

Polski Rejestr Statków

RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF SEA-GOING SHIPS

AMENDMENTS NO. 4/2010

to

PART V

FIRE PROTECTION

2008



GDAŃSK

Amendments No. 4/2010 to Part V – Fire Protection – 2008, of the Rules for the Classification and Construction of Sea-going Ships, were approved by PRS S.A. Executive Board on 8 September 2010 and enter into force on 15 September 2010.

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The following amendments to Part V – Fire Protection – 2008, have been introduced:

1. *In the Contents, in Chapter 4, the sub-chapters have been amended to read:*

4.1 Fixed Fire Detection and Fire Alarm System

- 4.1.1 Definitions
- 4.1.2 General Requirements
- 4.1.3 Sources of Power Supply
- 4.1.4 Component Requirements
- 4.1.5 Installation Requirements
- 4.1.6 System Control Requirements
- 4.1.7 Installation Tests

4.2 Sample Extraction Smoke Detection System (for cargo spaces)

- 4.2.1 General Requirements
- 4.2.2 Component Requirements
- 4.2.3 Installation Requirements
- 4.2.4 System Control Requirements
- 4.2.5 Testing

2. *Sub-chapter 4.1 has been amended to read:*

4.1 Fixed Fire Detection and Fire Alarm System

4.1.1 Definitions

Section – a group of fire detectors and manually operated call points as reported in the indicating unit.

Section identification capability – a system with the capability of identifying the section in which a detector or manually operated call point has activated.

Individually identifiable means a system with the capability to identify the exact location and type of detector or manually activated call point which has activated, and which can differentiate the signal of that device from all others.

4.1.2 General Requirements

4.1.2.1 Any required fixed fire detection and fire alarm system shall consist of fire detectors, manually operated call points and the control panel. The system shall be capable of immediate operation at all times (this does not require a back-up control panel). Notwithstanding this, particular spaces may be disconnected, for example workshops during hot work and ro-ro spaces during on and off-loading. The means for disconnecting the detectors shall be so designed as to automatically restore the system to normal surveillance after a pre-determined time that is appropriate for the operations in question. The space shall be manned or provided with patrol when the required detectors are disconnected. The detectors in all other compartments shall remain operational.

4.1.2.2 Where a fixed fire detection and fire alarm system is required for the protection of spaces other than stairways, corridors and escape routes, at least one detector shall be installed each such space.

4.1.2.3 Fixed fire detection and fire alarm system shall be so designed and the detectors so positioned as to detect rapidly the onset of fire in any part of those spaces and under any normal conditions of operation of the machinery and variations of ventilation as required by the possible range of ambient temperatures.

4.1.2.4 Except in spaces of restricted height and where their use is specially appropriate, detection systems using only thermal detectors shall not be permitted.

4.1.2.5 Smoke detectors shall be installed in all stairways, corridors and escape routes within accommodation spaces. It is recommended that special purpose smoke detectors be installed within ventilation ducting where smoke may occur as a factor indicative of incipient fire.

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

4.1.2.7 Fixed fire detection and fire alarm system shall be designed to:

- .1** control and monitor input signals from all the connected fire and smoke detectors and manual call points;
- .2** provide output signals to the navigation bridge, continuously manned control station or onboard safety centre to notify the crew of fire and fault conditions;
- .3** monitor power supplies and circuits necessary for the operation of the system for loss of power and fault conditions;

and:

- .4** the system may be arranged with output signals to other fire safety systems including:
 - .1** paging systems, fire alarm or public address systems;
 - .2** fan stops;
 - .3** fire doors;
 - .4** fire dampers;
 - .5** sprinkler systems;
 - .6** smoke extraction systems;
 - .7** low-location lighting systems;
 - .8** fixed local application fire-extinguishing systems;
 - .9** CCTV system; and
 - .10** other fire safety systems.

