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MINISTRY OF PORTS, SHIPPING AND WATERWAYS

NOTIFICATION

New Delhi, the_____ 2026

G.S.R. _____ (E)—In exercise of the powers conferred by sub-section (1) and (2) of section 116 read with sub-section (1) and clause (a) and (b) of sub-section (2) of section 130 of the Merchant Shipping Act, 2025, and in supersession of the Merchant Shipping (Fire Appliances) Rules, 1990, except as respects things done or omitted to be done before such supersession, the Central Government hereby makes the following rules, namely: –

PART I - PRELIMINARY

1. Short title, commencement and application:

(1) These rules may be called the **Merchant Shipping (Fire Appliances) Rules, 2026**.

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

(3) For the purpose of these provisions, this rule shall apply to vessels the keel of which are laid or which are at a similar stage of construction on or after 1 January 2026 unless otherwise notified by the Directorate General of Maritime Administration.(4) Repairs, alterations, modifications and outfitting

All vessels which undergo repairs, alterations, modifications and outfitting related thereto shall continue to comply with at least the requirements previously applicable to these vessels. Such vessels, if constructed before 1 Januray 2026shall, as

a rule, comply with the requirements for vessels constructed on or after that date to at least the same extent as they did before undergoing such repairs, alterations, modifications or outfitting.

(4) Repairs, alterations and modifications which substantially alter the dimensions of a vessel or the passenger accommodation spaces, or substantially increase a vessel's service life and outfitting related thereto, shall meet the requirements for vessels constructed on or after 1 January 2026 in so far as the Administration deems reasonable and practicable.

(5) They shall not apply to any such vessel or sailing vessel the keel of which was laid before 1 July 2002and the provisions of the Merchant Shipping (Fire Appliances) Rules, 1990 shall apply to such vessels or sailing vessel.

Provided that the Director General of Maritime Administration may after the commencement of these rules, require by order in writing, the owner of any such

vessel or sailing vessel, having regard to any structural changes made in such vessel or sailing vessel, to comply with any or all of the requirements specified in these rules.

(6) The Merchant Shipping (Fire Appliances) Rules, 1990, as amended by the Merchant Shipping (Fire Appliances) Amendment Rules, 1994, are hereby repealed and superseded by these rules, except as respects things done or omitted to be done under the said rules.

2. Definitions:-

In these rules, unless the context otherwise requires

(a) 'Act' means the Merchant Shipping Act, 2025.

(b) 'accommodation spaces' means public spaces corridors and lobbies, stairways, lavatories, cabins, offices, hospitals, hair dressing saloons, pantries, not containing cooking appliances, lockers, games and hobbies rooms and spaces similar to any of the fore-going and trunks to such spaces allocated to passenger or crew;

(c) 'approved' means approved by the Chief Surveyor with the Government of India;

(d) 'bulkhead deck' is the uppermost deck upto which the transverse water-tight bulkheads are carried;

(e) 'cargo space' means spaces used for cargo including cargo oil tanks, slop tanks and trunks to all such spaces;

(f) "chemical tanker" means a tanker constructed or adapted and used for the carriage in bulk of any liquid product of a flammable nature listed in either,--

(i) chapter 17 of the "International Code for the Construction and Equipment of vessels Carrying Dangerous Chemicals in Bulk"; or

(ii) chapter VI of the Code for the construction and Equipment of vessels Carrying Dangerous Chemicals in Bulk.

whichever is applicable.

(g) "closed ro/ro space" is a ro/ro cargo space which is not an open ro/ro space and not a weather deck;

(h) "combination carrier" means a tanker designed to carry oil or solid cargo in bulk;

(i) "Control stations" are those spaces in which the vessel'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. Spaces where the fire recording or fire control equipment is centralized are also considered to be a fire control station.

(j) "crew space" means crew accommodation provided for the exclusive use of the crew ;

(k) "crude oil" means any oil occurring naturally in the earth whether or not treated to render it suitable for transportation and includes :

(i) crude oil from which certain distillate fractions may have been removed; and

(ii) crude oil to which a certain distillate fraction may have been added.

(l) "deadweight" means the difference in tonnes between the displacement of a vessel in a water of a specific gravity of 1.025 at the load line corresponding to the assigned summer freeboard and the lightweight of the vessels;

(m) 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 1974 , as amended

(n) "guidelines for inert gas systems" forms part of the publication "Inert Gas Systems" 1983 edition published by the International Maritime Organisation;

(o) "length" in relation to a registered vessel, means the registered length, and in relation to an unregistered vessel, means the length from the fore part of the stem to the aft side of the head of the stern post or, if no stern post is fitted to take the rudder, to the fore side of the rudder stock at the point where the rudder passes out of the hull;

(p) Machinery spaces are all machinery spaces of category A and all other spaces containing propelling machinery, boilers, oil fuel units, steam and internal-combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air conditioning machinery, and similar spaces, and trunks to such spaces.

(q) "machinery spaces of category ‘A’ " means the spaces and trunk to such spaces which contain:-

(i) internal combustion machinery used for main propulsion; or

(ii) internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 K.W.; or

(iii) any oil-fired boiler or oil fire unit;

(r) "oil-fired boiler" means any boiler wholly or partly fired by liquid fuel;

(s) "oil fuel unit" means the equipment used for the preparation of oil fuel for delivery to an oil-fired boiler or equipment used for preparation for delivery of heated oil to an internal combustion engine, and includes any oil pressure pumps, filters and heaters dealing with oil at a pressure more than 1.8 bar (0.18 N/mm2)

(t) "open ro/ro spaces" means ro/ro cargo spaces which are open at both ends, or open at one end and provided with adequate natural ventilation effective over the entire length through permanent openings in the side plating or deck head or fromabove, having a total area of at least 10% of the total area of the space sides.;

(u) "passenger space" means space provided for the use of passengers;

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

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

(x) "ro/ro cargo spaces" means spaces not normally sub-divided in any way and extending to either a substantial length or the entire length of the vessel in which goods (packaged or in bulk), in or on rail or road cars, vehicles (including road or rail tankers), trailers, containers, pallets, demountable tanks or in or on similar stowage units or other receptacles can be loaded and unloaded normally in a horizontal direction.

(y) "Schedule" appended to these rules;

(z) "service spaces" indoor galleys, pantries containing cooking appliances, laundries, drying rooms, lockers and store rooms, paint rooms, baggage rooms, mail and specie rooms, workshops (other than those forming part of the machinery spaces) and similar spaces and trunks to such spaces;

(aa) "short international voyage" is an international voyage in the course of which a vessel is not more than 200 nautical miles from a port or place in which the passengers and crew could be placed in safety. Neither the distance between the last port of call in the country in which the voyage begins and the final port of destination nor the return voyage shall exceed 600 nautical miles. The final port of destination is the last port of call in the scheduled voyage at which the vessel commences its return voyage to the country in which the voyage began;

(ab) "special category space" means an enclosed space above or below the bulkhead deck intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion, into and from which such vehicles can be driven and to which passengers have access;

(ac) "tons" means gross tons and in the case of vessels having two gross tonnages the larger of these ;

(ad) "weather deck" means a deck completely exposed to the weather from above and from at least two sides.

Terms not defined herein shall have the meanings assigned to them under Chapter II-2 of SOLAS, FSS Code, and the MS Act, 2025.

3. Classification of vessels

For the purpose of these rules, any Indian vessel and any sea going sailing vessel shall be arranged in the following classes, namely :--

A-Passenger vessels

Class I- Passenger vessels engaged on international voyages other than vessels of classes II, III and IV.

Class II-Passenger vessels engaged on short international voyages other than vessels of class IV.

Class III-Special trade passenger vessels engaged on international voyages other than vessels of class IV.

Class IV- Special trade passenger vessels engaged on short international voyages.

Class V-Special trade passenger vessels and passenger vessels other than vessels of classes VI and VII engaged on voyages other than international voyages.

Class VI- Special trade passenger vessels or passenger vessels engaged on voyages on the coasting trade of India during the course of which they do not go more than 20 nautical miles from the nearest land. Provided that such vessels shall not cease to be vessels of class VI merely by reason of the fact that they cross during their voyage the Gulf of Kutch, Cambay or Mannar.

Class VII- Special trade passenger vessels or passenger vessels engaged on voyages between ports in India during the course of which they do not go more than 5 nautical miles from the nearest land.

B—Vessels other than passenger vessels

Class VIII - Cargo vessels engaged on international voyages.

Class IX- Cargo vessels (other than vessels of class X) engaged on voyages which are not international.

Class X-Cargo vessels engaged on the coasting trade of India (other than vessels of class IX) during the course of which they do not go more than 20 nautical miles from the nearest land:

Provided that such vessels shall not cease to be vessels of class X merely by reason of the fact that they cross during their voyage the Gulf of Kutch, Cambay or Mannar.

Class XI - Cargo vessels engaged on voyages between ports in India during the course of which they do not go more than 5 nautical miles from the nearest land.

Class XII - Tugs and tenders which proceed to sea but are not engaged on international voyages.

Class XIII - Fishing vessels other than those of class XIV.

Class XIV - Sailing vessels including sailing fishing vessels.

Class XV- Pleasure Craft.

The provision of section 261 to empowers the Central Government, by notification, to direct that any other provisions of the Act shall apply to such vessels, subject to specified conditions, exceptions, and modifications. In the absence of such a notification, the requirements under these rules should not be extended to sailing vessels.

PART II – FIRE PREVENTION AND FIRE APPLIANCES:

Section A—PASSENGER VESSELS

4. Application:-

(i) Rule 5 to 15 shall apply to every vessel of Class I, II, III, IV and every vessel of Class V of 20 meters in length and above.

(ii) Rules 16 to 18 shall apply to every vessel of Class V of 20 metres in length.

(iii) Rules 19 to 23 shall apply to every vessel of Class VI of 20 metres in length and above.

(iv) Rule 24 shall apply to every vessel of Class VI if less than 20 metres in length.

(v) Rule 25 shall apply to every vessel of Class VII.

Class I, II, III, IV and every vessel of Class V of 20 meters in length and above.

5. Fire patrols, detections, alarm and public address systems:-

Every vessel shall comply with the following, namely:

(i) An efficient fire patrol shall be maintained in vessels carrying more than 36 passengers so that an outbreak of fire may be promptly detected.

(ii) Each member of the fire patrol shall be trained to be familiar with the arrangements of the vessel as well as the location and operation of any equipment he may be called upon to use.

(iii) Manually operated call points complying with the requirements specified in Schedule VII shall be fitted throughout the accommodation spaces, service spaces, control stations and special category spaces. One manually operated call point shall be located at each exit. Manually operated call points shall be readily accessible in the corridors of each deck such that no part of the corridor is more than 20 m from a manually operated call point. For special category space, manually operated call points shall be spaced so that no part of the space is more than 20 m from a manually operated call point, and one shall be placed close to each exit from such spaces.

Fire protection systems shall be provided to adequately protect the vessel from the fire hazards associated with vehicle, special category and ro-ro spaces, and weather deck intended for the carriage of vehicles. Ignition sources shall be separated from vehicle, special category and ro-ro spaces; and vehicle, special category and ro-ro spaces shall be adequately ventilated.

(iv) Protection of machinery spaces

A fixed fire detection and fire alarm system shall be installed in:

1. periodically unattended machinery spaces;

2. machinery spaces where:

2.1 the installation of automatic and remote control systems and equipment has been approved in lieu of continuous manning of the space; and

2.2 the main propulsion and associated machinery including 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; and;

2.3 enclosed spaces containing incinerators

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

so manned and equipped as to ensure that any initial fire alarm is immediately received by a responsible member of the crew at all times when at sea, or in port (except when out of service).

(v) A special alarm, operated from the navigating bridge or fire control station, shall be fitted to summon the crew, which may be part of the vessel's general alarm system but shall be capable of being sounded independently of the alarm to the passenger spaces.

(vi) A public address system or other effective means of communication shall be available throughout the accommodation space, the service space and the control station.

(vii) A fixed fire detection and fire alarm system for passenger vessels shall be capable of remotely and individually identifying each detector and manually operated call point.

(viii) Protection of accommodation and service spaces and control stations:

1. Smoke detectors in accommodation spaces

Smoke detectors shall be installed in all stairways, corridors and escape routes within accommodation spaces as provided in paragraphs 2, 3 and 4 of this rule. Consideration shall be given to the installation of special purpose smoke detectors within ventilation ducting

2.Requirements for passenger vessels carrying more than 36 passengers

A fixed fire detection and fire alarm system shall be so installed and arranged as to provide smoke detection in service spaces, control stations and accommodation spaces, including corridors, stairways and escape routes within accommodation spaces. Smoke detectors need not be fitted in private bathrooms and galleys. Spaces having little or no fire risk such as voids, public toilets, carbon dioxide rooms and similar spaces need not be fitted with a fixed fire detection and fire alarm system. Detectors fitted in cabins, when activated, shall also be capable of emitting, or cause to be emitted, an audible alarm within the space where they are located.

3. Requirements for passenger vessels carrying not more than 36 passengers

There shall be installed throughout each separate zone, whether vertical or horizontal, in all accommodation and service spaces and, where it is considered necessary by the [Administration], in control stations, except spaces which afford no substantial fire risk such as void spaces, sanitary spaces, etc., either:

3.1 a fixed fire detection and fire alarm system so installed and arranged as to detect the presence of fire in such spaces and providing smoke detection in corridors, stairways and escape routes within accommodation spaces. Detectors fitted in cabins, when activated, shall also be capable of emitting, or cause to be emitted, an audible alarm within the space where they are located. Or

3.2 an automatic sprinkler, fire detection and fire alarm system of an approved type complying with the relevant requirements of the **Schedule XVII** and so installed and arranged as to protect such spaces and, in addition, a fixed fire detection and fire alarm system and so installed and arranged as to provide smoke detection in corridors, stairways and escape routes within accommodation spaces.

4. Protection of atriums in passenger vessels

The entire main vertical zone containing the atrium shall be protected throughout with a smoke detection system.

(ix) Protection of cargo spaces in passenger vessels:

A fixed fire detection and fire alarm system or a sample extraction smoke detection system shall be provided in any cargo space which, in the opinion of the [Administration], is not accessible, except where it is shown to the satisfaction of the [Administration] that the vessel is engaged on voyages of such short duration that it would be unreasonable to apply this requirement.

(x) Protection of cabin balconies on passenger vessels:

A fixed fire detection and fire alarm system complying with the provisions of the Schedule VII shall be installed on cabin balconies of vessels to which regulation 5.3.4 of SOLAS Chapter II-2 applies, when furniture and furnishings on such balconies are not as defined in regulations 3.40.1,3.40.2, 3.40.3, 3.40.6 and 3.40.7 of SOLAS Chapter II-2.6. Fire pumps, fire main, water service pipes, hydrants, hoses and nozzles.

(1) Every vessel shall be provided with fire pumps, fire mains, water service pipes, hydrants, hoses and nozzles capable of providing at least two jets of water, not emanating from the same hydrant, capable of reaching normally accessible parts of the vessel while the vessel is being navigated and any store room and any part of any cargo space when empty.

(2) Every vessel of 4000 tons or above shall be provided with at least three independently driven fire pumps and every vessel or less than 4000 tons shall be provided with at least two such pumps, and each such pump shall be capable of delivering two jets of water specified under clause (1) and in addition shall comply with the requirements specified in rule 58.

(3) The arrangement of sea connections, fire pumps and their sources of power shall be as to ensure that:

.1 in passenger vessels of 1,000 gross tonnage and upwards, in the event of a fire in any one compartment all the fire pumps will not be put out of action; and

.2 in passenger vessels of less than 1,000 gross tonnage, if a fire in any one compartment could put all the pumps out of action, there shall be an alternative means consisting of an emergency fire pump complying with the provisions of the Schedule XVII with its source of power and sea connection located outside the space where the main fire pumps or their sources of power are located.

(4)(a) Every Vessel shall be provided with a fire main, water service pipes, hydrants, hoses and nozzles which shall be so arranged that they comply with the requirements specified in rules 59, 60 and 61 when all watertight door and all doors in main vertical zone bulkheads are closed.

(4) (b) The arrangements for the ready availability of water supply shall be

1.vessels of 1,000 gross tonnage and upwards such that at least one effective jet of water is immediately available from any hydrant in an interior location and so as to ensure the continuation of the output of water by the automatic starting of one required fire pump;

2.vessels of less than 1,000 gross tonnage by automatic start of at least one fire pump or by remote starting from the navigation bridge of at least one fire pump. If the pump starts automatically or if the bottom valve cannot be opened from where the pump is remotely started, the bottom valve shall always be kept open; and

3.if fitted with periodically unattended machinery spaces, the [Administration] shall determine provisions for fixed water fire-extinguishing arrangement for such spaces equivalent to those required for normally attended machinery spaces;(5) In every vessel at least one fire hose complete with nozzle shall be provided for every hydrant fitted in compliance with this rule and shall be used only for the purpose of extinguishing fire or for testing the fire extinguishing appliances at fire drills and surveys.

(5) (a)The number and position of hydrants shall be such that at least two jets of water not emanating from the same hydrant, one of which shall be from a single length of hose, may reach any part of the vessel normally accessible to the passengers or crew while the vessel is being navigated and any part of any cargo space when empty, any ro-ro space or any vehicle space in which latter case the two jets shall reach any part of the space, each from a single length of hose. Furthermore, such hydrants shall be positioned near the accesses to the protected spaces.

5.(b)) in the accommodation, service and machinery spaces the number and position of hydrants shall be such that the requirements of **paragraph 6(a)** may be complied with when all watertight doors and all doors in main vertical zone bulkheads are closed; and

5.(c)) where access is provided to a machinery space of category A at a low level from an adjacent shaft tunnel, two hydrants shall be provided external to, but near

the entrance to that machinery space. Where such access is provided from other spaces, in one of those spaces two hydrants shall be provided near the entrance to the machinery space of category A. Such provision need not be made where the tunnel or adjacent spaces are not part of the escape route.(7) In every vessel.

(a) at least three water-fog applicators in addition to the nozzles required under this rule shall be provided in special category spaces;

(b) carrying more than 36 passengers, each machinery space of category A shall be provided with at least two suitable water fog applicators.

6. Portable fire extinguishers in accommodation, cargo and service spaces*:--

(1) Every vessel shall be provided:-

(a) on each deck below the bulkhead deck, a sufficient number of portable fire extinguishers so that at least two of these shall be readily available for use in every accommodation space, service space and control station, between main vertical zones and

(b) in enclosed accommodation space, service spaces and control stations above the bulkhead deck at least one such extinguisher shall be provided for use on each side of the vessel in such space, such that the total number of extinguishers provided, including those specified in Clause (a) is not less than five on a vessel of 1000 tons or ever; and

(c) at least one portable fire extinguisher and a fire blanket in every galley and where the superficial deck area of any galley exceeds 45 square metres, at least two fire blankets.

(d) at least one portable fire extinguisher for use in each control station;

(e) in each special category space and cargo space intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion;

(i) for every 40 metres length of deck space, at least two portable fire extinguishers, suitable for extinguishing oil fires, so arranged that at least one extinguisher is available on each side of the deck space and at least one extinguisher is available at each access to the deck space; and

(ii) one portable foam applicator unit complying with the requirement specified in Schedule V. Provided that not less than two such applicators shall be available in the vessel for use in any such space.

(2) One of the portable fire extinguishers, intended for use in each space shall be available near the entrance to that space.

(3) Carbon dioxide fire extinguishers shall not be placed in accommodation spaces. In control stations and other spaces containing electrical or electronic equipment or appliances necessary for the safety of the vessel, fire extinguishers shall be provided

whose extinguishing media are neither electrically conductive nor harmful to the equipment and appliances

(4) Fire extinguishers shall be situated ready for use at easily visible places, which can be reached quickly and easily at any time in the event of a fire, and in such a way that their serviceability is not impaired by the weather, vibration or other external factors. Portable fire extinguishers shall be provided with devices which indicate whether they have been used

** Refer to Unified interpretation of SOLAS chapter II-2 on the number and arrangement of portable fire extinguishers on board ships (MSC.1/Circ.1275)*

7. Fixed fire extinguishing systems in cargo spaces.

(1)Except as provided for in paragraph 3 of this rule, the cargo spaces of passenger vessels of 1,000 gross tonnage and upwards shall be protected by a fixed carbon dioxide or inert gas fire-extinguishing system complying with the provisions of the schedule [XIV] or by a fixed high-expansion foam fire-extinguishing system which gives equivalent protection.

(2) Where it is shown to the satisfaction of the [Administration] that a passenger vessel is engaged on voyages of such short duration that it would be unreasonable to apply the requirements of paragraph 7.1.1 and also in vessels of less than 1,000 gross tonnage, the arrangements in cargo spaces shall be to the satisfaction of the [*Administration],* provided that the vessel is fitted with steel hatch covers and effective means of closing all ventilators and other openings leading to the cargo spaces.

(3) A vessel engaged in the carriage of dangerous goods in any cargo spaces shall be provided with a fixed carbon dioxide or inert gas fire-extinguishing system complying with the provisions of the schedule IX or with a fire-extinguishing system which, in the opinion of the [Administration], gives equivalent protection for the cargoes carried.

(4) Every vessel shall be provided:

(a) in each special category space a fixed pressure water spraying system complying with the requirements specified in Schedule XI or any other fixed fire extinguishing system, which the Chief Surveyor with the Government of India, being satisfied after full scale test in conditions simulating a flowing petrol fire in a special category space to be not less effective in controlling fires likely to occur in such a space.

(b) in each cargo space (other than special category space) intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion a fixed pressure water spraying system complying with the requirements specified in Schedule XI or a fixed gas fire extinguishing system complying with the requirements specified in Schedule IX.

(c) in each open ro/ro cargo space having a deck over and each closed ro/ro cargo space not capable of being sealed, a fixed pressure water spraying system complying with the requirements specified in Schedule XI.

(d) the vehicles do not use their own propulsion within the cargo spaces;

(e) the cargo spaces are in compliance with the appropriate requirements of regulation 19; and

(f) the vehicles are carried in accordance with the IMDG Code, as defined in regulation VII/1.1.

Every vessel with machinery space of category-A.

1) At least one of the following fixed fire extinguishing installations, namely:-

(i) a fixed pressure water spraying system complying with the requirements specified in Schedule XII,

(ii) a fixed gas fire extinguishing system complying with the requirements specified in Schedule IX,

(iii) a fixed high expansion foam system complying with the requirements specified in Schedule X.

Explanation—For the purpose of this rule, if the engine and boiler rooms are not entirely separated from each other by a bulkhead and if fuel oil can draw from the boiler room into the engine room, the combined engine and boiler rooms shall be considered as one single machinery space

2) In addition to the requirements of Clause (1) there shall be provided :-

(a) in each boiler room--

(i) There shall be not less than one approved foam-type extinguisher of at least 135 l capacity or equivalent in each 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 paragraph 10(4),an approved foam-type extinguisher of at least 135 l capacity is not required.

ii) one portable foam applicator complying with the requirements specified in Schedule V.

b) in each firing space in each boiler room and in each space containing any part of any oil fuel installation, at least two portable fire extinguishers suitable for extinguishing oil fires;

c) In each firing space there shall be a receptacle containing at least 0.1 m^3 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.

3) In addition to the requirements of Clause (1) there shall be provided in any space containing internal combustion type machinery:-

(i) not less than one foam fire extinguishers of 45 litres or carbon dioxide extinguishers of at least 15 Kilograms capacity. The extinguishers shall be sited so as to be readily accessible in the event of fire and they shall be sufficient in number to enable foam or CO2 to be directed into any part of the fuel and lubricating oil pressure systems, gearing and other areas of high fire risk.

(ii) not less than set of portable foam applicator unit complying with the requirements specified in Schedule V.

(iii) not less than two portable fire extinguishers suitable for extinguishing oil fires, to ensure that at least one extinguisher is not more than 10 metres distance from any position within the space.

4) Fixed local application fire-extinguishing systems

a) Paragraph (10(4)shall apply to passenger ships of 500 gross tonnage and above
b) Machinery spaces of category A above 500 m³ in volume shall, in addition to the fixed fire-extinguishing system required in paragraph 10 (1) (b), be protected by an approved type of fixed water-based or equivalent local application fire-extinguishing system, based on the guidelines developed by the Organization. In the case of periodically unattended machinery spaces, the fire-extinguishing system shall 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.
c) Fixed local application fire-fighting systems are to protect areas such as the following without the necessity of engine shutdown, personnel evacuation, or sealing of the spaces
.1 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;
.2 boiler fronts;
.3 the fire hazard portions of incinerators; and
.4 purifiers for heated fuel oil.
d) Activation of any local application system shall give a visual and distinct audible alarm in the protected space and at continuously manned stations. The alarm shall indicate the specific system activated. The system alarm requirements described within this paragraph are in addition to, and not a

substitute for, the detection and fire alarm system required elsewhere in this chapter.

8. SPACES CONTAINING STEAM TURBINE OR ENCLOSED STEAM ENGINES :

Every vessel shall be provided in spaces containing steam turbine or enclosed pressure lubricated steam engines used either for main propulsion or having in the aggregate, a total power of not less than 375 KW for auxiliary purposes:-

(a) if such spaces have not been fitted with fixed fire extinguishing system specified in Clause (1)(b) of rule 10, foam fire extinguisher each of at least 45 litres capacity or carbon dioxide fire extinguishers each of at least 16 Kilograms capacity sufficient in number to enable foam or CO_2 to be directed on to any part of the pressure lubrication system and on to any part of the casings enclosing pressure lubricated parts of the turbine, engines or associated gearing and any other areas of high fire risk.

(b) not less than two portable fire extinguishers suitable for extinguishing oil fires, sufficient in number, so located that no point in the space is more than 10 metres distance from an extinguisher in that space; provided that where such spaces are periodically unattended one of the fixed fire extinguishing system complying with the requirements of sub-clause (b) of clause (1) of rule 10 shall be provided in addition.

9. FIRE EXTINGUISHING APPLIANCES IN OTHER MACHINERY SPACES:

In every vessel where a fire hazard exists in any machinery space for which no specific provisions for fire extinguishing appliances are specified in rule 10 or 11, there shall be provided in or adjacent to that space sufficient number of portable fire extinguishers to ensure that at least one extinguisher is not more than 10 metres distance from any position within that space unless equivalent means of fire extinction are provided.

10. SPECIAL REQUIREMENTS FOR MACHINERY SPACES:

In every vessel:-

(1) in any machinery space of category-A, to which access is provided at a low level from an adjacent shaft tunnel there shall be provided in the shaft tunnel, on the side remote from that machinery space, a light steel screen-door which shall be capable of being operated from each side in addition to any water-tight door,

(2) Ventilation systems for ro-ro cargo spaces on board vessel generally operate according to the principle of dilution ventilation, whereby the supply air flow to the area is sufficient for the exhaust gases to mix thoroughly with the air and be removed.

There are two main types of dilution ventilation: exhaust air ventilation and supply air ventilation. Briefly, in exhaust air ventilation, fans remove air from a ro-ro cargo space, and this is then replaced by outdoor air entering through open ramps, doors and other openings. Exhaust air ventilation is employed when sub-atmospheric pressure is required in the ro-ro cargo space. The sub-atmospheric pressure prevents the pollution from spreading to adjacent areas.

Supply air ventilation works in the opposite way. Fans deliver outdoor air into the ro-ro cargo space and the air is then exhausted through ramps and other openings. Supply air ventilation usually creates slight pressurisation of the ro-ro cargo space. If supply air ventilation is used exclusively, pollutants may mix with the supply air, be pushed up the internal ramps and contaminate other decks. However, if sufficient mixing with supply air does not occur, contaminants may remain on the deck in question. Particularly hazardous conditions may occur on lower decks.

