is more than 10 m walking distance from an extinguisher and that there are at least two such extinguishers in each such space. For smaller spaces of cargo ships the Director General may consider relaxing this requirement.

(c) Machinery spaces containing steam turbines or enclosed steam engines

(i) Fixed fire-extinguishing systems

In spaces containing steam turbines or enclosed steam engines used for main propulsion or other purposes having in the aggregate a total output of not less than 375

Kw, one of the fire-extinguishing systems specified in Sub-rule (4)(a) will be provided if such spaces are periodically unattended.

(ii) Additional fire-extinguishing arrangements

(A) There will be approved foam fire extinguishers, each of at least 45 l capacity or equivalent, sufficient in number to enable foam or its equivalent to be directed on to any part of the pressure lubrication system, on to any part of the casings enclosing pressure-lubricated parts of the turbines, engines or associated gearing, and any other fire hazards. However, such extinguishers will not be required if protection, at least equivalent to that required by this sub paragraph, is provided in such spaces by a fixed fire-extinguishing system fitted in compliance with Sub-rule (4)(a)

(B) There will be a sufficient number of portable foam extinguishers or equivalent which will be so located that no point in the space is more than 10 m walking distance from an extinguisher and that there are at least two such extinguishers in each such space, except that such extinguishers will not be required in addition to any provided in compliance with sub-rule (5)(a)(ii)(B)

(d) Other machinery spaces

Where, in the opinion of the Director General, a fire hazard exists in any machinery space for which no specific provisions for fire-extinguishing appliances are prescribed in sub-rule (5)(a),(b) and (c), there will be provided in, or adjacent to, that space such a number of approved portable fire extinguishers or other means of fire extinction as the Director General may deem sufficient.

(e) Fixed local application fire-extinguishing systems

(i) This rule will apply to cargo ships of 2,000 gross tonnage and above.

(ii) Machinery spaces of category A above 500 m^3 in volume will, in addition to the fixed fire extinguishing system required in sub-rule (5)(a)(i), be protected by an approved type of fixed water-based or equivalent local application fire-extinguishing system, based on the guidelines developed by the IMO. In the case of periodically unattended machinery spaces, the fire-extinguishing system will have both automatic and manual release capabilities. In the case of continuously manned machinery spaces, the fire-extinguishing system is only required to have a manual release capability.

(iii) Fixed local application fire-extinguishing systems are to protect areas such as the following without the necessity of engine shutdown, personnel evacuation, or sealing of the spaces:

(A) the fire hazard portions of internal combustion machinery or, for ships constructed before 1 July 2014, the fire hazard portions of internal combustion machinery used for the ship's main propulsion and power generation

(B) boiler fronts;

(C) the fire hazards portions of incinerators; and

(D) purifiers for heated oil.

(iv) Activation of any local application system will give a visual and distinct audible alarm in the protected space and at continuously manned stations. The alarm will indicate the specific system activated. The system alarm requirements described within this sub-rule are in addition to, and not a substitute for, the detection and fire alarm system required elsewhere in this chapter.

(6) Fire-extinguishing arrangements in control stations, accommodation and service spaces

(a) Sprinkler systems for cargo ships

In cargo ships in which method IIC specified in Rule 73 Sub-rule (2) clause (b) (A) (II) is adopted, an automatic sprinkler, fire detection and fire alarm system will be fitted in accordance with the requirements in Rule 71 sub-rule (5) clause (b) sub clause (ii).

(b) Spaces containing flammable liquid

(i) Paint lockers will be protected by:

(A) a carbon dioxide system, designed to give a minimum volume of free gas equal to 40% of the gross volume of the protected space;

(B) a dry powder system, designed for at least 0.5 kg powder/m^3;

(C) a water spraying or sprinkler system, designed for 5l/m^2 min. Water spraying systems may be connected to the fire main of the ship; or

(D) a system providing equivalent protection, as determined by the director general.

In all cases, the system will be operable from outside the protected space.

(ii) Flammable liquid lockers will be protected by an appropriate fire-extinguishing arrangement approved by the Director General.

(iii) For lockers of a deck area of less than 4 m^2 , which do not give access to accommodation spaces, a portable carbon dioxide fire extinguisher sized to provide a minimum volume of free gas equal to 40% of the gross volume of the space may be accepted in lieu of a fixed system. A discharge port will be arranged in the locker to allow the discharge of the extinguisher without having to enter into the protected space. The required portable fire extinguisher will be stowed adjacent to the port. Alternatively, a port or hose connection may be provided to facilitate the use of fire main water.

(c) Deep-fat cooking equipment

(i) Deep-fat cooking equipment installed in enclosed spaces or on open decks will be fitted with the following:

(A) an automatic or manual fire-extinguishing system tested to an international standard acceptable to the IMO;

(B) a primary and backup thermostat with an alarm to alert the operator in the event of failure of either thermostat;

(C) arrangements for automatically shutting off the electrical power upon activation of the fire-extinguishing system;

(D) an alarm for indicating operation of the fire-extinguishing system in the galley where the equipment is installed; and

(E) controls for manual operation of the fire-extinguishing system which are clearly labeled for ready use by the crew.

(7) Fire-extinguishing arrangements in cargo spaces

(a) Fixed gas fire-extinguishing systems for general cargo

(i) Except for ro-ro and vehicle spaces, cargo spaces on cargo ships of 2,000 gross tonnage and upwards will be protected by a fixed carbon dioxide or inert gas fire-extinguishing system complying with the provisions of the Fire Safety Systems Code, or by a fire-extinguishing system which gives equivalent protection.

(ii) The Director General may exempt from the requirements of Sub-rule (7)(a)(i) cargo spaces of any cargo ship if constructed, and solely

intended, for the carriage of ore, coal, grain unseasoned timber, non-combustible cargoes or cargoes which, in the opinion of the Director General, constitute a low fire risk. Such exemptions may be granted only if the ship is fitted with steel hatch covers and effective means of closing all ventilators and other openings leading to cargo spaces. When such exemptions are granted, the Director General will issue an Exemption Certificate, irrespective of the date of construction of the ship concerned, in accordance with regulation I/12(a)(vii) of SOLAS , and will ensure that the list of cargoes the ship is permitted to carry is attached to the Exemption Certificate.

(b) Fixed gas fire-extinguishing systems for dangerous goods

A ship engaged in the carriage of dangerous goods in any cargo spaces will be provided with a fixed carbon dioxide or inert gas fire-extinguishing system complying with the provisions of the Fire Safety Systems Code or with a fire-extinguishing system which, in the opinion of the Director General, gives equivalent protection for the cargoes carried.

(c) Firefighting for ships constructed on or after 1 January 2016 designed to carry containers on or above the weather deck

(i) Ships will carry, in addition to the equipment and arrangements required by paragraphs 1 and 2, at least one water mist lance.

(A) The water mist lance will consist of a tube with a piercing nozzle which is capable of penetrating a container wall and producing water mist inside a confined space (container, etc.) when connected to the fire main.

(ii) Ships designed to carry five or more tiers of containers on or above the weather deck will carry, in addition to the requirements of Sub-rule (7)(c)(i), mobile water monitors as follows:

(A) ships with breadth less than 30 m: at least two mobile water monitors; or

(B) ships with breadth of 30 m or more: at least four mobile water monitors.

(iii) The mobile water monitors, all necessary hoses, fittings and required fixing hardware will be kept ready for use in a location outside the cargo space area not likely to be cut-off in the event of a fire in the cargo spaces.

(iv) A sufficient number of fire hydrants will be provided such that:

(A) all provided mobile water monitors can be operated simultaneously for creating effective water barriers forward and aft of each container bay;

(B) the two jets of water required by paragraph 2.1.5.1 can be supplied at the pressure required by paragraph 2.1.6; and

(C) each of the required mobile water monitors can be supplied by separate hydrants at the pressure necessary to reach the top tier of containers on deck.

(v) The mobile water monitors may be supplied by the fire main, provided the capacity of fire pumps and fire main diameter are adequate to simultaneously operate the mobile water monitors and two jets of water from fire hoses at the required pressure values. If carrying dangerous goods, the capacity of fire pumps and fire main diameter will also comply with Rule 86 Sub-rule(3)(a)(v), as far as applicable to on-deck cargo areas.

(vi) The operational performance of each mobile water monitor will be tested during initial survey on board the ship to the satisfaction of the Director General. The test will verify that:

(A) the mobile water monitor can be securely fixed to the ship structure ensuring safe and effective operation; and

(B) the mobile water monitor jet reaches the top tier of containers with all required monitors and water jets from fire hoses operated simultaneously.

(8) Cargo tank protection

(a) Fixed deck foam systems

(i) For tankers of 20,000 tonnes deadweight and upwards, a fixed deck foam fire-extinguishing system will be provided complying with the provisions of the Fire Safety Systems Code, except that, in lieu of the above, the Director General, after having given consideration to the ship’s arrangement and equipment, may accept other fixed installations if they afford protection equivalent to the above, the requirements for alternative fixed installations will comply with the requirements in Sub-rule Sub-rule (8)(a)(ii).

(ii) In accordance with Sub-rule (8)(a)(i), where the Director General accepts an equivalent fixed installation in lieu of the fixed deck foam fire-extinguishing system, the installation will:

(A) be capable of extinguishing spill fires and also preclude ignition of spilled oil not yet ignited; and

(B) be capable of combating fires in ruptured tanks.

(iii) Tankers of less than 20,000 tonnes deadweight will be provided with a deck foam fire-extinguishing system complying with the requirements of the Fire Safety Systems Code.

(9) Protection of cargo pump-rooms

(a) Fixed fire-extinguishing systems

Each cargo pump-room will be provided with one of the following fixed fire-extinguishing systems operated from a readily accessible position outside the pump-room. Cargo pump-rooms will be provided with a system suitable for machinery spaces of category A.

(i) A carbon dioxide fire-extinguishing system complying with the provisions of the Fire Safety Systems Code and with the following:

(A) the alarms giving audible warning of the release of fire-extinguishing medium will be safe for use in a flammable cargo vapour/air mixture; and

(B) a notice will be exhibited at the controls stating that, due to the electrostatic ignition hazard, the system is to be used only for fire extinguishing and not for inerting purposes.

(ii) A high-expansion foam fire-extinguishing system complying with the provisions of the Fire Safety Systems Code, provided that the foam concentrate supply is suitable for extinguishing fires involving the cargoes carried.

(iii) A fixed pressure water-spraying fire-extinguishing system complying with the provisions of the Fire Safety Systems Code.

(b) Quantity of fire-extinguishing medium

Where the fire-extinguishing medium used in the cargo pump-room system is also used in systems serving other spaces, the quantity of medium provided or its delivery rate not be more than the maximum required for the largest compartment.

(10) Fire-fighter's outfits

(a) Types of fire-fighter’s outfits

(i) Fire-fighter’s outfits will comply with the Fire Safety Systems Code.

(ii) Self-contained compressed air breathing apparatus of fire-fighter's outfits will comply with the Fire Safety Systems Code.

(b) Number of fire-fighter’s outfits

(i) Ships will carry at least two fire-fighter’s outfits.

(ii) In addition, in tankers, two fire-fighter’s outfits will be provided.

(iii) The Director General may require additional sets of personal equipment and breathing apparatus, having due regard to the size and type of the ship.

(iv) Two spare charges will be provided for each required breathing apparatus. Cargo ships that are equipped with suitably located means for fully recharging the air cylinders free from contamination, need carry only one spare charge for each required apparatus.

(c) Storage of fire-fighter’s outfits

The fire-fighter’s outfits or sets of personal equipment will be kept ready for use in an easily accessible location that is permanently and clearly marked and, where more than one fire-fighter’s outfit or more than one set of personal equipment is carried, they will be stored in widely separated positions.

(d) Fire-fighter's communication

For ships constructed on or after 1 July 2014, a minimum of two two-way portable radiotelephone apparatus for each fire party for fire-fighter's communication will be carried on board. Those two-way portable radiotelephone apparatus will be of an explosion-proof type or intrinsically safe. Ships constructed before 1 July 2014 will comply with the requirements of this paragraph not later than the first survey after 1 July 2018.

(11) Fire-extinguishing media restrictions

The purpose of this paragraph is to protect persons on board against exposure to dangerous substances used in firefighting, as well as to minimize the impact of fire-extinguishing media that are deemed detrimental to the environment.

