



**RULES
FOR THE CLASSIFICATION AND CONSTRUCTION
OF INLAND WATERWAYS VESSELS**

**PART V
FIRE PROTECTION**

July
2022

GDAŃSK

RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF INLAND WATERWAYS VESSELS prepared and edited by Polski Rejestr Statków S.A., hereinafter referred to as PRS, consist of the following Parts:

- Part I – Classification Regulations
- Part II – Hull
- Part III – Hull Equipment
- Part IV – Stability and Freeboard
- Part V – Fire Protection
- Part VI – Machinery and Piping Systems
- Part VII – Electrical Equipment and Automation

With respect to materials and welding, the requirements specified in the Rules for the Classification and Construction of Sea-Going Ships, Part IX – Materials and Welding, apply.

Part V – Fire Protection, July 2022, was approved by the PRS Board on 28 June 2022 and enters into force on 1 July 2022.

From the entry into force, the requirements of Part V – Fire Protection apply, in full, to new ships.

For existing ships, the requirements of the present *Part* are applicable within the scope specified in *Part I – Classification Regulations*.

The requirements of *Part VI – Machinery Installations and Refrigerating Plants* are extended by the following Publications:

- Publication No. 51/P – Procedural Requirements for Service Suppliers,
- Publication No. 92/P – Specific Requirements for Inland Waterways High-Speed Vessels,
- Publication No. 118/P – Requirements for passenger ships constructed of polymer composites operated in domestic navigation.

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1 GENERAL

1.1 Application

1.1.1 The requirements specified in *Part V – Fire Protection* apply to:

- .1 vessels with mechanical propulsion;
- .2 vessels without mechanical propulsion if the product of the vessel length, breadth and draught ($L \times B \times T$)¹⁾ is more than 20 m³;
- .3 floating equipment,

intended for navigation in inland waterways and other inland waters.

1.1.2 Departures from the requirements of this *Part V* are permitted for:

- .1 the vessels, referred to in 1.1.1, operating on navigable waterways not linked by inland waterway to the waterways of other EU Member States;
- .2 craft having a deadweight not exceeding 350 tonnes or craft not intended for the carriage of goods and having a water displacement of less than 100 m³, which were laid down before 1 January 1950 and operate exclusively on a national waterway.

1.1.3 Derogations from the requirements specified in this *Part V* are permitted for vessels engaged on domestic navigation, for limited journeys of local interest or in harbour areas.

1.1.4 The requirements of Chapters 1 to 5 and 7 are the basic requirements for all types of vessels to be assigned the main symbol of class of vessel built under PRS survey. The requirements of Chapter 6 complete the requirements for a particular type of vessel to be assigned additional mark in the symbol of class specified in Chapter 3, *Part I – Classification Regulations*.

1.1.5 The requirements of the present *Part* apply, in full, to craft navigating in operating areas 1, 2, 3 or 4, referred to in paragraph 3.6.3.1, *Part I – Classification Regulations*.

1.1.6 Vessels of a length $L \leq 24$ m in length L which are not subject to the requirements of **ES-TRIN**, shall fulfil the relevant fire protection requirements of standards ISO 9094:2017 unless otherwise specified in *Part V*.

1.1.7 Vessels made of materials other than metal shall fulfill the applicable requirements specified in *Publication No. 118/P – Requirements for passenger ships constructed of polymer composites used in domestic navigation*.

1.2 Definitions

The definitions relating to the general terminology of the *Rules for Classification and Construction of Inland Waterways Vessels* (hereinafter referred to as the *Rules*) are given in *Part I – Classification Regulations*. Wherever in *Part V* definitions given in other Parts of the *Rules* appear, reference to these Parts is made.

For the purpose of the present *Part*, the following additional definitions have been adopted:

- .1 **ES-TRIN, ed. 2021/1– European Standard laying down Technical Requirements for Inland Navigation Vessels, as amended.**
- .2 **Class of fire** – fires' classification by the types of fuel they burn and burning process; fires are classified as follows:
 - **Class A** – fires that involve solid combustibles such as wood, paper, cloth, coal, etc. whose burning process normally produces glowing coal;

- Class B – fires of flammable liquids, such as oil, petrol, alcohols, etc. and solid materials which melt when heated such as fat, tar, etc.;
 - Class C – fires of such gasses as: methane, acetylene, hydrogen, etc.;
 - Class D – fires that involve such light metals and their alloys as magnesium, sodium, aluminium, etc.;
 - Class F or K – fires that involve cooking oils, grease or animal fat in cooking appliances.
- .3 High-speed vessel – motorised craft capable of reaching speeds exceeding 40 km/h in relation to water.
- .4 *FTP Code* – *International Code for the Application of Fire Test Procedures* adopted under Resolution MSC 307(88) by the Maritime Safety Committee of the IMO.
- .5 *HSC Code* – *International Code of Safety for High-Speed Craft*, 2000 edition, as amended.
- .6 Corridor/ passage – an area intended for the normal movement of persons and goods.
- .7 Boiler room – space housing a fuel-operated installation designed to produce steam or heat a thermal fluid.
- .8 Galley – room with a stove or a similar cooking appliance.
- .9 Hold – part of the vessel, bounded fore and aft by bulkheads, opened or closed by means of hatch covers, intended for the carriage of goods, whether packaged or in bulk, or for housing tanks not forming part of the hull.
- .10 Store-room – room for the storage of flammable liquids or a room with an area of over 4 m² for storing supplies, i.e. materials consumed by the ship, indispensable for its operation.
- .11 Engine room – a space where combustion engines are installed.
- .12 Main engine room – space where the propulsion engines are installed.
- .13 Non-combustible material – material which neither burns nor gives off flammable vapours in sufficient quantity for self-ignition when heated to 750° C. Another material is a combustible material.
- Note:** The requirements for testing non-combustible materials are specified in *FTP Code*.
- .14 Steel equivalent material – any non-combustible material which, by itself or due to insulation provided, has structural and integrity properties equivalent to steel at the end of applicable exposure to the standard fire test (e.g. aluminium alloy with appropriate insulation or composite material); steel equivalent material is subject to test in accordance with fire protection standards.
- .15 Muster areas – areas of the passenger vessel which are specially protected and in which passengers muster in the event of danger.
- .16 International carriage of dangerous goods – any carriage of dangerous goods performed by a vessel on inland waterways on the territory of at least two Contracting Parties to AND.
- .17 Naked light – source of light using flame which is not enclosed in a flameproof enclosure.
- .18 Protected area – (on vessels carrying dangerous goods) see ADN Rules, Part 1, paragraph 1.2.1.
- .19 Persons with reduced mobility – persons facing particular problems when using public transport, such as the elderly and the handicapped and persons with sensory disabilities, persons in wheelchairs, pregnant women and persons accompanying young children.

.20 Primary deck covering – the first layer of a floor construction, applied directly on the top of the deck plating – primary coat, anticorrosive compound or adhesive – which is necessary to provide protection or the floor adhesion to the deck plating. Other layers in the floor construction are floor coverings.

Note: The requirements for testing primary deck coverings are specified in *FTP Code*.

.21 Accommodation spaces – a spaces intended for the use of persons normally living on board, including galleys, store rooms, toilets and washing facilities, laundry facilities, passageways, but not the wheelhouse. In passenger vessels, galleys are not regarded as accommodation spaces.

.22 Passenger rooms – rooms on board intended for passengers and enclosed areas such as: lounges, offices, shops, hairdressing salons, drying rooms, laundries, saunas, toilets, washrooms, passageways, connecting passages and stairs not encapsulated by walls.

.23 Service spaces – spaces (on vessels carrying dangerous goods) which are accessible during the vessel operation and which are neither a part of crew accommodation spaces nor cargo spaces/tanks, with the exception of the forepeak and afterpeak, provided no machinery has been installed in the latter spaces.

.24 Control stations – a wheelhouse, an area which contains an emergency electrical power plant (emergency batteries), or parts thereof or an area with a center permanently occupied by shipboard personnel or crew members, such as for fire alarm equipment, remote controls of doors or fire dampers are located.

.25 A Class fire divisions – (required on passenger vessels) fire-resisting divisions formed by bulkheads and decks which fulfil the following criteria:

- they are constructed of steel or other equivalent material;
- they are suitably stiffened;
- they are 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 at least the time listed below:

Class A-60 – 60 min,

Class A-30 – 30 min,

Class A-0 – 0 min;

- they are so constructed as to be capable of preventing the passage of smoke and flame to the end of the one-hour standard fire test.

Note: The requirements for testing fire divisions are specified in *FTP Code*.

.26 B Class fire divisions – (required on passenger vessels) fire-retardant divisions formed by bulkheads, decks, ceilings or linings which fulfil the following criteria:

- they are constructed of approved non-combustible materials and all materials used in the construction and erection of these divisions are non-combustible, with the exception that paint coatings and veneers with LFS characteristics may be used;
- they have an insulation value 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 at least the time listed below:

Class B-15 – 15 min,

Class B-0 – 0 min;

- they are 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.

Note: The requirements for testing fire divisions are specified in *FTP Code*.

- .27 **ADN Rules** – technical regulations annexed to the *European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways*.
- .28 **Cargo area** – (on vessels carrying dangerous goods) see ADN Rules, Part I, paragraph 1.2.1.
- .29 **Passenger area** – areas (on weather deck) intended for passengers and enclosed accommodation spaces for passengers, as well as offices, shops, hairdressing salons, drying rooms, laundries, saunas, toilets, washrooms, passageways, connecting passages and stairs not encapsulated by walls.
- .30 **Wheelhouse** – space or area containing all control and monitoring instruments necessary for manoeuvring the vessel.
- .31 **Cabin vessel** – passenger vessel with overnight passenger cabins.
- .32 **Oil separator vessel** – open type AND-N tank vessel with a dead weight up to 300 tonnes, constructed and fitted to accept and carry oily wastes and oily waters from the operation of other vessels.
- .33 **Supply vessel** – open type AND-N tank vessel with a dead weight of up to 300 tonnes, constructed and fitted for the carriage and delivery to other vessels of products for their operation.
- .34 **Passenger vessel** – day trip vessel or cabin vessel constructed and equipped to carry more than 12 passengers.
- .35 **Day-trip vessel** – passenger vessel without overnight passenger cabins.
- .36 **Flame arrester** – device mounted in the vent/outlet of part of an installation or in the interconnecting piping of a system of installations, the purpose of which is to permit flow but prevent the propagation of a flame. This device shall be tested in accordance with European Standard EN 12 874 (1999).
- .37 **Dangerous goods** – substances and articles for which the international waterway carriage is prohibited by ADN, or authorized only on certain conditions specified in ADN Rules.

Dangerous goods are divided, according to ADN, Vol.2, Section 2.2 as follows:

- Class 1 – explosive substances and articles;
- Class 2 – gases;
- Class 3 – flammable liquids;
- Class 4.1 – flammable solids, self-reactive substances and desensitized explosives;
- Class 4.2 – substances liable to spontaneous combustion;
- Class 4.3 – **substances** which, **in contact** with water, emit flammable gases;
- Class 5.1 – oxidizing substances;
- Class 5.2 – organic peroxides;
- Class 6.1 – toxic substances;

- Class 6.2 – infectious substances;
 - Class 7 – radioactive materials;
 - Class 8 – **corrosive** substances;
 - Class 9 – miscellaneous dangerous substances and articles.
- .38 Heating appliances** – all appliances used on board for heating any space, water (e.g. boilers) and other media.
- .38a) Recognized service station** – works / company or a person with appropriate competences to perform work, measurements, tests, etc. in a specified scope and under certain conditions, confirmed by PRS or an authorized institution.
- .39 Low flame-spread characteristics** – the characteristic of surface which will adequately restrict the spread of flame.
Note: The requirements for testing fire divisions are specified in *FTP Code*.
- .40 Tank vessel** – vessel intended for the carriage of substances in cargo tanks.
Types of tank vessels:
ADN-C – for the carriage of liquids. The vessel is of the flush-deck/double hull type with double hull spaces, double bottoms, but without trunk. Cargo tanks may be formed by the vessels' inner hull or may be installed in the hold spaces as independent tanks.
ADN-G – for the carriage of gases, which may be carried under pressure or under refrigeration.
ADN-N – for the carriage of liquids.
Closed type – for the carriage of liquids in closed cargo tanks.
Open type – for the carriage of liquids in open cargo tanks.
Open type with flame arresters – for the carriage of liquids in open cargo tanks whose openings to the atmosphere are equipped with flame arresters capable of withstanding steady burning.

1.3 Scope of Survey

1.3.1 The general survey regulations concerning classification are specified in *Part I – Classification Regulations*.

1.3.2 The following are subject to PRS survey during vessel construction or alteration: structural fire protection, fire-extinguishing systems, fire alarm system, systems which constitute fire risk, as well as the materials used for the internal finish of the vessel's spaces (with regard to their flammability properties and emission of toxic gases.)

1.3.3 Appliances and components of fire-extinguishing systems, fire alarm system, as well as flammable gases concentration alarm system, such as pumps, fittings, nozzles, fire-extinguishing medium, fire detectors, etc., and fire-fighting equipment, such as fire-extinguishers, fire hoses, etc. shall have the *Certificate of Approval* issued by PRS or by an institution authorized by the Flag State Administration.

1.3.4 Materials and structural elements used in fire protection (non-combustible materials, LFS materials and steel equivalent materials, as well as A Class and B Class divisions) shall have the *Certificate of Approval* issued by PRS or by an institution authorized by the Flag State Administration, permitting their use for the purpose of fire protection.

1.3.5 PRS may give consent to a single acceptance of a material or product to be installed on a given vessel subject to tests and acceptance surveys being performed in accordance with the previously agreed test programme.

1.3.6 During the ship service, fixed fire-extinguishing systems, fire detection systems, gas-detection systems, gas fuel systems, safety guidance systems (low-location lighting system), as well as fire-fighting equipment, such as fire-extinguishers and cylinders of fixed gas fire-extinguishing systems are subject to periodical inspections and attestation to be performed by recognized service stations, as specified in particular subchapters of this Part of the *Rules*.

Service stations seeking PRS approval shall fulfil the requirements, as applicable, specified in *Publication No. 51/P – Procedural Requirements for Service Suppliers*.

1.4 Technical Documentation

1.4.1 Prior to the commencement of the vessel construction/alteration, the following technical documentation is to be submitted to the PRS Head Office for consideration and approval:

A. Structural Fire Protection:

- .1** plan of structural fire protection, indicating:
 - the arrangement of spaces, including their names and intended use;
 - the arrangement of A and B Class fire divisions, including the closing appliances for openings in such divisions;
 - the arrangement of draught stops;
 - structural details of the divisions
 - the arrangement and dimensions of the means of escape;
 - design solutions for typical penetrations through fire divisions for electric cable transits, pipe, ducts;
- .2** arrangement plan of doors including the means of control for fire doors;
- .3** arrangement plan of windows and sidescuttles;
- .4** spaces' insulation plan;
- .5** deck linings' plan;
- .6** spaces' furnishing plan including:
 - partitions' and ceilings' lining;
 - flooring;
 - list of upholstered furniture, suspended textile materials and bedding components;
- .7** maintenance and painting plan;
- .8** ventilation and air-conditioning plan for spaces including the arrangement of ventilation ducts, air inlets and outlets as well as fire dampers;
- .9** plan of safety guidance system (low-location lighting system) and marking of escape routes;
- .10** list of the required certificates for the materials/components/construction of fire divisions;

Note: The above mentioned documentation is required in the full scope for passenger vessels. For other vessel types, the documentation is required in the scope sufficient to demonstrate fulfilment of the relevant requirements specified in this *Part* of the *Rules*.

B. Active Fire Protection:

- .1** water fire main system plan including the arrangement of fire pumps, piping and hydrants;
- .2** plan of automatic sprinkler system or equivalent high-pressure sprinkler system (required for passenger vessels), together with the calculation of water supply and the required

- pressure at sprinklers, including the diagram of the system and alarm system indicating the arrangement of pumps, hydrophore tank, piping, section stop valves and sprinklers taking account of the piping division into sections;
- .3 plan of fixed fire-extinguishing system for machinery spaces including the calculations of the required quantity of extinguishing agent, diameters of piping and nozzles, the system diagram including the alarm system, fire-extinguishing station arrangement, starting arrangement, the arrangement of piping and nozzles and operating instructions;
 - .4 plan of the fire alarm system including diagrams of electric circuits showing the division into sections, the arrangement of control panel, indicating units, sensors and manually operated call points;
 - .5 plan of the alarm system warning of explosive gases (required for tank vessels) including the arrangement of the detection and alarm devices, fire detectors, wiring as well as diagrams of electric circuits;
 - .6 arrangement plan of fire-fighting equipment and fire-fighter's outfit;
 - .7 list of the required certificates for the applied fire-fighting equipment/outfits and their components, if applicable.

C. Equipment Posing Extra Fire Hazard:

- .1 plan of heating, cooking and refrigerating appliances, including their arrangement, liquid fuel systems as well as ventilation and fume extraction systems;
- .2 plan of the gas fuel system for domestic purposes.

1.4.2 Classification documentation shall contain – as appropriate – the material specifications, summary lists of the equipment and system components as well as all the information necessary to assess whether the constructions/equipment/installations fulfil the requirements of this *Part* of the *Rules*.

1.4.3 For vessels undergoing alteration, the above mentioned documentation relating to the alteration is subject to consideration and approval.

1.5 Fire Control Plan

1.5.1 The vessel shall be provided with *Fire Control Plan/Safety Plan* indicating: the arrangement of the vessel spaces, the arrangement of A and B Class fire divisions/doors, exits/emergency exits, escape routes and muster areas, spaces/areas protected by fire alarm systems and fire extinguishing systems, fans switches, fire dampers, ventilating openings closures, fuel pumps switches, remote control of fuel shut-off valves, the location of hydrants with fire hoses and nozzles as well as the location of fire-fighting equipment/fire extinguishers. *Fire Control Plan/Safety Plan* shall be posted up in the vessel in the easily accessible and visible place.

1.5.2 It is recommended that the graphic symbols be relevant to inland waterways vessels in accordance with IMO Res. A.654(16) or A.952(23) and Res.A.1116(30).

1.5.3 *Fire Control Plan/Safety Plan* shall be provided on board passenger vessels and tankers intended for the carriage of dangerous goods, see 6.1.12.3 and 6.5.15.

1.5.4 *Fire Control Plan/Safety Plan* shall be approved by PRS or another authorised institution supervising the vessel.

2 FIRE PROTECTION OF SELF-PROPELLED VESSELS

2.1 Vessel Construction

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

2.1.2 In vessels less than 20 m in length, the use of other materials with low flame-spread characteristics is permitted.

2.1.3 Accommodation spaces shall be separated from engine rooms, boiler rooms and holds by gastight bulkheads¹⁾ and shall be directly accessible from the deck. If no such access has been provided, an emergency exit shall also lead directly to the deck.

2.1.4 Walls and ceilings in accommodation spaces shall be constructed of non-combustible materials.

2.1.5 Stairs in accommodation spaces and service spaces shall have framework made of steel or steel equivalent material.

2.1.6 Exposed external surfaces of walls, floors and ceilings of corridors and stairwells within accommodation and service spaces are to be constructed of LFS materials. In the event of fire, they are not to give off dangerous amounts of toxic gases or smoke.

2.1.7 It is recommended that the amount of combustible materials used for partition bulkheads, insulation, decorative finish, furniture and other equipment of the wheelhouse, accommodation and service spaces should be minimized.

2.1.8 Use of materials containing asbestos as insulation materials and structural elements with insulation is prohibited.

2.2 Construction of Engine Rooms, Boiler Rooms and Fuel Tanks

2.2.1 Engine room, boiler room and fuel tanks bulkheads, ceilings and doors (hatches) shall be made of steel or steel equivalent material.

2.2.2 Integrated tanks of liquid-fuel or lubricating oil, as well as accommodation spaces shall not be adjacent.

2.2.3 Insulation materials used in engine rooms and boiler rooms shall be protected against the intrusion of fuel and fuel vapours.

2.2.4 All openings in walls, ceilings, and doors of engine rooms, boiler rooms, and bunker rooms shall be such that they can be closed from outside the room. The locking devices shall be made from steel or steel equivalent material.

2.2.5 Engine rooms, boiler rooms and other premises in which flammable or toxic gases are likely to escape shall be capable of being adequately ventilated.

2.2.6 Companionways and ladders providing access to engine rooms, boiler rooms and bunkers shall be firmly attached and be made of steel or another shock-resistant and non-combustible material.

¹⁾ Gas-tightness of bulkheads is subject to acceptance by PRS' Surveyor supervising construction of the vessel, according to the agreed acceptance and tests programme submitted by the manufacturer.