Ventilation systems on board vessel often combine these two principles. The fans can then be reversible, so that they can either supply air into the ro-ro cargo space or exhaust air from it

(3) the power ventilation system referred to in sub-rule (2) shall be entirely separate from other ventilation systems and shall be operated at all times when vehicles are in such spaces. Ventilation ducts serving such spaces capable of being effectively sealed shall be separated for each such space. The system shall be capable of being controlled from a position outside such spaces. In addition :--

(a) the ventilation system shall be such as to prevent air stratification and the formation of air pockets;

(b) an indicator to indicate on the navigating bridge any loss or reduction of the required ventilating capacity shall be provided;

(c) arrangements shall be provided to permit a rapid shut-down and effective closure of the ventilation system in case of fire, taking into account the weather and sea conditions

(d) Ventilation ducts traversing different fire zones shall be fitted with automatic fire dampers of A-60 equivalent material, actuated through the fire-detection system.

(e) Control stations shall maintain positive pressure ≥ 50 Pa above adjacent spaces.

11. INTERNATIONAL SHORE CONNECTIONS:

Every vessel shall be provided with at least one international shore connection complying with the requirements specified in Schedule I, to enable water to be

supplied from another vessel or from the shore, to the fire main and necessary facilities for enabling such a connection to be used on both sides of a vessel.

12. FIRE-MAN'S OUTFIT :

(1) Every vessel shall be provided with at least:--

(a) Two fireman's outfit; and

(b) : for every 80 m, or part thereof, of the aggregate of the lengths of all passenger spaces and service spaces on the deck which carries such spaces or, if there is more than one such deck, on the deck which has the largest aggregate of such lengths, two fire-fighter's outfits and, in addition, two sets of personal equipment, each set comprising the items stipulated in the Schedule VI. In passenger vessels carrying more than 36 passengers, two additional fire-fighter's outfits shall be provided for each main vertical zone. However, for stairway enclosures which constitute individual main vertical zones and for the main vertical zones in the fore or aft end of a vessel which do not contain spaces of categories (6), (7), (8) or (12) defined in regulation 9.2.2.3 of SOLAS Chapter II-2 no additional fire-fighter's outfits are required;

(2) Two spare charges shall be provided for each required breathing apparatus. Passenger vessels carrying not more than 36 passengers 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. In passenger vessels carrying more than 36 passengers, at least two spare charges for each breathing apparatus shall be provided

(3) Passenger vessels carrying more than 36 passengers constructed on or after 1 July 2010shall be fitted with a suitably located means for fully recharging breathing air cylinders, free from contamination. The means for recharging shall be either:

(i) breathing air compressors supplied from the main and emergency switchboard, or independently driven, with a minimum capacity of 60 l/min per required breathing apparatus, not to exceed 420 l/min; or

(ii) self-contained high-pressure storage systems of suitable pressure to recharge the breathing apparatus used on board, with a capacity of at least 1,200 l per required breathing apparatus, not to exceed 50,000 l of free air()

(4) Every vessel carrying more than 36 passengers shall be provided for each pair of breathing apparatus one water for applicator which shall be stored adjacent to such apparatus.

(5) The fireman's outfits on sets of personal equipment referred to in sub-rule (1) shall be so stored as to be easily accessible and ready for use and where more than one fireman's outfits or more than one set of personal equipment is carried they shall be stored in widely separated positions. At least two fireman's outfits and one set of personal equipment shall be available at any one storage position. At least two fire-fighter's outfits shall be stored in each main vertical zone.

13. A Placement and number of Emergency escape breathing devices

i. Accommodation space

(a) for passenger vessels carrying not more than 36 passengers: two (2) EEBDs for each main vertical zone, except those defined in the regulation 13.3.4.5 of SOLAS Chapter II-2, and a total of two (2) spare EEBDs; and

(b) for passenger vessels carrying more than 36 passengers: four (4) EEBDs for each main vertical zone, except those defined in the regulation 13.3.4.5 of SOLAS Chapter II-2, and a total of two (2) spare EEBDs.

(c) However, paragraphs 15.1.1.a and 15.1.1.b do not apply to stairway enclosures which constitute individual main vertical zones and to the main vertical zones in the fore or aft end of a vessel which do not contain spaces of categories (6), (7), (8) or (12) defined in regulation 9.2.2.3 of SOLAS Chapter II-2

ii) Machinery space for category A containing internal combustion machinery used for main propulsion

(a) one (1) EEBD in the engine control room, if located within the machinery space;

(b) one (1) EEBD in workshop areas. If there is, however, a direct access to an escape way from the workshop, an EEBD is not required; and

(c) one (1) EEBD on each deck or platform level near the escape ladder constituting the second means of escape from the machinery space (the other means being an enclosed escape trunk or watertight door at the lower level of the space).

iiiFor machinery spaces of category A other than those containing internal combustion machinery used for main propulsion, one (1) EEBD should, as a minimum, be provided on each deck or platform level near the escape ladder constituting the second means of escape from the space (the other means being an enclosed escape trunk or watertight door at the lower level of the space).

iv. Training EEBD

At least one EEBD is required for training purposes. This EEBD should be clearly marked so that they cannot be confused with the operational EEBD's and it should not be stored in the same place as the operational EEBD's. Enough spare charges/bottles to be provided for the training EEBD.

VESSELS OF CLASS V OF LESS THAN 20 METRES IN LENGTH

14. Fire pumps, fire main, water service pipes, hydrants, hoses and nozzles--

Every vessel of class V of less than 20 metres in length shall be provided in a place outside the machinery spaces a power or hand operated pump with a permanent sea connection and a hose with a 10 millimetre diameter nozzle capable of producing a jet of water having a throw of not les than 6 metres, capable of being directed to any part of the vessel.

15. Portable fire extinguishers--

Every vessel of class V of less than 20 metres in length shall be provided with at least one portable fire extinguisher in each of the passenger spaces above the bulkhead deck, and with at least two portable extinguishers in each of the crew spaces and in each of the passenger spaces below the deck. At least one portable fire extinguisher shall be available for use in any galley.

16. Machinery spaces of category A and spaces containing oil fuel settling tanks--

(1) Every vessel of class V of less than 20 metres in length shall be provided--

(a) in any space containing any oil-fired boiler, on fuel setting tank or oil fuel unit, not less than one foam fire extinguisher of at least 45 litres capacity or carbon dioxide extinguishers of at least 16 kilogrammes capacity, which shall be placed so as to be readily accessible in the event of a fire shall be sufficient in number of enable foam or carbon dioxide to be directed on to any part of the boiler room or space containing any part of the oil fuel installation;

(b) in such firing space and in each space which contains any part of any oil fuel installation at least two portable fire extinguishers suitable for extinguishing oil fires; and

(c) in each firing space a receptacle containing at least 0.3 cubic metre of sand or other dry material suitable for extinguishing oil fires together with a scoop for its distribution, or an additional portable fire extinguisher suitable for extinguishing oil fires.

(2) Every such vessel of 15 metres in length and above but less than 20 metres in length, shall be provided in each space containing internal combustion type propulsion

machinery, at least five portable fire extinguishers suitable for extinguishing oil fires, and every such vessel of less than 15 metres in length shall be provided with at least three such portable fire extinguishers in such spaces :

Provided that where the internal combustion machinery is situated in a space to which sub-rule (1) applies, only two such portable fire extinguishers need be provided in addition to the extinguishers required by that sub-rule.

VESSELS OF CLASS VI OF 20 METRES IN LENGTH AND ABOVE

17. Fire pumps, fire main, water service pipes, hydrants, hoses and nozzles--

(1) Every vessel of class VI of 20 metres in length and above shall be provided with fire pumps, fire main, water service pipes, hydrants, hoses and nozzles whereby at least one jet of water can reach any part of the vessel normally accessible to the passengers or crew while the vessel is being navigated and any store room and any part of any cargo space when empty.

(2) Every such vessel shall be provided with at least one fire pump operated by power, which shall be capable of delivering at least one jet of water from any fire hydrant, hose and nozzle provided in the vessel and shall comply with the requirements of rule 58.

(3) Every such vessel fitted with oil-fired boilers or internal combustion type propulsion machinery shall be provided with an additional fire pump which shall be permanently connected to the fire main but which may not be required to be operated by power. Such pump and its source of power, if any, shall not be situated in the same compartment as the pump required under sub-rule (2) and shall be provided with a permanent sea connection situated outside the machinery space. If such a pump is operated by power, it shall comply with the requirements of sub-rule (2) and if it is manually operated it shall be capable of producing a jet of water having a throw of not less than 6 metres from nozzles.

(4) Every such vessel shall be provided with a fire main, water service pipes, hydrants, hoses and nozzles which shall comply with the requirements specified in rules 59, 60 and 61.

(5) Every such vessel shall be provided with at least one fire hose for every hydrant

(6) Every such vessel fitted with oil-fired boilers or internal combustion type machinery shall be provided with at least one fire hydrant in each space containing such boilers or machinery; with a nozzle for every fire hose at every hydrant fitted in such spaces.

18. Portable fire extinguishers--

Every vessel of class VI of 20 metres in length and above shall be provided with at least one portable fire extinguisher in each of the passenger spaces above the bulkhead deck, and with at least two such extinguishers in each of the crew spaces and the passenger space below that deck. At least one portable fire extinguisher shall be available for use in any gallery.

19. Machinery spaces of category A--

(1) In every vessel of class VI of 20 metre, in length and above shall be provided, for the protection of any machinery space of category A, at least one of the fixed fire extinguishing installations required under Clause (1) (b) of rule 10.

(2) In addition to the requirements specified in sub-rule (1), there shall also be provided-

(a) in each boiler room not less than two foam fire extinguishers of at least 45 litres capacity or carbon dioxide fire extinguishers of at least 16 kilogrammes capacity and shall be placed so as to be readily accessible in the event of fire and they shall be sufficient in number to enable foam or carbon dioxide to be directed on to any part of the boiler room or spaces containing any part of the oil fuel installations;

(b) in each firing space and in each space which contains any part of any oil fuel installation at least two portable fire extinguishers suitable for extinguishing oil fires;

(c) in each firing space a receptacle containing at least 0.3 cubic metre of sand or other dry material suitable for extinguishing oil fires together with a scoop for its distribution, or an additional portable fire extinguisher suitable for extinguishing oil fires.

(3) In addition to the requirements of sub-rule (1) there shall be provided in any machinery space containing internal combustion type machinery:

(a) one foam fire extinguisher of at least 45 litres capacity or a carbon dioxide fire extinguisher of at least 16 kilogrammes capacity; and

(b) not less than two portable fire extinguishers suitable for extinguishing oil fires, so located that an extinguisher is not more than 10 metres distance from any point in such machinery space.

20. Firemen's outfit--

every vessel of class VI of 20 metres in length and above shall carry one fireman's outfit for each 30 metres (or part thereof) of the registered length of the vessel, complying with the requirements specified in Schedule VI.

21. International shore connections--

every vessel of class VI of 500 tonnes and above shall be provided with at least one international shore connection complying with the requirements specified in the Schedule I, to enable water to be supplied from another vessel or from the shore to the fire man and necessary facilities for enabling such a connection to be used on both sides of a vessel.

22. Vessels of Class VI of less than 20 metres in Length-

Provisions of Rules 16 to 18 (both inclusive) shall apply to vessels of Class VI of less than 20 metres in length.

23. Vessels of Class VII-

(1) Provisions of rules 19 to 23 (both inclusive) shall apply to vessels of Class VII of 20 metres in length and above

(2) Provisions of rules 16 to 18 (both inclusive) shall apply to vessels of Class VII of less than 20 metres in length.

SECTION B—VESSELS OTHER THAN PASSENGER VESSELS AND TANKERS

24. Application--

Save as otherwise provided, the provisions of rules 27 to 36 (both inclusive) shall apply to vessels of Classes VIII, IX, X, XI, XII and XV of 500 tons and above.

25. Fixed fire extinguishing arrangements in cargo spaces--

(1) Fixed gas fire-extinguishing systems for dangerous goods

A vessel engaged in the carriage of dangerous goods in any cargo spaces shall be provided with a fixed carbon dioxide or inert gas fire-extinguishing system complying with the provisions of the Fire Safety Systems Code and Schedule IX or with a fire-extinguishing system which, in the opinion of the [Administration], gives equivalent protection for the cargoes carried.

(2) On all vessels, 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:

(a) the vehicles do not use their own propulsion within the cargo spaces;

(b) the cargo spaces are in compliance with the appropriate requirements of

regulation 19; and

(c) the vehicles are carried in accordance with the IMDG Code, as defined in

regulation VII/1.1.(3)(a) Except for ro-ro and vehicle spaces, cargo spaces on cargo vessels of 2,000 gross tonnage and upwards shall be protected by a fixed carbon dioxide or inert gas fire extinguishing system complying with the provisions of the Schedule IX[], or by a fire-extinguishing system which gives equivalent protection.

(b) The [Administration] may exempt from the requirements of paragraphs 27.3.(a) and 27.1, cargo spaces of any cargo vessel 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 [Administration], constitute a low fire risk. Such exemptions may be granted only if the vessel is fitted with steel hatch covers and effective means of closing all ventilators and other openings leading to the cargo spaces. When such exemptions are granted, the [Administration] shall issue an Exemption Certificate, irrespective of the date of construction of the vessel concerned, [and shall ensure that the list of cargoes the vessel is permitted to carry is attached to the Exemption Certificate

26. Fire pumps, fire mains, water service pipes, hydrants, hoses and nozzles.

(1) Every such vessel shall be provided with fire pumps, fire-mains, water service pipes, hydrant, house and nozzles which shall be capable of delivering at least two jets of water so as to reach any part of the vessel normally accessible to the passengers and crew while the vessel is being navigated, and any store room and any part of any cargo space when empty.

(2) (a)Every such vessel, which is less than 1000 tons shall be provided with at least one two fire pump operated by power, one of which shall be independently driven having a capacity of not less than 25 cubic metres per hour, which shall be capable of delivering at least one two jets of water simultaneously from each of any two fire hydrants, hoses and nozzles provided in the vessel and shall comply with the requirements of rule 58.

(b) In every such vessel, in addition to the fire pumps required under this rule, one of the other pump shall be fitted in the machinery space such as the general service, bilge and ballast pump, which shall be capable of providing water to the fire main at the capacity and pressure of the fire pumps.

(c) Every such vessel of 1000 tons and above shall be provided with at least two independently driven fire pumps operated by power. Each pump shall be capable of delivering at least one two jets of water simultaneously from each of any two fire hydrants, hoses and nozzles provided in the vessel and shall comply with the requirements of rule 58.(3) (a) If in any such vessel fire in any one compartment could put all the fire pumps out of action, an independently driven power operated emergency fire pump and its source of power and sea connection shall be provided in a position outside the machinery spaces.

(b) In every such vessel such emergency fire pump shall be capable of delivering at least two jet of water simultaneously from each of any two hydrants and hoses through nozzles which shall comply with rule 61(1) while maintaining a pressure required by rule 58(2) at any hydrant in the vessel.

(c) In every such vessel emergency fire pump shall meet the requirements specified in rule 58(3).

4 (a) Every such vessel shall be provided with a fire main, water service pipes, hydrants, hoses and nozzles which shall comply with rules 59, 60 and 61.

(b) In every such vessel the number of fire hoses shall be in addition to those required for any machinery spaces, one fire hose for each 30 metres f(or part thereof), length of the vessel but in no case less than 5 hoses in a vessel of 1000 tons and over and not less than 3 in a vessel under 1000 tons. Such hoses shall have a total length of at least 60 per cent of the length of the vessel. In addition there shall be provided one spare fire hoses, complete with couplings and nozzles:

Vessels carrying dangerous goods shall be provided with 3 hoses and nozzles, in addition to those required above'.

Provided that the Chief Surveyor with the Government of India may require a greater number of hoses to be carried so as to ensure that hoses in sufficient number are available and accessible at all time, having regard to the size and type of vessel and nature of services.

(5) All hydrants in machinery spaces of such vessels fitted with main or auxiliary oil fire boilers of internal combustion type of machinery shall be provided with hoses complete with nozzles. In each such space at least two fire hydrants one on port and one on

the starboard side; and in addition where there is access to the machinery space of any such vessel by way of a shaft tunnel, a fire hydrant should be provided in the tunnel at the end adjacent to that space. (6) Fire protection systems shall be provided to adequately protect the vessel from the fire hazards associated with vehicle, special category and ro-ro spaces, and weather deck intended for the carriage of vehicles;"

(6) In every such vessel in every ro/ro cargo space the number of hydrants with hoses shall be so arranged that at least two jets of water each from a single length of hose not emanating from the same hydrant length of hose not emanating from the same hydrant may reach any part of such space and such hydrants shall be positioned near the accesses to such space.

27. Portable fire extinguishers in accommodation, cargo and service spaces*.

Every such vessel shall be provided with--

(a) portable fire extinguishers not being less than fire in a vessel of 1000 tons or above and not less than three in a vessel of 500 tons and above but less than 1000 tons to ensure that at least one such extinguisher is readily available for use in any part of the accommodation spaces, service spaces and control stations.

(b) For this purpose, the following functional requirements shall be met:

(i) fire protection systems shall be provided to adequately protect the vessel from the fire hazards associated with vehicle, special category and ro-ro spaces, and weather deck intended for the carriage of vehicles.

(ii) ignition sources shall be separated from vehicle, special category and ro-ro

spaces; and

(iii) vehicle, special category and ro-ro spaces shall be adequately ventilated.

.

(c) One of the portable fire extinguishers intended for use in any space shall be stowed near the entrance to that space.

(d) Carbon dioxide fire extinguishers shall not be placed in accommodation spaces. In control stations and other spaces containing electrical or electronic equipment or appliances necessary for the safety of the vessel, fire extinguishers shall be provided whose extinguishing media are neither electrically conductive nor harmful to the equipment and appliances.

(e) Fire extinguishers shall be situated ready for use at easily visible places, which can be reached quickly and easily at any time in the event of a fire, and in such a way that their serviceability is not impaired by the weather, vibration or other external factors. Portable fire extinguishers shall be provided with devices which indicate whether they have been used.

** Refer to Unified interpretation of SOLAS chapter II-2 on the number and arrangement of*

portable fire extinguishers on board ships (MSC.1/Circ.1275)

28. Machinery spaces of Category-A :

Every such vessel with machinery space of category-A, shall be provided--

(1) in such machinery spaces--

(a) at least two fire hydrants one on both sides of the vessel for each such hydrants, one fire hose complete with nozzle and one space fire hose complete with nozzle.

(b) at least one of the following fixed fire extinguishing installations namely :-

(i) a fixed pressure water spraying system complying with the requirements specified in Schedule XII.

(ii) a fixed gas fire extinguishing system complying with the requirements of Schedule IX.

(iii) a fixed high expansion foam system complying with the requirement specified in Schedule X.

EXPLANATION: - For the purpose of this rule, if the engine and boiler rooms are not entirely separated from each other by a bulk head and if fuel oil can drain from the boiler room into the engine room, the combined engine and boiler rooms shall be considered as one single machinery space.

(2) In each boiler room--

(i) There shall be not less than one approved foam-type extinguisher of at least 135 l capacity or equivalent in each 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 paragraph 30.4, an approved foam-type extinguisher of at least 135 l capacity is not required.

(ii) one portable foam applicator complying with the requirements specified in Schedule V:

(iii) in each, firing space and in each space containing any part of any oil fuel installation at least two portable fire extinguishers suitable for extinguishing oil fires;

(iv) in each firing space, a receptacle containing at least 0.3 cubic metre of sand, saw dust impregnated with soda or other dry material suitable for quenching oil fire insufficient quantity together with scoops for its distribution or an additional portable fire extinguisher suitable for extinguishing oil fires.

(3) in any space containing internal combustion type machinery :-

(i) not less than one foam fire extinguishers of 45 litres or carbon dioxide extinguishers or at least 16 Kilogramme capacity sufficient in number to enable foam or Co2 to be directed into any part of the fuel and lubricating oil pressure systems, gearing and other areas of high fire risk.;

(ii) not less than one set of portable foam applicator unit complying with the requirements specified in Schedule V;

(iii) not less than two portable fire extinguishers suitable for extinguishing oil fires to ensure that at least one extinguisher is not more than 10 metres distance from any position within the space.

(4) Fixed local application fire-extinguishing systems

1. This Paragraph 30.4 shall apply to cargo vessels of 2000 gross tonnage and above

2. Machinery spaces of category A above 500 m^3 in volume shall, in addition to the fixed fire-extinguishing system required in paragraph 10 (1) (b), be protected by an approved type of fixed water-based or equivalent local application fire-extinguishing system, based on the guidelines developed by the Organization. In the case of periodically unattended machinery spaces, the fire-extinguishing system shall 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.

3. Fixed local application fire-fighting systems are to protect areas such as the following without the necessity of engine shutdown, personnel evacuation, or sealing of the spaces

(a) the fire hazard portions of internal combustion machinery or, for vessels constructed before 1 July 2014, the fire hazard portions of internal combustion machinery used for the vessel's main propulsion and power generation;

(b) boiler fronts;

(c) the fire hazard portions of incinerators; and

(d) purifiers for heated fuel oil.

4. Activation of any local application system shall give a visual and distinct audible alarm in the protected space and at continuously manned stations. The alarm shall indicate the specific system activated. The system alarm requirements described within this paragraph are in addition to, and not a substitute for, the detection and fire alarm system required elsewhere in this chapter.

29. Spaces Containing Steam Turbine or enclosed Steam Engines:

Every such vessel shall be provided in spaces containing steam turbine or enclosed pressure lubricated steam engines used either for main propulsion or having in the aggregate a total power of one less than 375 Kw for auxiliary purposes:-

(a) if such spaces have not been fitted with fixed fire extinguishing system specified in clause (1)(b) of rule 30, foam fire extinguish each of at least 45 litres capacity or carbon dioxide fire extinguishers each of at least 16 Kilogramme capacity sufficient in number to enable foam or Co2 to be directed on to any part of the pressure lubrication system and on to any part of the castings enclosing pressure lubricated parts of the turbine, engines or associated gearing and any other areas of high fire risk:

(b) not less than two portable fire extinguishers suitable for extinguishing oil fires, sufficient in number, so located that no point in the space is more than 10 metres distance from an extinguisher in that space.

30. Fire Extinguishing Appliances in other Machinery Spaces.

Every vessel where a fire hazard exists in any machinery space for which no specific provisions for fire extinguishing appliances are specified in rule 30 and 31, shall be provided in or adjacent to such space a sufficient number of portable fire extinguishers to ensure that at least one extinguisher is not more than 10 metres distance from any position within such space or other equivalent means of fire extinction.

31. SPECIAL REQUIREMENTS

In every vessel--

(1) there shall be provided in each closed ro/ro cargo space and each cargo space intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion, power ventilation system to provide at least six air changes per hour based on an empty hold. Ventilation fans shall be run continuously whenever vehicles are on board. The system shall be entirely separate from other ventilating systems. Ventilation ducts serving such spaces capable of being effectively sealed shall be separated for each cargo space. The system shall be capable of being controlled from a position outside such spaces. In addition :--

(a) fire protection systems shall be provided to adequately protect the vessel 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 shall be separated from vehicle, special category and ro-ro

spaces; and

(c) vehicle, special category and ro-ro spaces shall be adequately ventilated.

32. FIRE ALARM AND DETECTION SYSTEM.

(1) Protection of machinery spaces

A fixed fire detection and fire alarm system shall be installed in:

(a) periodically unattended machinery spaces;

(b) machinery spaces where:

(b) (i) the installation of automatic and remote control systems and equipment has been approved in lieu of continuous manning of the space; and

(b) (ii) the main propulsion and associated machinery including 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; and;

(b) (iii) enclosed spaces containing incinerators

The fixed fire detection and fire alarm system required in periodically unattended machinery spaces shall be so designed and the detectors so positioned as to detect rapidly the onset of fire in any part of those spaces and under any normal conditions of operation of the machinery and variations of ventilation as required by the possible range of ambient temperatures. Except in spaces of restricted height and where their use is specially appropriate, detection systems using only thermal detectors shall not be permitted. The detection system shall initiate audible and visual alarms distinct in

both respects from the alarms of any other system not indicating fire, in sufficient places to ensure that the alarms are heard and observed on the navigation bridge and by a responsible engineer officer. When the navigation bridge is unmanned the alarm shall sound in a place where a responsible member of the crew is on duty.

(2) Fire protection systems shall be provided to adequately protect the vessel from the fire hazards associated with vehicle, special category and ro-ro spaces, and weather deck intended for the carriage of vehicles;

(3) Ignition sources shall be separated from vehicle, special category and ro-ro spaces; and vehicle, special category and ro-ro spaces shall be adequately ventilated

(4) Protection of accommodation and service spaces and control stations

Accommodation and service spaces and control stations of cargo vessels shall 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

(a). Method IC

A fixed fire detection and fire alarm system shall be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces and in all control stations and cargo control rooms.

(b). Method IIC

An automatic sprinkler, fire detection and fire alarm system of an approved type complying with the relevant requirements of the [Schedule XVII] shall 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 shall be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces and in all control stations and cargo control rooms.

(c). Method IIIC

A fixed fire detection and fire alarm system shall 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 shall be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces and in all control stations and cargo control rooms.

(5) The requirements for manually operated call point

Manually operated call points complying with the provisions of Schedule VII shall be installed throughout the accommodation spaces, service spaces and control stations. One manually operated call point shall be located at each exit. Manually operated call points shall be readily accessible in the corridors of each deck such that no part of the corridor is more than 20 m from a manually operated call point.

33.FIREMEN'S OUTFITS

(1) Every vessel shall carry firemen's outfits which shall comply with requirements specified in Schedule VI in accordance with the following scale:

Tonnage of the vessel	Number of outfits
500 tons and over but under 2500 tons	2
2500 tons and over but under 4000 tons	3
4000 tons and over	4

(2) The firemen's outfits or sets of personal equipment shall be so stored as to be easily accessible and ready for use and where more than one such set is carried, they shall be stored in widely separated position.

(3) Two spare charges shall be provided for each required breathing apparatus. Cargo vessels 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.

35 A Placement and number of Emergency escape breathing devices

1. Accommodation space

   .1 two (2) EEBDs and one (1) spare EEBD

2. Machinery space for category A containing internal combustion machinery used for main propulsion

   .1 one (1) EEBD in the engine control room, if located within the machinery space;

.2 one (1) EEBD in workshop areas. If there is, however, a direct access to an escape way from the workshop, an EEBD is not required; and

.3 one (1) EEBD on each deck or platform level near the escape ladder constituting the second means of escape from the machinery space (the other means being an enclosed escape trunk or watertight door at the lower level of the space).

3. For machinery spaces of category A other than those containing internal combustion machinery used for main propulsion, one (1) EEBD should, as a minimum, be provided on each deck or platform level near the escape ladder constituting the second means of escape from the space (the other means being an enclosed escape trunk or watertight door at the lower level of the space).
4. Training EEBD

At least one EEBD is required for training purposes. This EEBD should be clearly marked so that they cannot be confused with the operational EEBD's and it should not be stored in the same place as the operational EEBD's. Enough spare charges/bottles to be provided for the training EEBD.

34.INTERNATIONAL SHORE CONNECTION

Every vessel shall be provided with--

(1) at least one international shore connection complying with the requirements of Schedule I to enable water to be supplied from another vessel or from the shore to the fire main.

(2) fixed provisions shall be made to enable such a connection to be used on both sides of the vessel.

