

**PART 7 Fire Protection, Detection and
Extinction**

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CHAPTER 1 General

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SECTION 1 General Requirements

1.1 Application

1.1.1 The requirements of this chapter apply to service craft of less than 500 gross tons. Aspects of fire protection, detection and extinction not specifically stated in this Part will be specially considered in each case.

1.1.2 The requirements of this chapter apply also to yachts with the notation "COMMERCIAL YACHT" of less than 500 gross tons.

1.1.3 Cargo ships of 500 gross tons and over on international voyages and all passenger ships in international voyages are to satisfy the relevant regulations of the International Convention for the Safety of Life at Sea 1974, as amended, with the exception of the regulations for ships carrying dangerous goods. Attention should also be given to any relevant statutory requirements of the National Authority of the country in which the ship is to be registered.

1.1.4 Cargo ships of 500 gross tons and over on national voyages and passenger ships employed on national voyages are to satisfy the fire safety measures of the National Authority of the country in which the ship is to be registered.

1.1.5 High-speed vessels are to be provided by the fire safety requirements of the HSC Code, as amended.

1.1.6 Pleasure yachts are to be provided by the fire safety measures required by the Government of the flag state.

1.1.7 Consideration will be given to special cases where the arrangements are equivalent to those required by these Rules, in the sense that they provide an equivalent level of fire safety, as well as to arrangements for ships not covered by these Rules.

1.1.8 Special consideration will be given to fire protection arrangements and fire-extinguishing equipment and arrangements for ships classed for restricted special service.

1.1.9 For yachts with the notation "COMMERCIAL YACHT" and of less than 500 gross tons, fire appliances are to be of an approved type should be provided to meet the minimum requirements listed in the following Table 7.1.1 along with the specific requirements for fire appliances that regard yachts with this specific notation and are listed in this Part.

1	PROVISION OF WATER JET	1 (sufficient to reach any part of vessel)
2	POWER DRIVEN FIRE PUMP	1 (engine or independent drive)
3	ADDITIONAL INDEPENDENT POWER DRIVEN FIRE PUMP, POWER SOURCE AND SEA CONNECTION	1 (not located in the same space as item 2)
4	FIREMAIN AND HYDRANTS	Sufficient to achieve item 1 with a single length of hose
5	HOSES	3 (with jet/spray nozzles each fitted with a shut-off facility)
6	PORTABLE FIRE EXTINGUISHERS (Accommodation and Service Spaces)	For each deck, one within 10m of any position within an accommodation or service space
7	FIRE EXTINGUISHERS	A fixed fire extinguishing system approved in accordance with the Fire Safety Systems Code;

	(For Machinery Space of Category A)	and One portable extinguisher for oil fires for each 74.6k2 power (up to 7 maximum); or Two portable extinguishers for oil fires together with either one foam extinguisher of 45l capacity or 1 CO2 extinguisher of 16kg capacity
8	FIREMANS OUTFIT - to include an approved breathing apparatus for each outfit	2
9	FIRE BLANKET – in galley	1

Table 7.1.1 – Fire Appliances – Vessels of less than 500GT

1.1.10 For yachts with the notation “COMMERCIAL YACHT”, fire appliances provided in addition to those required by paragraph 1.1.9 should be of a type acceptable to L.H.R. and the location of concealed fire appliances should be clearly marked.

1.1.11 Where a fixed fire-extinguishing system not required by this Chapter, is installed, the arrangement is to be to the satisfaction of L.H.R.

1.2 Acceptance of substitutes

1.2.1 Fire-fighting appliances, insulating materials and other items of equipment which have been approved by a National Authority as complying with the regulations of the International Convention for the Safety of Life at Sea, 1974 (as amended in 1981 and 1983) may be accepted as complying with the requirements of this Part.

1.3 Ready availability of fire-extinguishing appliances

1.3.1 Fire-extinguishing appliances are to be kept in good working order and available for immediate use at all times during a voyage.

1.4 Submission of plans and supporting data

1.4.1 Plans, together with supporting data and particulars of fire protection, detection and extinction arrangements of the ship are to be submitted for approval. General information such as number of passengers and gross tonnage should also be submitted.

1.4.2 For fire protection, at least the following plans and information are to be submitted:

- (a) Indication of the method of structural fire protection adopted.
- (b) A general arrangement plan showing the main fire zones, escape stairways and the fire compartmentation bulkheads and decks within the main fire zones.
- (c) A plan showing the construction details of the fire-protected bulkheads and decks and the particulars of any surface laminates employed.
- (d) Copies of the Certificates of Approval by National Authorities of all “A” and “B” Class fire divisions, fire doors, non-combustible materials and materials having low flame-spread characteristics etc., which are to be used but have not been approved by the Society.

- (e) A plan showing the location of fire doors and their remote control, if applicable.
- (f) A ventilation plan showing the ducts and any dampers in them and the position of the controls for stopping the system.
- (g) A plan showing the sprinkler system and/or the fire detection and fire alarm system, as applicable.
- (h) A plan showing the location of the emergency stops for the oil fuel units and the arrangements for closing the outlet valves from oil fuel tanks.

1.4.3 For fire extinguishing at least the following plans and information are to be submitted:

- (a) A general arrangement plan showing the disposition of all the fire-fighting equipment including the fire main, the fixed fire-extinguishing systems in the cargo spaces, on deck and in the machinery spaces; the disposition of the portable and non-portable extinguishers and their types; and the location of firemen's outfits.
- (b) A plan showing the layout and construction of the fire main, including the main and emergency fire pumps, isolating valves, pipe sizes and materials, the international shore connections and the cross connections to any other system.
- (c) A plan showing details of each fixed fire-fighting system, including calculations for the adequacy of their capacity.

1.4.4 For fire control, plans as required by [SECTION 15](#) are to be submitted.

SECTION 2 Definitions

2.1 Ship types

2.1.1 A "passenger ship" is a ship which carries more than twelve passengers, a passenger being every person other than:

- (a) the master and the members of the crew or other persons employed or engaged in any capacity on board a ship on the business of that ship, and
- (b) a child under one year of age.

2.1.2 A "cargo ship" is any ship which is not a passenger ship.

2.1.3 A "tanker" is a cargo ship constructed or adapted for the carriage in bulk of liquid cargoes of a flammable nature.

2.1.4 A "combination carrier" is a tanker designed to carry oil or alternatively solid cargoes in bulk.

2.1.5 A "fishing vessel" is a vessel used for catching fish, or other living resources of the sea.

2.2 Deadweight and lightweight

2.2.1 "Deadweight" is the difference in tonnes, between the displacement of a ship in water of a relative density (specific gravity) of 1,025 tonnes/m³ at the load waterline corresponding to the assigned summer freeboard, and the lightweight of the ship.

2.2.2 "Lightweight" is the displacement of a ship, in tonnes, without cargo, fuel, lubricating oil, ballast water, fresh water and feed water in tanks, consumable stores and passengers and crew with their effects.

2.3 Cargo

2.3.1 "Crude oil" means any oil occurring naturally in the earth whether or not treated to render it suitable for transportation and includes:

- (a) Crude oil from which certain distillate fractions may have been removed; and
- (b) Crude oil to which certain distillate fractions may have been added.

2.3.2 "Dangerous goods" are those listed below:

Class 1: Explosives.

Class 2: Gases: compressed, liquefied or dissolved under pressure.

Class 3: Flammable liquids.

Class 4.1: Flammable solids.

Class 4.2: Substances liable to spontaneous combustion.

Class 4.3: Substances which, in contact with water, emit flammable gases.

Class 5.1: Oxidizing substances.

Class 5.2: Organic peroxides.

Class 6.1: Poisonous (toxic) substances.

Class 6.2: Infectious substances.

Class 7: Radioactive materials.

Class 8: Corrosives.

Class 9: Miscellaneous dangerous substances, that is any other substance which experience has shown, or may show, to be of a dangerous character.

2.4 Materials

2.4.1 "Non-combustible" material means a material which neither burns nor gives off flammable vapours in sufficient quantity for self-ignition when heated to approximately 750°C, according to an established test procedure. Any other material is a "combustible" material.

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

2.5 Fire test

2.5.1 A "Standard Fire Test" is one in which specimens of the relevant bulkheads or decks are exposed in a test furnace to temperatures corresponding approximately to the standard time- temperature curve. The specimen is to have an exposed surface of at least 4,65 m² and height (or length for deck) of 2,44 m resembling as closely as possible the intended construction and including where appropriate at least one joint. The standard time-temperature curve is defined by a smooth curve drawn through the following

temperature points measured above the initial furnace temperature:

- (a) At the end of the first 5 min, 556°C.
- (b) At the end of the first 10 min, 659°C.
- (c) At the end of the first 15 min, 718°C.
- (d) At the end of the first 30 min, 821°C.
- (e) At the end of the first 60 min, 925°C.

2.6 Flame spread

2.6.1 "Low Flame Spread" means that the surface thus described will adequately restrict the spread of flame, this being determined by an acceptable test procedure.

2.7 Ship divisions and spaces

2.7.1 "A Class divisions" are those formed by bulkheads and decks which comply with the following:

- (a) They are to be constructed of steel or other equivalent material.
- (b) They are to be suitably stiffened.
- (c) They are to be so constructed as to be capable of preventing the passage of smoke and flame up to the end of the one-hour standard fire test.
- (d) They are to be insulated with approved non-combustible materials such that the average temperature of the unexposed side will not rise more than 139°C above the original temperature, nor will the temperature, at any one point, including any joint, rise more than 180°C above the original temperature, within the time listed below:
 - .1 Class "A-60" 60 min
 - .2 Class "A-30" 30 min
 - .3 Class "A-15" 15 min
 - .4 Class "A-0" 0 min
- (e) A test of a prototype bulkhead or deck may be required to ensure that it meets the above requirements for integrity and temperature rise.

2.7.2 "B Class divisions" are those formed by bulkheads, decks ceilings or linings which comply with the following:

- (a) They are to be so constructed as to be capable of preventing the passage of flame up to the end of the first half hour of the standard fire test.
- (b) They are to have an insulation value such that the average temperature of the unexposed side will not rise more than 139°C above the original temperature, nor will the temperature, at any one point, including any joint, rise more than 225°C above the original temperature, within the time listed below:
 - .1 Class "B-15" 15 min
 - .2 Class "B-0" 0 min
- (c) They are to be constructed of approved non-combustible materials and all materials entering into

the construction and erection of "B" Class divisions are to be non-combustible, except where permitted by other requirements of this Part.

(d) A test of a prototype division may be required to ensure that it meets the above requirements for integrity and temperature rise.

2.7.3 "C Class divisions" are to be constructed of approved non-combustible materials. They need meet neither requirements relative to the passage of smoke and flame nor limitations relative to the temperature rise. Combustible veneers are permitted provided they meet the other requirements of this Part.

2.7.4 "Continuous B Class ceilings or linings" are those "B" Class ceilings or linings that terminate only at an "A" or "B" Class division.

2.7.5 "Main vertical zones" are those sections into which the hull, superstructure and deckhouses are divided by "A" Class divisions, the mean length of which on any one deck does not, in general, exceed 40m.

2.7.6 "Accommodation spaces" are spaces intended for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, barber shops, pantries containing no cooking appliances and similar spaces.

2.7.7 "Public spaces" are those portions of the accommodation which are used as halls, dining rooms, lounges and similar permanently enclosed spaces.

2.7.8 "Service spaces" are those used for galleys, pantries containing cooking appliances, stores, mail and specie rooms, store rooms, lockers, workshops other than those forming part of the machinery spaces and similar spaces and trunks to such spaces.

2.7.9 "Cargo spaces" are all spaces used for cargo (including cargo oil tanks) and trunks to such spaces.

2.7.10 "Ro-Ro cargo spaces" are spaces not normally subdivided in any way and extending either to a substantial length or the entire length of the ship in which goods (packaged or in bulk, in or on rail or road cars, vehicles (including road or rail tankers), trailers, containers, pallets, dismantable tanks in or on similar stowage units or other receptacles) can be loaded and unloaded normally in a horizontal direction.

2.7.11 "Open ro-ro cargo spaces" are ro-ro cargo spaces either open at both ends or open at one end and provided with adequate natural ventilation effective over their entire length through permanent openings in the side plating or deckhead.

2.7.12 "Closed ro-ro cargo spaces" are ro-ro cargo spaces which are neither open ro-ro cargo spaces nor weather decks.

2.7.13 "Special category spaces" are those enclosed spaces above or below the bulkhead deck intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion, into and from which such vehicles can be driven, and to which passengers have access.

2.7.14 "Machinery spaces of Category A" are those spaces and trunks to such spaces which contain:

- (a) internal combustion machinery used for main propulsion; or
- (b) internal combustion machinery used for purposes other than main propulsion where such machinery has in aggregate a total power output of not less than 375 kW; or
- (c) any oil-fired boiler or oil fuel unit.

2.7.15 "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.

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

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

- (a) All case furniture such as desks, wardrobes, dressing tables, bureaux, dressers etc. is constructed entirely of approved non-combustible materials, except that a combustible veneer not exceeding 2 mm may be used on the working surface of such articles.
- (b) All free-standing furniture such as chairs, sofas, tables is constructed with frames of non-combustible materials.
- (c) All draperies, curtains and other suspended textile materials have qualities of resistance to the propagation of flame not inferior to those of wool of mass 0,8 kg/m².
- (d) All floor coverings have qualities of resistance to the propagation of flame not inferior to those of an equivalent woolen material used for the same purpose.
- (e) All exposed surfaces of bulkheads, linings and ceilings have low flame-spread characteristics.
- (f) All upholstered furniture has qualities of resistance to the ignition and propagation of flame.

2.7.18 "Weather deck" is a deck which is completely exposed to the weather from above and from at least two sides.

2.7.19 "Bulkhead deck" is the uppermost deck up to which the transverse watertight bulkheads are carried.

2.7.20 "Cargo area" is that part of the ship that contains cargo tanks, slop tanks and cargo pump rooms including pump rooms, cofferdams, ballast and void spaces adjacent to cargo tanks and also deck areas throughout the entire length and breadth of the part of the ship over the above mentioned spaces.

2.8 Equipment

2.8.1 "Oil fuel unit" is the equipment used for the preparation of oil fuel for delivery to an oil-fired boiler or equipment used for the preparation for delivery of heated oil to an internal combustion engine and includes any oil pressure pumps, filters and heaters dealing with oil at a pressure of more than 0,18 N/mm².

SECTION 3 Fire main system and pumps

3.1 Application

3.1.1 Every ship is to be provided with fire pumps, fire mains, hydrants and hoses complying as applicable with the requirements of this Section.

3.1.2 For yachts with the notation "COMMERCIAL YACHT", the fire main shall have no permanent connections other than those necessary for firefighting or washing down.

3.2 Capacity of fire pumps

3.2.1 The required fire pumps are to be capable of delivering for fire-fighting purposes a quantity of water, at the pressure specified in [3.5](#), of not less than two thirds of the quantity required to be dealt with by the bilge pumps when employed for bilge pumping.

3.2.2 Where more than the minimum number of required pumps are installed, the capacity of such additional pumps will be specially considered.

3.3 Fire pumps

3.3.1 Two power-driven fire pumps are to be installed, one of which is to be independently driven. Where vessels are less than 20 m in length, one power-driven pump, which may be attached to the propulsion unit, and one hand-operated fire pump are to be provided.

3.3.2 Sanitary, ballast, bilge or general service pumps may be accepted as fire pumps, provided that they are not normally used for pumping oil and that if they are subject to occasional duty for the transfer or pumping of oil fuel, suitable change-over arrangements are fitted.

3.3.3 The arrangement of sea connections, fire pumps and their sources of power are to be such as to ensure that if a fire in any one compartment could put all the pumps out of action there is to be an alternative means consisting of a fixed independently driven emergency pump which is to be capable of supplying a jet of water. The pump and its location are to comply with [3.4](#). For vessels of less than 20 m in length, the emergency pump may be hand operated.

3.3.4 In addition, in cargo ships where other pumps such as general service, bilge and ballast, etc. are fitted in a machinery space, arrangements are to be made to ensure that at least one of these pumps is capable of providing water to the fire main.

3.3.5 Relief valves are to be provided in conjunction with all fire pumps if the pumps are capable of developing a pressure exceeding the design pressure of the water service pipes, hydrants and hoses. These valves are to be so placed and adjusted as to prevent excessive pressure in any part of the fire system.

3.3.6 Where centrifugal pumps are provided in order to comply with [3.3](#) or [3.4](#), a non-return valve is to be fitted in the pipe connecting the pump to the fire main.

3.3.7 For yachts with the notation "COMMERCIAL YACHT", the power driven fire pump should have a capacity of:

$$2.5x \left\{ 1 + 0.066x(L(B + D))^{0.5} \right\}^2 \text{ m}^3/\text{hour}$$

Where L = the length; B = the greatest moulded breadth; D = the moulded depth measured to the bulkhead deck at amidships.

Where discharging at full capacity through 2 adjacent fire hydrants, the pump shall be capable of maintaining a water pressure of 0.2N/mm² at any hydrant, provided the fire hose can be effectively controlled at this pressure.

3.3.8 For yachts with the notation "COMMERCIAL YACHT", The second fire pump, which may be portable, shall have a capacity of at least 80% of that required by 3.3.7 and be capable of input to the fire main. A permanent sea connection, external to the machinery space, shall be provided. "Throw-over" sea suction are not acceptable.