2.2.7 Engine rooms and boiler rooms shall have two exits, one of which may be an emergency exit.

The second exit may be dispensed with if the following conditions are satisfied:

- .1 the total floor area of the engine or boiler room does not exceed 35 m²;
- .2 the length of escape route between each point where servicing or maintenance operations are to be carried out and the exit or foot of the companionway near the exit providing access to the outside, is not longer than 5 m;
- .3 a fire extinguisher is located at the servicing point that is furthest removed from the exit door and also where the installed power of the engines does not exceed 100 kW.

2.3 Escape Routes

2.3.1 Means of escape shall ensure that persons onboard can safely and swiftly escape from all the compartments to the open deck.

2.3.2 All accommodation spaces and engine rooms in which the personnel are normally employed or to which they have access shall be provided with stairways or ladders affording ready means of escape to the open deck.

2.3.3 From each accommodation area, at least two widely separated exits used as escape routes are to be provided. One of the exits may be an emergency escape. Two exits are not required for accommodation spaces having direct access to the open deck or a corridor included in escape route, provided that the corridor has two exits to the deck, on the portside and starboard side. Skylights and windows with an opening area not less than 0.36 m², the smaller dimension being not less than 0.5 m, may be used as emergency escapes.

2.3.4 The width of stairways and corridors used as escape routes shall be not less than 0.8 m. In well-grounded cases, this value may be reduced to 0.7 m.

2.3.5 Doors from public spaces shall open outwards, be operable from both sides or may be sliding doors. Doors from accommodation spaces leading to corridors shall open inwards.

2.3.6 Means of escape from all spaces in which the personnel are normally employed or to which they have access as well as exits and emergency exits shall be marked with graphic symbols used for the evacuation purposes.

2.4 Fire Protection of Accommodation Spaces and Control Stations

2.4.1 At least one portable fire-extinguisher, complying with the requirements specified in 5.2, shall be provided close to each entrance from the deck to accommodation spaces (public spaces, corridors, halls).

2.4.2 At least one portable fire-extinguisher shall be provided close to each entrance to crew spaces which are not accessible from the accommodation spaces and which contain heating, cooking or refrigeration equipment using solid or liquid fuels or liquefied gas.

2.4.3 The wheelhouse and any other control station shall be provided with at least one portable fire-extinguisher.

2.5 Fire Protection of Engine Room and Boiler Room

2.5.1 At least one portable fire-extinguisher shall be provided at each entrance to the engine room and boiler room. Inside these spaces fire-extinguishers shall be so located that no position in the space is more than 10 metres walking distance away from an extinguisher.

2.5.2 In vessels with a length $L^{1)}$ of 20 m and above and the total power output of the main and auxiliary engines of 100 kW and upwards navigating in operating area **1**, engine rooms and boiler rooms shall be protected by mobile fire-extinguisher with fire reel hose supplying extinguishing agent, located outside, at the entrance to these spaces.

2.5.3 In vessels with a length $L^{1)}$ exceeding 110 m or the total power output of the main and auxiliary engines of 750 kW and upwards navigating in operating area **1**, engine rooms and boiler rooms shall be fitted with a fixed fire-extinguishing system complying with the requirements stated in 3.3.

2.5.4 Engine rooms and boiler rooms protected by a fixed fire-extinguishing system shall be fitted with fire alarm system, see 3.3.3.

2.6 Fire Protection of Galley

2.6.1 Walls and decks of galley spaces adjacent to accommodation spaces shall be made of steel or steel equivalent materials.

2.6.2 On vessels less than 20 m in length L , application of other materials with low-flame spread characteristics is permitted.

2.6.3 Galley doors shall be self-closing.

2.6.4 Each galley shall be provided with at least one portable CO₂ fire-extinguisher or a fire-extinguisher suitable for fighting edible oil fires (group F fires).

2.7 Storage of Flammable Liquids

2.7.1 Flammable liquids having a flash-point below 55° C shall be stored in a separate space (store-room) bounded by steel walls and decks, with exit to the open deck or in a box/cupboard made of non-combustible material, installed on open deck.

2.7.2 Store-rooms or boxes/cupboards for flammable liquids shall be located outside accommodation spaces, be well ventilated and their doors shall open outwards.

2.7.3 On the store-room doors or the outside of the box/cupboard there shall be a symbol – pictograph “Fire, naked flame and smoking prohibited”, with a diameter of at least 10 cm (see Annex to ES - TRIN, Fig. 2).

2.7.4 A portable fire-extinguisher shall be located at the entrance to the store-room or adjacent to a box/cupboard.

2.8 Appliances Affording Fire Risk

Additional lamps using gas or liquid fuel may only be used in public spaces. Such lamps shall be made of metal and shall burn only fuels with a flash point above 55 °C or commercial paraffin oil. They shall be placed or attached so as not to constitute a fire hazard.

¹⁾ The definition of L – see sub-chapter 1.2, *Part II- Hull*.

3 FIRE-EXTINGUISHING SYSTEMS

3.1 General Requirements

3.1.1 Fire-extinguishing systems shall be so constructed as to be efficient and readily available for operation under normal conditions specified in sub-chapter 1.5, *Part VI – Machinery and Piping Systems*.

3.1.2 Fire-extinguishing agent pressure tanks and cylinders used in fire-extinguishing systems shall comply with the requirements for pressure vessels specified in Chapter 13, *Part VI – Machinery and Piping Systems*.

3.1.3 The use of fire-extinguishing agents, which, either by themselves or under expected conditions of use, emit toxic gases in such quantities as to endanger persons or environment, is not permitted.

3.1.4 In fire-extinguishing systems, metal pipes, except aluminium alloy pipes, shall be used. Steel pipes, except stainless steel pipes, shall be protected against corrosion; it is recommended that steel pipes should be hot-galvanized both inside and outside.

3.1.5 Fire-extinguishing systems shall also comply with the requirements specified in Chapter 15, *Part VI – Machinery and Piping Systems*.

3.2 Water Fire Main System

Vessels and floating equipment with mechanical propulsion, listed in 1.1.1, shall be fitted with water fire main system consisting of a power-operated fire pump, water supply pipelines, hydrant valves and fire hoses with nozzles. The water fire main system shall fulfil the requirements specified in the present sub-chapter. Vessels and floating equipment without mechanical propulsion as well as vessels with mechanical propulsion of a length $L \leq 20$ m – other than pushers, tugs or ice-breakers – need not be fitted with water fire main system.

3.2.1 Fire Pumps

3.2.1.1 The fire pump shall have a capacity not less than 12 m³/h and shall develop such pressure that during its operation at full capacity, the range of the water jet from a fire hydrant furthestmost from the pump, by the fire nozzles used on the vessel, is not less than 6 m.

3.2.1.2 The fire pump shall be independently driven. In vessels with $L \cdot B \cdot H$ ratio¹⁾ less than 800 or of the main engines total power output less than 350 kW, the fire pump may be driven from the main engine, or bilge pump or cooling water pump driven from the main engine may be used as fire pump if provision has been made for disconnecting the shaft from the engine. Upon PRS' agreement, V-belt drive from the main engine to the pump may be permitted, provided that transmission of torque is ensured even when one of the belts is broken.

3.2.1.3 Electric engines may be used to drive fire pumps, provided that electrical power supply to the pumps is ensured in any conditions of service, including periods when the vessel is in port.

3.2.1.4 General use, bilge, ballast, etc. pumps may be used as fire pumps, provided that they are not used for pumping oil flammable liquids.

3.2.1.5 Fire pumps shall not be installed forward of the collision bulkhead.

¹⁾ Definition of L , B and H – see sub-chapter 1.2, *Part II – Hull*.

3.2.1.6 Pumps capable of developing, in piping, pressure exceeding the working pressure shall be provided with a safety valve. The valve shall be located on the delivery pipeline, before the shut-off valve. The flow capacity of the valve shall be such that under any service conditions the working pressure will not be exceeded by more than 10 per cent. The discharge from the safety valve shall be directed into the pump suction pipe.

3.2.1.7 Fire pumps, as well as their water-inlet valves shall be located below the light waterline. Fixed fire pumps, located above the light waterline shall be of the self-priming type or shall be connected to a suction system.

3.2.1.8 Each fire pump shall be fitted with shut-off valves on the suction and discharge side, as well as a pressure gauge. In the case of centrifugal fire pumps, non-return valves, preventing water backflow, shall be fitted on the discharge side. The valves shall be provided with a notice board stating the following: *“The valve shall be always kept open during normal operation of the vessel”*.

3.2.2 Pipes and Fire Hydrants

3.2.2.1 In vessels operating in winter time, the water fire main pipes located in non-heated spaces and on open decks shall be provided with shut-off valves and drain cocks so as to prevent water from freezing. A notice board shall be fitted at the hydrant and cock informing on the necessity to drain this section of the pipe after it has been used.

3.2.2.2 Fire hydrants shall consist of gate valve and connecting pipe conforming to the Flag State standards. Fire hydrants shall be painted red.

3.2.2.3 Fire hydrants shall be made from bronze, brass or other metal alloys resistant to corrosion.

3.2.2.4 Fire hydrants shall be so placed that fire hoses may be easily and quickly coupled to them. The number of fire hydrants shall be sufficient to provide one jet of water to any part of the vessel by means of a single fire hose of not more than 20 m in length.

In vessel with a length of 20 m and above, at least 3 fire hydrants shall be provided.

3.2.2.5 In vessels carrying deck cargo, fire hydrants shall be so placed as not to be exposed to damage during loading and reloading operations and shall be always readily accessible.

3.2.2.6 Every engine room or boiler room which affords access to machinery during the vessel operation shall be fitted with at least one fire hydrant.

3.2.3 Fire Hoses and Fire Hose Nozzles

3.2.3.1 Fire hoses shall comply with the Flag State standards and shall be of 10 to 20 m in length. The diameters of fire hoses shall correspond to the capacity of the coupled standard fire hose nozzles.

3.2.3.2 All nozzles shall be provided with water jet adjustment (they shall be capable of producing both a compact and a sprayed jet) and a shut-off valve.

3.2.3.3 Fire hoses coupled with the hose nozzles shall be kept in the close vicinity of the fire hydrant to which they are to be connected. Where hose boxes are provided for the storage of fire hoses, a square sign - pictograph “Fire hose”, having the sides length of at least 10 cm, representing a fire hose reel symbol used in fire protection shall be displayed on the boxes. The fire reel hose symbol – in white shall be presented on a red background (see *Annex* to ES-TRIN, Fig. 5).

3.2.3.4 The fire hose nozzles with standard diameter of orifices, selected to match the effective capacity of the pump and the required number of water jets delivered simultaneously, shall be used. The minimum orifice diameter in systems fitted with power driven pump shall be 12 mm.

3.2.3.5 At least two fire hoses with nozzles shall be available on board the vessel.

3.3 Fixed Fire-Extinguishing Systems for the Protection of Machinery Spaces, Boiler Rooms and Pump Rooms

3.3.1 Fire-Extinguishing Agents

In fixed fire-extinguishing systems intended for the protection of engine rooms, boiler rooms and pump rooms, the following fire- extinguishing agents may be used:

- .1** CO₂ (carbon dioxide);
- .2** HFC 227 ea (heptafluoropropane);
- .3** IG-541 (52% of nitrogen, 40% of argon, 8% of carbon dioxide);
- .4** FK-5-12 (dodecafluoro-2-metylopentan-3-on);
- .5** Water.

3.3.2 Ventilation and Air Intake in Spaces Protected by Fixed Fire-Extinguishing System

3.3.2.1 Combustion air for the propulsion engines shall not be extracted from spaces protected by fixed fire-extinguishing systems. This requirement shall not apply where there are two mutually independent and separated by gastight bulkheads main engine rooms or if next to the main engine room there is a separate engine room with a bow thruster ensuring that the vessel is able to make way under its own power in the event of fire in the main engine room.

3.3.2.2 Mechanical ventilation present in the protected spaces shall switch off automatically if the fire-extinguishing system comes into operation.

3.3.2.3 There shall be devices available with which all apertures which can allow air to enter or gas to escape from the protected space can be quickly closed by means controlled outside of this room. The closing devices shall be provided with “open/ closed” indicators.

3.3.2.4 The air escaping from relief valves in the compressed-air tanks installed in protected spaces shall be conveyed to the open air.

3.3.2.5 Over- or underpressure resulting from the inflow of extinguishing agent shall not destroy the components of the surrounding partitions of the protected space. It shall be possible for the pressure to equalise without danger.

3.3.2.6 Protected spaces shall have a facility – either permanently installed extractors or portable fans – for extracting the extinguishing agent, as well as smoke and the combustion gases. Such facilities shall be capable of being operated from position outside the protected space and which would not be made inaccessible by a fire within such space. If there are permanently installed extractors, it shall not be possible for these extractors to be switched on while the fire is being extinguished.

3.3.3 Fire Alarm System

Protected spaces fitted with a fixed gas fire-extinguishing system shall be provided with fire alarm system, complying with the requirements specified in 4.1. The alarm (visual and audible) shall be given in the wheelhouse, in the accommodation spaces and in the protected spaces.

3.3.4 Piping

3.3.4.1 The extinguishing agent shall be conveyed to the protected space and distributed there by means of a fixed piping system. Inside the protected space the piping and associated fittings shall be made of steel. Tank connecting pipes and expansion joints may be exempted from this requirement, provided the materials used have equivalent properties in case of fire. Pipes shall be both internally and externally protected against corrosion.

3.3.4.2 Outlet nozzles shall be dimensioned and fitted such that the extinguishing agent is evenly distributed in the protected space. The extinguishing agent shall also be supplied beneath the floor plates in that space.

3.3.5 Starting Arrangements

3.3.5.1 Fixed fire-extinguishing systems with automatic starting shall not be permissible.

3.3.5.2 It shall be possible to start the fixed fire-extinguishing system from a suitable place outside the protected space.

3.3.5.3 Starting arrangements shall be installed in such a way that they can be operated even in case of a fire and in the event of damage by fire or explosion in the space to be protected the necessary quantity of extinguishing agent can still be conveyed.

Non-mechanical starting arrangements devices be powered from two different mutually independent energy sources. These energy sources shall be located outside the space to be protected. Control lines in the protected space shall be designed so as to remain functional for at least 30 minutes in the event of fire. Electric wiring shall be considered as complying with the above requirements if it complies with IEC 60331-21:1999.

If starting arrangements are installed in such a way that they are out of sight, the panel covering them shall be identified by a sign – pictograph (i.e. a white semicircle on red background), having the width of at least 10 cm and the inscription "Fire-extinguishing system" written in the Flag State language as well as in German, French, Spanish and English (in red letters on white background) (see *Annex* to ES-TRIN, Fig. 6).

3.3.5.4 If the fire-extinguishing system is intended for the protection of several spaces, the starting arrangements for each space shall be separate and clearly identified.

3.3.5.5 Next to each starting arrangement, operating instructions, prepared in the Flag State language, shall be posted up visibly and indelibly. They shall contain, in particular, instructions regarding:

- .1 starting the fire-extinguishing system;
- .2 action to be taken by the crew when the fire-extinguishing system is triggered (i.e. shutting down combustion engines drawing air from the protected space, cutting off fuel supply to these engines and closing all openings in the space);
- .3 the need for checking to ensure that all persons have left the space to be protected;
- .4 action to be taken by the crew in the case when the fire-extinguishing system is triggered and restriction of access to the space after the extinguishing agent release, having regard to possible presence of toxic substances;
- .5 action to be taken by the crew in the case of failure/damage of the fire-extinguishing system.

3.3.6 Warning System

3.3.6.1 Fixed fire-extinguishing systems installed in spaces in which people may be present shall be fitted with acoustic and optical warning system advising about extinguishing agent release into the space.

3.3.6.2 The warning system shall be set off automatically as soon as the fire-extinguishing system is triggered. The warning signal shall sound for an appropriate time before the extinguishing agent is released to allow evacuation of the space and it shall not be possible to switch it off.

3.3.6.3 Warning signals shall be clearly visible in the protected and outside the accesses to them and clearly audible even under operating conditions producing the loudest inherent noise. They shall be clearly distinct from all other acoustic and optical signals in the space to be protected.

3.3.6.4 The acoustic warning signals shall be clearly audible in the adjacent rooms even when connecting doors are closed and under operating conditions producing the loudest inherent noise.

3.3.6.5 If the warning system is not self-monitoring as regards short-circuits, wire breaks and voltage drops, it shall be possible to check that it is working properly.

3.3.6.6 At every entrance to a protected space, a clearly visible notice shall be put up bearing the following instruction/warning written in red letters on a white background:

WARNING, FIRE-EXTINGUISHING SYSTEM!
LEAVE THE SPACE AS SOON AS WARNING SIGNAL (*signal description*) SOUNDS!

The notice shall be written in the Flag State language as well as in German, French, Spanish and English.

3.3.7 Pressure Tanks

3.3.7.1 Pressure tanks, fittings and pressure pipes shall comply with technical standards in force in one of the EU Member States.

3.3.7.2 Pressure tanks shall be installed in accordance with the manufacturer's instructions.

3.3.7.3 Pressure tanks, fittings and pressure pipes shall not be installed in accommodation spaces.

3.3.7.4 The temperature in cabinets and installation spaces containing pressure tanks shall not exceed 50° C.

3.3.7.5 If pressure tanks are to be installed outside the protected space, they shall be placed in cabinets or installation spaces. Such cabinets or installation spaces shall be situated on open decks, shall be firmly fixed in place and have air vents which shall be arranged in such a way that in the event of a leak in the pressure tank no gas can escape into the interior of the vessel. Direct connections to other spaces are not permitted.

3.3.8 Quantity of Extinguishing Agent

If extinguishing agent is intended for the protection of more than one space, the total amount of the extinguishing agent available does not need to be greater than the quantity necessary for the largest space room to be protected.

3.3.9 Final System Acceptance, Operation Tests and Periodical Inspections

3.3.9.1 The system may only be installed or rebuilt by a company specializing in fire-extinguishing systems. When installing the system, the fire extinguishing agent and installation manufacturer's conditions should be observed, bearing in mind the product safety data sheets and the safety data sheet. Maintenance, in particular nozzles, should be carried out regularly in accordance with the instructions of the system manufacturer or the manufacturer of the extinguishing agent.

3.3.9.2 After fire-extinguishing system has been installed on board the vessel, it is subject to the final acceptance and operation tests to be witnessed by PRS Surveyor.

Also, the system is subject to final acceptance and operation tests:

- .1 before being put back into service after it has been triggered;
- .2 after a substantial modification or repair.

3.3.9.3 During the vessel service, the system is subject to periodical inspections to be performed by a recognized service station at intervals not exceeding two years.

3.3.9.4 The final acceptance and periodical inspection shall check that the system fulfils the requirements specified in this sub-chapter and they shall cover at least:

- .1 external examination of the entire installation;
- .2 tightness check on pipes;
- .3 operation test of starting arrangement;
- .4 checking of tank pressure and quantity of extinguishing agent;
- .5 checking of tightness and facilities for locking the space to be protected;
- .6 checking the operation of fire alarm system in the protected space;
- .7 checking the operation of the warning system.

3.3.9.5 Performance of the final acceptance/periodical inspection shall be confirmed by the report to be made by a recognized service station which shall contain their signature and the inspection date. The report shall state the number of fixed fire-extinguishing systems installed on board the vessel.

3.3.9.6 The number of fixed fire-extinguishing systems shall be entered in the inland navigation vessel certificate.

3.3.10 Carbon Dioxide Fire-extinguishing System

In addition to the requirements specified in 3.3.1 to 3.3.9, fire-extinguishing system using CO₂ as the extinguishing agent shall comply with the requirements given in this sub-chapter.

3.3.10.1 Calculation of CO₂ Amount

3.3.10.1.1 The required amount of CO₂ shall be calculated according to the formula:

$$G = 0.71 \times V, \quad [\text{kg}]$$

where:

0.71 – the volume of CO₂ for the space to be protected shall be at least 40% of the gross volume assuming that the specific volume of unpressurized CO₂ is 0.56 m³/kg;

V – design volume of the largest space to be protected, [m³].

For engine rooms and pump-rooms, this means the gross volume of the space, without deduction for the tanks and machinery contained therein.

3.3.10.1.2 When calculating the number of CO₂ cylinders, the cylinder filling ratio, to be taken, shall not exceed 0.675 kg/dm³ – for cylinders of the design pressure 12.5 MPa and 0.75 kg/dm³ – for cylinders of the design pressure 15 MPa.

When filling the cylinder, allowance not exceeding ± 0.5 kg in relation to the design quantity is permitted.

3.3.10.1.3 The diameter of the piping shall be such that the required amount of CO₂ can be discharged to the protected space within not more than 2 minutes. Arrangements shall be

provided in the system to allow to check whether the required CO₂ supply to the space has been completed.