35.VESSELS OF CLASS VIII UNDER 500 TONS AND VESSELS OF CLASSES IX, X, XI, XII AND XV UNDER 500 TONS BUT NOT UNDER 150 TONS--

(1) The provisions of this rule shall apply to vessels of Class VIII under 500 tons and vessels of Classes IX, X, XI, XII and XV under 500 tons but not under 150 tons.

(2) Every vessel shall be provided with---

(a) Fire pumps, fire mains, water service pipes, hydrants hoses and nozzles whereby at least one jet of water can reach any part of the vessel normally

accessible to the passengers or crew while the vessel is being navigated and any store room and any part of any cargo space when empty:

(b) at least one fire pump operated by power complying with the requirements of rule 58, which shall be capable of delivering at least one jet of water from any fire hydrant hose and nozzle provided in the vessel;

(c) if fitted with oil-fired boiler or internal combustion type propelling machinery, an additional fire pump and its source of power and sea connection in a position outside the spaces containing such boilers or machinery and if such pump is operated by power, it shall comply with the requirements of the preceding clause and if it is manually operated, it shall be provided with a hose and 10 millimetres diameter nozzle capable of producing a jet of water having a throw of not less than 6 metres capable of being directed on to any part of the vessel;

(d) a fire main, water service pipes and hydrants complying with the requirements of rule 59 and at least three fire hoses and nozzles complying with rules 60 & 61;

(e) at least three portable fire extinguishers so situated as to be readily available for use in the accommodation and service spaces;

(f) at least one of the fixed fire extinguishing installations specified in Clause (1)(b) of rule 30 for the protection of any space containing any oil-fired boiler, oil Fuel Setting Tank or Oil Fuel Unit;

(g) at least two portable fire extinguishers suitable for extinguishing oil fires; in each boiler room and in each space which contains any part of any oil fuel installation;

(h) a receptacle containing at least 0.3 cubic metre of sand or other dry material suitable for extinguishing oil fires together with a scoop for its distribution or an additional portable fire extinguisher suitable for extinguishing oil fires in each firing space;

(i) if it is fitted with internal combustion propelling machinery in machinery spaces with--

(i) portable fire extinguishers capable of discharging from or other substances suitable for quenching oil fires, as specified in the Table below :-

Power of main engine in KW	No.of portable extinguishers
Upto and including 150	2
Above 150 but not above 300	4
Above 300 but not above 450	6
Above 450	7

or

(ii) two portable fire extinguishers suitable for extinguishing oil fires together with--

(a) one foam fire extinguisher of at least 45 litres; or

(b) one carbon dioxide fire extinguisher of at least 16 kilograms capacity.

(j) at least one fireman's outfit which shall comply with the requirements specified in Schedule VI and which shall contain a breathing apparatus of the air hose type.

36.VESSELS OF CLASSES IX, X, XI AND XII UNDER 150 TONS

(1)(a) in respect of every vessel of Classes IX, X, XI and XII under 150 tons, which is 20 metres in length and above the provision of sub-rule (2) of rule 37 shall apply, subject to the conditions that fire pumps required to be provided under clause (b) of that sub-rule may be driven by the main engine.

(b) Every such vessel being less than 20 metres in length shall be provided, in a position outside the machinery spaces, with a power or a hand operated pump with a permanent sea connection, hose with a 10 millimetre diameter nozzle capable of producing a jet of water having a throw of not less than 6 metres capable of being directed to any part of the Vessel, and a spray nozzle suitable for use with the hose :

Provided that if such vessel is of less than 9 metres in length or is an open vessel of less than 20 metres is length and if such vessel complies with the requirements of sub-rule (2), so far as it relates to fire buckets the requirement specified in this clause shall not be required to be complied with and if such vessel does not comply with the requirement of sub-rule (3) so far as it relates to fire buckets, shall be required to have two fire buckets one of which shall be fitted with a lanyard.

(2) Every such vessel shall be provided with portable fire extinguishers or with fire buckets in accordance with the following Table:-

Length of vessel	Minimum number of extinguishers or buckets
Under 20 m	2
20 m or over	3

When fire buckets are provided, these shall be fitted with a lanyard.

(3) Every such vessel if fitted with oil-fired boilers or internal combustion type propulsion machinery shall in addition be provided with portable fire extinguishers suitable for extinguishing oil fires in accordance with the following table :--

Length of vessel	Minimum number of extinguishers or buckets
Under 6 m	1
6 m or over	2

(4) Every such vessel of 9 metres in length or over which is fitted with oil-fired boilers or internal combustion type propulsion machinery shall, if it is mainly or wholly constructed of wood or glass reinforced plastic and is decked in way of the machinery space, be provided with means outside the machinery space for rapidly injecting into the machinery space a quantity of fire smothering gas equivalent to at least 60 per cent of the gross volume of that space, or where the machinery space is bounded by steel bulk-heads equivalent to at least 40 per cent of the gross volume of the space.

Provided that where such vessel is of less than 20 metres in length, it will be sufficient if a water spraying system supplied from a hand pump and a permanent sea connection situated outside the machinery space which may be the hand pump and the sea connection referred to in sub-rule (1)(b) is provided. Such pump shall be connected by fixed piping to a sufficient number of water spraying nozzles suitably placed in the machinery space and capable of extinguishing oil fires.

(5) Every such vessel being a fully decked vessel of 20 metres in length or over shall be provided with a fireman's axe.

37.VESSELS OF CLASS XIII OF 60 METRES IN LENGTH AND ABOVE:-

(1) The Provisions of rules 28 to 30 (except sub-rule 2(ii) and 3(ii) of rule 30), 35 and 36 shall apply to vessels of class XIII of 60 metres in length and above as they apply to vessels of class XIII of 1000 tons and above, and

(2) In every such vessel, a water spray system independent of any system fitted in the machinery space capable of being connected with the fire main and operable from outside the store shall be fitted in the net store.

38.VESSELS OF CLASS XIII OF 45 METRES IN LENGTH AND ABOVE BUT LESS THAN 60 METRES IN LENGTH :-

(1) The provisions of rules 28 to 30 (except sub-rules 2(ii) and 3(ii) of rule 30), 35 and 36 shall apply to vessels of class XIII of 45 metres in length and above but less than 60 metres in length as they apply to vessels of class VIII of 500 tons and above, and

(2) In every such vessel, a water spray system independent of any system fitted in the machinery space capable of being connected with a fire man and operable from outside the store shall be fitted in the net store.

39.VESSELS OF CLASS XIII OF 25 METRES IN LENGTH AND ABOVE BUT LESS THAN 45 METRES:--

(1) The provisions of rule 37(2) (a) (b) (c) (d) (e) (i) (j) shall apply to vessels of class XIII of 25 metres in length and above but less than 45 metres in length as they apply to vessels of class VIII of less than 500 tons.

(2) In every such vessel, the hull of which is constructed of wood or glass reinforced plastic, there shall be provided for the protection of machinery spaces a fixed fire smothering gas installation complying with the requirements specified in Schedule IX except that the quantity of free fire smothering gas provided shall be equivalent to at least 60 per cent of the gross volume of the machinery space or in the case of any such vessel where the machinery space is bounded by steel bulkheads, the quantity off free fire smothering gas shall be equivalent to at least 40 per cent of the gross volume of that space.

(3) In every such vessel which is not required to comply with sub-rule (2) shall be provided with at least one of the fixed fire extinguishing installations required under rule 30(1)(b) for the protection of any space containing any oil fire boiler, oil fuel settling tank or oil fuel unit in vessels.

(4) In every such vessel, in addition to the requirements of sub-rule (3), there shall be provided:-

(a) in each boiler room and in each space which contains any part of any oil fuel installation, at least two portable fire extinguishers suitable for extinguishing oil fires;

(b) in each firing space a receptacle containing at least 0.15 cubic metres of sand or other dry material suitable for quenching oil fires together with a scoop for its distribution, or an additional portable fire extinguisher suitable for extinguishing oil fires.

(5) In every such vessel, water spray system independent of any system fitted in the machinery space and which may be connected to the fire main shall be fitted in the net store and be operable from outside the space.

40.VESSELS OF CLASS XIII OF LESS THAN 25 METRES IN LENGTH:-

The provisions of rule 38 shall apply to vessels of class XIII of less than 25 metres in length.

41.VESSELS OF CLASS XIV OF 500 TONS AND ABOVE :-

The provisions of rule 37 shall apply to all vessels of Class XIV of 500 tons and above.

42.VESSELS OF CLASS XIV OF 150 TONS AND ABOVE BUT LESS THAN 500 TONS :-

(1)(a) Every vessel of class XIV of 150 tons and over but less than 500 tons shall be provided with at least one fire pump and fire hose with nozzle whereby a jet of water can be directed into any part of the vessel.

(b) Where the pump provided in accordance with clause (a) is situated inside spaces containing oil fired boilers or internal combustion machinery, there shall be provided outside such space a portable diesel driven pump or a hand pump with a hose and nozzle capable of delivering a jet of water having a throw of not less than 6 metres.

(c) Every such vessel shall be provided with at least 3 portable fire extinguishers for the protection of accommodation and service spaces.

(d) Every such vessel shall be provided with three fire buckets.

(2) Every such vessel fitted with main or auxiliary oil-fired boilers or internal combustion propelling machinery shall be provided with--

(a) a nozzle suitable for spraying water on oil;

(b) a receptacle containing 0.3 cubic metre of sand or other dry material suitable for quenching oil fires together with a scoop for distributing the contents of the receptacle.

(3) In each boiler room or space containing any part of any oil fuel installation of such vessel there shall be provided at least 2 portable fire extinguishers suitable for extinguishing oil fires.

(4) In each machinery space in such vessel one foam extinguisher of at least 45 litre capacity or an equivalent carbon dioxide extinguisher shall be provided.

(5) At least 2 portable extinguishers capable of discharging foam or any other substance suitable for quenching oil fires shall be provided in such vessel.

43.VESSELS OF CLASS XIV OF UNDER 150 TONS:-

(1) Every vessel of class XIV of 50 tons and above but less than 150 tons shall be provided, with a fire pump operated by power and fire hose with nozzle capable of discharging at jet of water into any part of the vessel and where the fire pump is driven by main engine, a outside the machinery space with its sea connection and hose and nozzle capable of directing a jet of water having a throw not less than 6 metres. In addition, a nozzle for spraying water suitable for quenching oil fire shall be provided.

(2) Every such vessel fitted with main or auxiliary oil-fired boilers or internal combustion propelling machinery shall be provided with.--

(a) a receptacle containing 0.3 cubic metre of sand or other dry material suitable for quenching oil fires together with a scoop for distributing the contents of the receptacle;

(b) at least 4 portable fire extinguishers capable of discharging foam or other substances suitable for quenching oil fires.

(3) Every such vessel shall be provided with fire buckets in accordance with the following Table :-

Vessel tonnage	Minimum number of Fire buckets
Under 50 tons	2 (One of which shall be fitted with lanyard)
Over 50 tons but not over 100 tons	3 (two of which shall be fitted with lanyard)
Over 100 tons	4 (two of which shall be fitted with lanyard)

44.VESSELS OF CLASS XV OF UNDER 150 TONS:-

(1) Every vessel of class XV of under 150 tons of 20 metres in length or over:--

(a) shall be provided with fire pumps fire mains, water mains, hydrants, hoses and nozzles capable of producing at least one jet of water to reach any part of the vessel normally accessible to the passengers or crew while the vessel is being navigated, and any store room and any part of any cargo space when empty;

(b) shall be provided with at least one fire pump operated by power which may be driven by the main engine and which shall be capable of delivering at least one jet of water from any fire hydrant hose and nozzle provided with the vessel and which shall comply with the requirements of rule 58:

(c) if fitted with boilers or internal combustion type propulsion machinery, the pump required under the preceding clause and its source of power and sea connection are not situated outside spaces containing such boilers or machinery, there shall be provided in a position outside such spaces an additional fire pump and its source of power and sea connection. If such comply with the requirements of the preceding clause and if it is manually operated, it shall be provided with a hose and a 10 millimetre diameter nozzle through which it shall be capable of producing a jet of water having a throw of not less than 6 metres capable of being directed on to any part of the vessel;

(d) In every such vessel there shall be provided a fire main, water service pipes and hydrants which shall comply with the requirements of rule 59 and at least two fire hoses.

(2) Every such vessel of less than 20 metres in length shall be provided in a position outside the machinery spaces with either a power or a hand operated pump with a permanent sea connection, a hose with a nozzle at least 6 millimetres in diameter capable of producing a jet of water having a throw of not less than 6 metres capable of being directed on to any part of the vessel, and in addition a spray nozzle suitable for use with the hose.

Provided that if such vessel is of less than 15 metres in length or is an open vessel of less than 20 metres in length and if such vessel complies with the requirements of sub-rule (3), so far as it relates to fire buckets, the requirements specified in this sub-rule shall not be required to be complied with and if such vessel does not comply with the requirements of sub-rule (3), so far as it relates to fire buckets, shall be required to have two fire buckets one of which shall be fitted with a lanyard. (3) Every such vessel shall be provided with portable fire extinguishers or with fire buckets in accordance with the following table:--

(when fire buckets are provided at least one shall be fitted with a lanyard).

Length of vessel	Minimum number of extinguishers or buckets
Under 20 m	2
20 m or over	3

(4) Every such vessel, if fitted with oil-fired boilers or internal combustion type propelling machinery shall, in addition, be provided with two portable fire extinguishers suitable for extinguishing oil fires.

(5) Every such vessel being a fully decked vessel of 20 metres in length or over shall be provided with fireman's axe.

Section C—TANKERS

TANKERS OF CLASS VII AND IX OF 500 TONS OR OVER

45. GENERAL REQUIREMENTS:-

Provisions of rules 28, 29(a), 30 to 33 (1) (both inclusive), 34(1) and 36 shall apply to every tanker of class VIII and IX of 500 tons or over.

46.CARGO TANK PROTECTION:-

(1) Every tanker of class VIII and class IX of 20000 tonnes or deadweight and over upward shall be provided with a fixed deck foam system complying with the requirements specified in [Schedule XIII]. Tankers of less than 20,000 tonnes deadweight shall be provided with a deck foam Fire-Extinguishing system complying with the requirements specified in [Schedule XIII].

(2) Every tanker of class VIII and class IX of 8000tonnes deadweight or over constructed or adapted and used to carry crude oil and petroleum products having a closed flash point not exceeding 60^0C, the reid vapour pressures of which is below that of atmospheric pressure and other liquids having a similar fire hazard shall be provided with an inert gas system complying with the requirements specified in Schedule XIV:

Provided that the requirement of this sub-rule shall not apply to a chemical tanker having a valid certificate of fitness for the carriage of dangerous chemicals in bulk in compliance with the requirements of the IMO Code for the construction and equipment of vessels carrying dangerous chemicals in bulk, and to a gas carrier having a valid certificate of fitness for the carriage of liquefied gases in bulk in compliance with the requirements of the IMO Code for the construction and equipment of vessels carrying

liquefied gases in bulk. For these vessels, alternative arrangements may be provided to the satisfaction of Chief Surveyor with the Government of India.

(2) The inert gas system for tankers required in accordance with regulation 4.5.5.1 shall 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.

(2) (i) 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 shall 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.

(2) (ii) Notwithstanding regulation 1.2.2.2, the provisions of this paragraph shall 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 shall 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 shall be suspended so as to avoid air being drawn into the cargo tanks, the gas regulating valve, if fitted, shall be closed and the off-specification gas shall be vented to atmosphere.

(2) (iii) In the event that the inert gas system is unable to meet the requirement in paragraph 16.3.3.1 and it has been assessed that it is impractical to effect a repair, then cargo discharge and cleaning of those cargo tanks requiring inerting shall only be resumed when suitable emergency procedures have been followed, taking into account guidelines developed by the Organisation.

(3) Combination carriers shall not carry solid cargoes unless,--

(a) all cargo tanks are empty of crude oil and other petroleum products having a closed flash point not exceeding 600C and other liquids having a similar fire hazard and are gas freed; or

(b) the arrangements provided in each case are in accordance with the relevant operational requirements contained in the "Guidelines for Inert Gas Systems".

(4)(a) Every inert gas system provided in accordance with this rule shall be designed and operated so as to render and keep the atmosphere of the cargo tanks including the slop tanks non-flammable at all times, except where such tanks are to be gas free.

(b) In the event that the inert gas system is unable to meet the operational requirement set out above and it has been assessed that it is impractical to effect a repair, then cargo discharge, deballasting and necessary tank cleaning may only be resumed when the "emergency procedures" laid down in the "Guidelines for Inert Gas Systems" are complied with.

(5) Notwithstanding the provisions of sub-rule (2), every tanker of class VIII and class IX operating with a tank cleaning procedure using crude oil washing shall be,--

(a) fitted with an inert gas system complying with the requirements specified in Schedule XIV, and

(b) provided with fixed tank washing machines.

(6) Every tanker of class VIII and class IX fitted with a fixed inert gas system shall be provided with a closed ullage system.

(7) Other fixed fire extinguishing installations may be provided in place of those required by the foregoing provisions of this rule if each installation is equivalent to the said systems in the manner set out in clauses (a) and (b),--

(a) an installation provided in place of the inert gas system shall be deemed to be equivalent to that system, if it is,--

(i) capable of preventing dangerous accumulation of explosive mixtures in intact cargo tanks during normal service throughout the ballast voyage and necessary in-tank operations; and

(ii) so designed as to minimise the risk of ignition from the general of static electricity by the system itself.

(b) an installation provided in place of the fixed deck foam system shall be deemed to be equivalent to that system, if it is--

(i) capable of extinguishing spill fires and precludes ignition of spilled oil, and

(ii) capable of combating fires in ruptured tanks.

47.CARGO TANK PURGING AND/OR GAS FREEING:-

(1) In every tanker of class VIII and class IX of 500 tons or over, arrangements of purging or gas freeing, or both, shall be such as to minimise the hazards due to the dispersal of flammable vapours in the atmosphere and to flammable mixtures in a cargo tank.

(2) When such tanker is provided with an inert gas system, it shall first be purged in accordance with the provisions of para (13) of Schedule XIV until the concentration of hydrocarbon vapours in the cargo tanks has been reduced to less than 2 per cent by volume. Thereafter, venting may be at the cargo tank deck level.

(3) When the vessel is not provided with an inert gas system, the operation shall be such that the flammable vapour is discharged initially through

(a) the vent outlets as specified in regulation 4.5.3.4 of chapter II-2 of the SOLAS;

(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.

48. CARGO PUMP ROOMS:-

(1) (i) Except as otherwise provided in sub-rule (2), in every tanker of class VIII and class IX of 500 tons or over, each cargo pump room and each pump room having a similar hazard shall be provided with at least one of the fixed fire extinguishing systems specified in clause (1) (b) of rule 30 and shall be operated from a readily accessible position outside the pump room and where the fixed fire extinguishing system is a a carbon dioxide fire extinguishing system,--

(a) the alarm system referred to in Schedule VII shall be safe for use in a flammable cargo vapour or air mixture;

(b) a notice shall be exhibited at the controls of such fixed fire extinguishing system stating that due to the electrostatic ignition hazard, the system is to be used only for fire extinguishing and not for inerting purposes;

(c) in which 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 need not be more than the maximum required for the largest compartment.

(2) In chemical tankers having a valid certificate of fitness for the carriage of dangerous chemicals in bulk, where the carbon dioxide fire-extinguishing system referred to in sub-rule (1) is a gas system, the concentration shall be as specified in the code for the construction and equipment of vessels carrying dangerous chemicals in bulk.

49. FIRE MAIN ISOLATING VALVES:-

In every tanker of class VIII and class IX of 500 tons or over, isolation valves shall be fitted in the fire main at poop front in a protected position and on the tank deck at intervals of not more than 40 metres so as to preserve the integrity of the fire main system in case of fire or explosion.

50. FIREMEN'S OUTFITS:-

In every tanker of class VIII and class IX of 500 tons and over, there shall be provided not less than four firemen's outfits complying with the requirements specified in Schedule VI, which shall be so stored as to be easily accessible and ready for use and where more than one fireman's outfits are carried, they shall be stored in widely separated positions.

51. TANKERS OF CLASS VIII OF UNDER 500 TONS :-

(1) The provisions of rules 37, 49 and 50 shall apply to every tankers of class VIII under 500 tons.

(2) In addition to the requirements specified in sub-rule (1), every such tanker shall be provided with at least one mobile foam appliance capable of discharging foam rapidly in the cargo manifold areas by simple operation.

52. TANKERS OF CLASS IX OF 150 TONS OR OVER BUT UNDER 500 TONS :-

The provisions of rules 37, 49, 50 and sub-rule (2) of rule 53 shall apply to tankers of class IX of 150 tons or over but under 500 tons.

53. TANKERS OF CLASS IX OF UNDER 150 TONS :-

The provisions of rules 37, 49, 50 and sub-rule 53 shall apply to tankers of class IX under 150 tons.

54. TANKERS OF CLASS X :-

The provisions of rules 35 and 47 to 51 shall apply to tankers of class X of 500 tons or over, the provisions of rule 54 shall apply to such tankers of 150 tons or over but under 500 tons and rule 55 shall apply to such tankers under 150 tons:

Provided that tankers over 500 tons but less than 2000 tons may comply with the provisions of sub-rule (2) of rule 53 in place of sub-rule (1) of rule 48.

Section D-MISCELLANEOUS

55. Requirements for Vessels Provided with Helicopter landing with or without Fuelling Facilities--

(1) In close proximity to the helideck, the following fire-fighting appliances shall be provided and stored near the means of access to that helideck:

(a) at least two dry powder extinguishers having a total capacity of not less than 45 kg; and

(b) carbon dioxide extinguishers of a total capacity of not less than 18 kg or Equivalent*;

(c) 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 shall be capable of delivering a discharge rate as required in table 18.1 for at least five minutes.

Table 18.1 - 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

d) .the principal agent shall be suitable for use with salt water and conform to performance standards not inferior to those acceptable to the Organization#;

e) at least two nozzles of an approved dual-purpose type (jet/spray) and hoses sufficient to reach any part of the helideck;

f) in lieu of the requirements of paragraphs 5.1.3 through 5.1.5, 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

g) in addition to the requirements of regulation [xx] two sets of fire-fighter's outfits; and

**Refer to Unified interpretation of SOLAS chapter II-2 on the number and arrangement of*

portable fire extinguishers on board vessels (MSC.1/Circ.1275)

Refer to the International Civil Aviation Organization Airport Services Manual, part 1 -

Rescue and Fire Fighting, chapter 8 - Extinguishing Agent Characteristics, Paragraph 8.1.5 -Foam Specifications Table 8-1, Level 'B'.

g) at least the following equipment shall be stored in a manner that provides for

immediate use and protection from the elements

.1 adjustable wrench;

.2 blanket, fire-resistant;

.3 cutters, bolt 60 cm;

.4 hook, grab or salving;

.5 hacksaw, heavy duty complete with 6 spare blades;

.6 ladder;

.7 lift line 5 mm diameter and 15 m in length;

.8 pliers, side cutting;

.9 set of assorted screwdrivers; and

.10 harness knife complete with sheath.

56 (A). Fire Extinguishing Arrangements for Paint Lockers

(1) Paint lockers and flammable liquid lockers of deck area 4m2 and more shall be providing with a fire extinguishing system enabling the crew to extinguish a fire without entering the space. Fixed arrangements as specified below shall be provided:

a) CO2 system, designed for 40% of the gross volume of the space;
b) Dry powder system, designed for atleast 0.5 kg power/m2
c) Water spraying system, designed for 5.1m2, min;

(2) Water spraying system shall be connected to the vessel’s main system.

(3) Besides the systems mentioned in sub-paragraph (1) and (2) other systems may be accepted.

(4) For lockers of a deck area of less than 4 m², 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 shall be arranged in the locker to allow the discharge of the extinguisher without having to enter into the protected space. The required portable fire extinguisher shall be stowed adjacent to the port. Alternatively, a port or hose connection may be provided to facilitate the use of fire main water.

(5) Firefighting for ships constructed on or after 1 January 2016 designed to carry containers on or above the weather deck

a) Ships shall carry, in addition to the equipment and arrangements required by these rules in cargo spaces, at least one water mist lance.

i) The water mist lance shall 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.

b) Ships designed to carry five or more tiers of containers on or above the weather deck

shall carry, in addition to the requirements of paragraph (a), mobile water monitors* as follows:

.1 ships with breadth less than 30 m: at least two mobile water monitors; or

.2 ships with breadth of 30 m or more: at least four mobile water monitors.

i) The mobile water monitors, all necessary hoses, fittings and required fixing hardware shall 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.

ii) A sufficient number of fire hydrants shall be provided such that:

.1 all provided mobile water monitors can be operated simultaneously for creating effective water barriers forward and aft of each container bay;

.2 the two jets of water can be supplied at the required pressure required ; and

.3 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.

iii) 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 shall also comply with regulation 19.3.1.5 of SOLAS Ch-II-2, as far as applicable to on-deck cargo areas.

iv) The operational performance of each mobile water monitor shall be tested during initial survey on board the ship to the satisfaction of the [*Administration*]. The test shall verify that:

.1 the mobile water monitor can be securely fixed to the ship structure ensuring safe and effective operation; and

.2 the mobile water monitor jet reaches the top tier of containers with all required monitors and water jets from fire hoses operated simultaneously.

57. Deep-fat cooking equipment

Deep-fat cooking equipment installed in enclosed spaces or on open decks shall be fitted with the following

.1 an automatic or manual extinguishing system tested to an international standard acceptable to the Organization;*

**Refer to the recommendations by the International Organization for Standardization, in particular, Publication ISO 15371, Ships and marine technology - Fire-extinguishing systems for protection of galley cooking equipment*

.2 a primary and backup thermostat with an alarm to alert the operator in the event of failure of either thermostat;

.3 arrangements for automatically shutting off the electrical power upon activation of the fire-extinguishing system;

.4 an alarm for indicating operation of the fire-extinguishing system in the galley where the equipment is installed; and

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

58. Carriage of dangerous goods

Ship types and cargo spaces, intended for the carriage of dangerous goods shall comply with the requirements of SOLAS Ch-II-2/Regulation 19, as appropriate.

59. Casualty threshold, safe return to port and safe areas

1.Application

Passenger ships constructed on or after 1 July 2010 having length, as defined in SOLAS regulation II-1/2.5, of 120 m or more or having three or more main vertical zones shall comply with the provisions of this regulation.

2. Purpose

The purpose of this regulation is to establish design criteria for a ship's safe return to port under its own propulsion after a casualty that does not exceed the casualty threshold stipulated in paragraph 3 and also provides functional requirements and performance standards for safe areas.

60. Casualty threshold

The casualty threshold, in the context of a fire, includes:

1. loss of space of origin up to the nearest "A" class boundaries, which may be a part of the space of origin, if the space of origin is protected by a fixed fire extinguishing system; or
2. loss of the space of origin and adjacent spaces up to the nearest "A" class boundaries, which are not part of the space of origin.

61. Safe return to port*

**Refer to the Performance standards for the systems and services to remain operational on passenger ships for safe return to port and orderly evacuation and abandonment after a casualty (MSC.1/Circ.1214).*

When fire damage does not exceed the casualty threshold indicated in paragraph 3, the ship shall be capable of returning to port while providing a safe area as defined in regulation 3. To be deemed capable of returning to port, the following systems shall remain operational in the remaining part of the ship not affected by fire:

.1 propulsion;

.2 steering systems and steering-control systems;

.3 navigational systems;

.4 systems for fill, transfer and service of fuel oil;

.5 internal communication between the bridge, engineering spaces, safety centre, fire-fighting and damage control teams, and as required for passenger and crew notification and mustering;

.6 external communication;

.7 fire main system;

.8 fixed fire-extinguishing systems;

.9 fire and smoke detection system;

.10 bilge and ballast system;

.11 power-operated watertight and semi-watertight doors;

.12 systems intended to support “safe areas” as indicated in paragraph 5.1.2;

.13 flooding detection systems; and

.14 other systems determined by the Administration to be vital to damage control efforts.

