

# **RULES**

## **FOR THE CLASSIFICATION AND CONSTRUCTION OF NUCLEAR SHIPS AND NUCLEAR SUPPORT VESSELS**

### **PART V**

#### **FIRE PROTECTION**

ND No. 2-020101-169-E



**St. Petersburg**  
**2022**

# **RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF NUCLEAR SHIPS AND NUCLEAR SUPPORT VESSELS**

---

Rules for the Classification and Construction of Nuclear Ships and Nuclear Support Vessels developed by Russian Maritime Register of Shipping (RS, the Register) have been approved in accordance with the established approval procedure and come into force on 1 October 2022.

The present edition is based on the 2022 edition of the Rules for the Classification and Construction of Nuclear Ships and Floating Facilities and on the 2017 edition of the Rules for the Classification and Construction of Nuclear Support Vessels, taking into account Circular Letters No. 110-312-1-1695c dated 04.02.2022 and No. 110-312-1-1702c dated 14.02.2022, amendments and additions developed immediately before publication.

The Rules set down specific requirements for the nuclear ships, nuclear support vessels and supplement the Rules for the Classification and Construction of Sea-Going Ships and the Rules for the Equipment of Sea-Going Ships of Russian Maritime Register of Shipping.

The Rules are published in the following parts:

- Part I "Classification";
- Part II "Safety Standards";
- Part III "Hull";
- Part IV "Stability. Subdivision";
- Part V "Fire Protection";
- Part VI "Nuclear Steam Supply Systems";
- Part VII "Special Systems";
- Part VIII "Electrical and Automation Equipment";
- Part IX "Radiation Safety";
- Part X "Physical Security".

**REVISION HISTORY**

(purely editorial amendments are not included in the Revision History)

For this version, there are no amendments to be included in the Revision History.

## **1 GENERAL**

**1.1** Requirements of this Part supplement the requirements of Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships<sup>1</sup>.

**1.2** Fire protection of the nuclear ship shall comply with all requirements of Part VI "Fire Protection" of the Rules for the Classification for passenger ships carrying over 36 passengers, and requirements of this Part.

**1.3** Fire protection of the nuclear support vessel<sup>2</sup> shall comply with the requirements of Part VI "Fire Protection" of the Rules for the Classification and requirements of this Part.

---

<sup>1</sup> Hereinafter referred to as "the Rules for the Classification".

<sup>2</sup> Hereinafter referred to as "the NS vessels".

## **2 STRUCTURAL FIRE PROTECTION**

**2.1** Reactor compartment, new fuel assemblies, irradiated fuel assemblies and radioactive waste storage facilities shall be separated from adjacent spaces by means of cofferdams or class A-60 bulkheads to provide protection against external fires and explosions.

**2.2** Structural fire protection of the controlled area spaces on the NS vessels that are not fitted with new fuel assemblies, irradiated fuel assemblies and radioactive waste storage facilities, shall meet the requirements of 2.3, Part VI "Fire Protection" of the Rules for the Classification.

**2.3** Only non-combustible materials shall be used in the reactor compartment and spaces where equipment for the SSS safe operation is located.

Combustible materials may be permitted as an exception if they cannot be replaced with non-combustible ones. Such an exception shall be approved by the Register in each case.

**2.4** Spaces within the shielding barrier where combustible materials are used or containing installations which require the use of combustible materials (except for cables and paint materials for painting spaces) shall be enclosed with class A-60 structures.

Passages of pipelines and electric cables in the shielding barrier shall provide gastightness and fire resistance equivalent to those for the shielding barrier structure.

**2.5** Trunks and vent ducts to the containment, shielding barrier and controlled area spaces shall be insulated to A-60 standard:

inside containment, shielding barrier and controlled area spaces — over the whole length;

outside containment, shielding barrier and controlled area spaces — at a length equal to the size of the trunk's (ventilation duct's) cross section.

When the trunks and vent ducts are fitted with fire dampers capable of automatic closing in case of fire and complying with the requirements of Part VII "Systems and Piping" of the Rules for the Classification, they may be insulated to A-0 standard.

**2.6** Double bottom tanks located in the reactor compartments, near new fuel assemblies, irradiated fuel assemblies or radioactive waste storage facilities shall not contain fuel.

Where double bottom tanks containing fuel are provided forward or aft of the reactor compartment and controlled area spaces, they shall be separated from double bottom space of the reactor compartment and controlled area spaces by means of cofferdams with structural elements to comply with the requirements of Part II "Hull" of the Rules for the Classification.

### **3 FIRE FIGHTING EQUIPMENT AND SYSTEMS**

**3.1** Water shall not be used as a fire-extinguishing medium in spaces within the containment and in the new fuel assemblies, irradiated fuel assemblies and radioactive waste storage facilities. The extinguishing medium shall not result in increase of the effective neutron multiplication factor (i.e. spontaneous nuclear chain reaction).