3.3.10.2 CO₂ Cylinders

3.3.10.2.1 CO₂ cylinders shall be located in special spaces – fire-extinguishing station or steel cabinets. Fire-extinguishing stations/steel cabinets shall comply with the following requirements:

- .1 they shall be separated from the adjacent spaces by gastight bulkheads and decks;
- .2 access doors shall open outwards; the doors shall bear on the outside a sign – pictograph “General danger warning” (equilateral triangle in yellow colour, with a black colour exclamation mark, of 5 cm in height) and the marking: “CO₂” – in the same colour and of the same height (see *Annex* to ES-TRIN, Fig. 4);
- .3 where the fire-extinguishing station is located below deck, it shall be accessible only from the open deck. The space shall be provided with a separate mechanical ventilation complying with the requirements specified in sub-chapter 21.5, *Part VI – Machinery and Piping Systems*;
- .4 the station/cabinet shall be lockable. One key for the lock shall be kept in a glazed box, located near the entrance doors to the station/cabinet. The box door shall be protected, e.g. by sealing against being incidentally opened;
- .5 a plan of the CO₂ system and the system operating instructions shall be kept in the fire-extinguishing station/cabinet.

3.3.10.2.2 CO₂ cylinders shall be fitted with safety valves or bursting disks, operating or bursting at a pressure in the cylinders to $1.3 p (\pm 0.1 \%)$, where p means the cylinder design pressure. Where carbon dioxide discharge from safety valves may result in significant pressure rise in the cylinder storage space, CO₂ shall be discharged to the atmosphere by a special pipe fitted with audible signalling device.

3.3.10.2.3 CO₂ cylinders in fire-extinguishing stations/cabinets shall be placed vertically in rows on insulation pads which may be made of wood. The cylinders shall be securely fastened and shall be accessible for inspection and for checking the amount of carbon dioxide they contain. All cylinders shall be painted red and bear the inscription “CO₂,” made in white. The letters shall be not less than 6 cm high. All cylinders are to be numbered.

3.3.10.3 Pipes, Fittings and Discharge Nozzles

3.3.10.3.1 CO₂ cylinders shall be connected to a collecting manifold. To ensure connection flexibility, the sections of the system from the cylinder valves to the manifold shall be flexible hoses of the approved type. Each pipeline connecting the cylinder with the manifold shall be fitted with a non-return valve. The manifold shall be fitted with a pressure gauge and stub-pipe with valve for connecting to compressed air used for the piping passage test.

3.3.10.3.2 From the collecting manifold, pipes shall be led which convey CO₂ to the protected spaces. Each CO₂ pipe shall be fitted with a separate shut-off valve.

3.3.10.4 Starting Arrangements

3.3.10.4.1 Carbon dioxide fire-extinguishing system shall be manually started from the CO₂ fire-extinguishing station or shall be remotely controlled if the fire-extinguishing station is located far from the entrance to the protected space. Automatic release of the carbon dioxide system is not permitted.

3.3.10.4.2 Having regard to the safety of persons present in the protected space, the starting of the system shall be performed in two stages; the first stage – opening the valve of the pipe which conveys CO₂ into the protected space, the second stage – opening the cylinder valves.

3.3.10.4.3 The cylinder valves opening device shall ensure a quick and simultaneous opening of all cylinder valves provided for the protected space.

3.3.10.4.4 Remote starting arrangement shall have two separate controls of carbon dioxide discharge to the protected space. One control shall be used for opening the valve of the pipe which conveys CO₂ into the protected space; a second control shall be used to open the cylinder valves. The two controls shall be located inside a control cabinet clearly identified for the particular space. If the cabinet containing the controls is to be locked, a key to the cabinet shall be kept in a glazed box, located near the cabinet.

3.3.10.4.5 Remote starting arrangement shall be of pneumatic type and shall consist of two cylinders (one of the cylinders shall be a reserve one). The arrangement shall be located outside a protected space in the vicinity of the entrance to the space, in a clearly marked and well lighted position. Control cables shall be made of steel.

3.3.10.4.6 Starting arrangement shall be provided with time-delay device, interlocked with warning signalization to ensure that the release of carbon dioxide into the space will be delayed by the time necessary to evacuate the space, but not shorter than 20 seconds.

Time-delay device is not required for small protected spaces (allowing easily to decide if anyone is present there) or spaces in which the crew is not normally present (e.g. cargo holds).

3.3.11 HFC 227ea Fire-Extinguishing System

3.3.11.1 In addition to the requirements specified in 3.3.1 to 3.3.9, fire-extin-guishing system using HFC 227 ea as the extinguishing agent shall fulfil the requirements specified in the present sub-chapter.

3.3.11.2 If there are several spaces to be protected, each with a different gross volume, each space shall be provided with its own fire-extinguishing system.

3.3.11.3 Each HFC-227ea container that is installed in the space to be protected shall be equipped with an overpressure relief valve. This shall harmlessly release the content of the container into the space to be protected if the container is exposed to the effects of fire and the fire-extinguishing system has not been started.

3.3.11.4 Each container shall be fitted with a device for checking the gas pressure.

3.3.11.5 The containers shall not be filled to more than 1.15 kg/l. The specific volume of the unpressurised HFC-227ea shall be taken as 0.1374 m³/kg.

3.3.11.6 The volume of HFC-227ea for the space to be protected shall be at least 8 % of the space gross volume. This volume shall be supplied within 10 seconds.

3.3.11.7 The HFC-227ea containers shall be provided with a pressure monitor which triggers an acoustic and optical alarm signal in the wheelhouse in the event of an unauthorised loss of propellant. If there is no wheelhouse, this alarm signal shall be given outside the protected space.

3.3.11.8 After release of the extinguishing agent into the space, the concentration in the protected space shall not exceed 10.5 % of the space net volume.

3.3.11.9 The fire-extinguishing system shall not contain any parts made of aluminium.

3.3.12 IG-541 Fire-Extinguishing System

3.3.12.1 In addition to requirements specified in 3.3.11.2 to 3.3.11.4, fire-extinguishing system using IG-541 as the extinguishing agent shall comply with requirements specified in 3.3.11.2 to 3.3.11.4, as well the requirements of this sub-chapter.

3.3.12.2 The filling pressure of the container shall not exceed 20.0 MPa at + 15 °C.

3.3.12.3 The volume of IG-541 for the space to be protected shall be at least 44 % and not more than 50 % of the space gross volume. This volume shall be supplied within 120 seconds.

3.3.13 FK-5-1-12 Fire-Extinguishing System

3.3.13.1 In addition to the requirements specified in 3.3.1 to 3.3.9, fire-extinguishing system using FK-5-1-12 as the extinguishing agent shall comply with the requirements specified in 3.3.11.2 to 3.3.11.4, as well the requirements of the present sub-chapter.

3.3.13.2 The filling pressure of the container shall not exceed 1.00kg/l. The specific volume of unpressurized FK-5-1-12 shall be taken as 0.0719 m³/kg.

3.3.13.3 The volume of FK-5-1-12 for the space to be protected shall be at least 5.5 % of the space gross volume. This volume shall be supplied within 10 seconds.

3.3.13.4 The FK-5-1-12 containers shall be provided with a pressure monitor which triggers an acoustic and optical alarm signal in the wheelhouse in the event of an unauthorised loss of propellant. If there is no wheelhouse, this alarm signal shall be given outside the protected space.

3.3.13.5 After release of the extinguishing agent into the space, the concentration in the protected space shall not exceed 10.0 % of the space net volume.

3.3.14 Fire-extinguishing Systems Using Water as the Fire-extinguishing Agent

3.3.14.1 Fire-extinguishing systems may use water only in the form of water mist. The drop size shall be between 5 and 300 microns.

3.3.14.2 In addition to the applicable requirements set out in items 3.3.1 to 3.3.9, the system shall fulfill the requirements given in this sub-chapter.

3.3.14.3 The fire- extinguishing system shall have a type- approval certificate in accordance with MSC/Circ.1165* or another standard recognized by one of the Member States. Type-approval shall be carried out based on research conducted by an accredited research institution that meets the requirements of the European Standard for general requirements regarding the competence of testing and calibration laboratories (EN 17025: 2017).

3.3.14.4 The fire- extinguishing system shall be suitable for the size of the largest of the protected spaces and shall be able to spray water continuously into the room for a minimum of 30 minutes.

* Circular MSC/Circ.1165 – Revised guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms - adopted on 10 July 2005 and as amended by MSC.1/Circ.1269, MSC.1/Circ.1386 and MSC.1/Circ.1385.

3.3.14.5 The pumps, their switching mechanisms and the valves necessary for the operation of the system shall be installed in a room outside the protected room. The room in which they are installed should be separated from the adjacent rooms by A-30 class fire divisions.

3.3.14.6 The fire- extinguishing system must be completely full of water at all times, at least as far as the trip valves and be under the required initial operating pressure. The water supply pumps shall be automatically initiated when the system is triggered. The system must feature a continuously operating water supply. It must be ensured that water pollution does not affect the operation of the installation.

3.3.14.7 The capacity and design of the system's pipe network shall be based on hydraulic calculations.

3.3.14.8 The number and arrangement of nozzles shall ensure sufficient distribution of water in the protected space. The spray nozzles must be located so as to ensure that the water mist is distributed throughout the room to be protected, especially in those areas where there is a high risk of fire, including behind the fittings and beneath the floor.

3.3.14.9 The electrical components of the fire-extinguishing system located in the protected space shall at least correspond to the protection class IP54. The system shall feature two independent energy sources with automatic switching. One of the power sources must be outside the protected room. Each power source should on its own be capable of ensuring the operation of the system.

3.3.14.10 The fire- extinguishing system must feature redundant pumps.

3.3.14.11 The system must be equipped with a monitoring device which triggers an alarm signal in the wheelhouse in the following cases:

- drop in water tank level (if fitted);
- power supply failure;
- loss of pressure in the low-pressure system pipework;
- loss of pressure in the high-pressure circuit;
- when the system is activated.

3.3.14.12 The documentation required for installation, functional testing and documentation for the purposes of acceptance and inspection shall contain at least:

- a schematic diagram of the system showing pipe sections and the types of spray nozzles;
- hydraulic calculations;
- the manufacturer's technical documentation covering all aspects of the installation;
- the user manual and maintenance instructions.

3.4 Automatic Sprinkler System

3.4.1 General Requirements

3.4.1.1 The automatic sprinkler system shall be ready for service at all times when there are persons on board. No additional action by crew members shall be required to trigger operation.

3.4.1.2 The sprinkler system shall comprise a water supply pump, a pressure tank, pressure control unit, section valves, distribution pipelines and sprinklers.

The system shall be completely filled with fresh water and shall be permanently maintained at the necessary pressure. The system shall have a continuously working water supply. It shall not be possible for operation-harmful impurities to enter the system.

3.4.1.3 The system shall be divided into sections, each with no more than 50 spray nozzles.

3.4.1.4 The system components, such as water supply pump and pressure water tank shall be located outside the protected spaces. Such components of the system shall not be installed in the main engine rooms.

3.4.1.5 Activation of any section of sprinklers shall give visual and audible alarm signal in the wheelhouse or other permanently manned location.

3.4.1.6 The water supply pump and the alarm system shall be supplied from at least two independent power sources which shall not be installed in the same location. Each energy source shall be capable of supplying the entire system unassisted.

3.4.1.7 Pipe connections with closing valve shall be provided on the open deck on the port and starboard sides for supplying the sprinkler system with water from the shore. The closing valves shall to be secured against inadvertent opening.

3.4.1.8 In ships operating in wintertime, the pressure water tank and the sprinkler system piping shall be located in heated spaces or shall be suitably protected against freezing.

3.4.1.9 The system components shall be made of steel or other equivalent stainless alloys.

3.4.2 Water Supply Pump

3.4.2.1 The water supply pump shall be put automatically into action by a pressure drop in the system before the standing fresh water charge in the pressure water tank is completely exhausted. The pump shall not be used for any other purpose than supplying water for the sprinkler system.

3.4.2.2 The capacity and the pressure of the pump shall be sufficient to cover an area of the largest space (the region of compartments bounded by fire divisions) to be protected at the pressure required for spray nozzles and the application rate specified in 3.4.4.2.

3.4.2.3 In the event of water supply pump failure, it shall be possible to provide the spray nozzles with a sufficient water supply from another on-board pump, e.g. water fire main system pump, through a non-return shut-off valve.

3.4.2.4 The pump delivery pipe shall be provided with a test valve with a short open-ended discharge pipe. The effective cross-sectional area of the valve and pipe shall be adequate to permit the release of the required pump output.

3.4.2.5 The pump delivery pipe shall be fitted with a non-return shut-off valve. A notice board shall be placed at the valve stating that it shall be kept in the open position during service.

3.4.2.6 The pump shall be provided with water inlet valve, located in the space containing the pump. A notice board shall be placed at the valve stating that it shall be kept in the open position during service. The suction pipe shall be fitted with a suitable water filter to prevent the nozzles from being clogged by impurities in the water.

3.4.3 Pressure Water Tank

3.4.3.1 The pressure water tank shall be fitted with a safety valve directly connected to the tank water area (without intermediate valve), water level indicator with isolating valves, a pressure gauge and connecting hoses to connect to fresh water supply and compressed air.

3.4.3.2 The volume of the pressure water tank shall be equivalent to at least twice the pump delivery per minute. The quantity of fresh water in the pressure tank shall be equal to at least the quantity of water delivered by the water supply pump in one minute.

3.4.3.3 The pressure water tank shall additionally comply with the requirements for pressure vessels set forth in *Part VI – Machinery and Piping Systems*.

3.4.3.4 The pipe connecting the pressure water tank with the water pipe shall be fitted with non-return valves precluding the ingress of water into the tank and the water discharge overboard by the pump suction pipe.

3.4.4 Sprinklers

3.4.4.1 The number and the layout of sprinklers shall ensure effective distribution of water in the spaces to be protected.

3.4.4.2 Sprinklers shall be placed in the overhead position and spaced at suitable pattern to maintain an average application rate of not less than 5 l/min per 1 m² of the space floor.

3.4.4.3 In accommodation and other spaces for the crew, the sprinklers shall come into operation within the temperatures range from 68 °C to 79 °C. This requirement does not apply to drying rooms and galleys where the sprinkler operating temperature may be increased, but by not more than 30 °C above the maximum deckhead temperature.

3.4.4.4 Sprinklers shall be made from corrosion-resistant material.

3.4.5 Section Valves (alarm and indication)

3.4.5.1 Each section of the sprinklers system shall be provided with a section valve, fitted on the supply pipe. The valve shall activate an alarm (visual and audible) in the wheelhouse or at other permanently manned positions whenever a sprinkler comes into operation. The section valve shall be fitted with a pressure gauge and a test valve with a passage equivalent to that of a spray nozzle to enable the sprinkler system to be tested.

3.4.5.2 Section valves shall be fitted in easily accessible positions and shall be provided with notice boards.

3.4.5.3 In the wheelhouse or other permanently manned position an indicating panel shall be mounted which identifies the actuated sprinkler section.

3.4.5.4 The electrical installation shall be self-monitoring and shall be capable of being tested separately for each section.

3.4.6 Final System Acceptance, Operation Tests and Periodical Inspections

3.4.6.1 After water sprinkler system has been installed on board the vessel, it is subject to the final acceptance and operation tests to be witnessed by PRS Surveyor.

Also, the system is subject to final acceptance and operation tests:

- .1 before being put back into service after it has been triggered;
- .2 after a substantial modification or repair.

3.4.6.2 During the vessel service, the system is subject to periodical inspections to be performed by a recognized service station at intervals not exceeding two years.

3.4.6.3 The final acceptance and periodical inspection shall check that the system fulfils the requirements specified in this sub-chapter and they shall cover at least:

- .1 external examination of the entire system;
- .2 operation test of automatic operation of water supply pump and alarm systems;
- .3 operation test of the pressure tanks and water replenishment system.

3.4.6.4 Performance of the final acceptance/periodical inspection shall be confirmed by the report, to be made by a recognized service station, which shall contain their signature and the inspection date.

3.4.6.5 The number of fixed fire-extinguishing systems shall be entered in the inland navigation vessel certificate.

3.5 Equivalent High-Pressure Sprinkler System

3.5.1.1 The system using less water quantity shall fulfil the relevant requirements specified in sub-chapter 3.4 and additionally, with the requirements stated in the present sub-chapter.

3.5.1.2 The number and arrangement of sprinklers shall ensure effective and uniform distribution of water in the protected spaces; the water discharge rate may be lower than that specified in 3.4.4.2.

3.5.1.3 The system shall be type approved – it is required that the system shall have approval certificate confirming compliance with the requirements of IMO Resolution A.800(19), as amended, or other standard recognised by one of the Member States. Approval certificate may be issued by a recognized classification institution or an accredited testing institution complying with the requirements of EN 17025: 2017 standard regarding competences of testing and calibration laboratories.

3.6 Pressure Tests of Fire-Extinguishing Systems

3.6.1 The scope of tests and test pressure values for fire-extinguishing systems for workshop tests and upon completion of the system installation on board vessel are given in Table 3.6.1.

Table 3.6.1
Scope of tests and test pressure values for fire-extinguishing systems

Item.	Systems and components subject to tests	Pressure test	
		In workshop	On board
1	Water fire-extinguishing systems: .1 pipes of water fire main systems; .2 pipes of water spraying systems; .3 pipes of sprinkler systems.	- - -	1.25 p 1.25 p 1.25 p
2	Carbon dioxide fire-extinguishing system and other gas extinguishing systems: .1 pipes from cylinders to isolating valves, pipes passing through accommodation spaces and other crew spaces; .2 pipes from isolating valves to protected spaces, pipes from safety valves; .3 pipes in the protected space.	1.5 p - -	10 MPa 5 MPa 1 MPa

3	Cylinders, storage tanks and containers: .1 pressurized (including cylinders without valves); .2 non-pressurized; .3 cylinders with valves fitted.	1.5 <i>p</i> (by filling with water) 1.5 <i>p</i> (air test)	- together with the whole system -
4	Fittings – pressure and strength tests	1.5 <i>p</i> (but at least 0.2 MPa)	-

Notes to Table 3.6.1:

- 1) The value *p* in the Table means the maximum working pressure in the system. For carbon dioxide fire-extinguishing system, *p* is equal to the design pressure in the cylinder.
- 2) Complete fittings shall be subjected to hydraulic test with a pressure of at least 1.25 *p*.
- 3) The systems shall be tested in assembly on board ship, upon completion of all installation work.

4 FIRE ALARM AND WARNING SYSTEMS

4.1 Fire Alarm System

4.1.1 Fire Alarm System Components

4.1.1.1 Fire alarm system shall consist of:

- .1 fire detection system;
- .2 fire indicator system;
- .3 control panel,

as well as the external power supply.

4.1.1.2 The fire detection system may be divided into one or more fire zones.

4.1.1.3 The fire indicator system may have one or more indicator devices.

4.1.1.4 The control panel is the central unit of the fire alarm system. It also includes parts of the fire indicators system (i.e. an indicator device).

4.1.1.5 A fire detection zone may have one or more fire detectors.

4.1.1.6 Fire detectors may be:

- .1 heat detectors;
- .2 smoke detectors;
- .3 ion detectors;
- .4 flame detectors;
- .5 combination detectors (fire detectors combining two or more of the detectors).

Fire detectors which respond to other factors indicating the onset of a fire may be approved by the institution supervising the vessel construction, provided that they are no less sensitive than the detectors, referred to in .1 to .5).

4.1.1.7 Fire detectors may be installed:

- .1 with or
- .2 without

individual identification.

4.1.2 Construction Requirements

4.1.2.1 Compulsory fire alarm systems shall be operational at all times.

4.1.2.2 Fire detectors required in each space shall be automatic. Additional manually operated fire detectors may be installed.

4.1.2.3 The system and its components shall be able to withstand voltage fluctuations and surges, changes in ambient temperature, vibrations, humidity, shocks, impacts and corrosion such as commonly occur on vessels.

4.1.3 Energy Supply

4.1.3.1 Energy sources and electric circuits necessary for the operation of the fire alarm system shall be self-monitoring. Any fault occurring shall activate a visual and acoustic alarm signal on the control panel which can be distinguished from a fire alarm signal.

4.1.3.2 There shall be at least two power sources for the electrical part of the fire alarm system, one of which shall be an emergency power system (i.e. emergency power source and emergency switchboard). There shall be two separate power-feeds solely for this purpose. These shall lead to an automatic switch in or near the control panel of the fire alarm system. On day-trip vessels up to 25 m in length L_{WL} and on motor vessels a separate emergency power supply is sufficient.

4.1.4 Fire Detection System

4.1.4.1 Fire detectors shall be grouped in fire detection zones.

4.1.4.2 Fire detection systems shall not be used for any other purpose. By way of exemption, the closing and opening of the doors, as well as similar functions may be activated and indicated on the control panel.

4.1.4.3 Fire detection systems shall be designed in such a way that the first indicated fire alarm does not prevent fire alarms set off by other detectors.

4.1.5 Fire Detection Zones

4.1.5.1 Where the fire detectors cannot be remotely identified individually, a fire detection zone shall not monitor more than one deck. This does not apply to a fire detection zone which monitors an enclosed stairway.

