

# RULES

## FOR THE CLASSIFICATION AND CONSTRUCTION OF SMALL SEA FISHING VESSELS

### PART IX MACHINERY

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# **RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF SMALL SEA FISHING VESSELS**

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Rules for the Classification and Construction of Small Sea Fishing Vessels of Russian Maritime Register of Shipping (RS, the Register) have been approved in accordance with the established approval procedure and come into force on 1 January 2022.

The present edition of the Rules is based on the 2021 edition taking into account the amendments and additions developed immediately before publication.

The Rules are published in the following parts:

Part I "Classification";

Part II "Hull";

Part III "Equipment, Arrangements and Outfit";

Part IV "Stability and Freeboard";

Part V "Subdivision";

Part VI "Fire Protection";

Part VII "Machinery Installations";

Part VIII "Systems and Piping";

Part IX "Machinery";

Part X "Boilers, Heat Exchangers and Pressure Vessels";

Part XI "Electrical Equipment";

Part XII "Refrigerating Plants";

Part XIII "Materials";

Part XIV "Welding";

Part XV "Automation";

Part XVI "Structure and Strength of Fiber-Reinforced Plastic Ships";

Part XVII "Radio Equipment";

Part XVIII "Navigational Equipment".

**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 APPLICATION**

**1.1.1** Requirements of this Part of the Rules for the Classification and Construction of Small Sea Fishing Vessels<sup>1</sup> apply to the following engines and machinery:

- .1** internal combustion engines, main;
- .2** gears and couplings;
- .3** engines driving electric generators or auxiliary and deck machinery, units in assembly;
- .4** pumps included into the systems covered by Parts VI "Fire Protection", VIII "Systems and Piping" and XII "Refrigerating Plants" of the Rules for the Classification and Construction of Sea-Going Ships<sup>2</sup>;
- .5** air compressors;
- .6** fans included into the systems covered by Part VIII "Systems and Piping" of the Rules for the Classification;
- .7** steering gear;
- .8** anchoring and mooring machinery;
- .9** hydraulic drives;
- .10** separators for fuel and oil.

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<sup>1</sup> Hereinafter referred to as "these Rules".

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

## **1.2 SCOPE OF SUPERVISION**

**1.2.1** Engines and machinery indicated in [1.1.1](#) shall be manufactured under the Register supervision in compliance with the requirements stipulated in Part IX "Machinery" of the Rules for the Classification and have the respective certificates.

### **1.3 GENERAL REQUIREMENTS**

**1.3.1** Machinery indicated in [1.1.1](#) shall remain operative under the conditions specified in 2.2, Part VII "Machinery Installations" of these Rules.

**1.3.2** The machinery parts that are in contact with a corrosive medium shall be made of an anticorrosive material or shall have corrosion-resistant coatings.

**1.3.3** V-belt drive from the main engine shall provide safe operation of the drive in case one of the belts is broken.

**1.3.4** Materials intended for manufacture of the machinery parts shall comply with the requirements of 1.6, Part IX "Machinery" of the Rules for the Classification.

## **2 INTERNAL COMBUSTION ENGINES**

### **2.1 GENERAL PROVISIONS**

**2.1.1** The requirements of this Section are applicable to the engines of 55 to 375 kW power output. The requirements to the internal combustion engines with power output less than 55 kW apply in the scope agreed with the Register.

**2.1.2** The engines intended to be used as main engines shall comply with the requirements of Part VII "Machinery Installations" of these Rules.

**2.1.3** Fuel oil, lubricating oil pipes, fittings, flanged connections, filters shall be protected so that in case of their failure petroleum products falling on hot surfaces with the temperature of 220 °C and above is prevented.

**2.1.4** The air intake pipes of engines and scavenging-and-supercharging units shall be fitted with safety gauzes.

**2.1.5** Electrically started engines shall be equipped with engine-driven generators for automatic charging of starting storage batteries.

**2.1.6** Each main engine shall have a speed governor so adjusted that the engine speed cannot exceed the rated speed by more than 15 %.

**2.1.7** Protection system of main and auxiliary engines shall provide complete fuel cut-off when the oil pressure in the system drops below the allowable value.