62. Safe area(s)

1. Functional requirements:

the safe area(s) shall generally be internal space(s); however, the use of an external space as a safe area may be allowed by the Administration taking into account any restriction due to the area of operation and relevant expected environmental conditions;

2. the safe area(s) shall provide all occupants with the following basic services* to ensure that the health of passengers and crew is maintained:

**Refer to the Performance standards for the systems and services to remain operational on passenger ships for safe return to port and orderly evacuation and abandonment after a casualty (MSC.1/Circ.1214).*

.1 sanitation;

.2 water;

.3 food;

.4 alternate space for medical care;

.5 shelter from the weather;

.6 means of preventing heat stress and hypothermia;

.7 light; and

.8 ventilation;

3. ventilation design shall reduce the risk that smoke and hot gases could affect

the use of the safe area(s); and

4. means of access to life-saving appliances shall be provided from each area identified or used as a safe area, taking into account that a main vertical zone may not be available for internal transit.

4.1 Alternate space for medical care:

Alternate space for medical care shall conform to a standard acceptable to the

Administration.**

*** Refer to the Guidance on the establishment of medical and sanitation related programmes for passenger ships (MSC/Circ.1129).*

63. Design criteria for systems to remain operational after a fire casualty

1 **Application**

Passenger ships constructed on or after 1 July 2010 having length, as defined in SOLAS regulation II-1/2.5*)*, of 120 m or more or having three or more main vertical zones shall comply with the provisions of this regulation.

2 **Purpose**

The purpose of this regulation is to provide design criteria for systems required to remain operational for supporting the orderly evacuation and abandonment of a ship, if the casualty threshold, as defined in regulation 57 (E)(3), is exceeded.

3 **Systems***

*** Refer to the Performance standards for the systems and services to remain operational on passenger ships for safe return to port and orderly evacuation and abandonment after a casualty (MSC.1/Circ.1214).*

3.1 In case any one main vertical zone is unserviceable due to fire, the following systems shall be so arranged and segregated as to remain operational:

.1 fire main;

.2 internal communications (in support of fire-fighting as required for passenger and crew notification and evacuation);

.3 means of external communications;

.4 bilge systems for removal of fire-fighting water;

.5 lighting along escape routes, at assembly stations and at embarkation stations of life-saving appliances; and

.6 guidance systems for evacuation shall be available.

3.2 The above systems shall be capable of operation for at least 3 h based on the assumption of no damage outside the unserviceable main vertical zone. These systems are not required to remain operational within the unserviceable main vertical zones.

3.3 Cabling and piping within a trunk constructed to an “A-60” standard shall be deemed to remain intact and serviceable while passing through the unserviceable main vertical zone for the purposes of paragraph 3.1. An equivalent degree of protection for cabling and piping may be approved by the Administration.

64. Safety centre on passenger ships

1. **Application**

Passenger ships constructed on or after 1 July 2010 shall have on board a safety centre complying with the requirements of this regulation.

2. Purpose

The purpose of this regulation is to provide a space to assist with the management of emergency situations.

3. Location and arrangement

The safety centre shall either be a part of the navigation bridge or be located in a separate space adjacent to and having direct access to the navigation bridge, so that the management of emergencies can be performed without distracting watch officers from their navigational duties.

4. **Layout and ergonomic design**

The layout and ergonomic design of the safety centre shall take into account the guidelines developed by the Organization, as appropriate.

5. Communications

Means of communication between the safety centre, the central control station, the navigation bridge, the engine control room, the storage room(s) for fire extinguishing system(s) and fire equipment lockers shall be provided.

6. Control and monitoring of safety systems

Notwithstanding the requirements set out elsewhere in the Convention, the full functionality (operation, control, monitoring or any combination thereof, as required) of the safety systems listed below shall be available from the safety centre

.1 all powered ventilation systems;

.2 fire doors;

.3 general emergency alarm system;

.4 public address system;

.5 electrically powered evacuation guidance systems;

.6 watertight and semi-watertight doors;

.7 indicators for shell doors, loading doors and other closing appliances;

.8 water leakage of inner/outer bow doors, stern doors and any other shell door;

.9 television surveillance system;

.10 fire detection and fire alarm system;

.11 fixed fire-fighting local application system(s);

.12 sprinkler and equivalent systems;

.13 water-based systems for machinery spaces;

.14 alarm to summon the crew;

.15 atrium smoke extraction system;

.16 flooding detection systems; and

.17 fire pumps and emergency fire pumps.

65. FIRE PUMPS

(1)(a) Every fire pump required to be carried under these rules shall be operated by means of power other than the vessels main engines except as expressly provided otherwise in these rules. Sanitary, ballast, bilge or general service pumps may be accepted by the Director General of Maritime Administration as fire pumps provided they are not normally used for umping oil and in case they are occasionally used for pumping or transferring fuel oil, suitable change-over arrangements are fitted and operating instructions are conspicuously displayed at the change-over position.

(b)(i) In every passenger vessel which is required by these rules to be provided with fire pumps operated by powers, such fire pumps (other than any emergency fire pump) shall together be capable of delivering for fire fighting purposes a quantity of water under the conditions and at the pressure specified in sub-rule (2) of not less than two-thirds of the quantity required to be dealt with by the bilge pumps provided in the vessel

in compliance with part I of the Merchant Shipping (Construction and Survey of Passenger Vessels) Rules,.

(ii) In every vessel, other than a passenger vessel, which is required by these rules to be provided with fire pumps operated by power such fire pumps (other than any emergency fire pump) shall together be capable of delivering for the fire fighting purposes a quantity of water, under the conditions and at the pressure specified in sub-rule (2) which shall not be less than the quantity obtained from the following formula:-

Quantity of water is cubic metres per hour = Cd^2 where:

(a) C=5 for vessels required to be provided with more than one fire pump (excluding any emergency fire pump) and C=2.5 for vessels required to be provided with only one fire pump, and

(b) $d=1+0.066 \sqrt{L(B+D)}$ to the nearest 0.25 where

L=length of the vessel in metres on the summer load water line from the foresaid of the stem to the aft side of the rudder post. Where there is no rudder post, the length is measured from the foreside of the stem to the axis of the rudder stock if that be the greater:

B= greatest moulded breadth of the vessel in metres; and

D= moulded depth of the vessel in metres measured to the bulkhead deck amidships:

Provided that in any such vessel other than those included in the total capacity of the fire pumps for firefighting shall not be required to exceed 180 cubic metres per hour.

(c) (i) In every vessel which is required by these rules to be provided with more than one fire pump operated by power (other than any emergency fire pump) every such fire pump shall have a capacity of not less than 80 per cent of the total capacity of the fire pumps required by clause (b) of sub-rule (1) divided by the minimum number of fire pumps required by these rules to be provided in the vessel but in any case not less than $25M^3$/hour.

(iii) Every fire pump which is operated by power (other than any emergency fire pump) shall be capable of producing from any fire hydrant or hydrants in the vessel, at least the minimum number of jets of water required by these rules as appropriate to the class and tonnage of the vessel, while maintaining the pressure required by sub-rule (2).

(iv) In any vessel in which automatic and remote control systems have been provided in the machinery space in lieu of continuous meaning of the space, arrangements shall be made to ensure immediate availability of water supply from the firemain at the required pressure either by permanent pressurization or by suitably placed remote starting of the fire pump.

(v) Relief valves shall be provided in conjunction with all then fire pumps if the pumps are capable of developing a pressure exceeding the design pressure of fire main, water service pipes, hydrants or hoses provided that such valves shall be so placed and adjusted as to prevent excessive pressure in any part of the fire main system.

(vi) Every centrifugal pump which is connected to the fire main shall be fitted with a non-return valve.

(viii) In every vessel of class I, II, III or IV an emergency fire pump shall be fitted abaft of the vessel's collision bulkhead.

(2) With the two pumps simultaneously delivering water through the nozzles of sizes specified in rule 61, with the quantity of water required by sub-rule (1) of rule 59, through any adjacent hydrants, the following minimum pressures shall be maintained at all hydrants

(a) in any passenger vessel.

(i) of 4,000 tonnage and upwards: 4 bar (0.4 N/mm2)

(ii) of less than 4,000 tonnage: 3 bar (0.3 N/mm2)

(b) in any vessel other than a passenger vessel.

(i) of 6,000 tonnage and upwards: 2.7 bar (.027 N/mm2)

(ii) of 500 tonnage and upward but under 6000 tonnage: 2.5 bar (0.25 N/mm2)

(iii) of under 500 tonnage: 2.1 bar (0.2) N/mm2)(3) Requirements for the emergency fire pump:

a) . Emergency fire pump shall comply with requirements of Schedule XVII

b) Requirements for the space containing the emergency fire pump

i) Location of the space

The space containing the fire pump shall 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 shall be insulated to a standard of structural fire protection equivalent to that required for a control station

ii). Access to the emergency fire pump

No direct access shall be permitted between the machinery space and the space containing the emergency fire pump and its source of power. When this is impracticable, the Administration 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 reasonably 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 shall be provided.

iii). Ventilation of the emergency fire pump space

Ventilation arrangements to the space containing the independent source of power for the emergency fire pump shall 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.

(4) In cargo vessel where other pumps, such as general service, bilge and ballast, etc. are fitted in a machinery space, arrangements shall be made to ensure that at least one of these pumps having the capacity and pressure required under sub-rule (1) (b) and sub-rule (2) is capable of providing water to the fire main.

66. FIRE MAIN, WATER SERVICE PIPES AND HYDRANTS:

All water pipes and fire hydrants required to be provided under these rules shall be so placed that in addition to complying with other requirements specified in those rules, fire hoses may easily be coupled to them.

(1) In every vessel which is required to be provided with fire pumps operated by power the diameter of the fire main and of the water service pipes connecting the hydrants thereto shall be sufficient for the effective distribution of the maximum discharge required by these rule from:

(a) where only one pump is required that pump, or

(b) where two such pumps are required, both pumps operating simultaneously, or

(c) where more than two such pumps are required, the two largest of such pumps operate simultaneously:

(d) The diameter of the fire main and water service pipes shall be sufficient for the effective distribution of the maximum required discharge from two fire pumps operating simultaneously, except that in the case of cargo vessels, other than those included in rules 57 B, the diameter need only be sufficient for the discharge of 140 m^3 /h.

(2) In vessels carrying deck cargo, the position of the hydrants shall be such that they are always readily accessible with pipes and arranged in a manner to avoid risk of damage from such cargo and in vessels where the deck pipe lines rune on exposed deck, two such lines shall be provided.

(3) Water pipes shall not be made of material which may be readily rendered ineffective by heat. They shall not be made of cast iron and if made of cast iron or steel, shall be galvanised or the pipe wall thickness shall be increased by a corrosion allowance.

(4) The fire hydrants shall be so placed that the fire hoses may be easily coupled to them.

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

(6) Hydrants valve of screw lift type or cocks shall be fitted to water service pipes and shall be so arranged that any fire hose coupled these to may be removed while fire pumps are in operation.

(7) All water pipes for fire extinguishing system shall be provided with drain valves or cocks for use in frosty weather and so located that they may not be damaged by cargo.

(8) Unless one hose and nozzles is provided for each hydrant in the vessel be complete interchangeability of hose couplings and nozzles.

(9) In tankers isolation valves shall be fitted in the fire main at poop front in a protected position and on the tank deck at internals of not more than 40m. to preserve the integrity of the fire main system in case of fire or explosion.

(10) (a)number and position of hydrants shall be such that at least two jets of water not emanating from the same hydrant, one of which shall be from a single length of hose, may reach any part of the vessel normally accessible to the passengers on crew while the vessel is being navigated and any part of any cargo space when empty any ro/ro cargo space or any special category space in which latter case the two jets shall reach any part of such space each from a single length of hose. Furthermore, such hydrants shall be position and near the access to the protected spaces.

(b) Where any vessel is required to provide one jet of water under the conditions required by these rules, hydrants sufficient in number shall be so positioned as to

enable one jet of water from a single length of hose to reach any part of the vessel normally accessible to the passengers or crew while the vessel is being navigated, any store room and any part of any cargo space when empty.

(c) In the accommodation service and machinery spaces of passenger vessels the number and position of hydrants shall be such that the requirement of clause (a) and (b) are complied with when all water tight doors and all doors in main vertical zone bulk-heads are closed.

67.FIRE HOSES:-

(1) Fire hoses shall be of non-perishable material approved by the [Administration] and shall be sufficient in length to project a jet of water to any of the spaces in which they may be required to be used. Each hose shall be provided with a nozzle and the necessary couplings. Hoses specified in this chapter as "fire hoses" shall, together with any necessary fittings and tools, be kept ready for use in conspicuous positions near the water service hydrants or connections. Fire hoses shall have a length of at least 10 m, but not more than:

(a) 15 m in machinery spaces;

(b) 20 m in other spaces and open decks; and

(c) 25 m for open decks on vessels with a maximum breadth in excess of 30 m.

(2) Every such fire hose together with the tools and fittings shall be kept in a conspicuous position near the hydrants or connection with which it is intended to be used. In interior locations in passenger vessel, fire hoses shall be connected to the hydrants at all times. Hose diameter shall be not loss than 64 millimetres if unlined or 45 millimetres if lined provided that the Chief Surveyor with the Government of India may permit smaller diameter hoses in vessels of less than 500 tons.

(3) Such hose provided in compliance with these rules shall not be used for any purpose other than for extinguishing fire or testing with fire appliances at fire drill and surveys.

(4) In interior locations in passenger vessel, carrying more than 36 passengers fire hoses shall be connected to hydrants at all times.

68. NOZZLES:

(1) Every vessel which is required under these rules to be provided with fire pumps operated by power shall be provided with nozzle of 12 millimetre, 16 millimetres, 19 millimetres in diameter or as near thereto in diameter as possible. Nozzles larger in diameter may be provided if the requirements of these rules relating to the provision of water for firefighting purposes are otherwise complied with.

(2) For machinery spaces and exterior location the diameter of the nozzles shall be such as to obtain the maximum possible discharge from the minimum number of jets of water and at the pressure required under these rules from the smallest fire pump permitted by clause (c) (1) of sub-rule 1 of rule 58 provided that the diameter of the nozzles shall not be greater than 19 millimetres.

(3) For accommodation and service space the diameter of the nozzles shall need not be required to be greater than 12 millimetres.

(4) Every such nozzle shall be capable of producing a water spray suitable for extinguishing oil fires and a plain water jet and shall incorporate a shut-off facility.

69. LOCATION AND ARRANGEMENTS OF WATER PUMPS FOR OTHER FIRE EXTINGUISHING SYSTEMS:

Pumps required for the provision of water for other fire extinguishing systems required by these rules, their sources of power and their controls shall be installed outside the space or spaces protected by such systems and shall be so arranged that a fire in the pace or spaces protected will not put any such system out of action.

70. FIRE EXTINGUISHERS:

(1) Non portable foam, carbon dioxide and dry powder fire extinguishers provided in compliance with these rules shall be constructed in accordance with the requirements specified in Schedules II, III and IV respectively.

(2)(a) Each powder or carbon dioxide extinguisher shall have a capacity of at least 5 kg, and each foam extinguisher shall have a capacity of at least 9ℓ. The mass of all portable fire extinguishers shall not exceed 23 kg, and they shall have a fire-extinguishing capability at least equivalent to that of a 9ℓ fluid extinguisher.

(b) Only refills approved for the fire extinguisher in question shall be used for recharging.

3)(a) Portable fire extinguishers (other than carbon dioxide and dry powder fire extinguishers) provided in compliance with these rules shall, if they are of a type discharging fluid have a capacity of not more than 13.5 litres and not less than 9 litres;

(b) Portable carbon dioxide fire extinguisher provided in compliance with these rules shall have a capacity of not less than 4.5 kg. of carbon dioxide;

(c) Portable dry powder fire extinguishers provided in compliance with these rules shall have a capacity of not les than 4.5 kg. of dry powder;

(4) Portable fire extinguishers of other than those specified in sub-rule (2) and (3) provided in compliance with these rules shall be of not less than the fire extinguishing equivalent of 9 litres fluid extinguishers.

(5) Portable fire extinguishers provided in compliance with these rules.--

(a) shall not exceed 25.5 kg. in weight in the fully charged condition and shall be as portable as a 13.5 litres fluid fire extinguisher;

(b) for use in accommodation or service spaces of any vessel, shall so far as practicable have a uniform method of operation;

(6) Fire extinguishers in which the substance used for extinguishing fire is stored under pressure shall not be provided for use in accommodation spaces :

Provided that portable dry power fire extinguishers may be provided in compliance with these rules in the accommodation spaces, service spaces or in the machinery spaces, subject to their number not exceeding one half of the total number of extinguishers required to be provided in each of these spaces.

(7) Fire extinguishers provided for use in any vessel to which these rules apply shall not contain an extinguishing medium which either itself or when in use gives of gases harmful to persons.

(8) For the purposes of these rules,--

(a) the capacity of any fire extinguisher other than a carbon dioxide extinguisher shall be taken to be the greatest volume or weight of extinguishing medium which it can contain when sufficient space is left to ensure the proper operation of the extinguishers;

(b) the capacity of carbon dioxide or halogenated hydrocarbon fire extinguisher shall be taken to be the greatest weight of carbon dioxide or halogenated hydrocarbon respectively which it can safely contain in a tropical climate.

(9) Portable carbon dioxide extinguishers shall not be located in accommodation spaces:

Provided that where such extinguishers are provided in compliance with these rules in radio rooms, at switch-boards and other similar positions, the volume of any space containing one or more extinguishers shall be such as to limit the concentration of vapour that can occur due to discharge, to not more than 5 per cent of the net volume of the space.

(10) Fire extinguishers shall be periodically inspected at intervals not exceeding two years.

(11) Every fire extinguishers provided in compliance with these rules shall be kept fully charged at all times.

(12) (a) Spare charges shall be provided for 100% of the first 10 extinguishers and 50% of the remaining fire extinguishers capable of being recharged on board. Not more than 60 total spare charges are required. Instructions for recharging shall be carried on board.

(b) For fire extinguishers which cannot be recharged onboard, additional portable fire extinguishers of the same quantity, type, capacity and number as determined in paragraph 63.13.a above shall be provided in lieu of spare charges.

(13) Following extinguishers are also considered as equivalent:

a) 25 kg dry powder is considered as equivalent to 45 l foam liquid.

b) 75 kg dry powder is considered as equivalent to 135 l foam liquid.

71. FIRE BUCKETS :-

(1) Every fire bucket provided in compliance with these rules shall be painted red and shall be clearly and permanently marked in black or white with the word "FIRE". Every such fire bucket shall be kept filled with sand or water.

(2) At least half the number of such fire buckets shall be fitted with lanyards of sufficient length to enable the buckets to be fitted from the sea with the vessel in light condition.

(3) Such fire buckets shall not be used for any purpose other than for extinguishing fires.

72. SPECIAL REQUIREMENTS FOR FIXED FIRE EXTINGUISHING SYSTEMS:

Where a fixed pressure water spraying system is used for the protection of special category spaces, cargo spaces where permitted by these rules or ro/ro cargo spaces, special consideration shall be given to the bilge pumping and drainage arrangements where such spaces are below the bulk-head deck and to the scupper arrangements where such spaces are above the bulkhead deck.

73. FIXED LOW-EXPANSION FOAM FIRE EXTINGUISHING SYSTEMS IN MACHINERY SPACES FITTED IN ADDITION TO REQUIREMENTS OF THESE RULES:

Fixed low-expansion foam fire-extinguishing systems:

1) Quantity and foam concentrates

a) The foam concentrates of low-expansion foam fire-extinguishing systems shall be approved by the [Administration] based on the guidelines adopted by the Organization. Different foam concentrate types shall not be mixed in a low-expansion foam system. Foam concentrates of the same type from different manufacturers shall not be mixed unless they are approved for compatibility.

b) The system shall be capable of discharging through fixed discharge outlets, in no more than 5 min, a quantity of foam sufficient to produce an effective foam blanket over the largest single area over which oil fuel is liable to spread.

2) Installation requirements

a) Means shall be provided for effective distribution of the foam through a permanent system of piping and control valves or cocks to suitable discharge outlets, and for the foam to be effectively directed by fixed sprayers onto other main fire hazards in the protected space. The means for effective distribution of the foam shall be proven acceptable to the [Administration] through calculation or by testing.

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

74. FIXED FIRE EXTINGUISHING SYSTEMS NOT REQUIRED BY THESE RULES:-

In every vessel where a fixed fire extinguishing system not required under these rules is provided, such a system shall be of the approved type and shall be installed outside the space or spaces protected by such systems and shall be so arranged that a fire in the space or spaces protected will not put any such system out of action.

75. FIRE CONTROL PLAN:

(1) There shall be permanently exhibited for the guidance of the master and officers of all vessels over 20 metres in length, general arrangement plans showing clearly for each deck the position of the control station, the sections of the vessel which are enclosed by fire resisting bulkheads, together with particulars of the fire alarms, fire detection systems, the sprinkler installations, fireman's outfits, fire extinguishing appliances, the means of access to the various compartments and decks in the vessel, the ventilating system including particulars of the master-fan controls, the position of dampers and identification numbers of the ventilating fans serving each section of the vessel, the location of the international shore connection, and the position of all means of control referred to in rule 69.

(2) The general arrangement plans required by this rule shall be kept up-to-date, any alteration being recorded therein without delay.

(3) In all vessels a duplicate set of fire control plans or booklet containing such plans shall be permanently stored in a prominently marked weathertight enclosure outside the deckhouse for the assistance of shoreside fire fighting personnel.

76. MEANS FOR STOPPING MACHINERY, SHUTTING OFF OIL FUEL SUCTION PIPES AND CLOSING OF OPENINGS:

(1) In every vessel to which these rules apply, there shall be provided :-

(a) means for stopping ventilation fans serving machinery, accommodation and cargo spaces ;

(b) means for closing all skylights, doorways, ventilators, annular spaces, around funnels and other openings to such spaces; and

(c) means to permit the release of smoke from machinery spaces.

(2) Such means shall be capable of being operated from positions outside the said spaces and which would not be made in accessible by a fire within such spaces.

(3) Machinery driving the forced and induced draught fan, oil fuel transfer pumps, oil fuel unit pumps and other similar fuel pumps shall be fitted with remote controls situated outside the spaces in which such machinery or pumps are situated and which would not be made inaccessible by a fire within such spaces. The controls shall be capable of stopping such machinery or pumps in the event of fire in such spaces. For machinery spaces in passenger vessels such controls together with the controls required in sub-rule

(1) shall be situated at one control position or grouped is an few positions as possible. Such controls shall have safe access from the open deck.

(4) Except as provided in sub-rule (5) in every vessel to which these rules apply, every pipe connected to any oil fuel or lubricating oil storage, setting, or daily service tank, not being a double bottom tank, which if damaged would permit discharge of the contents so as to cause a fire hazard, shall be fitted with a valve or cock which shall

be secured to the capable of being closed from a readily accessible position outside the space in which the tank is situated.

Provided that --

(a) in the case of any inlet pipe to such a tank, a non-return valve secured to the tank may be substituted,

(b) in the case of an oil fuel or lubricating oil deep tank situated in or adjacent to a shaft or pipe tunnel or similar space, a valve or valves (additional to the valve required to be fitted on the tank) may be fitted on the pipe line outside the tunnel or tunnels or similar space to enable control to be exercised in the event of fire. Such valves if fitted in the machinery space shall be operated from a position outside the space.

(5) The valve or cock required under sub-rule (4) may be dispensed with in the case of a pipe connected to a lubricating oil tank fitted is a space other than a machinery space of category 'A' provided that the safety of the vessel is not impaired.

77. AVAILABILITY OF FIRE FIGHTING APPLIANCES:

Fire appliances carried in any vessel to which these rules apply shall be maintained in good order and shall be kept available for immediate use at all times. All moveable fire appliances, other than firemen's outfits, carried in compliance with these rules shall be stowed where they will be readily accessible from the spaces in which they are intended to be used and in particular one of the portable fire extinguishers intended for the use in any space shall be stowed near the entrance to that space.

All fire-fighting systems and appliances shall be tested at intervals prescribed in MSC.1/Circ.1432 (2012). Each vessel shall maintain a Fire Safety Operational Booklet detailing test procedures, record logs, and crew training certificates.

78. APPROVAL OF MATERIAL :

Where these rules require that a particular fitting, appliance, apparatus or equipment or any type or equivalent thereof shall be provided, fitted or carried or any particular arrangement or provision shall be made, then every such fitting, appliances apparatus or equivalent thereof or any such arrangement or provision shall be such as is reasonably adequate for the purpose for which it is required to be provided.

79. SPACES CONTAINING PARTICULAR RISKS:

In every vessel to which these rules apply containing spaces such as galleys, gasoline compartments, cinemas, electric-steering gear, battery charging room and such other similar spaces which in the opinion of the Director General of Maritime Administration

or Chief Surveyor with the Government of India contain particular risk, there shall be provided such additional fire appliances as may be specified by them.

80. REQUIREMENTS FOR VESSELS OF SPECIAL DESIGN AND LAYOUT:

Where in the case of a vessel in which particular fittings, appliances, apparatus or any other equipment or any type thereof, fitted in compliance with these rules are not considered by the Director General of Maritime Administration as adequate, having regard to her design, layout or susceptibility to risk of fire, it may, notwithstanding anything contained in these rules, require, by order in writing the vessel to be provided such other fittings, appliances, apparatus or equipment as it may consider necessary.

81. EQUIVALENTS, EXEMPTIONS AND SAVING:-

(1) Where these rules require that a particular fitting material, appliance, apparatus, equipment, or any type thereof shall be fitted or carried in a vessel or that any particular arrangement or provision shall be made, the Chief Surveyor with the Government of India may in writing allow any other fitting material, appliance, apparatus or any type thereof to be carried or fitted or any other arrangement or provision to be made in that vessel if he is satisfied by trial thereof or otherwise, that such other fittings, materials, appliance, apparatus, equipment or type thereof or any such other arrangement or provision is at least as effective as that required under these rules.

(2) The Director General of Maritime Administration or Chief Surveyor with the Govt. of India may :-

(i) exempt, in writing, any vessel from the requirements o these rules if he is satisfied that by the nature of her construction and design, it is neither practicable nor reasonable for that vessel to comply with such requirements on such conditions as he thinks fit. It may also be noted that the power to exempt certain classes of vessels vests in the Central Government and not the Director General of Maritime Administration under section 300 of the MS Act but such delegation to the Director General may be permissible under section 7(2).

(ii) exempt in writing, any vessel which is not normally engaged on international voyages but which in exceptional circumstances is required to undertake a single international voyage from the requirement of these rule, provided the vessel complies with such safety requirements as are, in the opinion of the Director General of Maritime Administration, or as the case may be the Chief Surveyor with the Government of India, adequate for the intended voyage.

82. PENALTIES:-

Whoever commits a breach of any of the provision of these rules shall be punishable with a fine which is mentioned in the section 281 (and section 116(1)) of the Act.

SCHEDULE I

(See rules 14, 23 and 36)

INTERNATIONAL SHORE CONNECTION

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

(1) Application

This chapter details the specifications for international shore connections as required by chapter II-2 of the SOLAS Convention.