3.4 Emergency fire pump

3.4.1 A power-driven emergency fire pump is to be provided, in accessible positions outside the category "A" machinery space referred to in [2.7.14](#). For vessels of less than 20 m in length a hand-operated fire pump will be accepted provided it and its sea connection comply with the requirements of this Section.

3.4.2 The capacity of the emergency pump is to be not less than 40% of the total capacity of the fire pumps required in [3.2](#).

3.4.3 When the emergency fire pump is electrically-driven, the power is to be supplied by a source other than that supplying the main fire pumps. This source is to be located outside the machinery spaces containing the main fire pumps and their source of power and drive units, the boundaries of the space being insulated to a standard of structural fire protection required by Chapter 3. The relevant electric cables

are not to pass through the compartment containing the main fire pumps.

3.4.4 The sea valve is to be capable of being operated from a position near the pump.

3.4.5 The boundaries of the space containing the fire pump are to be insulated to a standard of structural fire protection equivalent to that required for a control station in Chapter 3.

3.4.6 There is to be no direct access between the machinery space and the space containing the emergency fire pump and its source of power. When this is impracticable an arrangement may be accepted where the access is by means of an airlock, each of the two doors being self-closing, or 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 is to be provided.

3.4.7 Ventilation arrangements to the space containing the emergency fire pump prime mover are to 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. Power for illumination and ventilation (if mechanical) of that space is to be provided by the emergency source.

3.4.8 If the emergency fire pump is required to supply water for a fixed fire-extinguishing system in the space where the main fire pumps are situated, it is to be capable of simultaneously supplying water to this system and the fire main at the required rates.

3.4.9 The emergency fire pump may also be used for other suitable purposes subject to approval by the Society.

3.5 Diameter of and pressure in the fire mains

3.5.1 The diameter of the fire main is to be based on the required capacity of two fire pumps and the diameters of the water service pipes are to be sufficient to ensure an adequate supply of water for the simultaneous operation of at least two fire hoses. In general the diameter of the fire main is not to be less than 38 mm, and for vessels under 20 m in length is not to be less than 18 mm.

3.5.2 The deck wash line may be used as a fire main provided that the requirements of this Section are satisfied.

3.5.3 All water pipes for fire extinguishing are to be provided with drain valves for use in frosty weather. The valves are to be located where they will not be damaged by cargo.

3.5.4 With the two pumps simultaneously delivering through nozzles specified in [3.8](#) the quantity of water specified in [3.2](#), through any adjacent hydrants, the pressure maintained at any hydrant is to be sufficient to supply a jet throw of 15 m at any nozzle.

3.5.5 A power-driven emergency fire pump is to maintain a pressure at any hydrant sufficient to supply a jet throw of 15 m at any nozzle. In the case of a hand-operated emergency pump the jet throw need only be about 7 m when produced through a suitable nozzle.

3.5.6 The maximum pressure at any hydrant is not to exceed that at which the effective control of a fire hose can be demonstrated.

3.5.7 For yachts with the notation "COMMERCIAL YACHT", the fire main and water service pipe connections to the hydrants shall be sized for the maximum discharge rate of the pump(s) connected to the main.

3.6 Number and position of hydrants

3.6.1 The number and position of hydrants is to be such that at least one jet of water may reach any part of the ship normally accessible to the passengers or crew while the ship is being navigated and any part of any cargo space when empty. Furthermore, such hydrants are to be positioned near the accesses to the protected spaces.

3.6.2 For yachts with the notation "COMMERCIAL YACHT", the arrangements shall be suitable so this jet of water can be supplied from a single length of hose.

3.6.3 At least one hydrants is to be provided in each machinery space.

3.6.4 In the accommodation, service and machinery spaces of passenger ships the number and position of hydrants is to be such that the requirements of [3.6.1](#) may be complied with when all watertight doors and all doors in main vertical zone bulkheads are closed.

3.6.5 Where, in a passenger ship, access is provided to a machinery space of Category "A" at a low level from an adjacent shaft tunnel, one hydrant is to 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 one hydrant is to 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.

3.6.6 For yachts with the notation "COMMERCIAL YACHT", fire hydrants shall be located for easy attachment of fire hoses, protected from damage and distributed so that a single length of the fire hoses provided can reach any part of the vessel.

3.7 Pipes and hydrants

3.7.1 Materials readily rendered ineffective by heat are not to be used for fire mains and hydrants unless adequately protected. Where steel pipes are used, they are to be galvanized internally and externally. Cast iron pipes are not acceptable. The pipes and hydrants are to be so placed that the fire hoses may be easily coupled to them. The arrangement of pipes and hydrants is to be such as to avoid the possibility of freezing. In ships where deck cargo may be carried, the positions of the hydrants are to be such that they are always readily accessible and the pipes are to be arranged as far as practicable to avoid risk of damage by such cargo. Unless one hose and nozzle is provided for each hydrant in the ship, there is to be complete interchangeability of hose couplings and nozzles.

3.7.2 A valve is to be fitted to serve each fire hose so that any fire hose may be removed while the fire pumps are at work.

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

3.8 Fire hoses and nozzles

3.8.1 Ships are to be provided with fire hoses the number and diameter of which should be sufficient for the type of ship.

3.8.2 In passenger ships there is to be at least one fire hose for each of the hydrants required by 3.6 and these hoses are to be used only for the purposes of extinguishing fires or testing the fire-extinguishing apparatus during fire drills and surveys.

3.8.3 Fire hoses are to be of approved non-perishable material. The hoses are to be sufficient in length to project a jet of water to any of the spaces in which they may be required to be used. Their length, in general, is not to exceed 18 m. Each hose is to be provided with a nozzle and the necessary couplings. Fire hoses, together with any necessary fittings and tools are to be kept ready for use in conspicuous positions near the water service hydrants and connections. Additionally in interior locations in passenger ships, fire hoses are to be connected to the hydrants at all times.

3.8.4 For the purposes of this Part, standard nozzle sizes are to be 12 mm, 16 mm, 19 mm or as near thereto as possible, so as to make full use of the maximum discharge capacity of the fire pumps.

3.8.5 For accommodation and service spaces, the nozzle size need not exceed 12 mm.

3.8.6 For machinery spaces and exterior locations, the nozzle size is to be not less than 12 mm.

3.8.7 The size of nozzle intended to use with a hand-operated emergency fire pump need not to be greater than 10 mm.

3.8.8 For yachts with the notation "COMMERCIAL YACHT", for machinery spaces and exterior locations, the nozzle size shall be as to obtain the maximum discharge possible from two jets at the pressure referred to in paragraph 3.3.7, from the smallest pump.

3.8.9 All nozzles are to be of an approved dual-purpose type (i.e. spray/jet type) incorporating a shutoff.

3.8.10 The jet throw at any nozzle is to be about 12 m.

3.8.11 For yachts with the notation "COMMERCIAL YACHT", hydrants or connections in interior locations on the vessel shall have hoses connected at all times. For use within accommodation and service spaces, proposals to provide a smaller diameter of hoses and jet/spray nozzles shall be considered.

3.8.12 For yachts with the notation "COMMERCIAL YACHT", The number of fire hoses and nozzles provided shall correspond to the functional fire safety requirements, but be at least 3.

SECTION 4 Fixed gas fire-extinguishing systems

4.1 General

4.1.1 The use of a fire-extinguishing medium which, either by itself or under expected conditions of use gives off toxic gases in such quantities as to endanger persons is not permitted.

4.1.2 The necessary pipes for conveying a fire-extinguishing medium into protected spaces are to be provided with control valves so marked as to indicate clearly the spaces to which the pipes are led. The control valves are to be easily accessible and not readily cut off from use by an outbreak of fire. Suitable provision is to be made to prevent inadvertent admission of the medium to any space. Where a cargo space fitted with a gas fire-extinguishing system is used as a passenger space the gas connection is to be blanked during such use. Blank flanges fitted in gas distribution pipes are to be of the "spectacle" type. The nuts for the securing bolts are to be of non-corrodible material and fitted in an easily accessible position.

4.1.3 The piping for the distribution of the fire-extinguishing medium is to be arranged and discharge nozzles so positioned that a uniform distribution of medium is obtained. In holds exceeding 18 m in length, there are to be at least two pipes, one of which is to be fitted in the forward part and one in the after part. Separate pipes are to be provided for lower holds and tweendecks. All pipes are to be arranged to be self

draining and where led into refrigerated spaces, the arrangement will be specially considered. A means whereby the individual pipes to all protected spaces can be tested using compressed air is to be provided.

4.1.4 Steel pipes fitted in spaces where corrosion is likely to occur are to be galvanized, at least internally.

4.1.5 Distribution pipes are not to be smaller than 20 mm bore for carbon dioxide.

4.1.6 Means are to be provided to close all openings which may admit air to or allow gas to escape from a protected space.

4.1.7 Where the volume of free air contained in air receivers in any space is such that, if released in such a 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 is to be provided.

4.1.8 Means are to 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 is to operate for a suitable period before the medium is released.

4.1.9 Where pneumatically operated alarms are fitted which require periodic testing, carbon dioxide is not to be used as an operating medium. Air operated alarms may be used provided that the air supply is clean and dry.

4.1.10 Where electrically operated alarms are used, the arrangements are to be such that the electric operating mechanism is located outside the pump room.

4.1.11 The means of control of any fixed gas fire-extinguishing system are to be readily accessible and simple to operate and are to 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 is to be clear instructions relating to the operation of the system having regard to the safety of personnel.

4.1.12 Automatic release of the fire-extinguishing medium is not to be permitted.

4.1.13 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.

4.1.14 Means are to be provided for the crew to safely check the quantity of medium in the containers.

4.1.15 Containers for the storage of the fire-extinguishing medium and associated pressure components are to be designed to codes of practice recognized by the Society having regard to their locations and maximum ambient temperatures expected in service.

4.1.16 When the fire-extinguishing medium is stored outside a protected space it is to be stored in a room which is situated in a safe and readily accessible position and is effectively ventilated. Any entrance to such a storage room is to preferably be from the open deck and in any case be independent of the protected space. Access doors are to open outwards, and bulkheads and decks including doors and other means of closing any opening therein, which form the boundaries between such rooms and adjoining enclosed spaces are to be gastight.

4.1.17 Spare parts for the system are to be stored on board.

4.1.18 Fire extinguishing systems using Halon 1211, 1301 and 2402 and PFC's shall be prohibited.

4.2 Carbon dioxide systems

4.2.1 For cargo spaces the quantity of carbon dioxide available, unless otherwise provided, is to be sufficient to give a minimum volume of free gas equal to 30% of the gross volume of the largest cargo space so protected in the ship. For special requirements when vehicles with fuel, for their own propulsion, in their tanks are carried in the cargo compartments, and in the ro-ro cargo spaces, see Chapter 3.

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

- (a) 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
- (b) 35% of the gross volume of the largest machinery space protected, including the casing; provided that the above-mentioned percentages may be reduced to 35% and 30% respectively for cargo ships of less than 2000 tons gross provided also that if two or more machinery spaces are not entirely separate they are to be considered as forming one space.

4.2.3 For the purpose of this paragraph the volume of free carbon dioxide is to be taken as 0,56 m³/kg.

4.2.4 For machinery spaces the fixed piping system is to be such that 85% of the gas can be discharged into the space within 2 minutes.

4.2.5 For machinery spaces the distribution arrangements are to be such that approximately 15% of the required quantity of carbon dioxide is led to the bilge areas. Distribution to other high risk areas such as boiler flats are to be specially considered.

SECTION 5 Fire extinguishers

5.1 Approved types

5.1.1 All fire extinguishers are to be of approved types and designs.

5.1.2 Fire extinguishers are to be periodically examined and tested.

5.2 Extinguishing media

5.2.1 The number, location and type of extinguishing media employed are to be suitable for extinguishing fires in the compartments in which they are to be used.

5.2.2 The extinguishers required for use in the machinery spaces of ships using oil as fuel are to be of a type discharging foam, carbon dioxide gas, dry powder or other approved media suitable for extinguishing oil fires.

5.2.3 Fire extinguishers containing an extinguishing medium which, either by itself or under expected conditions of use gives off toxic gases in such quantities as to endanger persons are not permitted.

5.3 Capacity

5.3.1 The capacity of required portable fluid extinguishers is to be not more than 13,5 litres and not less than 9 litres. Other extinguishers are to be at least as portable as the 13,5 litres fluid extinguisher and are to have a fire-extinguishing capability at least equivalent to that of a 9 litre fluid extinguisher.

5.4 Spare charges

5.4.1 A spare charge is to be provided for each required portable fire extinguisher which can be readily recharged on board. If this cannot be done, duplicate extinguishers are to be carried.

5.5 Location

5.5.1 The extinguishers are to be stowed in readily accessible positions.

5.5.2 One of the portable fire extinguishers intended for use in any space is to be stowed near the entrance to that space.

5.6 Portable fire extinguishers in accommodation spaces, service spaces and control stations

5.6.1 Accommodation spaces, service spaces and control stations are to be provided with a sufficient number of portable fire extinguishers to ensure that at least one extinguisher will be readily available for use in every compartment of the crew and passenger spaces. In any case their number is not to be less than three.

5.6.2 For yachts with the notation "COMMERCIAL YACHT", for each deck one portable extinguisher shall be available for use within a distance of 10m from any location.

5.6.3 For yachts with the notation "COMMERCIAL YACHT", portable fire extinguishers of the carbon dioxide type shall not be located or provided for use in accommodation spaces.

5.6.4 For yachts with the notation "COMMERCIAL YACHT", except for portable extinguishers provided in connection with a specific hazard within a space when it is manned (such as a galley), portable extinguishers generally shall be located external to, but adjacent to, the entrance of the space(s) in which they shall be used. Extinguishers shall be stowed in readily accessible and marked locations.

5.7 Portable foam applicator

5.7.1 A portable foam applicator unit is to consist of an air-foam nozzle of an inductor type capable of being connected to the fire main by a fire hose, together with a portable tank containing at least 20 litres of foam-making liquid and one spare tank. The nozzle is to be capable of producing effective foam suitable for extinguishing an oil fire, at the rate of at least 1,5 m³/min.

SECTION 6 Fixed pressure water-spraying systems

6.1 Application

6.1.1 This Section applies to special category spaces and ro-ro cargo spaces.

6.2 Requirements

6.2.1 A fixed fire-extinguishing system for special category spaces is to be at least as effective in controlling a flowing petrol fire as a fixed pressure water-spraying system complying with [6.2.2](#) to [6.2.15](#) (referred to as a "drencher system").

6.2.2 The nozzles are to be of an approved, full bore type. They are to be so arranged as to secure an effective distribution of water in the spaces which are to be protected. For this purpose, the system is to be such as will provide water application at a rate of at least 3,5 l/m² of deck area per minute for spaces with a deck height not exceeding 2,5 m, and a capacity of at least 5 l/m² of deck area per minute for spaces with a deck height of 2,5 m or more. Precautions are to be taken to prevent the nozzles from becoming clogged by impurities in the water.

6.2.3 The water pressure is to be sufficient to ensure an even distribution of water.

6.2.4 The system is normally to cover the full breadth of the vehicle deck and may be divided into sections provided that they are of at least 20 m in length, except that in ships where the vehicle deck space is subdivided with longitudinal "A" Class divisions forming boundaries of staircases, etc., the breadth of the section may be reduced accordingly.

6.2.5 The distribution valves of the system are to be situated in an easily accessible position, adjacent to but outside the space protected, which will not readily be cut off by a fire within the space. Direct access to the distribution valves from the vehicle deck space and from outside that space is to be provided. Adequate ventilation is to be fitted in the space containing the distribution valves.

6.2.6 The water supply to the system is to be provided by a pump or pumps other than the pumps required by [SECTION 3](#) which are additionally to be connected to this system by a lockable non-return valve, which will prevent a backflow from the system into the fire main.

6.2.7 The principal pump or pumps are to be capable of providing simultaneously and at all times a sufficient supply of water at the required pressure to all nozzles in the vehicle deck, or in at least the two adjacent sections having the greatest aggregate application rate.

6.2.8 The principal pump or pumps are to 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.

6.2.9 The principal pump or pumps are to be situated in a position which is reasonably remote from the protected space.

6.2.10 If independently driven, e.g. by internal combustion engines, the pumps are to be so situated that a fire in the protected space would not affect the air supply to that machinery.

6.2.11 When a fixed pressure water-spraying system is provided for the machinery spaces in accordance with [SECTION 7](#), the pump required for that system may also be used for the purposes of supplying the drencher system, subject to the other requirements for the drencher pump being complied with.

6.2.12 The sea suction of the pump is to be so arranged that, when the ship 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.

6.2.13 The pump suction and discharge valves and any other valve requiring to be operated to bring the pump into operation should be locked open or be operable from the control position.

6.2.14 A waste valve with a short open ended pipe is to be fitted between the pump discharge and section control valves for testing purposes.

6.2.15 A new drencher system, after it has been installed in the ship, is to be tested to the satisfaction of the Surveyors.