The fire detection system may be connected to a decision management system provided that:

- .1 the decision management system is proven to be compatible with the fire detection system;
- .2 the decision management system can be disconnected without losing any of the functions required by this sub-chapter for the fire detection system; and;
- .3 any malfunction of the interfaced and connected equipment will not propagate under any circumstance to the fire detection system.

Detectors and manual call points shall be connected to dedicated sections of the fire detection system. Other fire safety functions, such as alarm signals from the sprinkler valves, may be permitted if in separate sections.

4.1.2.8 Fixed fire detection and fire alarm system shall be so designed as to withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in ships. All electrical and electronic equipment in the bridge or in the vicinity of the bridge shall be tested for electromagnetic compatibility taking into account the recommendations developed by IMO¹⁾.

4.1.2.9 Fixed fire detection and fire alarm systems with a zone address identification capability shall be so arranged that:

- .1 means are provided to ensure that any fault (e.g. power break, short circuit, earth, etc.) occurring in the loop will not render the whole loop ineffective;
- .2 all arrangements are made to enable the initial configuration of the system to be restored in the event of failure (e.g. electrical, electronic, informatics, etc.);
- .3 the first initiated fire alarm will not prevent any other detector from initiating further fire alarms; and
- .4 no loop will pass through a space twice. When this is not practical (e.g. for large public spaces), the part of the loop which by necessity passes through the space for a second time shall be installed at the maximum possible distance from the other parts of the loop.

4.1.2.10 In cargo ships, the fixed fire detection and fire alarm system shall be, as a minimum, capable of identifying each loop.

¹⁾ Refer to the General Requirements for Electronic Compatibility for All Electrical and Electronic Ship's Equipment adopted by IMO resolution A.813(19).

4.1.3 Sources of Power Supply

4.1.3.1 There shall be not less than two sources of power supply for the electrical equipment used in the operations of the fixed fire detection and fire alarm system, one of which shall be an emergency source. The supply shall be provided by separate feeders reserved solely for that purpose. Such feeders shall run to an automatic changeover switch situated in or adjacent to the control panel for the fire detection system. The main feeder (and the corresponding emergency feeder) shall run from the switchboard to the changeover switch avoiding another switchboard.

4.1.3.2 There shall be sufficient power to permit the continued operation of the system with all detectors activated, but not more than 100 if the total exceeds this figure.

4.1.3.3 In cargo ships, the emergency source of power specified in paragraph 4.1.3.1 shall be sufficient to maintain the operation of the fire detection and fire alarm system for the periods required in sub-chapter 9.3 of *Part VIII – Electrical Installations and Control Systems*, and at the end of that period, shall be capable of operating all connected visual and audible fire alarm signals for a period of at least 30 min.

4.1.4 Component Requirements

4.1.4.1 Detectors

4.1.4.1.1 Detectors shall be operated by heat, smoke or other products of combustion, flame, or any combination of these factors. Detectors operated by other factors indicative of incipient fires may be accepted provided that they are no less sensitive than such detectors.

4.1.4.1.2 Smoke detectors required in all stairways, corridors and escape routes within accommodation spaces shall be certified to operate before the smoke density exceeds 12.5% obscuration per metre, but not until the smoke density exceeds 2% obscuration per metre, when tested according to standards EN 54 (2001) and 60092-505 (2001). Alternative testing standards may be used. Smoke detectors to be installed in other spaces shall operate within sensitivity limits recommended by the manufacturer having regard to the avoidance of detector insensitivity or oversensitivity.

4.1.4.1.3 Heat detectors shall be certified to operate before the temperature exceeds 78°C but not until the temperature exceeds 54°C, when the temperature is raised to those limits at a rate less than 1°C per min, when tested according to standards EN 54 (2001) and IEC 60092-505 (2001). Alternative testing standards may be used. At higher rates of temperature rise, the heat detector shall operate within temperature limits recommended by the manufacturer having regard to the avoidance of detector insensitivity or oversensitivity.