(**2) Engineering specifications**

(4) (1) Standard dimensions

Standard dimensions of flanges for the international shore connection shall be in accordance with the following table:

Table (4) (1) - Standard dimensions for international shore connections

Description	Dimension
Outside diameter	178 mm
Inside diameter	64 mm
Bolt circle diameter	132 mm
Slots in flange	4 holes, 19 mm in diameter spaced equidistantly on a bolt circle of the above diameter, slotted to the flange periphery
Flange thickness	14.5 mm minimum
Bolts and nuts	4, each of 16 mm diameter, 50 mm in length

(3) Materials and accessories

International shore connections shall be of steel or other equivalent material and shall be designed for 1.0 N/mm² services. The flange shall have a flat face on one side and, on the other side, it shall be permanently attached to a coupling that will fit the vessel's hydrant and hose. The connection shall be kept aboard the vessel together with a gasket of any material suitable for 1.0 N/mm² services, together with four bolts of 16 mm diameter and 50 mm in length, four 16 mm nuts, and eight washers.

SCHEDULE –II

(See rule 63)

NON-PORTABLE FOAM FIRE EXTINGUISHERS.

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

(1) Every foam fire extinguisher, other than a portable fire extinguisher provided in compliance with these rules shall be constructed in accordance with approved specifications and be of suitable materials and shall be of sufficient strength to withstand with an adequate factor of safety the maximum internal pressure to which it may be subjected and shall be capable of withstanding a test by hydraulic pressure, in excess of the maximum working pressure. For the purpose of this schedule the maximum working pressure shall be the equilibrium pressure that develops within the body at 70^0C when the correctly charged extinguisher has been operated with all outlets closed. The interior of the extinguisher shall be capable of being examined.

(2) The body of the extinguisher shall be cylindrical with ends which shall be dished outwards without reverse flanging to a radius not exceeding the diameter of the body. The body and ends shall be made of sheet steel which shall be tinned on lead-coated internally, and every part of the extinguisher shall, where necessary, be protected against corrosion. The body of the extinguisher shall be welded.

(3) Where the extinguisher is provided with a gas cylinder as the means for expelling the extinguishing medium, such gas cylinder shall be constructed to approve specifications.

(4) The extinguisher shall be provided with an opening for the introduction of an inner container which shall be adequately supported. The opening shall be fitted with a cap of gun-metal or other suitable materials, screwed with a continuous thread, through the side of which safety holes or slots shall be provided so that when the cap is being removed any pressure of gas remaining in the container may be released gradually, should the discharge opening be choked. [The cap joint shall be made with acid-resisting rubber, greased leather, or other suitable material. The extinguisher shall have the correct filling level clearly indicated. The design shall permit the ready availability of the extinguisher to be verified as required and ensure that it will be apparent whether or not the extinguisher has been operated.

(5) The extinguisher shall be provided with a controllable device to enable the discharge to be interrupted and means to prevent the loss of liquid when the extinguisher is standing.

(6) The extinguisher actuating mechanism shall be protected so that it is safeguarded against inadvertent operation.

(7) A reinforced discharge hose shall be provided together with a nozzle, the area of which shall be such that when the extinguisher is operated, the foam is projected to a distance of 14.0 metres for a period not less than 90 seconds, in the case of an extinguisher of 135 litres capacity or over and to distance of 10.0 metres for a period not less than 60 seconds in the case of an extinguisher of under 135 litres capacity. The nozzle and the reinforced discharge hose should be capable to withstand four times the maximum working pressure specified in para (1) of this schedule.

(8) The charge and the air space above the level of the solution in the body shall be so regulated that the maximum pressure in the extinguisher when put into action, with all outlets closed, does not exceed 19.50 bar 1.95 N/mm^2 with solution at a temperature of 38^0C.

(9) The extinguisher shall be capable of withstanding for a period of 5 minutes an internal pressure of 1-1/2 times the maximum working pressure specified in para (1) of this schedule, in the extinguisher when put into action with all outlets closed, and in no event of less than 24.5 bar (2.45 N/mm^2).

(10) The outside of the extinguisher; shall be clearly and permanently marked with :-

(a) the name of the maker or vendor of the extinguisher;

(b) the capacity of the extinguisher;

(c) the pressure under which the extinguisher was tested;

(d) instructions for operating the extinguisher;

(e) the year in which the extinguisher was manufactured;

(f) the level of the solution, when the extinguisher is filled to its working capacity.

SCHEDULE – III

(See rule 63)

Non-Portable Carbon Dioxide fire extinguishers

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

(1) Every carbon dioxide fire extinguisher provided in compliance with these rules shall be provided and constructed in accordance with approved specifications.

(2) Each cylinder shall be provided with an internal discharge tube, and a valve to release the gas.

(3) The extinguisher shall be provided with a discharge hose which shall be reinforced so as to withstand a pressure of at least 122 bar (12.2 N/mm^2) when the necessary couplings are fitted. The bore of the discharge hose shall not be less than the sizes respectively setforth in the following table:-

Capacity of extinguisher	Period
16.0 Kg.	30 to 45 seconds
45.0 Kg.	60 to 90 seconds

(5) The outside of the extinguisher shall be clearly and permanently marked with :-

(a) the name of the maker or vendor of the extinguisher;

(b) the capacity of the extinguisher;

(c) instructions for operating the extinguisher;

(d) markings which will indicate the respective weights of the extinguisher when empty and when filled;

(e) the year in which the extinguisher was factured.

(f) the pressure under which the extinguisher was being hydraulically tested.

SCHEDULE - IV

(See rule 63)

Non-Portable Dry Powder Fire Extinguishers:

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

(1) Every dry powder fire extinguisher, other than a portable fire extinguisher, provided in compliance with these rule shall be constructed of suitable materials and shall be of an efficient design and of sufficient strength to withstand with an adequate factor of safety the maximum internal pressure to which it may be subjected and shall be capable of withstanding a test by hydraulic pressure suitably in excess of the maximum working pressure. For the purpose of this schedule, the maximum working pressure shall be the equilibrium pressure that develops within the body at 70^0C when the correctly charged extinguisher has been operated with all outlets closed.

(2) Where the extinguisher is provided with a gas cylinder as the means for expelling the extinguishing medium, such gas cylinder shall be in accordance with approved specifications.

(3) The extinguisher shall be provided with a nozzle and a reinforced discharge hose constructed to withstand four times the maximum working pressure specified in para (1) of this schedule.

(4) Any necessary openings in the extinguisher body shall be fitted with caps or covers so designed that any pressure remaining in the container may be released gradually before the cap or cover can be removed completely.

(5) Every part of the extinguisher shall, where necessary, be protected against corrosion.

(6) The extinguisher shall be effectively sealed to present the ingress of moisture, but such sealing arrangements shall not interfere with the discharge of the extinguisher.

(7) The extinguisher shall be provided with a controllable device to enable the discharge to be interrupted.

(8) The extinguisher actuating mechanism shall be protected so that it is safeguarded against inadvertent operation.

(9) The design shall permit the ready availability of the extinguisher to be verified as required and ensure that it will be apparent whether or not the extinguisher has been operated.

(10) A fully charged extinguisher shall, when operated under normal conditions, be capable of discharging not less than 85 per cent of the mass of the dry power charge. The discharge rate shall be not less than 1 kilogram per second.

(11) The outside of the extinguisher body shall be clearly marked with :--

(a) name of the maker or vendor of the extinguisher;

(b) the capacity of the extinguisher;

(c) the pressure under which the extinguisher was tested ;

(d) instructions for operating the extinguisher ;

(e) the year in which the extinguisher was manufactured.

SCHEDULE – V

[See rule 7(1)(ii), 10(2)(a), 10(3)(ii), 29(b)(ii), 30(2) and (3)]

Portable Foam Applicator Units :

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

(1) Every portable foam applicator unit provided in compliance with these rules shall be provided with :-

(a) an induction type of air-foam nozzle capable of being connected to the fire main by means of a fire hose;

(b) a portable tank containing at least 20 litres of form concentrate from which the nozzle specified at sub-para (a) of this paragraph can induce the contents;

(c) a spare tank identical to that specified at sub-para (b) of this paragraph.

(2) The nozzle whilst being supplied at the minimum hydrant pressure on the vessel permitted by these rules shall be capable of producing effective foam suitable for extinguishing an oil fire at the rate of at least 1.5 cubic metres per minute.

(3) The foam expansion ratio (i.e the ratio of the volume of foam produced to the volume of foam solution) shall not exceed 12 to 1.

(4) Portable fire extinguishers shall be approved per IMO Res. A.951(23), constructed of corrosion-resistant materials, mass ≤ 23 kg, and excludes Halon agents. Each unit shall carry a fire-rating mark indicating minimum Class A or B capacity.

(5) Portable foam applicators (Amended by Res.MSC.217(82))

(5) (i) A portable foam applicator unit shall consist of a foam nozzle/branch pipe, either of a self-inducing type or in combination with a separate inductor, capable of being connected to the fire main by a fire hose, together with a portable tank containing at least 20 liters of foam concentrate and at least one spare tank of foam concentrate of the same capacity.

(6) System performance

(6) (i) The nozzle/branch pipe and inductor shall be capable of producing effective foam suitable for extinguishing an oil fire, at a foam solution flow rate of at least 200 ℓ/min at the nominal pressure in the fire main.

(6) (ii) The foam concentrate shall be approved by the Administration based on guidelines developed by the Organisation.*

* Refer to the Guidelines for the performance and testing criteria, and surveys of foam concentrates for fixed fire-extinguishing systems (MSC.1/Circ.1312 and Corr.1).

(6) (iii) The values of the foam expansion and drainage time of the foam produced by the portable foam applicator unit shall not differ more than ± 10% of that determined in 3.2.2.2.

(6) (iv) The portable foam applicator unit shall be designed to withstand clogging, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered on vessels.

SCHEDULE - VI

[See rules 15, 22, 35, 37(2)(i) and 52]

Fireman's Outfit:

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

(1) Every fire man's outfit shall be constructed in accordance with approved specifications and consist of the following :

(a) Personal equipment.

(b) A breathing apparatus of an approved type.

(c) Fire proof life line of sufficient length and strength capable of being attached by means of a snap hock to the harness of the apparatus or to a separate belt in order to prevent the breathing apparatus becoming detached when life line is operated.

(2) Personal equipment:-The personal equipment shall comprise the following namely :-

(a) Protective clothing of material to protect the skin from the heat radiating from the fire and from burns and scalding from steam. The outer surface shall be water resistant.

(b) Boots and gloves of rubber or other electrically non-conducting material.

(c) A rigid helmet providing effective protection against impact.

(d) An electric safety lamp (hand lantern) of approved type with a minimum burning period of 3 hours.

(e) An axe fitted with an insulated handle.

(3) Breathing apparatus (Air Hose Type):-

Every smoke helmet or smoke mask shall be provided with a hose for the supply of air from the outside atmosphere. An air pump or bellows shall be provided which shall be suitable for pumping air through the hose. The hose shall be of the non-collapsing type and shall be sufficient in length to enable the air pump or bellows to be on the open deck in clean air, well clear of any hatch or doorway while the wearer of the helmet or mask is in any part of the accommodation, service, cargo or machinery spaces. Couplings shall be provided if two or more lengths of hose are to be joined in order to reach the aforesaid spaces. The air inlet to the pump or bellows shall be so

protected as to ensure that the supply of air is not obstructed. If in order to comply with this subparagraph, an air hose exceeding 36 metres in length is necessary, a self-contained breathing apparatus shall be substituted or provided in addition.

(4) Self-contained breathing apparatus :-- Every self-contained breathing apparatus shall :-

(a) be of the open circuit compressed air type and shall be of an approved type;

(b) be capable of functioning for at least 30 minutes and shall be provided with not m ore than one face mask unless the apparatus has been approved for use with a second face mask which may be used in emergency;

(c) contain storage capacity of the compressed air cylinder or cylinders attached to the apparatus and carried by the weather of at least 1,200 litres of free air. The storage cylinders shall be of sufficient strength and be capable of withstanding hydraulic pressure in excess of the maximum working pressure.

(d) contain provision for automatic regulation of air supply to the wearer of the apparatus in accordance with his breathing requirements when he is breathing any volume of free air of up to 85 litres per minute at any time when the pressure in the supply cylinder or cylinders is above 10.5 bars (1.05 N/mm^2). Means shall be provided for overriding the automatic air supply to increase the volume of air available to the wearer if required.

(f) not weigh more than 16 kilogrammes excluding any lifeline and if they do not foam an integral part of the apparatus, any safety belt or harness;

(g) be provided with fully charged spare cylinders having a spare storage capacity of at least 2,400 litres of free air except where :

(i) the vessel is carrying five sets or more of such apparatus the total spare storage capacity of free air shall not be required to exceed 9,600 litres; or

(ii) the vessel is equipped with means for recharging the air cylinders to full pressure with air, free from contamination, the spare storage capacity of the fully charged spare cylinders of each such apparatus shall be of at least 1,200 litres of free air and the total spare storage capacity of free air provided in the vessel shall not be required to exceed 4,800 litres

(h) contain provision for warning the wearer audibly when 80 per cent of usable capacity of the apparatus has been consumed.

(i) accompany a servicing and instruction manual.

(5) General :- Every breathing apparatus shall--

(a) be constructed of material having adequate mechanical strength and durability and be resistant to deterioration by heat, contact with water or to fire and shall not allow the breathing circuit to be penetrated by smoke or chemical fumes likely to be

encountered in service. The fabric used in the construction of any harness provided with such apparatus shall be resistant to shrinkage. Exposed metal parts of the apparatus, harness and fittings shall be of materials, so far as practicable, resistant to frictional sparking.

(b) accompany for use,

(i) a fire-proof life and signalling line at least 3 metres longer than is required to reach from the open deck in clean air clear of any hatch or doorway to any part of the accommodation, service, cargo or machinery spaces. Such line shall be made of copper or galvanised steel wire rope having a breaking strength of at least 500 kilogrammes and shall be overlaid up to at least 32 millimetres in circumference by hemp or other covering to provide a surface which can be firmly gripped when wet;

(ii) an adjustable safety belt or harness to which such line shall be capable of being securely attached and detached by the wearer by means of a snap hook;

(iii) provision for protecting the eyes and face of the wearer against smoke;

(iv) plates of suitable non-flammable material bearing a clearly legible code of signals to be used between the wearer and his attendant, one of which shall be attached to the safety belt o harness and another attached to the free end of the life-line.

(c) be clearly marked with the name of the maker or vendor and the year of manufacture;

(d) contain operating instructions in clear and permanent lettering.

(6) Lifeline

For each breathing apparatus a fireproof lifeline of at least 30 m in length shall be provided. The lifeline shall successfully pass an approval test by statical load of 3.5 kN for 5 min without failure. The lifeline shall be capable of being attached by means of a snap-hook to the harness of the apparatus or to a separate belt in order to prevent the breathing apparatus becoming detached when the lifeline is operated.

(7) Emergency escape breathing devices (EEBD)

(7) (a) General

An EEBD is a supplied-air or oxygen device only used for escape from a compartment that has a hazardous atmosphere and shall be of an approved type.

(7) (a) (i) EEBDs shall not be used for fighting fires, entering oxygen deficient voids or tanks, or worn by fire-fighters. In these events, a self-contained breathing apparatus, which is specifically suited for such applications, shall be used.

(7) (b) Definitions

(7) (b) (i) Face piece means a face covering that is designed to form a complete seal around the eyes, nose and mouth which is secured in position by a suitable means.

(7) (b) (ii) Hood means a head covering which completely covers the head, neck, and may cover portions of the shoulders.

(7) (b) (iii) Hazardous atmosphere means any atmosphere that is immediately dangerous to life or health.

(7) (c) Particulars

(7) (c) (i) The EEBD shall have a service duration of at least 10 minutes.

(7) (c) (ii) The EEBD shall include a hood or full face piece, as appropriate, to protect the eyes, nose and mouth during escape. Hoods and face pieces shall be constructed of flame-resistant materials and include a clear window for viewing.

(7) (c) (iii) An inactivated EEBD shall be capable of being carried hands-free.

(7) (c) (iv) An EEBD, when stored, shall be suitably protected from the environment.

(7) (c) (v) Brief instructions or diagrams clearly illustrating their use shall be clearly printed on the EEBD. The donning procedures shall be quick and easy to allow for situations where there is little time to seek safety from a hazardous atmosphere.

(7) (d) Markings

Maintenance requirements, manufacturer’s trademarks and serial number, shelf life with accompanying manufacture date and name of the approving authority shall be printed on each EEBD. All EEBD training units shall be clearly marked.

SCHEDULE – VII

[See rule 5(iii), (iv) (v) and (vi), VII and 34(1), (2) and (3), 50(1)(a)]

FIXED FIRE DETECTION AND FIRE ALARM SYSTEMS

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

(1) General requirements.

(a) Any required fixed fire detection and fire alarm system with manually operated call points shall be of approved type and capable of immediate operation at all times.

(b) Power supplies and electric circuits necessary for operation of the system shall be monitored for loss of power or fault conditions as appropriate. Occurrence of a fault condition shall initiate a visual and audible fault signal at the control panel which shall be distinct from a fire signal.

(c) There shall be not less than two sources of power supply for the electrical equipment used in the operation of the fire detection and fire alarm system, one of which shall be an emergency source. The supply shall be provided by separate feeders reserved solely for that purpose. Such feeders shall run to an automatic change-over switch situated in or adjacent to the control panel for the fire detection system.

(d) Detectors and manually operated call points shall be grouped into sections. The activation of any detector or manually operated call points shall initiate a visual and audible fire signal at the control panel and indicating units. If the signals have not received attention within two minutes an audible alarm shall be automatically sounded throughout the crew accommodation and service spaces, control stations and machinery spaces of category A. This alarm sounder system need not be an integral part of the detection system.

(e) The control panel shall be located on the navigating bridge or in the main fire control station.

(f) Indicating units shall denote the section in which a detector or manually operated call point has operated. At least one unit shall be so located that it is easily accessible to responsible members of the crew at all times, when at sea or in port except when the vessel is out of service. One indicating unit shall be located on the navigating bridge if the control panel is located in the main fire control station.

(g) Clear information shall be displayed on or adjacent to each indicating unit about the spaces covered and the location of the sections.

(h) No section covering more than one dock within accommodation spaces, service spaces and control stations shall be permitted except a section which covers an enclosed stairway. In order to avoid delay in identifying the source of fire, each section shall contain not more than 100 detectors and shall cover not more than 50 rooms.

(i) In passenger vessel a section of detectors shall not serve spaces on both sides of the vessel nor on more than one deck and neither shall it be situated in more than one main vertical zone except that the Chief Surveyor with the Government of India if he is satisfied that the protection of the vessel against fire will not thereby be reduced, may permit such a section of detectors to serve both sides of the slup and more than one deck.

(j) A section of fire detectors covering a control station, service space, accommodation space or cargo space shall not include a machinery space of category A.

(k) Detectors shall be operated by heat, smoke or other products of combustion, flam or any combination of these factors. Detectors operated by other factors, indicative of incipient fires may be accepted provided that they are no less sensitive than such detectors. Flame detectors shall be used only as an additional to smoke or heat detectors.

(l) Suitable instructions and spare components for testing and maintenance shall be provided.

(m) The function of the detection system shall be periodically tested by means of equipment producing hot air at the appropriate temperature, or smoke or aerosol articles having the appropriate range of density or particle size, or other phenomena associated with incipient fires to which the detector is designed to respond. All detectors shall be of a type such that they can be tested for correct operation and restored to normal surveillance without the renewal of any component.

(n) The fire detection system shall not be used for any other purpose except that closing of fire doors and similar functions may be permitted at the control panel.

(2) Installation requirements.

(a) Manually operated call points shall be installed throughout the accommodation spaces, service spaces and control stations. One manually operated call point shall be located at each exit. Manually operated call points shall be readily accessible in the corridors of each dock such that no part of the corridor is more than 20 meters from a manually operated call point.

(b) Smoke detectors shall be installed in all stairways, corridors and escape routes within accommodation space.

(c) Where a fixed fire detection and fire alarm system is required for the protection of spaces other than those specified in para (2)(a) of this schedule of least one detector complying with para (1)(k) of this schedule shall be installed in each such space.

(d) Detectors shall be located for optimum performance. Positions near beams and ventilation ducts or other positions where patterns of air flow could adversely affect performance and positions where impact or physical damage is likely shall be avoided. In general, detectors which are located in overhead positions shall be a minimum distance of 0.5 metre away from bulkheads.

(e) The maximum spacing of detectors shall be decided on the basis of characteristics of the detectors but, ordinarily shall be in accordance with the table below :-

Type of detector	Maximum floor area Per detector	Maximum distance apart between centers	Maximum distance Away from Bulkheads
Heat	$37m^2$	9m	4.5m
Smoke	$74m^2$	11m	5.5m

(f) Electrical wiring which forms part of the system shall be so arranged as to avoid galleys, machinery spaces of category A, and other enclosed spaces of high fire risk except where it is necessary to provide for fire detection or fire alarm in such spaces or to connect to the appropriate power supply.

(3) Design requirements :

(a) The system and equipment shall be suitable designed to withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in vessels.

(b) Smoke detectors required by para (2)(b) shall be certified to operate before the smoke density exceeds 12.5 per cent, obscuration per metre, but not to operate until the smoke density exceeds 2 per cent, obscuration per metre. Smoke detectors

to be installed in other spaces shall operate within approved sensitivity limits having regard to the avoidance of detector insensitivity or over-sensitivity.

(c) Heat detectors shall be certified to operate before the temperature exceeds 78^0 C but not to operate until the temperature exceeds 54 C. when the temperature is raised to those limits at a rate less than 1^0C per minute. At higher rates of temperature rise, the heat detector shall operate within approved temperature limits having regard to the avoidance of detector insensitivity or oversensitivity.

(d) The permissible temperature of operation of heat detectors may be increased to 30^0C above the maximum deckhead temperature in drying rooms and similar spaces of a normal high ambient temperature.

(4) Special requirements for periodically unattended machinery spaces.

For periodically unattended machinery spaces the fixed fire detection and fire alarm system shall comply with the following additional requirements:-

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

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

(5) Special requirements for cargo spaces.

In cargo spaces the system shall comply with the following additional requirements :-

(a) Detectors shall be grouped into separate sections such that a section shall cover not more than one cargo space. Each section shall contain not more than 100 detectors.

(b) The type, number and spacing of detectors shall be to the satisfaction of the Chief Surveyor with the Govt. of India taking into account the conditions of ventilation and other factors prevailing in the space in which the detectors are installed.

(c) In special category spaces and ro-ro cargo spaces, the system shall be capable of rapidly detecting the onset fire. After being installed, the system shall be tested under normal ventilation conditions and shall give an overall response time to the satisfaction of the Chief Surveyor with the Government of India.

(6) Smoke detectors shall have sensitivity between 2–12.5 % obscuration per metre, individually addressable, with loop fault isolation and dual power supply. System design to conform to IEC 60092-504 and EN 54.

(7) **System control requirements**

(7) (a) Visual and audible fire signals*

* Refer to the Code on Alerts and Indicators, 2009, as adopted by the Organisation by resolution A.1021(26).

(7) (a) (i) The activation of any detector or manually operated call point shall initiate a visual and audible fire detection alarm signal at the control panel and indicating units. If the signals have not been acknowledged within 2 min, an audible fire alarm shall be automatically sounded throughout the crew accommodation and service spaces, control stations and machinery spaces of category A. This alarm sounder system need not be an integral part of the detection system.

(7) (a) (ii) On ro-ro passenger vessels constructed on or after 1 January 2026, alarm notifications shall follow a consistent alarm presentation scheme (wording, vocabulary, colour and position). Alarms shall be immediately recognizable on the navigation bridge and shall not be compromised by noise or poor placing.

(7) (a) (iii) On ro-ro passenger vessels constructed on or after 1 January 2026, the interface shall provide alarm addressability, allow the crew to identify the alarm history, the most recent alarm and the means to suppress alarms while ensuring the alarms with ongoing trigger conditions are still clearly visible.

(7) (a) (iv) On ro-ro passenger vessels constructed on or after 1 January 2026, the smoke detector function in special category and ro-ro spaces may be disconnected during loading and unloading of vehicles. The time of disconnection shall be adapted to the time of loading/unloading and be automatically reset after this predetermined time. The central unit shall indicate whether the detector sections are disconnected or not. Disconnection of the heat detection function or manual call points shall not be permitted.

(7) (a) (v) In passenger vessels, the control panel shall be located in the onboard safety centre. In cargo vessels, the control panel shall be located on the navigation bridge or in the fire control station.

(7) (a) (vi) In passenger vessels, an indicating unit that is capable of individually identifying each detector that has been activated or manually operated call point that has operated shall be located on the navigation bridge. In cargo vessels, an indicating unit shall be located on the navigation bridge if the control panel is located in the fire control station. In vessels constructed on or after 1 July 2014, with a cargo control room, an additional indicating unit shall be located in the cargo control room. *(Added by Res. MSC. 339(91))* In cargo vessels and on passenger cabin balconies, indicating units shall, as a minimum, denote the section in which a detector has activated or manually operated call point has operated.

(7) (a) (vii) Clear information shall be displayed on or adjacent to each indicating unit about the spaces covered and the location of the sections.

(7) (a) (viii) Power supplies and electric circuits necessary for the operation of the system shall be monitored for loss of power and fault conditions as appropriate including:

(viii)(a) single open or power break fault caused by a broken wire;

(viii)(b) single ground fault caused by the contact of a wiring conductor to a metal component; and

(viii)(c) single wire to wire fault caused by the contact of two or more wiring conductors.

The occurrence of a fault condition shall initiate a visual and audible fault signal at the control panel which shall be distinct from a fire signal.

(7) (a) (ix) Means to manually acknowledge all alarm and fault signals shall be provided at the control panel. The audible alarm sounders on the control panel and indicating units may be manually silenced. The control panel shall clearly distinguish between normal, alarm, acknowledged alarm, fault and silenced conditions.

(7) (a) (x) The system shall be arranged to automatically reset to the normal operating condition after alarm and fault conditions are cleared.

(7) (a) (xi) When the system is required to sound a local audible alarm within the cabins where the detectors are located, a means to silence the local audible alarms from the control panel shall not be permitted.

(7) (a) (xii) In general, audible alarm sound pressure levels at the sleeping positions in the cabins and 1 m from the source shall be at least 75 dB(A) and at least 10 dB(A)

above ambient noise levels existing during normal equipment operation with the vessel under way in moderate weather. The sound pressure level should be in the 1/3 octave band about the fundamental frequency. Audible alarm signals shall not exceed 120 dB(A).

(The above underline paragraphs have been inserted and subsequent paragraphs have been renumbered by Res. MSC. 555(108))

(7) (b) Testing

Suitable instructions and component spares for testing and maintenance shall be provided. Detectors shall be periodically tested using equipment suitable for the types of fires to which the detector is designed to respond. On vessels constructed on or after 1 July 2014, detectors installed within cold spaces such as refrigerated compartments shall be tested using procedures having due regard for such locations.* *(Added by MSC. Res. 339(91)).* Vessels with self-diagnostic systems that have in place a cleaning regime for areas where heads may be prone to contamination may carry out testing in accordance with the requirements of the Administration.

**Refer to the recommendations of the International Electrotechnical Commission, in particular publication IEC 60068-2-1 –Section one -Test Ab, Environmental Testing – Part 2-1: Tests –Test A: Cold*

SCHEDULE VIII

[See rules 5(v) and 34(3)]

SAMPLE EXTRACTION SMOKE DETECTION SYSTEMS

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

(1) General requirements.