SECTION 7 Fire-extinguishing arrangements in machinery spaces

7.1 Spaces containing oil-fired boilers or oil fuel units

7.1.1 Machinery spaces of Category "A" containing oil-fired boilers or oil fuel units are to be provided with any one of the following fire-extinguishing systems:

- (a) A gas system complying with [SECTION 4](#).
- (b) A high-expansion foam system complying with [8.3](#).
- (c) A pressure water-spraying system complying with [8.4](#).

7.1.2 In each case if the engine and boiler rooms are not entirely separate, or if oil fuel can drain from the boiler room into the engine room, the combined engine and boiler rooms are to be considered as one compartment.

7.1.3 There is to be in each boiler room at least one set of portable foam applicator unit complying with [5.7](#).

7.1.4 There is to be at least one portable foam extinguishers or equivalent in each firing space, in each boiler room and in each space in which a part of the oil fuel installation is situated.

7.1.5 There is to be not less than one approved foam-type extinguisher of at least 135 litres capacity or equivalent in each boiler room. These extinguishers are to be provided with hoses on reels suitable for reaching any part of the boiler room.

7.1.6 The requirements for domestic boilers of less than 175 kW in cargo ships will be specially considered.

7.1.7 In each firing space there is to be a receptacle containing sand, sawdust impregnated with soda, or other approved dry material and a scoop for distributing this material. An approved portable extinguisher may be substituted as an alternative.

7.1.8 For yachts with the notation "COMMERCIAL YACHT", in a machinery space containing an oil fired boiler, oil fuel settling tank or oil fuel unit, a fixed fire extinguishing system complying with the Fire Safety Systems Code shall be installed.

7.1.9 For yachts with the notation "COMMERCIAL YACHT", portable fire extinguishers for extinguishing oil fires shall be fitted as follows:

- (a) In a boiler room – at least 2;
- (b) In a space containing any part of an oil fuel installation – at least 2; and
- (c) In a firing space – at least 1.

7.2 Spaces containing internal combustion machinery

7.2.1 Machinery spaces of Category "A" containing internal combustion machinery are to be provided with:

- (a) At least one set of portable air-foam equipment complying with [5.7](#).
- (b) In each such space approved foam-type fire extinguishers, each of at least 45 litres capacity or equivalent, sufficient in number to enable foam or its equivalent to be directed on to any part of the fuel and lubricating oil pressure systems, gearing and other fire hazards.
- (c) A sufficient number of portable foam extinguishers or equivalent are to be located so that no point in the space is more than 10 m walking distance from an extinguisher and that there are at least two such extinguishers in each such space.

7.2.2 For yachts with the notation "COMMERCIAL YACHT", in machinery spaces of category "A" containing internal combustion machinery, fire appliances shall be provided at least to the extent listed in the following:

- (a) A fixed fire extinguisher system approved in accordance with the Fire Safety Systems Code; and
- (b) 1 portable extinguisher for oil fires for each 74.6 kw power (up to 7 maximum); or
- (c) 2 portable extinguishers for oil fires together with either

- i. 1 foam extinguisher of 45l capacity; or
- ii. 1 CO₂ extinguisher of 16kg capacity

7.2.3 Where fixed carbon dioxide fire-extinguishing systems for the protection of machinery spaces are fitted on ships constructed before 1 July 2002, they shall comply with the provisions of paragraph 2.2.2 of chapter 5 of the Fire Safety Systems Code.

7.3 Fire-extinguishing appliances in other machinery spaces

7.3.1 Where a fire hazard exists in any machinery space for which no specific provisions for fire-extinguishing appliances are prescribed in 7.1 and 7.2, there are to be provided in, or adjacent to, that space such a satisfactory number of approved portable fire extinguishers or other approved means of fire extinction.

7.4 Fixed fire-extinguishing systems not required by this Part

7.4.1 Where a fixed fire-extinguishing system not required by this Part is installed, the arrangement will be specially considered.

7.5 Machinery spaces of Category "A" in passenger ships

7.5.1 In passenger ships each machinery space of Category "A" is to be provided with at least two suitable water fog applicators, each consisting of a metal L-shaped pipe, the long limb being about 2 m in length capable of being fitted to a fire hose and the short limb being about 250 mm in length fitted with a fixed water fog nozzle or capable of being fitted with a water spray nozzle.

SECTION 8 Fixed fire-extinguishing systems in machinery spaces

8.1 Gas fire-extinguishing systems

8.1.1 For fixed gas fire-extinguishing systems see [SECTION 4](#).

8.2 Low-expansion foam systems

8.2.1 Any fixed low-expansion foam fire-extinguishing system in machinery spaces is to be fitted in addition to the requirements of [SECTION 7](#).

8.2.2 Any such system is to be capable of discharging through fixed discharge outlets in not more than five minutes a quantity of foam sufficient to cover to a depth of 150 mm the largest single area over which oil fuel is liable to spread.

8.2.3 The system is to be capable of generating foam suitable for extinguishing oil fires. Means are to be provided for effective distribution of the foam through a permanent system of piping and control valves or cocks to suitable discharge outlets, and for the foam to be effectively directed by fixed sprayers on other main fire hazards in the protected space. The distribution pipes are to be of steel and galvanized, at least internally.

8.2.4 The expansion ratio of the foam is not to exceed 12 to 1.

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

8.3 High-expansion foam systems

8.3.1 Any required fixed high-expansion foam system in machinery spaces is to be capable of rapidly discharging through fixed discharge outlets a quantity of foam sufficient to fill the greatest space to be protected at a rate of at least 1 m in depth per minute. The quantity of foam-forming liquid available is to be sufficient to produce a volume of foam equal to five times the volume of the largest space to be protected.

8.3.2 The expansion ratio of the foam is to not exceed 1000 to 1.

8.3.3 Alternative arrangements and discharge rates will be permitted provided that equivalent protection is achieved.

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

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

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

8.4 Pressure water-spraying systems

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

8.4.2 The number and arrangement of the nozzles is to be such as to ensure an effective average distribution of water of at least 5 l/m² per minute in the spaces to be protected. Where increased application rates are considered necessary, these will be specially considered. Nozzles are to be fitted above bilges, tank tops and other areas over which oil fuel is liable to spread and also above other specific fire hazards in the machinery spaces.

8.4.3 The system may be divided into sections, the distribution valves of which are to be operated from easily accessible positions outside the spaces to be protected and will not be readily cut off by a fire in the protected space.

8.4.4 The system is to be kept charged at the necessary pressure and the pump supplying the water for the system is to be put automatically into action by a pressure drop in the system.

8.4.5 The pump is to be capable of simultaneously supplying, at the necessary pressure, all sections of the system in any one compartment to be protected. The pump and its controls are to be installed outside the space or spaces to be protected. It is not to be possible for a fire in the space or spaces protected by the water-spraying system to put the system out of action.

8.4.6 The pump may be driven by independent internal combustion machinery but, if it is dependent upon power being supplied from the emergency generator, that generator is to be so arranged as to start automatically in case of main power failure so that power for the pump required by 8.4.5 is immediately available. When the pump is driven by independent internal combustion machinery it is to be so situated

that a fire in the protected space will not affect the air supply to the machinery.

8.4.7 Precautions are to be taken to prevent the nozzles from becoming clogged by impurities in the water of corrosion of piping, nozzles, valves and pump.

SECTION 9 Special arrangements in machinery spaces

9.1 Application

9.1.1 The provisions of this Section apply to machinery spaces of Category "A" and, where necessary, to other machinery spaces.

9.2 Requirements

9.2.1 The number of skylights, doors, ventilators, openings in funnels to permit exhaust ventilation and other openings to machinery spaces are to be reduced to a minimum consistent with the needs of ventilation and the proper and safe working of the ship.

9.2.2 Skylights are to be of steel and are not to contain glass panels. Suitable arrangements are to be made to permit the release of smoke in the event of fire, from the space to be protected.

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

9.2.4 Windows are not to be fitted in machinery space boundaries. This does not preclude the use of glass in control rooms within the machinery spaces.

9.2.5 Means of control are to be provided for:

- (a) Opening and closure of skylights, closure of openings in funnels which normally allow exhaust ventilation, and closure of ventilator dampers.
- (b) Permitting the release of smoke.
- (c) Closing power-operated doors or actuating release mechanism on fire-doors other than power-operated watertight doors.
- (d) Stopping ventilating fans.
- (e) Stopping forced and induced draught fans, oil fuel transfer pumps, oil fuel unit pumps and other similar fuel pumps.

9.2.6 The controls required in [9.2.5](#) are to be located outside the space concerned, where they will not be cut off in the event of fire in the space they serve. In passenger ships such controls and the controls for any required fire-extinguishing system are to be situated at one control position or grouped in as few positions as possible. Such positions are to have a safe access from the open deck.

9.2.7 For periodically unattended machinery spaces in cargo ships, special consideration will be given to maintaining fire integrity of the machinery spaces, the location and centralization of the fire-extinguishing system controls, and the required shutdown arrangements (e.g. ventilation, fuel pumps, etc.). Additional fire-extinguishing appliances and other fire-fighting equipment and breathing apparatus may be required. In passenger ships these requirements are to be at least equivalent to those of machinery spaces normally

attended.

9.2.8 A fixed fire detection and alarm system complying with the provisions of [SECTION 11](#) is to be fitted in any machinery space:

- (a) Where the installation of automatic and remote control systems and equipment has been approved in lieu of continuous manning of the space.
- (b) Where the main propulsion and associated machinery including sources of main electrical supply are provided with various degrees of automatic or remote control and are under continuous manned supervision from a control room.

SECTION 10 Fixed fire detection and fire alarm systems

10.1 General requirements

10.1.1 Any required fixed fire detection and fire alarm system with manually operated call points is to be capable of immediate operation at all times.

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

10.1.3 Detectors and manually operated call points are to be grouped into sections. The activation of any detector or manually operated call point is to 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 is to 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.

10.1.4 The control panel is to be located on the navigating bridge or in the main fire control station.

10.1.5 Detectors are to be operated by heat, smoke or other products of combustion, flame, or any combination of these factors. Detectors operated by other factors indicative of incipient fires may be considered, provided that they are no less sensitive than such detectors. Flame detectors are only to be used in addition to smoke or heat detectors.

10.1.6 Suitable instructions and component spares for testing and maintenance are to be provided.

10.1.7 In each section, one spare detector head is to be provided for each 50 heads in that section with a minimum of 6 heads per type fitted. They are to be stowed in a suitable container at the control station.

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

10.1.9 The fire detection system is not to be used for any other purpose, except that closing of fire doors and similar functions may be permitted at the control panel.

10.1.10 For yachts with the notation "COMMERCIAL YACHT", a fixed fire detection and fire alarm system shall be fitted in all enclosed spaces except those containing no significant fire risk (toilets, bathrooms, void spaces, etc). Manually operated call points shall be placed effectively to ensure a readily accessible means of notification. The fixed fire detection and fire-alarm system shall be installed in accordance with the

requirements of SOLAS II-2/7 and the Fire Safety Systems Code, Chapter 9, and shall be audible externally. The arrangements should be such as to detect a fire in the space of origin and to provide for an alarm for safe escape and fire fighting activity.

10.2 Installation requirements

10.2.1 Manually-operated call points are to be installed throughout the accommodation spaces, service spaces and control stations. One manually-operated call point is to be located at each exit. Manually-operated call points are to 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.

10.2.2 Smoke detectors are to be installed in all stairways, corridors and escape routes within accommodation spaces. Consideration is to be given to the installation of special purpose smoke detectors within ventilation ducting.

10.2.3 Where a fixed fire detection and fire alarm system is required for the protection of spaces other than those specified in [10.2.2](#), at least one detector complying with [10.1.5](#) is to be installed in each such space.

10.2.4 Detectors are to 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 are to be avoided. In general, detectors which are located overhead are to be a minimum distance of 0,5 m away from bulkheads.

10.2.5 Electrical wiring which forms part of the system is to 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.

10.3 Design requirements

10.3.1 The system and equipment are to be suitably designed to withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in ships.

10.3.2 Smoke detectors required by [10.2.2](#) are to be certified to operate before the smoke density exceeds 12,5% obscuration per metre, but not until the smoke density exceeds 2% obscuration per metre. Smoke detectors to be installed in other spaces are to operate within satisfactory sensitivity limits having regard to the avoidance of detector insensitivity or oversensitivity.

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

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

10.4 Requirements for periodically unattended machinery spaces

10.4.1 A fixed fire detection and fire alarm system complying with the relevant provisions of [10.1](#) to [10.3](#) is to be installed in periodically unattended machinery spaces.

10.4.2 The system is to be so designed and the detectors so positioned as to detect rapidly the onset of fire in any part of those spaces and under any normal conditions of operation of the machinery and

variations of ventilation as required by the possible range of ambient temperatures. Except in spaces of restricted height and where their use is specially appropriate, detection systems using only thermal detectors will not be permitted.

10.4.3 The detection system is to 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 is to sound in a place where a responsible member of the crew is on duty.

10.4.4 Facilities are to be provided in the fire detecting system to manually initiate the fire alarm from the following locations:

- (a) Positions adjacent to entrances to engine and boiler rooms.
- (b) Navigating bridge.
- (c) Control station in engine room.
- (d) Fire control station.

10.4.5 The alarm system is to be designed with self-monitoring properties. Power or system failures are to initiate an audible alarm distinguishable from the fire alarm.

10.4.6 After installation the system is to be tested under varying conditions of engine operation and ventilation to the satisfaction of the Surveyors.

SECTION 11 Arrangements for oil fuel, lubricating oil and other flammable oils

11.1 Limitations in the use of oil as fuel

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

- (a) Except as otherwise permitted by this paragraph, no oil fuel with a flashpoint of less than 60°C is to be used.
- (b) In emergency generators oil fuel with a flashpoint of not less than 43°C may be used.
- (c) Subject to such additional precautions as it may be considered necessary and on condition that the ambient temperature of the space in which such oil fuel is stored or used is not to be allowed to rise to within 10°C below the flashpoint of the oil fuel, the general use of oil fuel having a flashpoint of less than 60°C but not less than 43°C may be permitted.
- (d) In cargo ships the use of fuel having a lower flashpoint than otherwise specified in this paragraph, for example crude oil, may be permitted provided that such fuel is not stored in any machinery space and subject to the approval of the complete installation.

11.1.2 The flashpoint of oils is to be determined by an approved closed cup method.

11.2 Oil fuel arrangements

11.2.1 In a ship in which oil fuel is used, the arrangements for the storage, distribution and utilization of the oil fuel are to be such as to minimise the risk of fire or explosion and to ensure the safety of the ship and persons on board and are to comply at least with the provisions of [11.2.2](#) to [11.2.9](#).

11.2.2 As far as practicable, parts of the oil fuel system containing heated oil under pressure exceeding 0,18 N/mm² are not to be placed in a concealed position such that defects and leakage cannot readily be

observed. The machinery spaces in way of such parts of the oil fuel system are to be adequately illuminated.

11.2.3 The ventilation of machinery spaces is to be sufficient under all normal conditions to prevent accumulation of oil vapour.

11.2.4 As far as practicable, oil fuel tanks are to be part of the ship's structure and are to be located outside machinery spaces of Category "A". Where oil fuel tanks, other than double bottom tanks, are necessarily located adjacent to or within machinery spaces of Category "A", at least one of their vertical sides is to be contiguous to the machinery space boundaries, and is preferably to have a common boundary with the double bottom tanks, and the area of the tank boundary common with the machinery spaces is to be kept to a minimum. Where such tanks are situated within the boundaries of machinery spaces of Category "A" they are not to contain oil fuel having a flashpoint of less than 60°C. In general the use of free-standing oil fuel tanks is to be avoided. When such tanks are employed their use is to be prohibited in Category "A" machinery spaces on passenger ships. Where permitted, they are to be placed in an oiltight spill tray of ample size having a suitable drain pipe leading to a suitably sized oil spill tank.

11.2.5 No oil fuel tank is to be situated where spillage or leakage therefrom can constitute a hazard by falling on heated surfaces. Precautions are to be taken to prevent any oil that may escape under pressure from any pump, filter or heater from coming into contact with heated surfaces.

11.2.6 Every oil fuel pipe, which, if damaged, would allow oil to escape from a storage, settling or daily service tank situated above the double bottom is to be fitted with a cock or valve directly on the tank capable of being closed from a safe position outside the space concerned in the event of a fire occurring in the space in which such tanks are situated. In the special case of deep tanks situated in any shaft or pipe tunnel or similar space, valves on the tank are to be fitted but control in the event of fire may be effected by means of an additional valve on the pipe or pipes outside the tunnel or similar space. If such additional valve is fitted in the machinery space it is to be operated from a position outside this space.

11.2.7 Safe and efficient means of ascertaining the amount of oil fuel contained in any oil fuel tank are to be provided.

(a) Where sounding pipes are used, they are not to terminate in any space where the risk of ignition of spillage from the sounding pipe might arise. In particular, they are not to terminate in passenger or crew spaces. As a general rule, they are not to terminate in machinery spaces except if all the following requirements are met:

- .1 In addition, an oil-level gauge is provided meeting the requirements of (b).
- .2 The sounding pipes terminate in locations remote from ignition hazards unless precautions are taken such as the fitting of effective screens to prevent the oil fuel in case of spillage through the terminations of the sounding pipes from coming into contact with a source of ignition.
- .3 The terminations of sounding pipes are fitted with self-closing blanking devices and with a small-diameter self-closing control cock located below the blanking device for the purpose of ascertaining, before the blanking device is opened, that oil fuel is not present. Provision is to be made so as to ensure that any spillage of oil fuel through the control cock involves no ignition hazard.