4.1.4.1.4 Operation temperature of heat detectors in drying rooms and similar spaces of a normal high ambient temperature may be up to 130 °C, and to 140 °C in saunas.

4.1.4.1.5 Flame detectors shall be tested in accordance with standards EN 54-10 (2001) and IEC 60092-505 (2001). Alternative testing standards are permitted.

4.1.4.1.6 All detectors shall be of a type such that they can be tested for correct operation and restored to normal surveillance without the renewal of any component.

4.1.4.1.7 Detectors fitted in hazardous areas, where is a risk of explosion, shall be tested and type-approved for such service. Detectors installed in special category spaces above the bulkhead deck need not be type-approved for service in hazardous areas. Detectors fitted in spaces carrying dangerous goods, mentioned in sub-chapter 2.10, Table 2.10-3, shall be suitable for service in hazardous areas in order to fulfil the requirements specified in sub-chapter 2.10.4.

4.1.4.2 Control Panel

The control panel for the fire detection system shall be tested in accordance with standards EN 54-2 (1997), EN 54-4 (1997) and IEC 60092-504 (2001). Alternative testing standards are permitted.

4.1.4.3 Cables

Cables used in the electrical circuits shall be flame retardant in accordance with standard IEC 60332-1

4.1.5 Installation Requirements

4.1.5.1 Sections

4.1.5.1.1 Detectors and manually operated call points shall be grouped into sections.

4.1.5.1.2 The section of fire detectors which covers a control station, a service space or an accommodation space shall not include a machinery space of category A or a ro-ro space. The section of fire detectors which covers a ro-ro space shall not include a machinery space of category A. For fixed fire detection systems with remotely and individually identifiable fire detectors, a section covering fire detectors in accommodation, service spaces and control stations shall not include fire detectors in machinery spaces of category A or ro-ro spaces.

4.1.5.1.3 Where the fixed fire detection and fire alarm system does not include means of remotely identifying each detector individually, no section covering more than one deck within accommodation spaces, service spaces and control stations shall normally be permitted except a section which covers an enclosed stairway. In order to avoid delay in identifying the source of fire, the number of enclosed spaces included in each section shall be limited and is subject to PRS

consideration in each particular case. If the detection system is fitted with remotely and individually identifiable fire detectors, the sections may cover several decks and serve any number of enclosed spaces.

4.1.5.2 Positioning of Detectors

4.1.5.2.1 Detectors shall be located for optimum performance. Positions near beams and ventilation ducts, or other positions where patterns of air flow could adversely affect performance, and positions where impact or physical damage is likely, shall be avoided. Detectors shall be located on the overhead at a minimum distance of 0.5 m away from bulkheads, except in corridors, lockers and stairways.

4.1.5.2.2 The maximum spacing of detectors shall be in accordance with the table below:

Table 9.1 – Spacing of detectors

Detector type	Maximum floor area per detector (m ²)	Maximum distance apart between centres (m)	Maximum distance from bulkheads (m)
Heat	37	9	4.5
Smoke	74	11	5.5

Other spacings based upon test data which demonstrate the characteristics of the detectors are permitted. Detectors located below moveable ro-ro decks shall be in accordance with the above.

4.1.5.2.3 Detectors in stairways shall be located at least at the top level of the stair and at every second level beneath.

4.1.5.2.4 When fire detectors are installed in freezers, drying rooms, saunas, parts of galleys used to heat food, laundries and other spaces where steam or fumes are produced, heat detectors may be used.

4.1.5.2.5 Where a fixed fire detection and fire alarm system is used within accommodation spaces and service spaces (see the requirements specified in subchapter 2.4.1), spaces having little or no fire risk need not be fitted with detectors. Such spaces include void spaces with no storage of combustibles, private bathrooms, public toilets, fire-extinguishing medium storage rooms, cleaning gear lockers (in which flammable liquids are not stowed), open deck spaces and enclosed promenades having little or no fire risk and that are naturally ventilated by permanent openings.