(a) Wherever in the text of this schedule the word "system" spears, it shall mean "sample extraction smoke detection system".

(b) Any required system shall be capable of continuous operation, at all times except that systems operating on a sequential scanning principle may be accepted, provided that the interval between scanning the same position twice gives an overall response time to the satisfaction of the Chief Surveyor with the Govt. of India.

(c) Power supplies necessary for the operation of the system shall be monitored for loss of power. Occurrence of loss of power shall initiate a visual and audible signal at the control panel and the navigating bridge which shall be distinct from a signal indicating smoke detection.

(d) An alternative power supply for the electrical equipment used in the operation of the system shall be provided.

(e) The control panel shall be located on the navigating bridge or in the main fire control station.

(f) The detection of smoke or other products of combustion shall initiate a visual and audible signal at the control panel and the navigating bridge.

(g) Clear information shall be displayed on or adjacent to the control panel designating the spaces covered.

(h) The sampling pipe arrangements shall be such that the location of the fire can be readily identified.

(i) Suitable instructions and spare components shall be provided for the testing and maintenance of the system.

(j) The function of the system shall be periodically tested to the satisfaction of the Chief Surveyor with the Govt. of India. The system shall be of a type that can be tested for correct operation and restored to normal surveillance without the renewal of any component.

(k) The system shall be designed constructed and installed so as to prevent the leakage of any toxic or flammable substances of fire extinguishing medium into any accommodation space, service space, control station or machinery space.

(2) Installation requirements.

(a) At least one smoke accumulator shall be located in every enclosed space for which smoke detection is required. However, where space is designed to carry oil or refrigerated cargo alternatively with cargoes for which a smoke sampling system is required, means may be provided to isolate the smoke accumulators in such compartments for the system. Such means shall be to the satisfaction of the Chief Surveyor with the Govt. of India.

(b) Smoke accumulators shall be located for optimum performance and shall be spaced so that no part of the overhead deck area is more than 12 metres measured horizontally from an accumulator. Where systems are used in space which may be mechanically ventilated, the position of the smoke accumulators shall be considered having regard to the effects of ventilation.

(c) Smoke accumulators shall be positioned where impact or physical damage is unlikely to occur.

(d) Not more than four accumulators shall be connected to each sampling point.

(e) Smoke accumulators from more than one enclosed space shall not be connected to the same sampling point.

(f) Sampling pipes shall be self-draining and suitably protected from impart or damage from cargo working.

(3) Design requirements.

(a) The system and equipment shall be suitable designed to withstand supply voltage variations and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in vessels and to avoid the possibility of ignition of flammable gas/air mixtures.

(b) The sensing unit shall be certificated to operate before the smoke density within the sensing chamber exceeds 6.65 per cent obscuration per metre.

(c) Duplicate sample extraction fans shall be provided. The fans shall be of sufficient capacity to operate with the normal conditions of ventilation in the protected area and shall give an overall response time to the satisfaction of the Chief Surveyor with the Govt. of India.

(d) The control panel shall permit observation of smoke in the individual sampling pipe.

(e) Means shall be provided to monitor the air flow through the sampling pipes and to ensure that as far as practicable equal quantities are extracted from each interconnected accumulator.

(f) Sampling pipes shall be a minimum of 12 millimetres internal diameter except when used in conjunction with fixed gas fire extinguishing systems when the minimum size of pipe should be sufficient to permit the fire extinguishing gas to be discharge within the appropriate time.

(g) Sampling pipes shall be provided with an arrangement for periodically purging with compressed air.

(4) Any required system shall be capable of continuous operation at all times except that systems operating on a sequential scanning principle may be accepted, provided that the interval between scanning the same position twice gives a maximum allowable interval determined as follows:

The interval (I) should depend on the number of scanning points (N) and the response time of the fans (T), with a 20% allowance:

$I = 1.2 \times T \times N$

However, the maximum allowable interval should not exceed 120 s (I_{max} = 120 s).

(5) The system shall be designed, constructed and installed so as to prevent the leakage of any toxic or flammable substances or fire-extinguishing media into any accommodation space, service space, control station or machinery space.

(6) The system and equipment shall be suitably designed to withstand supply voltage variations and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in vessels and to avoid the possibility of ignition of a flammable gas-air mixture.

(7) The system shall be of a type that can be tested for correct operation and restored to normal surveillance without the renewal of any component.

(8) An alternative power supply for the electrical equipment used in the operation of the system shall be provided.

(9) Component requirements

(9) (i) The sensing unit shall be certified to operate before the smoke density within the sensing chamber exceeds 6.65% obscuration per metre.

(9) (ii) Duplicate sample extraction fans shall be provided. The fans shall be of sufficient capacity to operate with the normal conditions or ventilation in the protected area and the connected pipe size shall be determined with consideration of fan suction capacity and piping arrangement to satisfy the conditions of paragraph

2.4.2.2. Sampling pipes shall be a minimum of 12 mm internal diameter. The fan suction capacity should be adequate to ensure the response of the most remote area within the required time criteria in paragraph 2.4.2.2. Means to monitor airflow shall be provided in each sampling line.

(9) (iii) The control panel shall permit observation of smoke in the individual sampling pipes.

(9) (iv) The sampling pipes shall be so designed as to ensure that, as far as practicable, equal quantities of airflow are extracted from each interconnected accumulator.

(9) (v) Sampling pipes shall be provided with an arrangement for periodically purging with compressed air.

(9) (vi) The control panel for the smoke detection system shall be tested according to standards EN 54-2 (1997), EN 54-4 (1997) and IEC 60092-504 (2001). Alternative standards may be used as determined by the Administration.

(10) Installation requirements

(10) (a) Smoke accumulators

(a) (i) At least one smoke accumulator shall be located in every enclosed space for which smoke detection is required. However, where a space is designed to carry oil or refrigerated cargo alternatively with cargoes for which a smoke sampling system is required, means may be provided to isolate the smoke accumulators in such compartments for the system. Such means shall be to the satisfaction of the Administration.

(a) (ii) Smoke accumulators shall be located on the overhead or as high as possible in the protected space, and shall be spaced so that no part of the overhead deck area is more than 12 m measured horizontally from an accumulator. Where systems are used in spaces which may be mechanically ventilated, the position of the smoke accumulators shall be considered having regard to the effects of ventilation. At least one additional smoke accumulator is to be provided in the upper part of each exhaust ventilation duct. An adequate filtering system shall be fitted at the additional accumulator to avoid dust contamination.

(a) (iii) Smoke accumulators shall be positioned where impact or physical damage is unlikely to occur.

(a) (iv) Sampling pipe networks shall be balanced to ensure compliance with paragraph 2.2.4. The number of accumulators connected to each sampling pipe shall ensure compliance with paragraph 2.4.2.2.

(a) (v) Smoke accumulators from more than one enclosed space shall not be connected to the same sampling pipe.

(a) (vi) In cargo holds where non-gastight "'tween deck panels" (movable stowage platforms) are provided, smoke accumulators shall be located in both the upper and lower parts of the holds.

(11) Sampling pipes

(11) (a) The sampling pipe arrangements shall be such that the location of the fire can be readily identified.

(11) (b) Sampling pipes shall be self-draining and suitably protected from impact or damage from cargo working.

(12) System control requirements

(!2) (a) Visual and audible fire signals

(a)(i) The detection of smoke or other products of combustion shall initiate a visual and audible signal at the control panel and indicating units.

(a)(ii) The control panel shall be located on the navigation bridge or in the fire control station. An indicating unit shall be located on the navigation bridge if the control panel is located in the fire control station.

(a)(iii) Clear information shall be displayed on or adjacent to the control panel and indicating units designating the spaces covered.

(a)(iv) Power supplies necessary for the operation of the system shall be monitored for loss of power. Any loss of power shall initiate a visual and audible signal at the control panel and the navigating bridge which shall be distinct from a signal indicating smoke detection.

(a)(v) Means to manually acknowledge all alarm and fault signals shall be provided at the control panel. The audible alarm sounders on the control panel and indicating units may be manually silenced. The control panel shall clearly distinguish between normal, alarm, acknowledged alarm, fault and silenced conditions.

(a)(vi) The system shall be arranged to automatically reset to the normal operating condition after alarm and fault conditions are cleared.

(13) Testing

(13) (i) Suitable instructions and component spares shall be provided for the testing and maintenance of the system.

(13) (ii) After installation, the system shall be functionally tested using smoke generating machines or equivalent as a smoke source. An alarm shall be received at the control unit in not more than 180 s for vehicle decks, and not more than 300 s for

container and general cargo holds, after smoke is introduced at the most remote accumulator.

SCHEDULE IX

[See Rules 8(1) and (2) (b), 10(1) (b), 27(1) (a), (2) and (3) 30(1) (b), 31(c), 37(2) (f), 41(2) (3)

Fixed Gas Fire Extinguishing Systems.

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

(1) General.

(a) Fire extinguishing systems provided for use in any vessel to which these rules apply shall not contain an extinguishing medium which not contain an extinguishing medium which either itself or under expected conditions of use gives off toxic gases in such quantities as to endanger personnel.

(b)(i) In every such system provided for the injection of fire extinguishing medium into any compartment for fire extinguishing purposes, the pipes for conveying the medium shall be provided with control valves or cocks which shall be

be so placed that they will be easily accessible and not readily cut off from use by an outbreak of fire within the protected compartment. Such control valves or cooks shall be permanently marked to indicate clearly the compartments to which the pipes are led.

(ii) Where cargo spaces fitted with a gas extinguishing system for fire protection are used as passenger spaces the extinguishing connection shall be blanked during service as a passenger space.

(iii) Suitable provisions shall be made to prevent inadvertent admission of the medium to any compartment.

(c) The piping for the distribution of fire extinguishing medium shall be arranged and discharge nozzles so positioned that a uniform distribution of medium is obtained.

(d) Means shall be provided to close all openings which may admit air to or allow gas to escape from a protected space.

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

(f) Means shall be provided for automatically giving audible warning of the release of fire extinguishing medium into any space in which personnel normally work or to which they have access. The alarm shall operate for a suitable period before the medium is released.

(g) The means of control of any fixed gas fire extinguishing system shall be readily accessible and simple to operate and shall be grouped together in as few locations as possible at positions not likely to be cut off by a fire in a protected space. At each location there shall be clear instructions relating to the operation of the system having regard to the safety of personnel.

(h) Automatic release of fire extinguishing medium shall not be permitted except as provided by sub-para (3)(c)(v) and in respect of local automatically operated units referred to in sub-para (3) (d) and (3)(e).

(i) Where the quantity of extinguishing medium is required to protect more than one space, the quantity of medium available need not be more than the largest quantity required for any one space so protected.

(j) Except as otherwise permitted by sub-para (3) (c), (3) (d) and (3) (e), pressure containers required for the storage of fire extinguishing medium shall be located out side protected spaces in accordance with sub-para (1) (a).

(k) The storage containers and associated pressure components shall be constructed of suitable material and shall be of efficient design and sufficient strength having regard to their locations and maximum ambient temperatures expected in service.

(l) When the fire extinguishing medium is stored outside a protected space, it shall be stored in a room which shall be situated in a safe and readily accessible position and shall be effectively ventilated.

Any entrance to such a storage room shall be from the open dock and in any case shall be independent of the protected space. Access doors shall open outwards, and bulk-heads and decks including doors and other means of closing any opening therein, which form the boundaries between such rooms and adjoining enclosed spaces shall be gas tight.

(m) Spare parts for the system shall be stored on board.

(2) Carbon dioxide systems.

(a) When carbon dioxide is used as the extinguishing medium in cargo spaces, the quantity of gas, available shall be sufficient to give a minimum volume of free gas equal to 30 per cent of the gross volume of the largest cargo compartment in the vessel which is capable of being sealed.

(b) When carbon dioxide is used as the extinguishing medium in cargo spaces containing motor vehicles with fuel in their tanks for their own propulsion or in closed

ro/ro spaces or closed ro/ro spaces used for bulk stowage of cargo, the quantity of gas available shall be sufficient to give a minimum volume of free gas equal to 45 per cent of the gross volume of the largest such cargo space which is capable of being effectively sealed.

(c) When carbon dioxide is used as an extinguishing medium for machinery spaces or pump rooms, the quantity of gas available shall be sufficient to give a minimum of free gas equal to the larger of the following quantities, either :

(i) 40 per cent of the gross volume of the largest space, such volume being measured upto the level at which the horizontal area of the casing is 40 per cent or less of the gross area of such space measured midway between the tank top and the lowest part of the casing; or

(ii) 35 per cent, of the gross volume of the largest space including the casing;

Provided that the aforesaid percentages may be reduced to 35 per cent and 30 per cent respectively for vessels of under 2,000 tons, not being passenger vessels, provided also that if two or more machinery spaces are not entirely separate they shall be considered as forming one space.

(d) The volume of carbon dioxide shall be calculated at 0.56 cubic metre per kilogramme.

(e)(i) When carbon dioxide is used as the extinguishing medium for machinery spaces or pump rooms the arrangements shall be such that 85 per cent of the gas required to provide the concentration referred to in sub-para (2) (c) when applied to the space concerned can be discharged into that space within two minutes.

(ii) When carbon dioxide is used as the extinguishing medium in cargo spaces containing motor vehicles with fuel in their tanks for their own propulsion or in closed ro/ro spaces the arrangements shall be such as to ensure that at least two thirds of the gas required for the space can be introduced within 10 minutes.

(f) Safe means shall be provided for the crew to check the quantity of medium within the containers.

(3) Halogenated hydrocarbon systems.

(a) The use of halogenated hydrocarbons as fire extinguishing media is only permitted in machinery spaces, pumprooms and in cargo spaces intended solely for the carriage of vehicles which are not carrying any cargo.

(b) When halogenated hydrocarbons are used as the fire extinguishing media in total flooding systems:

(i) The system shall be arranged for manual initiation of power release only and such means shall be provided outside the protected space.

(ii) Where the cargo of halogenated hydrocarbon is required to supply more than one space, the arrangements for its storage and release shall comply with sub-para (3) (b) (ix) or (3) (b) (x) for each such space.

(iii) Means shall be provided for stopping automatically all ventilation fans serving the protected space before the medium is released.

(iv) Means shall be provided to close manually all dampers in the ventilation system serving a protected space.

(v) The arrangements shall be such that the liquid phase of the minimum quantity of medium required by sub-para (3) (b) (ix) or (3) (b) (x) when applied to the space concerned can be discharged into that space within 20 seconds or less.

(vi) The system shall be designed to operate within the temperature range likely to be experienced in service.

(vii) Discharge nozzles shall be so positioned that a uniform distribution of fire extinguishing medium is obtained and the discharge does not endanger personnel engaged on maintenance of machinery or equipment or using the normal access ladders and escapes serving the compartment

(viii) Safe means shall be provided for the crew to check the quantity of medium in the containers and the pressure therein.

(ix) The quantity of extinguishing medium for cargo spaces intended solely for the carriage of vehicles which are not carrying any cargo shall be calculated in accordance with the following table. This quantity shall be based on the gross volume of the protected space.

Table 1

Halon	Minimum	Maximum
1301 (BTM)	5 per cent	7 per cent
1211 (BCF)	5 per cent	5.5 per cent

The volume of Halon 1301 (BTM) shall be calculated at 0.16 cubic metres per kilogramme and the volume of Halon 1211 (BCF) shall be calculated at 0.14 cubic metres per kilogramme.

(x) The quantity of extinguishing medium for machinery spaces shall be calculated in accordance with the following Table 2. This quantity shall be based on the gross

volume of the space in respect of the minimum concentration and the net volume of the space in respect of the maximum concentration, including the casing.

Halon	Minimum	Maximum
1301 (BTM)	4.25 per cent	7 per cent
1211 (BCF)	4.25 per cent	5.5 per cent

The volume of Halon 1301 (BTM) shall be calculated at 0.16 cubic metres per kilogramme and the volume of Halon 1211 (BCF) shall be calculated at 0.14 cubic metres per kilogramme.

(c) Where the medium is Halon 1301 (BTM), the storage containers may be permitted within a protected machinery space other than a pumproom provided that the arrangements comply with the following requirements :

(i) The containers shall be individually distributed throughout the protected space having regard to the appropriate requirements of sub-para (1)(c).

(ii) A manually initiated power release, located outside the protected space, shall be provided. Duplicate sources of power shall be provided for this release and shall be located outside the protected space and be immediately available except that for machinery spaces, one of the sources of power may be located inside the protected space.

(iii) The sources of pneumatic and hydraulic pressure and of electrical power shall be monitored for loss of pressure or power as appropriate and electrical circuits essential for the release of the medium from the containers shall be monitored for all fault conditions. Visual and audible alarms shall be provided to indicate this. The pneumatic or hydraulic power circuits connecting the containers shall be duplicated.

(iv) Within the protected space, electrical circuits essential for the release of the medium shall be mineral insolated cable or other equivalent material. Hydraulic and pneumatic piping systems essential for the release of the medium shall be of steel or other equivalent heat resisting material.

(v) Each container shall be fitted with an automatic over pressure device which will safely vent the contents of the container into the protected space in the event of over pressure caused by the container being exposed to a fire and in operation or failure of the power.

(vi) The arrangements of the containers and the electric circuits and piping essential for the release of the medium shall be such that in the event of damage at any one location in a circuit through fire or explosion, i.e. a single fault concept at least two-thirds of the quantity of medium required for that space in accordance with sub-para 3(b) (ix) or 3(b) (x) can still be discharged at will, having regard to the requirement for uniform distribution of medium throughout the space. In small compartments, the Chief Surveyor with the Govt. of India may permit only one or two containers if he is satisfied with the storage and release arrangements.

(vii) Not more than two discharge nozzles shall be fitted to any pressure container and the maximum quantity of agent in each container shall be adequate, having regard to the requirement for uniform distribution of medium throughout the space.

(viii) The containers shall be monitored for decrease in pressure due to leakage and discharge. Visual and audible alarms in the protected area and on the navigation bridge or at the control station hall be provided to indicate this condition, except that for cargo spaces alarms need only be provided on the navigation bridge or the control station.

(d) Local automatically operated units containing Halon 1301 (BTM) or Halon 1211 (BCF) fitted in enclosed areas of high fire risk within machinery spaces in addition to and independent of any required fixed fire extinguishing system may be accepted provided the units comply with the following requirements:

(i) The space in which such additional local protection is provided should be on one working level and on the same level as the access. More than one working level may be permitted subject to an access being provided on each level.

(ii) The escape arrangements shall be such that escape from anywhere in such protected spaces can be effected in not more than ten seconds.

(iii) The operation of any unit shall be indicated by visual and audible alarms outside each access into the space and the navigating bridge or at the control station.

(iv) A notice stating that the space contains one or more automatically operated units and the name of the medium used shall be displayed outside each access to the space.

(v) The time to discharge the liquid phase of the medium in any local automatically operated unit shall not exceed ten seconds.

(vi) The arrangements of such units shall be such that release of the medium from any unit does not result in the loss of electrical power or reduction in the manoeuvrability of the vessel.

(vii) The total quantity of medium provided in such units within a protected space shall be such that the maximum vapour concentration at 200C as specified in sub-para (3) (b) (x) is not exceeded when all such units operate, provided that the

concentration may be exceeded where such units are operated together with a fixed system fitted in compliance with sub-para (3) (b).

(viii) Every such unit shall comply with sub-para (1) (k), (3) (b) (vi), (3) (b) (vii) and (3) (b) (viii).

(e) Local automatically operated units fitted in machinery spaces over equipment having high fire risk in addition to and independent of any required fixed fire extinguishing system may be accepted provided that they comply with the following requirements:-

(i) The total quantity of medium provided in such units within the machinery space shall be such that the maximum vapour concentration of 125 per cent of the gross volume of that space is not exceeded when all such units operate simultaneously.

(ii) Every such unit shall comply with sub-para 1(k), 3(b) (vii) (except that uniform distribution of the medium may not be required), (3) (b) (viii), (3) (d) (iii), (3) (d) (iv), (3) (d) (v), (3) (d) (vi) and (3) (d) (viii).

(4) Other gas systems.

(a) Where gas other than carbon dioxide or halogenated hydro-carbon is produced on the vessel and is used as in extinguishing medium, it shall be a gaseous product of fuel combustion in which the oxygen content, the carbon monoxide content, the corrosive elements and any solid combustible elements have been reduced to a permissible minimum. Any system using such gas shall afford equivalent protection to that provided by a fixed carbon dioxide system.

(b) When a system producing inert gas is used to provide extinguishing gas in a fixed fire extinguishing system for cargo spaces, except cargo oil tanks in compliance with these rules, it shall be capable of producing hourly a volume of free gas at least equal to 25 per cent of the gross volume of the largest compartment protected in this way for a period of 72 hours.

(c) No part of the control storage or generating arrangement of any fixed fire extinguishing system shall be situated forward of the collision bulkhead in any passenger vessel.

(5) Steam system.

In general, the Chief Surveyor with the Government of India, shall 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 Chief Surveyor with the Government of India shall be used only in restricted areas as an addition to the required fir extinguishing medium and with the proviso that the boiler or boilers available for applying steam shall have an evaporation of at least 1.0 kg. of steam per hour for each 0.75 m3 of the gross volume of the largest space so protected. In addition to complying with the foregoing

requirements the systems in all respect shall be as determined by and to the satisfaction of the Chief Surveyor with the Government of India.

(6) Fixed gas extinguishing systems shall achieve 85 % CO_2 concentration within 2 minutes; installations shall include visual and audible pre-discharge alarms ≥ 20 seconds before release; remote valve sequencing per FSS Ch. 5 & 2.1.

(7) System control requirements

(7)(i) The necessary pipes for conveying fire-extinguishing medium into the protected spaces shall be provided with control valves so marked as to indicate clearly the spaces to which the pipes are led. Suitable provisions shall be made to prevent inadvertent release of the medium into the space. Where a cargo space fitted with a gas fire-extinguishing system is used as a passenger space, the gas connection shall be blanked during such use. The pipes may pass through accommodations providing that they are of substantial thickness and that their tightness is verified with a pressure test, after their installation, at a pressure head not less than 5 N/mm². In addition, pipes passing through accommodation areas shall be joined only by welding and shall not be fitted with drains or other openings within such spaces. The pipes shall not pass through refrigerated spaces.

(7)(ii) Means shall be provided for automatically giving audible and visual warning of the release of fire-extinguishing medium into any ro-ro spaces, container holds equipped with integral reefer containers, spaces accessible by doors or hatches, and other spaces in which personnel normally work or to which they have access. The audible alarms shall be located so as to be audible throughout the protected space with all machinery operating, and the alarms should be distinguished from other audible alarms by adjustment of sound pressure or sound patterns. The pre-discharge alarm shall be automatically activated (e.g., by opening of the release cabinet door). The alarm shall operate for the length of time needed to evacuate the space, but in no case less than 20s before the medium is released. Conventional cargo spaces and small spaces (such as compressor rooms, paint lockers, etc.) with only a local release need not be provided with such an alarm. *(Amended by MSC. Res. 339(91))*

(7)(iii) The means of control of any fixed gas fire-extinguishing system shall be readily accessible, simple to operate and shall be grouped together in as few locations as possible at positions not likely to be cut off by a fire in a protected space. At each location there shall be clear instructions relating to the operation of the system having regard to the safety of personnel.

(7)(iv) Automatic release of fire-extinguishing medium shall not be permitted, except as permitted by the Administration.

(8) Carbon dioxide systems

(8) (i) Quantity of fire extinguishing medium

(8) (ii) 1 For cargo spaces, the quantity of carbon dioxide available shall, unless otherwise provided, be sufficient to give a minimum volume of free gas equal to 30% of the gross volume of the largest cargo space to be protected in the vessel.

(8) (iii) For vehicle spaces and ro-ro spaces which are not special category spaces, the quantity of carbon dioxide available shall be at least sufficient to give aminimum volume of free gas equal to 45%of the gross volume of the largest such cargo space which is capable of being sealed, and the arrangements shall be such as to ensure that at least two thirds of the gas required for the relevant space shall be introduced within 10min.Carbon dioxide systems shall not be used for the protection of special category spaces. *(Added by MSC. Res. 339(91))*

(8) (iv) For machinery spaces, the quantity of carbon dioxide carried shall be sufficient to give a minimum volume of free gas equal to the larger of the following volumes, either:

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

.2 35% of the gross volume of the largest machinery space protected,

including the casing.

(8) (v) The percentages specified in paragraph 2.2.1.3 above may be reduced to 35% and 30%, respectively, for cargo vessels of less than 2,000 gross tonnage where two or more machinery spaces, which are not entirely separate, are considered as forming one space.

(8) (vi) For the purpose of this paragraph the volume of free carbon dioxide shall be calculated at 0.56 m^3/kg.

(8) (vii) For machinery spaces, the fixed piping system shall be such that 85% of the gas can be discharged into the space within 2 min.

(8) (viii) For container and general cargo spaces (primarily intended to carry a variety of cargoes separately secured or packed) the fixed piping system shall be such that at least two thirds of the gas can be discharged into the space within 10min. For solid bulk cargo spaces the fixed piping system shall be such that at least two thirds of the gas can be discharged into the space within 20min. The system controls shall be arranged to allow one third, two thirds or the entire quantity of gas to be discharged based on the loading condition of the hold. *(Added by MSC. Res. 339(91))*

(9) Controls

Carbon dioxide systems for the protection of ro-ro spaces, container holds equipped with integral reefer containers, spaces accessible by doors or hatches, and other

spaces in which personnel normally work or to which they have access shall comply with the following requirements: *(Amended by MSC. Res. 339(91))*

.1 two separate controls shall be provided for releasing carbon dioxide into a protected space and to ensure the activation of the alarm. One control shall be used for opening the valve of the piping which conveys the gas into the protected space and a second control shall be used to discharge the gas from its storage containers. Positive means shall be provided so they can only be operated in that order; and

.2 the two controls shall be located inside a release box clearly identified for

the particular space. If the box containing the controls is to be locked, a key to the box shall be in a break-glass-type enclosure conspicuously located adjacent to the box.

(10) Testing of the installation

When the system has been installed, pressure-tested and inspected, the following shall be carried out:

(10)(i) a test of the free air flow in all pipes and nozzles; and

(ii) a functional test of the alarm equipment.

(11) Low-pressure CO_2 system

Where a low pressure CO_2 system is fitted to comply with this regulation, the following applies.

(11) (i) The system control devices and the refrigerating plants shall be located within the same room where the pressure vessels are stored.

(11) (ii) The rated amount of liquid carbon dioxide shall be stored in vessel(s) under the working pressure in the range of 1.8 N/mm² to 2.2 N/mm². The normal liquid charge in the container shall be limited to provide sufficient vapour space to allow for expansion of the liquid under the maximum storage temperatures than can be obtained corresponding to the setting of the pressure relief valves but shall not exceed 95% of the volumetric capacity of the container.

(11) (iii) Provision shall be made for:

.1 pressure gauge;

.2 high pressure alarm: not more than setting of the relief valve;

.3 low pressure alarm: not less than 1.8 N/mm²;

.4 branch pipes with stop valves for filling the vessel;

.5 discharge pipes;

.6 liquid CO_2 level indicator, fitted on the vessel(s); and

.7 two safety valves.

(11) (iv) The two safety relief valves shall be arranged so that either valve can be shut off while the other is connected to the vessel. The setting of the relief valves shall not be less than 1.1 times working pressure. The capacity of each valve shall be such that the vapours generated under fire condition can be discharged with a pressure rise not more than 20% above the setting pressure. The discharge from the safety valves shall be led to the open.

