

# RULES AND REGULATIONS FOR THE CLASSIFICATION OF SPECIAL SERVICE CRAFT

FIRE PROTECTION, DETECTION AND EXTINCTION

JULY 2008

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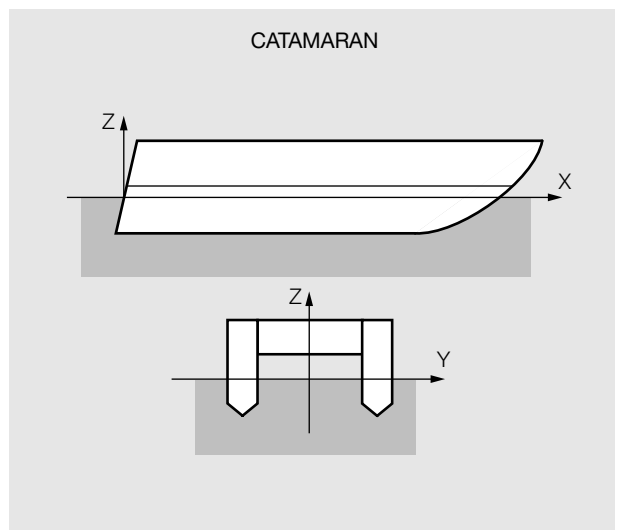
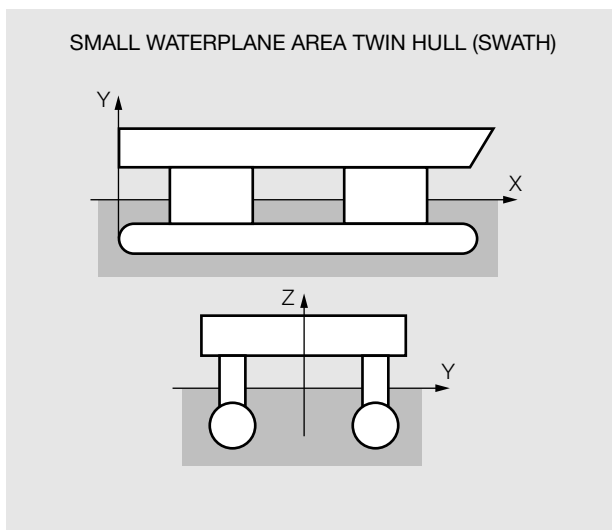
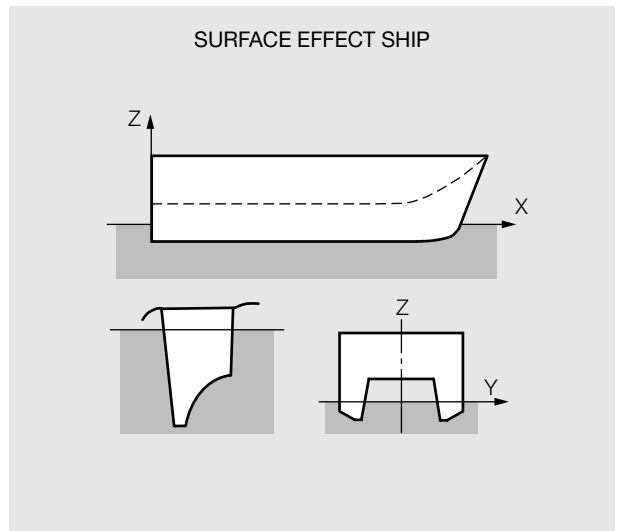
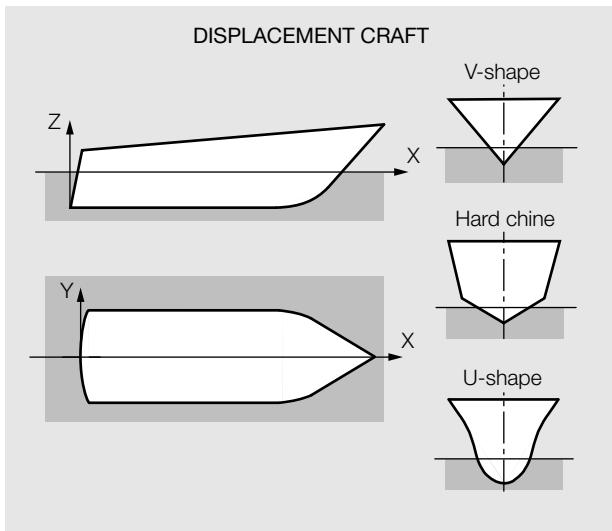
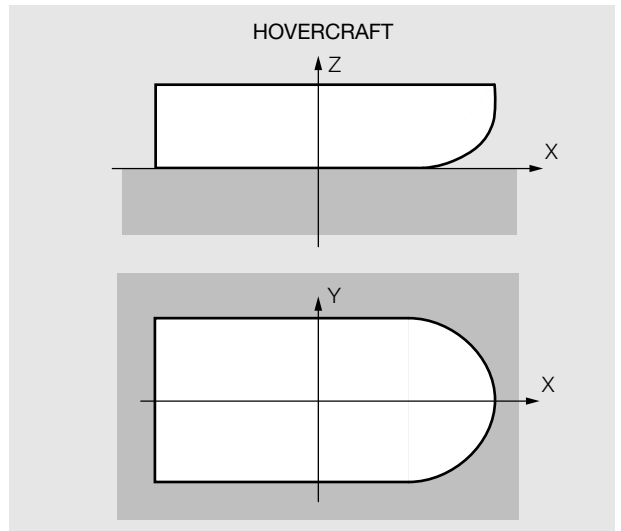
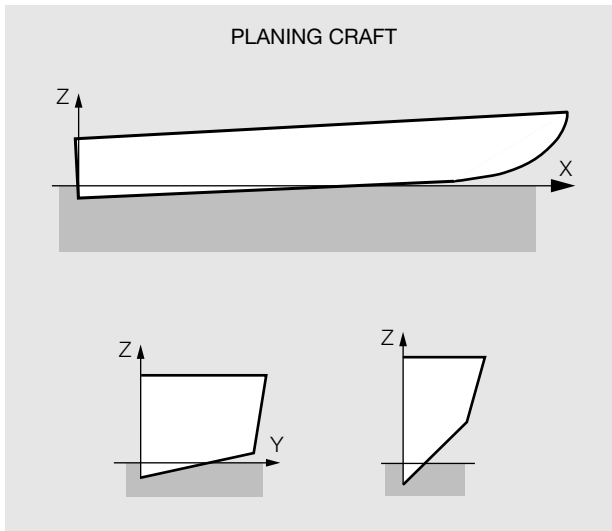
PART 17

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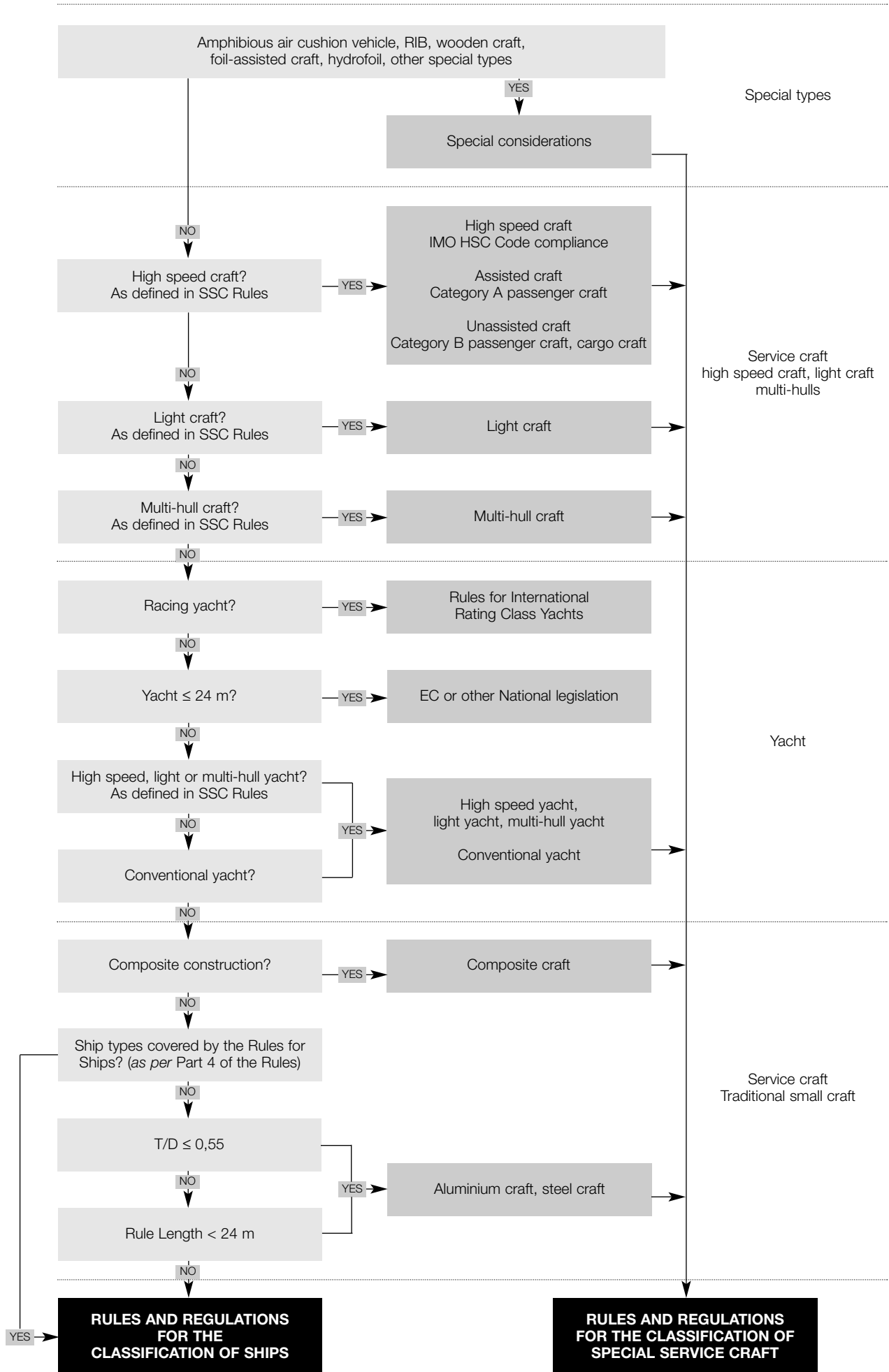
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**DIFFERENT TYPES OF HULL FORMS COVERED BY THE SPECIAL SERVICE CRAFT RULES**



**DIFFERENT TYPES OF CRAFT COVERED BY THE SPECIAL SERVICE CRAFT RULES**



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Section

1 **General requirements**

2 **Definitions**

■ **Section 1  
General requirements**

**1.1 Application**

1.1.1 The requirements of this Part apply to yachts with an overall length,  $L_{OA}$  (as defined in Pt 3, Ch 1,6.2.4) of 24 m or greater, 3000 gross registered tonnage or less, and intended for the carriage of 12 passengers or less, and service craft (see also 1.1.2(c)) built in accordance with these Rules.

1.1.2 Consideration will be given to the acceptance of fire safety measures:

- (a) which have been prescribed and approved by the Government of the flag state;
- (b) where the arrangements are considered equivalent to those required by these Rules as a result of risk assessment studies; or
- (c) where the arrangements are considered acceptable compared to those required by these Rules, due cognisance having been taken of any restricted service limits.

1.1.3 Special consideration, consistent with the fire hazard involved, will be given to construction or arrangements not covered by this Chapter.

1.1.4 High speed cargo craft of 500 gross tons and over on international voyages and high speed passenger craft on international voyages are to be provided with the fire safety measures required by the *International Convention for the Safety of Life at Sea, 1974* as amended (SOLAS 74), Chapter X – Safety Measures for High Speed Craft (*International Code of Safety for High Speed Craft*).

1.1.5 High speed cargo craft of 500 gross tons and over employed on national voyages and high speed passenger craft employed on national voyages are to comply with the fire safety measures of the Government of the flag state.

1.1.6 High speed cargo craft of less than 500 gross tons employed on national or international voyages are to comply with the fire safety measures of the Government of the flag state.

1.1.7 It is the responsibility of the Government of the flag state to give effect to the fire safety measures of 1.1.4, 1.1.5 and 1.1.6. However, LR will undertake to do this in cases where:

- (a) Contracting Governments have authorized LR to apply the requirements of SOLAS 74 and issue the appropriate certification on their behalf; or
- (b) the Government of the flag state is not a signatory to SOLAS 74; or

- (c) the craft is to be classed for restricted or special service in national waters and the Government of the flag state has no national requirements.

1.1.8 When implementing the provisions of 1.1.7, LR will apply the fire safety measures required by SOLAS 74 Chapter X – Safety Measures for High Speed Craft (*International Code of Safety for High Speed Craft*). However, due consideration will be given to arrangements deemed to provide an equivalent level of fire safety, taking due cognisance of the circumstances of the restricted or special service.

**1.2 Submission of plans and information**

1.2.1 The plans and information detailed in 1.2.2 to 1.2.4, where applicable, are to be submitted at least in triplicate for approval, together with all additional information such as gross tonnage and number of passengers/guests.

1.2.2 For fire protection, the following plans and information are to be submitted:

- (a) Structural fire protection plan showing extent of materials used in construction, steel, aluminium, or alternative forms of construction, together with details of the thermal characteristics of the alternative forms of construction that include the temperature at which the material starts to lose its strength, and proposals for protection, etc.
- (b) A general arrangement plan showing the main fire zones, escape stairways and the fire compartmentation bulkheads and decks within the main fire zones, including engine rooms, galleys, bonded stores, paint stores, navigating bridge, radio room, fire-fighting control room, emergency generator rooms and battery locker, helicopter arrangements, including re-fuelling and petrol stowage arrangements.
- (c) A plan showing the details of construction of the fire protection bulkheads and decks and particulars of any surface laminates employed.
- (d) Copies of Certificates of Approval by National Authorities and Fire Test Reports in respect of all 'A' and 'B' Class fire divisions, non-combustible materials and materials having low flame-spread characteristics, etc., which are to be used but have not been approved by LR. Copies of Certificates issued by other recognised approval bodies may be submitted for consideration.
- (e) A ventilation plan showing ducts and any dampers in them, closing appliances and the position of the controls for stopping the system.
- (f) A plan showing the fire detection and alarm system.
- (g) A plan showing the remote control system for fire doors, if applicable.
- (h) A fire control plan meeting the requirements of Ch 4,5.

1.2.3 For fire-extinguishing the following plans 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; the disposition of the portable and non-portable extinguishers and the types used; and the position and details of the 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, and the cross connections to any other system.
- (c) A plan showing details of each fixed fire-fighting system, including calculations for the quantities of the media used and the proposed rates of application.

1.2.4 Fire-control plans as required by Ch 4,5 are to be submitted.

## ■ Section 2 Definitions

### 2.1 Materials

2.1.1 **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, see IMO *International Code for Application of Fire Test Procedures* (FTP Code), Annex 1, Part 1. Any other material is a **combustible material**.

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

2.1.3 **Alternative forms of construction** means any combustible material may be accepted if it can be demonstrated that the material, which by itself or due to insulation provided has structural and fire integrity properties equivalent to 'A' or 'B' class divisions, or steel, as applicable, at the end of the applicable fire exposure to the standard fire test.

### 2.2 Fire test

2.2.1 A **standard fire test** is one in which the specimens of the relevant bulkheads and decks are exposed in a test furnace to temperatures corresponding approximately to the standard time-temperature curve. The test methods are to be in accordance with the IMO FTP Code, Annex 1, Part 3.

### 2.3 Flame spread

2.3.1 **Low flame spread** means that the surface thus described will adequately restrict the spread of flame, having regard to the risk of fire in the spaces concerned, this being determined by an acceptable test procedure, see IMO FTP Code, Annex 1, Part 5.

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

### 2.4 Ship divisions and spaces

2.4.1 **'A' Class divisions** are those divisions formed by bulkheads and decks, and:

- (a) Are to be constructed of steel or other equivalent material.
- (b) Are to be suitably stiffened.
- (c) 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, see 2.2.1.
- (d) Are to be insulated with approved non-combustible materials such that the average temperature of the unexposed side will not rise more than 140°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:
 

Class 'A-60'	60 minutes.
Class 'A-30'	30 minutes.
Class 'A-15'	15 minutes.
Class 'A-0'	0 minutes.
- (e) May be required to demonstrate that they meet the above requirements for integrity and temperature rise, through a test.