(b) Other level gauges may be used in place of sounding pipes. Such means, like the means provided in (a) are subject to the following conditions:

- .1 In passenger ships, such means do not require penetration below the top of the tank, and their failure or overfilling of the tanks will not permit release of fuel.
- .2 In cargo ships, the failure of such means or overfilling of the tanks will not permit release of fuel. The use of cylindrical gauge glasses is prohibited. The use of oil-level gauges with flat glasses and self-closing valves between the gauges and the fuel tanks may be permitted. Such other means are to be maintained in the proper condition to ensure their continued accurate functioning in

service.

11.2.8 Provision is to be made to prevent overpressure in any oil tank or in any part of the oil fuel system, including the filling pipes. Any relief valves and air or overflow pipes are to discharge to a position which is safe.

11.2.9 Oil fuel pipes and their valves and fittings are to be of steel or other approved material, except that restricted use of flexible pipes may be permissible in positions where they are necessary. Such flexible pipes and end attachments are to be of approved fire-resisting materials of adequate strength.

11.2.10 Additionally, for yachts with the notation "COMMERCIAL YACHT" means shall be provided to stop fuel transfer pumps, oil fired boilers and separators from outside the machinery space. Moreover, all fuel filter bowls shall be of metal construction.

11.3 Lubricating oil arrangements

11.3.1 The arrangements for the storage, distribution and utilization of oil used in pressure lubrication systems are to be such as to minimise the risk of fire or explosion and to ensure the safety of the ship and persons on board. The arrangements made in machinery spaces of Category "A" and whenever possible in other machinery spaces are at least to comply with the provisions of [11.2](#), except that:

- (a) This does not preclude the use of sight-flow glasses in lubricating systems provided that they are shown by test to have a suitable degree of fire resistance.
- (b) Sounding pipes may be authorized in machinery spaces; the requirements of [11.2.7\(a\).1](#) and [11.2.7\(a\).3](#) need not be applied on condition that the sounding pipes are fitted with appropriate means of closure.

11.4 Arrangements for other flammable oils

11.4.1 The arrangements for the storage, distribution and utilization of other flammable oils employed under pressure in power transmission systems, control and activating systems and heating systems are to be such as to minimise the risk of fire or explosion and to ensure the safety of the ship and persons on board. In locations where means of ignition are present, such arrangements are to comply at least with the provisions of [11.2.5](#) and [11.2.7](#) and with the provisions of [11.2.8](#) and [11.2.9](#) in respect of strength and construction.

11.5 Periodically unattended machinery spaces

11.5.1 In addition to the requirements of [11.4](#), the oil fuel and lubricating oil systems are to comply with the following:

- (a) Where necessary, oil fuel and lubricating oil pipelines are to be screened or otherwise suitably protected to avoid as far as practicable oil spray or oil leakages on to hot surfaces or into machinery air intakes. The number of joints in such piping systems is to be kept to a minimum and, where practicable, leakages from high pressure oil fuel pipes are to be collected and arrangements provided for an alarm to be given.
- (b) Where daily service oil fuel tanks are filled automatically or by remote control, means are to be provided to prevent overflow spillages. Other equipment used in the automatic treatment of flammable liquids, e.g. oil fuel purifiers, are, whenever practicable, to be installed in a special space reserved for purifiers and their heaters and are to have arrangements to prevent overflow spillages.
- (c) Where daily service oil fuel tanks or settling tanks are fitted with heating arrangements, a high

temperature alarm is to be provided if the flashpoint of the oil fuel can be exceeded.

11.6 Prohibition of carriage of flammable oils in forepeak tanks

11.6.1 Oil fuel, lubrication oil and other flammable oils are not to be carried in forepeak tanks.

SECTION 12 Ventilation systems

12.1 General requirements

12.1.1 Ventilation ducts are to be of non-combustible material. Short ducts, however, not generally exceeding 2 m in length and with a cross-section not exceeding 0,02 m² need not be non-combustible, subject to the following conditions:

- (a) These ducts are to be of a material which has a low fire risk.
- (b) They may only be used at the end of the ventilation device.
- (c) They are not to be situated less than 600 mm, measured along the duct, from an opening in an "A" or "B" Class division including continuous "B" Class ceilings.

12.1.2 Where the ventilation ducts with a free-sectional area exceeding 0,02 m² pass through Class "A" bulkheads or decks, the opening is to be lined with a steel sheet sleeve unless the ducts passing through the bulkheads or decks are of steel in the vicinity of passage through the deck or bulkhead and the ducts and sleeves are to comply in this part with following:

- (a) The ducts or sleeves lining such ducts are to have a thickness of at least 3 mm and a length of at least 900 mm. When passing through bulkheads, this length is to be divided preferably into 450 mm on each side of the bulkhead. These ducts, or sleeves lining such ducts, are to be provided with fire insulation. The insulation is to have at least the same fire integrity as the bulkhead or deck through which the duct passes. Equivalent penetration protection will be specially considered.
- (b) Ducts with a free cross-sectional area exceeding 0,075 m² are to be fitted with fire dampers in addition to the requirements of (a). The fire damper is to operate automatically but is also to be capable of being closed manually from both sides of the bulkhead or deck. The damper is to be provided with an indicator which shows whether the damper is open or closed. Fire dampers are not required, however, where ducts pass through spaces surrounded by "A" Class divisions, without serving those spaces, provided those ducts have the same fire integrity as the divisions which they pierce.

12.1.3 Ducts provided for the ventilation of machinery spaces of Category "A", galleys, car deck spaces, ro-ro cargo spaces or special category spaces are not to pass through accommodation spaces, service spaces or control stations. Where this is unavoidable the ducts are :

- (a) Constructed of steel having a thickness of at least 3 mm and 5 mm for ducts the widths or diameters of which are up to and including 300 mm and 760 mm and over respectively and, in the case of such ducts, the widths or diameters of which are between 300 mm and 760 mm having a thickness to be obtained by interpolation.
- (b) Suitably supported and stiffened.

- (c) Fitted with automatic fire dampers close to the boundaries penetrated; and
- (d) Insulated to "A-30" (B-15 on Short Range Yachts) standard from the machinery spaces, galleys, car deck spaces, ro-ro cargo spaces or special category spaces to a point at least 5 m beyond each fire damper; or
- (e) Constructed of steel in accordance with [\(a\)](#) and [\(b\)](#); and
- (f) Insulated to "A-60" standard throughout the accommodation spaces, service spaces or control stations; except that penetrations of main zone divisions are to also comply with the requirements of [12.1.8](#).
- (g) In addition, for yachts with the notation of "COMMERCIAL YACHT" fixed means for extinguishing a fire within the galley exhaust duct shall exist.

12.1.4 Ducts provided for ventilation to accommodation spaces, service spaces or control stations are not to pass through Category "A" machinery spaces, galleys, car deck spaces, ro-ro cargo spaces or special category spaces unless either:

- (a) The ducts where they pass through Category "A" machinery spaces, galley, car deck space, ro-ro cargo space or special category space are constructed of steel in accordance with [12.1.3\(a\)](#) and [12.1.3\(b\)](#).
- (b) Automatic fire dampers are fitted close to the boundaries penetrated; and
- (c) The integrity of the machinery space, galley, car deck space, ro-ro cargo space or special category space boundaries is maintained at the penetrations; or
- (d) The ducts are insulated to "A-60" standard within the machinery space, galley, car deck space, ro-ro cargo space or special category space.

Except that, penetrations of main zone divisions are also to comply with [12.1.8](#).

12.1.5 Ventilation ducts with a free cross-sectional area exceeding 0,02 m² passing through "B" class bulkheads are to be lined with steel sheet sleeves of 900 mm in length divided preferably into 450 mm on each side of the bulkheads unless the duct is of steel for this length.

12.1.6 Such measures are as practicable as to be taken in respect of control stations outside machinery spaces in order to ensure that ventilation, visibility and freedom from smoke are maintained, so that in the event of fire the machinery and equipment contained therein may be supervised and continue to function effectively. Alternative and separate means of air supply are to be provided; air inlets of the two sources of supply are to be so disposed that the risk of both inlets drawing in smoke simultaneously is minimized. Such requirements need not apply to control stations situated on, and opening on to, an open deck, or where local closing arrangements would be equally effective.

12.1.7 Where they pass through accommodation spaces or spaces containing combustible materials, the exhaust ducts from galley ranges are to be constructed of "A" Class divisions. Such exhaust ducts are to be fitted with:

- (a) A grease tap readily removable for cleaning.
- (b) A fire damper located in the lower end of the duct.
- (c) Arrangements, operable from within the galley, for shutting off the exhaust fans.
- (d) Fixed means for extinguishing a fire within the duct.

12.1.8 Where it is necessary that a ventilation duct passes through a main vertical zone division, a fail-safe automatic closing fire damper is to be fitted adjacent to the division. The damper is also to be capable of being manually closed from each side of the division. The operating position is to be readily accessible and be marked in red light-reflecting colour. The duct between the division and the damper is to be of steel or

other equivalent material and, if necessary, insulated to comply with the requirements of [14.1.1](#). The damper is to be fitted on at least one side of the division with a visible indicator showing whether the damper is in the open position.

12.1.9 The main inlets and outlets of all ventilation systems are to be capable of being closed from outside the spaces being ventilated.

12.1.10 Ventilation systems serving machinery spaces are to be independent of systems serving other spaces.

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

12.1.12 Store-rooms containing appreciable quantities of highly flammable products are to be provided with ventilation arrangements which are separate from other ventilation systems. Ventilation is to be arranged at high and low levels and the inlets and outlets of ventilators are to be positioned in safe areas and fitted with spark arresters.

12.1.13 For yachts with the notation "COMMERCIAL YACHT" the following additional requirements shall be met:

1. All enclosed spaces containing free standing fuel tanks are to be ventilated independently of systems serving other spaces.
2. Ventilation shall be provided to prevent the accumulation of dangerous concentrations of flammable gas which may be emitted from batteries.
3. Ducts provided for tumble driers shall be fitted with filters readily removable for cleaning purposes and suitably located cleaning and inspection openings.
4. All fire dampers shall be capable of manual operation. The dampers shall have a direct mechanical means of release or, alternatively, be closed by electrical, hydraulic, or pneumatic operation. All dampers shall be manually operable from both sides of the division. Automatic fire dampers, including those capable of remote operation, shall have a failsafe mechanism that shall close the damper in a fire even upon loss of electrical power or hydraulic or pneumatic pressure loss. Remotely operated fire dampers shall be capable of being reopened manually at the damper.
5. Fire dampers shall be easily accessible. Where they are placed behind ceilings or linings, these ceilings or linings shall be provided with an inspection hatch on which the identification number of the fire damper is marked. The fire damper identification number shall also be marked on any remote controls provided.
6. Ventilation ducts shall be of non-combustible material except flexible bellows of short length not exceeding 600 millimetres used for connecting fans to the ducting in air-conditioning rooms. Short ducts, however, not generally exceeding 2m in length and with a cross-section not exceeding 0.02m² need not be non-combustible, subject to the following conditions:
 - a) they shall be of a suitable material having low flame-spread characteristics and, in each case, a calorific value not exceeding 45 MJ/m² of their surface area for the thickness used.
 - b) they shall be used only at the end of the ventilation device; and
 - c) they shall not be situated less than 600 millimetres, measured along the duct, from an opening in an "A" or "B" class division including continuous "B" class ceilings.

7. Ventilation ducts shall be provided with hatches for inspection and cleaning. The hatches shall be located near the fire dampers.

SECTION 13 Fireman's outfit

13.1 Components

13.1.1 A fireman's outfit is to consist of:

(a) Personal equipment comprising:

- .1 Protective clothing of material to protect the skin from the heat radiating from the fire and from burns and scalding by steam. The outer surface is to be water-resistant.
- .2 Boots and gloves of rubber or other electrically non-conducting material.
- .3 A rigid helmet providing effective protection against impact.
- .4 An electric safety lamp (hand lantern) of an approved type with a minimum burning period of three hours.
- .5 An axe with an insulated handle.

(b) A breathing apparatus of an approved type which may be either:

- .1 A smoke helmet or smoke mask which is to be provided with a suitable air pump and a length of air hose sufficient to reach from the open deck, well clear of hatch or doorway, to any part of the holds or machinery spaces; or
- .2 A self-contained breathing apparatus, the volume of air contained in the cylinders of which is to be at least 1200 l, or other self-contained breathing apparatus which is to be capable of functioning for at least 30 minutes. A number of spare bottles, which are to be maintained fully charged, are to be provided except where facilities for re-charging the bottles are available on board ship.

13.1.2 If in order to comply with the requirements of [13.1.1\(b\).1](#), an air hose exceeding 36 m in length would be necessary, all breathing apparatus required is to be self-contained breathing apparatus in accordance with [13.1.1\(b\).2](#). However, in such cases, if so desired, a smoke helmet or smoke mask as described in [13.1.1\(b\).1](#) may be provided in addition.

13.1.3 For each breathing apparatus a fireproof lifeline of sufficient length and strength is to be provided capable of being attached by means of a snaphook to the harness of the apparatus or to a separate belt in order to prevent the breathing apparatus becoming detached when the lifeline is operated.

13.2 Application

13.2.1 All ships are to carry at least two firemen's outfits complying with the requirements of [13.1](#).

13.3 Fire-fighter's communication

13.3.1 On existing vessels and new vessels, a minimum of two two-way portable radiotelephone apparatus for each fire party for fire-fighter's communication shall be carried onboard. Those two-way portable radiotelephone apparatus shall be of an explosion-proof type or intrinsically safe.

SECTION 14 Miscellaneous Items

14.1 Penetrations

14.1.1 Where "A" Class divisions are penetrated for the passage of electric cables, pipes, trunks, ducts, etc., or for girders, beams or other structural members, arrangements are to be made to ensure that the fire resistance is not impaired. Any such through-going members should in general be insulated in a manner similar to the division for a distance of 400 mm from the division.

14.1.2 Where "B" Class divisions are penetrated for the passage of electric cables, pipes, trunks, ducts, etc., or for the fitting of ventilation terminals, lighting fixtures and similar devices, arrangements are to be made to ensure that the fire resistance is not impaired. Pipes, cables or trunks, etc, which are made of material which can fuse or which is combustible, should be protected by steel or incombustible sleeves or similar arrangements and insulated as necessary.

14.2 Materials

14.2.1 Pipes penetrating "A" or "B" Class divisions are to be of approved materials having regard to the temperature such divisions are required to withstand.

14.2.2 Pipes conveying oil or combustible liquids through accommodation and service spaces are to be of approved materials having regard to the fire risk.

14.2.3 Materials readily rendered ineffective by heat are not to be used for overboard scuppers, sanitary discharges, and other outlets which are close to the waterline and where the failure of the material in the event of fire would give rise to danger of flooding.

14.2.4 For the protection of cargo tanks carrying crude oil and petroleum products having a flashpoint not exceeding 60°C, materials readily rendered ineffective by heat are not to be used for valves, fittings, tank opening covers, cargo vent piping and cargo piping so as to prevent the spread of fire to the cargo.

14.3 Heating installations

14.3.1 Electric radiators/space heaters, if used, are to be fixed in position and so constructed as to reduce fire risks to a minimum. No such radiators are to be fitted with an element so exposed that clothing, curtains, or other similar materials can be scorched or set on fire by heat from the element.

14.3.2 Heating by means of open fires will not be permitted. Heating stoves and other similar appliances are to be firmly secured and adequate protection and insulation against fire is to be provided beneath and around such appliances and in way of their uptakes.

14.4 Waste receptacles

14.4.1 All waste receptacles are to be constructed of non-combustible materials with no openings in the sides or bottom.

14.5 Surface of insulation

14.5.1 In spaces where penetration of oil products is possible, the surface of insulation is to be impervious to oil or oil vapours. Insulation boundaries are to be arranged to avoid immersion in oil spillages.

14.6 Storage of gas cylinders and dangerous materials

14.6.1 Cylinders for compressed, liquefied or dissolved gases are to be clearly marked by means of prescribed identifying colours, to have a clearly legible identification of the name and chemical formula of their contents and to be properly secured.

14.6.2 Cylinders containing flammable or other dangerous gases and expended cylinders are to be stored, properly secured, on open decks and all valves, pressure regulators and pipes leading from such cylinders are to be protected against damage. Cylinders are to be protected against excessive variations in temperature, direct rays of the sun and accumulation of snow. However, such cylinders may be stored in compartments complying with the requirements of [14.6.3](#), [14.6.4](#) and [14.6.5](#).

14.6.3 Spaces containing highly flammable liquids, such as volatile paints, paraffin, benzol, etc. and, where permitted, liquefied gas, are to have direct access from open decks only. Pressure-adjusting devices and relief valves are to exhaust within the compartment. Where boundary bulkheads of such compartments adjoin other enclosed spaces they are to be gastight.

14.6.4 Except as necessary for service within the space, electrical wiring and fittings will not be permitted within compartments used for the storage of highly flammable liquids or liquefied gases. Where such electrical fittings are installed, they are to be satisfactory for use in a flammable atmosphere. Sources of heat are to be kept clear of such spaces and "No Smoking" and "No Naked Light" notices are to be displayed in a prominent position.