(11) (v) The vessel(s) and outgoing pipes permanently filled with carbon dioxide shall have thermal insulation preventing the operation of the safety valve in 24 h after deenergizing the plant, at ambient temperature of 45°C and an initial pressure equal to the starting pressure of the refrigeration unit.

(11) (vi) The vessel(s) shall be serviced by two automated completely independent refrigerating units solely intended for this purpose, each comprising a compressor and the relevant prime mover, evaporator and condenser.

(11) (vii) The refrigerating capacity and the automatic control of each unit shall be so as to maintain the required temperature under conditions of continuous operation during 24 h at sea temperatures up to 32°C and ambient air temperatures up to 45°C.

(11) (viii) Each electric refrigerating unit shall be supplied from the main switchboard busbars by a separate feeder.

(11) (ix) Cooling water supply to the refrigerating plant (where required) shall be provided from at least two circulating pumps one of which being used as a stand-by. The stand-by pump may be a pump used for other services so long as its use for cooling would not interfere with any other essential service of the vessel. Cooling water shall be taken from not less than two sea connections, preferably one port and one starboard.

(11) (x) Safety relief devices shall be provided in each section of pipe that may be isolated by block valves and in which there could be a build-up of pressure in excess of the design pressure of any of the components.

(11) (xi) Audible and visual alarms shall be given in a central control station or, in accordance with regulation II-1/51, where a central control station is not provided, when:

(xi) (i)the pressure in the vessel(s) reaches the low and high values according to paragraph 2.2.4.2;

(xi) (ii)any one of the refrigerating units fails to operate; or

(xi) (iii)the lowest permissible level of the liquid in the vessels is reached.

(11) (xii) If the system serves more than one space, means for control of discharge quantities of CO_2 shall be provided, e.g. automatic timer or accurate level indicators located at the control position(s).

(11) (xiii) If a device is provided which automatically regulates the discharge of the rated quantity of carbon dioxide into the protected spaces, it shall be also possible to regulate the discharge manually.

SCHEDULE -X

[See rule 10(1) (b), 30(1) (b) and 31(c)]

FIXED HIGH-EXPANSION FOAM FIRE-EXTINGUISHING SYSTEMS IN MACHINERY SPACES

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

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

(b) The Chief Surveyor with the Government of India may permit alternative arrangements and discharge rates provided that he is satisfied that equivalent protection is achieved.

(2) Supply ducts for delivering foam air intakes to the foam generator and the number of foam producing units shall in the opinion of the Chief Surveyor with the Government of India, as well provide effective foam production and distribution.

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

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

SCHEDULE - XI

[See rule 8(2) (a) (b) (c) and 27 (1) (b) and (2)]

FIXED PRESSURE WATER SPRAYING SYSTEMS FOR CARGO SPACES

(1) Every fixed pressure water spraying system fitted in compliance with these rules shall be provided with a pump piping system, control valves and spraying nozzles.

(2) The nozzles shall be of an accepted full bore type and shall be arranged so as to secure an effective distribution of water in the spaces which are to be protected.

(3) The system shall be such as will provide water application at a rate of at least 3.5 litres per square metre per minute for spaces with a deck height not greater than 2.5 metres and at least 5 litres per square metre per minute for space with a deck height greater than 2.5 metres.

(4) Precautions shall be taken to prevent the nozzles from becoming clogged by impurities in the water.

(5) The system shall cover the full breadth of the protected space except that in vessels where the protected space is sub-divided with longitudinal class "A" divisions forming boundaries of staircase, etc, the breadth of the sections may be reduced accordingly. In vessels of classes I, II, III, IV, V, VIII and IV where the length of the enclosed part of the protected space is 50 metre or over, the system may be divided into sections provided they are at least 20 metres in length. In vessel of other classes the length of a section may be less than 20 metres but shall be not less than 10 metres provided the capacity of the pumps are capable of supplying the two largest adjacent section simultaneously at the application rate referred to in para (3) of this schedule.

(6) The distribution valves, for the system shall be situated in an easily accessible position adjacent to but outside, the space to be protected which will not readily be cut off by a fire within the space. Direct access to the distribution valves from the protected spaces and from outside the spaces shall be provided. Adequate ventilation shall be fitted in the space containing the distribution valves.

(7) The water supply to the system shall be provided by a pump or pumps, other than the vessel's required fire pumps which shall additionally be connected to the system by a lockable non-return valve which will prevent a back flow from the system into the fire main.

(8) The principal pump or pumps shall be capable of supplying simultaneously at all times at the required pressure all nozzles in the protected spaces, or two adjacent sections if this is less, a quantity of water in accordance with para (2) and (3) of this schedule.

(9) The principal pump or pumps shall be capable of being brought into operation by remote control which may be manually actuated, from the position at which the distribution valves are situated.

(10) In vessels of classes I, II and III and in vessels of class IV of 76 metres or over in length or where the length of the enclosed part of the protected space is 50 metres or over the principal pump or pumps shall be situated in a position reasonably remote from the protected space and from any machinery space of category A. In vessels of other classes the principal pump or pump shall be situated outside the protected space but may be situated within any machinery space.

(11) In vessels of classes I, II and III and in vessels of class IV of 76 metres or over in length or where the length of the enclosed part of the protected space is 50 metres

or over, if the principal pump or pumps are electrically driven there shall be two sources of power which may be two of the auxiliary generators provided they are independently driven. If the principal pump or pumps are driven by independent internal combustion type machinery they shall be so situated that a fire in the protected space will not affect the air supply to the machinery and the pump compartment.

(12) When a fixed pressure water spraying system is provided for the machinery spaces in accordance with schedule XII of these rules the pump required for that system may also be used for the purpose of complying with this schedule.

(13) The sea suction of the pump shall be so arranged that when the vessel is afloat, it will not be necessary to shut off the supply of sea water to the pump for any purpose other than the inspection or repair of the pump.

(14) The pump suction and discharge valves and any other valves requiring to be operated to bring the pump into operation shall be locked open or be openable from any control position of the system. A pressure gauge shall be provided at such control positions to show when water is available.

(15) A waste valve with a short open ended pipe shall be fitted between the pump discharge and section control valves for testing purposes.

(16) The pipes of the system shall be solid drawn or welded steel or equivalent and they shall be hydraulically tested by the manufactures to twice the working pressure but not less than 20 bar (2N/mm2) and be galvanized internally in per cent corrosion.

(17) Fittings such as self-aligning swivel joints and flexible pipe situated within the protected space shall not be readily rendered ineffective by heat and where such fittings are used at least one spare of each type fitted shall be carried.

SCHEDULE - XI

[See rule 8(2) (a) (b) (c) and 27 (1) (b) and (2)]

FIXED PRESSURE WATER SPRAYING SYSTEMS FOR CARGO SPACES

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

(1) Every fixed pressure water spraying system fitted in compliance with these rules shall be provided with a pump piping system, control valves and spraying nozzles.

(2) The nozzles shall be of an accepted full bore type and shall be arranged so as to secure an effective distribution of water in the spaces which are to be protected.

(3) The system shall be such as will provide water application at a rate of at least 3.5 litres per square metre per minute for spaces with a deck height not greater than 2.5 metres and at least 5 litres per square metre per minute for space with a deck height greater than 2.5 metres.

(4) Precautions shall be taken to prevent the nozzles from becoming clogged by impurities in the water.

(5) The system shall cover the full breadth of the protected space except that in vessels where the protected space is sub-divided with longitudinal class "A" divisions forming boundaries of staircase, etc, the breadth of the sections may be reduced accordingly. In vessels of classes I, II, III, IV, V, VIII and IV where the length of the enclosed part of the protected space is 50 metre or over, the system may be divided into sections provided they are at least 20 metres in length. In vessel of other classes the length of a section may be less than 20 metres but shall be not less than 10 metres provided the capacity of the pumps are capable of supplying the two largest adjacent section simultaneously at the application rate referred to in para (3) of this schedule.

(6) The distribution valves, for the system shall be situated in an easily accessible position adjacent to but outside, the space to be protected which will not readily be cut off by a fire within the space. Direct access to the distribution valves from the protected spaces and from outside the spaces shall be provided. Adequate ventilation shall be fitted in the space containing the distribution valves.

(7) The water supply to the system shall be provided by a pump or pumps, other than the vessel's required fire pumps which shall additionally be connected to

the system by a lockable non-return valve which will prevent a back flow from the system into the fire main.

(8) The principal pump or pumps shall be capable of supplying simultaneously at all times at the required pressure all nozzles in the protected spaces, or two adjacent sections if this is less, a quantity of water in accordance with para (2) and (3) of this schedule.

(9) The principal pump or pumps shall be capable of being brought into operation by remote control which may be manually actuated, from the position at which the distribution valves are situated.

(10) In vessels of classes I, II and III and in vessels of class IV of 76 metres or over in length or where the length of the enclosed part of the protected space is 50 metres or over the principal pump or pumps shall be situated in a position reasonably remote from the protected space and from any machinery space of category A. In vessels of other classes the principal pump or pump shall be situated outside the protected space but may be situated within any machinery space.

(11) In vessels of classes I, II and III and in vessels of class IV of 76 metres or over in length or where the length of the enclosed part of the protected space is 50 metres or over, if the principal pump or pumps are electrically driven there shall be two sources of power which may be two of the auxiliary generators provided they are independently driven. If the principal pump or pumps are driven by independent internal combustion type machinery they shall be so situated that a fire in the protected space will not affect the air supply to the machinery and the pump compartment.

(12) When a fixed pressure water spraying system is provided for the machinery spaces in accordance with schedule XII of these rules the pump required for that system may also be used for the purpose of complying with this schedule.

(13) The sea suction of the pump shall be so arranged that when the vessel is afloat, it will not be necessary to shut off the supply of sea water to the pump for any purpose other than the inspection or repair of the pump.

(14) The pump suction and discharge valves and any other valves requiring to be operated to bring the pump into operation shall be locked open or be openable from any control position of the system. A pressure gauge shall be provided at such control positions to show when water is available.

(15) A waste valve with a short open ended pipe shall be fitted between the pump discharge and section control valves for testing purposes.

(16) The pipes of the system shall be solid drawn or welded steel or equivalent and they shall be hydraulically tested by the manufactures to twice the working pressure but not less than 20 bar ($2N/mm^2$) and be galvanized internally in per cent corrosion.

(17) Fittings such as self-aligning swivel joints and flexible pipe situated within the protected space shall not be readily rendered ineffective by heat and where such fittings are used at least one spare of each type fitted shall be carried.

SCHEDULE XII

[See rules 10(1) (b), 30(1) (b) and 31(c)]

FIXED PRESSURE WATER SPRAYING SYSTEMS FOR MACHINERY SPACES AND CARGO PUMP ROOMS.

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

(1) Every fixed pressure water spraying systems fitted in compliance with these rules shall be provided of approved type and with a pump, piping system, control valves and spraying nozzles. For machinery space protection the pump shall not be used for any other purpose except that the Chief Surveyor with the Govt. of India may permit the pump to be used for supplying cargo pump room of cargo space water spraying systems where such systems are permitted. For cargo pump room protection the water supply may be from the vessel's main fire pumps provided such pumps comply with the requirements of this schedule.

(2) The spraying nozzles shall be of such a type sufficient in number and so arranged as to ensure an effective average distribution of water in accordance with the following table.

Protected Area	**Application Rate Litres Per sq. meter/min.**
Boiler fronts or roof firing areas, oil fuel units centrifugal separators (not only water separators), oil fuel purifiers and clarifiers.	20
Hot oil fuel pipes near exhaust pipes or similar heated surface on main or auxiliary diesel engines.	10
Tank top areas and oil tanks not forming part of the vessel's structure	5
Cargo pump rooms.	10

(3) Spraying nozzles shall be fitted above bilges, tank tops and other areas over which oil fuel is liable to spread and above other main fire hazards in the spaces to be protected.

(4) The water spraying system may be divided into sections and shall be controlled from distribution manifolds the valves of which shall be capable of being operated from easily assessible positions outside the spaces to be protected and which will not be readily cut off by an outbreak of fire within the protected space.

(5) The water spraying system shall be kept charged at the necessary pressure and the pump supplying the water for the system shall be automatically put into action by a pressure drop in the system.

(6) The pump may be driven by independent internal combustion type machinery but if it is dependent upon power being supplied from the emergency generator fitted in compliance with the Merchant Shipping (Passenger Vessel Construction) rules, 1981 or the Merchant Shipping (Cargo Vessel Construction and Survey) Rules, 1988 the generator shall be arranged to start automatically in case of main power failure so that power for the pump is immediately available. When the pump is driven by independent internal combustion type machinery it shall be so situated that a fire in the protected space will not affect the air supply to the machinery and the pump compartment.

(7) The pump shall be capable of supplying water at the necessary pressure simultaneously to all sections of the water spraying system in any one compartment to be protected. The pump and its controls shall be installed outside the space or spaces to be protected. it shall not be possible for a fire in the space or spaces protected by the water spraying system to put the system out of action.

(8) Means shall be provided which will prevent nozzles from becoming closed by impurities in the water or corrosion of piping, nozzles, valves and pump.

(9) No part of the water spraying system shall be situated forward of the collision bulkhead in any passenger vessel.

(10) Operating instructions in clear and permanent lettering shall be affixed to every water spraying system or in a position adjacent thereto.

SCHEDULE XIII

[See Rule 48(1)]

Fixed Deck Foam System

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

(1) The arrangements for providing foam shall be capable of delivering foam to the entire cargo tanks deck area as well as into any cargo tank, the deck of which has been ruptured.

(2) The deck foam system shall be capable of simple and rapid operation. The main control station for the system shall be suitable located outside the cargo area adjacent to the accommodation paces and readily accessible and operable in the event of fire in the areas protected.

(3) The rate of supply of foam solution (that is, the mixture of foam concentrate and water before expansion) shall be not less than the following whichever is the greatest:

(a) 0.6 litre per minute per square metre of cargo tanks deck area, where cargo tanks deck area means the maximum breadth of the vessel times the total longitudinal extent of the cargo tank spaces.

(a) 6 litres per minute per square metre of the horizontal sectional area of the single tank having the largest such area; or

(b) 6 litres per minute per square metre of the area protected by the largest monitor, such area being entirely forward of the monitor, but not less than 1, 250 litres per minute.

(4) Sufficient foam concentrate shall be supplied to ensure atleast 20 minutes of foam generation in vessel fitted with an inert gas system complying with Schedule XIV to these Regulations or 30 minutes of foam generation in vessels not fitted with an inert gas by system when using the solution rates stipulated in para (3) of this Schedule. The foam expansion ratio (that is, the ratio of the volume of foam produced to the volume of the mixture of foam concentrate and water before expansion) shall not generally exceed 12 to 1.

(5) Foam from the fixed system shall be supplied by means of monitors and foam applicators. At least 50 per cent of the foam solution rate required in sub-paras (a) and (b) of para (3) of this Schedule shall be delivered from each monitor. On tankers

of less than 4,000 tonnes deadweight, applicators may be substituted for an installation of monitors. In such a case the capacity of each applicator shall be at least 25 per cent of the foam solution rate required in sub-para (a) or (b) of para (3) of this Schedule.

(6)(a) The number and position of monitors shall be such as to comply with para (1) of this Schedule. The capacity of any monitor shall be at least 3 litres per minute of foam solution per square metre or deck area protected by that monitor, such area being entirely forward of the monitor. such capacity shall be not less than 1,250 litres per minute.

(b) The distance from the monitor to the farthest extremely of the protected area forward of that monitor shall not be more than 75 per cent of the monitor throw in still air conditions.

(7) A monitor and hose connection for a foam applicator shall be situated both port and starboard at the front of the poop or accommodation spaces facing the cargo tanks deck. On tankers of a deadweight of less than 4,000 tonnes not fitted with monitors a hose connection for a foam applicator shall be situated both port and starboard at the front of the poop or accommodation spaces facing the cargo tanks deck.

(8) The capacity of any applicator shall be not less than 400 litres per minute and the applicator throw in still air conditions shall be not less than 15 metres. The number of foam applicators provided in accordance with the requirements of para (5) of this Schedule shall be not less than four. The number and disposition of foam main outlets shall be such that foam from at least two applicators can be directed on to any part of the cargo tank deck area.

(9) Valves shall be provided in the foam main, and in the fire main when this is an integral part of the deck foam system, immediately forward of any monitor position to isolate damaged sections of those mains.

(10) Operation of a deck foam system at its required output shall permit the simultaneous use of the minimum required number of jets of water at the required pressure from the fire main.

(11) Application

(11) (i) This chapter details the specification of fixed deck foam systems which are required to be provided by chapter II-2 of the Convention

(12) Engineering specifications

(12) (a) General

(12) (a) (i) The arrangements for providing foam shall be capable of delivering foam to the entire cargo tanks deck area as well as into any cargo tank the deck of which has been ruptured.

(12) (a) (ii) The deck foam system shall be capable of simple and rapid operation.

(12) (a) (iii) Operation of a deck foam system at its required output shall permit the simultaneous use of the minimum required number of jets of water at the required pressure from the fire main. Where the deck foam system is supplied by a common line from the fire main, additional foam concentrate shall be provided for operation of two nozzles for the same period of time required for the foam system. The simultaneous use of the minimum required jets of water shall be possible on deck over the full length of the vessel, in the accommodation, service spaces, control stations and machinery spaces.

(13) Component requirements

(13) (i) Foam solution and foam concentrate

(14) For tankers carrying:

(14) (i) crude oil or petroleum products having a flashpoint not exceeding 60ºC (closed cup), as determined by an approved flashpoint apparatus, and a Reid vapour pressure which is below atmospheric pressure or other liquid products having a similar fire hazard, including cargoes in chapter 18 of the IBC Code, having a flashpoint not exceeding 60ºC (closed cup) for which a regular foam fire-fighting system is effective (refer to regulations II-2/1.6.1 and 10.8 of the Convention); or

(14) (ii) petroleum products with a flashpoint exceeding 60ºC (closed cup), as determined by an approved flashpoint apparatus (refer to regulation II-

2/1.6.4 of the Convention); or

(14) (iii) IBC Code chapter 17 products with a flashpoint exceeding 60oC (closed cup) determined by an approved flashpoint apparatus (refer to paragraph 11.1.3 of the IBC Code and regulation II-2/1.6.4 of the Convention), the rate of supply of foam solution shall be not less than the greatest of the following:

(14) (iii) (i) 0.6 l/min per square metre of cargo tanks deck area, where cargo tanks deck area means the maximum breadth of the vessel multiplied by the total longitudinal extent of the cargo tank spaces;

(14) (iii) (ii) 6 l/min per square metre of the horizontal sectional area of the single tank having the largest such area; or

(14) (iii) (iii) 3 l/min per square metre of the area protected by the largest monitor, such area being entirely forward of the monitor, but in no case should the output of any monitor be less than 1,250 l/min. monitor, such area being entirely forward of the monitor, but in no case should the output of any monitor be less than 1,250 l/min.

(15) For tankers carrying chemicals in bulk listed in chapter 17 of the IBC Code having a flashpoint not exceeding 60ºC (closed cup), the rate of supply of foam solution shall be as required by the IBC Code.

(16) Sufficient foam concentrate shall be supplied to ensure at least 20 min of foam generation in tankers fitted with an inert gas installation or 30 min of foam generation in tankers not fitted with an inert gas installation or not required to use an inert gas system.

(17) The foam concentrate supplied on board shall be approved by the Administration* for the cargoes intended to be carried. Type B foam concentrates shall be supplied for the protection of crude oil, petroleum products and non-polar solvent cargoes. Type A foam concentrates shall be supplied for polar solvent cargoes, as listed in the table of chapter 17 of the IBC Code. Only one type of foam concentrate shall be supplied, and it shall be effective for the maximum possible number of cargoes intended to be carried. For cargoes for which foam is not effective or is incompatible, additional arrangements to the satisfaction of the Administration shall be provided.

*Refer to the Guidelines for performance and testing criteria and surveys of foam concentrates for fixed fire-extinguishing systems (MSC.1/Circ.1312).

(18) Liquid cargoes with a flashpoint not exceeding 60°C for which a regular foam fire-fighting system is not effective shall comply with the provisions of regulation II2/1.6.2.1 of the Convention.

(19) Monitors and foam applicators

(19 (a) Foam from the fixed foam system shall be supplied by means of monitors and foam applicators. Prototype tests of the monitors and foam applicators shall be performed to ensure the foam expansion and drainage time of the foam produced does not differ more than ± 10 percent of that determined in paragraph 2.2.1.4. When medium expansion ratio foam (between 21:1 and 200:1 expansion ratio) is employed, the application rate of the foam and the capacity of a monitor installation shall be to the satisfaction of the Administration. At least 50 per cent of the foam solution supply rate required shall be delivered from each monitor. On tankers of less than 4,000 tonnes deadweight the Administration may not require installation of monitors but only applicators. However, in such a case the capacity of each applicator shall be at least 25 per cent of the foam solution supply rate required.

(19)(b) The capacity of any applicator shall be not less than 400 l/min and the applicator throw in still air conditions shall be not less than 15 m.

(20) Installation requirements

(20)(a) Main control station

(20)(b) The main control station for the system shall be suitably located outside the cargo area, adjacent to the accommodation spaces and readily accessible and operable in the event of fire in the areas protected.

(21) Monitors

(21)(i) The number and position of monitors shall be such as to comply with paragraph 2.1.1.

(21)(ii) The distance from the monitor to the farthest extremity of the protected area forward of that monitor shall not be more than 75 per cent of the monitor throw in still air conditions.

(21)(iii) A monitor and hose connection for a foam applicator shall be situated both port and starboard at the front of the poop or accommodation spaces facing the cargo tanks deck. The monitors and hose connections shall be aft of any cargo tanks, but may be located in the cargo area above pump-rooms, cofferdams, ballast tanks and void spaces adjacent to cargo tanks if capable of protecting the deck below and aft of each other. On tankers of less than 4,000 tonnes deadweight, a hose connection for a foam applicator shall be situated both port and starboard at the front of the poop or accommodation spaces facing the cargo tanks deck.

(22) Applicators

(22) (i) At least four foam applicators shall be provided on all tankers. The number and disposition of foam main outlets shall be such that foam from at least two applicators can be directed on to any part of the cargo tanks deck area.

(22) (ii) Applicators shall be provided to ensure flexibility of action during fire-fighting operations and to cover areas screened from the monitors.

(23) Isolation valves

(23)(i) Valves shall be provided in the foam main, and in the fire main when this is an integral part of the deck foam system, immediately forward of any monitor position to isolate damaged sections of those mains.

SCHEDULE XIV

[See Rules 48(2), 48(5)(a) and 49(2)]

Inert Gas Systems

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

(1) Every inert gas system provided in accordance with these rules shall be designed, constructed and tested to the satisfaction of the Chief Surveyor with the Govt. of India.

(2) The system shall be capable of :

(a) inert'ng empty cargo tanks including slop tanks by reducing the oxygen content of the atmosphere in each tank to a level at which combustion cannot be supported;

(b) maintaining the atmosphere in any part of any cargo tank or slop tank at an oxygen content not exceeding 8 per cent by volume and at a positive pressure at all times both in port and at sea except when it is necessary for such a tank to be gas free;

(c) eliminating the need for air to enter tank during normal operations except when it is necessary for such tank to be gas free;

(d) purging empty cargo tanks including slop tanks or hydrocarbon gas, so that subsequent gas freeing operations will at no time create a atmosphere within the tank.

(3)(a) The system shall be capable of delivering mert gas to the cargo tanks and stop tanks at a rate of at least 125 per cent of the maximum rate of discharge capacity of the vessel, expressed as a volume ;

(b) the system shall be capable of delivering merit gas with an oxygen content or not more than 5 per cent by volume in the inert gas supply main to the cargo tanks and stop tanks at any required rate of flow.

(4) The inert gas supply may be treated flue gas from the main or auxiliary boilers, from one or more separate gas generators or other sources or from any combination thereof. Director General of Maritime Administration may approve systems using inert gases other than true gas, provided he is satisfied that an equivalent standard of safety I achieved. Systems using stored carbon dioxide shall not be permitted unless the Chief Surveyor with the Govt. of India is satisfied that the risk of ignition from generation of state electricity by the system itself is minimized.

(5) Flue gas isolating valves shall be fitted in the inert gas supply means between the boiler uptakes and flue gas scrubber. These valves shall be provided with indicators to show whether they are open or shut, and precautions shall be taken to maintain them gas-tight and keep the seating clear of soot. Arrangements shall be made so that boiler soot blowers cannot be operated when the corresponding flue gas valves open.

(6)(a) A flue gas scrubber shall be fitted which will effectively cool the volume of gas specified in para (3) of this Schedule and remove solids and sulphur combustion products. The cooling water arrangements shall be such that an adequate supply of water will always be available without interfering with any essential services on the vessel. Provisions shall also be made for an alternative supply of cooling water;

(b) Filters or equivalent devices shall be fitted to minimize the amount of water carried over to the inert gas blowers;

(c) The scrubber shall be located aft of all cargo tanks, slop tanks, cargo pump rooms and cofferdams separating these spaces from machinery spaces of Category A.(7)(a) Atleast two blowers shall be fitted which together shall be capable of delivering to the cargo tanks and slop tanks, at least the volume of gas required by para (3) of this Schedule. In a system provided with a gas generator, the Chief Surveyor with the Govt. of India may permit only one blower if that system is capable of delivering the total volume of gas required by para (3) to the protected cargo tanks, provided that sufficient spares for the blower and its prime mover are carried on board to enable any failure of the blower and its prime mover to be rectified by the vessel's crew.

(b) Two fuel oil pumps shall be fitted to the inert gas generator, Chief Surveyor with the Govt. of India may permit only one fuel oil pump on condition that sufficient spares for the fuel oil pump and its prime mover are carried on board to enable any failure of the fuel oil pump and its prime mover to be rectified by the vessel's crew.

(c) The inert gas system be so designed that the maximum pressure which it can exert on any cargo tank will not exceed the test pressure of any cargo tank. Suitable shut-off arrangements shall be provided on the suction and discharge connexions of each blower. Arrangements shall be provided to enable the functioning of the inert gas plant to be stabilized before commencing cargo discharge. If the blowers are to be used for gas freeing, their inlets shall be provided with blanking arrangements.

(d) The blowers shall be located aft of all cargo tanks, cargo pump rooms and cofferrdams separating these spaces from machinery spaces of Category A.

(8)(a) The design and location of scrubber and blowers with relevant piping and fittings shall be such as to prevent fire gas leakages into enclosed spaces.

(b) To permit safe maintenance, an additional water seal or other effective means of preventing flue gas leakage shall be fitted between the flue gas isolating valves and scrubber or incorporated in the gas entry to the scrubber.

(9)(a) A gas regulating valve shall be fitted in the inert gas supply main. This valve shall be automatically controlled to close as required in para (19)(c) and 19(d) of this Schedule. It shall also be capable of automatically regulating the flow of inert gas to the cargo tanks unless means are provided to automatically control the speed of the inert gas blowers required in para (7) of this Schedule.

(b) The valve referred to in sub-para (a) of this para shall be located at the forward bulkhead of the most forward gas safe space through which the inert gas supply main passes.

(10)(a)At least two non-return devices, one of which shall be a water seal, shall be fitted in the inert gas supply main, in order to prevent the return of hydrocarbon vapour to machinery spaces uptakes or to any gas safe spaces under all normal conditions of trim; 1st and motion of the vessel. They shall be located between the automatic valve required by para (9) of this Schedule and the aftermost connection to any cargo tank or cargo pipeline.

(b) The devices referred to in this para shall be located in the cargo area on deck.

(c) The water seal referred to in sub-para (a) of this para shall be capable of being supplied by two separate pumps, each of which shall be capable of maintaining an adequate supply at all times.