2.4.2 **'B' Class divisions** are those divisions formed by bulkheads, decks, ceilings or linings and:

- (a) Are to be so constructed as to be capable of preventing the passage of flame to the end of the first half hour of the standard fire test, see IMO FTP Code, Annex 1, Part 3.
- (b) Are to be insulated such that the average temperature of the unexposed side will not rise more than 140°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:
 

Class 'B-15'	15 minutes.
Class 'B-0'	0 minutes.
- (c) 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 Chapter.
- (d) May be required to ensure that they meet the above requirements for integrity and temperature rise through a test of a prototype division.

2.4.3 **'C' Class divisions** are divisions to be constructed of approved non-combustible materials. They need to 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 other requirements of this Chapter.

2.4.4 **Continuous 'B' Class ceilings or linings** are those 'B' Class ceilings or linings which terminate only at an 'A' or 'B' Class division.

2.4.5 **Accommodation spaces** are those spaces used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, pantries containing no cooking appliances and similar spaces.

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2.4.6 **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.

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

2.4.8 **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 the aggregate a total power output of not less than 375 kW; or
- (c) any oil-fired boiler or oil fuel unit.

2.4.9 **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.

2.4.10 **Control stations** are those spaces in which the craft'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.

2.4.11 **Cargo area** is that part of the craft 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 craft over the above-mentioned spaces.

2.4.12 **Main vertical zones** are those sections into which the hull, superstructure and deck houses are divided by 'A' Class divisions, the mean length and width of which on any one deck does not, in general, exceed 48 m.

## 2.5 Equipment

2.5.1 **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 1,8 bar (1,8 kgf/cm<sup>2</sup>) gauge.

## 2.6 Craft types

2.6.1 For the purpose of this Part the definitions of craft types given in 2.6.2 and 2.6.3 apply.

2.6.2 A **passenger craft** is a craft which carries more than twelve passengers.

2.6.3 A **yacht** is a recreational craft used for sport or pleasure and may be propelled mechanically, by sail or by a combination of both.



Section

- 1 **General requirements**
- 2 **Fire safety measures for service craft**

■ **Section 1  
General requirements**

**1.1 Application**

1.1.1 The requirements of this Chapter apply to service craft built in accordance with these Rules.

1.1.2 Where service craft incorporate fire hazards not covered in this Part, appropriate fire protection, detection and extinction arrangements are to be provided. Details are to be submitted for approval.

■ **Section 2  
Fire safety measures for service craft**

**2.1 General**

2.1.1 Table 2.2.1 is a guide to the major requirements of this Section. 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.

**2.2 Forms of construction – Structure**

2.2.1 The hull, superstructure, structural bulkheads, decks and deckhouses may be constructed of steel, other equivalent material, see Ch 1,2.1.2, or be of alternative forms of construction, see Ch 1,2.1.3.

2.2.2 The structure in way of Category 'A' machinery spaces, galleys containing appliances of significant fire risk, see 2.4.2, and other high risk areas is to be protected such that the material by itself or due to insulation provided can maintain its required strength at the end of 30 minutes exposure to the standard fire test.

2.2.3 Details of the method of construction, supported by calculations and/or fire test data, demonstrating compliance with 2.2.2, are to be submitted.

2.2.4 For aluminium alloy structures, the insulation is to 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 specified fire exposure.

**Table 2.2.1 General fire protection, detection and extinction requirements**

Form of construction, see 2.2	Steel or equivalent, or alternative forms of construction may be accepted, subject to requirements in high fire risk areas
Passive fire protection, see 2.3 to 2.6	Category 'A' machinery spaces: <ul style="list-style-type: none"> <li>• For craft &gt;150 gross tons: A-30/A-0</li> <li>• For craft &lt;150 gross tons: A-0</li> </ul> Galleys: <ul style="list-style-type: none"> <li>• For craft &gt;50 gross tons: B-15</li> </ul>
Means of escape, see 2.7: <ul style="list-style-type: none"> <li>• Machinery spaces</li> <li>• Accommodation, etc.</li> </ul>	} <sup>2</sup>
Fixed fire detection system, see 2.13	<ul style="list-style-type: none"> <li>• Fitted in all machinery spaces</li> <li>• Fitted in stairways, service spaces, machinery spaces, control stations and accommodation spaces of craft &gt;50 gross tons with sleeping accommodation</li> </ul>
Fire pumps, see 2.14	<ul style="list-style-type: none"> <li>• 1 fixed power pump + 1 portable pump</li> <li>• For craft &lt;150 gross tons: 1 portable pump</li> </ul>
Fire-extinguishing arrangements in machinery spaces, see 2.15	<ul style="list-style-type: none"> <li>• A fixed fire-extinguishing system</li> <li>• A minimum of 2, but need not exceed 5 portable foam extinguishers or equivalent</li> </ul>
Portable fire-extinguishers in accommodation, see 2.18	Sufficient to ensure that at least one will be readily available in every compartment

2.2.5 For composite structures, the insulation is to 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 is to be determined as in Ch 14,3.7 of the *Rules for the Manufacture, Testing and Certification of Materials* (hereinafter referred to as the Rules for Materials).

2.2.6 For structures in contact with sea-water, the required insulation should extend to at least 300 mm below the lightest waterline, see also 2.6.1.

**2.3 Forms of construction – Fire divisions**

2.3.1 Fire divisions required by 2.4 are to be constructed in accordance with the remaining paragraphs of this sub-Section.

2.3.2 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 insulation provided, has the fire resistance properties equivalent to 'A' or 'B' class divisions.

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2.3.3 Insulation required by 2.3.2 is to 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.

2.3.4 For aluminium alloy structures the insulation is to 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.

2.3.5 For composite structures, the insulation is to 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 is to be determined as in Ch 14,3.7 of the Rules for Materials.

### 2.4 Structural fire protection

2.4.1 Category 'A' machinery spaces are to be enclosed by A-30 Class divisions where adjacent to accommodation spaces, or control positions and A-0 Class divisions elsewhere. For craft below 150 gross tons, Category 'A' machinery spaces are to be enclosed by A-0 Class divisions, regardless of adjacent space use.

2.4.2 For craft greater than 50 gross tons, galleys are to be enclosed by B-15 Class divisions unless the cooking appliances contained therein have an insignificant fire risk.

- (a) For the purposes of this Chapter, coffee automats, toasters, dishwashers, microwave ovens, water boilers and similar appliances each with a maximum power of 5 kW may be regarded as having an insignificant fire risk. Electrically-heated cooking plates and hot plates for keeping food warm, each of them having a maximum power of 2 kW and a surface temperature not above 150°C may also be regarded as having insignificant fire risk. If spaces containing this equipment are lockable, then means of cutting-off the power to the space are to comply with Pt 16, Ch 2,16.6.7.
- (b) Other equipment such as fat fryers, open flame cookers, etc., are to be regarded as having a significant fire risk.

2.4.3 Openings in 'A' Class divisions are to be provided with permanently attached means of closing that are to be at least as effective for resisting fires as the divisions in which they are fitted.

2.4.4 Interior stairways serving machinery spaces, accommodation spaces, service spaces or control stations are to be of steel or other equivalent material.

2.4.5 Doors are to be self-closing in way of Category 'A' machinery spaces.

2.4.6 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.

2.4.7 Where the structure or 'A' Class divisions are required to be insulated, it is to 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 are to be made to prevent this heat transmission by insulating the horizontal and vertical boundaries or penetrations for a distance of 450 mm.

### 2.5 Materials

2.5.1 Paints, varnishes and other finishes used on exposed interior surfaces are not to be capable of producing excessive quantities of smoke, toxic gases or vapours and are to be of the low flame spread type. Reference is also to be made to the IMO FTP Code, Annex 1, Parts 2 and 5.

2.5.2 Except in refrigerated compartments of service space, all insulation (e.g. fire and comfort) is to be of non-combustible materials.

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

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

2.5.5 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 danger of flooding.

2.5.6 Primary deck coverings within accommodation spaces, service spaces and control stations are to be of a type that will not readily ignite, or give rise to toxic or explosive hazards at elevated temperatures. Reference is also to be made to the IMO FTP Code, Annex 1, Parts 2 and 6.

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

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



**2.6 Surface of insulation**

2.6.1 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.

**2.7 Means of escape**

2.7.1 Stairways, ladders and corridors serving crew spaces and other spaces to which the crew normally have access are to be arranged so as to provide ready means of escape to a deck from which disembarkation may be effected.

2.7.2 Where reasonable and practicable, and having regard to the number of crew and size of space, at least two means of escape, as widely separated as possible, are to be provided from each section of accommodation spaces, service spaces and control stations:

- (a) The normal means of access to the accommodation and service spaces below the open deck is to be arranged so that it is possible to reach the open deck without passing through intervening spaces containing a possible source of fire.
- (b) The second means of escape may be through portholes, or hatches of adequate size, leading to the open deck.
- (c) No dead-end corridors having a length of more than 7 m will be accepted. A 'dead-end corridor' is a corridor or part of a corridor from which there is only one escape route.

2.7.3 At least two means of escape are to be provided from machinery spaces, except where the small size of the machinery space makes it impractical. Escape is to be by steel ladders that are as widely separated as possible.

**2.8 Ventilation systems**

2.8.1 Ventilation fans are to be capable of being stopped, and main inlets and outlets of ventilation systems closed, from outside the spaces being served, see also Pt 16, Ch 2, 16.6.

2.8.2 Ventilation ducts for Category 'A' machinery spaces and exhaust ducts for galleys of significant fire risk are not to pass through accommodation spaces, service spaces or control stations unless the ducts are constructed of steel and arranged to preserve the integrity of the division.

2.8.3 Ventilation ducts for accommodation spaces, service spaces or control stations are not to pass through Category 'A' machinery spaces unless the ducts are constructed of steel and arranged to preserve the integrity of the division.

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

2.8.5 Ventilation systems serving Category 'A' machinery spaces are to be independent of systems serving other spaces.

2.8.6 All enclosed spaces containing free-standing fuel tanks are to be ventilated independently of systems serving other spaces.

2.8.7 Ventilation is to be provided to prevent the accumulation of dangerous concentrations of flammable gas that may be emitted from batteries. The requirements of Pt 16, Ch 2, 11.5 are to be complied with.

2.8.8 Ventilation openings may be fitted in and under the lower parts of cabin and public space doors in corridor bulkheads. Ventilation grills are to be of non-combustible material. The total net area of any such openings is not to exceed 0,05 m<sup>2</sup>. Bridging ducts are not allowed in fire divisions.

2.8.9 For additional requirements for the ventilation of domestic gaseous fuel, see 2.11.

**2.9 Fuel arrangements**

2.9.1 In service craft in which oil fuel is used, the arrangements for the storage, distribution and utilization of the oil fuel are to be such as to ensure the safety of the service craft and persons on board. For details, see Pt 15, Ch 3.

2.9.2 Oil fuel tanks situated within the boundaries of Category 'A' machinery spaces are not to contain oil fuel having a flashpoint of less than 60°C.

2.9.3 Oil fuel, lubricating oil and other flammable oils are not to be carried in fore peak tanks.

**2.10 Special arrangements in machinery spaces and, where necessary, other spaces**

2.10.1 Openings are to be provided with closing appliances constructed so as to maintain the fire integrity of the machinery space boundaries.

2.10.2 The type of equipment installed and the layout of the craft are to take account of the risk and spread of fire. Special attention is to be paid to the surroundings of open flame devices, hot areas and main and auxiliary machinery, oil and fuel overflows, and uncovered oil and fuel pipes.

2.10.3 Fuel filling, storage, venting and supply systems are to be installed so as to minimize the risk of fire and explosion.

2.10.4 Machinery components and accessories that require frequent maintenance and inspection are to be readily accessible.

2.10.5 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.

2.10.6 In Category 'A' machinery spaces means of control are to be provided for:

- (a) closure of openings which normally allow exhaust ventilation, and closure of ventilator dampers;
- (b) permitting the release of smoke;
- (c) stopping ventilating fans; and
- (d) stopping forced and induced draught fans, oil fuel transfer pumps, oil fuel unit pumps and other similar fuel pumps.

2.10.7 The controls required in 2.10.6 are to be located outside the space concerned, in a position where they will not be cut off in the event of fire in the space they serve. 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. See also Pt 15, Ch 3,4.5.1 and 4.9.2.

**2.11 Arrangements for gaseous fuel for domestic purposes**

2.11.1 Where gaseous fuel is used for domestic purposes, the arrangements for the storage, distribution and utilisation of the fuel are to be such that, having regard to the hazards of fire and explosion which the use of such fuel may entail, the safety of the service craft and the persons onboard is preserved. The installation is to be in accordance with recognised National or International Standards.

2.11.2 Storage lockers for gas cylinders are to be provided with:

- (a) effective ventilation;
- (b) an outward-opening door accessible directly to the open deck; and
- (c) gas-tight boundaries, including doors and other means of closing any openings therein, which form boundaries between such lockers and adjoining spaces.

2.11.3 Arrangements for storage on open deck will be specially considered.

**2.12 Space heaters**

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

**2.13 Fixed fire detection and fire-alarm systems**

2.13.1 A fixed fire detection and fire-alarm system is to be installed in all Category 'A' machinery spaces and is to comply with the requirements of Pt 16, Ch 1,2.8.

2.13.2 In craft over 50 gross tons, where sleeping accommodation is provided on board, a fixed fire detection and fire-alarm system is to be installed in all stairways, service spaces, machinery spaces, control stations and accommodation spaces (except toilets, bathrooms, void spaces, etc.). The fixed fire detection and fire-alarm system is to be installed in accordance with Ch 4,2.

**2.14 Fire pumps and fire main system**

**2.14.1 Application:**

- (a) Every service craft is to be provided with a fire pump(s), fire mains, hydrants and hoses as required by this Chapter.
- (b) For very small service craft, where it is not considered possible to fit a fire pump, the arrangements will be specially considered.

2.14.2 **Capacity of fire pumps.** The capacity of the fixed main fire pump(s) is not to be less than:

$$Q = (0,15 (L_R (B + D))^{1/2} + 2,25)^2$$

but need not exceed 25 m<sup>3</sup>/hour.

where

- B* = greatest moulded breadth of craft, in metres
- D* = moulded depth to bulkhead deck, in metres
- L<sub>R</sub>* = Rule length of craft, as defined in Pt 3, Ch 1,6.2.1, in metres
- Q* = total capacity in m<sup>3</sup>/hours.

**2.14.3 Fire pumps:**

- (a) In service craft of 150 tons gross or more, a minimum of one fixed power pump and one portable pump, complying with 2.14.4, are to be provided.
- (b) For service craft of less than 150 tons gross, one portable pump or alternative as required by 2.14.4, is to be provided.
- (c) 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 fuel oil, suitable changeover arrangements are fitted.
- (d) In service craft classed for navigation in ice, the fire pump sea inlet valves are to be provided with ice clearing arrangements, see Pt 1, Ch 2,3.8.1.
- (e) Relief valves are to be provided in conjunction with any fire pumps if the pump is 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 main system.
- (f) Where centrifugal pumps are provided in order to comply with this Section, a non-return valve is to be fitted in the pipe connecting each pump to the fire main.

# Fire Protection, Detection and Extinction – Service Craft

## Part 17, Chapter 2

Section 2

### 2.14.4 Portable fire pumps:

(a) Except for electric pumps, which will be specially considered, portable fire pumps are to comply with the following:

- (i) The pump is to be self priming.
- (ii) The suction head in operation is not to exceed 4,5 m.
- (iii) The portable fire pump is to be fitted with a length of discharge hose and nozzle capable of maintaining a pressure sufficient to produce a jet throw of at least 12 m, or that required to enable a jet of water to be directed on any part of the engine room or the exterior boundary of the engine room and casing, whichever is the greater. The jet throw required need not exceed the length of the craft.
- (iv) The pump set is to have its own fuel tank of sufficient capacity to operate the pump for three hours.
- (v) Details of the fuel type and storage location are to be submitted. If the fuel type has a flashpoint below 60°C, further consideration will be given to the fire safety aspects.
- (vi) The pump set is to be stored in a secure, safe and enclosed space, accessible from open deck and clear of the Category 'A' machinery space.
- (vii) The pump set is to be easily moved and operated by two persons and be readily available for immediate use.
- (viii) Arrangements are to be provided to secure the pump at its anticipated operating position(s).
- (ix) The overboard suction hose is to be non-collapsible and of sufficient length to cater for the craft's motion under all operational conditions. A suitable strainer is to be fitted at the inlet end of the hose.
- (x) Any diesel-driven power source for the pump is to be capable of being readily started in its cold condition down to a temperature of 0°C by hand (manual) cranking.