4.1.5.2 In order to avoid delays in detecting the origin of the fire, the number of enclosed spaces included in each fire detection zone shall be limited. There shall not be more than fifty enclosed spaces in one fire detection zone.

4.1.5.3 Where the fire detection system has remote identification of individual fire detectors, the fire detection zones may monitor several decks and any number of enclosed spaces.

4.1.5.4 On passenger vessels which do not have a fire detection system with remote identification of individual fire detectors, a fire detection zone shall not comprise more than one main fire zone defined in 6.1.1.2. The activation of a fire detector in an individual cabin in this fire detection zone shall set off a visual and acoustic signal in the passageway outside that cabin.

4.1.5.5 Galleys, engine rooms and boiler rooms shall constitute separate fire detection zones.

4.1.6 Fire Detectors

4.1.6.1 Only heat, smoke or ion detectors shall be used as fire detectors. Other types may only be used as additional detectors.

4.1.6.2 Fire detectors shall be type approved.

4.1.6.3 All automatic fire detectors shall be designed in such a way that they can be tested to ensure that they are working properly and brought back into service without having to replace any components.

4.1.6.4 Smoke detectors shall be set so that they respond to a reduction in visibility per metre caused by smoke of more than 2 % to 12.5 %. Smoke detectors fitted in galleys, engine rooms and boiler rooms shall respond within sensitivity limits meeting the requirements of the institution supervising the vessel construction, whereby under-sensitivity or over-sensitivity of the detectors shall be avoided.

4.1.6.5 Heat detectors shall be set so that with temperature increase rates of less than 1 °C/min they respond at temperatures of between 54 °C and 78 °C. With higher rates of temperature increase, the heat detector shall respond within temperature limits where under- or over-sensitivity of the heat detector is avoided.

4.1.6.6 It is allowed that the permissible operating temperature of heat detectors may be increased to 30 °C above the maximum temperature in the upper part of engine and boiler rooms.

4.1.6.7 The sensitivity of flame detectors shall be sufficient to detect flames against an illuminated background. Flame detectors shall also be equipped with a system for identifying false alarms.

4.1.7 Control Panel and the Indicator Devices

4.1.7.1 Activation of a fire detector shall set off a visual and acoustic fire alarm signal at the control panel and the indicator devices.

4.1.7.2 The control panel and the indicator devices shall be at a location which is permanently manned by crew or shipboard personnel. One indicator shall be at the steering position.

4.1.7.3 The indicator devices shall indicate at least the fire detection zone where a fire detector has been activated.

4.1.7.4 On or near each indicator device there shall be clear information on the areas monitored and the location of the fire detection zones.

4.1.8 Installation Requirements

4.1.8.1 Fire detectors shall be installed in such a manner as to ensure the best possible operation of the system. Locations in the vicinity of deck girders and ventilation shafts or other locations where air currents could adversely affect system operation and locations where impacts or mechanical damage are likely shall be avoided.

4.1.8.2 In general, fire detectors located on the ceiling shall be at least 0.5 metres away from bulkheads. The maximum distance between fire detectors and bulkheads shall conform to the following Table:

Type of fire detector	Maximum floor surface area per fire detector [m ²]	Maximum distance between fire detectors, [m]	Maximum distance of fire detectors from bulkheads [m]
Heat	37	9	4.5
Smoke	74	11	5.5

PRS may approve other distances on the basis of the manufacturer's tests which prove the characteristics of the detectors.

4.1.8.3 The routing of electric cables for the fire alarm system through engine rooms and boiler rooms or other high fire risk areas is not permitted unless this is necessary for fire detection in those areas or connection to the corresponding power supply.

4.1.9 Final System Acceptance, Operation Tests, Periodical Inspections

4.1.9.1 After system has been installed on board the vessel, it is subject to the final acceptance and operation tests to be witnessed by PRS Surveyor.

After a substantial modification or repair, the system is also subject to final acceptance and operation tests.

4.1.9.2 During the vessel service, the system is subject to periodical inspections to be performed by a recognized service station at intervals not exceeding two years.

4.1.9.3 Where fire alarm system is installed in the engine room and boiler room, these tests shall be performed under different conditions of the machinery installations' operation and variable ventilation conditions.

4.1.9.4 Performance of the final acceptance/periodical inspection shall be confirmed by the report to be made by a recognized service station which shall contain their signature and the inspection date.

4.2 Safety Guidance System (Low-Location Lighting System)

4.2.1 General Requirements

4.2.1.1 In addition to the emergency lighting, the escape routes, including stairways, exits and emergency exits, shall be marked by low-location lighting throughout the whole of the escape route, particularly at corners and intersections.

4.2.1.2 The low-location lighting system shall function for at least 30 minutes after its activation.

4.2.1.3 The low-location lighting system components shall be neither radioactive nor toxic.

4.2.1.4 Instructions on the low-location lighting system shall be displayed with the safety plan, referred to in 6.1.12 and in every cabin.

4.2.2 Definitions

4.2.2.1 Low-location lighting – electrically powered lighting or photoluminescent indicators placed along the escape routes so as to ensure that all such routes can be easily identified.

4.2.2.2 Photoluminescent system – a low-location lighting system which uses photoluminescent material. Photoluminescent material contains a chemical substance (e.g. zinc sulphide) that has the quality of storing energy when illuminated by visible light. The photoluminescent material emits light which becomes visible when the ambient light source is less effective. Without the light source to re-energise it, the photoluminescent material gives off the stored energy for a period of time with diminishing luminance.

4.2.2.3 Electrically powered system – a low-location lighting system which requires electrical power for its operation, such as systems using incandescent bulbs, light-emitting diodes, electroluminescent strips or lamps, electrofluorescent lamps, etc.

4.2.3 Passageways and Stairways

4.2.3.1 In all passageways, the low-location lighting system shall be continuous, except where interrupted by corridors and cabin doors, in order to provide a visible delineation along the escape route. Low-location lighting systems in compliance with an international standard having a visible delineation without being continuous shall also be acceptable. The low-location lighting system shall be installed at least on one side of the corridor, either on the wall no more than 0.3 m from the floor, or on the floor no more than 0.15 m from the wall. In corridors more than two metres wide, low-location lighting system shall be installed on both sides.

4.2.3.2 In dead-end corridors, the low-location lighting system shall have arrows placed at intervals of no more than 1 m, or equivalent direction indicators, pointing in the direction of the escape route.

4.2.3.3 In all stairways, low-location lighting system shall be installed on at least one side at no more than 0.3 m above the steps, which will make the location of each step readily identifiable to any person standing above and below that step. Low-location lighting shall be installed on both sides if the width of the stairway is two metres or more. The top and bottom of each set of stairs shall be identified to show that there are no further steps.

4.2.4 Doors

4.2.4.1 Low-location lighting shall lead to the exit door handle. To prevent confusion, no other doors shall be similarly marked.

4.2.4.2 Where sliding doors are fitted in fire divisions and in bulkheads, the direction of opening shall be indicated.

4.2.5 Signs and Markings

4.2.5.1 All escape route signs shall be of photoluminescent material or marked by electric lighting. The dimensions of such signs and markings shall be commensurate with the rest of the low-location lighting system.

4.2.5.2 Low-location lighting exit signs shall be provided at all exits. The signs shall be located within the prescribed area on the side of the exit doors where the handle is located.

4.2.5.3 All signs shall contrast in colour to the background (wall or floor) on which they are installed.

4.2.5.4 Standardised symbols (e.g. those described in IMO Resolution A.760(18), as amended by MSC.82(70)) shall be used for the low-location lighting.

4.2.6 Photoluminescent System

4.2.6.1 Photoluminescent strips shall be not less than 0.075 m wide. Narrower strips may, however, be used if their luminance is increased proportionally to compensate for their width.

4.2.6.2 Photoluminescent materials shall provide at least 15 mcd/m² measured 10 minutes after the removal of all external illuminating sources. The system shall then continue to provide luminance values greater than 2 mcd/m² for 20 minutes.

4.2.6.3 Any photoluminescent system materials shall be provided with not less than the minimum level of ambient light necessary to charge the photoluminescent material to meet the above luminance requirements.

4.2.7 Electrically Powered Systems

4.2.7.1 Electrically powered systems shall be connected to the emergency switchboard so as to be powered by the main source of electrical power under normal circumstances and also by the emergency source of electrical power when the latter is in operation. For the purpose of calculating the capacity of the emergency source of electrical power the electrically powered systems shall be included in the list of emergency consumers.

4.2.7.2 Electrically powered systems shall either switch on automatically or be capable of being activated by means of a single operation at the steering position.

4.2.7.3 Where electrically powered systems are installed, the following standards of luminance shall be applied:

- .1 the active parts of electrically powered systems shall have a minimum luminance of 10 cd/m²;
- .2 the point sources of miniature incandescent lamps shall provide not less than 150 mcd mean spherical intensity with a spacing of not more than 0.1 m between lamps;
- .3 the point sources of light-emitting-diode systems shall have a minimum peak intensity of 35 mcd. The angle of half-intensity cone shall be appropriate to the likely track directions of approach and viewing. Spacing between lamps shall be no more than 0.3 m; and
- .4 for electroluminescent systems, these shall function for 30 minutes from the instant when the main power supply to which it was required to be connected according to 4.2.7.1 is disconnected.

4.2.7.4 All electrically powered systems shall be arranged so that the failure of any single light, lighting strip, or battery will not result in the marking being ineffective.

4.2.7.5 Electrically powered systems shall meet the requirements for vibration and heat testing. By way of exemption, the heat test may be conducted at a reference ambient temperature of 40 °C.

4.2.7.6 Electrically powered systems shall meet the electromagnetic compatibility requirements.

4.2.7.7 Electrically powered systems shall provide a type of minimum protection of IP 55 in accordance with IEC 60529:2014.

4.2.8 Final Acceptance, Operation Tests and Periodical Inspections

4.2.8.1 After water sprinkler system has been installed on board the vessel, it is subject to the final acceptance and operation tests to be performed by a recognized service station.

After a substantial modification or repair, the system is also subject to luminance tests.

4.2.8.2 During the vessel service, the system is subject to luminance tests to be performed by an expert/competent person at intervals not exceeding five years.

4.2.8.3 If during the luminance test, the luminance for a particular reading does not fulfil the requirements of this sub-chapter, readings shall be taken in at least ten locations equally spaced apart. If more than 30 % of the readings do not fulfil the requirements of the present sub-chapter, the low-location lighting system shall be replaced. If between 20 % and 30 % of the readings do not fulfil the requirements of the present sub-chapter, the low-location lighting system shall be checked again within one year.

4.2.8.4 Performance of the acceptance/luminance test shall be confirmed by the report to be made by a recognized service station which shall contain their signature Surveyor's report, containing his signature and the test date.

4.3 Explosive Gases and Carbon Monoxide Warning System

4.3.1 General Requirements

4.3.1.1 The system shall consist of sensors, sampling devices, warning equipment and pipes.

The system shall be approved by an authorized institution.

4.3.1.2 Gas warning shall be given at the latest when reaching or exceeding one of the following values:

- .1 10 % lower explosion limit of a propane-air mixture; and
- .2 30 ppm CO (carbon monoxide).

4.3.1.3 The time until activation of the alarm for the whole system must not exceed 20 s.

4.3.1.4 The limit values, listed in 4.3.1.2, and alarm activation time must not be adjustable.

4.3.1.5 The test gas production shall be so designed that any interruption or obstruction is detected. Any falsification due to air admission or loss of test gas as a consequence of leakage shall be avoided or detected and reported.

4.3.1.6 The system shall be designed for temperatures ranging from – 10 to 40° C and an air humidity ranging from 20 to 100 %.

4.3.1.7 The gas warning system must be self-monitoring. It shall be impossible to switch off the system unauthorised.

4.3.1.8 The gas warning system supplied by the onboard power supply network shall be buffered against power failure. Battery-powered appliances shall be provided with a warning device indicating a reduction of the battery voltage.

4.3.2 Detection and Alarm Equipment

4.3.2.1 The equipment shall consist of an evaluation/processing and display unit.

4.3.2.2 The alarm indicating that the limit values given in 4.3.1.2 have been reached or exceeded shall be given optically and acoustically, both in the room monitored and in the wheelhouse or at any other permanently manned location. It shall be clearly visible and audible even in operating conditions with the highest noise level. It shall be clearly distinguishable from any other acoustic and optical signals in the room to be protected. The acoustic alarm shall also be clearly audible with closed connecting doors at the entrances and in neighbouring rooms. The acoustic alarm may be silenced after activation, the optical alarm may only be cancelled if the limit values fall below those given in 4.3.1.2.

4.3.2.3 It shall be possible to separately detect and clearly assign the reports indicating that the limit values given in 4.3.1.2.1 and 4.3.1.2.2 have been reached or exceeded.

4.3.2.4 If the appliance has a special status (start-up, failure, calibration, parameterisation, maintenance etc.), this shall be indicated. The failure of the whole system or one of the components shall be indicated by an alarm in analogy to 4.3.2.2. The acoustic alarm may be silenced after activation, the optical alarm may only be cancelled if the failure is removed.

4.3.2.5 If it is possible to issue different reports (limit values, special status), it shall also be possible to discern them separately and to assign them clearly. If necessary, a collective signal shall be displayed indicating that it is not possible to issue all reports. In this case, the reports shall be issued by order of priority, beginning with the report with the highest safety relevance. The

display of the reports which cannot be issued shall be possible by pressing a button. The order of priority shall be evident from the documentation of the appliance.

4.3.2.6 The equipment shall be so designed that unauthorised interference is not possible.

4.3.2.7 In all cases where detection and alarm equipment are used, the control alarm unit and indicating device shall be operable from outside the spaces containing the gas storage and consuming appliances.

4.3.3 Sensors/Sampling Devices

4.3.3.1 In every room with consuming appliances, sensors of the gas warning equipment shall be provided in the vicinity of these appliances. The sensors/sampling devices shall be installed in such a way that gas accumulation is detected before the limit values given mentioned in 4.3.1.2 are reached. The arrangement and installation of the sensors shall be documented. The selection of the locations shall be substantiated by the manufacturer or the specialised firm installing the equipment. The pipes of the sampling devices should be as short as possible.

4.3.3.2 The sensors shall be easily accessible in order to enable regular calibration, maintenance and safety checks.

4.3.4 Installation Requirements

4.3.4.1 The whole gas warning equipment shall be installed by a specialised firm.

4.3.4.2 For the installation, the following aspects shall be taken into consideration:

- .1 local ventilation systems;
- .2 structural arrangements (design of walls, partitions, etc.) facilitating or complicating the accumulation of gases; and
- .3 prevention of adverse effects due to mechanical damage, water or heat damage.

4.3.4.3 All pipes of the sampling devices shall be arranged in such a way that condensate formation is not possible.

4.3.4.4 The installation shall be effected in such a way that any unauthorised tampering is not possible.

4.3.5 Acceptance, Calibration and Periodical Inspections

4.3.5.1 After installation on board, the gas warning system is subject to acceptance and calibration by a **an expert / competent person*** in accordance with the manufacturer's recommendations.

After each substantial modification or repair, the system is also subject to the inspection and calibration.

4.3.5.2 During the vessel service, the warning systems are subject to inspections and calibration to be performed by a recognized service station at regular intervals as recommended by the system manufacturer.

* Expert / competent person - this is a representative of a service company specializing in gas warning systems, with the manufacturer's approval / authorization or qualifications confirming the competences, issued by the local Gas Office

4.3.5.3 Performance of the final acceptance/calibration shall be confirmed by the report to be made by an expert/competent person which shall contain their signature and the inspection date.

4.3.5.4 Elements of the gas warning equipment with limited lifespan shall be replaced in due time before the expiry of the expected lifespan specified by the manufacturer.

4.3.6 Marking

4.3.6.1 All appliances shall show at least the following clearly legible and indelible information:

- .1 name and address of the manufacturer;
- .2 legal marking;
- .3 designation of series and type;
- .4 if possible, serial number;
- .5 if required, any advice indispensable for safe use; and
- .6 for each sensor, the indication of the calibration gas.

4.3.6.2 Elements of the gas warning equipment with limited restricted lifespan shall be clearly marked as such.

4.3.7 Required Information to be Submitted by Manufacturer

The warning system, accompanied with the below documentation, shall be submitted by manufacturer. The documentation shall contain the following:

- .1 complete instructions, drawings and diagrams concerning the safe and proper operation, as well as the installation, starting-up and maintenance of the gas warning system;
- .2 operating instructions containing at least:
 - measures to be taken in the case of an alarm or error indication;
 - safety measures in the case of non-availability (e.g. calibration, inspection, interruption); and
 - persons responsible for installation and maintenance;
- .3 instructions for calibration before the starting-up, and for routine calibration, including time intervals to be followed;
- .4 supply voltage;
- .5 type and meaning of the alarms and displays (e.g. special status);
- .6 information concerning the detection of operating difficulties and the removal of faults;
- .7 type and scope of the replacement of components with limited lifespan; and
- .8 type, scope and time interval of the inspections.

5 FIRE-FIGHTING EQUIPMENT

5.1 General Requirements

5.1.1 Fire-fighting equipment shall be located in easily accessible positions, preferably at the entrance to the space and shall be suitably marked with symbols used in ship fire protection.

5.1.2 Fire-fighting equipment shall be kept in good working condition and shall be available for immediate use at all times. The equipment shall not be used for purposes other than fire-fighting.

5.1.3 Fire-fighting equipment shall be of the type approved by PRS or the Flag State Administration.

5.2 Portable and Mobile Fire-Extinguishers

5.2.1 Portable fire-extinguishers used in vessels shall fulfil the requirements of European standard PN-EN 3-7: 2008 and PN-EN 3-8: 2022.

5.2.2 As portable fire-extinguishers, only dry powder fire-extinguishers with a content of at least 6 kg or equivalent fire-extinguishers with at least the same extinguishing capacity may be used. These extinguishers shall be capable of extinguishing Class A, B and C fires and extinguishing fires in live electrical systems of up to 1000 V.

On vessels not fitted with gas fuel systems, 9-litre foam fire extinguishers with foam concentrate AFFF-AR up to -20°C frost resistant may be used as equivalent extinguishers.

On vessels of a length $L \leq 20$ m other than pushers, tugs and ice-breakers, dry powder fire extinguishers having a capacity 2 kg are permitted.

5.2.3 Additionally, powder, water or foam fire-extinguishers may be used as ones suitable for at least the group of fire most likely to occur in the space for which they are intended.

5.2.4 Portable fire-extinguishers with CO₂ as the extinguishing agent may be used only for extinguishing fires in galleys and electrical installations. Having regard to health hazard for persons present in the space, the content of these fire-extinguishers shall be not more than 1 kg per 15 m³ of the space in which they are made available for use.

5.2.5 Fire-extinguishers are subject to periodical inspections to be performed by a recognized service stations at intervals not exceeding 2 years, see paragraph 1.3.6.

The inspection performance shall be confirmed by a maintenance label containing an authorised person's signature and the inspection date.

On Polish vessels, fire-extinguishers inspections shall be performed at intervals not exceeding 12 months.

5.2.6 If fire-extinguishers are so installed that they are out of sight, the panel covering them shall be identified by a square sign – pictograph “Fire-extinguisher”, having the sides length of at least 10 cm, representing a fire-extinguisher symbol used in fire protection. The fire-extinguisher symbol – in white shall be presented on a red background (see *Annex* to ES-TRIN, Fig.3).

5.2.7 Fire-extinguishers shall be so located and arranged on the vessel as to be immediately ready for use in the event of fire in any place on the vessel and at any time.

In addition, fire-extinguishers shall be installed in such a way that their effectiveness will not be impaired due to weather conditions, vibrations or other external factors.

5.2.8 In vessels operating in wintertime, fire-extinguishers shall be stowed in heated spaces so as to preclude the possibility of freezing.

5.2.9 Each fire-extinguisher shall be fitted with a device or a cotter pin and a seal, the breaking of which will indicate that the fire-extinguisher has been used and is, or maybe, discharged.

5.2.10 Mobile fire-extinguishers are wheeled extinguishers with at least 20 kg extinguishing media capacity, provided with an actuating device containing propellant gas which allows immediate and independent fire-extinguishing operation.

Mobile fire-extinguishers may, subject to PRS' consent, be used as an alternative fire arrangement for fire-extinguishing equipment required by the present *Part* of the *Rules*.

5.3 Breathing Apparatus

5.3.1 Types of breathing apparatus:

- a breathing apparatus (self-contained) – an apparatus which supplies the person wearing it when working in a dangerous atmosphere with breathing air by means of pressurized air container carried with him;
- breathing apparatus (ambient air-dependent) – an apparatus which protects the person wearing it when working in a dangerous atmosphere by means of a suitable filter;
- escape breathing device – a respiratory protection device, designed to cover the wearer’s mouth, nose and eyes, which can be easily put on and which serves to escape from a danger area.