(d) The arrangement of the seal and its associated provisions shall be such that it will prevent back-flow of hydrocarbon vapours and will ensure the proper functioning of the seal under operating conditions.

(e) Provision shall be made to ensure that the water seal is protected against freezing, in such a way that the integrity of the seal is not impaired by overheating.

(f) A water loop or other arrangement approved by Director General of Maritime Administration shall also be fitted in all associated water supply and dry piping and all venting or pressure sensing piping leading to gas safe spaces. Means shall be provided to prevent such loops from being emptied by vacuum.

(g) The deck water seal and all loop arrangements shall be capable of preventing return of hydrocarbon vapours at a pressure equal to the test pressure of the cargo tanks.

(h) The second non-return device mentioned in sub-para (a) of this paragraph shall be a non-return valve or equivalent capable of preventing the return of vapours or liquids or both fitted forward of the deck water seal required by sub-para (a) of this para. It shall be provided with either positive means of closure or an additional valve

having such means of closure located forward of the non-return valve to isolate the deck water seal from the inert gas main to the cargo tanks and slop tanks.

(i) As an additional safeguard against the possible leakage of hydrocarbon liquids or vapours back from the deck main, means shall be provided to permit the section of the line between the valve having positive means of closure referred to in sub-para (h) of this para, and the valve referred to in para (9) of this Schedule to be vented in a safe manner when the first of these valves is closed.

11(a) The inert gas main may be divided into two or more branches forward of the non-return devices required by para (10) of this schedule.

(b)(i) The inert gas supply main shall be fitted with branch piping leading to each cargo tank and slop tank. Branch piping for inert gas shall be fitted with either stop valves or equivalent means of control for isolating each tank. Where stop valves are fitted they shall be provided with locking arrangements, which shall be under the control of a responsible vessel's officer.

(ii) In combination carriers, the arrangements to isolate the slop tanks containing oil or oil residues from other tanks shall consist of blank flanges which will remain in position at all times when cargoes other then oil are being carried except as provided for in the relevant section of the Guidelines on Inert Gas Systems.

(c) Means shall be provided to protect cargo tanks and stop tanks against effect of over pressure or vacuum caused by thermal variations when such tanks are isolated from the inert gas main.

(d) Piping systems shall be so designed as to prevent the accumulation of cargo or water in the pipelines under all normal conditions.

(12) The arrangements for the venting of all vapours displaced from the cargo tanks during loading or ballasting shall comply with rule 66 of the Merchant Shipping (Cargo Vessel Construction and Survey) Rules, 1988 and shall consist of either one or more mast risers or a number of rigid velocity vents. The inert gas supply main may be used for such venting.

(13) The arrangements for inerting, purging or gas freeing of empty tanks as required in para (2) of this Schedule shall be approved and shall be such that the accumulation of hydrocarbon vapours in pockets formed by the internal structural members in a tank is minimised and that :

(a) on individual cargo tanks or slop tanks the gas outlet pipe, if fitted, shall be positioned as far as practicable from the inert gas/air inlet and in accordance with rule 66 of the Merchant Shipping (Cargo Vessel Construction and Survey) Rules 1988. The inlet of such outlet pips may be located at either deck level or at not more than 1 metre above the bottom of the tank;

(b) the cross sectional area of such a gas outlet pipe referred to in sub-para (1) of this para shall be such that an exit velocity of at least 20 metres per second can be maintained when any three tanks are being simultaneously supplied with inert gas. Their outlets shall extend not less than 2 metres above deck level;

(c) each gas outlet referred to in sub-para (b) of this para shall be fitted with suitable blanking arrangements;

(d)(i) if a connection is fitted between the inert gas supply main and the cargo piping system arrangements shall be made to ensure an effective isolation having regard to the high pressure difference which may exist between the systems. This shall consist of two shut off valves with an arrangements to vent the space between the valves in a safe manner or an arrangement consisting or a spoolpiece with associated blanks.

(ii) the valve separating the inert gas supply main from the cargo main shall be a non-return valve with a positive means of closure.

(14)(a) One or more pressure-vacuum breaking devices shall be provided to prevent the cargo tanks from being subject to :

(i) 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 were left shut; and

(ii) a negative pressure in excess of 700 milimetres water gauge if cargo were to be discharged at the maximum rated capacity of the cargo pumps and the inert gas blower were to fail. Such devices shall be installed on the inert gas main unless they are installed in the venting system required by rule 66 of the Merchant Shipping (Cargo Vessel Construction and Survey) Rules 1988 or on individual cargo tanks.

(b) The location and design of the devices referred to in sub-para (a) of this para shall be in accordance with rule 66 of the Merchant Shipping (Cargo Vessel Construction and Survey) Rules, 1988.

(15) Means shall be provided for continuously indicating the temperature and pressure of the inert gas at the discharge side of the gas blowers, whenever those gas blowers are operating.

(16)(a)Instrumentation shall be fitted for continuously indicating and permanently recording when inert gas is being supplied.

(i) the pressure of the inert gas supply main forward of the non-return devices required by sub-para (a) of para (10) of this Schedule; and

(ii) the oxygen content of the inert gas in the inert gas supply main on the discharge side of the gas blowers

(b) The devices referred to in sub-para 9a) of this para shall be placed in the cargo control room where provided. Where no cargo control room is provided they shall be placed in a position easily accessible to the officer in charge of cargo operations.

(c) In addition, meters shall be fitted :

(i) in the navigating bridge, to indicate at all times the pressure referred to in sub-para (a)(i) of this para and the pressure in the slop tanks of combination carriers, whenever those tanks are isolated from the inert gas supply main; and

(ii) in the machinery control room or in the machinery space, to indicate the oxygen content referred to in sub-para (a) (ii) of this para.

(17) Portable instruments for measuring oxygen and flammable vapour concentration shall be provided. In addition, suitable arrangements shall be made on each cargo tank and slop tank such that the condition of the tank atmosphere can be determined using these portable instruments.

(18) Suitable means shall be provided for the zero and span calibration of both fixed and portable gas concentration measurement instruments, referred to in para (16) and (17) of this Schedule.

(19)(a) Audible and visual alarms shall be provided to indicate:

(i) low water pressure or low water flow rate to the flue gas scrubber referred to in sub-para (6)(a) of this Schedule;

(ii) high water level in the flue gas scrubber referred to in sub-para (6)(a) of this Schedule;

(iii) high gas temperature referred to in para (15) of this Schedule;

(iv) failure of the inert gas blowers referred to in sub-para (7)(a) of this Schedule;

(v) Oxygen content in excess of 8 per cent volume referred to in sub-para (16)((a)(ii) of this Schedule;

(vi) failure of the power supply to the automatic control system for the gas regulating valve and to the indicating devices referred to in para (9) and sub-para (16)(a) respectively of this Schedule;

(vii) low water level in the water seal referred to in sub-para (10)(a) of this Schedule;

(viii) gas pressure less than 100 millimetres water gauge as referred to in sub-para (16)(a)(i) of this Schedule; the alarm arrangement for this gas pressure shall be such as to ensure that the pressure in slop tanks in combination carriers can be monitored at all times; and

(ix) high gas pressure referred to in sub-para (16)(a)(i) of this Schedule.

(b) In the system with gas generators, audible and visual alarms shall be provided in accordance with sub para 19(a)(i), 19(a)(iii), 19(a)(v) and 19(a)(ix) of this para and additional alarms to indicate:

(i) insufficient fuel oil supply ;

(ii) failure of the power supply to the generator;

(iii) failure of the power supply to the automatic control system for the generator.

(c) Automatic shut down of the inert gas blowers and gas regulating valve shall be arranged on predetermined limit being reached in respect of sub-para (a)(i), (a) (ii) and (a) (iii) of this para.

(d) Automatic shut down of the gas blowers and gas regulating valve shall be arranged so as to take account of failure of the inert gas blowers referred to in para (7) of this Schedule.

(e) In relation to sub-para (a)(v) of this para, when the oxygen content of the inert gas exceeds 8 per cent, immediately action shall be taken to reduce the oxygen level. Unless the quality of the gas improves, all in-tank operations shall be suspended so as to avoid air being drawn into the tanks and the isolation valve referred to in sub-para 10(h) of this Schedule shall be closed.

(f) The alarms required in sub-para (a)(v), (a) (vi), and (a) (viii) of this para shall be fitted in the machinery space and cargo control room, where provided, but in any event in such a position that they are immediately received by responsible members of the crew.

(g) In relation to sub-para (a)(vii) of this para the Chief Surveyor with the Govt. of India shall be satisfied as to the maintenance of an adequate reserve of water at all times and the integrity of the arrangements to permit the automatic formation of the water seal when the gas flow ceases. The audible and visual alarm on the low level of water in the water seal shall operate when the inert gas is not being supplied.

(h) An audible alarm system, independent of that required in sub-para (a)(viii) of this para, or automatic shut down of cargo pumps shall be provided to operate on predetermined limits of low pressure in the inert gas main being reached.

(20) A detailed instruction manual shall be provided on board by the owner and it shall cover the operational safety and maintenance requirements and occupational health hazards relevant to the inert gas system and its application to the cargo tank system. The manual shall include guidance on procedures to be followed in the event of a fault or failure of the inert gas system as detailed in the Guidelines for Inert Gas System.

(21) Cooling and scrubbing arrangement

(21)(i) Means shall be fitted which will effectively cool the volume of gas specified in paragraph 2.2.1.2 and remove solids and sulphur combustion products. The cooling water arrangements shall be such that an adequate supply of water will always be available without interfering with any essential services on the vessel. Provision shall also be made for an alternative supply of cooling water.

(21)(ii) Filters or equivalent devices shall be fitted to minimize the amount of water carried over to the inert gas blowers.

(22) Blowers

(22)(i) At least two inert gas blowers shall be fitted and be capable of delivering to the cargo tanks at least the volume of gas required by paragraph 2.2.1.2. For systems fitted with inert gas generators the Administration may permit only one blower if that system is capable of delivering the total volume of gas required by paragraph 2.2.1.2 to the cargo tanks, provided that sufficient spares for the blower and its prime mover are carried on board to enable any failure of the blower and its prime mover to be rectified by the vessel's crew.

(22)(ii) Where inert gas generators are served by positive displacement blowers, a pressure relief device shall be provided to prevent excess pressure being developed on the discharge side of the blower.

(22)(iii) When two blowers are provided, the total required capacity of the inert gas system shall be divided evenly between the two and in no case is one blower to have a capacity less than 1/3 of the total required.

(23) Inert gas isolating valves

For systems using flue gas, flue gas isolating valves shall be fitted in the inert gas mains between the boiler uptakes and the flue gas scrubber. These valves shall be provided with indicators to show whether they are open or shut, and precautions shall be taken to maintain them gastight and keep the seatings clear of soot. Arrangements shall be made to ensure that boiler soot blowers cannot be operated when the corresponding flue gas valve is open.

(24) Prevention of flue gas leakage

(24)(i) Special consideration shall be given to the design and location of scrubber and blowers with relevant piping and fittings in order to prevent flue gas leakages into enclosed spaces.

(24)(ii) To permit safe maintenance, an additional water seal or other effective means of preventing flue gas leakage shall be fitted between the flue gas isolating valves and scrubber or incorporated in the gas entry to the scrubber.

(25) Indicators and alarms

(25)(a) In addition to the requirements in paragraph 2.2.4.2, means shall be provided for continuously indicating the temperature of the inert gas at the discharge side of the system, whenever it is operating.

(25)(b) In addition to the requirements of paragraph 2.2.4.5, audible and visual alarms shall be provided to indicate:

(25)(b) (i)insufficient fuel oil supply to the oil-fired inert gas generator;

(25)(b) (ii)failure of the power supply to the generator;

(25)(b)(iii) low water pressure or low water flow rate to the cooling and scrubbing arrangement;

(25)(b) (iv) high water level in the cooling and scrubbing arrangement;

(25)(b) (v)high gas temperature;

(25)(b) (vi)failure of the inert gas blowers; and

(25)(b) (vii) low water level in the water seal.

(26) Requirements for nitrogen generator systems

In addition to the provisions in paragraph 2.2, for inert gas systems using nitrogen generators, the provisions of this section shall apply.

(27) System requirements

(27) (i) The system shall be provided with one or more compressors to generate enough positive pressure to be capable of delivering the total volume of gas required by paragraph 2.2.1.2.

(27) (ii) A feed air treatment system shall be fitted to remove free water, particles and traces of oil from the compressed air.

(27) (iii) The air compressor and nitrogen generator may be installed in the engine-room or in a separate compartment. A separate compartment and any installed equipment shall be treated as an "Other machinery space" with respect to fire protection. Where a separate compartment is provided for the nitrogen generator, the compartment shall be fitted with an independent mechanical extraction ventilation system providing six air changes per hour. The compartment is to have no direct access to accommodation spaces, service spaces and control stations.

(27) (iv) Where a nitrogen receiver or a buffer tank is installed, it may be installed in a dedicated compartment, in a separate compartment containing the air compressor and the generator, in the engine room, or in the cargo area. Where the nitrogen receiver or a buffer tank is installed in an enclosed space, the access shall be arranged only

from the open deck and the access door shall open outwards. Adequate, independent mechanical ventilation, of the extraction type, shall be provided for such a compartment.

(28) Indicators and alarms

(28)(a) In addition to the requirements in paragraph 2.2.4.2, instrumentation is to be provided for continuously indicating the temperature and pressure of air at the suction side of the nitrogen generator.

(28)(b) In addition to the requirements in paragraph 2.2.4.5, audible and visual alarms shall be provided to include:

(28)(b)(i) failure of the electric heater, if fitted;

(28)(b)(ii) low feed-air pressure or flow from the compressor;

(28)(b)(iii) high-air temperature; and

(28)(b)(iv) high condensate level at automatic drain of water separator.

Schedule XV

[Sprinkler System Zoning]

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

Sprinkler System Zoning

Automatic sprinkler systems shall be divided into sections not exceeding 200 sprinkler heads, with test valves and pressure gauges; design verification shall follow MSC.265(84).

Special Spaces (Helidecks, Ro-Ro Decks, Inert Gas Systems)

Helideck fire-fighting systems shall deliver foam at ≥ 5 L/m²/min for 2 minutes through nozzles ensuring ≥ 1 jet covering the landing area. Ro-Ro deck monitors shall discharge ≥ 1,250 L/min. Inert gas systems shall provide ≥ 95 % CO_2 purity with dual pressure relief valves and automatic shutdown controls.

Ventilation Safety and Smoke Extraction

Ventilation fans shall automatically shut down upon fire alarm activation; exhaust fans shall start automatically in smoke extraction mode for affected zones. System capacity ≥ 10 air changes per hour in machinery spaces.

Schedule XVI

[Fire -extinguishing arrangements in control stations, accommodation and service spaces]

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

1) Sprinkler and water-spraying systems in passenger vessels

1) Passenger vessels carrying more than 36 passengers shall be equipped with an automatic sprinkler, fire detection and fire alarm system of an approved type complying with the requirements of the Fire Safety Systems Code in all control stations, accommodation and service spaces, including corridors and stairways. Alternatively, control stations, where water may cause damage to essential equipment, may be fitted with an approved fixed fire extinguishing system of another type. Spaces having little or no fire risk such as voids, public toilets, carbon dioxide rooms and similar spaces need not be fitted with an automatic sprinkler system.

2) In passenger vessels carrying not more than 36 passengers, when a fixed smoke detection and fire alarm system complying with the provisions of the Fire Safety Systems Code is provided only in corridors, stairways and escape routes within accommodation spaces, an automatic sprinkler system shall be installed in accordance with regulation 7.5.3.2.

3) A fixed pressure water-spraying fire-extinguishing system complying with the provisions of the Fire Safety Systems Code shall be installed on cabin balconies of vessels to which regulation 5.3.4 applies, where furniture and furnishings on such balconies are not as defined in regulation SOLAS Chapter-II-2/Reg.3.40.1, 3.40.2, 3.40.3, 3.40.6 and 3.40.7.

2) Sprinkler systems for cargo vessels

In cargo vessels in which method IIC specified in regulation SOLAS Chapter-II-2 9.2.3.1.1.2 is adopted, an automatic sprinkler, fire detection and fire alarm system shall be fitted in accordance with the requirements in regulation SOLAS Chapter-II-2 7.5.5.2.

SCHEDULE XVII

[**Operational requirements**]

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

Part E - Operational requirements

Regulation 14

Operational readiness and maintenance

1.) Purpose

The purpose of this regulation is to maintain and monitor the effectiveness of the fire safety measures the vessel is provided with. For this purpose, the following functional requirements shall be met:

1. fire protection systems and fire-fighting systems and appliances shall be maintained ready for use; and
2. fire protection systems and fire-fighting systems and appliances shall be properly tested and inspected.

2.) General requirements

At all times while the vessel is in service, the requirements of paragraph 1.1 shall be complied with. A vessel is not in service when:

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

2.1) Operational readiness

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

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

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

2.2) Maintenance, testing and inspections

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

*Refer to the Guidelines on maintenance and inspection of fire protection systems and appliances (MSC/ Circ.850).

2.2.2) The maintenance plan shall be kept on board the vessel and shall be available for inspection whenever required by the Administration.

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

1. fire mains, fire pumps and hydrants including hoses, nozzles and international shore connections;
2. fixed fire detection and fire alarm systems;
3. fixed fire-extinguishing systems and other fire-extinguishing appliances;
4. automatic sprinkler, fire detection and fire alarm systems;
5. ventilation systems including fire and smoke dampers, fans and their controls;
6. emergency shut down of fuel supply;
7. fire doors including their controls;
8. general emergency alarm systems;
9. emergency escape breathing devices;
10. portable fire extinguishers including spare charges; and
11. fire-fighter's outfits.
12. 2.2.4) The maintenance programme may be computer-based.
13. **3.) Additional requirements for passenger vessels**
14. In addition to the fire protection systems and appliances listed in paragraph 2.2.3, vessels carrying more than 36 passengers shall develop a maintenance plan for low-location lighting and public address systems.

4.) Additional requirements for tankers

1. In addition to the fire protection systems and appliances listed in paragraph 2.2.3, tankers shall have a develop maintenance plan for:
    a) inert gas systems;
    b) deck foam systems;
    c) fire safety arrangements in cargo pump-rooms; and
    d) flammable gas detectors.

Regulation 15

Instructions, onboard training and drills

1.) Purpose

The purpose of this regulation is to mitigate the consequences of fire by means of proper instructions for training and drills of persons onboard in correct procedures under emergency conditions. For this purpose, the crew shall have the necessary knowledge and skills to handle fire emergency cases, including passenger care.

2.) General requirements

2.1) Instructions, duties and organization

2.1.1) Crew members shall receive instruction on fire safety onboard the vessel.

2.1.2) Crew members shall receive instructions on their assigned duties.

2.1.3) Parties responsible for fire extinguishing shall be organized. These parties shall have the capability to complete their duties at all times while the vessel is in service.

2.2) On-board training and drills

2.2.1) Crew members shall be trained to be familiar with the arrangements of the vessel as well as the location and operation of any fire-fighting systems and appliances that they may be called upon to use.

2.2.2) Training in the use of the emergency escape breathing devices shall be considered as part of on-board training.

2.2.3) Performance of crew members assigned fire-fighting duties shall be periodically evaluated by conducting on-board training and drills to identify areas in need of improvement, to ensure competency in fire-fighting skills is maintained, and to ensure the operational readiness of the fire-fighting organization.

2.2.4) On-board training in the use of the vessel's fire-extinguishing systems and appliances shall be planned and conducted in accordance with the provisions of regulation III/19.4.1.

2.2.5) Fire drills shall be conducted and recorded in accordance with the provisions of regulations III/19.3 and III/19.5.

2.2.6) An onboard means of recharging breathing apparatus cylinders used during drills shall be provided or a suitable number of spare cylinders shall be carried on board to replace those used. (Added by Res.MSC.338(91))

2.3) Training manuals

2.3.1) A training manual shall be provided in each crew mess room and recreation room or in each crew cabin.

2.3.2) The training manual shall be written in the working language of the vessel.

2.3.3) The training manual, which may comprise several volumes, shall contain the instructions and information required in paragraph 2.3.4 in easily understood terms and illustrated wherever possible. Any part of such information may be provided in the form of audio-visual aides in lieu of the manual.

2.3.4) The training manual shall explain the following in detail:

1. general fire safety practice and precautions related to the dangers of smoking, electrical hazards, flammable liquids and similar common vesselboard hazards;
2. general instructions on fire-fighting activities and fire-fighting procedures including procedures for notification of a fire and use of manually operated call points;
3. meanings of the vessel's alarms;
4. operation and use of fire-fighting systems and appliances;
5. operation and use of fire doors;
6. operation and use of fire and smoke dampers; and
7. escape systems and appliances.

2.4) Fire control plans *

**Refer to the Graphical symbols for shipboard fire control plans as adopted by the Organization by resolution A.952(23).*

2.4.1) General arrangement plans shall be permanently exhibited for the guidance of the vessel'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 Administration, the aforementioned details may be set out in a booklet, a copy of which shall be supplied to each officer, and one copy shall at all times be available on board in an accessible position. Plans and booklets shall be kept up to date; any alterations thereto shall be recorded as soon as practicable. Description in such plans and booklets shall be in the language or languages required by the Administration. If the language is neither English nor French, a translation into one of those languages shall be included.

2.4.2) A duplicate set of fire control plans or a booklet containing such plans shall be permanently stored in a prominently marked weathertight enclosure outside the deckhouse for the assistance of shore-side fire-fighting personnel. ±

± Refer to the Guidance concerning the location of fire control plans for assistance of shoreside fire-fighting personnel (MSC/Circ.451).

3.) Additional requirements for passenger vessels

3.1) Fire drills

In addition to the requirement of paragraph 2.2.3, fire drills shall be conducted in accordance with the provisions of regulation III/30 having due regard to notification of passengers and movement of passengers to assembly stations and embarkation decks.

3.2) Fire control plans

In vessels carrying more than 36 passengers, plans and booklets required by this regulation shall provide information regarding fire protection, fire detection and fire extinction based on the guidelines issued by the Organization. *

** Refer to the Guidelines on the information to be provided with fire control plans and booklets required by SOLAS regulations II-2/20 and 41-2 adopted by the Organization by resolution A.756(18).*

Regulation 16

Operations

1.) Purpose

The purpose of this regulation is to provide information and instructions for proper vessel and cargo handling operations in relation to fire safety. For this purpose, the following functional requirements shall be met:

1. fire safety operational booklets shall be provided on board; and
2. flammable vapour releases from cargo tank venting shall be controlled.

2.) Fire Safety operational booklets

2.1) The required fire safety operational booklet shall contain the necessary information and instructions for the safe operation of the vessel and cargo handling operations in relation to fire safety. The booklet shall include information concerning the crew's responsibilities for the general fire safety of the vessel while loading and discharging cargo and while underway. Necessary fire safety precautions for handling general cargoes shall be explained. For vessels carrying dangerous goods and flammable bulk cargoes, the fire safety operational booklet shall also provide reference to the pertinent fire-fighting and emergency cargo handling instructions contained in the International Maritime Solid Bulk Cargoes (IMSBC) Code, the International Bulk Chemical Code, the International Gas Carrier Code and the International Maritime Dangerous Goods Code, as appropriate.

2.2) The fire safety operational booklet shall be provided in each crew mess room and recreation room or in each crew cabin.

2.3) The fire safety operational booklet shall be written in the working language of the vessel.

2.4) The fire safety operational booklet may be combined with the training manuals required in regulation 15.2.3.

3.) Additional requirements for tankers

3.1) General

1. The fire safety operational booklet referred to in paragraph 2 shall 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 paragraph 3.2.

3.2) Procedures for cargo tank purging and/or gas-freeing *(MSC/Circ.731)*

3.2.1) When the vessel is provided with an inert gas system, the cargo tanks shall first be purged in accordance with the provisions of regulation 4.5.6 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.

3.2.2) When the vessel is not provided with an inert gas system, the operation shall be such that the flammable vapour is discharged initially through:

1. the vent outlets as specified in regulation 4.5.3.4;
2. 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
3. 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.

3.2.3) The above outlets shall 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.

3.2.4) 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.

3.3) Operation of inert gas system

3.3.1) The inert gas system for tankers required in accordance with regulation 4.5.5.1 shall 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.

3.3.2) 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 shall 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.

3.3.3) Notwithstanding regulation 1.2.2.2, the provisions of this paragraph shall 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 shall 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 shall be suspended so as to avoid air being drawn into the cargo tanks, the gas regulating valve, if fitted, shall be closed and the off-specification gas shall be vented to atmosphere.

3.3.4) In the event that the inert gas system is unable to meet the requirement in paragraph 16.3.3.1 and it has been assessed that it is impractical to effect a repair, then cargo discharge and cleaning of those cargo tanks requiring inerting shall only be resumed when suitable emergency procedures have been followed, taking into account guidelines developed by the Organization*.

* Refer to the Clarification of inert gas system requirements under the Convention (MSC/Circ.485) and to the Revised Guidelines for inert gas systems (MSC/Circ.353), as amended by MSC/Circ.387.

(The above new paragraphs have been added by Res. MSC.365(93))

SCHEDULE XVIII

[Fixed emergency fire pumps]

Every vessel to which these rules apply shall comply with the requirements contained in the Schedule

This Schedule shall, to the extent applicable, be read in conformity with the provisions of the International Code for Fire Safety Systems (FSS Code), as amended.

1 Application

This chapter details the specifications for emergency fire pumps as required by the rules. This chapter is not applicable to passenger ships of l,000 gross tonnage and upwards

2 Engineering specifications

2.1 *General*

The emergency fire pump shall be of a fixed independently driven power-operated pump.

2.2 *Component requirements*

2.2.1 Emergency fire pumps

2.2.1.1 Capacity of the pump

The capacity of the pump shall not be less than 40% of the total capacity of the fire pumps required by the rules and in any case not less than the following:
.1 for passenger ships less than 1,000 gross tonnage and for cargo ships of
2000 gross tonnage and upwards ----------25 m³/h ; and
.2 for cargo ships less than 2,000 gross tonnage ---------- 15 m³/h.

2.2.1.2 Pressure at hydrants

When the pump is delivering the quantity of water required by paragraph 2.2.1.1, the

pressure at any hydrants shall be not less than the minimum pressure required by the rules.

2.2.1.3 Suction heads

The total suction head and the net positive suction head of the pump shall be determined having due regard to the requirements of the Convention and this chapter on the pump capacity and on the hydrant pressure under all conditions of list, trim, roll and pitch likely to be encountered in service. The ballast condition of a ship on entering or leaving a dry dock need not be considered a service condition.

2.2.2 Diesel engines and fuel tank

2.2.2.1 Starting of diesel engine

Any diesel driven power source for the pump shall be capable of being readily started in its cold condition down to the temperature of 0°C by hand (manual) cranking. Where ready starting cannot be assured, if this is impracticable, or if lower temperatures are likely to be encountered, and if the room for the diesel driven power source is not heated, electric heating of the diesel engine cooling water or lubricating oil system shall be fitted, to the satisfaction of the Administration. If hand (manual) starting is impracticable, the Administration may permit compressed air, electricity, or other sources of stored energy, including hydraulic power or starting cartridges to be used as a means of starting. These means shall be such as to enable the diesel-driven power source to be started at least six times within a period of 30 min and at least twice within the first 10 min

2.2.2.2 Fuel tank capacity

Any service fuel tank shall contain sufficient fuel to enable the pump to run on full load for at least three hours and sufficient reserves of fuel shall be available outside the machinery space of category A to enable the pump to be run on full load for an additional 15 h.