(b) If it is not possible to comply with the requirements of 2.14.4(a), an additional fixed fire pump will be required, which is to comply with the following:

- (i) The pump, its source of power and sea connection are to be located in accessible positions outside the Category 'A' machinery space, or in a different space to the main fire pump, if the main fire pump is located outside the Category 'A' machinery space. In the case of craft defined in 2.14.3(b), the pump may be situated in the Category 'A' machinery space, if so desired.
- (ii) The sea valve is to be capable of being operated from a position near the pump.
- (iii) The space where the fire pump prime mover is located is to be illuminated from the emergency source of electrical power, except for craft defined in 2.14.3(b), and is to be well ventilated.
- (iv) If the 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.

(v) The pump may also be used for other suitable purposes, subject to approval in each case.

(vi) The pressure and quantity of water delivered by the pump is to be sufficient to produce a jet of water at any nozzle of not less than 12 m.

(vii) In the case of craft defined in 2.14.3(b), a fire main, hydrants and hoses are to be installed in accordance with 2.14.5 to 2.14.10.

(c) Means to illuminate the stowage area of the portable pump and its necessary areas of operation are to be provided from the emergency source of electrical power.

(d) If preferred, a pump complying with 2.14.4(b) may be fitted instead of a portable pump complying with 2.14.4(a).

### 2.14.5 Fire main:

(a) The diameter of the fire main is to be based on the required capacity of the fixed main fire pump(s). The diameter of the water service pipes are to be sufficient to ensure an adequate supply of water for the operation of at least one fire-hose.

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

(c) All exposed 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.

**2.14.6 Pressure in the fire main.** When the fixed main fire pump, or the fire pump described in 2.14.4(b), is delivering the quantity of water required by 2.14.2 through the fire main, fire hoses and nozzles, the pressure maintained at any hydrant is to be sufficient to produce a jet throw at any nozzle of not less than 12 m.

**2.14.7 Number and position of hydrants.** The number and position of the hydrants are to be such that at least one jet of water is to reach any part normally accessible to the crew while the service craft 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. At least one hydrant is to be provided in each machinery space.

### 2.14.8 Pipes and hydrants:

(a) Materials readily rendered ineffective by heat are not to be used for fire mains. 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 arrangements of pipes and hydrants is to be such as to avoid the possibility of freezing. In service craft 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 service craft, there is to be complete interchangeability of hose couplings and nozzles.

(b) A valve is to be fitted at each fire hydrant so that any fire-hose may be removed while the fire pumps are at work.

- (c) Where an additional fixed fire pump is fitted in accordance with 2.14.4(b) or 2.14.4(d):
- (i) An isolating valve is to be fitted in the fire main so that all the hydrants in the service craft, except those in the Category 'A' machinery space containing the main fire pump, can be supplied with water by the additional fixed fire pump. The isolating valve is to be located in an easily accessible and tenable position outside the Category 'A' machinery space; and
  - (ii) The fire main is not to re-enter the machinery space downstream of the isolating valve.

**2.14.9 Fire-hoses:**

- (a) 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 or connections.
- (b) The number of fire-hoses to be provided, each complete with couplings and nozzles, is to be one for each 15 m length of the service craft, or part thereof, but need not exceed the number of hydrants provided. This number does not include any hoses required in any engine room. If necessary, the number of hoses is to be increased so as to ensure that hoses in sufficient numbers are available and accessible at all times.

**2.14.10 Nozzles:**

- (a) For the purpose of this Chapter, standard nozzle sizes are to be 12 mm, 16 mm or 19 mm, or as near thereto as possible, so as to make full use of the maximum discharge capacity of the fire pump(s).
- (b) For accommodation and service spaces, the nozzle size need not exceed 12 mm.
- (c) The size of nozzles intended for use in conjunction with a portable fire pump need not exceed 12 mm.
- (d) All nozzles are to be of an approved dual purpose type (i.e. spray/jet type) incorporating a shut-off.

**2.15 Fire-extinguishing arrangements in Category 'A' machinery spaces**

2.15.1 Except where provided for in 2.15.2, Category 'A' machinery spaces are to be provided with:

- (a) one of the fixed fire-extinguishing systems given in Ch 4,3; and
- (b) at least two portable foam extinguishers or equivalent, see Ch 4,6.3.2. Where internal combustion machinery is installed, an additional portable extinguisher is to be provided for every 375 kW of power output, but the total number of such additional extinguishers need not exceed five.

2.15.2 Where the size of the machinery space precludes access under normal operating conditions, provision is to be made such that a manually-released extinguishing medium, of a type allowed in Chapter 4, can be remotely discharged into the space. Such arrangements may utilise a portable extinguisher of adequate size. Details of the arrangements with supporting calculations are to be submitted for approval.

**2.16 Fire-extinguishing appliances in other machinery spaces**

2.16.1 Where a fire hazard exists in any machinery space for which no specific provisions for fire-extinguishing appliances are prescribed in 2.15 and 2.17, there is to be provided in, or adjacent to, that space a satisfactory number of approved portable fire-extinguishers or other approved means of fire-extinction.

**2.17 Machinery spaces in craft which are constructed mainly or wholly of alternative forms of construction**

2.17.1 Machinery spaces in craft which are constructed mainly or wholly with alternative forms of construction that contain internal combustion machinery, are to comply with the fire-extinguishing requirements for Category 'A' machinery spaces, see 2.15.1.

**2.18 Fixed fire-extinguishing systems not required by this Chapter**

2.18.1 Where a fixed fire-extinguishing system not required by this Chapter is installed, the arrangement is to comply with the relevant requirements of this Chapter.

**2.19 Portable fire-extinguishers**

2.19.1 All portable fire-extinguishers are to comply with the requirements of Ch 4,6.

2.19.2 The portable fire-extinguishers are to be stowed in readily accessible positions.

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

2.19.4 At least one portable fire-extinguisher is to be located so that it can easily be reached from the main steering position of the craft.

2.19.5 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.

2.19.6 Where cooking facilities are provided a portable fire-extinguisher of a type appropriate to the energy source used is to be located in a position readily accessible for use in the event of a fire.

## **2.20 Fire blanket**

2.20.1 A fire blanket is to be installed in all galleys.

## **2.21 Protection of paint lockers and flammable liquid lockers**

2.21.1 Paint lockers and flammable liquid lockers with a deck area 4 m<sup>2</sup> or over are to be provided with a fixed fire-extinguishing system enabling the crew to extinguish a fire without entering the space. One of the following systems is to be provided:

- A carbon dioxide system designed for 40 per cent of the gross volume of the space.
- A dry powder system designed to discharge 0,5 kg powder per cubic metre of gross volume of the space.
- A water spray system designed to give a coverage of 5 litres per square metre of deck area per minute. Water spray systems may be connected to the fire main.

2.21.2 Consideration will be given to the acceptance of other arrangements which provide equivalent protection.

2.21.3 Lockers having a deck area of less than 4 m<sup>2</sup> may be protected by carbon dioxide or dry powder portable extinguishers located near the entrance to the locker.

## **2.22 Arrangements where deep-fat cooking equipment is installed**

2.22.1 Where deep-fat cooking equipment is installed in high speed craft, all installations are to be fitted with:

- (a) an automatic or manual fixed extinguishing system type approved in accordance with ISO 15371, *Ships and marine technology – Fire extinguishing systems for protection of galley deep-fat cooking equipment – Fire tests*, or an acceptable alternative National or International Standard, for protection of the deep-fat cooking equipment;
- (b) a primary and back up thermostat with an alarm to alert the operator in the event of failure of either thermostat;
- (c) means to automatically shut off the deep-fat cooking equipment electrical power upon activation of the fire-extinguishing system;
- (d) an alarm for indicating operation of the fire-extinguishing system in the galley where the equipment is installed; and
- (e) controls for manual operation of the fire-extinguishing system which are clearly labelled for ready use by the crew.

Control and electrical engineering arrangements are to be in accordance with the requirements of Pt 16, Ch 1 and Ch 2, as applicable.

## **2.23 Helicopter decks**

2.23.1 The requirements of IMO Resolution A.855(20) are to be complied with having due regard to the hazards involved.

2.23.2 If a helicopter hangar is not provided and if two fireman's outfits are supplied as per 2.24.1, then the fireman's outfits required by IMO Resolution A.855(20) need not be provided.

## **2.24 Fireman's outfit**

2.24.1 All service craft of 350 gross tons or more and having enclosed spaces which are normally accessible, are to carry at least two fireman's outfits complying with the requirements of Ch 4,4.

## **2.25 Fire-control plans**

2.25.1 Fire-control plans are to meet the requirements of Ch 4,5.



Section

- 1 **General requirements**
- 2 **Fire safety measures for yachts of overall length greater than 24 m but less than 500 gt**
- 3 **Fire safety measures for yachts 500 gt or more**

■ **Section 1  
General requirements**

**1.1 Application**

1.1.1 The requirements of this Chapter apply to yachts with an overall length,  $L_{OA}$  (as defined in Pt 3, Ch 1,6.2.4) of 24 m or greater built in accordance with the Rules.

1.1.2 Where yachts incorporate fire hazards not covered in this Part, appropriate fire protection, detection and extinction arrangements are to be provided. Details are to be submitted for approval.

1.1.3 For yachts with an overall length of 24 m or more, and less than 500 gt, the fire safety measures are to comply with Section 2.

1.1.4 For yachts 500 gt or more, the fire safety measures are to comply with Section 3.

■ **Section 2  
Fire safety measures for yachts of overall length greater than 24 m but less than 500 gt**

**2.1 General**

2.1.1 Table 3.2.1 is a guide to the major requirements of this Section. 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.

**2.2 Forms of construction – Structure**

2.2.1 The hull, superstructure, structural bulkheads, decks and deckhouses may be constructed of steel, other equivalent material, see Ch 1,2.1.2, or be of alternative forms of construction, see Ch 1,2.1.3.

2.2.2 The structure in way of Category ‘A’ machinery spaces, galleys containing appliances of significant fire risk, see 2.4.2, and other high risk areas is to be protected such that the material by itself or due to insulation provided can maintain its required strength at the end of 30 minutes exposure to the standard fire test.

**Table 3.2.1 General fire protection, detection and extinction requirements**

Form of construction, see 2.2	Steel or equivalent, or alternative forms of construction may be accepted subject to requirements
Passive fire protection, see 2.3 to 2.6	<ul style="list-style-type: none"> <li>• Category ‘A’ machinery spaces ‘A-30’/‘A-0’</li> <li>• Galleys: ‘B-15’ where significant fire risk</li> <li>• Bulkheads in escape route corridors greater than 7 m in length: ‘B-0’</li> <li>• Stairway enclosures: ‘B-0’</li> </ul>
Means of escape, see 2.7	} 2
<ul style="list-style-type: none"> <li>• Category ‘A’ machinery spaces</li> <li>• Accommodation, etc.</li> </ul>	
Fixed fire detection system, see 2.13	<ul style="list-style-type: none"> <li>• Fitted in machinery spaces</li> <li>• Fitted in service spaces, control stations and accommodation spaces</li> </ul>
Fire pumps, see 2.14	1 fixed power pump + 1 portable pump
Fire extinguishing arrangements in Category ‘A’ machinery spaces, see 2.15	<ul style="list-style-type: none"> <li>• A fixed fire-extinguishing system</li> <li>• A minimum of 2 and maximum of 5 portable foam extinguishers or equivalent</li> </ul>
Portable fire-extinguishers in accommodation, see 2.18	At least 3
Automatic sprinkler system or equivalent, see 2.16	Fitted in yachts >350 gross tons

2.2.3 Details of the method of construction, supported by calculations and/or fire test data, demonstrating compliance with 2.2.2 are to be submitted.

2.2.4 For aluminium alloy structures, the insulation is to 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 specified fire exposure.

2.2.5 For composite structures, the insulation is to 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 is to be determined as in Ch 14,3.7 of the *Rules for the Manufacture, Testing and Certification of Materials* (hereinafter referred to as the Rules for Materials).

2.2.6 For structures in contact with sea-water, the required insulation should extend to at least 300 mm below the lightest waterline, see also 2.6.1.

**2.3 Forms of construction – Fire divisions**

2.3.1 Fire divisions required by 2.4 are to be constructed in accordance with the remaining paragraphs of this sub-Section.

# Fire Protection, Detection and Extinction – Yachts

## Part 17, Chapter 3

Section 2

2.3.2 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 insulation provided, has the fire resistance properties equivalent to 'A' or 'B' Class divisions.

2.3.3 Insulation required by 2.3.2 is to 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.

2.3.4 For aluminium alloy structures, the insulation is to 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.

2.3.5 For composite structures, the insulation is to 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 is to be determined as in Ch 14,3.7 of the Rules for Materials.

### 2.4 Structural fire protection

2.4.1 Category 'A' machinery spaces, spaces containing vehicles or craft with fuel in their tanks, or lockers storing such fuels, are to be enclosed by 'A-30' Class divisions where adjacent to accommodation or service spaces, control positions or each other, and 'A-0' Class divisions elsewhere.

2.4.2 Galleys are to be enclosed by 'B-15' Class divisions, unless the cooking appliances contained therein have an insignificant fire risk:

- (a) For the purposes of this Chapter, coffee automats, toasters, dishwashers, microwave ovens, water boilers and similar appliances each with a maximum power of 5 kW may be regarded as having an insignificant fire risk. Electrically-heated cooking plates and hot plates for keeping food warm, each of them having a maximum power of 2 kW and a surface temperature not above 150°C may also be regarded as having insignificant fire risk. If spaces containing this equipment are lockable, then means of cutting-off the power to the space are to comply with Pt 16, Ch 2,16.6.7.
- (b) Other equipment such as fat fryers, open flame cookers, etc., would be regarded as having a significant fire risk.

2.4.3 Where forming escape routes, corridor bulkheads and ceilings may be constructed of combustible materials provided they have a non-combustible core such that the 'B-0' Class standard fire test criteria are met.

2.4.4 Stairways connecting spaces below the main deck to the deck above are to be protected at one level by at least 'B-0' Class divisions and self-closing doors.

2.4.5 Lift and dumbwaiter trunks are to be enclosed by at least 'B-0' Class divisions and self-closing doors.

2.4.6 Openings in 'A' and 'B' Class divisions are to be provided with permanently attached means of closing that are to be at least as effective for resisting fires as the divisions in which they are fitted.

2.4.7 Interior stairways serving machinery spaces, accommodation spaces, service spaces or control stations are to be of steel, or other equivalent material.

2.4.8 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.

2.4.9 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.

2.4.10 Where the structure or 'A' Class divisions are required to be insulated, it is to 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 are to be made to prevent this heat transmission by insulating the horizontal and vertical boundaries or penetrations for a distance of 450 mm.

### 2.5 Materials

2.5.1 Except in refrigerated compartments of service spaces, all insulation other than fire insulation is to be of non-readily ignitable type. Fire insulation is to be of the non-combustible type.

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

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

2.5.4 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.

2.5.5 Primary deck coverings within accommodation spaces, service spaces and control stations are to be of a type that will not readily ignite, or give rise to toxic or explosive hazards at elevated temperatures. Reference is also to be made to the IMO FTP Code, Annex 1, Parts 2 and 6.

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



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

### 2.6 Surface of insulation

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

### 2.7 Means of escape

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

2.7.2 Where reasonable and practicable, and having regard to the number of personnel involved and size of space, at least two means of escape, as widely separated as possible, are to be provided from each section of accommodation and service spaces and control stations:

- (a) The normal means of access to the accommodation and service spaces below the open deck are to be arranged so that it is possible to reach the open deck without passing through intervening spaces containing a possible source of fire.
- (b) Where accommodation arrangements are such that access to compartments is through another compartment, as is often the case with an Owner's suite, a second means of escape is to be provided. The second escape route is to be as remote as possible from the main escape route.
- (c) This second means of escape may be through portholes, or hatches of adequate size, leading to the open deck.
- (d) No dead-end corridors having a length of more than 7 m will be accepted. A 'dead-end corridor' is a corridor or part of a corridor from which there is only one escape route.