4.1.5.3 Arrangement of Cables

4.1.5.3.1 Cables which form part of the system shall be so arranged as to avoid galleys, machinery spaces of category A, and other enclosed spaces of high fire risk except where it is necessary to provide for fire detection or fire alarms in such spaces or to connect them to the appropriate power supply.

4.1.5.3.2 Section with individually identifiable capability shall be so arranged that it cannot be damaged at more than one point by a fire.

4.1.6 System Control Requirements

4.1.6.1 Visual and Audible Fire Signals

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

4.1.6.1.2 Control panel shall be located on the navigation bridge or in the fire control station.

4.1.6.1.3 In cargo ships, an indicating unit shall be located on the navigation bridge if the control panel is located in the fire control station. Indicating units shall, as a minimum, denote the section in which a detector has activated or manually operated call point has been operated.

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

4.1.6.1.5 Power supplies and electric circuits necessary for the operation of the system shall be monitored for loss of power and fault conditions as appropriate including:

- .1** a single open or power break fault caused by a broken wire;
- .2** a single ground fault caused by the contact of a wiring conductor to a metal component; and
- .3** a single wire to wire fault caused by the contact of two or more wiring conductors.

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

4.1.6.1.6 Means to manually acknowledge all alarm and fault signals shall be provided at the control panel. Audible alarm sounders on the control panel and indicating units may be manually silenced. The control panel shall clearly distinguish between normal, alarm, acknowledged alarm, fault and silenced conditions.

4.1.6.1.7 The system shall be arranged to automatically reset to the normal operating condition after alarm and fault conditions are cleared.

4.1.6.1.8 When the system is required to sound a local audible alarm within the cabins where the detectors are located, any means to silence the local audible alarms from the control panel are not permitted.

4.1.6.1.9 In general, audible alarm sound pressure levels at the sleeping positions in the cabins and 1 m from the source shall be at least 75 dB(A) and at least 10 dB(A) above ambient noise levels existing during normal equipment operation with the ship under way in moderate weather. The sound pressure level shall be in the 1/3 octave band about the fundamental frequency. Audible alarm signals shall not exceed 120 dB(A).

4.1.7 Installation Tests

4.1.7.1 The function of fixed fire detection and fire alarm systems shall be tested under varying conditions of ventilation after installation.

4.1.7.2 Suitable instructions and component spares for testing and maintenance shall be provided. Detectors shall be periodically tested using equipment suitable for the types of fires to which the detector is designed to respond. Ships with self-diagnostic systems that have in place a cleaning regime for areas where heads may be prone to contamination, may carry out testing in accordance with the guidelines specified by the installation manufacturer.

4.1.7.3 During the ship service, the function of fixed fire detection and fire alarm systems shall be periodically tested in accordance with the *Maintenance Plan* required in paragraph 1.4.3.2 by means of equipment producing hot air at the appropriate temperature, or smoke or aerosol particles having the appropriate range of density or particle size, or other phenomena associated with incipient fires to which the detector is designed to respond.

3. *Sub-chapter 4.2 has been amended to read:*

4.2 Sample Extraction Smoke Detection System (for cargo spaces)

4.2.1 General Requirements

4.2.1.1 Sample extraction smoke detection system is intended for installation in conventional cargo spaces in ships carrying dangerous goods in accordance with the requirements specified in sub-chapter 2.10 as well as in ro-ro spaces and vehicle spaces.

4.2.1.2 Sample extraction smoke detection system shall consist of the following main components:

- .1** smoke accumulators – air collection devices installed at the open ends of the sampling pipes in each cargo hold that perform the physical function of collecting air samples for transmission to the control panel through the sampling pipes, and may also act as discharge nozzles for the fixed-gas fire-extinguishing system, if installed;
- .2** sampling pipes – a piping network that connects the smoke accumulators to the control panel, arranged in sections to allow the location of the fire to be readily identified;