(a) This paragraph applies to ships constructed on or after 1 January 2026

(b) The prohibited substances in this paragraph will be delivered to appropriate shore-based reception facilities when removed from the ship.

(c) Use or storage of extinguishing media containing perfluorooctane sulfonic acid (PFOS) will be prohibited.

78. Structural integrity. -

(1) Purpose : The purpose of this rule is to maintain structural integrity of the ship preventing partial or whole collapse of the ship structures due to strength deterioration by heat. For this purpose, materials used in the ship's structure will ensure that the structural integrity is not degraded due to fire.

(2) Material of hull, superstructures, structural bulkheads, decks and deckhouses

The hull, superstructures, structural bulkheads, decks and deckhouses will be constructed of steel or other equivalent material. For the purpose of applying the definition of steel or other equivalent material as given in Part I Rule 2 Sub-rule (104), the "applicable fire exposure" will be according to the integrity and insulation standards given in tables 1 to 4 For example, where divisions such as decks or sides and ends of deckhouses are permitted to have "B-0" fire integrity, the "applicable fire exposure" will be half an hour.

(3) Structure of aluminum alloy

Unless otherwise specified in sub-rule (2), in cases where any part of the structure is of aluminum alloy, the following will apply:

(a) the insulation of aluminum alloy components of "A" or "B" class divisions, except structure which, in the opinion of the Director General, is non-load-bearing, will be such that the temperature of the structural core does not rise more than 200°C above the ambient temperature at any time during the applicable fire exposure to the standard fire test; and

(b) special attention will be given to the insulation of aluminum alloy components of columns, stanchions and other structural members required to support lifeboat and liferaft stowage, launching and embarkation areas, and "A" and "B" class divisions to ensure:

(i) that for such members supporting lifeboat and liferaft areas and "A" class divisions, the temperature rise limitation specified in clause(a) of sub-rule (3) will apply at the end of one hour; and

(ii) that for such members required to support "B" class divisions, the temperature rise limitation specified in clause(a) of sub-rule (3) will apply at the end of half an hour.

(4) Machinery spaces of category A

(a) Crowns and casings

Crowns and casings of machinery spaces of category A will be of steel construction and will be insulated as required by table 1 and 3 , as appropriate.

(b) Floor plating

The floor plating of normal passageways in machinery spaces of category A will be made of steel

(5) Materials of overboard fittings

Materials readily rendered ineffective by heat will not be used for overboard scuppers, sanitary discharges, and other outlets which are close to the waterline and where the failure of the material in the event of fire would give rise to danger of flooding.

(6) Protection of cargo tank structure against pressure or vacuum in tankers

(a) General

The venting arrangements will be so designed and operated as to ensure that neither pressure nor vacuum in cargo tanks will exceed design parameters and be such as to provide for:

(i) the flow of the small volumes of vapour, air or inert gas mixtures caused by thermal variations in a cargo tank in all cases through pressure/vacuum valves; and

(ii) the passage of large volumes of vapour, air or inert gas mixtures during cargo loading and ballasting, or during discharging.

(b) Openings for small flow by thermal variations

Openings for pressure release required by sub- clause (i) of clause(a) of sub-rule(6)will:

(i) have as great a height as is practicable above the cargo tank deck to obtain maximum dispersal of flammable vapours, but in no case less than 2 m above the cargo tank deck; and

(ii) be arranged at the furthest distance practicable but not less than 5 m from the nearest air intakes and openings to enclosed spaces containing a source of ignition and from deck machinery and equipment which may constitute an ignition hazard. Anchor windlass and chain locker openings constitute an ignition hazard.

(iii) For tankers constructed on or after 1 January 2017, the openings will be arranged in accordance with Rule 68 Sub-rule (5)(c)(iv)

(c) Safety measures in cargo tanks

(i) Preventive measures against liquid rising in the venting system

Provisions will be made to guard against liquid rising in the venting system to a height which would exceed the design head of cargo tanks. This will be accomplished by high-level alarms or overflow control systems or other equivalent means, together with independent gauging devices and cargo tank filling procedures. For the purposes of this rule, spill valves are not considered equivalent to an overflow system.

(ii) Secondary means for pressure/vacuum relief

A secondary means of allowing full flow relief of vapour, air or inert gas mixtures to prevent over-pressure or under-pressure in the event of failure of the arrangements in sub- clause (ii) of clause(a) of sub-rule(6). In addition, for tankers constructed on or after 1 January 2017, the secondary means will be capable of preventing over-pressure or under-pressure in the event of damage to, or inadvertent closing of, the means of isolation required in Rule 68 Sub-rule (5)(c)(ii)(B).Alternatively, pressure sensors may be fitted in each tank protected by the arrangement required in sub- clause (ii) of clause(a) of sub-rule(6) with a monitoring system in the ship's cargo control room or the position from which cargo operations are normally carried out. Such monitoring equipment will also provide an alarm facility which is activated by detection of over-pressure or under-pressure conditions within a tank.

(iii) Bypasses in vent mains

Pressure/vacuum valves required by sub- clause (i) of clause(a) of sub-rule(6) may be provided with a bypass arrangement when they are located in a vent main or masthead riser. Where such an arrangement is provided there will be suitable indicators to show whether the bypass is open or closed.

(iv) Pressure/vacuum-breaking devices

One or more pressure/vacuum-breaking devices will be provided to prevent the cargo tanks from being subject to:

(A) a positive pressure, in excess of the test pressure of the cargo tank, if the cargo were to be loaded at the maximum rated capacity and all other outlets are left shut; and

(B) a negative pressure in excess of 700 mm water gauge if cargo were to be discharged at the maximum rated capacity of the cargo pumps and the inert gas blowers were to fail.

(C) Such devices will be installed on the inert gas main unless they are installed in the venting system required by Rule 68 Sub-rule (5)(c)(i)or on individual cargo tanks. The location and design of

the devices will be in accordance with Rule 68 Sub-rule (5)(c) and sub-rule(6) of this rule.

(v) Size of vent outlets

Vent outlets for cargo loading, discharging and ballasting required by sub-clause (ii) of clause(a) of sub-rule(6) will be designed on the basis of the maximum designed loading rate multiplied by a factor of at least 1.25 to take account of gas evolution, in order to prevent the pressure in any cargo tank from exceeding the design pressure. The master will be provided with information regarding the maximum permissible loading rate for each cargo tank and in the case of combined venting systems, for each group of cargo tanks.

CHAPTER IV

Escape

79. Notification of crew .-

(1) Purpose : The purpose of this rule is to notify crew of a fire for safe evacuation. For this purpose, a general emergency alarm system and a public address system will be provided.

(2) General emergency alarm system

A general emergency alarm system required by regulation III/6.4.2 of SOLAS will be used for notifying crew of a fire.

80. Means of escape .-

(1) Purpose: The purpose of this rule is to provide means of escape so that persons onboard can safely and swiftly escape to the lifeboat and life raft embarkation deck. For this purpose, the following functional requirements will be met:

(a) safe escape routes will be provided;

(b) escape routes will be maintained in a safe condition, clear of obstacles;

and

(c) additional aids for escape will be provided as necessary to ensure accessibility, clear marking, and adequate design for emergency situations.

(2) General requirements

(a) Unless expressly provided otherwise in this rule, at least two widely separated and ready means of escape will be provided from all spaces or group of spaces.

(b) Lifts will not be considered as forming one of the means of escape as required by this rule.

(3) Means of escape from control stations, accommodation and service spaces

(a) General requirements

(i) Stairways and ladders will be so arranged as to provide ready means of escape to the lifeboat and liferaft embarkation deck from crew accommodation spaces and from spaces in which the crew is normally employed, other than machinery spaces.

(ii) Unless expressly provided otherwise in this rule, a corridor, lobby, or part of a corridor from which there is only one route of escape will be

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

(iii) All stairways in accommodation and service spaces and control stations will be of steel frame construction except where the Director General sanctions the use of other equivalent material.

(iv) If a radiotelegraph station has no direct access to the open deck, two means of escape from or access to, the station will be provided, one of which may be a porthole or window of sufficient size or other means to the satisfaction of the Director General.

(v) Doors in escape routes will, in general, open in-way of the direction of escape, except that:

(A) individual cabin doors may open into the cabins in order to avoid injury to persons in the corridor when the door is opened; and

(B) doors in vertical emergency escape trunks may open out of the trunk in order to permit the trunk to be used both for escape and for access.

(b) Means of escape in cargo ships

(i) General

At all levels of accommodation there will be provided at least two widely separated means of escape from each restricted space or group of spaces.

(ii) Escape from spaces below the lowest open deck

Below the lowest open deck the main means of escape will be a stairway and the second escape may be a trunk or a stairway.

(iii) Escape from spaces above the lowest open deck

Above the lowest open deck the means of escape will be stairways or doors to an open deck or a combination thereof.

(iv) Dead-end corridors

No dead-end corridors having a length of more than 7 m will be accepted.

(v) Width and continuity of escape routes

The width, number and continuity of escape routes will be in accordance with the requirements in the Fire Safety Systems Code.

(vi) Dispensation from two means of escape

Exceptionally the Director General may dispense with one of the means of escape, for crew spaces that are entered only occasionally, if the required escape route is independent of watertight doors.

(c) Emergency escape breathing devices

(i) Emergency escape breathing devices will comply with the Fire Safety Systems Code. Spare emergency escape breathing devices will be kept onboard.

(ii) All ships will carry at least two emergency escape breathing devices within accommodation spaces.

(4) Means of escape from machinery spaces

(a) Means of escape on cargo ships

Means of escape from each machinery space in cargo ships will comply with the following provisions.

(i) Escape from machinery spaces of category A

Except as provided in sub- clause (ii) of clause(a) of sub-rule(4) , two means of escape will be provided from each machinery space of category A. In particular, one of the following provisions will be complied with:

(A) 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 open deck. One of these ladders will be located within a protected enclosure that satisfies Rule 73 Sub-rule(2)(b)(iii), category (4), from the lower part of the space it serves to a safe position outside the space. Self-closing fire doors of the same fire integrity standards will be fitted in the enclosure. The ladder will be fixed in such a way that heat is not transferred into the enclosure through non-insulated fixing points. The enclosure will have minimum internal dimensions of at least 800 mm x 800 mm, and will have emergency lighting provisions; or

(B) one steel ladder leading to a door in the upper part of the space from which access is provided to the open deck and, additionally, in the lower part of the space and in a position well separated from the ladder referred to, a steel door capable of being

operated from each side and which provides access to a safe escape route from the lower part of the space to the open deck.

(ii) Dispensation from two means of escape

In a ship of less than 1,000 gross tonnage, the Director General may dispense with one of the means of escape required under sub- clause (i) of clause(a) of sub-rule(4), due regard being paid to the dimension and disposition of the upper part of the space. In addition, the means of escape from machinery spaces of category A need not comply with the requirement for an enclosed fire shelter listed in sub-rule (4)(a)(i)(A). In the steering gear space, a second means of escape will be provided when the emergency steering position is located in that space unless there is direct access to the open deck.

(iii) Escape from machinery spaces other than those of category A

From machinery spaces other than those of category A, two escape routes will be provided except that a single escape route may be accepted for spaces that are entered only occasionally, and for spaces where the maximum travel distance to the door is 5 m or less.

(iv) Inclined ladders and stairways

For ships constructed on or after 1 January 2016, all inclined ladders/stairways fitted to comply with Sub-rule (4)(a)(i) with open treads in machinery spaces being part of or providing access to escape routes but not located within a protected enclosure will be made of steel. Such ladders/stairways will be fitted with steel shields attached to their undersides, such as to provide escaping personnel protection against heat and flame from beneath.

(v) Escape from machinery control rooms in machinery spaces of category "A"

For ships constructed on or after 1 January 2016, two means of escape will be provided from the machinery control room located within a machinery space. At least one of these escape routes will provide a continuous fire shelter to a safe position outside the machinery space.

(vi) Escape from main workshops in machinery spaces of category "A"

For ships constructed on or after 1 January 2016, two means of escape will be provided from the main workshop within a machinery space. At least one of these escape routes will provide a continuous fire shelter to a safe position outside the machinery space.