**2.1.8** Main and auxiliary engines shall be equipped with the following instruments for measuring:

- .1** oil pressure at engine inlet (before and after filter);
- .2** oil temperature at the engine inlet and outlet;
- .3** air pressure at the starting device inlet;
- .4** fresh water pressure at the engine outlet;
- .5** scavenging (supercharging) receiver pressure;
- .6** exhaust gas temperature in front of turbocharger and behind it;
- .7** crankshaft speed, and for main engines and engines with disengaging couplings and reversereduction gear, also with indicators of the direction of propeller shaft rotation;
- .8** alarm device with audible and visual signals for the failure of lubricating oil system.

*Note.* It is recommended to install the warning alarms on achievement of the maximum limiting coolant temperature at the engine outlet.

### **3 GEARS, DISENGAGING AND ELASTIC COUPLINGS**

#### **3.1 GENERAL**

**3.1.1** The requirements of the present Section apply to gearing, elastic and disengaging couplings of the main engines and auxiliary machinery drives.

**3.1.2** The gearing cases shall be provided with ventilating arrangements. When the ventilating ducts are led to the deck, the possibility of water getting inside shall be prevented.

**3.1.3** Where the main thrust bearing is housed in the gearing case, the lower part of the case shall have proper strengthening.

**3.1.4** It is recommended to fit the gear drives with throats with easy-dismountable covers for examination of gear teeth and bearings.

**3.1.5** Provision shall be made for forced lubrication or lubrication by spraying of the tothing and bearings.

**3.1.6** Provision shall be made for a meter of oil level within the reduction gear casing, and for pressure and temperature meters in case of forced lubrication.

**3.1.7** Control stations of gearing and disengaging couplings shall comply with the requirements of Part VII "Machinery Installations" of these Rules.

**3.1.8** It shall be possible to control the disengaging couplings of main machinery from the stations, from which the main machinery is controlled. It is recommended to provide standby (emergency) control arrangements directly at the disengaging couplings.

**3.1.9** The ultimate static moment of the elastic coupling material, i.e. rubber or similar synthetic material, being in shear or tension, shall be at least eight times the torque transmitted by the coupling operating in the ship's shafting.



## **4 AUXILIARY MACHINERY**

### **4.1 AIR COMPRESSORS**

**4.1.1** Air compressors shall be so designed that the air temperature at the outlet of the air cooler is not in excess of 90 °C. The compressor cooling water spaces shall be fitted with drain arrangements.

**4.1.2** Each compressor stage or directly after it shall be fitted with a safety valve preventing the pressure rise in the stage above 10 % of the rated pressure when the delivery pipe valve is closed. The safety valve design shall prevent any possibility of its adjustment or disconnection after being fitted on the compressor.

**4.1.3** The casings of the coolers shall be fitted with safety devices providing for a free escape of air in case the pipe are broken.

**4.1.4** A pressure gauge shall be fitted at the air outlet after each stage of the compressor.

## **4.2 PUMPS**

**4.2.1** Provision shall be made to prevent the pumped fluid from penetration to the pump bearings, except for the pumps where the pumped fluid is employed for lubrication of bearings.

**4.2.2** If the pump design does not preclude the possibility of pressure rising above the rated value, a safety valve shall be fitted on the pump casing or on the pipe before the first stop valve.

**4.2.3** In pumps intended for transferring of flammable liquids, the by-pass from safety valves shall be effected into the suction side of the pump or to the suction pipe.

**4.2.4** Sealing of shaft of the flammable liquid transfer pump shall prevent leakages or their number shall be minimal and shall not produce the flammable air/gas mixture.

### **4.3 CENTRIFUGAL SEPARATORS**

**4.3.1** The requirements of Part VII "Machinery Installations" of the Rules for the Classification shall be followed during installation of centrifugal separators, and their design shall comply with the requirements of Part IX "Machinery" of the Rules for the Classification.

## **5 DECK MACHINERY**

### **5.1 GENERAL**

**5.1.1** The machinery having both manual and power drives shall be provided with interlocking arrangements preventing their simultaneous operation.

**5.1.2** The machinery with the hydraulic drive or control shall also comply with the requirements of [Section 6](#).

**5.1.3** Deck machinery may be driven by the main engine via hydraulic or mechanical gear, provided all the safety regulations are observed. V-belt gear from the main engine shall provide safe operation of the drive in case one of the belts is broken.

## 5.2 STEERING GEAR

**5.2.1** Main and auxiliary steering gear shall be so designed that a single failure in one of them will not render the other one inoperative.

