# RUSSIAN MARITIME REGISTER OF SHIPPING

| CIRCULAR LETTER | No. 313-14-1519c | dated 10.03.2021 |
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Re:

amendments to the Rules for the Classification and Construction of Sea-Going Ships, 2021, ND No. 2-020101-138-E in connection with implementation of requirements for multi-criteria fire detection and fire alarm systems

Item(s) of supervision:

ships under construction

| Entry-into-force date: | ~~Valid till:~~ | ~~Validity period extended till:~~ |
|---|---|---|
| **15.04.2021** | | |

| ~~Cancels / amends / adds Circular Letter No.~~ | ~~dated~~ |
|---|---|

Number of pages:     1 + 5

Appendices:

Appendix 1: information on amendments introduced by the Circular Letter

Appendix 2: text of amendments to Part VI "Fire Protection"

| Director General | Konstantin G. Palnikov |
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Text of CL:

We hereby inform that due to implementation of multi-criteria fire detection and alarm systems the Rules for the Classification and Construction of Sea-Going Ships shall be amended as specified in the Appendices to the Circular Letter.

It is necessary to do the following:

1. Bring the content of the Circular Letter to the notice of the RS surveyors, interested organizations and persons in the area of the RS Branch Offices' activity.

2. Apply the provisions of the Circular Letter during review and approval of the technical documentation on ships contracted for construction or conversion on or after 15.04.2021, in the absence of a contract, the keels of which are laid or which are at a similar stage of construction on or after 15.04.2021.

List of the amended and/or introduced paras/chapters/sections:

Part VI: paras 1.2.1, 4.1.2 – 4.1.4 and 4.2.4

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"Thesis" System No.     21-30787

**Information on amendments introduced by the Circular Letter
(for inclusion in the Revision History to the RS Publication)**

| Nos. | Amended paras/chapters/sections | Information on amendments | Number and date of the Circular Letter | Entry-into-force date |
|---|---|---|---|---|
| 1 | Para 1.2.1 | New definition "Dangerous factors of the fire" has been introduced. The definitions "Code on Alerts and Indicators" and "Section" have been transferred to new para 4.1.2 | 313-14-1519c of 10.03.2021 | 15.04.2021 |
| 2 | Paras 4.1.2 – 4.1.4 | New para 4.1.2 has been introduced containing definitions regarding fire detection and alarm systems. Existing paras 4.1.2 and 4.1.3 have been renumbered 4.1.3 and 4.1.4, accordingly | 313-14-1519c of 10.03.2021 | 15.04.2021 |
| 3 | Para 4.2.4 | New para 4.2.4 has been introduced containing requirements for multi-criteria fire detection and fire alarm systems | 313-14-1519c of 10.03.2021 | 15.04.2021 |

**RULES FOR THE CLASSIFICATION AND CONSTRUCTION
OF SEA-GOING SHIPS, 2021,**

**ND No. 2-020101-138-E**

**PART VI. FIRE PROTECTION**

**1 GENERAL**

1     **Para 1.2.1**. The definitions "Code on Alerts and Indicators" and "Section" are transferred to new para 4.1.2.

After the definition "Fire-fighting equipment and systems" the definition "Dangerous factors of the fire" is introduced reading as follows:

"Dangerous factors of the fire are fire factors which impact can lead to injury, poisoning or death of the person and/or to material damage;
Treat the dangerous factors of the fire influencing people and property:
flame and sparks;
thermal flow;
increased ambient temperature;
increased concentration of toxic products of burning and thermal decomposition;
lowered concentration of oxygen;
visibility reduction in smoke.".

**4 FIRE DETECTION AND ALARM SYSTEMS**

2     **New para 4.1.2** is introduced reading as follows:

"**4.1.2**     The following additional definitions and abbreviations have been adopted in this Part of the Rules.
Code on Alerts and Indicators, 2009 is the Code on Alerts and Indicators, as adopted by IMO resolution A.1021(26).
Delta-factor is a standardized change of the fire factor value at the early stage of fire development within the specified time period when the fire factor does not reach dangerous values.
Detection circuit is a set of assemblies or components of multi-criteria detector monitoring a fire factor changing during fire.
Fire alarm control and indicating equipment is a technical equipment designed to receive, process and display signals of fire detectors and other interacting devices, to control integrity and functionality of communication lines between the equipment and fire detectors or other devices.
Fire detector is a technical equipment designed to detect a fire factor and/or generate an alarm signal.
Depending on the method of actuation, the fire detectors are divided into automatic fire detectors and manual call points.
Automatic fire detector is a fire detector responding to one or several fire factors.
Depending on the mode of data exchange with the fire alarm control and indicating equipment, the automatic fire detectors are divided into threshold and analogue.