(b) Emergency escape breathing devices

(i) (i) On all ships, within the machinery spaces, emergency escape breathing devices will be situated ready for use at easily visible places, which can be reached quickly and easily at any time in the event of fire. The location of emergency escape breathing devices will take into account the layout of the machinery space and the number of persons normally working in the spaces

(ii) The number and location of these devices will be indicated in the fire control plan required in Rule 79 Sub-rule (2).

(iii) Emergency escape breathing devices will comply with the Fire Safety Systems Code.

(5) Means of escape from ro-ro spaces

At least two means of escape will be provided in ro-ro spaces where the crew are normally employed. The escape routes will provide a safe escape to the lifeboat and liferaft embarkation decks and will be located at the fore and aft ends of the space.

CHAPTER V

OPERATIONAL REQUIREMENTS

PART E

81. **Operational readiness and maintenance.-**

(1) Purpose : The purpose of this rule is to maintain and monitor the effectiveness of the fire safety measures the ship is provided with. For this purpose, the following functional requirements will be met:

(a) fire protection systems and fire-fighting systems and appliances will be maintained ready for use; and

(b) fire protection systems and fire-fighting systems and appliances will be properly tested and inspected

(2) General requirements

At all times while the ship is in service, the requirements of clause (a) of sub-rule(1) will be complied with. A ship is not in service when:

(i) it is in for repairs or lay-up (either at anchor or in port) or in dry-dock;

(ii) it is declared not in service by the owner or the owner's representative; and

(b) Operational readiness

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

(A) structural fire protection including fire-resisting divisions, and protection of openings and penetrations in these divisions;

(B) fire detection and fire alarm systems; and

(C) means of escape systems and appliances.

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

(c) Maintenance, testing and inspections

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

(ii) The maintenance plan will be kept on board the ship and will be available for inspection whenever required by the Director General.

(iii) The maintenance plan will include at least the following fire protection systems and fire-fighting systems and appliances, where installed:

(A) fire mains, fire pumps and hydrants including hoses, nozzles and international shore connections;

(B) fixed fire detection and fire alarm systems;

(C) fixed fire-extinguishing systems and other fire extinguishing appliances;

(D) automatic sprinkler, fire detection and fire alarm systems;

(E) ventilation systems including fire and smoke dampers, fans and their controls;

(F) emergency shutdown of fuel supply;

(G) fire doors, including their controls;

(H) general emergency alarm systems;

(I) emergency escape breathing devices;

(J) portable fire extinguishers including space charges; and

(K) fire-fighter's outfits.

(d) The maintenance programme may be computer-based

(3) Additional requirements for tankers

(a) In addition to the fire protection systems and appliances listed in sub-clause (iii) of clause (b) of sub-rule(2) tankers will develop a maintenance plan for:

(b) inert gas systems;

(c) deck foam systems;

(d) fire safety arrangements in cargo pump rooms; and

(e) flammable gas detectors.

82. **Instructions, on-board training and drills .-**

(1) Purpose : The purpose of this rule is to mitigate the consequences of fire by means of proper instructions for training and drills of persons on board in correct procedures under emergency conditions. For this purpose, the crew will have the necessary knowledge and skills to handle fire emergency cases, including passenger care.

(2) General requirements

(a) Instructions, duties and organization

(i) Crew members will receive instruction on fire safety on board the ship.

(ii) Crew members will receive instructions on their assigned duties.

(iii) Parties responsible for fire-extinguishing will be organized. These parties will have the capability to complete their duties at all times while the ship is in service.

(b) Onboard training and drills

(i) Crew members will be trained to be familiar with the arrangements of the ship as well as the location and operation of any fire-fighting systems and appliances that they may be called upon to use.

(ii) Training in the use of the emergency escape breathing devices will be considered as part of on-board training.

(iii) Performance of crew members assigned fire-fighting duties will be periodically evaluated by conducting on-board training and drills to identify areas in need of improvement, to ensure competency in fire-fighting skills is maintained, and to ensure the operational readiness of the fire-fighting organization.

(iv) On-board training in the use of the ship's fire-extinguishing systems and appliances will be planned and conducted in accordance with provisions of regulation III/19.4.1 of SOLAS .

(v) Fire drills will be conducted and recorded in accordance with the provisions of regulations III/19.3 and III/19.5 of SOLAS.

(vi) An onboard means of recharging breathing apparatus cylinders used during drills will be provided or a suitable number of spare cylinders will be carried onboard to replace those used.

(c) Training manuals

(i) A training manual will be provided in each crew mess room and recreation room or in each crew cabin.

(ii) The training manual will be written in the working language of the ship.

(iii) The training manual, which may comprise several volumes, will contain the instructions and information required in sub- clause (iv) of clause(c) in easily understood terms and illustrated wherever possible. Any part of such information may be provided in the form of audio-visual aids in lieu of the manual.

(iv) The training manual will explain the following in detail:

(A) general fire safety practice and precautions related to the dangers of smoking, electrical hazards, flammable liquids and similar common shipboard hazards;

(B) general instructions on fire-fighting activities and fire-fighting procedures including procedures for notification of a fire and use of manually operated call points;

(C) meanings of the ship's alarms;

(D) operation and use of fire-fighting systems and appliances;

(E) operation and use of fire doors;

(F) operation and use of fire and smoke dampers; and

(G)escape systems and appliances.

(d) Fire control plans

(i) General arrangement plans will be permanently exhibited for the guidance of the ship's officers, showing clearly for each deck the control stations, the various fire sections enclosed by "A" class divisions, the sections enclosed by "B" class divisions together with particulars of the fire detection and fire alarm systems, the sprinkler installation, the fire-extinguishing appliances, means of access to different compartments, decks, etc., and the ventilating system including particulars of the fan control positions, the position of dampers and identification numbers of the ventilating fans serving each section. Alternatively, at the discretion of the Director General, the aforementioned details may be set out in a booklet, a copy of which will be supplied to each officer, and one copy will at all times be available on board in an accessible position. Plans and booklets will be kept up to date; any alterations thereto will be recorded as soon as practicable. Description in such plans and booklets will be in the language or languages required by the Director General. If the language is neither English nor Hindi, a translation into one of those languages will be included.

(ii) A duplicate set of fire control plans or a booklet containing such plans will be permanently stored in a prominently marked weathertight enclosure outside the deckhouse for the assistance of shore-side fire-fighting personnel.

83. **Operations** .-

(1) Purpose : The purpose of this rule is to provide information and instructions for proper ship and cargo handling operations in relation to fire safety. For this purpose, the following functional requirements will be met:

(a) fire safety operational booklets will be provided on board; and

(b) flammable vapour releases from cargo tank venting will be controlled.

(2) Fire safety operation booklets

(a) The required fire safety operational booklet will contain the necessary information and instructions for the safe operation of the ship and cargo handling operations in relation to fire safety. The booklet will include information concerning the crew's responsibilities for the general fire safety of the ship while loading and discharging cargo and while underway.

Necessary fire safety precautions for handling general cargoes will be explained. For ships carrying dangerous goods and flammable bulk cargoes, the fire safety operational booklet will also provide reference to the pertinent fire-fighting and emergency cargo handling instructions contained in the Code of Safe Practice for Solid Bulk Cargoes, the International Bulk Chemical Code, the International Gas Carrier Code and the International Maritime Dangerous Goods Code, International Maritime Solid Bulk Cargoes(IMSBC) Code as appropriate.

(b) The fire safety operational booklet will be provided in each crew mess room and recreation room or in each crew cabin.

(c) The fire safety operational booklet will be written in the working language of the ship.

(d) The fire safety operational booklet may be combined with the training manuals required in clause(c) of sub-rule(2)of rule 79.

(3) Additional requirements for tankers

(a) General

The fire safety operational booklet referred to in sub-rule (2) will include provisions for preventing fire spread to the cargo area due to ignition of flammable vapours and include procedures of cargo tank gas-purging and/or gas-freeing, taking into account the provisions in clause(b) of sub-rule(3).

(b) Procedures for cargo tank purging and/or gas-freeing

(i) When the ship is provided with an inert gas system, the cargo tanks will first be purged in accordance with the provisions of Rule 68 Sub-rule (5)(f) until the concentration of hydrocarbon vapours in the cargo tanks has been reduced to less than 2% by volume. Thereafter, gas-freeing may take place at the cargo tank deck level.

(ii) When the ship is not provided with an inert gas system, the operation will be such that the flammable vapour is discharged initially through:

(A) the vent outlets as specified in Rule 68 Sub-rule (5)(c)(iv)

(B) outlets at least 2 m above the cargo tank deck level with a vertical efflux velocity of at least 30 m/s maintained during the gas-freeing operation; or

(C) outlets at least 2 m above the cargo tank deck level with a vertical efflux velocity of at least 20 m/s and which are protected by suitable devices to prevent the passage of flame.

(iii) The above outlets will be located not less than 10 m, measured horizontally, from the nearest air intakes and openings to enclosed spaces containing a source of ignition and from deck machinery, which may include anchor windlass and chain locker openings, and equipment which may constitute an ignition hazard.

(iv) When the flammable vapour concentration at the outlet has been reduced to 30% of the lower flammable limit, gas-freeing may be continued at cargo tank deck level.

(c) Operation of inert gas system

(i) The inert gas system for tankers required in accordance with rule 68 sub-rule (5)(e)(i) will be so operated as to render and maintain the atmosphere of the cargo tanks non-flammable, except when such tanks are required to be gas-free.

(ii) Notwithstanding the above, for chemical tankers, the application of inert gas, may take place after the cargo tank has been loaded, but before commencement of unloading and will continue to be applied until that cargo tank has been purged of all flammable vapours before gas-freeing. Only nitrogen is acceptable as inert gas under this provision.

(iii) the provisions of this rule will only apply to tankers constructed on or after 1 January 2016. If the oxygen content of the inert gas exceeds 5% by volume, immediate action will be taken to improve the gas quality. Unless the quality of the gas improves, all operations in those cargo tanks to which inert gas is being supplied will be suspended so as to avoid air being drawn into the cargo tanks, the gas regulating valve, if fitted, will be closed and the off-specification gas will be vented to atmosphere.

(iv) In the event that the inert gas system is unable to meet the requirement in Sub-rule (c)(i) of this rule and it has been assessed that it is impractical to effect a repair, then cargo discharge and cleaning of those cargo tanks requiring inerting will only be resumed when suitable emergency procedures have been followed, taking into account guidelines developed by the IMO.

CHAPTER VI

ALTERNATIVE DESIGN AND ARRANGEMENTS

84. Alternative design and arrangements .-

(1) Purpose- The purpose of this regulation is to provide a methodology for alternative design and arrangements for fire safety.

(2) General

(a) Fire safety design and arrangements may deviate from the prescriptive requirements set out in Chapters II, III, IV, V or VII of Part III, provided that the design and arrangements meet the fire safety objectives and the functional requirements.

(b) When fire safety design or arrangements deviate from the prescriptive requirements of this chapter, engineering analysis, evaluation and approval of the alternative design and arrangements will be carried out in accordance with this rule.

(3) Engineering analysis

The engineering analysis will be prepared and submitted to the Director General, based on the guidelines developed by the IMO, and will include, as a minimum, the following elements:

(a) determination of the ship type and space(s) concerned;

(b) identification of prescriptive requirement(s) with which the ship or the space(s) will not comply;

(c) identification of the fire and explosion hazards of the ship or the space(s) concerned including;

(i) identification of the possible ignition sources;

(ii) identification of the fire growth potential of each space concerned;

(iii) identification of the smoke and toxic effluent generation potential for each space concerned;

(iv) identification of the potential for the spread of fire, smoke or of toxic effluents from the space(s) concerned to other spaces;

(d) determination of the required fire safety performance criteria for the ship or the space(s) concerned addressed by the prescriptive requirement(s) in particular:

(i) performance criteria will be based on the fire safety objectives and on the functional requirements of this chapter;

(ii) performance criteria will provide a degree of safety not less than that achieved by using the prescriptive requirements; and

(iii) performance criteria will be quantifiable and measurable;

(e) detailed description of the alternative design and arrangements, including a list of the assumptions used in the design and any proposed operational restrictions or conditions; and

(f) technical justification demonstrating that the alternative design and arrangements meet the required fire safety performance criteria.

(4) Evaluation of the alternative design and arrangements

(a) The engineering analysis required in sub-rule (3) will be evaluated and approved by the Director General taking into account the guidelines developed by the IMO.

(b) A copy of the documentation, as approved by the Director General, indicating that the alternative design and arrangements comply with this rule will be carried on board the ship.