- .3 three-way valves – if the system is interconnected to a fixed-gas fire-extinguishing system, three-way valves are used to normally align the sampling pipes to the control panel, and if a fire is detected, the three-way valves are re-aligned to connect the sampling pipes to the fire-extinguishing system discharge manifold and isolate the control panel; and;
- .4 control panel – the main element of the system which provides continuous monitoring of the protected spaces for indication of smoke. It typically may include a viewing chamber or smoke sensing units. Extracted air from the protected spaces is drawn through the smoke accumulators and sampling pipes to the viewing chamber, and then to the smoke sensing chamber where the air stream is monitored by electrical smoke detectors. If smoke is sensed, the repeater panel (normally on the bridge) automatically sounds an alarm (not localized). The crew can then determine at the smoke sensing unit which cargo hold is on fire and operate the pertinent three-way valve for discharge of the extinguishing agent.

4.2.1.3 Any required system shall be capable of continuous operation at all times except that systems operating on a sequential scanning principle may be accepted, provided that the interval between scanning the same position twice depends on the number of scanning points and the response time of the fans.

The interval (I) shall be determined with a 20% allowance in accordance with the following formula:

$$I = 1.2 \times T \times N \text{ [s]}$$

where:

T – response time of the fans [s];

N – the number of scanning points.

The maximum allowable interval between the two subsequent scans, however, shall not exceed 120 s ($I_{max} = 120$ s).

4.2.1.4 The system shall be so designed, constructed and installed as to prevent the leakage of any toxic or flammable substances or fire-extinguishing media into any accommodation and service space, control station or machinery space.

4.2.1.5 The system and its equipment shall be suitably designed to withstand supply voltage variations and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in ships and to avoid the possibility of ignition of a flammable gas-air mixture.

4.2.1.6 The system shall be of a type that can be tested for correct operation and restored to normal surveillance without the renewal of any component.

4.2.1.7 Alternative power supply for the electrical equipment used in the operation of the system shall be provided.

4.2.2 Component Requirements

4.2.2.1 The sensing unit shall be certified to operate before the smoke density within the sensing chamber exceeds 6.65% obscuration per metre.

4.2.2.2 Duplicate sample extraction fans shall be provided. The fans shall be of sufficient capacity to operate with the normal conditions or ventilation in the protected area and the connected pipe size shall be determined with consideration of fan suction capacity and piping arrangement to satisfy the conditions specified in paragraph 4.2.5.2. Sampling pipes shall be a minimum of 12 mm internal diameter. The fan suction capacity shall be adequate to ensure the response of the most remote area within the required time criteria specified in paragraph 4.2.5.2. Means to monitor airflow shall be provided in each sampling line.

4.2.2.3 Control panel shall permit observation of smoke in the individual sampling pipes.

4.2.2.4 Sampling pipes shall be so designed as to ensure that, as far as practicable, equal quantities of airflow are extracted from each interconnected accumulator.

4.2.2.5 Sampling pipes shall be provided with an arrangement for periodically purging with compressed air.

4.2.2.6 Control panel for the smoke detection system shall be tested according to standards EN 54-2 (1997), EN 54-4 (1997) and IEC 60092-504 (2001). Alternative standards may also be used.

4.2.3 Installation Requirements

4.2.3.1 Smoke Accumulators

4.2.3.1.1 At least one smoke accumulator shall be located in every enclosed space for which smoke detection is required. However, where a space is designed to carry oil fuel or refrigerated cargo alternatively with cargoes for which a smoke sampling system is required, means may be provided to isolate the smoke accumulators in such compartments from the system. Such means are subject to PRS agreement in each particular case.

4.2.3.1.2 Smoke accumulators shall be located on the overhead or as high as possible in the protected space, and shall be spaced so that no part of the overhead deck area is more than 12 m measured horizontally from an accumulator. Where such systems are used in spaces which may be mechanically ventilated, the position of the smoke accumulators shall be considered having regard to the effects of ventilation. At least one additional smoke accumulator is to be provided in the upper part of each exhaust ventilation duct. An adequate filtering system shall be fitted at the additional accumulator to avoid dust contamination.