2.7.3 At least one of the means of escape from each space referred to in 2.7.2 is to be enclosed by 'B-0' Class divisions, unless it gives access directly to the open decks from the space.

2.7.4 At least two means of escape are to be provided from machinery spaces, except where the small size of the machinery space makes it impracticable. Escape is to be by steel ladders that are as widely separated as possible.

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

### 2.8 Ventilation systems

2.8.1 Ventilation fans are to be capable of being stopped, and main inlets and outlets of ventilation systems closed, from outside the spaces being served, see Pt 16, Ch 2,16.6.

2.8.2 Ventilation ducts for Category 'A' machinery spaces, exhaust ducts for galleys of significant fire risk, spaces containing vehicles or craft with fuel in their tanks, or lockers storing such fuels, are not to pass through accommodation spaces, service spaces or control stations unless the ducts are constructed of steel and arranged to preserve the integrity of the division.

2.8.3 Ventilation ducts for accommodation spaces, service spaces or control stations are not to pass through Category 'A' machinery spaces, spaces containing vehicles or craft with fuel in their tanks, or lockers storing such fuels, unless the ducts are constructed of steel and arranged to preserve the integrity of the division.

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

2.8.5 Ventilation systems serving Category 'A' machinery spaces are to be independent of systems serving other spaces.

2.8.6 All enclosed spaces containing free-standing fuel tanks are to be ventilated independently of systems serving other spaces.

2.8.7 Ventilation is to be provided to prevent the accumulation of dangerous concentrations of flammable gas which may be emitted from batteries. The requirements of Pt 16, Ch 2,11.5 are to be complied with.

2.8.8 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 0,05 m<sup>2</sup>. Bridging ducts are not allowed in fire divisions.

2.8.9 For spaces containing vehicles or craft with fuel in their tanks or lockers storing such fuels, see 2.20.1(d). For additional requirements for the ventilation of domestic gaseous fuel, see 2.11.

### 2.9 Fuel arrangements

2.9.1 In yachts in which oil fuel is used, the arrangements for the storage, distribution and utilization of the oil fuel are to be such as to ensure the safety of the yacht and persons on board. For details, see Pt 15, Ch 3.

2.9.2 Oil fuel tanks situated within the boundaries of Category 'A' machinery spaces are not to contain oil fuel having a flashpoint of less than 60°C.

2.9.3 Oil fuel, lubricating oil and other flammable oils are not to be carried in fore peak tanks.

**2.10 Special arrangements in Category 'A' machinery spaces and, where necessary, other machinery spaces**

2.10.1 Openings are to be provided with closing appliances constructed so as to maintain the fire integrity of the machinery space boundaries.

2.10.2 The type of equipment installed and the layout of the yacht are to take account of the risk and spread of fire. Special attention is to be paid to the surroundings of open flame devices, hot areas and main and auxiliary machinery, oil and fuel overflows, and uncovered oil and fuel pipes.

2.10.3 Fuel filling, storage, venting and supply systems are to be installed so as to minimize the risk of fire and explosion.

2.10.4 Machinery components and accessories that require frequent maintenance and inspection are to be readily accessible.

2.10.5 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.

2.10.6 Means of control are to be provided for:

- (a) closure of openings which normally allow exhaust ventilation, and closure of ventilator dampers;
- (b) permitting the release of smoke;
- (c) stopping ventilating fans; and
- (d) stopping forced and induced draught fans, oil fuel transfer pumps, oil fuel unit pumps and other similar fuel pumps.

2.10.7 The controls required in 2.10.6 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. 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. See also Pt 15, Ch 3,4.5.1 and 4.9.2.

**2.11 Arrangements for gaseous fuel for domestic purposes**

2.11.1 Where gaseous fuel is used for domestic purposes, the arrangements for the storage, distribution and utilisation of the fuel are to be such that, having regard to the hazards of fire and explosion which the use of such fuel may entail, the safety of the yacht and the persons onboard is preserved. The installation is to be in accordance with recognised National or International Standards.

2.11.2 Storage lockers for gas cylinders are to be provided with:

- (a) effective ventilation;
- (b) an outward-opening door accessible directly to the open deck; and
- (c) gas-tight boundaries, including doors and other means of closing any openings therein, which form boundaries between such lockers and adjoining spaces.

2.11.3 Arrangements for storage on open deck will be specially considered.

**2.12 Space heaters**

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

**2.13 Fixed fire detection and fire-alarm systems**

2.13.1 A fixed fire detection and fire-alarm system are to be installed in all Category 'A' machinery spaces and are to comply with the requirements of Pt 16, Ch 1,2.8.

2.13.2 A fixed fire detection and fire-alarm system are to be fitted in all stairways (including lift and dumbwaiter trunks), service spaces, control stations and accommodation spaces (except toilets, bathrooms, void spaces, etc.). The fixed fire detection and fire-alarm system are to be installed in accordance with Ch 4,2.

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

2.13.4 A special alarm, operated from the navigating bridge or fire-control station, is to be fitted to summon the crew.

**2.14 Fire pumps and fire main system**

2.14.1 **Application.** Every yacht is to be provided with a fire pump(s), fire mains, hydrants and hoses as required by this Section.

2.14.2 **Capacity of fire pumps.** The capacity of the fixed main fire pump(s) is not to be less than:

$$Q = (0,15 (L_R (B + D))^{1/2} + 2,25)^2$$

but need not exceed 25 m<sup>3</sup>/hour.

where

- B* = greatest moulded breadth of yacht, in metres
- D* = moulded depth to bulkhead deck, in metres
- L<sub>R</sub>* = Rule length of yacht, as defined in Pt 3, Ch 1,6.2.1, in metres
- Q* = total capacity in m<sup>3</sup>/hour.

**2.14.3 Fire pumps:**

- (a) A minimum of one fixed power pump and one portable pump or alternative, complying with 2.14.4, are to be provided.
- (b) 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 fuel oil, suitable changeover arrangements are fitted.

- (c) In yachts classed for navigation in ice, the fire pump sea inlet valves are to be provided with ice clearing arrangements, see Pt 1, Ch 2,3.8.1.
- (d) Relief valves are to be provided in conjunction with any fire pump if the pump is 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 main system.
- (e) Where centrifugal pumps are provided in order to comply with this Section, a non-return valve is to be fitted in the pipe connecting each pump to the fire main.
- (iii) The room where the fire pump prime mover is located is to be illuminated from the emergency source of electrical power and is to be well ventilated.
- (iv) If the 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.
- (v) The pump may also be used for other suitable purposes, subject to approval in each case.
- (vi) The pressure and quantity of water delivered by the pump are to be sufficient to produce a jet of water at any nozzle of not less than 12 m.

**2.14.4 Portable fire pumps:**

- (a) Except for electric pumps, which will be specially considered, portable fire pumps are to comply with the following:
  - (i) The pump is to be self priming.
  - (ii) The suction head in operation is not to exceed 4,5 m.
  - (iii) The portable fire pump is to be fitted with a length of discharge hose and nozzle capable of maintaining a pressure sufficient to produce a jet throw of at least 12 m or that required to enable a jet of water to be directed on any part of the engine room or the exterior boundary of the engine room and casing, whichever is the greater.
  - (iv) The pump set is to have its own fuel tank of sufficient capacity to operate the pump for three hours.
  - (v) Details of the fuel type and storage location are to be submitted. If the fuel type has a flashpoint below 60°C, further consideration will be given to the fire safety aspects.
  - (vi) The pump set is to be stored in a secure, safe and enclosed space, accessible from open deck and clear of the Category 'A' machinery space.
  - (vii) The pump set is to be easily moved and operated by two persons and be readily available for immediate use.
  - (viii) Arrangements are to be provided to secure the pump at its anticipated operating position(s).
  - (ix) The overboard suction hose is to be non-collapsible and of sufficient length to cater for the yacht's motion under all operational conditions. A suitable strainer is to be fitted at the inlet end of the hose.
  - (x) Any diesel driven power source for the pump is to be capable of being readily started in its cold condition down to a temperature of 0°C by hand (manual) cranking.
- (b) If it is not possible to comply with the requirements of 2.14.4(a), an additional fixed fire pump will be required, which is to comply with the following:
  - (i) The pump, its source of power and sea connection are to be located in accessible positions outside the Category 'A' machinery space, or in a different space to the main fire pump, if the main fire pump is located outside the Category 'A' machinery space.
  - (ii) The sea valve is to be capable of being operated from a position near the pump.
- (c) Means to illuminate the stowage area of the portable pump and its necessary areas of operation are to be provided from the emergency source of electrical power.
- (d) If preferred, a pump complying with 2.14.4(b) may be fitted instead of a portable pump complying with 2.14.4(a), see also 2.14.8(c).

**2.14.5 Fire main:**

- (a) The diameter of the fire main is to be based on the required capacity of the fixed main fire pump(s). The diameter of the water service pipes is to be sufficient to ensure an adequate supply of water for the operation of at least one fire-hose.
- (b) The wash deck line may be used as a fire main provided that the requirements of this Section are satisfied.
- (c) All exposed 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.

**2.14.6 Pressure in the fire main.** When the fixed main fire pump, or the fire pump described in 2.14.4(b), is delivering the quantity of water required by 2.14.2 through the fire main, fire-hoses and nozzles, the pressure maintained at any hydrant is to be sufficient to produce a jet throw at any nozzle of not less than 12 m.

**2.14.7 Number and position of hydrants.** The number and position of the hydrants are to be such that at least one jet of water is to reach any part normally accessible to any person while the yacht is being navigated. Furthermore, such hydrants are to be positioned near the accesses to the protected spaces. At least one hydrant is to be provided in each Category 'A' machinery space.

**2.14.8 Pipes and hydrants:**

- (a) Materials readily rendered ineffective by heat are not to be used for fire mains. For the use of aluminium alloy see Pt 15, Ch 1,10.1.4. 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. Unless one hose and nozzle is provided for each hydrant in the yacht, there is to be complete interchangeability of hose couplings and nozzles.
- (b) A valve is to be fitted at each fire hydrant so that any fire-hose may be removed while the fire pump is at work.

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- (c) Where an additional fixed fire pump is fitted in accordance with 2.14.4(b) or 2.14.4(d):
- (i) An isolating valve is to be fitted in the fire main so that all the hydrants in the yacht, except those in the Category 'A' machinery space containing the main fire pump, can be supplied with water by the additional fixed fire pump. The isolating valve is to be located in an easily accessible and tenable position outside the Category 'A' machinery space; and
  - (ii) the fire main is not to re-enter the machinery space downstream of the isolating valve.

### 2.14.9 Fire-hoses:

- (a) 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 or connections.
- (b) A minimum of three fire-hoses are to be provided, each complete with couplings and nozzles. These numbers do not include any hoses required in any engine room. If necessary, the number of hoses is to be increased so as to ensure that hoses in sufficient number are available and accessible at all times.

### 2.14.10 Nozzles:

- (a) For the purpose of this Chapter, standard nozzle sizes are to be 12 mm, 16 mm or 19 mm, or as near thereto as possible, so as to make full use of the maximum discharge capacity of the fire pump or pumps.
- (b) For accommodation and service spaces, the nozzle size need not exceed 12 mm.
- (c) The size of nozzles intended for use in conjunction with a portable fire pump need not exceed 12 mm.
- (d) All nozzles are to be of an approved dual purpose type (i.e. spray/jet type) incorporating a shut-off.

## 2.15 Fire-extinguishing arrangements in machinery spaces

2.15.1 **Category 'A' machinery spaces** are to be provided with:

- (a) One of the fixed fire-extinguishing systems given in Ch 4,3; and
- (b) at least two portable foam extinguishers or equivalent, see Ch 4,6.3.2. Where internal combustion machinery is installed, an additional portable extinguisher is to be provided for every 375 kW of power output, but the total number of such additional extinguishers need not exceed five.

2.15.2 **Fire-extinguishing appliances in other machinery spaces.** Where a fire hazard exists in any machinery space for which no specific provisions for fire-extinguishing appliances are prescribed in 2.15.1 or 2.15.3 there is to be provided in or adjacent to that space, a satisfactory number of approved portable fire-extinguishers or other approved means of fire-extinction.

2.15.3 **Machinery spaces, other than Category 'A', in yachts which are constructed mainly or wholly with alternative forms of construction.** In yachts that are constructed mainly or wholly with alternative forms of construction, machinery spaces, other than Category 'A', containing internal combustion machinery, are to comply with the fire-extinguishing requirements for Category 'A' machinery spaces, see 2.15.1.

## 2.16 Automatic sprinkler, fire detection and fire-alarm system

2.16.1 A fixed automatic sprinkler must be fitted in yachts over 350 gross tons, fire detection and fire-alarm system, or equivalent system (e.g. watermist), are to be fitted in all stairways, service spaces, control stations and accommodation spaces, except in general, in spaces which afford no fire risk such as void spaces.

2.16.2 The arrangements are to be in accordance with Ch 4,1, particular attention should be given to Ch 4,1.2.16 and 1.2.17.

## 2.17 Fixed fire-extinguishing systems not required by this Section

2.17.1 Where a fixed fire-extinguishing system not required by this Chapter is installed, the arrangement is to comply with the relevant requirements of this Chapter.

## 2.18 Portable fire-extinguishers

2.18.1 All portable fire-extinguishers are to comply with the requirements of Ch 4,6.

2.18.2 The portable fire-extinguishers are to be stowed in readily accessible positions.

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

2.18.4 At least one portable fire-extinguisher is to be located so that it can easily be reached from the main steering position of the yacht.

2.18.5 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. In any case, their number is to be not less than three.

2.18.6 Where cooking facilities are provided, a portable fire-extinguisher of a type appropriate to the energy source used is to be located in a position readily accessible for use in the event of a fire.

**2.19 Fire blanket**

2.19.1 A fire blanket is to be installed in all galleys.

**2.20 Protection of spaces containing vehicles or craft with fuel in their tanks or lockers storing such fuels**

2.20.1 Spaces containing vehicles or craft with fuel in their tanks, or lockers storing such fuels, are to be provided with the following:

- (a) A fixed fire detection and fire-alarm system complying with the requirements of Pt 16, Ch 1,2,8.
- (b) A manually-operated water spray deluge system having a water application rate of 5 litres per square metre of deck area per minute. Where the deck height does not exceed 2,5 m, an application rate of 3,5 litres per square metre of deck area per minute will be accepted. Adequate drainage of the protected spaces is to be provided generally in accordance with the requirements for vehicle or cargo spaces, see Pt 3, Ch 4,9,4.4. The drainage piping and connection for the space are to be non-combustible. Other fixed fire-extinguishing systems may be permitted, provided they are not less effective in controlling the type of fire likely to occur.
- (c) At least two portable foam extinguishers or equivalent.
- (d) An independent mechanical ventilation system, which is entirely separate from other ventilation systems, providing at least six air changes per hour. The ducted air is not to pass through other spaces, except as allowed under 2.8.2, or vent into areas where it could be drawn into accommodation areas or cause undue hazard.
- (e) Electrical equipment of a safe type is to be provided, see Pt 16, Ch 2,13.
- (f) Prominently displayed 'No Smoking' signs.
- (g) 'A-30' Class divisions where adjacent to Category 'A' machinery spaces, accommodation or service spaces, or control positions and 'A-0' Class divisions elsewhere.

2.20.2 Such spaces are not to give access to any space other than the fuel store or lockers for use within the space. Lockers storing fuel are to be accessed from an exterior location, unless the locker is within the space containing the vehicles or craft. Exceptionally, where the engine room escape cannot be routed elsewhere, it may exit into the space providing that:

- (a) the connecting door is self-closing;
- (b) no door hold back devices are fitted;
- (c) an audible and visual alarm is fitted on the bridge to signify when the door is open; and
- (d) a notice is posted at the door stating that the door is to remain closed and that the area beside the door is an escape route and is to be kept clear.