(5) Exchange of information

The Director General may communicate to the IMO pertinent information concerning alternative design and arrangements approved by them for circulation to all Contracting Governments.

(6) Re-evaluation due to change of conditions:

If the assumptions and operational restrictions that were stipulated in the alternative design and arrangements are changed, the engineering analysis will be carried out under the changed condition and will be approved by the Director General.

CHAPTER VII

Special requirements

85. **Helicopter facilities**.-

(1) Purpose: The purpose of this rule is to provide additional measures in order to address the fire safety objectives of this chapter for ships fitted with special

facilities for helicopters. For this purpose, the following functional requirements will be met:

(a) helideck structure must be adequate to protect the ship from the fire hazards associated with helicopter operations;

(b) fire-fighting appliances will be provided to adequately protect the ship from the fire hazards associated with helicopter operations;

(c) refuelling and hangar facilities and operations will provide the necessary measures to protect the ship from the fire hazards associated with helicopter operations; and

(d) operation manuals and training will be provided.

(2) Application

(a) In addition to complying with the requirements of rules in parts B, C, D and E, as appropriate, ships equipped with helidecks will comply with the requirements of this rule.

(b) Where helicopters land or conduct winching operations on an occasional or emergency basis on ships without helidecks, fire-fighting equipment fitted in accordance with the requirements in Part C may be used. This equipment will be made readily available in close proximity to the landing or winching areas during helicopter operations.

(c) Notwithstanding the requirements of Sub-rule (2) above, ships constructed on or after 1 January 2020, having a helicopter landing area, will be provided with foam firefighting appliances which comply with the relevant provisions of chapter 17 of the Fire Safety Systems Code.

(3) Structure

(a) Construction of steel or other equivalent material

In general, the construction of the helidecks will be of steel or other equivalent materials. If the helideck forms the deck head of a deckhouse or superstructure, it will be insulated to “A-60” class standard.

(b) Construction of aluminum or other low melting point metals

If the Director General permits aluminum or other low melting point metal construction that is not made equivalent to steel, the following provisions will be satisfied:

(i) if the platform is cantilevered over the side of the ship, after each fire on the ship or on the platform, the platform will undergo a structural analysis to determine its suitability for further use; and

(ii) if the platform is located above the ship's deckhouse or similar structure, the following conditions will be satisfied:

(A) the deckhouse top and bulkheads under the platform will have no openings;

(B) windows under the platform will be provided with steel shutters; and

(C) After each fire on the platform or in close proximity, the platform will undergo a structural analysis to determine its suitability for further use.

(4) Means of escape

A helideck will be provided with both a main and an emergency means of escape and access for firefighting and rescue personnel. These will be located as far apart from each other as is practicable and preferably on opposite sides of the helideck.

(5) Fire-fighting appliances

(a) In close proximity to the helideck, the following fire-fighting appliances will be provided and stored near the means of access to that helideck:

(i) at least two dry powder extinguishers having a total capacity of not less than 45 kg;

(ii) carbon dioxide extinguishers of a total capacity of not less than 18 kg or equivalent;

(iii) a suitable foam application system consisting of monitors or foam making branch pipes capable of delivering foam to all parts of the helideck in all weather conditions in which helicopters can operate. The system will be capable of delivering a discharge rate as required in table 1 for at least five minutes;

Table 1 Foam discharge rates

Category	Helicopter overall length	Discharge rate foam solution (l/min)
H1	up to but not including 15m	250
H2	from 15m up to but not including 24m	500

H3	from 24m up to but not including 35m	800

(iv) the principal agent will be suitable for use with salt water and conform to performance standards not inferior to those acceptable to the IMO;

(v) at least two nozzles of an approved dual-purpose type (jet/spray) and hoses sufficient to reach any part of the helideck;

(vi) in lieu of the requirements of Sub-rule (5)(a)(iii) through 5)(a)(v), on ships constructed on or after 1 January 2020 having a helideck, foam firefighting appliances which comply with the provisions of the Fire Safety Systems Code

(vii) in addition to the requirements of sub-rule(10) of rule 74, two sets of fire-fighter's outfits; and

(viii) at least the following equipment will be stored in a manner that provides for immediate use and protection from the elements:

(A) adjustable wrench

(B) blanket, fire resistant;

(C) cutters, bolt, 60 cm;

(D) hook, grab or salving;

(E) hacksaw, heavy duty complete with 6 spare blades;

(F) ladder;

(G) lift line 5 mm diameter × 15 m in length;

(H) pliers, side-cutting;

(I) set of assorted screwdrivers; and

(J) harness knife complete with sheath.

(6) Drainage facilities

Drainage facilities in way of helidecks will be constructed of steel and will lead directly overboard independent of any other system and will be designed so that drainage does not fall onto any part of the ship.

(7) Helicopter refueling and hangar facilities

Where the ship has helicopter refueling and hangar facilities, the following requirements will be complied with:

(a) A designated area will be provided for the storage of fuel tanks which will be:

(i) as remote as is practicable from accommodation spaces, escape routes and embarkation stations; and

(ii) isolated from areas containing a source of vapour ignition;

(b) the fuel storage area will be provided with arrangements whereby fuel spillage may be collected and drained to a safe location;

(c) tanks and associated equipment will be protected against physical damage and from a fire in an adjacent space or area;

(d) where portable fuel storage tanks are used, special attention will be given to:

(i) design of the tank for its intended purpose;

(ii) mounting and securing arrangements;

(iii) electric bonding; and

(iv) inspection procedures;

(e) (storage tank fuel pumps will be provided with means which permit shutdown from a safe remote location in the event of a fire. Where a gravity fuelling system is installed, equivalent closing arrangements will be provided to isolate the fuel source;

(f) the fuel pumping unit will be connected to one tank at a time. The piping between the tank and the pumping unit will be of steel or equivalent material, as short as possible, and protected against damage;

(g) electrical fuel pumping units and associated control equipment will be of a type suitable for the location and potential hazards;

(h) fuel pumping units will incorporate a device which will prevent over-pressurization of the delivery or filling hose;

(i) equipment used in refuelling operations will be electrically bonded;

(j) “NO SMOKING” signs will be displayed at appropriate locations;

(k) hangar, refuelling and maintenance facilities will be treated as category ‘A’ machinery spaces with regard to structural fire protection, fixed fire-extinguishing and detection system requirements;

(l) enclosed hangar facilities or enclosed spaces containing refuelling installations will be provided with mechanical ventilation, as required by sub-

rule(3)of rule 80 for closed ro-ro spaces of cargo ships. Ventilation fans will be of non-sparking type; and

(m) electric equipment and wiring in enclosed hangar or enclosed spaces containing refuelling installations will comply with rules of clause(b),(c),(d)of sub-rule(3)of rule 80.

(8) Operations manual and fire-fighting service

(a) Each helicopter facility will have an operations manual, including a description and a checklist of safety precautions, procedures and equipment requirements. This manual may be part of the ship's emergency response procedures.

(b) The procedures and precautions to be followed during refuelling operations will be in accordance with recognized safe practices and contained in the operations manual.

(c) Fire-fighting personnel, consisting of at least two persons trained for rescue and fire-fighting duties, and fire-fighting equipment will be immediately available at all times when helicopter operations are expected.

(d) Fire-fighting personnel will be present during refuelling operations. However, the fire-fighting personnel will not be involved with refuelling activities.

(e) On-board refresher training will be carried out and additional supplies of fire fighting media will be provided for training and testing of the equipment.

86. Carriage of dangerous goods .-

(1) Purpose :The purpose of this rule is to provide additional safety measures in order to address the fire safety objectives of this chapter for ships carrying dangerous goods. For this purpose, the following functional requirements will be met:

(a) fire protection systems will be provided to protect the ship from the added fire hazards associated with carriage of dangerous goods;

(b) dangerous goods will be adequately separated from ignition sources; and

(c) appropriate personnel protective equipment will be provided for the hazards associated with the carriage of dangerous goods

(2) General requirements

(a) In addition to complying with the requirements of rules in Chapter II,III, IV and V and rules 82 and 84 as appropriate, ship types and cargo spaces,

referred to in clause(b) of sub-rule(2), intended for the carriage of dangerous goods will comply with the requirements of this rule, as appropriate, except when carrying dangerous goods in limited quantities and excepted quantities unless such requirements have already been met by compliance with the requirements elsewhere in this chapter. The types of ships and modes of carriage of dangerous goods are referred to in clause (b) of sub-rule(2) and in table 2. Cargo ships of less than 500 gross tonnage will comply with this rule, but Director Generals may reduce the requirements and such reduced requirements will be recorded in the document of compliance referred to in sub-rule (4).

(b) The following ship types and cargo spaces will govern the application of tables 2 and 3

(i) ships and cargo spaces not specifically designed for the carriage of freight containers, but intended for the carriage of dangerous goods in packaged form including goods in freight containers and portable tanks;

(ii) purpose-built container ships and cargo spaces intended for the carriage of dangerous goods in freight containers and portable tanks;

(iii) ro-ro ships and ro-ro spaces intended for the carriage of dangerous goods;

(iv) ships and cargo spaces intended for the carriage of solid dangerous goods in bulk; and

(v) ships and cargo spaces intended for carriage of dangerous goods other than liquids and gases in bulk in shipborne barges.

(3) Special requirements

Unless otherwise specified, the following requirements will govern the application of tables 2,3 and 4 to both “on-deck” and “under-deck” stowage of dangerous goods where the numbers of the following sub-rules are indicated in the first column of the tables.

(a) Water supplies

(i) Arrangements will be made to ensure immediate availability of a supply of water from the fire main at the required pressure either by permanent pressurization or by suitably placed remote arrangements for the fire pumps.

(ii) The quantity of water delivered will be capable of supplying four nozzles of a size and at pressures as specified in sub-rule (2) of rule 69 capable

of being trained on any part of the cargo space when empty. This amount of water may be applied by equivalent means to the satisfaction of the Director General.

(iii) Means will be provided for effectively cooling the designated underdeck cargo space by at least 5 l/min per square metre of the horizontal area of cargo spaces, either by a fixed arrangement of spraying nozzles or flooding the cargo space with water. Hoses may be used for this purpose in small cargo spaces and in small areas of larger cargo spaces at the discretion of the Director General. However, the drainage and pumping arrangements will be such as to prevent the build-up of free surfaces. The drainage system will be sized to remove no less than 125% of the combined capacity of both the water spraying system pumps and the required number of fire hose nozzles. The drainage system valves will be operable from outside the protected space at a position in the vicinity of the extinguishing system controls. Bilge wells will be of sufficient holding capacity and will be arranged at the side shell of the ship at a distance from each other of not more than 40 m in each watertight compartment. If this is not possible, the adverse effect upon stability of the added weight and free surface of water will be taken into account to the extent deemed necessary by the Director General in its approval of the stability information.

(iv) Provision to flood a designated under-deck cargo space with suitable specified media may be substituted for the requirements in sub- clause (iii) of clause(a) of sub-rule (3)

(v) The total required capacity of the water supply will satisfy sub- clauses(ii) and (iii) of clause(a) of sub-rule (3), if applicable, simultaneously calculated for the largest designated cargo space. The capacity requirements of sub- clause (ii) of clause (a) of sub-rule (3)will be met by the total capacity of the main fire pump(s), not including the capacity of the emergency fire pump, if fitted. If a drencher system is used to satisfy sub- clause (iii) of clause(a) of sub-rule (3), the drencher pump will also be taken into account in this total capacity calculation.

(b) Sources of ignition

Electrical equipment and wiring will not be fitted in enclosed cargo spaces or vehicle spaces unless it is essential for operational purposes in the opinion of the Director General. However, if electrical equipment is fitted in such spaces, it will be of a certified safe type for use in the dangerous

environments to which it may be exposed unless it is possible to completely isolate the electrical system (e.g. by removal of links in the system, other than fuses). Cable penetrations of the decks and bulkheads will be sealed against the passage of gas or vapour. Through runs of cables and cables within the cargo spaces will be protected against damage from impact. Any other equipment which may constitute a source of ignition of flammable vapour will not be permitted.