5.3.2 The requirements regarding the number of breathing apparatus on the vessel are given in Chapter 6.

5.4 Vessel Fire-Fighting Equipment

5.4.1 The summary of the requirements regarding fire-fighting equipment for vessels intended to be assigned with the main symbol of class is given in Table 5.4.1.

Table 5.4.1
Vessel fire-fighting equipment

Item	Equipment	Number and arrangement
1	Fire hose with fittings and nozzle for the water fire main	equal to the number of the vessel’s hydrant valves
2	6 kg powder fire-extinguishers or equivalent, intended for extinction of A, B and C groups of fires, as well as electrical equipment operating under voltage	a) in accommodation area – one fire-extinguisher; b) in a space containing heating, cooking or other equipment fired on solid, liquid or gas fuel – one fire-extinguisher; c) in engine-room and boiler room: <ul style="list-style-type: none"> – one fire-extinguisher in the space with engines of the total power output less than 375 kW; – two fire-extinguishers for the space with engines of the total power output greater than 375 kW but less than 750 kW; – three fire-extinguishers for the space with engines of the total power output exceeding 750 kW and one further fire-extinguisher for each additional 750 kW or part thereof; d) at access to store-room or at the doors of box/cabinet for the storage of flammable liquids – one fire-extinguisher.

Item	Equipment	Number and arrangement
3	2 kg dry-powder fire-extinguishers, or equivalent, intended for the extinguishing of A, B and C groups of fires as well as live electrical equipment	To be used on vessels of a length $L \leq 20$ m, other than pushers, tugs and ice-breakers. The minimum number of fire extinguishers is dependent on the length of ship L and takes the following values: a) $L \leq 10$ m – (1 + s) extinguishers; b) $10 \text{ m} < L \leq 15$ m – (2 + s) extinguishers; c) $15 \text{ m} < L \leq 20$ m – (3 + s) extinguishers, where „s” represents the number of additional extinguishers depending on the output of propulsion engines, as follows: one fire extinguisher for engines of an output 50 ÷ 100 kW and additional one more for an output exceeding 100 kW. The additional fire extinguishers shall be spaced equally in conspicuous and readily accessible positions. Application of a different number of extinguishers is permitted if at least the equivalent fire-extinguishing capability is maintained in the case of extinguishers with a capacity exceeding 2 kg.
4	5 kg carbon dioxide fire-extinguishers (CO ₂)	a) in the wheelhouse – one fire-extinguisher; b) in the galley considered as a separate room – one fire-extinguisher; c) in space containing electrical equipment – one fire-extinguisher.
5	Mobile fire-extinguisher	in vessels with diesel engines of the total power output exceeding 1000 kW navigating in zone 1 – one pc.
6	10 l bucket with a line	on deck – one pc.
7	Fire blanket	a) in engine room or boiler room, permanently manned – one pc. b) in the galley considered as a separate room – one pc.
8	Crowbar and fire axe	within accommodation spaces – 1 set, required on vessels of a length $L > 15$ m
9	Fire axe	within accommodation spaces – 1 piece, required on vessels of a length $L \leq 15$ m
10	Fire gloves	In engine room and in the wheelhouse – 1 piece in each room

5.4.2 The requirements regarding the arrangement of fire-fighting equipment on vessels to be assigned additional mark in the symbol of class are specified in Chapter 6.

6 ADDITIONAL REQUIREMENTS

The requirements specified in this Chapter apply to vessels to be assigned additional mark in the symbol of class. These requirements shall be considered as supplementary ones to the relevant mandatory requirements for all vessel types specified in chapters 1, 2, 3, 4, 5 and 7.

6.1 Passenger Vessels – Mark: pas

6.1.1 Construction of Passenger Accommodation Spaces

6.1.1.1 The accommodation spaces shall be separated from engine rooms, boiler rooms and holds by gastight bulkheads¹⁾ and shall be directly accessible from the deck. If no such access has been provided, an emergency exit shall also lead directly to the deck.

¹⁾ Bulkheads gastightness is subject to acceptance of PRS surveyor supervising the vessel’s construction/reconstruction, according to an agreed survey and test programme submitted by the executor.

6.1.1.2 The following passenger areas shall be divided into main fire zones by fire divisions of at least A-0 Class standard having the fire integrity in accordance with 6.1.2:

- .1 passenger areas with a total surface area of more than 800 m²;
- .2 passenger areas in which there are passenger cabins, at intervals of not more than 40 m.

The fire divisions shall be smoke-tight under normal operating conditions and shall extend from deck to deck.

6.1.1.3 Air spaces behind ceilings, panellings, linings or under floors shall be divided by draught stops made of non-combustible materials and spaced not more than 14 m apart, which, in the event of fire, provide an effective fireproof seal.

6.1.1.4 Deck areas which are bounded by tents or other portable objects not only from the top but also completely or partially on their sides shall fulfil the same requirements as those for enclosed passenger spaces.

6.1.2 Fire Integrity of Bulkheads and Decks

6.1.2.1 The minimum fire integrity of vertical or horizontal divisions separating adjacent spaces which are not fitted with automatic sprinkler system shall be in accordance with Table 6.1.2-1; the minimum fire integrity of bulkheads separating adjacent spaces fitted with automatic sprinkler system complying with the requirements specified in 3.4 or 3.5 shall be in accordance with Table 6.1.2-2.

6.1.2.2 Bulkheads/walls forming B Class fire divisions shall extend from deck to deck or end at a continuous ceiling, which fulfils the same requirements as those specified for bulkheads/walls contained in Tables 6.1.2-1 or 6.1.2-2.

6.1.2.3 All openings in A and B Class divisions shall be provided with closures of fire integrity not lower than that of the division they are fitted in.

Table 6.1.2-1

Fire integrity of bulkheads separating adjacent spaces not fitted with sprinkler system

Spaces	Control stations	Stairways and lift trunks	Muster areas	Accommodation spaces	Engine rooms	Galleys	Store-rooms
Control stations	–	A-0	A-0/ B-15 ¹⁾	A-30	A-60	A-60	A-30/ A-60 ⁵⁾
Stairways and lift trunks		–	A-0	A-30	A-60	A-60	A-30
Muster areas				A-30 /B-15 ²⁾	A-60	A-60	A-30/ A-60 ⁵⁾
Accommodation spaces				-/A0/ B-15 ³⁾	A-60	A-60	A-30
Engine rooms					A-60/ A-0 ⁴⁾	A-60	A-60
Galleys						A-0	A-30/ A-60 ⁶⁾
Store-rooms							–

Table 6.1.2-2
Fire integrity of bulkheads separating adjacent spaces fitted with sprinkler system

Spaces	Control stations	Stairways and lift trunks	Muster areas	Accommodation spaces	Engine rooms	Galleys	Store-rooms
Control stations	–	A-0	A-0/ B-15 ¹⁾	A-0	A-60	A-30	A-0 A-30 ⁵⁾
Stairways and lift trunks		–	A-0	A-0	A-60	A-30	A-0
Muster areas			–	A-30/ B-15 ²⁾	A-60	A-30	A-0 A-30 ⁵⁾
Accommodation spaces				-/B-15/ B-0 ³⁾	A-60	A-30	A-0
Engine rooms					A-60/ A-0 ⁴⁾	A-60	A-60
Galleys						–	A-0 B-15 ⁶⁾
Store-rooms							–

where:

- 1) **Partitions** between control stations and internal muster areas shall be of A-0 Class standard, but between external muster areas only of B15 Class standard.
- 2) **Partitions** between accommodation spaces and internal muster areas shall be of A-30 Class standard, but between external muster areas only of B15 standard.
- 3) **Partitions** between adjacent cabins, **partitions** between cabins and corridors and **vertical partitions** separating accommodation spaces shall be of B-15 Class standard; for spaces fitted with sprinkler systems – B-0 Class standard is sufficient. **Partitions between cabins and saunas shall comply with type A-0, but for rooms that are fitted with sprinkler systems, they shall comply with type B-15.**
- 4) **Partitions** between engine-rooms shall be of A-60 Class standard; in other cases – Class A-0 is sufficient.
- 5) **Partitions** between store-rooms for flammable liquids and control stations and assembly stations shall be of A-60 Class standard, whereas for spaces fitted with automatic sprinkler system – A-30 Class standard.
- 6) B-15 Class standard is sufficient for **partitions** between galleys and cold-storage rooms and food store-rooms.

6.1.2.4 Penetrations for the passage of electric cables, pipes or vent ducts through A and B Class divisions shall have an appropriate construction and shall not impair the fire integrity of that division.

6.1.2.5 In the case of steel and aluminium structures, the insulation of decks or bulkheads regarded as A Class or B Class fire divisions shall extend past the penetration, intersection or terminal point for a distance of at least 450 mm.

6.1.2.6 A and B Class divisions, as well as structural elements installed in these divisions, i.e. doors, windows, fire dampers, pipes, ventilation ducts and cables penetrations are subject to tests in accordance with the requirements of the *FTP Code*, Annex 1, Part 3 or equivalent regulations of one of the Member States.

PRS or another institution conducting the vessel survey may, in accordance with the *FTP Code* provisions, demand a test on a sample bulkhead to be performed to verify compliance with the above requirements for fire integrity and temperature increase.

6.1.2.7 Performance of the test shall be confirmed by test report issued by an accredited institution, i.e. testing laboratory/institution which complies with the requirements of the *FTP Code* or EN 17025: 2017 concerning the general requirements for the competence of testing and calibration laboratories.

6.1.3 Doors in Fire Divisions

6.1.3.1 Doors in fire divisions shall have the same fire integrity as the bulkhead in which they are installed.

6.1.3.2 Doors in fire divisions, as well as doors in bulkheads enclosing engine rooms, galleys, stairways and lifts shall be self-closing.

6.1.3.3 Self-closing doors which remain open in normal operation shall be such that they can be remotely closed from a control station or location permanently manned by crew members. Once a door has been remotely closed, it shall be possible to reopen and close it safely on the spot.

6.1.3.4 Watertight doors considered as fire divisions need not be insulated.

6.1.4 Stairs and Lifts in Accommodation Area

6.1.4.1 Stairs shall be made of steel or a steel equivalent material.

6.1.4.2 Internal stairs and lifts shall be enclosed at all levels by fire divisions having the fire integrity corresponding to the category of adjacent spaces in accordance with sub-chapter 6.1.2.

6.1.4.3 A staircase connecting only two decks does not need to be enclosed if on one of the decks the staircase is enclosed with divisions having appropriate fire integrity in accordance with 6.1.2.

6.1.4.4 In accommodation spaces, stairs and lifts need not be enclosed if they are located entirely within the interior of the space, and:

- .1 if this space extends over only two decks, or;
- .2 if the space is fitted with automatic sprinkler system complying with the requirements given in 3.4 or 3.5, a smoke extraction system complying with the requirements given in 6.1.8.3 and provision has been made for access on all decks to the stairs and lifts.

6.1.5 Materials for Furnishing of Spaces

6.1.5.1 The following materials /components of equipment are subject to tests in accordance with the procedures specified in the given below Parts of the *FTP Code*:

- .1 non-combustible materials – Annex 1, Part 1;
- .2 low flame-spread materials - Annex 1, Part 5;
- .3 primary deck coverings - Annex 1, Part 6;
- .4 suspended textile materials and foils - Annex 1, Part 7;
- .5 upholstered furniture - Annex 1, Part 8;
- .6 bedding components - Annex 1, Part 9.

6.1.5.2 In lieu of the *FTP Code* requirements, the above-mentioned materials/components may comply with the equivalent regulations of one of the EU Member States.

6.1.5.3 The suitability for fire protection of materials and components shall be established by an accredited test institution, i.e. testing laboratory/ institution in a test report. This institution shall satisfy the requirements of the *FTP Code* and standard EN 17025: 2017 concerning the general requirements for the competence of testing and calibration laboratories.

6.1.5.4 Insulation materials of walls and decks, as well as pipes and ventilating ducts, except coolant-carrying pipes in accommodation spaces shall be non-combustible. The surfaces of the insulation materials used on these pipes shall have low flame-spread characteristics.

In justified cases, the use of combustible insulation materials is permitted, provided that the surfaces of the insulation materials are covered with a non-combustible board or plate.

6.1.5.5 Ceilings and wall claddings, including their substructures in accommodation spaces not fitted with automatic sprinkler system shall be constructed from non-combustible materials, with the exception of their surfaces whose materials may have low flame-spread characteristics. This requirement does not apply to saunas.

6.1.5.6 Furniture and fittings in accommodation spaces which serve as muster areas shall, where these spaces are not fitted with automatic sprinkler system, be manufactured from non-combustible materials.

6.1.5.7 Carpets, fabrics, curtains and other hanging textile materials, as well as upholstered furniture and components of bedding in accommodation spaces not fitted with automatic sprinkler system shall have low flame-spread characteristics.

6.1.5.8 Paints, varnishes and other surface treatment products, as well as deck coverings used in enclosed spaces, except engine rooms and store-rooms shall have low flame-spread characteristics.

6.1.5.9 Paints, varnishes and other materials used on exposed internal areas shall not produce excessive amounts of smoke or toxic substances. This shall be determined in accordance with the *FTP Code*.

6.1.5.10 Tents or other portable objects which form complete or partial boundaries of the passenger deck areas as well as deck foundation shall have low flame-spread characteristics.

6.1.6 Ventilation System

6.1.6.1 Ventilation system shall be so designed as to ensure that it does not cause the spread of fire and smoke in the event of fire.

6.1.6.2 Openings for air intake and extraction located on open deck shall be fitted with closing appliances.

6.1.6.3 Ventilation ducts shall be made from steel or an equivalent non-combustible material and be securely connected to each other and to the vessel structure.

6.1.6.4 When ventilation ducts with a cross-section of more than 0.02 m² pass through A Class divisions, they shall be fitted with automatic fire dampers which can be operated from a location permanently manned by crew members.

6.1.6.5 Ventilation systems for galleys and engine rooms shall be separated from ventilation systems which supply other areas.

6.1.6.6 Air extraction ducts shall be provided with lockable openings for inspection and cleaning. These openings shall be located close to the fire dampers.

6.1.6.7 Provision shall be made for engine room ventilation system fans to be switched off from a control station located outside the engine room.

6.1.7 Means of Escape and Exits within Passenger Accommodation Spaces

6.1.7.1 Exits of passengers spaces shall fulfil the following requirements:

- .1 spaces or groups of spaces designed or arranged for 30 or more passengers or including berths for 12 or more passengers shall have at least two exits. On day trip vessels, one of these two exits can be replaced by two emergency exits. Accommodation spaces, except individual passenger cabins, as well as groups of spaces having one exit only, shall be provided with at least one emergency exit;
- .2 if spaces are located below the bulkhead deck, one of the exits can be a watertight bulkhead door leading into an adjacent compartment from which the upper deck can be reached directly. The other exit or emergency exit – if permitted in accordance with .1 – shall lead directly to the open deck or to the bulkhead deck. This requirement does not apply to individual cabins;
- .3 exits, listed in .1 and .2, shall be suitably arranged and shall have a clear width of at least 0.8 m and also a clear height of at least 2 m. For doors of passenger cabins and other small rooms, the clear width can be reduced to 0.7 m;
- .4 in the case of spaces or groups of spaces intended for more than 80 passengers, the sum of the widths of all exits intended for passengers and which shall be used by them in an emergency shall be at least 0.01 m per passenger;
- .5 if the total width of the exits is determined by the number of passengers, the width of each exit shall be at least 0.005 m per passenger;
- .6 emergency exits (manholes) shall have a shortest side at least 0.6 m long or a minimum diameter of 0.7 m. They shall open in the direction of escape and be marked on both sides;
- .7 exits of spaces intended for use by persons with reduced mobility shall have a clear width of at least 0.9 m. Exits normally used for embarking and disembarking people with reduced mobility shall have a clear width of at least 1.5 m.

6.1.7.2 Doors of passenger spaces shall comply with the following requirements:

- .1 with the exception of doors leading to connecting corridors, they shall be capable of opening outwards or be constructed as sliding doors;
- .2 cabin doors shall be made in such a way that they can also be unlocked from the outside at any time;
- .3 powered doors shall open easily in the event of failure of the power supply to this mechanism;
- .4 for doors intended for use by persons with reduced mobility, there shall be from the direction from which the door opens, a minimum clearance of 0.6 m between the inner edge of the doorframe on the lock side and an adjacent perpendicular wall.

6.1.7.3 Connecting corridors of passenger spaces shall comply with the following requirements:

- .1 they shall have a clear width of at least 0.8 m. If the corridors lead to spaces intended for more than 80 passengers, they shall fulfil the requirements specified in 6.1.7.1.4 and 6.1.7.1.5 regarding the width of exits leading to connecting corridors;
- .2 they shall have a clear height of at least 2 m;
- .3 connecting corridors intended for use by persons with reduced mobility shall have a clear width of 1.3 m. Connecting corridors more than 1.50 m wide shall have handrails on either side;
- .4 where a part of the vessel or a space intended for passengers is served by a single connecting corridor, the clear width thereof shall be at least 1 m;
- .5 connecting corridors shall be free of steps;
- .6 they shall lead only to open decks, spaces or stairways;
- .7 dead ends in connecting corridors shall be not longer than two meters.

6.1.7.4 Additionally, escape routes in passenger area shall fulfil the following requirements:

- .1 stairways, exits and emergency exits shall be so disposed that, in the event of a fire in any given area, the other areas may be evacuated safely;
- .2 the escape routes shall lead by the shortest route to evacuation areas;
- .3 escape routes shall not lead through engine rooms or galleys. In vessels with the length not exceeding 45 m and a maximum number of passengers not exceeding the vessel length in whole metres, one escape route may lead through a galley, provided that a second means of escape is also provided;
- .4 there shall be no rungs, ladders or the like installed at any point along the escape routes;
- .5 doors to escape routes shall be constructed in such a way as not to reduce the minimum width of the escape route;
- .6 escape routes and emergency exits shall be clearly signed. The signs shall be lit by the emergency lighting system.

6.1.7.5 Escape routes and emergency exits shall be fitted with safety guidance system (low-location lighting system) complying with the requirements specified in 4.2.

6.1.7.6 Stairs and their landings in the passenger areas shall fulfil the following requirements:

- .1 they shall be constructed in accordance with standard EN 13056: 2002;
- .2 they shall have a clear width of at least 0.8 m or, if they lead to connecting corridors or areas used by more than 80 passengers, at least 0.01 m per passenger;
- .3 they shall have a clear width of at least 1.0 m if they provide the only means of access to a space intended for passengers;
- .4 where there is not at least one staircase on each side of the vessel in the same space, they shall lie in the safe area;
- .5 in addition, stairs intended for use by persons with reduced mobility shall comply with the following requirements:
 - .1 the gradient of the stairs shall not exceed 38°;
 - .2 the stairs shall have a clear width of at least 0.9 m;
 - .3 spiral staircases are not allowed;
 - .4 the stairs shall not run in a direction transverse to the vessel;
 - .5 the handrails of the stairs shall extend approximately 0.3 m beyond the top and bottom of the stairs without restricting traffic routes;
 - .6 handrails, front sides of at least the first and the last step, as well as the floor coverings at the ends of the stairs shall be colour highlighted.

Lifts or lifting equipment, such as stair lifts or lifting platforms intended for persons with reduced mobility shall be constructed according to a relevant standard or regulations of one of the EU Member States.

6.1.8 Fire Protection of the Vessel Spaces

6.1.8.1 Accommodation spaces not constantly supervised by crew members, galleys, engine rooms and other rooms presenting a fire risk shall be fitted with fire alarm system, complying with the requirements specified in sub-chapter 4.1. The existence of a fire and its exact whereabouts shall be automatically displayed in the wheelhouse or other control station permanently manned by crew members.

6.1.8.2 Fire protection in accommodation spaces, other crew spaces and control stations shall be provided only by suitable automatic sprinkler system, complying with the requirements given in 3.4 or 3.5 – in such case, fire integrity of walls separating adjacent spaces may be reduced in accordance with Table 6.1.2-2.

6.1.8.3 Control stations, stairways, lift trunks and internal evacuation areas shall be fitted with natural or mechanical smoke extraction systems. Smoke extraction systems shall satisfy the following requirements:

- .1 they shall offer sufficient capacity and reliability;
- .2 they shall comply with the operating conditions for passenger vessels;
- .3 if smoke extraction systems also serve as general ventilators for the rooms, this shall not hinder their function as smoke extraction systems in the event of a fire;
- .4 smoke extraction systems shall have a manually operated triggering device;
- .5 mechanical smoke extraction systems shall additionally be such that they can be operated from a location permanently manned by crew members;
- .6 natural smoke extraction systems shall be fitted with an opening mechanism, operated either manually or by a power source inside the extraction system;
- .7 manually operated triggering devices and opening mechanisms shall be accessible from inside or outside the space being protected.

