

# **RULES**

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

### **PART IV**

#### **STABILITY. SUBDIVISION**

ND No. 2-020101-169-E



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

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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** Stability and subdivision of nuclear ships and nuclear support vessels<sup>1</sup> shall comply in full with the requirements of Part IV "Stability" and Part V "Subdivision" of the Rules for the Classification and Construction of Sea-Going Ships<sup>2</sup> and requirements hereof.

**1.2** The nuclear ship and NS vessel designed for storage of new fuel assemblies and irradiated fuel assemblies and/or radioactive waste shall have unsinkability in case of flooding of at least two adjacent compartments.

**1.3** Definitions and explanations relating to adopted abbreviations and terms are given in Part I "Classification".

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<sup>1</sup> Hereinafter referred to as "the NS vessels".

<sup>2</sup> Hereinafter referred to as "the Rules for the Classification".

## **2 DAMAGED STABILITY OF NUCLEAR SHIP AND NS VESSEL WITH IRRADIATED FUEL ASSEMBLIES STORAGE FACILITY**

### **2.1 Damage extent.**

**2.1.1** When calculating damaged stability, the extent of side and bottom damage shall be assumed in compliance with 3.2.1, Part V "Subdivision" of the Rules for the Classification.

**2.1.2** With regard to collision, grounding and stranding protection in way of the reactor compartment (refer to 3.1, Part III "Hull"), the Register may accept less extents other than those specified in [2.1.1](#), provided the relevant calculations are submitted.

### **2.2 Permeabilities.**

**2.2.1** Permeabilities mentioned in Part V "Subdivision" of the Rules for the Classification shall be applied in assessment of damaged stability.

Permeability for cargo holds is taken to be 0,8.

**2.2.2** Permeabilities for the steam supply system spaces shall be determined with regard to actual flooding of these spaces.

### **2.3 Requirements to stability elements of the damaged nuclear ship.**

**2.3.1** Heel angle at the final stage of asymmetric flooding shall not exceed 15° before measures on righting are taken (actuation of valves fitted on crosspipes). This angle can be increased up to 17° provided that bulkhead deck is not submerged.

**2.3.2** Stability at the final stage of flooding is considered to be sufficient if the righting lever curve (GZ curve) has a range of at least 20° at the maximum righting lever of at least 0,2 m within the range specified. Area under the GZ curve within the same range shall be at least 3,5 cm × rad.

The ship shall be capable of maintaining sufficient stability at the intermediate stage of flooding.

**2.3.3** Crosspipes shall not be considered as arrangements to fulfill the requirements of [2.3.1](#) and [2.3.2](#).

**2.3.4** The asymmetric flooding shall be kept to the minimum by using effective heel stabilizing devices.

Spaces connected by means of large section ducts may be considered as common.

**2.3.5** Systems applied for stabilizing heel angles, whenever reasonable and practicable, shall be capable of automatic operation.

The cross piping, if any, shall be operable from a position above the bulkhead deck.

### **3 INFORMATION ON EMERGENCY GROUNDING AND STABILITY**

**3.1** Information on emergency grounding and stability as required by Part V "Subdivision" of the Rules for the Classification shall contain information for the Master as regards actions in case of damages greater than those specified in [2.1](#). Consequences of flooding caused by hull breach with depth to the centreline (for areas outside the reactor compartment) shall be considered.

#### **4 SUBDIVISION**

**4.1** In case of probability evaluation of subdivision according to Part V "Subdivision" of the Rules for the Classification, the  $R$  index shall be specially defined by the Register. Formulas for calculating  $S_c$  and  $S_m$  are selected as agreed upon with the Register with regard to the structural features and assumed operation of the ship.

**4.2** Subdivision requirements for the NS vessel designed for other purposes than those referred to in [1.2](#) are subject to consideration by the Register, having regard to the purpose, design and service area of the vessel, but, in any case, intact stability shall be sufficient to meet the requirements of the Rules for the Classification and Construction of Nuclear Ships and Nuclear Support Vessels for damage stability in case of side and/or bottom damage in any place lengthwise between two nearest bulkheads.

Russian Maritime Register of Shipping

**Rules for the Classification and Construction  
of Nuclear Ships and Nuclear Support Vessels  
Part IV  
Stability. Subdivision**

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