(c) Detection system

Ro-ro spaces will be fitted with a fixed fire detection and fire alarm system complying with the requirements of the Fire Safety Systems Code. All other types of cargo spaces will be fitted with either a fixed fire detection and fire alarm system or a sample extraction smoke detection system complying with the requirements of the Fire Safety Systems Code. If a sample extraction smoke detection system is fitted, particular attention will be made to paragraph 2.1.3 in chapter 10 of the Fire Safety Systems Code in order to prevent the leakage of toxic fumes into occupied areas.

(d) Ventilation arrangement

(i) (i) Adequate power ventilation will be provided in enclosed cargo spaces. The arrangement will be such as to provide for at least six air changes per hour in the cargo space based on an empty cargo space and for removal of vapours from the upper or lower parts of the cargo space, as appropriate.

(ii) (ii) The fans will be such as to avoid the possibility of ignition of flammable gas/air mixtures. Suitable wire mesh guards will be fitted over inlet and outlet ventilation openings.

(iii) (iii) Natural ventilation will be provided in enclosed cargo spaces intended for the carriage of solid dangerous goods in bulk, where there is no provision for mechanical ventilation.

(e) Bilge pumping

(i) Where it is intended to carry flammable or toxic liquids in enclosed cargo spaces, the bilge pumping system will be designed to protect against inadvertent pumping of such liquids through machinery space piping or pumps. Where large quantities of such liquids are carried, consideration will be given to the provision of additional means of draining those cargo spaces.

(ii) If the bilge drainage system is additional to the system served by pumps in the machinery space, the capacity of the system will be not less than 10 m^3/h per cargo space served. If the additional system is common, the capacity need not exceed 25 m^3/h. The additional bilge system need not be arranged with redundancy.

(iii) Whenever flammable or toxic liquids are carried, the bilge line into the machinery space will be isolated either by fitting a blank flange or by a closed lockable valve.

(iv) Enclosed spaces outside machinery spaces containing bilge pumps serving cargo spaces intended for carriage of flammable or toxic liquids should be fitted with separate mechanical ventilation giving at least 6 air changes per hour. If the space has access from another enclosed space, the door will be self-closing.

(v) If bilge drainage of cargo spaces is arranged by gravity drainage, the drainage will be either led directly overboard or to a closed drain tank located outside the machinery spaces. The tank will be provided with a vent pipe to a safe location on the open deck. Drainage from a cargo space into bilge wells in a lower space is only permitted if that space satisfies the same requirements as the cargo space above.

(f) Personnel protection

(i) Four sets of full protective clothing, resistant to chemical attack, will be provided in addition to the fire-fighter's outfits required by sub-rule(10) of rule 74 and will be selected taking into account the hazards associated with the chemicals being transported and the standards developed by the IMO according to the class and physical state. The protective clothing will cover all skin, so that no part of the body is unprotected.

(ii) At least two self-contained breathing apparatuses additional to those required by Rule 74 will be provided. Two spare charges suitable for use with the breathing apparatus will be provided for each required apparatus.

(g) Portable fire extinguishers

Portable fire extinguishers with a total capacity of at least 12 kg of dry powder or equivalent will be provided for the cargo spaces. These extinguishers will be in addition to any portable fire extinguishers required elsewhere in this chapter.

(h) Insulation of machinery space boundaries

Bulkheads forming boundaries between cargo spaces and machinery spaces of category A will be insulated to “A-60” class standard, unless the dangerous goods are stowed at least 3 m horizontally away from such bulkheads. Other boundaries between such spaces will be insulated to “A-60” class standard

(i) Water spray system

Each open ro-ro space having a deck above it and each space deemed to be a closed ro-ro space not capable of being sealed, will be fitted with an approved fixed pressure water-spraying system for manual operation which will protect all parts of any deck and vehicle platform in the space, except that the Director General may permit the use of any other fixed fire-extinguishing system that has been shown by full-scale test to be no less effective. However, the drainage and pumping arrangements will be such as to prevent the build-up of free surfaces. The drainage system will be sized to remove no less than 125% of the combined capacity of both the water spraying system pumps and the required number of fire hose nozzles. The drainage system valves will be operable from outside the protected space at a position in the vicinity of the extinguishing system controls. Bilge wells will be of sufficient holding capacity and will be arranged at the side shell of the ship at a distance from each other of not more than 40 m in each watertight compartment. If this is not possible the adverse effect upon stability of the added weight and free surface of water will be taken into account to the extent deemed necessary by the Director General in its approval of the stability information.

(j) Separation of ro-ro spaces

(i) In ships having ro-ro spaces, a separation will be provided between a closed ro-ro space and an adjacent open ro-ro space. The separation will be such as to minimize the passage of dangerous vapours and liquids between such spaces. Alternatively, such separation need not be provided if the ro-ro space is considered to be a closed cargo space over its entire length and fully complies with the relevant special requirements of this regulation.

(ii) In ships having ro-ro spaces, a separation will be provided between a closed ro-ro space and the adjacent weather deck. The separation will be such as to minimize the passage of dangerous vapours and liquids between such spaces. Alternatively, a separation need not be provided

if the arrangements of the closed ro-ro spaces are in accordance with those required for the dangerous goods carried on adjacent weather decks.

(4) Document of compliance

(a) The Director General will provide the ship with an appropriate document as evidence of compliance of construction and equipment with the requirements of this rule. Certification for dangerous goods, except solid dangerous goods in bulk, is not required for those cargoes specified as class 6.2 and 7, as defined in regulation VII/2, of SOLAS and dangerous goods in limited quantities and excepted quantities

Table 2 Application of the requirements to different modes of dangerous carriage

Where X appears in table 2 it means this requirement is applicable to all classes of dangerous goods as given in the appropriate line of table 3, except as indicated by the notes.							
Rule 83(2)(b)		.1	.2	.3		.4	.5
Rule 83	Weather decks .1 to .5 inclusive	Not specifically designed	Container cargo spaces	Closed ro-ro spaces[5]	Open ro-ro spaces	Solid dangerous goods in bulk	Shipbourne barges
(3)(a)(i)	X	X	X	X	X	For application of requirements of rule 83 to different classes of dangerous goods, see table 3	X
(3)(a)(ii)	X	X	X	X	X		-
(3)(a)(iii)	-	X	X	X	X		X
(3)(a)(iv)	-	X	X	X	X		X
(3)(b)	-	X	X	X	X		X[4]
(3)(C)	-	X	X	X	-		X[4]
(3)(d)(i)	-	X	X[1]	X	-		X[4]
(3)(d)(ii)	-	X	X[1]	X	-		X[4]

(3)(e)	-	X	X	X	-		-
(3)(f)(i)	X	X	X	X	X		-
(3)(f)(ii)	X	X	X	X	X		-
(3)(g)	X	X	-	-	X		-
(3)(h)	X	X	X[2]	X	X		-
(3)(i)	-	-	-	X[3]	X		-
(3)(j)(i)	-	-	-	X	-		-
(3)(j)(ii)	-	-	-	X	-		-

Notes:

1 For classes 4 and 5.1 solids not applicable to closed freight containers. For classes 2, 3, 6.1 and 8 when carried in closed freight containers, the ventilation rate may be reduced to not less than two air changes per hour. For classes 4 and 5.1 liquids when carried in closed freight containers, the ventilation rate may be reduced to not less than two air changes per hour. For the purpose of this requirement, a portable tank is a closed freight container

2 Applicable to decks only.

3 Applies only to closed ro-ro spaces, not capable of being sealed.

4 In the special case where the barges are capable of containing flammable vapours or alternatively if they are capable of discharging flammable vapours to a safe space outside the barge carrier compartment by means of ventilation ducts connected to the barges, these requirements may be reduced or waived to the satisfaction of the Central Government.

5 Special category spaces will be treated as closed ro-ro spaces when dangerous goods are carried.

Table 3 Application of the requirements to different classes of dangerous goods for ships

Class / Rule 83	4.1	4.2	4.3[6]	5.1	6.1	8	9

(3)(a)(i)	X	X	-	X	-	-	X
(3)(a)(ii)	X	X	-	X	-	-	X
(3)(b)	X	X[7]	X	X[8]	-	-	X[8]
(3)(d)(i)	-	X[7]	X	-	-	-	-
(3)(d)(ii)	X[9]	X[7]	X	X[7.9]	-	-	X[7.9]
(3)(d)(iii)	X	X	X	X	X	X	X
(3)(f)	X	X	X	X	X	X	X
(3)(h)	X	X	X	X[7]	-	-	X[10]

Notes:

6 The hazards of substances in this class which may be carried in bulk are such that special consideration must be given by the Director General to the construction and equipment of the ship involved in addition to meeting the requirements enumerated in this table.

7 Only applicable to Seedcake containing solvent extractions, to Ammonium nitrate and to Ammonium nitrate fertilizers.

8 Only applicable to Ammonium nitrate and to Ammonium nitrate fertilizers. However, a degree of protection in accordance with standards contained in the International Electrotechnical Commission publication 60079, Electrical Apparatus for Explosive Gas Atmospheres, is sufficient.

9 Only suitable wire mesh guards are required.

10 The requirements of the International Maritime Solid Bulk Cargoes (IMSBC) Code, as amended, are sufficient.

Table 4 Application of the requirements to different classes of dangerous goods except

Class Rule 83	1.1 to 1.6	1.4S	2.1	2.2	2.3 flammable[20]	2.3 non-flammable	3 FP[15] < 23°C	3 FP[15] ≥ 23°C to ≤	4.1	4.2	4.3 liquids[21]	4.3 solid	5.1	5.2[16]	6.1 liquids FP[15] < 23°C	6.1 liquids FP[15] ≥ 23°C	6.1 liquids	6.1 solids	8 liquids FP[15] < 23°C	8 liquids FP[15] ≥ 23°C	8 liquids	8 solids	9

								60° C									to ≤ 60° C					to ≤ 60° C			
(3)(a)(i)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
(3)(a)(ii)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	-
(3)(a)(iii)	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(3)(a)(iv)	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(3)(b)	x	-	x	-	x	-	x	-	-	-	x[18]	-	-	-	x	-	-	-	x	-	-	-	x[17]		
(3)(c)	x	x	x	x	-	x	x	x	x	x	x	x	x	-	x	x	x	x	x	x	x	x	-		
(3)(d)(ii)	-	-	x	-	-	x	x	-	x[11]	x[11]	x	x	x[11]	-	x	x	-	x[11]	x	x	-	-	x11		
(3)(d)(iii)	-	-	x	-	-	-	x	-	-	-	-	-	-	-	x	-	-	-	x	-	-	-	x17		
(3)(e)	-	-	-	-	-	-	x	-	-	-	-	-	-	-	x	x	x	-	x	x[19]	x[19]	-	-		
(3)(f)	-	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x[14]		
(3)(g)	-	-	-	-	-	-	x	x	x	x	x	x	x	-	x	x	-	-	x	x	-	-	-		
(3)(h)	x[12]	-	x	x	x	x	x	x	x	x	x	x	x[13]	x	x	x	-	-	x	x	-	-	-		
(3)(i)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
(3)(j)(i)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		

(3)(j)(k)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Notes:

11 When "mechanically-ventilated spaces" are required by the IMDG Code.

12 Stow 3 m horizontally away from the machinery space boundaries in all cases.

13 Refer to the IMDG Code.

14 As appropriate for the goods to be carried.

15 FP means flashpoint.

16 Under the provisions of the IMDG Code, stowage of class 5.2 dangerous goods under deck or in enclosed ro-ro spaces is prohibited.

17 Only applicable to dangerous goods evolving flammable vapour listed in the IMDG Code.

18 Only applicable to dangerous goods having a flashpoint less than 23ºC listed in the IMDG Code.

19 Only applicable to dangerous goods having a subsidiary risk class 6.1.

20 Under the provisions of the IMDG Code, stowage of class 2.3 having subsidiary risk class 2.1 under deck or in enclosed ro-ro spaces is prohibited.

21 Under the provisions of the IMDG Code, stowage of class 4.3 liquids having a flashpoint less than 23C under deck or in enclosed ro-ro spaces is prohibited.

87. Protection of vehicles, special category, open and closed ro-ro spaces

(1) Purpose: The purpose of this rule is to provide additional safety measures in order to address the fire safety objectives of this chapter for ships fitted with vehicle, special category. For this purpose, the following functional requirements will be met:

(a) fire protection systems will be provided to adequately protect the ship from the fire hazards associated with vehicle, special category and ro-ro spaces, and weather deck intended for the carriage of vehicles;

(b) ignition sources will be separated from vehicle, special category and ro-ro spaces and

(c) vehicle, special category and ro-ro spaces will be adequately ventilated.