2.20.3 The requirements of 2.9 are to be complied with, as appropriate.

**2.21 Protection of paint lockers and flammable liquid lockers**

2.21.1 Paint lockers and flammable liquid lockers with a deck area of 4 m<sup>2</sup> or more are to be provided with a fixed fire-extinguishing system enabling the crew to extinguish a fire without entering the space. One of the following systems is to be provided:

- A carbon dioxide system designed for 40 per cent of the gross volume of the space.
- A dry powder system designed to discharge 0,5 kg powder per cubic metre of gross volume of the space.
- A water spray system designed to give a coverage of 5 litres per square metre of deck area per minute. Water spray systems may be connected to the fire main.

2.21.2 Consideration will be given to the acceptance of other arrangements which provide equivalent protection.

2.21.3 Lockers having a deck area of less than 4 m<sup>2</sup> may be protected by carbon dioxide or dry powder portable extinguishers located near the entrance to the locker.

**2.22 Helicopter decks**

2.22.1 The requirements of IMO Resolution A.855(20) are to be complied with having due regard to the hazards involved.

2.22.2 If a helicopter hangar is not provided and if two fireman's outfits are supplied as in 2.23.1, then the fireman's outfits required by IMO Resolution A.855(20) need not be provided.

**2.23 Fireman's outfit**

2.23.1 All yachts of 350 gross tons or more are to carry at least two fireman's outfits complying with the requirements of Ch 4,4.

**2.24 Fire-control plans**

2.24.1 Fire control plans are to meet the requirements of Ch 4,5.

**Section 3  
Fire safety measures for yachts  
500 gt or more**

**3.1 General**

3.1.1 Table 3.3.1 is a guide to the major requirements of this Section. 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.

**Table 3.3.1 General fire protection, detection and extinction requirements**

Form of construction, see 3.2	Steel or equivalent, or alternative forms of construction may be accepted subject to extensive insulation requirements
Passive fire protection, see 3.3 to 3.12	See Table 3.3.2 and Table 3.3.3
Means of escape, see 3.15: • Category 'A' machinery spaces • Accommodation, etc.	} 2
Fixed fire detection system, see 3.24	
Fire pumps, see 3.25.1 to 3.25.10	<ul style="list-style-type: none"> <li>• In general, 2 independent power pumps</li> <li>• For yachts of ≥4000 gross tons: 3 independent power pumps</li> <li>• A fire in any one compartment is not to put all the fire pumps out of action</li> </ul>
International shore connection, see 3.25.11	At least 1
Fire extinguishing arrangements in Category 'A' machinery spaces, see 3.26. See also 3.27 for oil fuel units	<ul style="list-style-type: none"> <li>• A fixed fire extinguishing system</li> <li>• Portable air-foam equipment</li> <li>• 45 litre foam extinguisher</li> <li>• Portable foam extinguishers within 10 m walking distance</li> </ul>
Portable fire-extinguishers in accommodation, see 3.32	Sufficient to ensure that at least one will be readily available in every compartment, but a minimum of five
Automatic sprinkler system or equivalent, see 3.29	Fitted in all yachts
Fireman's outfits, see 3.38	At least 2

**3.2 Forms of construction – Structure**

3.2.1 The hull, superstructure, structural bulkheads, decks and deckhouses may be constructed of steel, other equivalent material, see Ch 1,2.1.2 or be of alternative forms of construction, see Ch 1,2.1.3.

3.2.2 The structure in way of Category 'A' machinery spaces, galleys containing appliances of significant fire risk and other high risk areas is to be protected such that the material by itself or due to insulation provided can maintain its required strength at the end of 60 minutes exposure to the standard fire test.

3.2.3 Details of the method of construction, supported by calculations and/or fire test data, demonstrating compliance with 3.2.2 are to be submitted.

3.2.4 For aluminium alloy structures, the insulation is to 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 specified fire exposure.

3.2.5 For composite structures, the insulation is to 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 is to be determined as in Ch 14,3.7 of the Rules for Materials.

3.2.6 For structures in contact with sea-water, the required insulation should extend to at least 300 mm below the lightest waterline, see also 2.6.1.

**3.3 Forms of construction – Fire divisions**

3.3.1 Fire divisions required by 3.4 are to be constructed in accordance with the remaining paragraphs of 3.3.

3.3.2 Fire divisions using steel equivalent, or alternative forms of construction, may be accepted if it can be demonstrated that the material by itself due to insulation provided, has the fire resistance properties equivalent to 'A' or 'B' Class divisions.

3.3.3 Insulation required by 3.3.2 is to 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.

3.3.4 For aluminium alloy structures, the insulation is to 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.

3.3.5 For composite structures, the insulation is to 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 is to be determined as in Ch 14,3.7 of the Rules for Materials.

**3.4 Structural fire protection – Main vertical zones and horizontal zones**

3.4.1 The hull, superstructure and deckhouses in way of accommodation and service spaces are to be subdivided into main vertical zones by 'A' Class divisions, see Ch 1,2.4.12. These divisions are to have insulation values in accordance with Tables 3.3.2 and 3.3.3.

3.4.2 As far as practicable, the bulkheads forming the boundaries of the main vertical zones above the bulkhead deck are to be in line with watertight subdivision bulkheads situated immediately below the bulkhead deck.

3.4.3 The bulkheads mentioned in 3.4.2 are to extend from deck to deck and to the shell or other boundaries.

**Table 3.3.2 Fire integrity of bulkheads separating adjacent spaces**

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'	(g)
Corridors	(2)	—	C(d)	'B-0'(d)	'A-0'(a) 'B-0'(d)	'B-0'(d)	'A-60'	'A-0'	'A-15' 'A-0'(f)	(g)
Accommodation spaces	(3)	—	—	C(d)	'A-0'(a) 'B-0'(d)	'B-0'(d)	'A-60'	'A-0'	'A-15' 'A-0'(f)	(g)
Stairways	(4)	—	—	—	'A-0'(a) 'B-0'(d)	'A-0'(a) 'B-0'(d)	'A-60'	'A-0'	'A-15' 'A-0'(f)	(g)
Service spaces (low risk)	(5)	—	—	—	—	C(d)	'A-60'	'A-0'	'A-0'	(g)
Machinery spaces of Category 'A' and spaces containing vehicles or craft with fuel in their tanks or lockers storing such fuels	(6)	—	—	—	—	—	'A-60'(b)	'A-0'	'A-60'	(g)
Other machinery spaces	(7)	—	—	—	—	—	—	'A-0'(b)	'A-0'	(g)
Service spaces (high risk)	(8)	—	—	—	—	—	—	—	'A-0'(b)	(g)
Open decks	(9)	—	—	—	—	—	—	—	—	—

**NOTES**

- For clarification as to which applies, see 3.7.
- Where spaces are of the same numerical category and superscript (b) appears, a bulkhead or deck of the ratings shown in the Table is only required when the adjacent spaces are for a different purpose, e.g. in category (8), a galley next to a galley does not require a bulkhead, but a galley next to a paint room requires an 'A-0' Class bulkhead.
- Bulkheads separating the wheelhouse and chartroom from each other may be 'B-0' rating.
- For the application of 3.4.1 all 'B-0' and 'C' Class bulkheads where appearing in this Table are to be taken as 'A-0' Class.
- Fire insulation need not be fitted if the machinery space of category (7) has little or no fire risk.
- Where the spaces are protected by the sprinkler system on both sides of the division, the division may be 'A-0' Class. Where the sprinkler system only protects a space on one side of the division the rating is to be the higher of the two values given.
- The division is to be of steel, other equivalent material, or alternative forms of construction, but is not required to be of 'A' Class standard. However, where decks, except open decks, are penetrated for the passage of electric cables, pipes and vent ducts, such penetrations are to be made tight to prevent the passage of flame and smoke.
- For requirements for main vertical zones, see 3.4.1.

**3.5 Structural fire protection of bulkheads within a main vertical zone**

3.5.1 All such divisions may be faced with combustible materials.

3.5.2 When continuous 'B' Class ceilings and/or linings are fitted on both sides of the bulkhead, the portion of the bulkhead behind the continuous ceiling or lining is to be of material which in thickness and composition is acceptable in the construction of 'B' Class divisions but which may meet 'B' Class standards only insofar as is reasonable and practicable.

3.5.3 All bulkheads required to be 'B' Class divisions, except corridor bulkheads prescribed in 3.5.2, are to extend from deck to deck and to the shell or other boundaries unless continuous 'B' Class ceilings or linings fitted on both sides of the bulkhead are at least of the same fire resistance as the bulkhead, in which case the bulkhead may terminate at the continuous ceiling or lining.

**3.6 Structural fire protection – Fire integrity of bulkheads and decks**

3.6.1 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 are to be as prescribed in Tables 3.3.2 and Table 3.3.3.

3.6.2 For determining the appropriate fire integrity standards to be applied to divisions between adjacent spaces, such spaces are classified in Table 3.3.2 and Table 3.3.3 according to their fire-risk as shown in space categories (1) to (9). The title of each category is intended to be typical (general) rather than restrictive. The number in parentheses preceding each space category refers to the applicable column or row in the Tables.

**(1) Control stations:**

- Spaces containing emergency sources of power and lighting.
- Wheelhouse and chartroom.
- Spaces containing the ship's radio equipment.
- Fire-extinguishing rooms, fire-control stations and fire recording stations.
- Control room for propulsion machinery when located outside the machinery space.
- Spaces containing centralized fire-alarm equipment.

**Table 3.3.3 Fire integrity of decks separating adjacent spaces**

Space below	Space 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'	(g)	
Corridors (2)	'A-0'	(g)	(g)	'A-0'	(g)	'A-60'	'A-0'	'A-0'	(g)	
Accommodation spaces (3)	'A-60'	'A-0'	(g)	'A-0'	(g)	'A-60'	'A-0'	'A-0'	(g)	
Stairways (4)	'A-0'	'A-0'	'A-0'	(g)	'A-0'	'A-60'	'A-0'	'A-0'	(g)	
Service spaces (low risk) (5)	'A-15'	'A-0'	'A-0'	'A-0'	(g)	'A-60'	'A-0'	'A-0'	(g)	
Machinery spaces of Category 'A' and spaces containing vehicles or craft with fuel in their tanks or lockers storing such fuels (6)	'A-60'	'A-60'	'A-60'	'A-60'	'A-60'	'A-60'	'A-60'	'A-60' <sup>(e)</sup>	'A-60'	(g)
Other machinery spaces (7)	'A-15'	'A-0'	'A-0'	'A-0'	'A-0'	'A-0'	(g)	'A-0'	(g)	
Service spaces (high risk) (8)	'A-60'	'A-30' 'A-0' <sup>(f)</sup>	'A-30' 'A-0' <sup>(f)</sup>	'A-30' 'A-0' <sup>(f)</sup>	'A-0'	'A-60'	'A-0'	'A-0'	(g)	
Open decks (9)	(g)	(g)	(g)	(g)	(g)	(g)	(g)	(g)	—	
NOTE See Notes to Table 3.3.2.										

- (2) Corridors:
  - Guest and crew corridors and lobbies.
- (3) Accommodation spaces:
  - Spaces as defined in Ch 1,2.4.5 excluding corridors.
- (4) Stairways:
  - Interior stairways, lifts and escalators (other than those wholly contained within the machinery spaces) and enclosures thereto.
  - In this connection, a stairway which is enclosed only at one level is to be regarded as part of the space from which it is not separated by a fire door.
- (5) Service spaces (low risk):
  - Lockers and store-rooms having areas of less than 4 m<sup>2</sup>, drying rooms and laundries.
- (6) Category 'A' machinery spaces, spaces containing vehicles or craft with fuel in their tanks, or lockers storing such fuels:
  - Spaces as defined in Ch 1,2.4.8.
- (7) Other machinery spaces:
  - Spaces as defined in Ch 1,2.4.9 excluding Category 'A' machinery spaces.
- (8) Service spaces (high risk):
  - Galleys, pantries containing cooking appliances, paint and lamp rooms, lockers and store-rooms having areas of 4 m<sup>2</sup> or more, spaces for the storage of flammable liquids, bonded stores and workshops other than those forming part of the machinery spaces.
- (9) Open decks:
  - Open deck spaces and enclosed promenades having no fire-risk. Air spaces (the space outside superstructures and deckhouses).

3.6.3 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.

**3.7 Structural fire protection – Protection of stairways and lifts in accommodation and service spaces**

3.7.1 All stairways are to be of steel construction except where the use of other equivalent material is specially approved, and are to be within enclosures formed of 'A' Class divisions, with positive means of closure at all openings, except that:

- (a) A stairway connecting only two decks need not be enclosed, provided that the integrity of the deck is maintained by proper bulkheads or doors at one level to at least 'B-0' Class. When a stairway is closed at one level, the stairway enclosure is to be protected in accordance with Tables 3.3.2 and 3.3.3; and
- (b) Stairways may be fitted in the open in a public space, provided that they lie wholly within such public space.

3.7.2 Stairway enclosures are to have a direct access to the corridors and to be of sufficient area to prevent congestion, having in view the number of persons likely to use them in an emergency. Within the perimeter of such stairway enclosures, only toilets and lockers of non-combustible material providing storage for safety equipment are permitted. Only public spaces, corridors, other escape stairways required by 3.15.1(e), pantries containing cooking appliances with an insignificant fire risk, see 2.4.2, and external areas are to have direct access to these stairway enclosures. Small corridors or lobbies may be used to separate an enclosed stairway from other spaces.



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3.7.3 Lift trunks are to be so fitted as to prevent the passage of smoke and flame from one 'tween deck to another and are to be provided with means of closing so as to permit the control of draught and smoke.

### 3.8 Structural fire protection – Openings in 'A' Class divisions

3.8.1 The construction of all doors and door frames in 'A' Class divisions, and the means of securing them when closed, is to provide resistance to fire as well as to the passage of smoke and flame, as far as practicable, equivalent to that of the bulkheads in which the doors are situated. Such doors and door frames are to be constructed of steel or other equivalent material. Steel watertight doors need not be insulated.

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

3.8.3 Fire doors in main vertical zone bulkheads and stairway enclosures are to satisfy the following requirements:

- (a) The doors shall be self-closing and be capable of closing with an angle of inclination of up to 3,5° opposing closure. The approximate time of closure for hinged fire-doors is to be no more than 40 s and not less than 10 s from the beginning of their movement with the ship in the upright position. The approximate uniform rate of closure for sliding fire doors is to be no more than 0,2 m/s and no less than 0,1 m/s with the ship in the upright position.
- (b) Remote-controlled sliding or power-operated doors are to be equipped with an alarm that will sound not less than 5 s but no more than 10 s before the door begins to move and will continue to sound until the door is completely closed. Doors designed to re-open upon contacting an object in its path are to re-open sufficiently to allow a clear passage of at least 0,75 m but not more than 1 m.
- (c) All doors are to be capable of remote and automatic release from the continuously manned central control station, either simultaneously or in groups and also individually from a position at both sides of the door. Indication is to be provided at the fire control panel in the continuously manned central control station whether each of the remotely-controlled doors are closed. The release mechanism is to be so designed that the door will automatically close in the event of disruption of the control system or central power supply. Release switches shall have an on-off function to prevent automatic resetting of the system. Hold-back devices not subject to central control station release are not permitted.
- (d) Local power accumulators for power-operated doors are to be located in the immediate vicinity of the doors. They are to have the capacity to enable the doors to be fully opened and closed at least 10 times using local controls.
- (e) Double-leaf doors dependent on a latch to maintain their fire integrity are to be arranged so that the latch is automatically activated by the action of the closing doors.
- (f) Doors which are power-operated and automatically closed, giving direct access to special category spaces need not be equipped with the alarms and remote release mechanisms required by (b) and (c).

(g) The components of the local control system are to be accessible for maintenance and adjusting.

3.8.4 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.

### 3.9 Structural fire protection – Openings in steel outer boundaries

3.9.1 The requirements for steel or other equivalent material on the outer boundaries of a yacht do not apply to glass partitions, windows and sidescuttles. The requirements of 3.11.2 for such boundaries to have 'A' class integrity are to be adhered to.

### 3.10 Structural fire protection – Openings in 'B' Class divisions

3.10.1 Doors and door frames in 'B' Class divisions and means of securing them are to provide a method of closure which has resistance to fire as far as practicable equivalent to the divisions they serve, except that ventilation openings may be permitted in the lower portion of such doors. Where such openings are in or under a door the total net area of any such opening or openings is not to exceed 0,05 m<sup>2</sup>. When such an opening is cut in a door it is to be fitted with a grill made of non-combustible material. Bridging ducts are not allowed in fire divisions.