6.1.8.4 Engine rooms and boiler rooms shall be provided with fire alarm system complying with the requirements given in 4.1. The existence of a fire and its exact whereabouts shall be automatically displayed in the wheelhouse or other control station permanently manned by crew members.

6.1.8.5 Engine rooms and boiler rooms shall be fitted with a fixed fire-extinguishing system complying with the requirements given in 3.3.

6.1.8.6 Galleys shall be fitted with ventilation systems and stoves with extractors. The air extraction ducts of the extractors shall satisfy the requirements given in 6.1.6 and additionally, be fitted with manually operated fire dampers at the inlet openings.

6.1.9 Appliances Affording Fire Risk

6.1.9.1 The following items of equipment are prohibited on passenger vessels:

- .1 vaporising oil-burner stoves, listed in 7.1.4;
- .2 solid fuel heaters, listed in 7.2;
- .3 devices fitted with wick burners, listed in 7.1.2.2;
- .4 liquefied gas devices, listed in 7.3.

6.1.9.2 In vessels of the length not exceeding 45 m, the use of liquefied gas devices may be permitted, provided the vessel spaces are fitted with explosive gases and carbon dioxide warning system complying with the requirements of 4.3.

6.1.10 Water Fire Main System

6.1.10.1 Each passenger vessels shall be provided with water fire main system complying with the requirements set forth in 3.2 and additionally with the requirements of the present sub-chapter.

6.1.10.2 The water fire main system shall consist of:

- .1 two motor-driven fire-extinguishing pumps of sufficient capacity, at least one of which is permanently installed;
- .2 one fire extinguisher line with a sufficient number of hydrants with permanently connected fire hoses at least 20 m in length and fitted with nozzles capable of producing both a mist and a jet of water and incorporating a shut-off valve.

6.1.10.3 The fire pumps shall:

- .1 be installed or housed in separate rooms;
- .2 be such that they can be operated independently of each other;
- .3 each pump be capable, on all decks, of maintaining the necessary pressure at the hydrants and achieving the required length of water jet;
- .4 be installed forward of the aft bulkhead.

6.1.10.4 The water fire main system shall be so designed and dimensioned that:

- .1 any point of the vessel can be reached from at least two hydrants in different places, each with a single hose length of not more than 20 m;
- .2 the pressure at the hydrants is at least 0.3 MPa; and
- .3 on all decks a water jet length of at least 6 m can be attained.

If a hydrant box is provided for the storage of fire hoses with nozzles, a square standardised sign – pictograph “Fire hose”, having the sides length of at least 10 cm, representing a fire hose symbol used in fire protection shall be affixed to the outside of the box. The fire hose symbol – in white shall be presented on a red background (see *Annex* to ES-TRIN, Fig. 5).

6.1.10.5 Hydrant valves with screw threads or cocks shall be such that they can be set so that each of the fire hoses can be separated and removed during operation of the fire pumps.

6.1.10.6 Fire hoses in the internal area shall be rolled up on an axially connected reel.

6.1.10.7 Materials for fire-fighting equipment shall either be heat-resistant or shall be suitably protected against failure to work when subjected to high temperatures.

6.1.10.8 In vessels operating in winter times, pipes and hydrants shall be suitably protected against freezing.

6.1.11 Fire-Fighting Equipment

6.1.11.1 In addition to fire-extinguishers, required in 5.2, each passenger vessel shall be provided with:

- .1 one fire-extinguisher for every 120 m² of gross floor area in passenger areas;
- .2 one fire-extinguisher for every group of 10 cabins, rounded upwards;
- .3 one fire-extinguisher in each galley and in the vicinity of any space in which flammable liquids are stored or used. In galleys, the extinguishing agent shall also be suitable for fighting fat fires (group F fires);
- .4 fire blankets in every galley, hairdressing salons and perfumeries.

6.1.11.2 All vessels with overnight cabins and vessels of a length L exceeding 20 m with overnight cabins under the main deck, engaged on voyages in waters administered by the Maritime Office Director shall also be provided with:

- .1 two self-contained breathing apparatus sets in accordance with European standard EN 137: 2008, with full-face masks in accordance with European standard EN 136: 2008;
- .2 two sets of equipment consisting of at least a protective suit, helmet, boots, gloves, axe, crowbar, torch and safety-line;
- .3 four escape breathing devices.

6.1.11.3 For cabin vessels not exceeding 45 m in length, fire-fighting equipment, listed in 6.1.11.2, is not required, provided that escape breathing devices in a number corresponding to the number of berths are readily accessible in each cabin.

6.1.12 Safety Documentation

6.1.12.1 The vessel shall be provided with *Safety Rota*, *Safety Plan* and a *Code of Conduct for Passengers*.

6.1.12.2 The *Safety rota* shall define the duties of the crew and the shipboard personnel in the following circumstances:

- .1 a breakdown;
- .2 fire on board;
- .3 evacuation of passengers;
- .4 person overboard.

The crew members and shipboard personnel designated in the *Safety Rota* shall be assigned their various duties, depending on the posts they occupy. In particular, the *Safety Rota* shall contain instructions on the operation of fire-fighting equipment, proceedings to be followed in the event of fire and evacuation procedures. Special instructions to the crew shall be given in the *Safety Rota* to ensure that, in the event of emergency, all doors and openings in the watertight bulkheads will be hermetically closed immediately.

Specific safety measures for persons with reduced mobility shall be taken into consideration in the *Safety rota*.

6.1.12.3 The *Safety Rota* shall comprise the *Fire Control Plan* which shall specify the following:

- .1 areas intended for use by persons with reduced mobility;
- .2 escape routes, emergency exits and muster and evacuation areas;
- .3 life-saving equipment and ship's boats;
- .4 fire-extinguishers and fire-extinguishing systems and automatic sprinkler systems;
- .5 other safety equipment;
- .6 the alarm system to alert passengers;
- .7 the alarm system to alert passengers and the crew;
- .8 the watertight bulkhead doors, and the position of their controls, as well as the other openings;
- .9 doors in fire divisions;
- .10 fire dampers;
- .11 fire alarm system;
- .12 emergency power plant;
- .13 ventilation system control units;
- .14 shore connections;
- .15 fuel line shut-offs;
- .16 liquefied gas installations;
- .17 public address system;
- .18 radiotelephone equipment;
- .19 first-aid kits.

On vessels engaged on international voyages, the required information shall be written in the Flag State language as well as in Dutch, English, French and German

6.1.12.4 The *Safety rota* and the *Fire Control Plan* shall be:

- .1 approved by PRS or another institution conducting the vessel survey;
- .2 prominently displayed in easily accessible and visible place on each deck.

6.1.12.5 A *Code of conduct for passengers* and the *Safety plan* (in a simplified form) shall be posted up in each passenger cabin and shall contain the information, referred to in paragraph in 6.1.12.3, sub-paragraphs from .1 to .6.

The *Code of conduct for passengers* shall include at least:

- .1 designation of emergencies, such as fire, flooding, general hazard;
- .2 description of the various alarm signals;
- .3 instructions concerning the escape routes and what to do need to keep calm;
- .4 instructions concerning smoking, use of fire and naked flame, opening windows, use of certain items of equipment (electrical).

The required information shall be written in the language of the Flag State, as well as in Dutch, English, French and German.

6.1.13 Vessel Adaptation for the Needs of Persons with Reduced Mobility

6.1.13.1 General Requirements

6.1.13.1.1 Persons with reduced mobility – anyone who, as a result of physical impairments, cannot move or distinguish their surroundings in the same way as other passengers. This definition includes persons with impaired eyesight or hearing or persons accompanying children in buggies or being carried. Persons with reduced mobility do not include anyone with psychic impairments.

6.1.13.1.2 To ensure suitable area for persons with reduced mobility, there shall be determined the maximum number of persons with reduced mobility for the vessel. The number of such passengers shall be determined by the Shipowner on the basis of service experience in a given operating area.

6.1.13.1.3 Areas provided for use by persons with reduced mobility range from, in the simplest case, the entrance area to the places from which an evacuation will take place in an emergency. They shall include:

- .1 cabins (in cabin vessels);
- .2 seats;
- .3 a place where life-saving equipment is stowed or issued in an emergency;
- .4 a suitably-adapted toilet;
- .5 connecting corridors.

6.1.13.1.4 In areas intended for persons with reduced mobility, adequate lighting shall be provided for persons with impaired eyesight.

6.1.13.2 Escape Routes

6.1.13.2.1 In public and passenger cabins area, escape routes to muster stations, especially the corridors with handrails, passageways, doors, as well as openings in bulwarks or guard rails shall be such that they can be used by persons with reduced mobility, in particular passengers travelling with buggies and persons dependent on various types of walking aids or wheelchairs. The requirements regarding the width of exits are given in 6.1.7.1.7; the requirements regarding doors are given in 6.1.7.2.4.

6.1.13.2.2 The requirements for the arrangement of stairways shall, in addition to possible reduced mobility, also take into account eyesight impediments.

6.1.13.2.3 The requirements for bulwarks and guard rails on open decks intended for use by persons with reduced mobility shall provide for a greater height, at least 1.1 m, since such persons are more likely to lose their balance or be unable to hold on by themselves.

6.1.13.2.4 The clear width of passageways shall be at least 1.3 m and they shall not have sills higher than 25 mm. The handrails along the escape routes shall be placed 0.9 m above the floor such that they can also be used by persons with reduced mobility.

6.1.13.3 Alarm System

6.1.13.3.1 In areas intended for persons with reduced mobility, the possibility for triggering an alarm by wheelchair persons shall be provided.

6.1.13.3.2 Persons with reduced mobility include persons with impaired eyesight or hearing. Consequently, at the areas intended for use by such persons the passenger alarm system shall provide suitable visual and audible alarms.

6.1.13.4 Safety Rota, Safety Plan and Code of Conduct for Passengers

6.1.13.4.1 The special safety measures necessary for persons with reduced mobility to be taken into consideration in the *Safety rota*, referred to in 6.1.12, shall include measures for normal operation in addition to measures in the event of emergencies.

6.1.13.4.2 *Safety plan* and *Code of conduct for passengers*, referred to in 6.1.12, shall designate the areas for persons with reduced mobility and shall be displayed in the areas intended for use by persons with reduced mobility at a height so that wheelchair users can read them as well.

6.1.13.4.3 *Safety plan* and *Code of conduct for passengers* shall be such that they can, where possible, also be read by persons with impaired eyesight. This can be achieved for example by appropriate use of contrast and character size.

6.2 Vessels Operating on Domestic Inland Waterways

Vessels operating exclusively on domestic inland waterways journeys, flying the flag of a non-EU Member State, may be exempted from the requirements that shall be complied with in respect of the EU waterways, subject to acceptance by PRS or the Flag State Administration.

6.3 Tugs and Pushing Vessels – Mark: hol and pch

6.3.1 Tugs and pushing vessels, irrespective of their length, shall be provided with water fire main system complying with the requirements of 3.2.

6.3.2 Tugs and pushing vessels intended for towing or pushing other vessels and barges carrying dangerous substances, which are subject to ADN requirements, shall additionally comply with the following requirements:

- .1 heating, cooking and refrigerating appliances shall not run on liquid fuels, liquid gas or solid fuels;
- .2 the water fire main system shall be fitted with a hose connection, located on the open deck, to connect a fire hose for projecting a jet of water on to the deck of the towed or pushed vessel. Fire hose nozzles of dual-purpose type shall be used, the minimum orifice diameter of the hose nozzle being 16 mm;
- .3 if the engine manufacturer does not ensure spark arresting in exhaust system (e.g. turbocharged engines), exhaust pipes shall be provided with spark arresters;
- .4 they shall be equipped with low-expansion foam fire-extinguishing system capable of directing foam onto the deck of the towed or pushed vessel. Instead of the low-expansion system, a foam-type fire extinguishing unit of 45 l capacity with hoses on reels may be used.

6.4 Cargo Vessels Intended for Carriage of Dangerous Goods in Packages or in Bulk – Mark: ADN

The requirements specified in this sub-chapter also apply to sea-going ships which are subject to the *Rules for Classification and Construction of Sea-going Ships* and intended to be assigned a certificate of approval for the international carriage of dangerous goods by inland waterways.

6.4.1 Accommodation and Service Spaces

6.4.1.1 Accommodation spaces shall be separated from the holds by metal bulkheads having no openings.

6.4.1.2 All openings in accommodation spaces and the wheelhouse facing the holds shall be provided with gastight closing appliances.

6.4.1.3 Entrances and openings to the engine room and service spaces shall not face the protected area.

6.4.2 Water Fire Main System

6.4.2.1 Vessels shall be provided with a water fire main system. The water fire main system shall be supplied by two independent fire or ballast pumps, one of which shall be ready for use at any time. These pumps, their drive systems and electrical equipment shall not be located in the same space.

6.4.2.2 The system shall consist of a water supply pipeline, to which at least three hydrants are connected, with fire hoses and dual-purpose nozzles having a diameter of not less than 12 mm, located in the protected area above deck. The hydrants shall be so arranged as to enable two jets of water which do not emanate from the same hydrant to reach any point of the deck in the protected area.

6.4.2.3 A spring-loaded non-return valve shall be fitted on the water fire main pipeline, to ensure that no gases can escape through the fire-extinguishing system into accommodation or service space outside the protected area.

6.4.2.4 The capacity of each fire pump shall be at least sufficient for a jet of water to reach a distance of not less than the vessel's breadth from any location on board with two spray nozzles being used at the same time.

6.4.2.5 A single portable fire pump or ballast pump shall suffice on pushed barges without their own means of propulsion.

6.4.3 Fixed Fire Extinguishing System

6.4.3.1 Engine rooms shall be provided with a fixed fire-extinguishing system in accordance with the requirements specified in sub-chapter 3.3.

6.4.3.2 Fire-extinguishing agent in the fixed fire-extinguishing system shall be suitable and in the amount sufficient to extinguish fires in the largest protected space.

6.4.4 Fire Sources, Heating, Cooking and Refrigerating Appliances

6.4.4.1 Funnel outlets shall be located not less than 2 m from the hatchway openings. Arrangements shall be provided to prevent the escape of sparks and the entry of water.

6.4.4.2 Heating, cooking and refrigerating appliances shall not be fuelled with liquid fuels, liquid gas or solid fuels. The installation in the engine room or other separate space of heating appliances fuelled with liquid fuel having a flash-point above 55 °C is, however, permitted.

6.4.4.3 Cooking and refrigerating appliances are permitted only in wheelhouses with metal floor and in accommodation spaces.

6.4.4.4 Only electric lighting appliances are permitted outside the accommodation spaces and the wheelhouse.

6.4.5 Exhaust Pipes

6.4.5.1 Exhaust outlets shall be located not less than 2.00 m from the hatchway openings. Exhaust pipes shall not be located within the protected area.

6.4.5.2 Exhaust outlets shall be provided with spark arresters.

6.4.6 Special Equipment

Depending on the class of dangerous goods carried and when required for the specific cargo by ADN, Table A: List of Dangerous Goods, column (9), the following equipment shall be available on board:

- .1 a protective suit, a pair of protective shoes, a pair of protective boots, a pair of protective gloves, a pair of protective goggles (PP) – for each crew member;
- .2 escape breathing apparatus (EP) – 1 piece for each person on board;
- .3 a flammable gas detector with instructions for its use (EX);
- .4 a toximeter with instructions for its use (TOX);
- .5 breathing apparatus ambient air-dependent (A) – 1 piece.

For pushed convoys or side-by-side formations under way, it is sufficient, however, if the pusher tug or the vessel propelling the formation is equipped with the special equipment referred to above.

6.4.7 Fire-fighting Equipment

In addition to the fire-fighting equipment required in Chapter 5, at least two fire-extinguishers of the same type and capacity and fire-extinguishing agent suitable for fighting fires of the carried dangerous goods shall be located in the protected area. Fire-extinguishers shall fulfil the requirements specified in sub-chapter 5.2.

6.4.8 Prohibition on Smoking, Fire and Naked Light

6.4.8.1 On board the vessel smoking prohibition shall apply. This prohibition does not apply to the crew accommodation spaces provided their windows, doors and other openings are closed.

6.4.8.2 On board the vessel noticeboards shall be placed bearing the inscription:

NO SMOKING, USE OF FIRE AND NAKED LIGHT

which shall be clearly legible from either side of the vessel.

6.4.8.3 Noticeboards indicating the circumstances under which the prohibition applies shall be fitted near the entrances to the spaces where smoking or the use of fire or naked light is not always prohibited.

6.4.8.4 Ashtrays shall be provided close to each exit of the accommodation space and the wheelhouse.

6.5 Tank Vessels Intended for Carriage of Dangerous Substances – Mark: zb ADN-C, zb ADN-G, zb ADN-N

6.5.1 Hold Spaces and Cargo Tanks

6.5.1.1 Hold spaces shall be separated from the accommodation and service spaces outside the cargo area below deck by A-60 fire class division. A space of not less than 0.20 m shall be provided between the cargo tanks and the end bulkheads of the hold spaces. Where the cargo tanks have plane end bulkheads, this space shall not be less than 0.50 m.

6.5.1.2 A space in the cargo area below deck may be arranged as a service space, provided that the bulkhead bounding the service space extends vertically to the bottom and the bulkhead not facing the cargo area extends from one side of the vessel to the other in one frame plane. This service space shall only be accessible from the deck.

6.5.1.3 Service spaces located in the cargo area under deck shall be arranged so as to be easily accessible and to permit persons wearing protective clothing and breathing apparatus to safely operate the service equipment contained therein. They shall be designed so as to allow injured or unconscious persons to be removed from such spaces without difficulty, if necessary by means of a stretcher.

6.5.1.4 The paint used in the cargo area shall not be liable to produce sparks in case of impact.

Tank vessels ADN-C and ADN-N

6.5.1.5 Cargo tanks shall be separated by cofferdams of at least 0.60 m in width from the accommodation spaces, engine room and service spaces outside the cargo area below deck or, if there are no such accommodation spaces, engine room and service spaces, from the vessel's ends. Where the cargo tanks are installed in a hold space, a space (cofferdam) of not less than 0.50 m shall be provided between such tanks and the end bulkheads of the hold space. Cofferdam is not required if an end bulkhead of the hold space is A-60 fire class division. For pressure cargo tanks, the 0.50 m distance may be reduced to 0.20 m.

6.5.1.6 Service spaces located in the cargo area under deck shall be so arranged as to be readily accessible and to permit persons wearing the protective clothing and breathing apparatus to safely operate the service equipment contained therein. They shall be designed so as to allow injured or unconscious persons to be removed from such spaces without difficulty, if necessary by means of a stretcher.

6.5.1.7 The paint used in the cargo area shall not be liable to produce sparks in case of impact.

6.5.2 Engine Rooms

6.5.2.1 Engine rooms shall be located outside the cargo area. Entrances and other openings of engine rooms shall be at least at a distance of not less than 2.00 m from the cargo area.

6.5.2.2 The engine room shall be accessible from the deck; the entrances shall not face the cargo area. Where the doors located in superstructure side walls and opening outwards are not located in a recess whose depth is at least equal to the door width, the hinges shall face the cargo area.

6.5.2.3 The last sentence of paragraph 6.5.2.2 does not apply to oil separator or supply vessels.

6.5.3 Accommodation and Service Spaces

6.5.3.1 All permanently fitted materials in the accommodation spaces or wheelhouse except furniture, shall have low flame-spread characteristics. They shall not evolve fumes or toxic gases in dangerous quantities, if involved in fire.

6.5.3.2 Accommodation spaces and the wheelhouse shall be located outside the cargo area forward of the fore vertical plane or abaft the aft vertical plane bounding the part of cargo area below deck. Wheelhouse windows located not less than 1.00 m above the wheelhouse bottom may tilt forward.

6.5.3.3 Entrances to these spaces and openings of superstructures shall not face the cargo area. Where the doors located in superstructure side walls and opening outwards are not located in a recess whose depth is at least equal to the door width, the hinges shall face the cargo area.

6.5.3.4 Entrances from the deck and openings of spaces facing the weather deck shall be capable of being closed. The following instruction shall be displayed at the entrance of such spaces:

**DO NOT OPEN DURING LOADING, UNLOADING (OR GAS-FREEING¹)
WITHOUT THE MASTER'S PERMISSION.**

CLOSE IMMEDIATELY.

6.5.3.5 Entrances and windows of superstructures and accommodation spaces which can be opened as well as other openings of these spaces shall be located not less than 2.00 m from the cargo area. No wheelhouse doors and windows shall be located within 2.00 m from the cargo area, except where there is no direct connection between the wheelhouse and accommodation space.

6.5.3.6 Penetrations through the bulkhead between the engine room and the service space in the cargo area and the bulkhead between the engine room and the hold spaces may be provided for electrical cables, hydraulic lines and piping for measuring, control and alarm systems, provided that the penetrations have been type-approved and gastight. Penetrations through A-60 fire class divisions shall additionally have sufficient fire insulation.