(2) General requirements

(a) Application

In addition to complying with the requirements of rules in Chapters II,III,IV and V as appropriate, vehicle, special category and ro-ro spaces will comply with the requirements of this rule.

(b) On all ships, vehicles with fuel in their tanks for their own propulsion may be carried in cargo spaces other than vehicle, special category or ro-ro spaces, provided that all the following conditions are met:

(i) the vehicles do not use their own propulsion within the cargo spaces;

(ii) the cargo spaces are in compliance with the appropriate requirements of rule 83; and

(iii) the vehicles are carried in accordance with the IMDG Code, as defined in regulation VII/1.1 of SOLAS.

(3) Precaution against ignition of flammable vapours in closed vehicle spaces, closed ro-ro spaced and special category spaces

(a) Ventilation systems

(i) Capacity of ventilation systems

There will be provided an effective power ventilation system sufficient to give at least the following air changes:

Cargo ships : 6 air changes per hour

The Director General may require an increased number of air changes when vehicles are being loaded and unloaded.

(ii) Performance of ventilation systems

(A) In cargo ships, the ventilation fans will normally be run continuously and give at least the number of air changes required in sub-rule (3)(a)(i) whenever vehicles are on board, except where an air quality control system in accordance with Sub-rule (3)(a)(ii)(C) is provided. Where this is impracticable, they will be operated for a limited period daily as weather permits and in any case for a reasonable period prior to discharge, after which period the ro-ro or vehicle space will be proved gas-free. One or more portable combustible gas detecting instruments will be carried for this purpose. The system will be entirely separate from other ventilation systems. Ventilation ducts serving ro-ro or vehicle spaces will be capable of being effectively sealed for

each cargo space. The system will be capable of being controlled from a position outside such spaces.

(B) The ventilation system will be such as to prevent air stratification and the formation of air pockets.

(C) For all ships, where an air quality control system is provided based on the guidelines developed by the IMO the ventilation system may be operated at a decreased number of air changes and/or a decreased amount of ventilation. This relaxation does not apply to spaces to which at least ten air changes per hour is required by sub-rule (3)(b)(ii) of this regulation and spaces subject to regulations Rule 83 Sub-rule (3)(d)(i) and Rule 85.

(iii) Indication of ventilation systems

Means will be provided on the navigation bridge to indicate any loss of the required ventilating capacity.

(iv) Closing appliances and ducts

(A) Arrangements will be provided to permit a rapid shutdown and effective closure of the ventilation system from outside of the space in case of fire, taking into account the weather and sea conditions.

(B) (B) Ventilation ducts, including dampers, within a common horizontal zone will be made of steel.

(v) Permanent openings

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

(b) Electrical equipment and wiring

(i) Except as provided in sub- clause (ii) of clause(b) of sub-rule(3), electrical equipment and wiring will be of a type suitable for use in an explosive petrol and air mixture

(ii) In case of other than special category spaces below the bulkhead deck, notwithstanding the provisions sub- clause (i) of clause(b) of sub-rule(3), above a height of 450 mm from the deck and from each platform for vehicles, if fitted, except platforms with openings of sufficient size

permitting penetration of petrol gases downwards, electrical equipment of a type so enclosed and protected as to prevent the escape of sparks will be permitted as an alternative on condition that the ventilation system is so designed and operated as to provide continuous ventilation of the cargo spaces at the rate of at least ten air changes per hour whenever vehicles are on board.

(c) Electrical equipment and wiring in exhaust ventilation ducts

Electrical equipment and wiring, if installed in an exhaust ventilation duct, will be of a type approved for use in explosive petrol and air mixtures and the outlet from any exhaust duct will be sited in a safe position, having regard to other possible sources of ignition.

(d) Other ignition sources

Other equipment which may constitute a source of ignition of flammable vapours will not be permitted.

(e) Scuppers and discharges

Scuppers will not be led to machinery or other spaces where sources of ignition may be present.

(4) Detection and alarm

(a) Fixed fire detection and fire alarm systems

The requirements of sub-rule (4)(a)(i) will apply to cargo ships constructed on or after 1 January 2026. Cargo ships constructed before 1 January 2026 will comply with the previously applicable requirements of sub-rule (4).

(i) In cargo ships, vehicle spaces, special category spaces and ro-ro spaces will be provided with a fixed fire detection and fire alarm system complying with the requirements of the Fire Safety Systems Code. The fixed fire detection system will be capable of rapidly detecting the onset of fire. The type of detectors and their spacing and location will be to the satisfaction of the Director General, taking into account the effects of ventilation and other relevant factors. After being installed, the system will be tested under normal ventilation conditions and will give an overall response time to the satisfaction of the Director General.

(b) Sample extraction smoke detection systems

Except open ro-ro space, open vehicle spaces and special category spaces, a sample extraction smoke detection system complying with the requirements

of the Fire Safety Systems Code may be used as an alternative of the fixed fire detection and fire alarm system required in Sub-rule (4)(a).

(c) Special category spaces

(i) An efficient fire patrol system will be maintained in special category spaces.

(ii) Manually operated call points will be spaced so that no part of the space is more than 20 m from a manually operated call point, and one will be placed close to each exit from such spaces.

(5) Fire-extinction

(a) Fixed fire-extinguishing systems

(i) (i)Vehicle spaces which are not special category spaces and are capable of being sealed from a location outside of the cargo spaces will be fitted with one of the following systems

(A) a fixed gas fire-extinguishing system which will comply with the provisions of the Fire Safety Systems Code

(B) a fixed high-expansion foam fire-extinguishing system complying with the provisions of the Fire Safety Systems Code; or

(C) a fixed water-based firefighting system for ro-ro spaces and special category spaces complying with the provisions of the Fire Safety Systems Code

(ii) Vehicle spaces and ro-ro spaces not capable of being sealed and special category spaces will be fitted with a fixed water-based fire-fighting system for ro-ro spaces and special category spaces complying with the provisions of the Fire Safety Systems Code which will protect all parts of any deck and vehicle platform in such spaces. Such a water-based fire-fighting system will have:

(A) a pressure gauge on the valve manifold;

(B) clear marking on each manifold valve indicating the spaces served;

(C) instructions for maintenance and operation located in the valve room; and

(D) a sufficient number of drainage valves to ensure complete drainage of the system.

(iii) The Director General may permit the use of any other fixed fire-extinguishing system that has been shown that it is not less effective by a full-scale test in conditions simulating a flowing petrol fire in a vehicle space or a ro-ro space in controlling fires likely to occur in such a space.

(iv) The requirement of this paragraph will apply to ships constructed on or after 1 January 2010. Ships constructed on or after 1 July 2002 and before 1 January 2010 will comply with the previously applicable requirements of this sub-rule, as amended by resolution MSC.99(73). When fixed pressure water-spraying systems are provided, in view of the serious loss of stability which could arise due to large quantities of water accumulating on the deck or decks during the operation of the fixed pressure water-spraying system, the following arrangements will be provided:

(A) in cargo ships, the drainage and pumping arrangements will be such as to prevent the build-up of free surfaces. In such case, the drainage system will be sized to remove no less than 125% of the combined capacity of both the water spraying system pumps and the required number of fire hose nozzles, taking into account the guidelines developed by IMO. The drainage system valves will be operable from outside the protected space at a position in the vicinity of the extinguishing system controls. Bilge wells will be of sufficient holding capacity and will be arranged at the side shell of the ship at a distance from each other of not more than 40 m in each watertight compartment. If this is not possible the adverse effect upon stability of the added weight and free surface of water will be taken into account to the extent deemed necessary by the Director General in its approval of the stability information. Such information will be included in the stability information supplied to the master as required by regulation II-1/5-1 of SOLAS.

(B) On all ships, for closed vehicles and ro-ro spaces and special category spaces, where fixed pressure water-spraying systems are fitted, means will be provided to prevent the blockage of drainage arrangements, taking into account the guidelines developed by the IMO. Ships constructed before 1 January 2010 will comply with the requirements of this paragraph by the first survey after 1 January 2010

(6) Portable fire extinguishers

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

(b) In addition to the provision of sub-rule sub- clause (i) of clause(b) of sub-rule(6), the following fire extinguishing appliances will be provided in vehicle, and special category spaces intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion:

(i) at least three water-fog applicators; and

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

88. Requirements for vehicle carriers carrying motor vehicles with compressed hydrogen or natural gas in their tanks for their own propulsion as cargo

(1) Purpose

The purpose of this regulation is to provide additional safety measures in order to address the fire safety objectives of this chapter for vehicle carriers with vehicle and ro-ro spaces intended for carriage of motor vehicles with compressed hydrogen or compressed natural gas in their tanks for their own propulsion as cargo.

(2) Application

(a) In addition to complying with the requirements of Rule 84, as appropriate, vehicle carriers constructed on or after 1 January 2016 intended for the carriage of motor vehicles with compressed hydrogen or compressed natural gas in their tanks for their own propulsion as cargo will comply with the requirements in sub-rule (3) to (5).

(b) In addition to complying with the requirements of Rule 84, as appropriate, vehicle carriers constructed before 1 January 2016, including those constructed before 1 July 2012, will comply with the requirements in Sub-rule(5).

(3) Requirements for spaces intended for carriage of motor vehicles with compressed natural gas in their tanks for their own propulsion as cargo

(a) Electrical equipment and wiring

All electrical equipment and wiring will be of a certified safe type for use in an explosive methane and air mixture

(b) Ventilation arrangement

(i) Electrical equipment and wiring, if installed in any ventilation duct, will be of a certified safe type for use in explosive methane and air mixtures.

(ii) The fans will be such as to avoid the possibility of ignition of methane and air mixtures. Suitable wire mesh guards will be fitted over inlet and outlet ventilation openings.

(c) Other ignition sources

Other equipment which may constitute a source of ignition of methane and air mixtures will not be permitted.

(4) Requirements for spaces intended for carriage of motor vehicles with compressed hydrogen in their tanks for their own propulsion as cargo

(a) Electrical equipment and wiring

All electrical equipment and wiring will be of a certified safe type for use in an explosive hydrogen and air mixture.

(b) Ventilation arrangement

(i) Electrical equipment and wiring, if installed in any ventilation duct, will be of a certified safe type for use in explosive hydrogen and air mixtures and the outlet from any exhaust duct will be sited in a safe position, having regard to other possible sources of ignition.

(ii) The fans will be designed such as to avoid the possibility of ignition of hydrogen and air mixtures. Suitable wire mesh guards will be fitted over inlet and outlet ventilation openings.

(c) Other ignition sources

Other equipment which may constitute a source of ignition of hydrogen and air mixtures will not be permitted.

(5) Detection

When a vehicle carrier carries as cargo one or more motor vehicles with either compressed hydrogen or compressed natural gas in their tanks for their own propulsion, at least two portable gas detectors will be provided.

Such detectors will be suitable for the detection of the gas fuel and be of a certified safe type for use in the explosive gas and air mixture.

89. **Application of Rules to ships of under 500GT:**

The provisions of following Rules will be applicable to ships of under 500GT, unless the Director General waives in writing the application of any provision or implement any additional provision to a class or category of such ships having regard to the size and intended services.

The provision of paragraph 8, paragraph 18, paragraph 19, paragraph 27, sub-paragraph(1) and (2) of paragraph 28, paragraph 32, paragraph 33, sub-paragraph(6) and (8) of paragraph 40, sub-paragraph (1),(2) and (12) of paragraph 43, paragraph 44, sub-paragraph (1) to (5) of paragraph 45, paragraph 46, paragraph 48, paragraph 49, sub-paragraph (1) to (5) and (8) of paragraph 50, paragraph 51, paragraph 52, paragraph 53, paragraph 54, sub-paragraph (1),(3) and (7) of paragraph 55, paragraph 57, paragraph 58, sub-paragraph (1) of paragraph 59, paragraph 60, paragraph 61, paragraph 62, sub-paragraph (1)clause (a),(b) and sub-paragraph (2)clause (a) and sub-paragraph (3)clause (a) of paragraph 63, 64, sub-paragraph (1)and (3) of paragraph 65, sub-paragraph (2) of paragraph 71, paragraph 76, paragraph 80 will apply to ships less than 500 tons but more than 15 tons.