14.6.5 Separate storage is to be provided for each type of compressed gas. Compartments used for the storage of such gases are not to be used for storage of other combustible products nor for tools or objects not part of the gas distribution system. However, these requirements may be waived considering the characteristics, volume and intended use of such compressed gases.

14.6.6 Spaces containing paints, flammable liquids or liquefied gases are to be protected by an appropriate fire-extinguishing arrangement.

SECTION 15 Fire control plans

15.1 Description of plans

15.1.1 In all ships general arrangement plans are to be permanently exhibited for the guidance of the ship's officers, showing clearly for each deck the control stations, the various fire sections enclosed by "A" Class divisions, the sections enclosed by "B" Class divisions together with particulars of the fire detection and fire alarm systems, the sprinkler installation, the fire-extinguishing appliances, means of access to different compartments, decks, etc. and the ventilating system including particulars of the fan control positions, the position of dampers and identification numbers of the ventilating fans serving each section.

Alternatively, the aforementioned details may be set out in a booklet, a copy of which is to be supplied to each officer, and one copy is at all times to be available on board in an accessible position. Plans and booklets are to be kept up to date, any alterations being recorded thereon as soon as practicable. Description in such plans and booklets is to be in the official language of the flag State. If the language is neither English or French, a translation into one of those languages is to be included. In addition, instructions concerning the maintenance and operation of all the equipment and installations on board for the fighting and containment of fire are to be kept under one cover, readily available in an accessible position.

15.1.2 In all ships a duplicate set of fire control plans or a booklet containing such plans is to be permanently stored in a prominently marked weathertight enclosure outside the deckhouse for the assistance of shoreside fire-fighting personnel.

15.1.3 For Yachts with the notation "COMMERCIAL YACHT", in addition to the requirements of 15.1.1 and 15.1.2, the content of the plan(s) should adequately show and describe the principal fire prevention and protection equipment while materials and symbols used on the plans should comply with a recognised international standard as far as practical. The fire control plan should also provide information on the location of flammable liquid storage and on the locations and means of control of systems and openings which should be closed down in a fire emergency. The fire control plan may be a combined Fire & Safety Plan, which should show the positions of stowage of the life-saving and fire appliances. For yachts over 500 gross tons, a Fire Training Manual, as required by SOLAS Chapter II-2/15 should be provided as well.

15.1.4 For yachts, where fire plans and the information referenced above have been appraised, approved and verified on board by the Flag Administration, LHR will only acknowledge the aforementioned and therefore no further appraisal, approval or survey should be provided.

SECTION 16 Cathodic protection

16.1 General

16.1.1 Impressed current systems are not permitted in oil cargo tanks.

16.1.2 Magnesium or magnesium alloy anodes are not permitted in oil cargo tanks.

16.1.3 Aluminium anodes are only permitted in cargo tanks of tankers in locations where the potential energy does not exceed 28 kg m (200 ft lb). The height of the anode is to be measured from the bottom of the tank to the centre of the anode, and its weight is to be taken as the weight of the anode as fitted, including the fitting devices and inserts. However, where aluminium anodes are located on horizontal surfaces such as bulkhead girders and stringers not less than 1 m wide and fitted with an upstanding flange or face flat projecting not less than 75 mm above the horizontal surface, the height of the anode may be measured from this surface. Aluminium anodes are not to be located under tank hatches or Butterworth openings (in order to avoid any metal parts falling on the fitted anodes), unless protected by adjacent structure.

16.1.4 There is no restriction on the positioning of zinc anodes.

16.1.5 The anodes should have steel cores and these should be sufficiently rigid to avoid resonance in the anode support and be designed so that they retain the anode even when it is wasted.

16.1.6 The steel inserts are to be attached to the structure by means of a continuous weld of adequate section. Alternatively they may be attached to separate supports by bolting, provided a minimum of two bolts with locknuts are used. However, approved mechanical means of clamping will be accepted.

16.1.7 The supports at each end of an anode should not be attached to separate items which are likely to move independently.

16.1.8 When anode inserts or supports are welded to the structure, they should be arranged so that the welds are clear of stress raisers.

SECTION 17 Additional requirements for commercial yachts

17.1 General

17.1.1 For yachts with the notation "COMMERCIAL YACHT", regardless of gross tonnage the following additional requirements should be met.

17.2 Protection of spaces containing vehicles or craft with fuel in their tanks or lockers storing such fuels and spaces containing recreational dive systems

17.2.1 Special consideration shall be given to safe conditions of carriage of petrol and other highly flammable liquids either in hand portable containers/tanks or in the tanks of vehicles (such as personal water craft, motor cars and helicopters) which may be transported. This section is not considered applicable to diesel stowage.

17.2.2 The quantity of spare petrol and/or other highly flammable liquids carried shall be kept to a minimum, generally up to 150 litres maximum. Greater quantities may be specially considered by the Administration when the storage location, ventilation, containers, fire suppression and space fire protection and detection are considered adequate for the given increase.

17.2.3 Containers used for the carriage of flammable liquids shall be constructed to a recognised standard appropriate to the contents and each container clearly marked to indicate its contents.

17.2.4 Small lockers on open deck for the stowage of hand portable containers of petrol shall be located away from high risk areas, have no electrical fittings, and be provided with the following:

- a) Natural ventilation openings top and bottom;
- b) Drainage leading overboard;
- c) Means of securing the fuels containers; and
- d) A facility to boundary cool the locker.

17.2.5 The enclosed spaces, and larger lockers on open deck, designated for the safe carriage of petrol or similar fuel, refuelling units or vehicles with fuel in their tanks shall be fitted with:

- a) A manual water spray system giving a coverage of 3.5 ltr/m²/minute over the total area of deck, which may be taken from the fire main with the isolating valve located outside the garage. An equivalent arrangement may be considered. Adequate provision shall be made for drainage of water introduced to the space. This shall not lead to machinery or other spaces where a source of ignition may exist.
- b) A fixed fire detection and fire alarm system complying with the requirements of SOLAS II-2/Part A / Fire Safety Systems Code Chapter IX. The system within the space shall also comply with 17.2.5(e).
- c) Ducted mechanical exhaust ventilation, which is isolated from other ventilated spaces, shall provide at least 6 air changes per hour (based on the gross empty space between structures). Ventilation systems may be operated at lower air changes per hour when controlled by a detection system that monitors the flammable and harmful gases in the space for which reduction of the airflow shall be signalled by an audible and visual alarm on the navigating bridge and at the "in port" control station(s). Exhaust ducting shall be arranged to extract from the lower bilge area. If the fan motors are located in the space or in the ventilation duct they shall be certified safe to the correct designation for the flammable vapour/liquid. The ventilation fans shall be of a non-sparking type and the ventilation system shall be capable of rapid shut down and effective closure in event of fire.
- d) A suitable gas detection system shall be provided, appropriate to the type of vehicle fuel or recreational dive system, with audible and visual alarm in the wheelhouse and where it may always

be observed by the crew.

- e) All electrical equipment located up to 450 millimetres above the deck shall be certified safe for petrol vapours.
- f) Electrical equipment located higher than 450 millimetres above the deck shall either;
 - i. Be to IP55 standard of construction (IEC Publication 529 -Classification of Degree of protection Provided by Enclosures); or
 - ii. provided with automatic isolation (on all poles) located outside the space on activation of the gas detection system. This option shall not be used for safety systems such as steering motors, rudder indicators, etc.
- g) Regardless of the height of installation, it is considered that the following equipment located within the space shall be certified safe for the flammable vapours:
 - i. Gas detection system
 - ii. Bilge alarm
 - iii. Fire detection alarm
 - iv. At least one light fitting (on a dedicated circuit, possibly emergency)

It shall be noted that electrical equipment includes starters, distribution boxes, etc.

- h) The drainage or bilge system shall be sized to remove no less than 125% of the combined capacity of both the water-spraying system pumps and the required number of fire hose nozzles, taking into account the guidelines developed by the IMO. The drainage system valves shall be operable from outside the protected space at a position in the vicinity of the extinguishing system controls. If this is not possible, the adverse effect upon stability of the added weight and free surface of water shall be taken into account to the extent deemed necessary by the Administration. Such information shall be included in the stability book.
- i) Provision shall be made to ensure that vehicles, craft, recreational diving systems and ancillary equipment are securely fastened with due consideration being given to the relative motion of the Yacht and possible movement between components. The design of diving equipment mounting and securing arrangements shall also consider mitigating the effects of heat transmission in the event of a fire in an adjacent space.

17.3 Construction and arrangement of saunas

17.3.1 All boundaries of the sauna shall be of "A" class divisions, and may include changing rooms, showers and toilets. The sauna shall be insulated to A-60 for vessels of 500GT and over, A-30 for vessels under 500GT, and B-15 for Short Range Yachts, against other spaces except those inside of the perimeter of the sauna.

17.3.2 Bathrooms with direct access to saunas may be considered as part of them. In such cases, the door between sauna and the bathroom need not comply with fire safety requirements.

17.3.3 Wooden linings on bulkheads and ceilings are permitted. The ceiling above the oven shall be lined with a non-combustible plate with an air gap of at least 30 millimetres. The distance from the hot surfaces to combustible materials shall be at least 500 millimetres or the combustible materials shall be protected (e.g. non-combustible plate with an air gap of at least 30 millimetres).

17.3.4 Wooden benches are permitted.

17.3.5 The sauna door shall open outwards by pushing.

17.3.6 Electrically heated ovens shall be provided with a timer.

17.3.7 All spaces within the perimeter of the sauna shall be protected by a fire detection and alarm system and an automatic sprinkler system. Yachts of <500GT may in lieu of an automatic sprinkler system be provided with a manual water spray system giving a coverage of 3.5 ltr/m²/min over the total area of the floor. Such a system may be taken from the fire main or be independent. Electrically driven fire pumps shall be provided with an emergency power supply in accordance with the requirements of Part 6, Chapter 1, Section 6, Paragraph 6.2.6.

17.4 Construction and arrangement of steam room

17.4.1 The perimeter of the steam room may include changing rooms, showers and toilets.

17.4.2 Bathrooms with direct access to suite may be considered as part of it. In such cases, the door between suite and the bathroom need not comply with fire safety requirements.

17.4.3 If a steam generator of more than 5 kW is contained within the perimeter, the suite boundary shall be constructed to an A-0 standard, or B-0 for Short Range Yachts. If a steam generator of more than 5 kW is not contained within the perimeter the steam generator shall be protected by A-0 standard divisions, or B-0 for Short Range Yachts and pipes leading to the discharge nozzles shall be lagged.

17.4.4 If a suite arrangement contains a sauna then the requirements contained in 17.3 are applicable, regardless of the steam generator location.

17.4.5 All spaces within the perimeter shall be protected by a fire detection and alarm system.

17.5 Deep fat frying equipment

17.5.1 Attention is drawn to the requirements in SOLAS II-2/10.6.4 for fire extinguishing systems for deep fat cooking equipment. For fryers of up to 15 litres cooking oil capacity, the provision of a suitably sized Class F extinguisher together with manual isolation of the electrical power supply is acceptable.

17.6 Alternative design and arrangement

17.6.1 Vessels may follow Part 1, Chapter 2, Section 1.9 on Alternative Design and Arrangements for this chapter as allowed by SOLAS II-2/17.17.6.2 The engineering analysis required by Part 1, Chapter 2, Section 1.9, Paragraph 1.9.3 shall be prepared and submitted to L.H.R., based on the guidelines (MSC/Circ.1002) and shall include, as a minimum, the following engineering analysis elements:

- a) determination of the ship type and space(s) concerned;
- b) identification of prescriptive requirement(s) with which the ship or the space(s) will not comply;
- c) identification of the fire and explosion hazards of the ship or the space(s) concerned, including:
 - i. identification of the possible ignition sources;
 - ii. identification of the fire growth potential of each space concerned;
 - iii. identification of the smoke and toxic effluent generation potential for each space concerned; and
 - iv. identification of the potential for the spread of fire, smoke or of toxic effluents from the space(s) concerned to other spaces;
- d) determination of the required fire safety performance criteria for the ship or the space(s) concerned addressed by the prescriptive requirement(s) in particular:
 - i. performance criteria shall be based on the fire safety objectives and on the functional requirements of this chapter;
 - ii. performance criteria shall provide a degree of safety not less than that achieved by using the prescriptive requirements; and

- iii. performance criteria shall be quantifiable and measurable;
- e) detailed description of the alternative design and arrangements, including a list of the assumptions used in the design and any proposed operational restrictions or conditions; and
- f) technical justification demonstrating that the alternative design and arrangements meet the required fire safety performance criteria.

17.7 Guidance on the storage of large quantities of petrol in fixed tanks

17.7.1 Yachts with the notation "COMMERCIAL YACHT" are to follow the guidance contained in Chapter 18 of L.H.R. "Guidance for the Classification and Construction of Commercial Yachts up to 60 meters".

17.8 Arrangements for 'Recreational Fire Appliances'

17.8.1 Recreational Fire Appliances means heating or cooking appliances with open flames such as fireplaces, charcoal galley ovens, barbecues, spit roasts and fire pits. 17.8.2 Yachts with the notation "COMMERCIAL YACHT" shall meet the requirement of Chapter 17 of L.H.R. "Guidance for the Classification and Construction of Commercial Yachts up to 60 meters".

17.9 Emergency Training and Drills

17.9.1 For yachts with the notation "COMMERCIAL YACHT", see Appendix 6 of L.H.R. "Guidance for the Classification and Construction of Commercial Yachts up to 60 metres".

**CHAPTER 2 Structural fire protection: Commercial Yachts of
less than 500 gross tons**

Contents

SECTION 1	General Requirements
SECTION 2	Structure
SECTION 3	Means of Escape

SECTION 1 General Requirements

1.1 General

1.1.1 The requirements of this chapter apply to yachts with the notation "COMMERCIAL YACHT" of less than 500 gross tons in addition to the rest of the requirements contained in Part 7 Chapter 1.

1.1.2 Terms used in this section shall have the same meaning as defined in SOLAS.

1.1.3 Table 7.2.1 is a guide to the major requirements of this Chapter. The Table is intended as a quick reference to the requirements and is not to be used in isolation when designing the fire safety arrangements.

Passive fire protection (Part 7, Chapter 2, Section 2)	Category 'A' machinery spaces: 'A-30', ("B-15" for short range yachts); Galley: "B-15" (for yachts not being Short Range Yachts).
Means of escape (Part 7, Chapter 2, Section 3)	
Category 'A' machinery spaces	Two (2)
Accommodation and other spaces	Two (2)
Fixed fire detection system (Part 7, Chapter 1, paragraph 10.1.10)	Fitted in machinery spaces. Fitted in service spaces, control stations and accommodation spaces
Automatic sprinkler system or equivalent	Fitted in yachts that do not meet restrictions on combustible materials (Part 7, Chapter 2, paragraphs 2.4.6 & 2.4.8)

Table 7.2.1

SECTION 2 Structure

2.1 Purpose

2.1.1 For yachts with the notation "Commercial Yachts" of less than 500 gross tons, the requirements of this section shall be met. The purpose of this section is to contain a fire in the space of origin. For this purpose, the following functional requirements shall be met:

- the engine room and galley shall be contained within boundaries required by this section;
- the fire integrity of the divisions shall be maintained at openings and penetrations.

2.2 Forms of construction – Fire divisions

2.2.1 Fire divisions required by subsection 2.3 shall be constructed in accordance with the remaining paragraphs of this Section.

2.2.2 Fire divisions using steel equivalent, or alternative forms of construction may be accepted if it can be demonstrated that the material by itself, or due to noncombustible insulation provided, has the fire resistance properties equivalent to those divisions required by paragraph 2.3.1.

2.2.3 Insulation required by paragraph 2.2.2 shall be such that the temperature of the structural core does not rise above the point at which the structure would begin to lose its strength at anytime during the applicable exposure to the standard fire test as referenced in the Fire Test Procedures Code. For 'A' Class divisions, the applicable exposure is 60 minutes, and for 'B' Class divisions, the applicable exposure is 30

minutes.

2.2.4 For aluminium alloy structures, the insulation shall be such that the temperature of the structural core does not rise more than 200°C above the ambient temperature at any time during the applicable fire exposure.

2.2.5 For composite structures, the insulation shall be such that the temperature of the laminate does not rise more than the minimum temperature of deflection under load of the resin at any time during the applicable fire exposure. The temperature of deflection under load shall be determined in accordance with a recognised international standard.

2.2.6 Insulation need only be applied on the side that is exposed to the greatest fire risk (for example inside the engine room), a division between two such spaces shall however be insulated on both sides unless it is a steel division.

2.2.7 Special attention shall be given to the fixing of fire door frames in bulkheads constructed of materials other than steel. Measures shall be taken to ensure that the temperature of the fixings when exposed to fire does not exceed the temperature at which the bulkhead itself loses strength.

2.3 Structural Fire Protection

2.3.1

- a) Machinery spaces of category 'A', shall be totally enclosed by 'A-30' Class boundaries (bulkheads, side shell and deck heads). For Short Range Yachts, such machinery spaces shall be totally enclosed by "B-15" Class boundaries (bulkheads, side shell and deck heads).
- b) Yachts which are not Short Range Yachts are to have galleys totally enclosed by "B-15" Boundaries (bulkheads, side shell and deck heads). Windows within the exterior hull or superstructure within this boundary are not expected to meet "B15" standards.