3.10.2 Cabin doors in 'B' class divisions are to be self-closing. Hold-backs are not permitted.

3.10.3 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.

### 3.11 Structural fire protection – Windows and side scuttles

3.11.1 Notwithstanding the requirements of Table 3.3.2 and Table 3.3.3, all windows and side scuttles in bulkheads separating accommodation and service spaces and control stations from weather are to be constructed with frames of steel or other suitable material. The glass is to be retained by a metal glazing bead or angle. Alternative forms of construction and retention will be considered.

3.11.2 Glass is not to be installed as an interior main vertical zone or stairway enclosure bulkhead.

3.11.3 For yachts having a freeboard length of 85 m and over, windows and side scuttles situated in the yacht's side shell below the life raft and escape slide embarkation areas and below lifeboat embarkation areas are to have fire integrity of at least equal to 'A-0' Class.

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### 3.12 Structural fire protection – Details of construction

3.12.1 In accommodation and services spaces, control stations, corridors and stairways, air spaces enclosed behind ceilings, panelling or linings are to be suitably divided by close-fitting draught stops not more than 7 m apart. In the vertical direction, such spaces, including those behind linings of stairways, trunks, etc., are to be closed at each deck.

3.12.2 The draught stops are to 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.

3.12.3 Where the structure or 'A' Class divisions are required to be insulated, it is to 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 are to be made to prevent this heat transmission by insulating the horizontal and vertical boundaries or penetrations for a distance of 450 mm.

### 3.13 Structural fire protection – Materials

3.13.1 Except in cargo spaces, mail rooms, baggage rooms, or refrigerated compartments, of service spaces, all insulation (e.g. fire and comfort) is to be of non-combustible materials. Partial bulkheads or decks used to subdivide a space for utility or artistic treatment are to have a non-combustible core.

3.13.2 The use of combustible materials is to be kept to a minimum.

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

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

3.13.5 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 danger of flooding.

3.13.6 Primary deck coverings within accommodation spaces, service spaces and control stations are to be of a type which will not readily ignite, or give rise to toxic or explosive hazards at elevated temperatures. Reference is also to be made to the IMO FTP Code, Annex 1, Parts 2 and 6.

3.13.7 Vapour barriers and adhesives used in conjunction with insulation, as well as insulation of pipe fittings for cold service systems 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.

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

3.13.9 Furniture in the stairway enclosures is to be limited to seating. If required, it is to be fixed, limited to four seats on each deck in each stairway enclosure and is not to obstruct the escape route. Additional seating may be permitted in the main reception area within a stairway enclosure provided it is fixed and does not obstruct the escape route. Furniture is not permitted in corridors forming escape routes in cabin areas. Lockers for the storage of safety equipment may be permitted.

### 3.14 Structural fire protection – Surface of insulation

3.14.1 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 so far as is practicable.

### 3.15 Structural fire protection – Means of escape

3.15.1 Stairways and ladders are to be arranged to provide ready means of escape to the survival craft embarkation deck from all guest and crew spaces and from spaces in which the crew is normally employed, other than machinery spaces. In particular, the following provisions are to be complied with:

- (a) Below the bulkhead deck, two means of escape, at least one of which is to be independent of watertight doors, are to be provided for each watertight compartment or similarly restricted space or group of spaces. One of these means of escape may be dispensed with, due regard being paid to the nature and the location of spaces concerned, and to the number of persons who normally might be accommodated or employed there.
- (b) Above the bulkhead deck, there are to be at least two practical means of escape from each main vertical zone or similarly restricted space or group of spaces, at least one of which is to give access to a stairway forming a vertical escape.
- (c) If a radio-telegraph station has no direct access to the open deck, two means of escape from or access to such station are to be provided, one of which may be a porthole or window of sufficient size or other satisfactory means to provide an emergency escape.
- (d) A corridor, lobby, or part of a corridor from which there is only one route of escape is not to exceed 7 m. Where accommodation arrangements are such that access to compartments is through another compartment, as is often the case with an Owner's suite, a second means of escape is to be provided. The second escape route is to be as remote as possible from the main escape route. The second means of escape may be through portholes or hatches of adequate size, leading to the open deck.

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- (e) At least one of the means of escape required by (a) or (b) is to be by means of a readily accessible enclosed stairway, which will provide continuous fire shelter from the level of its origin to the appropriate survival craft embarkation decks, or the uppermost weather deck if the embarkation deck does not extend to the main vertical zone being considered. In the latter case, direct access to the embarkation deck by external open stairways and passageways is to be provided and is to have emergency lighting and slip-free surfaces underfoot. Boundaries facing external open stairways and passageways forming part of an escape route and boundaries in such a position that their failure during a fire would impede escape to the embarkation deck, are to have fire integrity and insulation values in accordance with Tables 3.3.2 and 3.3.3. The widths, number and continuity of escape routes are to be as follows:
- (i) Stairways are to be not less than 900 mm clear width between handrails. Stairways are to be fitted with handrails on each side. The minimum clear width of stairways is to be increased by 10 mm for every person provided for in excess of 90 persons. The maximum clear width between handrails where stairways are wider than 900 mm is to be 1800 mm. The total number of persons to be evacuated by such stairways is to be two-thirds of the crew and total number of passengers in the areas served by such stairways.
  - (ii) Stairways with a clear width in excess of 900 mm are to be aligned in a fore-and-aft direction.
  - (iii) Doorways, corridors and intermediate landings included in the means of escape are to have widths sized in the same manner as the stairways.
  - (iv) Stairways are not to exceed 3,5 m vertical rise without the provision of a landing and are not to have angle of inclination greater than 45° to the horizontal.
  - (v) Landings at each deck level are to be not less than 2 m<sup>2</sup> in area and are to be increased by 1 m<sup>2</sup> for every 10 persons provided for in excess of 20 persons but need not exceed 16 m<sup>2</sup>, except for those landings serving public spaces having direct access onto the stairway enclosure.
- (f) Protection of access from the stairway enclosures to the survival craft embarkation areas are to comply with the requirements of Tables 3.3.2 and 3.3.3.
- (g) Where public spaces span three or more open decks, contain combustibles such as furniture and give access to other enclosed spaces, each level within the space is to have two means of escape, one of which is to give direct access to an enclosed vertical means of escape meeting the requirements of (e).
- (h) Where a dispensation has been granted under the provisions of (a), a safe means of escape is to be provided. Stairways are to be provided with handrails on both sides and are to have a clear width between handrails of not less than 800 mm.
- 3.15.2 Two means of escape are to be provided from each machinery space. In particular, the following provisions are to be complied with:
- (a) Where the space is below the bulkhead deck the two means of escape are to consist of either:
    - (i) Two sets of steel ladders and walkways 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 is to provide continuous fire shelter from the lower part of the space to a safe position outside the space. This shelter is to be of steel or equivalent material, insulated where necessary, and provided with a self closing door of steel or equivalent material at the lower end. If access is provided at other levels each level is to be provided with a door of steel or equivalent material; or
    - (ii) 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 or equivalent material 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.
  - (b) Where the space is above the bulkhead deck, the two means of escape are to be as widely separated as possible and the doors leading from such means of escape are to be in positions from which access is provided to the appropriate survival craft embarkation decks. Where such means of escape require the use of ladders these are to be of steel.
- 3.15.3 One of the means of escape from any such space required by 3.15.2 may be dispensed with, so long as either a door or a steel ladder and walkways provides a safe escape route to the embarkation deck, due regard being paid to the nature and location of the space and whether persons are normally employed in that space.
- 3.15.4 Two means of escape are to be provided from a machinery control room located inside a machinery space, at least one of which is to provide continuous fire shelter to a safe position outside the machinery space.
- 3.15.5 Adequate deck area is to be provided at muster stations and embarkation areas having due regard to the expected number of persons.

### 3.16 Ventilation systems

3.16.1 Ventilation ducts are to be of non-combustible material. Short lengths of ducts not exceeding 2 m in length and with a cross-section not exceeding 0,02 m<sup>2</sup> need not be non-combustible, subject to these ducts being:

- (a) of a material that has low flame spread characteristics;
- (b) used at the end of the ventilation device; and
- (c) situated not less than 600 mm, measured along the duct, from an opening in an 'A' or 'B' Class division including continuous 'B' Class ceilings.

3.16.2 Where the ventilation ducts with a free cross-sectional area exceeding 0,02 m<sup>2</sup> pass through Class 'A' bulkheads or decks, the openings are 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 the following:

- (a) Steel 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.
- (b) Steel ducts with a free cross-sectional area exceeding 0,075 m<sup>2</sup> 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.
- (c) Compliance with 3.8.4.

3.16.3 Ventilation ducts with a free cross-sectional area exceeding 0,02 m<sup>2</sup> passing through 'B' Class bulkheads are to be lined with steel sheet, or other equivalent material, 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, see also 3.10.3.

3.16.4 Ducts provided for the ventilation of Category 'A' machinery spaces, galleys, spaces containing vehicles or craft with fuel in their tanks or lockers storing such fuels, are not to pass through accommodation spaces, service spaces or control stations unless the ducts are:

- (a) either:
  - (i) constructed of steel having a thickness of at least 3 mm and 5 mm for ducts the widths or diameters of up to and including 300 mm and 760 mm and over respectively and, in the case of such ducts, the widths or diameters of between 300 mm and 760 mm having a thickness to be obtained by interpolation;
  - (ii) suitably supported and stiffened;
  - (iii) fitted with automatic fire dampers close to the boundaries penetrated; and
  - (iv) insulated to 'A-60' Class standard from the machinery spaces, galleys, spaces containing vehicles or craft with fuel in their tanks or lockers storing such fuels, to a point at least 5 m beyond each fire damper;
- (b) or:
  - (i) constructed of steel in accordance with (a)(i) and (ii); and
  - (ii) insulated to 'A-60' Class standard throughout the accommodation spaces, service spaces or control stations;

except that penetrations of main zone divisions are also to comply with 3.16.8.

3.16.5 Ducts provided for ventilation to accommodation spaces, service spaces or control stations are not to pass through such spaces, unless, where they pass through Category 'A' machinery space, galleys, spaces containing vehicles or craft with fuel in their tanks or lockers storing such fuels, the ducts:

- (a) either:
  - (i) are constructed of steel in accordance with 3.16.4(a)(i) and (ii);
  - (ii) are fitted with automatic fire dampers close to the boundaries penetrated; and
  - (iii) have the integrity of boundaries of the machinery space, galley, spaces containing vehicles or craft with fuel in their tanks, or lockers storing such fuels, maintained at the penetrations;
- (b) or:
  - (i) are constructed of steel in accordance with 3.16.4(a)(i) and (ii); and
  - (ii) are insulated to 'A-60' Class standard within the machinery space, galley or spaces containing vehicles or craft with fuel in their tanks or lockers storing such fuels;

except that penetration of main zone divisions is also to comply with 3.16.8.

3.16.6 Such measures as are practicable are 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 minimised. 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.

3.16.7 Where they pass through accommodation spaces or spaces containing combustible materials, the exhaust ducts from galley ranges are to comply with 3.16.4. Such exhaust ducts are to be fitted with:

- (a) a grease trap 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; and
- (d) fixed means for extinguishing a fire within the duct.

3.16.8 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 3.8.4. 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.

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3.16.9 Where public spaces span three or more open decks and contain combustibles such as furniture and other enclosed spaces, the space is to be equipped with a smoke extraction system. The smoke extraction system is to be activated by the smoke detection system required by Ch 4,2 and is to be capable of manual control. The fans are to be capable of exhausting the entire volume within the space in not more than 10 min.

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

3.16.11 Power ventilation of accommodation spaces, service 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, see also Pt 16, Ch 2,16.6.

3.16.12 Reference is also made to 2.8.4 to 2.8.7, 2.8.9 and 3.10.1.

3.16.13 Ducts provided for exhaust ventilation from laundries are to be fitted with suitably located cleaning and inspection openings.

3.16.14 Fire dampers required by 3.16.2, 3.16.4, 3.16.5 and 3.16.8, including relevant means of operation are to be fire tested. Reference is also to be made to IMO FTP Code, Annex 1, Part 3.

### 3.17 Oil fuel arrangements

3.17.1 In a yacht in which oil fuel is used, the arrangements for the storage, distribution and utilization of the oil fuel are to be such as to ensure the safety of the yacht and persons on board. For details, see Pt 15, Ch 3.

3.17.2 As far as practicable, oil fuel tanks are to be part of the yacht's structure and are to be located outside Category 'A' machinery spaces.

3.17.3 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 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 the vertical boundary of a tank directly exposed to a machinery space meets the yacht'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, will be specially considered. See also Pt 15, Ch 3. Oil fuel tanks situated within

the boundaries of Category 'A' machinery spaces are not to contain oil fuel having a flashpoint of less than 60°C. The use of free-standing oil fuel tanks is prohibited.

### 3.18 Lubricating oil arrangements

3.18.1 The arrangements for the storage, distribution and utilization of oil used in pressure lubrication systems are to be such as to ensure the safety of the yacht and persons on board, see also Pt 15, Ch 3.

### 3.19 Arrangements for other flammable oils

3.19.1 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 ensure the safety of the ship and persons on board, see also Pt 15, Ch 3.

### 3.20 Prohibition of carriage of flammable oils in forepeak tanks

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

### 3.21 Special arrangements in Category 'A' machinery spaces

3.21.1 Openings are to be provided with closing appliances constructed so as to maintain the fire integrity of the machinery space boundaries.

3.21.2 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.

3.21.3 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.

3.21.4 Means of control are to be provided for:

- (a) closure of openings 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 doors other than power-operated watertight doors;
- (d) stopping ventilating fans; and
- (e) stopping forced and induced draught fans, oil fuel transfer pumps, oil fuel unit pumps and other similar fuel pumps.

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3.21.5 The controls required in 3.21.4 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. 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, see also Pt 15, Ch 3,4.5.1 and 4.9.2.

3.21.6 When access to any Category 'A' machinery space is provided at a low level from an adjacent space there is to be provided near the watertight door, a light steel fire-screen door operable from each side.

### 3.22 Arrangements for gaseous fuel for domestic purposes

3.22.1 Where gaseous fuel is used for domestic purposes, the arrangements for the storage, distribution and utilization of the fuel is to be such that, having regard to the hazards of fire and explosion which the use of such fuel may entail, the safety of the yacht and the persons on board is preserved. The installation is to be in accordance with recognized National or International Standards.

3.22.2 Storage lockers for gas cylinders are to be provided with:

- (a) effective ventilation;
- (b) an outward-opening door accessible directly to the open deck; and
- (c) gas-tight boundaries, including doors and other means of closing any openings therein, which form boundaries between such lockers and adjoining enclosed spaces.

### 3.23 Space heaters

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

### 3.24 Fixed fire detection and fire-alarm systems

3.24.1 A fixed fire detection and fire-alarm system is to be installed in any machinery space and is to comply with the requirements of Pt 16, Ch 1,2.8.

3.24.2 A fixed fire detection and fire-alarm system is to be fitted in all stairways (including lift and dumbwaiter trunks), service spaces, control stations and accommodation spaces (except toilets, bathrooms, void spaces, etc.). The fixed fire detection and fire-alarm system is to be installed in accordance with Ch 4,2.

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

3.24.4 A special alarm, operated from the navigating bridge or fire-control station, is to be fitted to summon the crew.

3.24.5 For yachts having a freeboard length of 85 m or more, a public address system is to be available throughout the accommodation spaces, service, and control stations and open decks. The arrangements are to comply with Pt 16, Ch 2,17.3.

### 3.25 Fire pumps and fire main system

3.25.1 **Application.** Every yacht is to be provided with fire pumps in accordance with this Section. Fire mains, hydrants and hoses are also to be provided as required by this Section.

#### 3.25.2 Capacity of fire pumps:

- (a) The fire pumps required are to be capable of delivering for fire-fighting purposes a quantity of water, at the pressure specified in 3.25.5 of not less than two-thirds of the quantity required to be dealt with by the bilge pumps when employed for bilge pumping. For number and capacity of bilge pumps, see Pt 15, Ch 2.
- (b) As an alternative to (a) the capacity of fire pumps may be determined by hydrostatic calculations based on the requirement of 3.25.5(a).
- (c) Where more pumps than the minimum number of required pumps are installed the capacity of such additional pumps will be specially considered.