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PART -IV

SURVEY OF CARGO SHIPS.

Surveys and certificates

90. Inspection and survey.-

(1) The inspection and survey of ships, so far as regards the enforcement of the provisions of the present rules and the granting of exemptions there from, will be carried out by the Director General or any persons authorised by it in this regard. The Director General may, however, entrust the inspections and surveys either to surveyors nominated for the purpose or organizations recognized by it.

(2) The Director General nominating surveyors or recognizing organizations to conduct inspections and surveys as set forth above will as a minimum empower, any nominated surveyor or recognized organization to:

(i) require repairs to the ship;

(ii) carry out inspections and surveys if requested by the appropriate authorities of a port State.

The Director General will notify the IMO of the specific responsibilities and conditions of the authority delegated to nominated surveyors or recognized organizations.

(3) When a nominated surveyor or recognized organization determines that the condition of the ship or its equipment does not correspond substantially with the particulars of the certificate or is such that the ship is not fit to proceed to sea without danger to the ship, or persons on board, such surveyor or organization will immediately ensure that corrective action is taken and will in due course notify the Director General. If such corrective action is not taken the relevant certificate should be withdrawn and the Director General will be notified immediately; and, if the ship is in the port of another Government, the appropriate authorities of the port State will also be notified immediately. When a person authorized by the Director General, a nominated surveyor or a recognized organization has notified the appropriate authorities of the port State, the Government of the port State concerned will give such authorized person, surveyor or organization any necessary assistance to carry out their obligations under this rule. When applicable, the Government of the port State concerned will ensure that the ship will not sail until it can proceed to sea, or leave port for the purpose of proceeding to the appropriate repair yard, without danger to the ship or persons on board.

91. Surveys of structure, machinery and equipment of cargo ships.-

(1) The structure, machinery and equipment (other than items in respect of which a Cargo Ship Safety Equipment Certificate see Schedule and a Cargo Ship Safety Radio Certificate see Schedule are issued) of a cargo ship as referred to in clause (a) of Sub-rule(2) will be subject to the surveys and inspections specified below:

(a) an initial survey including an inspection of the outside of the ship's bottom before the ship is put in service;

(b) a renewal survey at intervals specified by the Director General but not exceeding 5 (five) years, except where Sub-rules (2),(5), (6) and (7) of rule 11 is applicable;

(c) an intermediate survey within 3 (three) months before or after the second anniversary date or within 3 (three) months before or after the third anniversary date of the Cargo Ship Safety Construction Certificate see Schedule, which will take the place of one of the annual surveys specified in clause (d) of sub-rule(1);

(d) an annual survey within 3 (three) months before or after each anniversary date of the Cargo Ship Safety Construction Certificate;

(e) a minimum of 2 (two) inspections of the outside of the ship's bottom during any five year period, which is the five year period of validity of the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate , except where sub- rule (5) or (6) of rule 11 is applicable. Where sub- rule (5) or (6) of rule 11 is applicable, this five year period may be extended to coincide with the extended period of validity of the certificate. In all cases the interval between any two such inspections will not exceed 36 months;

(2) The surveys and inspections referred to in sub-rule (1) will be carried out as follows:

(a) the initial survey will include a complete inspection of the structure, machinery and equipment. This survey will be such as to ensure that the arrangements, materials, scantlings and workmanship of the structure, boilers and other pressure vessels, their appurtenances, main and auxiliary machinery including steering gear and associated control systems, electrical installation and other equipment comply with the requirements of the present rules, are in satisfactory condition and are fit for the service for which the ship is intended and that the required stability information is provided. In the case of tankers such a survey will also include an inspection of the pump-rooms, cargo, bunker and ventilation piping systems and associated safety devices;

(b) the renewal survey will include an inspection of the structure, machinery and equipment as referred to in clause (a) of sub- rule (2) to ensure that they comply with the requirements of the present rules, are in satisfactory condition and are fit for the service for which the ship is intended;

(c) the intermediate survey will include an inspection of the structure, boilers (schedule 5) and other pressure vessels, machinery and equipment, the steering gear and the associated control systems and electrical installations to ensure that they remain satisfactory for the service for which the ship is intended. In the case of tankers, the survey will also include an inspection of the pump-rooms, cargo, bunker and ventilation piping systems and associated safety devices and the testing of insulation resistance of electrical installations in dangerous zones;

(d) the annual survey will include a general inspection of the structure, machinery and equipment referred to in clause (a) of sub-rule (2), to ensure that they have been maintained in accordance with Sub-rule (1) of rule 8 and that they remain satisfactory for the service for which the ship is intended;

(e) the inspection of the outside of the ship's bottom and the survey of tail shaft (schedule 6 and schedule 7) and related items inspected at the same time will be such as to ensure that they remain satisfactory for the service for which the ship is intended.

(3) The intermediate and annual surveys and the inspections of the outside of the ship's bottom referred to in clause (c), (d) and (e) of Sub-rule 1 will be endorsed on the Cargo Ship Safety Construction Certificate.

92. Maintenance of conditions after survey.-

(1)The condition of the ship and its equipment will be maintained to conform with the provisions of the present rules to ensure that the ship in all respects will remain fit to proceed to sea without danger to the ship or persons on board.

(2) After any survey of the ship under rule 83, has been completed, no change will be made in the structural arrangements, machinery, equipment and other items covered by the survey, without the sanction of the Director General.

(3)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 hull, machinery or equipment, the master or owner of the ship will report at the earliest opportunity to the Director General, the nominated surveyor or recognized organization or the person responsible for issuing the relevant certificate, who will cause investigations to be initiated to determine whether a survey, as required by rule 83, is necessary. If the ship is in a port of another Government, the master or owner will also report immediately to the appropriate authorities of the port State and the nominated surveyor or recognized organization or the authorized person will ascertain that such a report has been made.

93. Issue or endorsement of certificates.-

(1) (a) a certificate called a Cargo Ship Safety Construction Certificate or a Cargo Ship Construction Certificate will be issued after an initial or renewal survey to a cargo ship which complies with the relevant requirements of chapters II and III of these rules (other than those relating to fire safety systems and appliances and fire control plans) and any other relevant requirements of the present rules;

(b) when an exemption is granted to a ship under and in accordance with the provisions of the present rules, a certificate called an Exemption Certificate will be issued in addition to the certificates prescribed in this sub-rule;

(c) The format of certificates are provided in Schedule - 5.

94. Issue or endorsement of certificates by another Government.-

A Government who is party to SOLAS may, at the request of the Director General, cause a ship to be surveyed and, if satisfied that the requirements of the present rules are complied with, will issue or authorize the issue of certificates to the ship and, where appropriate, endorse or authorize the endorsement of certificates on the ship in accordance with the present rules. Any certificate so issued will contain a statement to the effect that it has been issued at the request of the Government of India, and it will have the same force and receive the same recognition as a certificate issued under rule 85.

95. **Duration and validity of certificates**.-

(1) A Cargo Ship Safety Construction Certificate or a Cargo Ship Construction Certificate will be issued for a period specified by the Director General which will not exceed 5 (five) years. An Exemption Certificate will not be valid for longer than the period of the certificate to which it refers.

(2) (a) notwithstanding the requirements of sub-rule (1), when the renewal survey is completed within 3 (three) months before the expiry date of the existing certificate, the new certificate will be valid from the date of completion of the renewal survey to a date not exceeding 5 (five) years from the date of expiry of the existing certificate;

(b) when the renewal survey is completed after the expiry date of the existing certificate, the new certificate will be valid from the date of completion of the renewal survey to a date not exceeding 5 (five) years from the date of expiry of the existing certificate;

(c) when the renewal survey is completed more than 3 (three) months before the expiry date of the existing certificate, the new certificate will be valid from the date of completion of the renewal survey to a date not exceeding 5 (five) years from the date of completion of the renewal survey.

(3) If a certificate is issued for a period of less than 5 (five) years, the Director General may extend the validity of the certificate beyond the expiry date to the maximum period specified in sub-rule (1), provided that the surveys referred to in rule 7, applicable when a certificate is issued for a period of 5 (five) years are carried out as appropriate.

(4) If a renewal survey has been completed and a new certificate cannot be issued or placed on board the ship before the expiry date of the existing certificate, the person or organization authorized by the Central Government may endorse the existing certificate and such a certificate will be accepted as valid for a further period which will not exceed 5 (five) months from the expiry date.

(5) If a ship at the time when a certificate expires is not in a port in which it is to be surveyed, the Director General may extend the period of validity of the certificate but this extension will be granted only for the purpose of allowing the ship to complete its voyage to the port in which it is to be surveyed, and then only in cases where it appears proper and reasonable to do so. No certificate will be extended for a period longer than 3 (three) months, and a ship to which an extension is granted will not, on its arrival in the port in which it is to be surveyed, be entitled by virtue of such extension to leave that port without having a new certificate. When the renewal survey is completed, the new certificate will be valid to a date not exceeding 5 years from the date of expiry of the existing certificate before the extension was granted.

(6) A certificate issued to a ship engaged on short voyages which has not been extended under the foregoing provisions of this rule may be extended by the Director General for a period of grace of up to 1 (one) month from the date of expiry stated on it. When the renewal survey is completed, the new certificate will be valid to a date not exceeding 5 (five) years from the date of expiry of the existing certificate before the extension was granted.

(7) In special circumstances, as determined by the Director General, a new certificate need not be dated from the date of expiry of the existing certificate as required by sub-rules (2)(b), (5) or (6). In these special circumstances, the new certificate will be valid to a date not exceeding 5 (five) years from the date of completion of the renewal survey.

(8) If an annual, intermediate or periodical survey is completed before the period specified in the relevant rules then:

(a) the anniversary date shown on the relevant certificate will be amended by endorsement to a date which will not be more than 3 (three) months later than the date on which the survey was completed;

(b) the subsequent annual, intermediate or periodical survey required by the relevant rules will be completed at the intervals prescribed by these rules using the new anniversary date;

(c) the expiry date may remain unchanged provided one or more annual, intermediate or periodical surveys, as appropriate, are carried out so that the

maximum intervals between the surveys prescribed by the relevant rules are not exceeded.

(9) A certificate issued under rule 85 or 86 will cease to be valid in any of the following cases:

(a) if the relevant surveys and inspections are not completed within the periods specified under sub-rule(1) of rule 83;

(b) if the certificate is not endorsed in accordance with the present rules;

(c) upon transfer of the ship from another flag to Indian flag, a new certificate will only be issued when the Director General is fully satisfied that the ship is in compliance with the requirements of Sub-rule (1) and (2) of rule 8. In the case of a transfer between Contracting Governments, if requested within 3 (three) months after the transfer has taken place, the Government of the State whose flag the ship was formerly entitled to fly will, as soon as possible, transmit to the Director General copies of the certificates carried by the ship before the transfer and, if available, copies of the relevant survey reports.

96. **Forms of certificates and records of equipment**. - The certificates and records of equipment will be drawn up in the form corresponding to the models given in the schedule to the present rules.

97. **Penalty** .- Whoever contravenes any of the provisions of these rules will be punishable with fine in accordance with the provisions of clause (b) of sub-section (2) of section 458 of the Merchant Shipping Act, 1958.

SCHEDULE 2

(1) See rule …...