2.3.2 Openings in 'A' and 'B' Class divisions shall be provided with permanently attached means of closing that shall be at least as effective for resisting fires as the divisions in which they are fitted. Generally, windows shall not be fitted in machinery space boundaries.

2.3.3 Where 'A' Class divisions are penetrated for the passage of electric cables, pipes, trunks, ducts, etc., or for girders, beams or other structural members, arrangements shall be made to ensure that the fire resistance is not impaired.

2.3.4 Where 'B' Class divisions are penetrated for the passage of electric cables, pipes, trunks, ducts, etc., or for the fitting of ventilation terminals, lighting fixtures and similar devices, arrangements shall be made to ensure that the fire resistance is not impaired.

2.3.5 Where 'A' Class divisions are required to be insulated, it shall be ensured that the heat from a fire is not transmitted through the intersections and terminal points of the divisions or penetrations to uninsulated boundaries. Where the insulation installed does not achieve this, arrangements shall be made to prevent this heat transmission by insulating the horizontal and vertical boundaries or penetrations for a distance of 450 millimetres.

2.4 Materials

2.4.1 Except in refrigerated compartments of service spaces, all insulation (e.g. thermal and acoustic) shall be of not readily-ignitable materials.

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

2.4.3 Pipes conveying oil or other combustible liquids through accommodation and service spaces shall

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be of approved materials having regard to the fire risk.

2.4.4 Materials readily rendered ineffective by heat are not to be used for overboard scuppers, sanitary discharges, and other outlets which are close to the waterline and where the failure of the material in the event of fire would give rise to danger of flooding. Due regard shall be paid to the Fire Test Procedures Code.

2.4.5 Vapour barriers and adhesives used in conjunction with insulation, as well as insulation of pipe fittings for cold service system need not be non-combustible, but they shall be kept to the minimum quantity practicable and their exposed surfaces are to have low flame spread characteristics.

2.4.6 Upholstery composites (fabric in association with any backing or padding material) used throughout the vessel excluding open decks shall be approved in accordance with the Fire Test Procedures Code, Annex 1, Part 8, or equivalent. This does not apply to spaces fitted with sprinklers or equivalent fixed fire extinguishing systems.

2.4.7 Organic foams used in upholstered furniture and mattresses shall be of the combustion modified type.

2.4.8 Suspended textile materials such as curtains or drapes shall be approved in accordance with the Fire Test Procedures Code, Annex 1, Part 7, or equivalent. This does not apply to spaces fitted with sprinklers or equivalent fixed fire extinguishing systems.

2.4.9 Where upholstery composites and suspended textile materials do not meet Fire Test Procedures Code standards in accordance with paragraphs 2.4.6 & 2.4.8, they may meet equivalent standards as follows:

- i. Materials shall be subject to fire protection treatment process;
- ii. Vessel shall have installed a sprinkler or equivalent fixed fire extinguishing system, that is compliant with the Fire Safety Systems Code in all aspects except they may be exempt from Fire Safety Systems Code Chapter 8 section 2.2.2 requirement for 2 sources of power. Or for sprinkler systems equivalent to that referred to in SOLAS II-2/12, Section 3.8 of the Annex to Resolution A.800. The system shall be designed to enable simultaneous operation of all sprinklers fitted in the most hydraulically demanding area. The minimum area for simultaneous operation may be taken as the largest enclosed accommodation space protected; or
- iii. An equivalent standard acceptable to L.H.R.

SECTION 3 Means of Escape

3.1 Purpose

3.1.1 The purpose of this section is to provide means of escape so that persons onboard can safely and swiftly escape to the liferaft embarkation deck. For this purpose, the following functional requirements shall be met:

- safe escape routes shall be provided;
- escape routes shall be maintained in a safe condition, clear of obstacles; and
- additional aids for escape shall be provided as necessary to ensure accessibility, clear marking, and adequate design for emergency situations.

3.2 Requirements

3.2.1 Stairways, ladders and corridors serving all spaces normally accessible shall be arranged so as to provide ready means of escape to a deck from which embarkation into survival craft may be effected.

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3.2.2 The arrangement of the vessel shall be such that all compartments are provided with a satisfactory means of escape. In the case of the accommodation, two means of escape from every restricted space or group of spaces shall be provided. Concealed escapes and escape routes shall be clearly marked to ensure ready exit.

Category 'A' machinery spaces on motor vessels shall also be provided with a minimum of two means of escape. Other machinery spaces shall also have at least two means of escape as widely separated as possible, except where the small size of the machinery space makes it impracticable.

- a) The normal means of access to the accommodation and service spaces below the open deck shall be arranged so that it is possible to reach the open deck without passing through a galley, engine room or other space with a high fire risk, wherever practicable.
- b) Where accommodation arrangements are such that access to compartments is through another compartment, the second escape route shall be as remote as possible from the main escape route. This may be through hatches of adequate size, leading to the open deck or separate space to the main escape route.
- c) In exceptional circumstances, a single means of escape may be accepted for spaces, other than accommodation spaces, that are entered only occasionally, if the escape route does not pass through a galley, machinery space or watertight door.
- d) No escape route shall be obstructed by furniture or fittings. Additionally, furniture along escape routes shall be secured in place to prevent shifting if the yacht rolls or lists.
- e) All doors in escape routes shall be openable from either side. In the direction of escape they are all to be openable without a key. All handles on the inside of weathertight doors and hatches shall be non removable. Where doors are lockable measures to ensure access from outside the space shall be provided for rescue purposes.

3.2.3 Lifts are not considered as forming a means of escape.

3.2.4 Adequate deck area shall be provided at muster stations and embarkation areas having due regard to the expected number of persons. Generally, muster stations shall be provided close to the embarkation stations. Each muster station shall have sufficient clear deck space to accommodate all persons assigned to muster at that station, but at least 0.35m² per person.

CHAPTER 3 Structural fire protection and Fire Appliances: Commercial Yachts of 500 gross tons and over

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SECTION 1 General

1.1 Application

1.1.1 The requirements of this Chapter apply to yachts assigned the notation "COMMERCIAL YACHT" and of 500 gross tons and over. Additionally, the requirements of Part 7, Chapter 1 Section 15 and Section 17 should also apply.

1.2 Definitions

1.2.1 Terms used in this section should have the same meaning as defined in SOLAS, except as defined in the rest of this chapter and as follows.

"Not readily ignitable" means that the surface thus described will not continue to burn for more than 20 seconds after removal of a suitable impinging test flame.

1.2.2 Table 7.3.1 is a guide to the major requirements of this Chapter. The table is intended as a quick reference to the requirements and is not to be used in isolation when designing the fire safety arrangements.

All vessels should comply with the following:	
Form of construction (see Section 2)	Steel or equivalent, or alternative forms of construction may be accepted subject to requirements
Passive fire protection (see Sections 2 to 7)	See Tables 7.3.2 and 7.3.3
Means of escape (see Section 12)	
Category 'A' machinery spaces Accommodation, etc	2 (two) 2 (two)
Fixed fire detection system (see Section 14)	Fitted in machinery spaces Fitted in service spaces, control stations and accommodations spaces
Fire extinguishing arrangements in Category 'A' machinery spaces (see Part 7, Chapter 3, Section 17)	In accordance with SOLAS II-2/10.5
Automatic sprinkler system or equivalent (see Section 14)	Fitted in all vessels

Table 7.3.1: Compliance requirements

SECTION 2 Structure

2.1 Purpose

The purpose of this section is to contain a fire in the space of origin. For this purpose, the following functional requirements shall be met:

- the ship shall be subdivided by thermal and structural boundaries;
- thermal insulation of boundaries shall have due regard to the fire risk of the space and adjacent spaces;
- the fire integrity of the divisions shall be maintained at openings and penetrations.

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2.1.1 The hull, superstructures, structural bulkheads, decks and deckhouses shall be constructed of steel or other equivalent material.

2.1.2 However, in cases where any part of the structure is of aluminium alloy, the following shall apply:

1. Insulation of aluminium alloy components of "A" or "B" class divisions, except structure which, in the opinion of the Administration, is non-load-bearing, shall be such that the temperature of the structural core does not rise more than 200°C above the ambient temperature at any time during the applicable fire exposure to the standard fire test. This insulation shall be applied on all sides except for the upper sides of decks and the outside of the vessel.
2. Special attention shall be given to the insulation of aluminium alloy components of columns, stanchions and other structural members required to support lifeboat and liferaft stowage, launching and embarkation areas, and "A" and "B" class divisions to ensure that for members:
 - a) supporting lifeboat and liferaft areas and "A" class divisions, the temperature rise limitation specified in (a) above shall apply at the end of one hour; and
 - b) supporting "B" class divisions, the temperature rise limitation specified in (a) above shall apply at the end of half an hour.
3. Aluminium alloy components of divisions that are required to be equivalent to steel (identified by an * in tables 1 and 2) shall be insulated with a certified system approved for use in Aluminium A Class Bulkheads and Decks as applicable. Alternatively, such structure may be insulated with 25 millimetres of 100kg/m³ mineral wool or equivalent for other insulation types, approved for use in "A" class divisions.

2.1.3 For composite structures, The insulation shall be such that the temperature of the laminate does not rise more than the minimum temperature of deflection under load of the resin at any time during the specified fire exposure. The temperature of deflection under load shall be determined in accordance with the requirements of a recognised international standard. This insulation shall be applied on all sides except for the upper sides of decks and the outside of the vessel.

1. Special attention shall be given to the insulation of composite components of columns, stanchions and other structural members required to support lifeboat and liferaft stowage, launching and embarkation areas, and "A" and "B" class divisions to ensure that for members:
 - a) supporting lifeboat and liferaft areas and "A" class divisions, the temperature rise limitation specified in .1 above shall apply at the end of one hour; and
 - b) supporting "B" class divisions, the temperature rise limitation specified in .1 above shall apply at the end of half an hour.

Special attention shall be given to the fixing of fire door frames in bulkheads constructed of materials other than steel. Measures shall be taken to ensure that the temperature of the fixings when exposed to fire does not exceed the temperature at which the bulkhead itself loses strength.

2.1.4 Crowns and casings of a machinery space of category A shall be A60 divisions and openings therein, if any, shall be suitably arranged and protected to prevent the spread of fire.

2.1.5 For structures in contact with sea-water, the required insulation shall extend to at least 300 millimetres below the lightest waterline.

2.1.6 Fire divisions using steel equivalent, or alternative forms of construction may be accepted if it can be demonstrated that the material by itself, or due to non-combustible insulation provided, has the fire resistance properties equivalent to the "A" or "B" class standard required.

2.1.7 Insulation required by paragraph 2.1.6 shall be such that the temperature of the structural core does not rise above the point at which the structure would begin to lose its strength at any time during the applicable exposure to the standard fire test. For 'A' Class divisions, the applicable exposure is 60 minutes,

and for 'B' Class divisions, the applicable exposure is 30 minutes.

SECTION 3 Main Vertical Zones and Horizontal Zones

3.1 Requirements

3.1.1 Hull, superstructure and deckhouses in way of accommodation and service spaces shall be subdivided into main vertical zones by "A" class divisions. These divisions shall have insulation values in accordance with tables 7.3.2 and 7.3.3.

3.1.2 As far as practicable, the bulkheads forming the boundaries of the main vertical zones above the bulkhead deck shall be in line with watertight subdivision bulkheads situated immediately below the bulkhead deck. The length and width of main vertical zones may be extended to a maximum of 48 metres in order to bring the ends of main vertical zones to coincide with watertight subdivision bulkheads or in order to accommodate a large public space extending for the whole length of the main vertical zone provided that the total area of the main vertical zone is not greater than 800 m² on any deck. The length or width of a main vertical zone is the maximum distance between the furthestmost points of the bulkheads bounding it.

3.1.3 Such bulkheads shall extend from deck to deck and to the shell or other boundaries.

3.1.4 When a main vertical zone is subdivided by "A" class divisions for the purpose of providing an appropriate barrier between spaces protected and not protected by a sprinkler system, the divisions shall be insulated in accordance with the fire insulation and integrity values given in tables 7.3.2 and 7.3.3.

SECTION 4 Bulkheads Within a Main Vertical Zone

4.1 Requirements

4.1.1 All bulkheads within accommodation and service spaces which are not required to be "A" class divisions shall be at least "B" class or "C" class divisions as prescribed in the Tables 7.3.2 and 7.3.3.

4.1.2 All such divisions may be faced with combustible materials.

4.1.3 All corridor bulkheads, where not required to be "A" class shall be "B" class divisions which shall extend from deck to deck except:

- 1) When continuous "B" class ceilings or linings are fitted on both sides of the bulkhead, the portion of the bulkhead behind the continuous ceilings or lining shall be of material which, in thickness and composition, is acceptable in the construction of "B" class divisions but which shall be required to meet "B" class integrity standards only in so far as is reasonable and practical in the opinion of the Administration;
- 2) The corridor bulkheads of "B" class materials may terminate at a ceiling in the corridor provided such a ceiling is of material which, in thickness and composition, is acceptable in the construction of "B" class divisions. All doors and frames in such bulkheads shall be so constructed and erected to provide a "B" class standard.

4.1.4 All bulkheads required to be "B" class divisions, except corridor bulkheads, shall extend from deck to deck and to the shell or other boundaries unless continuous "B" class ceilings or linings are fitted on both sides of the bulkhead, in which case the bulkhead may terminate at the continuous ceiling or lining.

SECTION 5 Fire Integrity of Bulkheads and Decks

5.1 Requirements

5.1.1 In addition to complying with the specific provisions for fire integrity of bulkheads and decks mentioned elsewhere in this section, the minimum fire integrity of bulkheads and decks shall be as prescribed in tables 7.3.2 and 7.3.3.

5.1.2 The following requirements shall govern application of the tables:

- a) Tables 7.3.2 and 7.3.3 shall apply respectively to the bulkheads and decks separating adjacent spaces.
 - b) For determining the appropriate fire integrity standards to be applied to divisions between adjacent spaces, such spaces are classified according to their fire risk as shown in categories (1) to (9) below. The title of each category is intended to be typical rather than restrictive. The number in parentheses preceding each category refers to the applicable column or row in the tables.
- 1) Control Stations
 - Spaces containing emergency sources of power and lighting.
 - Wheelhouse and chartroom.
 - Spaces containing the vessel's radio equipment.
 - Fire-extinguishing rooms.
 - Fire control rooms and fire-recording stations.
 - Control room for propulsion machinery when located outside the machinery space.
 - Spaces containing centralized fire alarm equipment.
 - 2) Corridors and lobbies
 - Passenger and crew corridors and lobbies.
 - 3) Accommodation spaces
 - Cabins, dining rooms, lounges, offices, pantries containing no cooking appliances, and similar spaces.
 - 4) Stairways
 - Interior stairways, lifts and escalators (other than those wholly contained within the machinery space(s)) and enclosures thereto.
 - In this connection, a stairway which is enclosed only at one level shall be regarded as part of the space from which it is not separated by a fire door.
 - 5) Service spaces (low risk)
 - Lockers, spaces dedicated exclusively to the storage of AV/IT racks and store-rooms (including refrigerator and cold rooms) not having provisions for the storage of flammable liquids and having areas less than 4m², drying rooms and laundries, and spaces containing marine Evacuation Systems
 - 6) Machinery spaces of category A
 - Spaces so defined.
 - 7) Other machinery spaces
 - Spaces so defined, excluding machinery spaces of category A.

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- Sprinkler, drencher or fire pump spaces.
- 8) Service spaces (high risk)
- Galleys, pantries containing cooking appliances, paint and lamp rooms, lockers, spaces dedicated exclusively to the storage of AV/IT racks and store-rooms (including refrigerator and cold rooms) having areas of 4m² or more, spaces for the storage of flammable liquids, workshops other than those forming part of the machinery spaces, and spaces containing vehicles or craft with fuel in their tanks (garages), or lockers storing such fuels storage lockers for gaseous fuels for domestic purposes
- 9) Open decks
- Open deck spaces and enclosed promenades having no fire risk. Air spaces (the space outside superstructures and deckhouses).

5.1.3 Continuous "B" class ceilings or linings, in association with the relevant decks or bulkheads, may be accepted as contributing, wholly or in part, to the required insulation and integrity of a division.

5.1.4 External boundaries which are required to be of steel or other equivalent material may be pierced for the fitting of windows and portholes provided that there is no requirement for such boundaries to have "A" class integrity elsewhere in this section. Similarly, in such boundaries which are not required to have "A" class integrity, doors may be of combustible materials, substantially constructed.

5.1.5 Atriums shall be within enclosures formed of "A" class divisions having a fire rating determined in accordance with Table 7.3.2.