#### 3.25.3 Fire pumps:

- (a) In yachts of 4000 tons gross or more, at least three independently driven fire pumps are to be provided and, in yachts of less than 4000 tons gross, at least two such fire pumps.
- (b) 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 fuel oil, suitable changeover arrangements are fitted.
- (c) In yachts classed for navigation in ice, the fire pump sea inlet valves are to be provided with clearing arrangements, see Pt 1, Ch 2,3.8.1.
- (d) The arrangements of sea connections, fire pumps and their sources of power are to be such as to ensure that in the event of a fire in any one compartment, all the fire pumps will not be put out of action.
- (e) The arrangements for the ready availability of water supply are to be as follows:
  - (i) In yachts of 1000 gross tons or more, or any yacht of an alternative form of construction, the arrangements are to be such that at least one effective jet of water is immediately available from any hydrant in an interior location and so as to ensure the continuation of the output of water by the automatic starting of a required fire pump.
  - (ii) Yachts not provided with arrangements complying with (i), but to which a UMS notation is to be assigned, are to have remote starting of a required fire pump from the navigating bridge and fire-control station, if any.

- (f) Relief valves are to be provided in conjunction with any fire pump if the pump is 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 main system.
- (g) Where centrifugal pumps are provided in order to comply with this sub-Section, a non-return valve is to be fitted in the pipe connecting the pump to the fire main.

**3.25.4 Fire main:**

- (a) The diameter of the fire main is to be based on the required capacity of two fire pumps, and the diameter 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 to be not less than:

$$d = (L_{pp}/1,2) + 25 \text{ mm}$$

but need not exceed 180 mm in yachts, and is in no case to be less than 50 mm

where

$d$  = internal diameter of the fire main, in mm

$L_{pp}$  = length of yacht measured between perpendiculars, in metres, as defined in Pt 3, Ch 1,6.2.2.

- (b) The wash deck line may be used as a fire main provided that the requirements of this sub-Section are satisfied.
- (c) All exposed 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.

**3.25.5 Pressure in the fire main:**

- (a) The fire pumps, associated piping and fire main are to be so designed that the following minimum pressures will be maintained at all hydrants under conditions where two fire pumps required by 3.25.3 are simultaneously delivering water to the fire main of the size required by 3.25.4 through adjacent nozzles of sizes required by 3.25.9:  

4000 tons gross and over	4 bar (0,4 N/mm <sup>2</sup> )
Less than 4000 tons gross	3 bar (0,3 N/mm <sup>2</sup> )
- (b) The maximum pressure at any hydrant shall not exceed that at which the effective control of a fire-hose can be demonstrated.

**3.25.6 Number and position of hydrants:**

- (a) The number and position of the hydrants are to be such that at least two jets of water not emanating from the same hydrant, one of which is to be from a single length of hose, may reach any part of the yacht normally accessible to the guests and crew while the yacht is being navigated. In yachts of 1000 tons gross or more, at least two hydrants are to be provided in the machinery spaces; in smaller yachts one hydrant will be accepted.
- (b) In the accommodation, service and machinery spaces, the number and position of hydrants are to be such that the requirements of (a) may be complied with when all watertight doors and all doors in main vertical zone bulk-heads are closed.
- (c) Where access is provided to a machinery space of Category 'A' at a low level, two hydrants are to be provided external to, but near the entrance, to that machinery space.

**3.25.7 Pipes and hydrants:**

- (a) Materials readily rendered ineffective by heat are not to be used for fire mains. 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. Unless one hose and nozzle is provided for each hydrant in the yacht, there is to be complete interchangeability of hose couplings and nozzles.
- (b) A valve is to be fitted at each fire hydrant so that any fire-hose may be removed while the fire pump is at work.
- (c) Isolating valve(s) to isolate the section of the fire main within the Category 'A' machinery space containing the main fire pump(s) from the rest of the fire main are to be fitted in an easily accessible and tenable position outside the Category 'A' machinery space. The fire main is to be so arranged that when the isolating valve(s) is shut, all the hydrants on the yacht, except those in the Category 'A' machinery space referred to above, can be supplied with water by a fire pump not located in this Category 'A' machinery space through pipes which do not enter this space.

**3.25.8 Fire-hoses:**

- (a) 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 or connections.
- (b) There is to be at least one fire-hose for each of the hydrants required by 3.25.6.

**3.25.9 Nozzles:**

- (a) For the purpose of this Chapter, standard nozzle sizes are to be 12 mm, 16 mm or 19 mm, or as near thereto as possible, so as to make full use of the maximum discharge capacity of the fire pumps.
- (b) For accommodation and service spaces, the nozzle size need not exceed 12 mm.
- (c) For machinery spaces and exterior locations, the nozzle size is to be such as to obtain the maximum discharge possible from two jets at the pressure indicated in 3.25.5 from the smallest pump, however a nozzle size greater than 19 mm need not be used.
- (d) All nozzles are to be of an approved dual purpose type (i.e. spray/jet type) incorporating a shut-off.

**3.25.10 Location and arrangement of water pumps, etc., for other fire-extinguishing systems.** Pumps required for the provision of water for other fire-extinguishing systems required by this Chapter are to have their sources of power and their controls installed outside the space or spaces protected by such systems and are to be so arranged that a fire in the space or spaces protected will not put any such system out of action.

**3.25.11 International shore connection.** At least one international shore connection is to be provided.

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### 3.26 Fire-extinguishing arrangements in spaces containing internal combustion machinery

3.26.1 Category 'A' machinery spaces containing internal combustion machinery are to be provided with:

- (a) one of the fire-extinguishing systems described in Ch 4,3;
- (b) at least one set of portable air-foam equipment complying with 3.29;
- (c) 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; and
- (d) 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.

3.26.2 Machinery spaces in yachts which are constructed mainly or wholly with alternative forms of construction, containing internal combustion machinery, are to comply with the requirements of 3.26.1.

### 3.27 Fire-extinguishing arrangements in spaces containing oil fuel units

3.27.1 Category 'A' machinery spaces containing oil fuel units are to be provided with one of the fixed fire-extinguishing systems described in Ch 4,3.

3.27.2 There are to be at least two portable foam extinguishers or equivalent in each space in which a part of the oil fuel unit is situated.

### 3.28 Limitations on the use of oil as a fuel

3.28.1 For the limitations of the use of oil as a fuel, see Pt 15, Ch 3.

### 3.29 Automatic sprinkler, fire detection and fire-alarm system

3.29.1 A fixed automatic sprinkler, fire detection and fire-alarm system, or equivalent system (e.g. watermist), is to be fitted in all stairways, service spaces, control stations and accommodation spaces except spaces which afford no fire risk such as void spaces.

3.29.2 The arrangements are to be in accordance with Ch 4,1.

### 3.30 Fixed fire-extinguishing systems not required by this Section

3.30.1 Where a fixed fire-extinguishing system not required by this Section is installed, the arrangement is to comply with the relevant requirements of this Chapter.

### 3.31 Portable foam applicator

3.31.1 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 m<sup>3</sup>/min.

### 3.32 Portable fire-extinguishers

3.32.1 All fire-extinguishers are to comply with the requirements of Ch 4,6.

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

3.32.3 One of the portable fire-extinguishers, or the portable fire-extinguisher, dedicated for use in any space is to be stowed near the entrance to that space.

3.32.4 At least one portable fire-extinguisher is to be located so that it can easily be reached from the main steering position of the yacht.

3.32.5 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. In any case, their number is to be not less than five.

3.32.6 Where cooking facilities are provided, a portable fire-extinguisher of a type appropriate to the energy source used is to be located in a position readily accessible for use in the event of a fire.

### 3.33 Fire blanket

3.33.1 A fire blanket is to be installed in all galleys.

### 3.34 Protection of spaces containing vehicles or craft with fuel in their tanks, or lockers storing such fuels

3.34.1 Spaces containing vehicles or craft with fuel in their tanks, or lockers storing such fuels, are to be provided with the following:

- (a) A fixed fire detection and fire-alarm system complying with the requirements of Pt 16, Ch 1,2.8.



- (b) A manually-operated water spray deluge system having a water application rate of 5 litres per square metre of deck area per minute. Where the deck height does not exceed 2,5 m, an application rate of 3,5 litres per square metre of deck area per minute will be accepted. Adequate drainage of the protected spaces is to be provided generally in accordance with the requirements for vehicle or cargo space, see Pt 3, Ch 4,9.4.4. The drainage piping and connections for the space are to be non-combustible. Other fixed fire-extinguishing systems may be permitted, provided they are not less effective in controlling the type of fire likely to occur.
- (c) At least two portable foam extinguishers, or equivalent;
- (d) An independent mechanical ventilation system, which is entirely separate from other ventilation systems, providing at least six air changes per hour. The ducted air is not to pass through other spaces, except as allowed under 3.16.4, or vent into areas where it could be drawn into accommodation areas or cause undue hazard.
- (e) Electrical equipment of a safe type is to be provided, see Pt 16, Ch 2,13.
- (f) Prominently displayed 'No Smoking' signs; and
- (g) Structural fire protection as required by Table 3.3.2 and Table 3.3.3.

3.34.2 Such spaces are not to give access to any space other than the fuel store or lockers for use within the space. Lockers storing fuel are to be accessed from an exterior location, unless the locker is within the space containing the vehicles or craft. Exceptionally, where the engine room escape cannot be routed elsewhere, it may exit into the space providing that:

- the connecting door is self-closing;
- no door hold-back devices are fitted;
- an audible and visual alarm is fitted on the bridge to signify when the door is open; and
- a notice is posted at the door stating that the door is to remain closed and that the area beside the door is an escape route and is to be kept clear.

3.34.3 The requirements of 3.17 are to be complied with, as appropriate.

### **3.35 Protection of paint lockers and flammable liquid lockers**

3.35.1 Paint lockers and flammable liquid lockers of deck area 4 m<sup>2</sup> or more are to be provided with a fixed fire-extinguishing system enabling the crew to extinguish a fire without entering the space. One of the following systems is to be provided:

- A carbon dioxide system designed for 40 per cent of the gross volume of the space.
- A dry powder system designed to discharge 0,5 kg powder per cubic metre of gross volume of the space.
- A water spray system designed to give a coverage of 5 litres per square metre of deck area per minute. Water spray systems may be connected to the fire main.

3.35.2 Consideration will be given to the acceptance of other arrangements which provide equivalent protection.

3.35.3 Lockers having a deck area less than 4 m<sup>2</sup> may be protected by carbon dioxide or dry powder portable extinguishers located near the entrance to the locker.

### **3.36 Arrangements where deep fat cooking equipment is installed**

3.36.1 Where deep-fat cooking equipment is installed, all installations are to be fitted with:

- an automatic or manual fixed extinguishing system type approved in accordance with ISO 15371, *Ships and marine technology-Fire extinguishing systems for protection of galley deep-fat cooking equipment-Fire tests*, or an acceptable alternative National or International Standard, for protection of the deep-fat cooking equipment;
- a primary and back up thermostat with an alarm to alert the operator in the event of failure of either thermostat;
- arrangements for automatically shutting off the deep-fat cooking equipment electrical power upon activation of the fire-extinguishing system;
- an alarm for indicating operation of the fire-extinguishing system in the galley where the equipment is installed; and
- controls for manual operation of the fire-extinguishing system which are clearly labelled for ready use by the crew.

Control and electrical engineering arrangements are to be in accordance with the requirements of Pt 16, Ch 1 and Ch 2, as applicable.

3.36.2 For fryers of up to 15 litres cooking oil capacity, the provision of a suitably sized extinguisher of a suitable type located for specific use on the cooking equipment together with manual isolation of the electrical power supply may be considered an acceptable alternative to 3.36.1 provided the arrangements are to the satisfaction of the National Administration.

### **3.37 Helicopter decks**

3.37.1 The requirements of IMO Resolution A.855(20) are to be complied with having due regard to the hazards involved.

3.37.2 If a helicopter hangar is not provided and if two fireman's outfits are supplied as per 3.38.1, then the fireman's outfits required by IMO Resolution A.855(20) need not be provided.

### **3.38 Fireman's outfit**

3.38.1 Each yacht is to carry at least two fireman's outfits complying with Ch 4,4. Additional fireman's outfits are to be provided as applicable to ensure that at least two fireman's outfits are stored in each main vertical zone.

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3.38.2 The fireman's outfits are to be so stored as to be easily accessible and ready for use. Where more than two fireman's outfits are required, they are to be located in widely separated positions. At least two fireman's outfits are to be available at any one position.

3.38.3 Additional sets of personal equipment and breathing apparatus, may be required, having due regard to the size of the yacht.

### **3.39 Fire-control plans**

3.39.1 Fire-control plans are to meet the requirements of Ch 4,5.

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Section

- 1 **Automatic sprinkler, fire detection and fire-alarm systems**
- 2 **Fixed fire detection and fire-alarm systems**
- 3 **Fixed fire-extinguishing systems in machinery spaces**
- 4 **Fireman's outfits**
- 5 **Fire-control plans**
- 6 **Fire-extinguishers (portable and non-portable)**

■ **Section 1**  
**Automatic sprinkler, fire detection and fire-alarm systems**

**1.1 General**

1.1.1 Any required automatic water sprinkler and fire-alarm and fire detection system is to be designed for immediate use at any time. Where such a system is fitted, it is to be of the wet pipe type. Any part of the system which may be subjected to freezing temperatures in service are to be suitably protected against freezing. It is to be kept charged at the necessary pressure and have provision for a continuous supply of water.

1.1.2 As an alternative to the system specified in 1.1.1, any one of the following systems may be considered:

- (a) **Dry pipe system.** A sprinkler system employing automatic sprinklers attached to a piping system containing air or nitrogen under pressure, the release of which (as from the opening of a sprinkler) permits the water pressure to open a valve known as a dry pipe valve. The water then flows into the piping system and out of the opened sprinklers.
- (b) **Pre-action system.** A sprinkler system employing automatic sprinklers attached to a piping system containing air that may or may not be under pressure, with a supplemental detection system installed in the same area as the sprinklers. Actuation of the detection system opens a valve that permits water to flow into the sprinkler piping system and to be discharged from any sprinklers that may be open.
- (c) **Deluge system.** A sprinkler system employing open sprinklers attached to a piping system connected to a water supply through a valve that is opened by the operation of a detection system installed in the same areas as the sprinklers. When this valve opens water flows into the piping system and discharges from all sprinklers attached thereto.

**1.2 Wet pipe type**

1.2.1 Any required automatic sprinkler, fire detection and fire-alarm system is to comply with the requirements of Pt 16, Ch 2,16.2.

1.2.2 Sprinklers are to be grouped into separate sections, each of which is to contain not more than 200 sprinklers. Any section of sprinklers is not to serve more than two decks nor be situated in more than one main vertical zone, except where it is satisfactorily shown that the protection of the yacht against fire will not thereby be reduced.

1.2.3 Each section of sprinklers is to be capable of being isolated by one stop valve only. The stop valve in each section is to be readily accessible and its location is to be clearly and permanently indicated. Means are to be provided to prevent the operation of the stop valves by any unauthorized person.

1.2.4 A gauge indicating the pressure in the system is to be provided at each section stop valve and at a central station.

1.2.5 The sprinklers are to be resistant to corrosion by marine atmosphere. In accommodation and service spaces the sprinklers are to come into operation within the temperature ranges from 68°C to 79°C, except that in locations such as drying rooms, where high ambient temperatures might be expected, the operating temperature may be increased by not more than 30°C above the maximum deck head temperature.

1.2.6 A list or plan is to be displayed at each indicating unit showing the spaces covered and the location of the zone in respect of each section. Suitable instructions for testing and maintenance are to be available.

1.2.7 Sprinklers are to be placed in an overhead position and spaced in a suitable pattern to maintain an average application rate of not less than 5 litres per square metre per minute over the nominal area covered by the sprinklers. The use of sprinklers providing other amounts of water suitably distributed, will be considered provided they are shown to be not less effective.

1.2.8 A pressure tank having a volume equal to at least twice that of the charge of water specified in 1.2.9 is to be provided.