Depending on a type of the monitored fire signature, the automatic fire detectors are divided into:

heat detectors;

smoke detectors;

flame detectors;

gas detectors;

combination detectors.

Analogue detector is an automatic fire detector communicating to the fire alarm control and indicating equipment the data on a current value of the monitored fire factor.

Combination fire detector is an automatic fire detector responding to two or more physical fire factors and performing AND logic operations.

Flame detector is an automatic fire detector responding to electromagnetic radiation emitted by flame or smoldering fire.

Depending on electromagnetic spectrum detected by the sensitive element, the flame detectors are divided into:

ultraviolet (UV) detectors;

infrared (IR) detectors;

visible light detectors;

multiple detectors.

Gas detector is an automatic fire detector sensitive to the changes in the chemical composition of the atmosphere caused by the fire.

Heat detector is an automatic fire detector sensitive to a value of temperature and/or rate of temperature rise.

Depending on response to the monitored fire factor, the threshold heat detectors are divided into:

maximum detectors;

differential detectors;

differential-maximum detectors.

Fixed (maximum) temperature heat detector is an automatic threshold detector initiating an alarm when the ambient air temperature (operation temperature) exceeds the specified threshold value.

Heat differential detector is an automatic threshold detector initiating an alarm when the rate of temperature rise exceeds the specified threshold value.

Differential-maximum heat detector is an automatic threshold detector performing OR logic operations as the maximum temperature and heat differential detectors.

Manual call point is a fire detector designed for manual initiation of an alarm in the fire alarm loop.

Multi-criteria detector is an automatic fire detector containing one or several sensors that respond to the fire-caused physical environmental variables or that uses more than one sensor to detect a separate fire factor based on its different physical properties and that initiates an alarm independently or together with the fire alarm control and indicating equipment upon multi-criteria processing of the monitored data.

Depending on a type of the monitored fire factor, the detection circuits of multi-criteria detectors are divided into:

heat circuits;

smoke circuits;

flame circuits;

gas circuits.

Multi-criteria fire detection algorithm is a method of processing the signals initiated by one or several fire detectors for reliable identification of fire situation with regard to the several fire factor variables or several physical properties of one factor.

Multi-criteria fire detection and fire alarm system is a complex of automatic multi-criteria fire detectors and fire alarm control and indicating equipment forming onboard integrated system to implement multi-criteria fire detection algorithm.

Section is a group of fire detectors and manually operated call points as reported in the indicating unit(s).

Smoke detector is an automatic fire detector sensitive to particulate solid or liquid products of combustion and/or pyrolysis suspended in the atmosphere.

Depending on the principle of operation, the smoke detectors are divided into ionization and optical.

I o n i z a t i o n   s m o k e   d e t e c t o r is an automatic smoke detector sensitive to smoke particles (aerosol) capable of affecting ionization currents.

O p t i c a l   s m o k e   d e t e c t o r is an automatic smoke detector sensitive to combustion products capable of adsorbing, diffusing or reflecting optical emission of optical signal with the sensible area located in the restricted volume significantly less than the protected space.

T h r e s h o l d   d e t e c t o r is an automatic fire detector initiating an alarm when the monitored fire factor reaches or exceeds the specified threshold value.".

3      **Existing paras 4.1.2 and 4.1.3** are renumbered 4.1.3 and 4.1.4, accordingly.

4      **New para 4.2.4** is introduced reading as follows:

"**4.2.4    Multi-criteria fire detection and fire alarm systems.**
**4.2.4.1**    Multi-criteria fire detection and fire alarm systems, which primary purpose is similar to the threshold fire alarm systems based on the threshold principle of automatic fire detectors' operation subject to dangerous factors of the fire, may be installed instead of the fire detection and fire alarm systems required in 4.2.1 and, in addition to the requirements of this Chapter, shall meet the applicable requirements of 7.5, Part XI "Electrical Equipment".

**4.2.4.2**    Multi-criteria fire detection and fire alarm systems may operate under one of the signal processing  algorithms:
determined algorithm;
selectable algorithm.

Determined algorithm is a method of processing the signals initiated by fire detectors that is independent of a category of the protected spaces and a class of potential fire and, consequently, may be treated as the universal algorithm. Contrary to the hard algorithm, the selectable algorithm depends on a category of the protected space and a class of potential fire.

Herewith, each selected algorithm of signal processing may be applied exclusively to the specific categories of spaces, e.g., machinery spaces, storerooms, cabins, etc.

Switching of the signal processing algorithms (for detectors with selectable algorithm) shall be provided via switchpoints located on the detectors or programming (via communication lines). Switchpoints and connectors of communication lines for detector programming shall be inaccessible after their installation.