5.1.6 Decks separating spaces within atriums shall have a fire rating determined in accordance with Table 7.3.3.

Spaces	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Control stations (1)	A-0 _c	A-0	A-60	A-0	A-15	A-60	A-15	A-60	*
Corridors and lobbies (2)		C _d	B-0 _d	A-0 _a B-0 _d	B-0 _d	A-60	A-0	A-0	*
Accommodation spaces (3)			C _d	A-0 _{af} B-0 _d	B-0 _d	A-60	A-0	A-0	*
Stairways (4)				A-0 _a B-0 _d	A-0 _a B-0 _d	A-60	A-0	A-0	*
Service spaces (low risk) (5)					C _d	A-60	A-0	A-0	*
Machinery spaces of category A (6)						*	A-0	A-60	*
Other machinery spaces (7)							A-0 _b	A-0	*
Service spaces (high risk) (8)								A-0 _b	*
Open decks (9)									

Table 7.3.2: Fire Integrity of bulkheads separating adjacent spaces

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Spaces below \ Spaces above	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Control stations (1)	A-0	A-0	A-0	A-0	A-0	A-60	A-0	A-0	*
Corridors and lobbies (2)	A-0	*	*	A-0	*	A-60	A-0	A-0	*
Accommodation spaces (3)	A-60	A-0	*	A-0	*	A-60	A-0	A-0	*
Stairways (4)	A-0	A-0	A-0	*	A-0	A-60	A-0	A-0	*
Service spaces (low risk) (5)	A-15	A-0	A-0	A-0	*	A-60	A-0	A-0	*
Machinery spaces of category A (6)	A-60	A-60	A-60	A-60	A-60	*	A-0 _e	A-60	*
Other machinery spaces (7)	A-15	A-0	A-0	A-0	A-0	A-0	*	A-0	*
Service spaces (high risk) (8)	A-60	A-0	A-0	A-0	A-0	A-60	A-0	A-0	*
Open decks (9)	*	*	*	*	*	*	*	*	-

Table 7.3.3: Fire Integrity of Decks Separating Adjacent Spaces

Notes: To be applied to both Tables 7.3.2 and 7.3.3, as appropriate.

- For clarification on which applies, see Section 4 and 6.
- Where spaces are of the same numerical category and subscript b appears, a bulkhead or deck of the rating shown in the tables is only required when the adjacent spaces are for a different purpose, e.g. in category (9). A galley next to a galley does not require a bulkhead but a galley next to a paint room requires an "A-0" bulkhead.
- Bulkheads separating the wheelhouse and chartroom from each other may be "B-0" rating.
- For the application of paragraph 3.3.1, "B-O" and "C", where appearing in table 7.3.2, shall be read as "A-0".
- Fire insulation need not be fitted if the machinery space in category (7), in the opinion of the Administration, has little or no fire risk.
- For Spaces located entirely within the "A" Class boundaries of a stairway enclosure, see paragraph 10.1.7.
- Where an asterisk * appears in the tables, the division is required to be of steel or other equivalent material but is not required to be of "A" class standard.

For the application of paragraph 3.3.1 an asterisk, where appearing in table 7.3.3, except for category (9), shall be read as "A-0".

SECTION 6 Protection of Stairways and Lifts in Accommodation and Service Spaces

6.1 Requirements

6.1.1 A stairway shall be of steel frame construction except where the Administration sanctions the use of other equivalent material, and shall be within enclosures formed of "A" class divisions, with positive means of closure at all openings, except that:

- an isolated stairway which penetrates a single deck only may be protected at one level only by at least "B" class divisions and self-closing door(s); and
- stairways may be fitted in the open in a public space, provided they lie wholly within such public space.

6.1.1 A stairway enclosure shall have direct communication with the corridors and be of sufficient area to prevent congestion, having in view the number of persons likely to use them in an emergency. In so far as

is practical, stairway enclosures shall not give direct access to galleys, machinery spaces, service lockers, or other enclosed spaces containing combustibles in which a fire is likely to originate.

6.1.2 A lift trunk shall be so fitted to prevent the passage of flame from one 'tween-deck to another and shall be provided with means of closing to permit the control of draught and smoke.

SECTION 7 Openings in "A" Class D

7.1 Requirements

7.1.1 Except for hatches between store and baggage spaces, and between such spaces and the weather decks, all openings shall be provided with permanently attached means of closing which shall be at least as effective for resisting fires as the divisions in which they are fitted.

7.1.2 The construction of all doors and door frames in "A" class divisions, with the means of securing them when closed, shall provide resistance to fire as well as the passage of smoke and flame, as follows:

- a) Doors in "A" Class divisions shall comply with the Fire Test Procedures Code, Annex 1, Part 3.
- b) Doors approved without the sill being part of the frame, shall be installed such that the gap under the door does not exceed 12 millimetres. A non-combustible sill shall be installed under the door such that floor coverings do not extend beneath the closed door, except where it can be demonstrated that the flooring is not readily ignitable when tested in accordance with Sections 4.1.1 & 4.1.2 of MSC/Circ.1006. The maximum time for the flame to extinguish under the aforementioned test conditions shall not be more than 20 seconds. Alternatively, floor coverings certificated in accordance with Annex 1, Part 5 of the IMO's 2010 FTP Code (Test for Surface Flammability) may be accepted.
- c) Sliding steel watertight doors need not be insulated.

7.1.3 It shall be possible for each door to be opened and closed from each side of the bulkhead by one person only.

7.1.4 Fire doors in main vertical zone bulkheads, galley boundaries and stairway enclosures other than power-operated watertight doors and those which are normally locked, shall satisfy the following requirements:

- 1) the doors shall be self-closing and be capable of closing with an angle of inclination of up to 3.5° opposing closure;
- 2) the approximate time of closure for hinged fire doors shall be no more than 40 seconds and no less than 10 seconds from the beginning of their movement with the ship in the upright position. The approximate uniform rate of closure for sliding doors shall be of no more than 0.2 m/s and no less than 0.1 m/s with the ship in the upright position;
- 3) the doors, except those for emergency escape trunks, shall be capable of remote release from the continuously manned central control station, either simultaneously or in groups and shall also be capable of release, individually, from a position at the door. Release switches shall have an on-off function to prevent automatic resetting of the system;
- 4) hold-back hooks not subject to central control station release are prohibited;
- 5) a door closed remotely from the central control station shall be capable of being re-opened from both sides of the door by local control. After such local opening, the door shall automatically close again;

- 6) indication shall be provided at the fire door indicator panel in the continuously manned central control station whether each door is closed;
- 7) the release mechanism shall be so designed that the door shall automatically close in the event of disruption of the control system or central power supply;
- 8) local power accumulators for power-operated doors shall be provided in the immediate vicinity of the doors to enable the doors to be operated after disruption of the control system or central power supply at least ten times (fully opened and closed) using the local controls;
- 9) disruption of the control system or central power supply at one door shall not impair the safe functioning of the other doors;
- 10) remote-released sliding or power-operated doors shall be equipped with an alarm that sounds at least 5 seconds but no more than 10 seconds after the door being released from the central control station and before the door begins to move and continues sounding until the door is completely closed;
- 11) a door designed to re-open upon contacting an object in its path shall re-open not more than 1 metre from the point of contact;
- 12) double-leaf doors equipped with a latch necessary for their fire integrity shall have a latch that is automatically activated by the operation of the doors when released by the system;
- 13) the components of the local control system shall be accessible for maintenance and adjusting; and
- 14) power-operated doors shall be provided with a control system of an approved type which shall be able to operate in case of fire and be in accordance with the Fire Test Procedures Code. This system shall satisfy the following requirements:
 - the control system shall be able to operate the door at the temperature of at least 200°C for at least 60 min, served by the power supply;
 - the power supply for all other doors not subject to fire shall not be impaired; and
 - at temperatures exceeding 200°C the control system shall be automatically isolated from the power supply and shall be capable of keeping the door closed up to at least 945°C.

7.1.5 Where 'A' Class divisions are penetrated for the passage of electric cables, pipes, trunks, ducts, etc., or for girders, beams or other structural members, arrangements shall be made to ensure that the fire resistance is not impaired.

SECTION 8 Openings in "B" Class Divisions

8.1 Requirements

8.1.1 Doors and door frames in "B" class divisions and means of securing them shall provide a method of closure which shall have resistance to fire as follows:

- a) Doors in "B" Class divisions shall comply with the Fire Test Procedures Code, Annex 1, Part 3;
- b) Ventilation opening may be permitted in the lower portion of such doors. When such an opening is in or under a door the total net area of the opening(s) shall not exceed 0.05m². When such an opening is cut in a door it shall be fitted with a grill made of non-combustible material.
- c) Doors approved as "B" Class without the sill being part of the frame, shall be installed such that the gap under the door does not exceed 25 millimetres.

8.1.2 Where 'B' Class divisions are penetrated for the passage of electric cables, pipes, trunks, ducts, etc., or for the fitting of ventilation terminals, lighting fixtures and similar devices, arrangements shall ensure that the fire resistance is not impaired.

SECTION 9 Windows and Portlights

9.1 Requirements

9.1.1 All windows and portlights in bulkheads within accommodation spaces, service spaces and control stations shall be so constructed to preserve the integrity requirements of the type of bulkheads in which they are fitted.

9.1.2 Windows shall not be fitted in machinery space boundaries. However, this does not preclude the use of glass in control rooms within the machinery spaces.

9.1.3 Attention shall be given to Part 3, Chapter 1, Section 4, paragraphs 4.6 and 4.7.

SECTION 10 Details of Construction

10.1 Requirements

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

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

10.1.2 The draught stops shall be non-combustible and are to form a continuation above the ceiling of the bulkhead below or the other side of the panelling or lining to the bulkhead, as far as possible.

10.1.3 Where the structure or 'A' Class divisions are required to be insulated, it shall be ensured that the heat from a fire is not transmitted through the intersections and terminal points of the divisions or penetrations to uninsulated boundaries. Where the insulation installed does not achieve this, arrangements shall be made to prevent this heat transmission by insulating the horizontal and vertical boundaries or penetrations for a distance of 450 millimetres.

10.1.4 Without impairing the efficiency of the fire protection, the construction of ceilings and bulkheads shall allow a fire patrol to detect any smoke originating in concealed and inaccessible places, except where there is no risk of fire originating in such places.

10.1.5 When gaseous fuel is used for domestic purposes, the arrangements for the storage, distribution and utilisation of the fuel shall be such that, having regard to the hazards of fire and explosion which the use of such fuel may entail, the safety of the vessel and the persons onboard are preserved.

10.1.6 Open flame gas appliances provided for cooking, heating or any other purposes, shall comply with the requirements of EC directive 90/396/EEC or equivalent and, the installation of open flame gas appliances shall comply with the appropriate provisions of Chapter 17 of "L.H.R. Guidance for the Classification and Construction of Commercial Yachts up to 60 meters".

10.1.7 Where toilets providing little or no fire risk and lockers providing storage for safety equipment only, are located entirely within the "A" Class boundaries of a stairway enclosure, these spaces are not required to be treated as separate Category Spaces and in such cases, the provision of "C" Class bulkheads between these spaces and the stairway enclosure are considered acceptable.

10.1.8 When located within the same fire zone, multiple staircases or lifts may be contained within a

single "A" Class trunk, with the provision of "C" Class bulkheads between the staircases or lifts.

SECTION 11 Restricted Use of Combustible Materials

11.1 Requirements

11.1.1 Except in spaces protected by an automatic sprinkler system and fully addressable fire detection system in accordance with Section 14, all linings, grounds and ceilings shall be of non-combustible materials. However, the use of combustible linings, grounds and ceilings in Machinery Spaces is prohibited.

11.1.2 Insulation materials shall be non-combustible, however core insulation of refrigerator and cold rooms need not be. Vapour barriers and adhesives used in conjunction with insulation, as well as insulation of pipe fittings for cold service systems and domestic water need not be non-combustible, but they shall be kept to the minimum quantity practicable and their exposed surfaces shall have low flame spread characteristics.

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

11.1.4 Pipes conveying oil or combustible liquids through accommodation and service spaces shall be of approved materials having regard to the fire risk.

11.1.5 Materials readily rendered ineffective by heat are not to be used for overboard scuppers, sanitary discharges, and other outlets which are close to the waterline and where the failure of the material in the event of fire would give rise to the danger of flooding.

11.1.6 Furniture in the corridors and escape routes shall be of a type and quantity not likely to obstruct access. Additionally, furniture along escape routes shall be secured in place to prevent shifting if the vessel rolls or lists.

11.1.7 Primary deck coverings within accommodation spaces, service spaces and control stations shall be of a type which shall not readily ignite, or give rise to toxic or explosive hazards at elevated temperatures. Reference is also to be made to the Fire Test Procedures Code, Annex 1, Parts 2 and 5.

11.1.8 Upholstery, bedding components and suspended textiles required to comply with the Fire Test Procedures Code or an equivalent standard shall be clearly labelled by the manufacturer stating the standard that they meet and any washing or cleaning instructions needed to ensure they remain fire retardant. These labels are not to be removed.

11.1.9 In spaces where penetration of oil products is possible, the surface of insulation shall be impervious to oil or oil vapours. Insulation boundaries shall be arranged to avoid immersion in oil spillages so far as is practicable.

SECTION 12 Means of Escape

12.1 Requirements

The purpose of this Section is to provide means of escape so that persons onboard can safely and swiftly escape to the lifeboat and liferaft embarkation deck. For this purpose, the following functional requirements shall be met:

- safe escape routes shall be provided;
- escape routes shall be maintained in a safe condition, clear of obstacles; and
- additional aids for escape shall be provided as necessary to ensure accessibility, clear marking, and

adequate design for emergency situations.

12.1.1 Stairways and ladders shall be arranged to provide ready means of escape to the lifeboat and liferaft embarkation deck from all passenger and crew accommodation spaces and service spaces in which the crew are normally employed, other than machinery spaces. In particular, the following provisions shall be complied with:

- 1) Below the bulkhead deck two means of escape, at least one of which shall be independent of watertight doors, shall be provided from each watertight compartment, main vertical zone or similarly restricted group of spaces. Exceptionally one of the means of escape may be dispensed with, due regard being paid to the nature and location of spaces and to the number of persons who might normally be accommodated or employed there.
- 2) Above the bulkhead deck, there shall be at least two means of escape from each vertical fire zone or similarly restricted spaces or group of spaces, at least one of which is to give access to a readily accessible escape which shall provide continuous fire shelter from the level of its origin to the appropriate survival craft embarkation deck.
- 3) Within each main vertical zone there shall be at least one readily accessible enclosed stairway providing continuous fire shelter, where practical, at all levels up to the appropriate lifeboat and liferaft embarkation decks or the highest level served by the stairway, whichever level is the highest. The width, number and continuity of the stairways shall be satisfactory for the number of persons likely to use them.
- 4) Access from the stairway enclosures to the lifeboat and liferaft embarkation areas shall avoid high fire risk areas.
- 5) Stairways serving only a space and a balcony in that space shall not be considered as forming one of the required means of escape.
- 6) If a radio room or wheelhouse has no direct access to the open deck, two means of escape shall be provided, one of which may be a window of sufficient size or another means.
- 7) Stairways are not to exceed 3.5 metres vertical rise without the provision of a landing.
- 8) In the case where direct access to the appropriate survival craft embarkation deck as required by (a) and (b) is not practical, a readily accessible escape which shall provide continuous fire shelter from the level of its origin to the appropriate open deck with subsequent direct passage to the embarkation deck can be accepted provided that these escape routes including external staircases, have emergency lighting and slip free surfaces under foot.
- 9) Protection of access from the stairway enclosures to the lifeboat and liferaft embarkation areas shall be provided either directly or through protected internal routes which have fire integrity and insulation values for stairway enclosures as determined by tables 7.3.2 and 7.3.3, as appropriate.
- 10) Where public spaces span three or more open decks and contain combustibles such as furniture and give access to other enclosed spaces, each level within the space shall have two means of escape, one of which is to give access to a readily accessible escape which shall provide continuous fire shelter from the level of its origin to the appropriate survival craft embarkation deck.

12.1.2 Two means of escape shall be provided from each machinery space. In particular, the following provisions shall be complied with:

- 1) The two means of escape shall consist of either:
 - a) two sets of steel ladders as widely separated as possible, leading to doors in the upper part of the space similarly separated and from which access is provided to the appropriate survival craft embarkation decks. One of these ladders shall provide

continuous fire shelter from the lower part of the space to a safe position outside the space. This shelter shall be of steel or equivalent material, insulated where necessary, and provided with a self closing door at the lower end. If access is provided at other levels each level shall be provided with a steel or equivalent material self-closing door; or

- b) one steel ladder leading to a door in the upper part of the space from which access is provided to the embarkation deck and additionally, in the lower part of the space and in a position well separated from the ladder referred to, a steel door capable of being operated from each side and which provides access to a safe escape route from the lower part of the space to the embarkation deck.
 - c) All inclined ladders and stairways fitted with open treads in machinery spaces being part of or providing access to escape routes, but not located within a protected enclosure, are to be fitted with steel shields attached to their undersides.
- 2) One of the means of escape from any such space required by 12.1.2.1 may be dispensed with on sailing vessels with small machinery spaces, so long as either a door or a steel ladder and walkways provide a safe escape route to the embarkation deck with due regard being paid to the nature and location of the space and whether persons are normally employed in that space.
 - 3) Two means of escape shall be provided from a machinery control room located within a machinery space, at least one of which shall provide continuous fire shelter to a safe position outside the machinery space.
 - 4) Two means of escape shall be provided from the main workshop within a machinery space. At least one of these escape routes shall provide a continuous fire shelter to a safe position outside the machinery space.

12.1.3 Lifts shall not be considered as forming one of the required means of escape.

12.1.4 In exceptional circumstances, a single means of escape may be accepted for spaces other than accommodation spaces that are entered only occasionally, if the escape route does not pass through a galley, machinery space or watertight door.