6.5.3.7 Pipes may penetrate the bulkhead between the engine room and the service space in the cargo area provided that these are pipes between the mechanical equipment in the engine room and the service space which do not have any openings within the service space and which are provided with shut-off devices at the bulkhead in the engine room.

6.5.3.8 The last sentence of paragraphs 6.5.3.3 and 6.5.3.4 as well as paragraph 6.5.3.5 do not apply to oil separator or supply vessels.

6.5.4 Cargo Pump-rooms

6.5.4.1 Service space located within the cargo area below deck may be used as a cargo pump room for the loading and unloading system, subject to the following requirements:

- .1** the cargo pump-room is separated from the engine room or from service spaces outside the cargo area by a cofferdam or A-60 fire class division or by service space or hold space;
- .2** the A-60 fire class division does not include penetrations of driving shafts of bilge or ballast pumps;
- .3** ventilation exhaust outlets are located not less than 6.00 m from entrances and openings of the accommodation and service spaces outside the cargo area;
- .4** access hatches and ventilation inlets can be closed from the outside;
- .5** all pipes for loading and unloading (at the suction side and delivery side) are led through the deck above the pump room. The necessary operation of the control devices in the pump-room, starting of pumps or compressors and necessary control of the liquid flow rate shall be effected from the deck;
- .6** the cargo pump-room is provided with an explosive gas-detection and oxygen measurement system. The system shall automatically indicate the presence of explosive gases or lack of oxygen by means of direct-measuring sensors and actuate a visual and audible alarm when the gas concentration has reached 20% of the lower explosive limit.

¹ Does not apply to ADN-G tank vessels.

The sensors of this system shall be placed at suitable positions at the bottom and directly below the deck. The system shall operate continuously;

- .7 audible and visual alarms of the explosive gas-detection and oxygen measurement system shall be installed in the wheelhouse and in the cargo pump-room. At the moment when the alarm is actuated, the loading and unloading system shall be shut down;
- .8 explosive gas-detection and oxygen measurement system shall have self-control failure ability and the system failure shall be immediately signalled in the wheelhouse and on the deck by means of audible and visual alarms;
- .9 the ventilation system shall have a capacity ensuring not less than 30 changes of air per hour.

6.5.4.2 The following instruction shall be displayed at the entrance to the cargo pump-room.

**BEFORE ENTERING THE CARGO PUMP-ROOM CHECK WHETHER
IT IS FREE FROM GASES AND CONTAINS SUFFICIENT OXYGEN.
DO NOT OPEN DOORS AND ENTRANCE OPENINGS WITHOUT
THE MASTER'S PERMISSION.
LEAVE IMMEDIATELY IN THE EVENT OF ALARM.**

6.5.4.3 The requirements of this sub-chapter do not apply to open type ADN-N.

6.5.5 Cofferdams Bounding Cargo Area

6.5.5.1 Cofferdams shall be capable of being filled with water (e.g. from the water fire main) within 30 minutes and emptied by means of pump. The cofferdams shall not be fitted with inlet valves.

These requirements do not apply where the bulkhead between the engine room and the cofferdam is a A60 fire class division or the cofferdam has been fitted out like a service space.

This requirement does not apply to oil separator or supply vessels.

6.5.5.2 Cofferdams shall not have permanent connections to other piping of the vessel outside the cargo area.

6.5.5.3 Ventilation openings of cofferdams shall be fitted with a flame arrester withstanding deflagration. This requirement does not apply to open type ADN-N Tank vessels.

6.5.6 Water Fire Main System

6.5.6.1 Tank vessels shall be fitted with a water fire main system. The system shall be supplied by two independent fire or ballast pumps, one of which shall be ready for use at any time. These pumps, their drive systems and electrical equipment shall not be located in the same space.

6.5.6.2 Water fire main system shall comprise a water supply line connected to at least three hydrants located in the cargo area above deck with fire hoses and spray nozzles having a diameter not less than 12 mm. The hydrants shall be so arranged as to reach any point of the deck in the cargo area simultaneously with at least two jets of water not emanating from the same hydrant.

6.5.6.3 Spring-loaded non-return valve shall be fitted on fire main pipeline to ensure that no gases can escape through the system into the accommodation or service spaces outside the cargo area.

6.5.6.4 The capacity of each fire pump shall be at least sufficient for a jet of water to have a minimum reach of not less than the vessel's breadth from any location on board with two spray nozzles being used at the same time.

6.5.6.5 Where filling cofferdams bounding the cargo areas from the water fire main system is provided, the capacity of the system shall be sufficient to fill the cofferdams within the time specified in 6.5.5.1.

6.5.6.6 The requirements of this sub-chapter do not apply to oil separator or supply vessels.

6.5.7 Fixed Fire-extinguishing System

6.5.7.1 Engine rooms, cargo pump-rooms and all spaces containing essential machinery (switchboards, compressors, etc.) for the refrigeration equipment shall be provided with a fixed fire-extinguishing system in accordance with the requirements specified in 3.3.

6.5.7.2 Fire-extinguishing agent in the fixed fire-extinguishing system shall be suitable and the amount sufficient to extinguish fires in the largest protected space.

6.5.7.3 The requirements of this sub-chapter do not apply to oil separator or supply vessels.

6.5.8 Water-spray System

6.5.8.1 Where water-spraying system is required by ADN in column (9) of Table C (List of dangerous goods accepted for carriage in tank vessels) of Chapter 3.2 therein for the specific types of dangerous goods, a water-spray system shall be installed in the cargo area on deck to enable gas emissions from loading to be precipitated and to cool the tops of cargo tanks by spraying water over the whole surface so as to safely avoid the activation of the high velocity vent valve at 10 kPa or as regulated.

6.5.8.2 The system shall be fitted with distribution pipes and spraying nozzles so arranged in the cargo area on deck as to ensure an uniform coverage of the deck at the outflow of 50 l/h per one square metre of the deck.

The system shall consist of water supply pipelines and water spraying nozzles so arranged that the entire cargo deck area is covered and the gases released are precipitated safely.

The system capacity shall be such that when all the spray nozzles are in operation, the outflow is not less than 50 litres per square metre of deck area and per hour.

6.5.8.3 The system may be supplied from its own pump or may be supplied from the water fire main system – in the latter case the capacity of the system pumps shall be adequately increased. The system shall be fitted with a connection device for supply from shore.

6.5.8.4 The system shall be capable of being put into operation from the wheelhouse and from the deck.

6.5.9 Inert Gas System

6.5.9.1 Where inerting or blanketing of the cargo tanks is required, the vessel shall be equipped with an inert gas system.

6.5.9.2 Inert gas system shall be capable of maintaining a permanent minimum pressure of 7 kPa in the spaces to be inerted. In addition, the system shall be designed to prevent increase of the pressure in the cargo tank to a pressure above the tank pressure relief valve setting. The setting pressure of the vacuum-relief valve shall be 3.5 kPa.

6.5.9.3 If the gas cannot be supplied from shore installation, sufficient quantity of inert gas cylinders for loading or unloading shall be carried onboard or inert gas generator with sufficient

capacity shall be provided. In addition, sufficient quantity of inert gas to offset normal losses occurring during carriage shall be on board.

6.5.9.4 The cargo tanks to be inerted shall be equipped with connections for introducing the inert gas and monitoring systems so as to ensure the correct atmosphere on a permanent basis.

6.5.9.5 Where the pressure or concentration of inert gas in the cargo tanks falls below a specific value, this monitoring system shall activate an audible and visible alarm in the wheelhouse. If the wheelhouse is unoccupied, the alarm shall also be perceptible in a location occupied by a crew member.

6.5.10 Fire Sources, Heating, Cooking and Refrigerating Appliances

6.5.10.1 Funnel outlets shall not be located less than 2.00 m from the cargo area. Means shall be provided to prevent the escape of sparks and the entry of water into the funnel outlets.

6.5.10.2 Heating, cooking and refrigerating appliances shall not be fuelled with liquid fuels, liquid gas or solid fuels. The installation in the engine room or another separate space of heating appliances fuelled with liquid fuel having flash point above 55 °C is permitted.

6.5.10.3 Cooking and refrigerating appliances are permitted only in the accommodation spaces.

6.5.10.4 Only electrical lighting appliances are permitted on tank vessels.

6.5.11 Exhaust Pipes

6.5.11.1 Exhaust outlets shall be located not less than 2 m from the cargo area. Exhaust pipes shall not be located within the cargo area.

The distance prescribed for exhaust pipe location does not apply to oil separator or supply vessels.

6.5.11.2 Exhaust pipes shall be provided with spark arresters.

6.5.12 Special Equipment

6.5.12.1 A shower and a foot-operated eye and face wash basin or water nozzles shall be provided on the vessel at a location which is directly accessible from the cargo area. Vessels operating in winter conditions shall be provided with appropriate arrangements to preclude the freezing of water supply to the shower and the bath.

This requirement does not apply to oil separator or supply vessels.

6.5.12.2 Depending on the class of dangerous substances carried and where required by ADN Rules in column (18) of Table C (List of dangerous goods accepted for carriage in tank vessels) of Chapter 3.2 therein, the following equipment shall be available on board:

- .1 a protective suit, a pair of protective shoes, a pair of protective boots, a pair of protective gloves, a pair of protective goggles (PP) – for each crew member;
- .2 escape breathing apparatus (EP) – 1 piece for each person on board;
- .3 a flammable and explosive gas detector with the instructions for its use (EX);
- .4 a toximeter with the instructions for its use (TOX acc. to ADN);
- .5 breathing apparatus (ambient air-dependent) (A) – 1 piece.

For pushed convoys or side-by-side formations under way, it is sufficient, however, if the pusher tug or the vessel propelling the formation is equipped with the special equipment referred to above.

6.5.13 Fire-fighting Equipment

In addition to the fire-fighting equipment required in Chapter 5, the protected area shall be provided with at least two fire-extinguishers of the same type and capacity and fire-extinguishing agent suitable for fighting fires involving the dangerous goods being carried. Fire-extinguishers shall fulfil the requirements specified in sub-chapter 5.2.

6.5.14 Prohibition on Smoking, Fire and Use of Naked Light

6.5.14.1 On board the vessel smoking prohibition shall apply. This prohibition does not apply to the accommodation spaces provided their windows, doors, and other openings are closed.

6.5.14.2 On board the vessel noticeboards shall be placed bearing the inscription:

NO SMOKING, USE OF FIRE AND NAKED LIGHT

which shall be clearly legible from either side of the vessel.

6.5.14.3 Noticeboards indicating the circumstances under which the prohibition applies shall be fitted near the entrances to the spaces where smoking, the use of fire or naked light is not always prohibited.

6.5.14.4 Ashtrays shall be provided close to each exit of the accommodation space and the wheelhouse.

6.5.15 Fire Control Plan

6.5.15.1 *Fire Control Plan/Safety Plan* complying with the requirements specified in 1.5 shall be approved by the institution responsible for the vessel survey.

6.5.15.2 *Fire Control Plan/Safety Plan* shall be exhibited on the vessel in a readily accessible and visible place.

6.6 High Speed Craft – Mark: hsc

Additional requirements for high speed craft are given in *Publication No. 92/P – Specific Requirements for Inland Waterways High-speed Vessels, 2010*.

6.7 Ships powered by LNG

These ships, in terms of fire protection, shall meet the requirements specified in ES-TRIN, Sec. I, Chapter 3.

7 REQUIREMENTS FOR SPACES AND APPLIANCES WHICH CONSTITUTE FIRE RISK

7.1 Heating, Cooking and Refrigeration Equipment Running on Liquid Fuel

7.1.1 General Requirements

7.1.1.1 Heating, cooking and refrigeration equipment running on liquefied gas shall meet the requirements specified in 7.4.

7.1.1.2 Heating, cooking and refrigeration equipment, together with its accessories, shall be so designed and installed that it is not dangerous even in the event of overheating. It shall be so installed that it cannot overturn or be moved accidentally.

7.1.1.3 The equipment referred to above shall not be installed in areas in which substances with a flash-point below 55 °C are used or stored. No flues from these installations may pass through such areas.

7.1.1.4 The supply of air necessary for combustion shall be ensured.

7.1.1.5 Heating appliances shall be securely connected to flues, which shall be fitted with suitable cowls or devices affording protection against the wind. They shall be arranged in such a manner as to permit cleaning and prevent their clogging by settling combustion products.

7.1.2 Use of Liquid Fuels

7.1.2.1 Heating, cooking and refrigeration equipment which uses liquid fuel may be operated only with fuels whose flash-point is above 55 °C.

7.1.2.2 By way of exemption, cooking appliances and heating and refrigeration appliances fitted with burners with wicks and running on commercial paraffin oil may be permitted in the accommodation and wheelhouse, provided the capacity of the fuel tank does not exceed 12 litres.

7.1.2.3 Appliances fitted with burners with wicks shall be:

- .1 fitted with a metal fuel tank whose filling aperture may be locked and which has no soft-solder joints below the maximum filling level, and shall be designed and installed in such a way that the fuel tank cannot be opened or emptied accidentally;
- .2 capable of being lit without the aid of another liquid fuel;
- .3 so installed as to ensure the safe evacuation of combustion gases.

7.1.3 Vaporising Oil Burner Stoves and Atomising Oil Burner Heating Appliances

7.1.3.1 Vaporising oil burner stoves and atomising oil burner heating appliances shall be built in accordance with best practice.

7.1.3.2 Where a vaporising oil burner stove or an atomising oil burner heating appliance is installed in an engine room, the air supply to the heating appliance and the engines shall be so designed that the heating appliance and the engines can operate properly and safely independently of one another. Where necessary, there shall be a separate air supply. The equipment shall be installed in such a way that no flame from the burner can reach other parts of the engine room installations.

7.1.4 Vaporising Oil Burner Stoves

7.1.4.1 It shall be possible to light vaporising oil burner stoves without the aid of another combustible liquid. They shall be fixed above a metal drip pan which encompasses all the fuel-carrying parts, whose sides are at least 20 mm high and which has a capacity of at least two litres.

7.1.4.2 For vaporising oil burner stoves installed in an engine room, the sides of the metal drip pan prescribed in paragraph 1 shall be at least 200 mm high. The lower edge of the vaporizing burner shall be located above the edge of the drip pan. In addition, the upper edge of the drip pan shall extend at least 100 mm above the floor.

7.1.4.3 Vaporising oil burner stoves shall be fitted with a suitable regulator which, at all settings, ensures a virtually constant flow of fuel to the burner and which prevents any fuel leak should the flame go out. Regulators shall be considered suitable which function properly even when exposed to vibration and inclined up to 12° and which, in addition to a level-regulating float, have:

- .1 a second float which closes off the fuel supply safely and reliably when the permitted level is exceeded, or
- .2 an overflow pipe, but only if the drip pan has sufficient capacity to accommodate at least the contents of the fuel tank.

7.1.4.4 Where the fuel tank of a vaporising oil burner stove is installed separately:

- .1 the drop between the tank and the burner feed may not exceed the value that is laid down in the manufacturer's operating instructions;
- .2 it shall be so installed as to be protected from unacceptable heating;
- .3 it shall be possible to interrupt the fuel supply from outside the fuel tank space.

7.1.4.5 The flues of vaporising oil burner stoves shall be fitted with a device to prevent draught inversion.

7.1.5 Atomising Oil Burner Heating Appliances

Atomising oil burner heating appliances shall comply with the following requirements:

- .1 adequate ventilation of the burner shall be ensured before the fuel is supplied;
- .2 the fuel supply shall be regulated by a thermostat;
- .3 the fuel shall be ignited by an electric device or by a pilot flame;
- .4 a flame monitoring device shall cut off the fuel supply when the flame goes out;
- .5 the main switch shall be placed at an easily accessible point outside the installation room.

7.1.6 Forced-Air Heating Appliances

Forced-air heating appliances consisting of a combustion chamber around which the heating air is conducted under pressure to a distribution system or to a room shall meet the following requirements:

- .1 if the fuel is atomised under pressure, the combustion air shall be supplied by a blower;
- .2 the combustion chamber shall be well ventilated before the burner can be lit. Ventilation may be considered complete when the combustion air blower continues to operate after the flame has gone out;
- .3 the fuel supply shall be automatically cut off if:
 - the fire goes out;
 - the supply of combustion air is not sufficient;
 - the heated air exceeds a previously set temperature, or
 - the power supply of the safety devices fails.
- .4 it shall be possible to switch off the combustion air and heating air blowers from outside the room where the heating appliance is located;
- .5 where heating air is drawn from outside, the intake vents shall be located as far as possible above the deck. They shall be installed in such a manner that rain and spray water cannot enter;
- .6 heating air pipes shall be made of metal;
- .7 it shall not be possible to close the heating air outlet apertures completely;
- .8 it shall not be possible for any leaking fuel to reach the heating air pipes;
- .9 it shall not be possible for forced-air heating appliances to draw their heating air from an engine room.

7.2 Solid Fuel Heating

7.2.1 Solid fuel heating appliances shall be placed on a metal plate with raised edges such that no burning fuel or hot cinders fall outside the plate.

This requirement does not apply to appliances installed in compartments built of non-combustible materials and intended solely to house boilers.

7.2.2 Solid fuel boilers shall be fitted with thermostatic controls to regulate the flow of combustion air.

7.2.3 A means by which cinders can be quickly doused shall be placed in the vicinity of each heating appliance.

7.3 Liquefied Gas Installations for Domestic Purposes

7.3.1 General Requirements

7.3.1.1 Liquefied gas installation shall comprise a gas receptacle, reducing valves, a distribution piping system and a number of gas-consuming appliances.

Gas receptacles not in the supply unit shall not be considered part of the installation.

7.3.1.2 Liquefied gas installations may be operated only on commercial propane.

7.3.1.3 All elements of liquefied gas installation shall be suitable for use with propane and are to comply with the relevant technical standards of the respective EU Member State.

7.3.1.4 A liquefied gas installation may be used only for domestic purposes in accommodation spaces and in the wheelhouse. No part of a liquefied gas installation shall be located in machinery spaces.

7.3.1.5 There may be a number of separate liquefied gas installations on board. Accommodation areas separated by a hold or a fixed tank cannot be served by the same installation.

7.3.2 Gas Receptacles

7.3.2.1 Only receptacles with a content of 5 kg to 35 kg are permitted. For passenger vessels, PRS may give consent to the use of receptacles with a larger content.

7.3.2.2 Gas receptacles shall bear the official stamp confirming their acceptance after performance of the required pressure tests.

7.3.3 Location and Arrangement of Supply Units

7.3.3.1 Gas receptacles shall be stored on deck in a special freestanding or wall cupboard set into the superstructure located outside the accommodation area in a position that will not interfere with movement on board. The wall cupboard shall be gastight and can only be opened from outside the superstructure. It shall be so located that the distribution pipes leading to the gas consumption points are as short as possible.

7.3.3.2 Each liquefied gas installation may comprise up to four receptacles in operation simultaneously, with the use of an automatic reversing coupler. The number of receptacles on board, including spare receptacles, shall not exceed six per installation.

Up to six receptacles may be in operation on passenger vessels with galleys or canteens for passengers. The number of receptacles on board, including spare receptacles, shall not exceed nine per installation.

7.3.3.3 The pressure reducer or in the case of two-stage reduction the first pressure reducer shall be fitted to a wall in the same cupboard as the receptacles.

7.3.3.4 Gas receptacles shall be so installed that any leaking gas can escape from the cupboard containing the receptacle into the open without any risk that it may penetrate inside the vessel or come into contact with a source of ignition.

7.3.3.5 The cupboards shall be constructed of fire-resistant materials and adequately ventilated by apertures in the top and bottom.

7.3.3.6 The gas receptacles shall be placed upright in the cupboard in such a way that they cannot be overturned.

7.3.3.7 Cupboards shall be so designed and placed that the temperature of the receptacles will not exceed 50°C.

7.3.3.8 The words “Liquefied gas” and a standardised sign – pictograph “No use of open flame and smoking”, at least 100 mm in diameter, shall be affixed to the outer wall of the cupboard (see Annex to ES-TRIN, Fig. 2).

7.3.3.9 The interior lighting in the cupboard, if provided, shall be electrical and the installation shall be explosion-proof in accordance with the requirements specified in *Part VII – Electrical Equipment and Automation*.

7.3.4 Storage of Spare and Empty Receptacles

Spare and empty receptacles shall be stored outside the accommodation area and the wheelhouse in a cupboard complying with the requirements of 7.3.3.

7.3.5 Pressure Reducers

7.3.5.1 Gas-consuming appliances may be connected to receptacles only through a distribution system fitted with reducing valves to bring the gas pressure down to the utilization pressure determined in accordance with 7.3.5.4. Single-stage or two-stage pressure reducers may be used.

7.3.5.2 The final pressure reducer shall be fitted with a safety valve to protect the pipe automatically against excess pressure in the event of malfunction of the pressure reducer. The safety valve may be fitted directly on the pressure reducer or behind it. Measures shall be taken to ensure that any leaking gas from the safety valve can escape into the open without any risk that it will penetrate inside the vessel or come into contact with a source of ignition. It is recommended that a special discharge pipe from the safety valve, led to the open, should be fitted.