N o t e . It is recommended that the switchpoint (microswitch, jumper (bridge), etc.) shall be used inaccessible after installation of detectors or other engineering solutions blocking communication lines intended for detector programming.

**4.2.4.3**    Multi-criteria fire detectors interacting with the fire alarm control and indicating equipment shall meet the requirements 7.5.10.2 — 7.5.10.5 and 7.5.10.7, Part XI "Electrical Equipment".

The detectors, except for detectors with hard algorithm of signal processing, shall be able to switch on/off (block) each detection circuit via switchpoints or programming. This ability shall be unavailable after installation of the detectors. Performance of detectors with one activated detection circuit shall comply with the requirements for automatic fire detectors sensitive to the same physical environmental parameter as the activated circuit.

The detectors shall remain operational and maintain performance under all voltage and frequency variations specified in Table 2.1.3.1, Part XI "Electrical Equipment".

The detectors shall report on their failures to the fire alarm control and indicating equipment/panel.

**4.2.4.4**    In ship's spaces without permanent operational, production, process or natural non-fire factors triggering false response of fire detectors, the multi-criteria detectors with a complete set of detection circuits shall be used.

N o t e . The above non-fire factors include, e.g., dust, steam, water mist, oil mist, condensate, non-fire-related smoke from operating engine, exhaust gases from operating engines in spaces for transportation of vehicles, different heat sources, etc.

**4.2.4.5**    In ship's spaces with permanent or occasional non-fire factors specified in 4.2.4.4 and capable of triggering false response of fire detectors, fire detectors may be used with partially locked (disconnected) detection circuits sensitive to the specified factors.

In these spaces, the fire detectors with one relevant detection circuit non-sensitive to the permanent or occasional non-fire factors may be used. Herewith, fire alarms shall be generated with regard to requirements in 4.2.4.7.

**4.2.4.6** Multi-criteria system shall automatically generate a reliable fire alarm and terminate false responses caused by non-fire factors using processing of varying signals initiated by fire detectors located in one space (zone).

**4.2.4.7** Multi-criteria system shall automatically generate a fire alarm when one or several fire detectors detect(s) at least two dangerous factors of fire of different physical origin, herewith it is not important whether these factors are detected by one or several fire detectors. In both cases, the system shall generate a fire alarm.

At least two independent physical properties of a separate fire factor of the same physical origin may be also used as reliable justification for generation of a fire alarm.

For example, for flame detectors with two (IR and UV) detection circuits, a fire alarm shall be generated with mutual flame detection in IR and UV ranges.

**4.2.4.8** Fire alarm shall not be generated when one or several fire detectors detect(s) variation in one property of fire factor of the same physical origin.

**4.2.4.9** Equipment of multi-criteria fire detection and fire alarm system shall be tested in accordance with the requirements of 10.7.14, Part IV "Technical Supervision during Manufacture of Products" of the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships, considering requirements for fire tests of fire detectors specified in ISO/TS 7240-9:2012 "Fire detection and alarm systems – Part 9: Test fires for fire detectors".

For fire tests of multi-criteria fire detection and fire alarm systems with smoke and heat detection circuits, the following types of test fire points are used according to ISO/TS 7240-9:2012: TF1, TF2, TF3, TF4, TF5, TF8.

For fire tests of multi-criteria fire detection and fire alarm systems with gas and heat detection circuits, the following types of test fire points are used according to ISO/TS 7240-9:2012: TF2, TF3, TF4, TF5.

For fire tests of multi-criteria fire detection and fire alarm systems with smoke, gas and heat detection circuits, the following types of test fire points are used according to ISO/TS 7240-9:2012: TF1, TF2, TF3, TF4, TF5, TF8.

**4.2.4.10** Multi-criteria fire detectors with one detection circuit shall be installed in accordance with the requirements of Table 4.2.1.4.

**4.2.4.11** Multi-criteria fire detectors with two — four detection circuits shall be installed in accordance with the requirements of Table 4.2.1.4 for installation of smoke detectors.

**4.2.4.12** For multi-criteria system with determined algorithm generating a fire alarm based on delta-factor detection, the following normative threshold values shall be used:

by temperature — 5 °C;

by smoke — 0,5 % for 1 m;

by carbon monoxide — 10 ppm;

within the specified time period of 15 min.

Detection of delta-factor shall be automatically recorded by the fire alarm control and indicating equipment when the following condition is met:

$$\Delta\Phi \le \Phi_2 - \Phi_1 \tag{4.2.4.12}$$

where $\Delta\Phi$ — delta-factor;
$\Phi_2$ — current value of delta-factor;
$\Phi_1$ — retrospective value of delta-factor at the beginning of the specified time period in relation to the current value.".