12.1.5 Adequate deck area shall be provided at muster stations and embarkation areas having due regard to the expected number of persons. Generally, muster stations shall be provided close to the embarkation stations. Each muster station shall have sufficient clear deck space to accommodate all persons assigned to muster at that station, but at least 0.35m² per person.

12.1.6 Stairways and corridors used as means of escape shall be not less than 700 millimetres in clear width and shall have a handrail on one side. Stairways and corridors with a clear width of 1,800 millimetres and over shall have handrails on both sides. "Clear width" is considered the distance between the handrail and the bulkhead on the other side or between the handrails.

12.1.7 The angle of inclination of stairways shall be, in general, 45°, but not greater than 50°, and in machinery spaces and small spaces not more than 60°.

12.1.8 Doorways which give access to a stairway shall be at least the minimal required width for the stairway being served.

12.1.9 Hatches in both bulkheads and decks shall be not less than 600 x 600 millimetres in clear width.

12.1.10 Where paragraphs 12.1.6 to 12.1.9 cannot be reasonably achieved, alternatives may be agreed by the L.H.R.

12.1.11 All doors in escape routes shall be openable from either side. In the direction of escape they are all to be openable without a key. All handles on the inside of weathertight doors and hatches shall be non-removable. Where doors are lockable measures to ensure access from outside the space shall be provided for rescue purposes."

12.1.12 Emergency escape breathing devices (EEBD's) shall comply with the Fire Safety Systems Code. At least one spare emergency escape breathing device shall be kept onboard.

- 1) All vessels shall carry at least two EEBD's within accommodation spaces, and at least two EEBD's shall be carried in each main vertical zone.
- 2) On all vessels, within the machinery spaces, EEBD's shall be situated ready for use at easily visible locations, which can be reached quickly and easily at any time in the event of fire. The number and location shall take into account the layout of the machinery space and the number of persons normally working in the space. The number and location of these devices shall be indicated in the fire control plan.

SECTION 13 Ventilation Systems

13.1 Requirements

13.1.1 Ventilation ducts shall be of non-combustible material except flexible bellows of short length not exceeding 600 millimetres used for connecting fans to the ducting in air-conditioning rooms. Short ducts, however, not generally exceeding 2m in length and with a cross-section not exceeding 0.02m² need not be non-combustible, subject to the following conditions:

- 1) they shall be of a suitable material having regard to the risk of fire;
- 2) they shall be used only at the end of the ventilation device; and
- 3) they shall not be situated less than 600 millimetres, measured along the duct, from an opening in an "A" or "B" class division including continuous "B" class ceilings.

13.1.2 Ducts passing through "A" class divisions shall meet the following requirements:

- 1) where a thin plated duct with a free cross sectional area equal to, or less than, 0.02 m² passes through "A" class divisions, the opening shall be fitted with a steel sheet sleeve having a thickness of at least 3 millimetres and a length of at least 200 millimetres, divided preferably into 100 millimetres on each side of a bulkhead or, in the case of a deck, wholly laid on the lower side of the decks penetrated;
- 2) where ventilation ducts with a free cross-sectional area exceeding 0.02 m², but not more than 0.075 m², pass through "A" class divisions, the openings shall be lined with steel sheet sleeves. The ducts and sleeves shall have a thickness of at least 3 millimetres and a length of at least 900 millimetres. When passing through bulkheads, this length shall be divided preferably into 450 millimetres on each side of the bulkhead. These ducts, or sleeves lining such ducts, shall be provided with fire insulation. The insulation shall have at least the same fire integrity as the division through which the duct passes; and
- 3) automatic fire dampers shall be fitted in all ducts with a free cross-sectional area exceeding 0.075 m² that pass through "A" class divisions. Each damper shall be fitted close to the division penetrated and the duct between the damper and the division penetrated shall be constructed of steel in accordance with Sections 13.1.2.1 and 13.1.2.2. The fire damper shall operate automatically, but shall also be capable of being closed manually from both sides of the division. The damper shall be fitted with a visible indicator which shows the operating position of the damper. Fire dampers are not required, however, where ducts pass through spaces surrounded by "A" class divisions, without serving those spaces, provided those ducts have the same fire integrity as the divisions which they penetrate. A duct of cross-sectional area exceeding 0.075 m² shall not be divided into smaller ducts at the penetration of an "A" class division and then recombined into the original duct once through the division to avoid installing the damper required by this provision.

13.1.3 Ducts provided for the ventilation of machinery spaces of category A, galleys or spaces containing vehicles or craft with fuel in their tanks shall not pass through accommodation spaces, service spaces, or control stations unless they comply with paragraph 13.1.5.

13.1.4 Ducts provided for the ventilation of accommodation spaces, service spaces or control stations shall not pass through machinery spaces of category A, galleys or spaces containing vehicles or craft with fuel in their tanks unless they comply with Section 13.1.5.

13.1.5 As permitted by Sections 13.1.3 and 13.1.4 ducts shall be either:

- 1) constructed of steel having a thickness of at least 3 millimetres for ducts with a free cross-sectional area of less than 0.075 m², at least 4 millimetres for ducts with a free cross-sectional area of between 0.075 m² and 0.45 m², and at least 5 millimetres for ducts with a free cross-sectional area of over 0.45 m²;
- 2) suitably supported and stiffened;
- 3) fitted with automatic fire dampers close to the boundaries penetrated; and
- 4) insulated to "A-60" class standard from the boundaries of the spaces they serve to a point at least 5 m beyond each fire damper; or
- 5) constructed of steel in accordance with Sections 13.1.5.1 and 13.1.5.4; and
- 6) insulated to "A-60" class standard throughout the spaces they pass through, except for ducts that pass through spaces of category (9) or (10) as defined in SOLAS II-2/9.2.2.3.2.2.

13.1.6 For the purposes of Sections 13.1.5.4 and 13.1.5.6, ducts shall be insulated over their entire cross-sectional external surface. Ducts that are outside but adjacent to the specified space, and share one or more surfaces with it, shall be considered to pass through the specified space, and shall be insulated over the surface they share with the space for a distance of 450 millimetres past the duct.

13.1.7 Ventilation ducts with a free cross-sectional area exceeding 0.02m² passing through "B" class bulkheads shall be lined with steel sheet sleeves of 900 millimetres in length divided preferably into 450 millimetres on each side of the bulkheads, unless the duct is of steel for this length.

13.1.8 For a control station outside machinery spaces and other normally manned control stations, practical measures shall be taken to ensure that ventilation, visibility and freedom from smoke are maintained so that, in the event of fire, the machinery and equipment contained in the control station may be supervised and continue to function effectively. Alternative and separate means of air supply shall be provided; air inlets of the two sources of supply shall be so disposed that the risk of both inlets drawing in smoke simultaneously is minimized. These requirements need not apply to control stations situated on, and opening on to, an open deck, or where local closing arrangements would be equally effective.

13.1.9 Exhaust duct(s) from a galley range shall be constructed of "A" class divisions where passing through accommodation spaces and/or spaces containing combustible materials. In addition to the requirements of 13.1.3 an exhaust duct shall be fitted with:

- 1) a grease trap readily removable for cleaning;
- 2) a fire damper located in the lower end of the duct and in addition, a fire damper in the upper end of the duct (if required for the extinguishing medium);
- 3) arrangements for shutting off the exhaust fans;
- 4) fixed means for extinguishing a fire within the duct;
- 5) local controls to activate extinguishing system; stop the fans and close the fire dampers shall be grouped in one position immediately outside the main entrance to the galley.

13.1.10 Where it is necessary that a ventilation duct passes through a main vertical zone division, an automatic fire damper shall be fitted adjacent to the division. The damper shall also be capable of being

manually closed from each side of the division. The control location shall be readily accessible and be clearly and prominently marked. The duct between the division and the damper shall be constructed of steel in accordance with 13.1.5.1 and 13.1.5.2 and insulated to at least the same fire integrity as the division penetrated. The damper shall be fitted on at least one side of the division with a visible indicator showing the operating position of the damper.

13.1.11 Inlets and outlets of ventilation systems shall be capable of being closed from outside the space being ventilated. The means of closing shall be easily accessible as well as prominently and permanently marked and shall indicate the operating position of the closing device.

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

13.1.13 Public spaces which span three or more open decks and contain combustibles such as furniture, and other enclosed spaces shall be equipped with a smoke extraction system. The smoke extraction system shall be activated by the required smoke detection system and be capable of manual control. The fans shall be sized such that the entire volume within the space can be exhausted in 10 min or less.

13.1.14 Store-rooms containing highly flammable products shall be provided with ventilation arrangements that are separate from other ventilation systems. Ventilation shall be arranged to prevent the build up of flammable vapours at high and low levels. The inlets and outlets of ventilators shall be positioned so that they do not draw from or vent into an area which would cause undue hazard, and shall be fitted with spark arresters.

13.1.15 Ventilation systems serving Category 'A' machinery spaces shall be independent of systems serving other spaces.

13.1.16 All enclosed spaces containing free standing fuel tanks shall be ventilated independently of systems serving other spaces.

13.1.17 Ventilation shall be provided to prevent the accumulation of dangerous concentrations of flammable gas which may be emitted from batteries.

13.1.18 Ventilation openings may be fitted in and under the lower parts of cabin and public space doors in corridor bulkheads. The total net area of any such openings is not to exceed 0.05m².

13.1.19 For spaces containing vehicles or craft with fuel in their tanks or lockers storing such fuels, see Part 7, Ch.1 paragraph 17.2.5. For additional requirements for the ventilation of domestic gaseous fuel, see Part 7, Ch.2, Section 5.

13.1.20 Exhaust ducts from laundries shall be fitted with filters readily removable for cleaning purposes.

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

- 1) fire dampers, including their relevant means of operation, however, the testing is not required for dampers located at the lower end of the duct in exhaust ducts for galley ranges, which shall be of steel and capable of stopping the draught in the duct; and the damper required by this provision.
- 2) duct penetrations through "A" class divisions. However, the test is not required where steel sleeves are directly joined to ventilation ducts by means of riveted or screwed connections or by welding.

13.1.22 Fire dampers shall be easily accessible. Where they are placed behind ceilings or linings, these ceilings or linings shall be provided with an inspection hatch on which the identification number of the fire damper is marked. The fire damper identification number shall also be marked on any remote controls provided.

13.1.23 Ventilation ducts shall be provided with hatches for inspection and cleaning where practicable. The hatches shall be located near the fire dampers.

13.1.24 Combustible gaskets in flanged ventilation duct connections shall not be permitted within 600 millimetres of openings in "A" or "B" class divisions and in ducts required to be of "A" class construction.

13.1.25 Ventilation openings or air balance ducts between two enclosed spaces shall not be provided except as permitted by Sections 8.1.1.b.

13.1.26 All fire dampers shall be capable of manual operation. The dampers shall have a direct mechanical means of release or, alternatively, be closed by electrical, hydraulic, or pneumatic operation. All dampers shall be manually operable from both sides of the division. Automatic fire dampers, including those capable of remote operation, shall have a failsafe mechanism that shall close the damper in a fire even upon loss of electrical power or hydraulic or pneumatic pressure loss. Remotely operated fire dampers shall be capable of being reopened manually at the damper.

13.1.27 Where a ventilation room serves only such an adjacent machinery space and there is no fire division between the ventilation room and the machinery space, the means for closing the ventilation duct or ducts serving the machinery space shall be located outside of the ventilation room and machinery space.

13.1.28 Where a ventilation room serves such a machinery space as well as other spaces and is separated from the machinery space by a "A-0" class division, including penetrations, the means for closing the ventilation duct or ducts for the machinery space can be located in the ventilation room.

SECTION 14 Fixed Fire Detection and Fire Alarm Systems and Automatic Sprinkler, Fire Detection and Fire Alarm Systems

14.1 Purpose

The purpose of this section is to detect a fire in the space of origin and to provide for alarm for safe escape and fire-fighting activity. For this purpose, the following functional requirements shall be met:

- fixed fire detection and fire alarm system installations shall be suitable for the nature of the space, fire growth potential and potential generation of smoke and gases; and
- manually operated call points shall be placed effectively to ensure a readily accessible means of notification.

14.2 Requirements

14.2.1 All control stations, accommodation and service spaces, including corridors and stairways, except spaces which afford no substantial fire risk such as void spaces and sanitary spaces, shall be provided throughout with:

- 1) an automatic sprinkler where the pumps and alternative supply components shall be capable of supplying the required flow rate and pressure for the space with the greatest hydraulic demand. For the purposes of this calculation, the design area used to calculate the required flow and pressure shall be the deck area of the most hydraulically demanding space, separated from adjacent spaces by "A" class divisions. The design area need not exceed 280 m². For application to a small ship with a total protected area of less than 280 m², the Administration may specify the appropriate area for sizing of pumps and alternate supply components.
- 2) a fully addressable fire detection and fire alarm system of an approved type complying with the requirements of the Fire Safety Systems Code, Chapter 8 and 9, or an equivalent standard acceptable to the Administration.

14.2.2 A fixed fire detection and fire alarm system shall be fitted in all enclosed spaces except those containing no significant fire risk (toilets, bathrooms, void spaces, etc). Ceiling void spaces containing

equipment that could present a fire risk shall be fitted with a fixed fire detection and fire alarm system. Manually operated call points shall be placed to ensure a readily accessible means of notification. The fixed fire detection and fire-alarm system shall be installed in accordance with the requirements of SOLAS II-2/7 and the Fire Safety Systems Code, Chapter 9, and shall be audible externally.

SECTION 15 Oil Fuel Arrangements

15.1 Requirements

15.1.1 Arrangements for the storage, distribution and utilisation of oil fuel shall be such as to minimise the risk of fire or explosion.

15.1.2 As far as practicable, oil fuel tanks shall be part of the vessel's structure and shall be located outside Category 'A' machinery spaces.

15.1.3 Where oil fuel tanks, other than double bottom tanks, are necessarily located adjacent to or within Category 'A' machinery spaces, at least one of their vertical sides shall be contiguous to the machinery space boundaries, and is preferably to have a common boundary with the double bottom tanks, and the area of the tank boundary common with the machinery spaces shall be kept to a minimum. Where the vertical boundary of a tank directly exposed to a machinery space meets the vessel's side plating at an acute angle, a small horizontal surface at the base of the tank, necessary to accommodate practical constructional considerations may be permitted. If the arrangement of the machinery is such that a tank with a large horizontal surface at the base is necessary then a cofferdam with suitable ventilation arrangements, to protect the base of the tank from the effect of a machinery space fire, shall be specially considered. Oil fuel tanks situated within the boundaries of Category 'A' machinery spaces shall not contain oil fuel having a flashpoint of less than 60°C. Except for vessels constructed of materials other than steel, where steel tanks shall be provided, the use of free standing oil fuel tanks is prohibited.

15.1.4 Arrangements for the storage, distribution and utilisation of oil used in pressure lubrication systems shall be such as to minimise the risk of fire or explosion.

15.1.5 Arrangements for the storage, distribution and utilisation of other flammable oils employed under pressure in power transmission systems, control and activating systems and heating systems shall be such as to minimise the risk of fire or explosion.

15.1.6 Oil fuel, lubricating oil and other flammable oils shall not be carried in forepeak tanks.

SECTION 16 Miscellaneous

16.1 Public Address System

16.1.1 For vessels having a length of 85 metres or more, a public address system complying with the requirements of SOLAS III/6.5 shall be available throughout the accommodation and service spaces and control stations and open decks.

16.2 Heating Installations

16.2.1 Space heaters, if used, shall be fixed in position and so constructed as to reduce fire risks to a minimum. The design and location of these units shall be such that clothing, curtains or other similar materials cannot be scorched or set on fire by heat from the unit.

16.3 Covered Category (9) (Open Deck) Spaces

16.3.1 Sprinkler means a fixed pressure water-spraying fire-extinguishing system complying with the

provisions of the Fire Safety Systems Code.

16.3.2 Covered open decks that have less than 30% communicating openings shall be treated as a Category (9) space with the following additional provisions:

- (a) a fixed fire detection and alarm system according to Section 14 shall be provided;
- (b) The space shall be protected by a suitable sprinkler system; and
- (c) ventilators and exhausts in accordance with Part 3, Chapter 1, Section 4.8 shall not terminate in these spaces when serving Accommodation, Control Stations, garages or Machinery Spaces.

SECTION 17 Fire Appliances

17.1 Yachts with the notation "Commercial Yachts" and of 500 gross tons and over shall comply with the requirements of SOLAS II-2/10. as may be amended, and as appropriate to the vessel and its equipment. For the purpose of the SOLAS regulations, the standards for a cargo ship apply. However, in interior locations, fire hoses shall be connected to hydrants at all times. Existing vessels are encouraged to comply with this requirement in so far as is practicable.

17.2 In no case shall the standards applied be less than those applied to a "Commercial Yacht" of less than 500 gross tons, Part 7, Chapter 1.

17.3 The location of concealed fire appliances shall be clearly marked.

17.4 An onboard means of recharging breathing apparatus cylinders used during drills shall be provided, or 2 spare cylinders shall be carried onboard to replace those used for each self-contained breathing apparatus set carried.

17.5 Fireman's outfits provided for helideck crew shall be of EN 469 standard or another suitable recognised national or international standard.