(2) SCHEDULE 1

(3)

(4) Table 9.1 Fire integrity of bulkheads separating adjacent spaces

Spaces	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Control stations (1)	A-0[e]	A-0	A-60	A-0	A-15	A-60	A-15	A-60	A-60	*	A-60
Corridors		C	B-0	B-0 A-0[c]	B-0	A-60	A-0	A-60	A-0	*	A-30
Accommodation spaces			C[a,b]	B-0 A-0[c]	B-0	A-60	A-0	A-0	A-0	*	A-30
Stairways (4)				B-0 A-0[c]	B-0 A-0[c]	A-60	A-0	A-0	A-0	*	A-30
Service spaces (low risk) (5)					C	A-60	A-0	A-0	A-0	*	A-0
Machinery spaces of category A (6)						*	A-0	A-0	A-60	*	A-60[f]
Other machinery spaces (7)							A-0[d]	A-0[g]	A-0	*	A-0
Cargo spaces (8)								A-0	A-0	*	A-0
Service spaces (high risk) (9)								*	A-0[d]	*	A-30

Open decks	(10)										–	A-0
Ro-ro and vehicle spaces	(11)											*h

See rule 70

(5) Table 9.2 Fire integrity of decks separating adjacent spaces

Space below↓	Space above→	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Control stations	(1)	A-0	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0	*	A-60
Corridors	(2)	A-0	*	*	A-0	*	A-60	A-0	A-0	A-0	*	A-30
Accommodation spaces	(3)	A-60	A-0	*	A-0	*	A-60	A-0	A-0	A-0	*	A-30
Stairways	(4)	A-0	A-0	A-0	*	A-0	A-60	A-0	A-0	A-0	*	A-30
Service spaces (low risk)	(5)	A-15	A-0	A-0	A-0	*	A-60	A-0	A-0	A-0	*	A-0
Machinery spaces of category A	(6)	A-60	A-60	A-60	A-60	A-60	*	A-60[i]	A-30	A-60	*	A-60
Other machinery spaces	(7)	A-15	A-0	A-0	A-0	A-0	A-0	*	A-0	A-0	*	A-0
Cargo spaces	(8)	A-60	A-0	A-0	A-0	A-0	A-0	A-0	*	A-0	*	A-0
Service spaces (high risk)	(9)	A-60	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0[d]	*	A-30
Open decks	(10)	*	*	*	*	*	*	*	*	*	–	*

Ro-ro and vehicle (11) spaces	A-60	A-30	A-30	A-30	A-0	A-60	A-0	A-0	A-30	*	*h

Notes:

To be applied to both tables 9.1 and 9.2 as appropriate.

a No special requirements are imposed upon bulkheads in methods IIC and IIIC fire protection.

b In case of method IIIC “B” class bulkheads of “B-0” rating will be provided between spaces or groups of spaces of 50 m^2 and over in area.

c For clarification as to which applies, see sub- clauses (ii) and(iv) of clause(c) of sub-rule(2).

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

e Bulkheads separating the wheelhouse, chartroom and radio room from each other may have a “B-0” rating.

f An “A-0” rating may be used if no dangerous goods are intended to be carried or if such goods are stowed not less than 3 m horizontally from such a bulkhead.

g For cargo spaces in which dangerous goods are intended to be carried, clause(h) of sub-rule(3)of rule19 applies.

h Bulkheads and decks separating ro-ro spaces will be capable of being closed reasonably gastight and such divisions will have “A” class integrity in so far as reasonable and practicable, in the opinion of the Central Government it has little or no fire risk.

i Fire insulation need not be fitted in the machinery space in category (7) if, in the opinion of the Central Government, it has little or no fire risk.

* Where an asterisk appears in the tables, the division is required to be of steel or other equivalent material but is not required to be of “A” class standard. However, where a deck, except an open deck, is penetrated for the passage of electric cables, pipes and vent ducts, such penetrations should be made tight to prevent the passage of flame and smoke. Divisions between control stations (emergency generators) and open decks may

have air intake openings without means for closure, unless a fixed gas fire-fighting system is fitted.

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SCHEDULE 2 See Rule 70

(6) Table 9.3 Fire integrity of bulkheads separating adjacent spaces

(7)

Spaces		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Control stations	(1)	A-0[c]	A-0	A-60	A-0	A-15	A-60	A-15	A-60	A-60	*
Corridors	(2)		C	B-0	B-0 A-0[a]	B-0	A-60	A-0	A-60	A-0	*
Accommodation spaces	(3)			C	B-0 A-0[a]	B-0	A-60	A-0	A-60	A-0	*
Stairways	(4)				B-0 A-0[a]	B-0 A-0[a]	A-60	A-0	A-60	A-0	*
Service spaces (low risk)	(5)					C	A-60	A-0	A-60	A-0	*
Machinery spaces of category A	(6)						*	A-0	A-0[d]	A-60	*
Other machinery spaces	(7)							A-0[b]	A-0	A-0	*
Cargo pump-rooms	(8)								*	A-60	*
Service spaces (high risk)	(9)									A-0[b]	*

Open decks	(10)										-

(8) Table 9.4 Fire integrity of decks separating adjacent spaces - See rule 70

Space below↓ Space above→		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Control stations	(1)	A-0	A-0	A-0	A-0	A-0	A-60	A-0	-	A-0	*
Corridors	(2)	A-0	*	*	A-0	*	A-60	A-0	-	A-0	*
Accommodation spaces	(3)	A-60	A-0	*	A-0	*	A-60	A-0	-	A-0	*
Stairways	(4)	A-0	A-0	A-0	*	A-0	A-60	A-0	-	A-0	*
Service spaces (low risk)	(5)	A-15	A-0	A-0	A-0	*	A-60	A-0	-	A-0	*
Machinery spaces of category A	(6)	A-60	A-60	A-60	A-60	A-60	*	A-60[a]	A-0	A-60	*
Other machinery spaces	(7)	A-15	A-0	A-0	A-0	A-0	A-0	*	A-0	A-0	*
Cargo pump-rooms	(8)	-	-	-	-	-	A-0[a]	A-0	*	A-0[b]	*
Service spaces (high risk)	(9)	A-60	A-0	A-0	A-0	A-0	A-60	A-0	-	A-0[b]	*
Open decks	(10)	*	*	*	*	*	*	*	*	*	-

Notes:

To be applied to tables 9.3 and 9.4 as appropriate.

a For clarification as to which applies, see sub- clauses (ii) and (iv) of clause(b) of sub-rule(2)

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

c Bulkheads separating the wheelhouse, chartroom and radio room from each other may have a “B-0” rating.

d Bulkheads and decks between cargo pump-rooms and machinery spaces of category A may be penetrated by cargo pump shaft glands and similar gland penetrations, provided that gastight seals with efficient lubrication or other means of ensuring the permanence of the gas seal are fitted in way of the bulkheads or deck.

e Fire insulation need not be fitted in the machinery space in category (7) if, in the opinion of the Central Government, it has little or no fire risk.

* Where an asterisk appears in the table, the division is required to be of steel or other equivalent material, but is not required to be of “A” class standard. However, where a deck, except an open deck, is penetrated for the passage of electric cables, pipes and vent ducts, such penetrations willwill be made tight to prevent the passage of flame and smoke. Divisions between control stations (emergency generators) and open decks may have air intake openings without means for closure, unless a fixed gas fire-fighting system is fitted.

SCHEDULE-3

See Rule 79

Table 18.1 Foam discharge rates

(i)

Category	Helicopter overall length	Discharge rate foam solution (**l**/min)
H1	up to but not including 15m	250
H2	from 15m up to but not including 24m	500
H3	from 24m up to but not including 35m	800

See rule 80

SCHEDULE-4

Table 19.1 Application of the requirements to different modes of carriage of dangerous goods in ships and cargo spaces

Where X appears in table 19.1 it means this requirement is applicable to all classes of dangerous goods as given in the appropriate line of table 19.3, except as indicated by the notes.

Rule 19(2)(b)		.1	.2	.3		.4	.5
Rule 19	Weather decks .1 to .5 inclusive	Not specifically designed	Container cargo spaces	Closed ro-ro spaces[5]	Open ro-ro spaces	Solid dangerous goods in bulk	Shipbourne barges
.3.1.1	X	X	X	X	X	For application of requirements of rule 19 to different classes of	X
.3.1.2	X	X	X	X	X		-
.3.1.3	-	X	X	X	X		X
.3.1.4	-	X	X	X	X		X
.3.2	-	X	X	X	X		X[4]

.3.3	-	X	X	X	-	dangerous goods, see table 19.2	X[4]
.3.4.1	-	X	X[1]	X	-		X[4]
.3.4.2	-	X	X[1]	X	-		X[4]
.3.5	-	X	X	X	-		-
.3.6.1	X	X	X	X	X		-
.3.6.2	X	X	X	X	X		-
.3.7	X	X	-	-	X		-
.3.8	X	X	X[2]	X	X		-
.3.9	-	-	-	X[3]	X		-
.3.10.1	-	-	-	X	-		-
.3.10.2	-	-	-	X	-		-

Notes:

1 For classes 4 and 5.1 not applicable to closed freight containers.

For classes 2, 3, 6.1 and 8 when carried in closed freight containers the ventilation rate may be reduced to not less than two air changes. For the purpose of this requirement a portable tank is a closed freight container.

2 Applicable to decks only.

3 Applies only to closed ro-ro spaces, not capable of being sealed.

4 In the special case where the barges are capable of containing flammable vapours or alternatively if they are capable of discharging flammable vapours to a safe space outside the barge carrier compartment by means of ventilation ducts connected to the barges, these requirements may be reduced or waived to the satisfaction of the Central Government.

5 Special category spaces will be treated as closed ro-ro spaces when dangerous goods are carried.

Table 19.2 Application of the requirements to different classes of dangerous goods for ships and cargo spaces carrying solid dangerous goods in bulk -See Rule 80

Class / Rule 19	4.1	4.2	4.3[6]	5.1	6.1	8	9
.3.1.1	X	X	-	X	-	-	X
.3.1.2	X	X	-	X	-	-	X
.3.2	X	X[7]	X	X[8]	-	-	X[8]
.3.4.1	-	X[7]	X	-	-	-	-
3.4.2	X[9]	X[7]	X	X[7.9]	-	-	X[7.9]
.3.4.3	X	X	X	X	X	X	X
.3.6	X	X	X	X	X	X	X
.3.8	X	X	X	X[7]	-	-	X[10]

Notes:

azards of substances in this class which may be carried in bulk are such that special consideration must be given by the Central Government to the construction and equipment of the ship involved in addition to meeting the requirements enumerated in this table.

7 Only applicable to Seedcake containing solvent extractions, to Ammonium nitrate and to Ammonium nitrate fertilizers.

8 Only applicable to Ammonium nitrate and to Ammonium nitrate fertilizers. However, a degree of protection in accordance with standards contained in the International Electrotechnical Commission publication 60079, Electrical Apparatus for Explosive Gas Atmospheres, is sufficient.

9 Only suitable wire mesh guards are required.

10 The requirements of the Code of Safe Practice for Solid bulk Cargoes adopted by resolution A.434(XI), as amended, are sufficient.

Table 19.3 Application of the requirements to different classes of dangerous goods except solid dangerous goods in bulk- See Rule 80

Class Rule 19	1.1 to 1.6	1.4 S	2.1	2.2	2.3	3 liquids ≤ 23 °C[15]	3 liquids > 23° C[15] ≤ 61° C	4.1	4.2	4.3	5.1	5.2	6.1 liquids	6.1 liquids ≤ 23° C[15]	6.1 liquids > 23° C[15] ≤ 61° C	6.1 solids	8 liquids	8 liquids ≤ 23° C[15]	8 liquids > 23° C[15] ≤ 61° C	8 solids	9
.3.1.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
.3.1.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-
.3.1.3	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.3.1.4	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.3.2	X	-	X	-	-	X	-	-	-	-	-	-	-	X	-	-	-	X	-	-	-
.3.3	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	-
.3.4.1	-	-	X	-	X	X	-	X[11]	X[11]	X	X[11]	-	-	X	X	X[11]	-	X	X	-	X[11]
.3.4.2	-	-	X	-	-	X	-	-	-	-	-	-	-	X	X	-	-	X	X	-	-
.3.5	-	-	-	-	-	X	-	-	-	-	-	-	X	X	X	-	-	X	-	-	-
.3.6	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X[14]

.3.7	-	-	-	-	-	X	X	X	X	X	X	-	-	X	X	-	-	X	X	-	-
.3.8	X[12]	-	X	X	X	X	X	X	X	X	X[13]	-	-	X	X	-	-	X	X	-	-
.3.9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
.3.10.1	X	X	X	X	X	X	X	X	X	X	X	X[16]	X	X	X	X	X	X	X	X	X
.3.10.2	X	X	X	X	X	X	X	X	X	X	X	X[16]	X	X	X	X	X	X	X	X	X

Notes:

11 When “mechanically-ventilated spaces” are required by the International Maritime Dangerous Goods Code, as amended.

12 Stow 3 m horizontally away from the machinery space boundaries in all cases.

13 Refer to the International Maritime Dangerous Goods Code, as amended.

14 As appropriate to the goods to be carried.

15 Refers to flashpoint.

16 Under the provisions of the IMDG Code, as amended, stowage of class 5.2 dangerous goods under deck or in enclosed ro-ro spaces is prohibited.

SCHEDULE-5

Form of Certificates (to be added)