**3.2** The NPP control stations shall be fitted with fire-extinguishing systems in compliance with the requirements for control stations given in Table 3.1.2.1, Part VI "Fire Protection" of the Rules for the Classification.

**3.3** New fuel assemblies and irradiated fuel assemblies storage facilities shall be equipped with a fixed self-contained fire-extinguishing system. In addition to the mentioned system, provision shall be made for supplying extinguishing medium by the ship's fixed fire-extinguishing system.

## **4 FIRE ALARM SYSTEM**

**4.1** Fire alarm systems fitted on the nuclear ships and NS vessels shall be of a type approved by the Register and shall meet the requirements of this Section and of Section 4, Part VI "Fire Protection" of the Rules for the Classification.

**4.2 Fixed fire alarm systems.**

**4.2.1** In addition to 4.2.1, Part VI "Fire Protection" of the Rules for the Classification, fire alarm system shall be fitted:

**.1** in the containment, shielding barrier spaces and nuclear power unit control stations on nuclear ships;

**.2** in the controlled area spaces on the NS vessels;

**4.2.2** Fixed fire alarm system shall be fitted:

**.1** within containment for protection of the reactor plant instrument space. Fire detectors are not required in unmanned containment spaces (reactor plant space, cofferdams);

**.2** within the shielding barrier for protection of all controlled area spaces. Fire detectors shall be fitted for protection of the following:

SRW storage spaces;

fuel assemblies' storage facilities;

spaces for equipment and systems for collecting and discharge of radioactive waste;

spaces with fitted equipment, pipelines and valves of the primary and tertiary circuits;

decontamination spaces;

spaces used for work with contaminated equipment and radioactive media;

exhaust ventilation spaces;

decontamination stations;

contamination control station spaces;

automation spaces;

electric cable route corridors;

passage corridors, lobbies, etc.

**4.2.3** Fire detectors are not required in the shielding barrier and controlled area spaces with the minimum fire risk, e.g., in the transit pipeline corridors, steam pipeline corridors, LRW tank spaces, void spaces, shower rooms, etc.

**4.2.4** Use of alarm detectors based on ionizing radiation in high-radiation spaces shall be avoided.

**4.2.5** For protection of the containment spaces and shielding barrier spaces, the following shall be done:

**.1** fixed fire alarm system shall be fitted and arranged to provide smoke detection in service spaces and control stations within the shielding barrier, including corridors, lobbies, access trunks and escape routes as specified in 4.2.1.2.2.1, 4.2.1.2.2.3, 4.2.1.2.4, 4.2.1.2.7, Part VI "Fire Protection" of the Rules for the Classification;

**.2** automatic detectors shall be arranged in such a way as to provide their optimum efficiency as specified in 4.2.1.4, Part VI "Fire Protection" of the Rules for the Classification;

**.3** thermal detectors may be used in the reactor plant instrument spaces, exhaust ventilation spaces and in spaces where steam may be present. When using the thermal detectors, operation temperature shall be at least 20 °C higher than the maximum permissible air temperature in the space;

**.4** when the dominating fire factor is not determined, it is recommended to use a combination of fire detectors reacting to different fire factors or combined fire detectors.

**4.2.6** Automatic fire detectors fitted in the containment spaces and shielding barrier spaces shall meet the requirements in 7.5.10.1 — 7.5.10.3, 7.5.10.5, 7.5.10.7, Part XI "Electrical Equipment" of the Rules for the Classification.

**4.3 Manual alarm.**

**4.3.1** In addition to the requirements of 4.2.2, Part VI "Fire Protection" of the Rules for the Classification, manual alarm detectors shall be fitted in the containment and shielding barrier spaces as well as in control stations on the nuclear ships.

**4.3.2** Manual detectors shall be fitted in the passage corridors, lobbies, access trunks, decontamination spaces, spaces used for works with contaminated equipment and radioactive media (radiochemical laboratories).

**4.4** Cabling being part of the fire alarm system laid in the controlled area shall meet the requirements of Section 9, Part VIII "Electrical and Automation Equipment".



## **5 FIRE FIGHTING APPLIANCES**

**5.1** Containment spaces shall be equipped with CO<sub>2</sub> fire extinguishers as mentioned in Part VI "Fire Protection" of the Rules for the Classification.

Spaces of the central control station and shielding barrier shall be equipped with CO<sub>2</sub> fire extinguishers as mentioned in Part VI "Fire Protection" of the Rules for the Classification.

**5.2** The ship shall carry emergency escape breathing devices in amount sufficient for members of damage control team plus one emergency escape breathing device for training purposes.

Russian Maritime Register of Shipping

**Rules for the Classification and Construction  
of Nuclear Ships and Nuclear Support Vessels  
Part V  
Fire Protection**

FAI "Russian Maritime Register of Shipping"  
8, Dvortsovaya Naberezhnaya, 191186, St. Petersburg  
[www.rs-class.org/en/](http://www.rs-class.org/en/)