4.2.3.1.3 Smoke accumulators shall be positioned where impact or physical damage is unlikely to occur.

4.2.3.1.4 Sampling pipe networks shall be balanced to ensure compliance with paragraph 4.2.2.4. The number of accumulators connected to each sampling pipe shall ensure compliance with paragraph 4.2.5.2.

4.2.3.1.5 Smoke accumulators from more than one enclosed space shall not be connected to the same sampling pipe.

4.2.3.1.6 In cargo holds where non-gastight “tween deck panels” (movable stowage platforms) are provided, smoke accumulators shall be located in both the upper and lower parts of the holds.

4.2.3.2 Sampling Pipes

4.2.3.2.1 Sampling pipe arrangement shall be such that the location of the fire can be readily identified.

4.2.3.2.2 Sampling pipes shall be self-draining and effectively protected from impact or damage from cargo working.

4.2.4 System Control Requirements

4.2.4.1 Visual and Audible Fire Signals

4.2.4.1.1 Detection of smoke or other products of combustion shall initiate a visual and audible signal at the control panel and indicating units.

4.2.4.1.2 Control panel shall be located on the navigation bridge or in the fire control station. An indicating unit shall be located on the navigation bridge if the control panel is located in the fire control station.

4.2.4.1.3 Clear information shall be displayed on or adjacent to the control panel and indicating units designating the spaces covered.

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

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

4.2.4.1.6 The system shall be so arranged as to automatically reset to the normal operating condition after alarm and fault conditions are cleared.

4.2.5 Testing

4.2.5.1 Suitable instructions and component spares shall be provided on ship-board for the system testing and maintenance.

4.2.5.2 After installation, the system shall be functionally tested using smoke generating machines or equivalent as a smoke source. An alarm shall be received at the control unit in not more than 180 s for vehicle decks, and not more than 300 s for container and general cargo holds, after smoke is introduced at the most remote accumulator.

4. *Sub-chapter 6.1.14 has been amended to read:*

6.1.14 Fixed Fire Detection and Fire Alarm System

6.1.14.1 Fixed fire detection and fire alarm system shall fulfil the relevant requirements specified in sub-chapter 4.1 and, additionally, the requirements specified in this sub-chapter.

6.1.14.2 Fixed fire detection and fire alarm system shall be capable of remotely and individually identifying each detector and manually operated call point. Fire detectors fitted in passenger ship cabins, when activated, shall also be capable of emitting, or cause to be emitted, an audible alarm within the space where they are located. On cabin balconies, the fixed fire detection and fire alarm system shall, as a minimum, have section identification capability.

6.1.14.3 The emergency source of power specified in paragraph 4.1.3.1 shall be sufficient to maintain the operation of the fire detection and fire alarm system for the periods required in sub-chapter 22.1.2 of *Part VIII – Electrical Installations and Control Systems*, and at the end of that period shall be capable of operating all the connected visual and audible fire alarm signals for a period of at least 30 min.

6.1.14.4 Fixed fire detection and fire alarm systems for cabin balconies shall be approved based on the guidelines developed by IMO¹⁾.

6.1.14.5 Cables routed through other main vertical zones that they serve, and cables to control panels in an unattended fire control station shall be fire resisting according to standard IEC 60331-1, unless duplicated and well separated.

6.1.14.6 Any section of detectors and manually operated call points shall not be situated in more than one main vertical zone, except on cabin balconies.

6.1.14.7 The control panel shall be located in the onboard safety centre.

6.1.14.8 Indicating unit that is capable of individually identifying each detector that has been activated or manually operated call point that has operated shall be located on the navigation bridge. On cabin balconies, indicating units shall, as a minimum, denote the section in which a detector has activated or manually operated call point has been operated.

¹⁾ See – guidelines for approval of fixed fire detection and fire alarm systems for cabin balconies (MSC.1/Circ.1242).