7.3.5.3 Means shall be provided to preclude the ingress of water into the safety valve and vents.

7.3.5.4 The pressure reducers shall maintain the system gas pressure as follows:

- .1** where two-stage reducing systems are used – the mean pressure shall not exceed 250 kPa above atmospheric pressure;
- .2** the pressure at the outlet from the last pressure reducer – shall not exceed 5 kPa above atmospheric pressure, with a tolerance of 10%.

7.3.6 Piping and Flexible Tubes

7.3.6.1 Pipes shall consist of fixed steel or copper tubing. Pipes connecting with the receptacles shall be high-pressure flexible tubes or spiral tubes suitable for propane.

7.3.6.2 Gas-consuming appliances, if not permanently installed, may be connected by means of suitable flexible tubes not more than 1 m long.

7.3.6.3 Pipes shall be able to withstand any stresses which may occur under normal operating conditions on board. The pipes diameters shall be such as to ensure a satisfactory flow of gas at the appropriate pressure to the gas-consuming appliances.

7.3.6.4 Pipes shall have as few joints as possible. Both pipes and joints shall be gastight and shall remain gastight despite any vibration or expansion to which they may be subjected.

7.3.6.5 The pipes shall be readily accessible, properly fixed and protected at every point where they may be subjected to impact or friction, particularly where they pass through steel bulkheads or metal walls. The entire outer surface of steel pipes shall be protected against corrosion.

7.3.6.6 Flexible pipes and their joints shall be able to withstand any stresses which may occur under normal operating conditions on board. They shall be unencumbered and fitted in such a way that they cannot be heated excessively and can be inspected over their entire length.

7.3.6.7 It shall be possible to shut off the entire distribution system by means of a valve which is at all times easily and rapidly accessible.

7.3.6.8 Each gas-consuming appliance shall be supplied by a separate branch of the distribution system and each branch shall be controlled by a separate closing valve.

7.3.6.9 Closing valves shall be fitted at points where they are protected from the weather and from impact.

7.3.6.10 An inspection joint shall be fitted after each pressure reducer. Closing valves shall be provided to ensure that during pipe pressure tests the pressure reducer is not exposed to the test pressure.

7.3.7 Installation of Gas-Consuming Appliances

7.3.7.1 The only appliances that may be installed are propane-consuming appliances approved by one of the EU Member States and which are fitted with devices that effectively prevent the escape of gas in the event of either the flame or the pilot light being extinguished.

7.3.7.2 Appliances shall be so placed and connected that they cannot overturn or be accidentally moved and so as to avoid any risk of accidental wrenching of the connecting pipes.

7.3.7.3 Gas-consuming appliances such as stoves, heating and water-heating appliances shall be connected to a duct for evacuating combustion gases into the open air.

7.3.7.4 The installation of gas-consuming appliances in the wheelhouse is permitted if the wheelhouse is so constructed that no leaking gas can escape into the lower part of the vessel, in particular through the control runs leading to the machinery space.

7.3.7.5 Gas-consuming appliances may be installed in sleeping quarters only if combustion takes place independently of the air in the quarters.

7.3.7.6 Gas-consuming appliances in which combustion depends on the air in the room in which they are located shall be installed in rooms which are sufficiently large and which are provided with ventilation system in accordance with the requirements of 7.3.8.

7.3.8 Ventilation and Evacuation of Combustion Gases

7.3.8.1 Rooms containing gas-consuming appliances in which combustion depends on the ambient air shall be provided with natural ventilation with supply duct terminating in the lower part and exhaust duct terminating in the upper part of the room, with a clear sectional area of at least 0.015 m² per aperture.

7.3.8.2 Ventilation ducts shall not have closing devices and shall not give on to the sleeping quarters.

7.3.8.3 The evacuation devices shall be so designed as to ensure the safe evacuation of the combustion gases. The devices shall be reliable in operation and are to be made of non-combustible materials. Their operation cannot be affected by the ventilators.

7.3.9 Instructions for Use and Safety

A notice on the use of the liquefied gas installation shall be affixed on board in a suitable place. It shall contain the following instructions:

- .1 the taps of the receptacles not connected to the distribution system shall be closed, even if the receptacles are presumed empty;
- .2 flexible pipes shall be replaced as soon as their condition so requires;
- .3 all gas-consuming appliances must remain connected unless the corresponding connecting pipes are sealed.

7.3.10 Installation Acceptance and Periodical Inspections

7.3.10.1 After gas fuel installation has been fitted on board the vessel, it is subject to the final acceptance and operation tests to be performed by an expert approved by a competent gas engineering supervision body. During the acceptance tests, the expert shall check that the system fulfils the requirements specified in sub-chapter 7.3 and the acceptance record shall be delivered to PRS.

For passenger vessels, an alarm system warning of explosive gases and carbon monoxide shall also be checked, in accordance with the requirements given in 4.3.

Also, the installation is subject to final acceptance by the expert after any modification or repair as well as before each renewal of the *Attestation* mentioned in paragraph 7.3.12.

7.3.10.2 During the vessel service, the installation is subject to periodical inspections at intervals not exceeding three years.

7.3.10.3 Performance of the final acceptance/periodical inspection shall be confirmed by the report made by the expert which will contain their signature and the inspection date.

7.3.11 Installation Tests

Liquefied gas installation shall be subjected to the following tests:

- .1 medium-pressure pipes between the closing valve, referred to in 7.3.6.10, of the first reducing device and the closing valve fitted before the final pressure reducer:
 - strength test, carried out with compressed air, an inert gas or a liquid at a pressure of 2 MPa above atmospheric pressure;
 - gastightness test, carried out with compressed air or an inert gas at a pressure of 0.35 MPa above atmospheric pressure;

- .2 pipes at the utilization pressure between the closing valve, referred to in 7.3.6.10, of the single-stage pressure reducer or the final pressure reducer and the closing valves fitted before the gas-consuming appliances are to be subjected to leak test, carried out with compressed air or an inert gas at a pressure of 0.1 MPa above atmospheric pressure;
- .3 pipes situated between the closing valve, referred to in 7.3.6.10, of the single-stage reducer or the final pressure reducer and the controls of the gas-consuming appliances are to be subjected to leak test at a pressure of 0.015 MPa above atmospheric pressure;
- .4 in the tests, specified in 1b), .2 and .3, the pipes are considered gastight if, after sufficient time to allow for normal balancing, no fall in the test pressure is observed during the following 10 minutes;
- .5 receptacle connectors, piping and other fittings subject to the pressure in the receptacles, as well as joints between the reducing valve and the distribution pipe are to be subjected to leak test, performed with a foaming substance, at the operating pressure;
- .6 all gas-consuming appliances are to be brought into service and tested at the nominal pressure to ensure that the combustion is satisfactory with the regulating knobs in different positions. Flame failure devices are to be also checked to ensure that they operate satisfactorily;
- .7 after the tests, prescribed in .6, it is to be verified in respect of each gas-consuming appliance connected to a flue, whether, after five minutes operation at the nominal pressure, with windows and doors closed and the ventilation devices in operation, any combustion gases are escaping through the damper. If there is a more than momentary escape of such gases, the cause shall immediately be detected and remedied. The appliance shall not be approved for use until defects have been eliminated.

7.3.12 Attestation

7.3.12.1 On the basis of the expert's report on acceptance/periodical tests of the installation performed in accordance with 7.3.10, PRS issues *Attestation* to the effect that the liquefied gas installation fulfils the requirements of PRS Rules and [ES-TRIN, Ch. 17](#).

7.3.12.2 *Attestation* is issued for the purpose of entering, by the Administration, appropriate records in the *Community Certificate*.

7.3.12.3 The attestation is valid for 3 years. After the attestation expiry, the liquefied gas installation is subject to further acceptance and tests according to 7.3.10.

7.3.12.4 In exceptional cases, at the Owner's well-justified request, the validity of the attestation may be extended for a period not exceeding 3 months, without the need to perform acceptance tests.

7.4 The Heating of Spaces

7.4.1 All heaters shall be so constructed and positioned as to preclude fire ignition. The heaters shall be screened and the temperature on the screen surface cannot exceed 60°C.

7.4.2 The electric heaters shall comply with the requirements specified in Chapter 13 of *Part VII – Electrical Equipment and Automation*.

7.4.3 Steam and electric heaters shall be placed at least 50 mm from the sides and walls. Sections of side or walls lined with wood, plywood or other combustible materials located in close vicinity of the heaters shall be covered with non-combustible thermal insulation.

7.4.4 Steam heating pipes shall be adequately insulated. In way of passage through wooden walls or bulkheads lined with combustible materials, the steam pipes shall have non-combustible insulation covered with metal plate over the length not less than 50 mm, on both sides of the wall.

SUPPLEMENT – RETROACTIVE REQUIREMENTS

1 APPLICATION

1.1 The requirements of the present Supplement apply to existing vessels, irrespective of the date of construction.

1.2 Compliance with the applicable retroactive requirements shall be confirmed by PRS' Surveyor in the report from the first survey of the vessel to be carried out after compliance deadline date.

2 REQUIREMENTS

2.1 Halon Fire-Extinguishing Systems, Halon Fire-Extinguishers

2.1.1 In accordance with *Regulation of (EC) No. 1005/2009 of the European Parliament and of the Council of 16 September 2009 on substances that deplete the ozone layer*, existing ships flying the flag of EU Member State shall not be fitted with halon fire-extinguishing systems using Halon 1211, 1301 and 2402, regarded as controlled substances listed in Annex I (Group III) to the a.m. *Regulation*. Portable fire-extinguishers using a.m. halons shall also not be provided on the ships.

2.1.2 If an existing ship to be assigned PRS class is fitted with halon fire-extinguishing system, the system shall be dismantled and halon shall be recovered in order to be destroyed, recycled or reclaimed by a service supplier recognized by the Flag State Administration, to comply with environment protection requirements. The dismantled halon system shall be replaced by a new fire-extinguishing system complying with the requirements specified in sub-chapter 3.3, of the present *Rules*. Portable fire-extinguishers using a.m. halons shall be replaced by fire-extinguishers approved in accordance paragraph 1.3 of the present *Rules*.

2.1.3 Technical documentation of a new fire-extinguishing system is subject to approval by the PRS Head Office. After installation on board, the system is subject to acceptance and tests under PRS Surveyor's supervision.

2.2 Self-powered Cargo Vessels, Tugs and Pushing Vessels

2.2.1 The requirements of the present sub-chapter apply to cargo vessels with the length L^1 of 20 m and above or the vessels for which the product of length L^1 , breadth B^1 and draught T^1 is a volume of 100 m³ or more, as well as to tugs and pushing vessels.

2.2.2 These vessels treated as existing, in terms of fire protection, depending on the date of issue of the inland navigation certificate, shall be adapted to meet the requirements specified in ES-TRIN, *Part IV - Transitional provisions*, Chapter 32 and 33, and instruction *ESI-IV-1 - Application of transitional provisions*, according to the indicated date of entry into force of a given requirement.

2.3 Passenger Vessels Assigned Additional Mark „pas”,

These vessels treated as existing, in terms of fire protection, depending on the date of issue of the inland navigation certificate, shall be adapted to meet the requirements specified in ES-TRIN, *Part IV - Transitional provisions*, Chapter 32 and 33, and instruction *ESI-IV-1 - Application of transitional provisions*, according to the indicated date of entry into force of a given requirement.

¹⁾ Definition of L , B and H – see sub-chapter 1.2, *Part II- Hull*.

2.4 Cargo Vessels Intended for Carriage of Dangerous Goods in Packages or Dry Bulk Cargoes – mark ADN, Approved for Carriage of Such Cargoes before 28 February 2009

If in column 4 of the following table “N.M.R.” appears, the requirements of the paragraphs of this Part V indicated in column 2 apply to those parts of the vessel which are modified or replaced.

If in column 4 of the following table the application date is indicated, the requirements of the paragraphs of this Part V indicated in column 2 shall be fulfilled at the nearest renewal of the approval certificate after the indicated application date. If, however, the approval certificate expires within the first year after the indicated application date, these requirements shall come into force after this first year period.

Table of Retroactive Requirements for Cargo Vessels

Item	Paragraph in Part V	Subject Notes	Effective date
1	6.4.1.2	Openings of accommodation and the wheelhouse facing the holds shall be capable of being tightly closed.	N.M.R.
2	6.4.1.3	Entrances and openings of engine room and service spaces facing the protected area shall be capable of being tightly closed.	N.M.R.
3	6.4.5.1	Exhaust outlets of engine exhaust pipes shall be located at least 2.00 m from the hatchway openings. Exhaust pipes shall not be located within the protected area.	N.M.R.
4	6.4.2	Water fire main system shall be supplied by two independently driven fire pumps and shall fulfil the requirements specified in 6.4.2	N.M.R.
5	6.4.3	Engine rooms shall be provided with fixed fire-extinguishing system in accordance with the requirements specified in sub-chapter 3.3	N.M.R.
6	6.4.4	Funnel outlets shall be located not less than 2 m from the hatchway openings. Heating and cooking appliances are permitted only in wheelhouses with metal floor and in the accommodation spaces. The installation of heating appliances fuelled with liquid fuel having a flash-point above 55 °C is permitted only in the engine room. Heating boilers fuelled by solid fuels are permitted in spaces situated below deck and accessible only from the deck.	N.M.R.

2.5 Tank Vessels Intended for Carriage of Dangerous Substances – mark zb ADN-C, zb ADN-G, zb ADN-N, Approved for Carriage of Such Substances before 28 February 2009

If in column 4 of the following table “N.M.R.” appears, the requirements of the paragraphs of this Part V indicated in column 2 apply to parts which are modified or replaced.

If in column 4 of the following table the application date is indicated, the requirements of the paragraphs of this Part V indicated in column 2 shall be fulfilled at the nearest renewal of the approval certificate after the indicated application date. If, however, the approval certificate expires within the first year after the indicated application date, these requirements shall come into force after this first year period.

Table of Retroactive Requirements for Tank Vessels

Item	Paragraph in Part V	Subject Notes	Effective date
1	6.5.3.1	All permanently fitted materials in the accommodation spaces or wheelhouse except furniture, shall have low flame-spread characteristics.	N.M.R.
2	6.5.1.1	Tank vessels ADN-G Cargo area end bulkheads shall be A-60 fire class divisions. A space of not less than 0.50 m shall be provided between the cargo tanks and the end bulkheads of the hold spaces.	N.M.R.
3	6.5.1.5	Tank vessels ADN-C and ADN-N Cargo tanks shall be separated by cofferdams of at least 0.60 m in width from the accommodation spaces, engine rooms and service spaces outside the cargo area below deck or by A-60 fire class divisions. On tank vessels ADN-C, cofferdams shall be at least 0.50 m in width. On tank vessels ADN-N, cofferdams shall be at least 0.50 m in width and on board vessels with a deadweight of up to 150 t – 0.40 m. On open tank vessels ADN-N with deadweight up to 150 t, cofferdams are not required The distance between cargo tanks and end bulkheads of hold spaces shall be at least 0.50 m. On open tank vessels ADN-N with deadweight up to 150 t, the distance between cargo tanks and end bulkheads of hold spaces shall be at least 0.40 m.	N.M.R.
4	6.5.1.3 6.5.1.6	Tank vessels ADN-G and ADN-N Where service spaces are located in the cargo area under deck, they shall be arranged so as to be easily accessible and to permit persons wearing protective clothing and breathing apparatus to safely operate the service equipment contained therein. They shall be designed so as to allow injured or unconscious persons to be removed from such spaces without difficulty, if necessary by means of a stretcher.	N.M.R.
5	6.5.2.1	Tank vessels ADN-G and ADN-N Entrances and other openings of engine rooms shall be at least at a distance of not less than 2.00 m from the cargo area.	N.M.R.
6	6.5.2.1	Open tank vessels ADN-N Engine rooms shall be located outside the cargo area	N.M.R.
7	6.5.2.2	Tank vessels ADN-G and ADN-N Where the doors arranged in side superstructure walls and opening outwards are not located in a recess whose depth is at least equal to the door width, the hinges shall face the cargo area. This requirement does not apply to tank vessels ADN-N whose keels were laid before 1 January 1977 where alterations would obstruct other major openings. Open tank vessels ADN-N The engine room shall be accessible from the weather deck.	N.M.R.

Item	Paragraph in Part V	Subject Notes	Effective date
8	6.5.3.2	<p>Tank vessels ADN-G and ADN-N</p> <p>Accommodation spaces and the wheelhouse shall be located outside the cargo area.</p> <p>This requirement does not apply to tank vessels ADN-N whose keels were laid before 1 January 1977, provided that there is no connection between the wheelhouse and other enclosed spaces.</p> <p>This requirement does not apply to vessels up to 50 m in length whose keels were laid before 1 January 1977 and whose wheelhouses are located in the cargo area even if it provide access to another enclosed space, provided that safety is ensured by appropriate service requirements of PRS.</p>	N.M.R.
9	6.5.3.3	<p>Entrances to accommodations and service spaces and openings of superstructures shall not face the cargo area.</p> <p>Entrances to these spaces shall not face the cargo area.</p> <p>This requirement does not apply to vessels up to 50 m in length whose keels were laid before 1 January 1977, provided that gas screens are installed.</p> <p>Open tank vessels ADN-N</p> <p>Entrances to accommodation and service spaces and openings of superstructures shall not face the cargo area.</p>	N.M.R.
10	6.5.3.4	<p>Open tank vessels ADN-N</p> <p>Entrances from the deck and openings of spaces facing the weather deck shall be capable of being closed.</p>	N.M.R.
11	6.5.3.5	<p>Tank vessels ADN-G and ADN-N</p> <p>Entrances and windows of superstructures and accommodation spaces which can be opened as well as other openings of these spaces shall be located not less than 2.00 m from the cargo area.</p>	N.M.R.
12	6.5.4.1	<p>Tank vessels ADN-G and ADN-N</p> <p>Cargo pump-rooms located below deck shall fulfil the requirements specified in 6.5.4.1.</p> <p>Pump-room ventilation system shall provide not less than 20 changes of air per hour and also shall fulfil the requirements specified in <i>Part VI – Machinery and Piping Systems</i>.</p> <p>Pump-room shall be provided with an explosive gas-detection system in accordance with 6.5.4.1.</p>	N.M.R.
13	6.5.5.1	<p>Tank vessels ADN-C and ADN-N</p> <p>Inlet valves shall not be fitted directly on cofferdam plates.</p>	N.M.R.
14	6.5.5.1	<p>Open tank vessels ADN-N</p> <p>Cofferdams shall be capable of being filled with water by means of a pump.</p>	N.M.R.
15	6.5.5.1	<p>Tank vessels ADN-C and ADN-N</p> <p>Cofferdams shall be capable of being filled with water within 30 minutes and emptied by means of a pump.</p>	N.M.R.
16	6.5.8	<p>Tank vessels ADN-C</p> <p>Water-spraying system required, by ADN, in Table C of Chapter 3.2 for carried dangerous goods.</p>	31.12.2004

Item	Paragraph in Part V	Subject Notes	Effective date
17	6.5.11.1	Tank vessels ADN-N Exhaust outlets shall be located not less than 2 m from the cargo area. Exhaust pipes shall not be located within the cargo area.	N.M.R.
18	6.5.6	Water fire main system shall be supplied from two independent fire pumps and shall fulfil the requirements specified in 6.5.6.	N.M.R.
19	6.5.7	Engine rooms shall be provided with a fixed fire-extinguishing system in accordance with the requirements specified in 3.3.	N.M.R.
20	6.5.10.1	Tank vessels ADN-G and ADN-N Funnel outlets shall not be located less than 2.00 m from the cargo area. This requirement does not apply to vessels whose keels were laid before 1 January 1977.	N.M.R.
21	6.5.10.1	Oil separator vessels Funnel outlets shall not be located less than 2.00 m from the cargo area.	N.M.R.
22	6.5.10.2	Heating, cooking and refrigerating appliances shall not be fuelled with liquid fuels, liquid gas or solid fuels. Installation in the engine room or another separate space of heating appliances fuelled with liquid fuel having flash point above 55 °C is permitted. Cooking and refrigerating appliances are permitted only in the accommodation spaces.	N.M.R.

List of amendments effective as of 1 July 2022

Item	Title/Subject	Source
1.2	ES-TRIN definition has been added	ES-TRIN
6.1.2.1	In footnote 3) referring to tables 6.1.2-1 and 6.1.2-2, an explanation has been added regarding the partitions between sleeping cabins and saunas	ES-TRIN, Art.19.11
6.7	For LNG fueled ships reference is made to ES TRIN, Sec. I, Ch. 3.	PRS own
Supplement 2.2, 2.3	Tables with requirements for existing vessels has been removed – reference to ES-TRIN, Part IV has been provided	ES-TRIN