1.2.9 The tank is to contain a standing charge of fresh water, equivalent to the amount of water which would be discharged in one minute by the pump referred to in 1.2.12, and the arrangements are to provide for maintaining such air pressure in the tank to ensure that where the standing charge of fresh water in the tank has been used the pressure will be not less than the working pressure of the sprinkler, plus the pressure exerted by a head of water measured from the bottom of the tank to the highest sprinkler in the system. Suitable means of replenishing the air under pressure and of replenishing the fresh water charge in the tank are to be provided. A glass gauge suitably protected is to be provided to indicate the correct level of the water in the tank.

1.2.10 Means are to be provided to prevent the passage of sea water into the tank.

1.2.11 An independent power pump is to be provided solely for the purpose of automatically continuing the discharge of water from the sprinklers. The pump is to be brought into action automatically by the pressure drop in the system before the standing fresh water charge in the pressure tank is completely exhausted.

1.2.12 The pump and the piping system are to be capable of maintaining the necessary pressure at the level of the highest sprinkler to ensure a continuous output of water sufficient for the simultaneous coverage of a minimum area of the maximum width of the craft squared or 280 m<sup>2</sup> whichever is the less, at the application rate specified in 1.2.7.

1.2.13 The pump is to have fitted on the delivery side a test valve with a short open-ended discharge pipe. The effective area through the valve and pipe is to be adequate to permit the release of the required pump output while maintaining the pressure in the system specified in 1.2.9.

1.2.14 The sea inlet to the pump is to be, wherever possible, in the space containing the pump and is to be so arranged that when the vessel is afloat it will not be necessary to shut off the supply of sea water to the pump for any purpose other than the inspection or repair of the pump.

1.2.15 The sprinkler pump and tank are to be situated in a position reasonably remote from any machinery space of Category 'A' and not in any space required to be protected by the sprinkler system.

1.2.16 Where the arrangement precludes locating the pump and tank in accordance with 1.2.15, for yachts of not greater than 50 m Rule length, the sprinkler pump and tank required by Ch 3,2.16 may be situated within Category 'A' machinery spaces, but not within the spaces that are protected by the system.

1.2.17 For yachts of not greater than 50 m Rule length and all service craft, the sources of electrical power supply for the sea-water pump may be fed from the main source of electrical power.

1.2.18 There are to be not less than two sources of power supply for the sea water pump and automatic alarm and detection system. Where one of the sources of power for the pump is an internal combustion engine it is to be so situated that a fire in any protected space will not affect the air supply to the machinery, in addition to complying with 1.2.15. When the sources of power for the pump are electrical, see Pt 16, Ch 2,2 and Pt 16, Ch 2,3.

1.2.19 The sprinkler system is to have a connection from the vessel's fire main by way of a lockable screw-down non-return valve at the connection which will prevent a backflow from the sprinkler system to the fire main.

1.2.20 A test valve is to be provided for testing the automatic alarm for each section of sprinklers by a discharge of water equivalent to the operation of one sprinkler. The test valve for each section is to be situated near the stop valve for that section.

1.2.21 Means are to be provided for testing the automatic operation of the pump, on reduction of pressure in the system.

1.2.22 Each section of sprinklers is to include means for giving a visual and audible alarm signal automatically at one or more indicating units whenever any sprinkler comes into operation. Such alarm systems are to be arranged to indicate if any fault occurs in the system. Such units are to indicate in which section, served by the system, fire has occurred and are to be centralized on the navigation bridge. In addition, visible and audible alarms from the unit are to be located in a position other than on the navigation bridge, so as to ensure that the indication of fire is immediately received by the crew. Switches are to be provided at one of these indicating positions, which will enable the alarm and the indicators for each section of sprinklers to be tested.

1.2.23 Spare sprinkler heads are to be provided as specified in Table 4.1.1. The spare sprinkler heads are to be stowed in boxes or holders provided for that purpose, together with a tool suitable for removing and installing sprinkler heads. The boxes or holders are to be situated near the control valve for the section, and are to be clearly and permanently marked to indicate their contents.

**Table 4.1.1 Spares requirements**

Number of sprinkler heads provided	Number of spare sprinkler heads required
300	One spare sprinkler head is to be provided for each 50 sprinkler heads fitted, with a minimum of one spare being provided for each type fitted
301 to 1000	12
>1000	24

**1.3 Arrangements which will be accepted as an alternative to 1.2**

1.3.1 The alternative system is to be tested, type approved and installed in accordance with IMO Resolution A.800(19). The following exceptions to Section 3 of the Annex may be applied:

- (a) Where the arrangement precludes locating the pump and tank in accordance with 1.2.15, for yachts not greater than 50 m Rule length, the sprinkler pump and tank required by Ch 3,2.16 may be situated within Category 'A' machinery spaces, but not within the spaces that are protected.
- (b) Pumps and alternative supply components are to be sized so as to be capable of maintaining the required flow to the hydraulically most demanding area of not less than the maximum width of the craft squared or 280 m<sup>2</sup> whichever is the less.

1.3.2 Spare nozzles are to be provided as specified in Table 4.1.2. The spare nozzles are to be stowed in boxes or holders provided for that purpose, together with a tool suitable for removing and installing nozzles. The boxes or holders are to be situated near the control valve for the section, and are to be clearly and permanently marked to indicate their contents.

**Table 4.1.2 Spares requirements**

Number of nozzles provided	Number of spare nozzles required
300	One spare nozzle is to be provided for each 50 nozzles fitted, with a minimum of one spare being provided for each type fitted
301 to 1000	12
>1000	24

■ **Section 2**  
**Fixed fire detection and fire-alarm systems**

**2.1 General requirements**

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

2.1.2 Fire detection systems are to comply with the requirements of Pt 16, Ch 2,16.1 in addition to the requirements of this Section.

2.1.3 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.

2.1.4 Suitable instructions for testing and maintenance are to be provided.

2.1.5 For each type of detector installed, one spare detector head is to be provided for every 10 heads or part thereof. They are to be stowed in a suitable container at the control station.

2.1.6 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.

**2.2 Installation requirements**

2.2.1 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.

2.2.2 Smoke detectors are to be installed in all stairways, corridors and escape routes within accommodation spaces.

2.2.3 Where a fixed fire detection and fire-alarm system is required for the protection of spaces other than those specified in 2.2.2, at least one detector complying with 2.1.3, is to be installed in each such space.

2.2.4 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.

2.2.5 The maximum spacing of detectors is to be in accordance with Table 4.2.1. Other spacings based upon test data which demonstrate the characteristics of the detectors may be required or permitted.

**Table 4.2.1 Maximum spacing of detectors**

Maximum		Maximum	
Maximum floor		Distance apart between centres, in metres	Distance away from bulkheads, in metres
Type of detector	Area per detector, m <sup>2</sup>		
Heat	37	9	4,5
Smoke	74	11	5,5

2.2.6 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. See also Pt 16, Ch 2.

**2.3 Design requirements**

2.3.1 Smoke detectors required by 2.2.2 are to be certified to operate before the smoke density exceeds 12,5 per cent obscuration per metre, but not until the smoke density exceeds two per cent 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.

2.3.2 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.

2.3.3 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.

## **2.4 Requirements for machinery spaces**

2.4.1 The arrangements of the fixed fire detection and fire-alarm system in machinery spaces are to comply with the requirements of Pt 16, Ch 1,2,8.

## ■ **Section 3** **Fixed fire-extinguishing systems in machinery spaces**

### **3.1 Gas fire-extinguishing systems**

3.1.1 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.

3.1.2 New installations that use fire-extinguishing media, which have ozone-depleting properties under the Montreal Protocol, are not permitted.

3.1.3 The necessary pipes for conveying a fire-extinguishing medium into protected spaces are to be provided with control valves which are to be so placed that they will be easily accessible and not readily cut off from use by an outbreak of fire. The control valves are to be so marked as to indicate clearly the spaces to which the pipes are led. Suitable provision is to be made to prevent inadvertent admission of the medium to any space. Where pipes pass through accommodation spaces they are to be seamless and the number of pipe joints is to be kept to a minimum and made by welding.

3.1.4 The piping for the distribution of fire-extinguishing medium is to be of adequate size and so arranged, and discharge nozzles so positioned that a uniform distribution of medium is obtained. 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. Distribution pipes are to extend at least 50 mm beyond the last nozzle.

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

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

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

3.1.8 The volume of starting air receivers, converted to free air volume, is to be added to the gross volume of the machinery space when calculating the necessary quantity of extinguishing medium. Alternatively a discharge pipe from the safety valves may be fitted and led directly to the open air.

3.1.9 Means are to be provided for automatically giving audible and visual 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.

3.1.10 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.

3.1.11 Where electrically operated alarms are used, the arrangements are to be such that the electric operating mechanism is located outside hazardous spaces.

3.1.12 The means of control of any fixed gas fire-extinguishing system is to be readily accessible and simple to operate and shall be grouped together in as few locations as possible at positions not likely to be cut off by a fire in a protected space. At each location there is to be clear instructions relating to the operation of the system having regard to the safety of personnel. Two separate controls are to be provided for releasing carbon dioxide into a protected space and each is to ensure the activation of the alarm. One control is to be used to discharge the gas from its storage cylinder(s). A second control is to be used for opening the valve of the piping which conveys the gas into the protected space. The two controls are to be located inside a release box clearly identified for the particular space. If the box containing the controls is to be locked, a key to the box is to be in a break-glass type enclosure conspicuously located adjacent to the box. There is to be a dedicated release box for each protected space, in which personnel normally work or to which they have access (see also 3.1.9). The space served is to be identified at the release box.

3.1.13 Automatic release of fire-extinguishing medium is not permitted.

3.1.14 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.

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

3.1.16 Containers for the storage of fire-extinguishing media and associated pressure components are to be designed and tested to Codes of Practice recognized by Lloyd's Register (hereinafter referred to as 'LR') having regard to their locations and the maximum ambient temperatures expected in service.

3.1.17 The fire-extinguishing medium is to be stored outside a protected space, in a room which is situated in a safe and readily accessible position and 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. Such storage rooms are to be treated as control stations.

3.1.18 In systems where containers discharge into a common manifold, non-return valves are to be provided at the connections of the container discharge pipes to the manifold to allow any container to be disconnected without preventing the use of other containers in the system and to prevent the discharge of extinguishing medium into the container storage room in the event of the system being operated. Manifolds are to be tested by hydraulic pressure to 1,5 times the design pressure. The design pressure is the maximum gauge pressure to which the system may be subjected and is not to be less than the gauge pressure corresponding to the maximum ambient temperature expected in service. The design pressure need not be greater than the maximum setting of the manifold pressure relief valve. After the hydraulic test, manifolds are to be carefully cleaned and dried before the non-return valves are finally fitted.

3.1.19 For craft on unrestricted service, spare parts for the system are to be stored on board. As a minimum these are to consist of:

- 1 actuator;
- 1 flexible hose (cylinder to manifold); and
- the cylinder bursting discs and sealing washers for all cylinders.

### **3.2 Carbon dioxide systems**

3.2.1 Carbon dioxide systems are to comply with 3.1 in addition to the remaining requirements of this sub-Section.

3.2.2 For the purpose of this paragraph the volume of free carbon dioxide is to be calculated at 0,56 m<sup>3</sup>/kg.

3.2.3 For machinery spaces:

- (a) The quantity of carbon dioxide carried is to be sufficient to give a minimum volume of free gas equal to the larger of:
- 40 per cent 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 per cent or less of the horizontal area of the space concerned taken midway between the tank top and the lowest part of the casing; or

- 35 per cent of the gross volume of the largest machinery space protected, including the casing.
- (b) The above mentioned percentages may be reduced to 35 per cent and 30 per cent respectively for craft less than 2000 gross tons.
- (c) The fixed piping system is to be such that 85 per cent of the gas can be discharged into the space within two minutes.
- (d) The distribution arrangements are to be such that approximately 15 per cent of the required quantity of carbon dioxide is led to the bilge areas.

3.2.4 Two separate controls are to be provided for releasing carbon dioxide into a protected space and each is to ensure the activation of the alarm. One control is to be used to discharge the gas from its storage cylinder(s). A second control is to be used for opening the valve of the piping which conveys the gas into the protected space. The two controls are to be located inside a release box clearly identified for the particular space. If the box containing the controls is to be locked, a key to the box is to be in a break-glass type enclosure conspicuously located adjacent to the box. There is to be a dedicated release box for each protected space in which personnel normally work or to which they have access, see *also* 3.1.8. The space served is to be identified at the release box.

### **3.3 High-expansion foam systems**

3.3.1 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.

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

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

3.3.4 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.

3.3.5 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.

3.3.6 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 fire in the protected space. Such spaces are to be treated as control stations.

3.3.7 Foam concentrates are to be of an approved type.

**3.4 Pressure water-spraying systems**

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

3.4.2 The number and arrangement of the nozzles is to be such as to ensure an effective average distribution of water of at least five litres per square metre 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.

3.4.3 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 which will not be readily cut off by fire in the protected space.

3.4.4 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.

3.4.5 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.

3.4.6 The pump may be driven by independent internal combustion type machinery but if it is dependent upon power being supplied from the emergency generator, that generator is to be arranged to start automatically in case of main power failure so that power for the pump required by 3.4.5 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.

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

**3.5 Arrangements which will be accepted as an alternative to 3.4**

3.5.1 The system is to be tested, type approved and installed in accordance with MSC/Circ. 668 as amended by IMO MSC/Circ. 728.

**3.6 Other systems**

3.6.1 Other fixed fire-extinguishing systems will be specially considered.

3.6.2 The use of steam as a fire-extinguishing medium in fixed fire-extinguishing systems is not permitted.

## ■ Section 4 Fireman's outfits

**4.1 Components**

4.1.1 A fireman's outfit is to consist of:

- (a) Personal equipment comprising:
  - (i) 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.
  - (ii) Boots and gloves of rubber or other electrically non-conducting material.
  - (iii) A rigid helmet providing effective protection against impact.
  - (iv) An electric safety lamp (hand lantern) of an approved type with a minimum burning period of three hours.
  - (v) An axe with an insulated handle.
- (b) A self contained breathing apparatus of an approved type. The volume of air contained in the cylinders of which is to be at least 1200 litres or other self contained breathing apparatus which is to be capable of functioning for a period of at least 30 minutes. Spare bottles are to be provided which are to be maintained fully charged except where facilities for re-charging the bottles are available on board. At least two spare charges for each breathing apparatus are to be provided, and all air cylinders for breathing apparatus are to be interchangeable.

4.1.2 For each breathing apparatus a fireproof life-line 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 life-line is operated.

## ■ Section 5 Fire-control plans

**5.1 Description of plans**

5.1.1 General arrangement plans are to be permanently exhibited for the guidance of the ship's officers, using graphical symbols in accordance with IMO Resolution A.654(16), which show clearly for each deck the control stations, the various fire sections enclosed by steel or 'A' and 'B' Class divisions, together with particulars of:

- the fire detection and fire-alarm system;
- any sprinkler installation;
- the fire-extinguishing appliances;
- the means of access to different compartments, decks, etc.;
- the position of the fireman's outfits;
- the ventilating system, including particulars of the fan control positions, the position of dampers and identification numbers of the ventilating fans serving each section; and



- the location and arrangement of the emergency stop(s) for pumps, and for remote closing the valves on the pipes from tanks, for oil fuel, lubricating oil and other flammable oils.

5.1.2 Alternatively, the details required by 5.1.1 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.

5.1.3 The 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 nor 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.

5.1.4 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.

6.3.2 The following capacities may be taken as equivalents:

- 9 litre fluid extinguisher;
- 4,5 kg dry powder;
- 5 kg carbon dioxide.

## **6.4 Spare charges**

6.4.1 A spare charge is to be provided for each required portable fire-extinguisher which can be readily re-charged on board. If this cannot be done, duplicate extinguishers are to be provided.

## ■ **Section 6** **Fire-extinguishers (portable and non-portable)**

### **6.1 Approved types**

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

### **6.2 Extinguishing medium**

6.2.1 The extinguishing media employed are to be suitable for extinguishing fires in the compartments in which they are intended to be used.

6.2.2 The extinguishers required for use in the machinery spaces using oil as fuel are to be of a type suitable for extinguishing oil fires.

6.2.3 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.

### **6.3 Capacity**

6.3.1 The capacity of required portable fluid extinguishers is to be not more than 13,5 litres but not less than nine litres. Other extinguishers are to be at least as portable as the 13,5 litre fluid extinguishers and are to have a fire-extinguishing capability at least equivalent to a 9,0 litre fluid extinguisher.





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