**5.2.2** Steering gears shall provide a continuous operation under the most severe service conditions. Design of the steering gear shall exclude the possibility of its failure with the ship running astern at the maximum speed.

**5.2.3** As a rated torque of the steering gear  $M_r$ , the torque is taken corresponding to the rudder (steering nozzle) angle equal to 35° for the main steering gear and 15° for the auxiliary steering gear when operating under the nominal parameters.

**5.2.4** The main steering gear shall be capable of putting the rudder over from 35° on one side to 30° on the other side in not more than 28 s when the rudder stock is affected by a rated torque of the steering engine.

**5.2.5** The main hand-operated steering gear shall comply with the requirements of 2.9.3, Part III "Equipment, Arrangements and Outfit" of these Rules.

**5.2.6** The main steering gear shall have protection against overloads of the gear elements and assemblies when the rudder stock torque equal to 1,5 times the corresponding rated value arises. In case of hydraulic steering gear the safety valves may be used set to provide protection against overloads but not in excess of 1,25 times the corresponding maximum working pressure in the inner spaces of the hydraulic steering gear. The maximum capacity of the safety valves shall exceed the total pump capacity by 10 %.

**5.2.7** For the main hand-operated steering gear it is sufficient to provide the gear with buffer springs instead of the protection against overload.

**5.2.8** Each power-operated steering gear shall be provided with a device discontinuing its operation before the rudder (steering nozzle) reaches the rudder (steering nozzle) stops.

**5.2.9** The steering gear segment rack or the element rigidly coupled with the rudder shall be fitted with a dial calibrated in not more than 1° to indicate the actual position of the rudder.

**5.2.10** For the strength calculation it is assumed that the reference stresses in the components shall not exceed 0,4 of yield stress for the steel components and 0,18 of yield stress for the components made of spheroidal cast iron; the steering gear elements unprotected from overloads by safety devices shall have the strength corresponding to the rudder stock strength.

**5.2.11** The connection of the steering engine or gear with the elements coupled with the rudder stock shall eliminate the possibility of breakdown on the steering gear when the rudder stock is shifted in the axial direction.

### **5.3 ANCHOR MACHINERY**

**5.3.1** Installation of hand-operated anchor machinery on ships with Equipment Number 205 and less is allowed in compliance with the requirements of 3.6, Part III "Equipment, Arrangements and Outfit" of these Rules.

**5.3.2** Anchor machinery design shall meet the applicable requirements in 6.3, Part IX "Machinery" of the Rules for the Classification.

## **6 HYDRAULIC DRIVES**

### **6.1 GENERAL**

**6.1.1** Connecting of hydraulic steering gear pipelines and those of hydraulic power systems of controlled pitch propeller to other hydraulic systems is not permitted.

**6.1.2** The hydraulic system failure shall not cause the failure of machinery or arrangement.

## **6.2 STRENGTH CALCULATION**

**6.2.1** The hydraulic machinery elements situated in lines of force flow shall be checked under the stresses corresponding to the working pressure. In this case, the reference stresses in elements shall not exceed 0,4 of the element material yield stress.

**6.2.2** In cases specified at the maximum loads of steering gear and gear of anchor machinery, the elements shall be checked for strength under the stresses corresponding to the opening pressure of the safety valves. In this case, the reference stresses in elements shall not exceed 0,95 element material yield stress.

**6.2.3** The pipes and fittings of the hydraulic systems shall comply with the requirements of Part VIII "Systems and Piping" of the Rules for the Classification.



### **6.3 SAFETY AND OTHER ARRANGEMENTS**

**6.3.1** The hydraulic machinery shall be protected by safety valves, while operating pressure shall not exceed 1,1 times of the maximum rated pressure, except for the cases specified in [5.2.6](#).

**6.3.2** The working fluid from the safety valves shall be led to the drain pipeline or drain tank.

**6.3.3** Arrangements for complete air expulsion when filling the machinery and pipelines with the working fluid and filters of appropriate capacity shall be provided. For continuously operating hydraulic systems (steering gear, hydraulic couplings, etc.) provision shall be made for filter cleaning without interruption of the system operation.

**6.3.4** Seals between fixed parts of the mechanism shall be of "metal on metal" type, and seals between moving parts forming a part of external pressure limit shall be doubled in such a way that the failure of one seal would not disable the executive actuator. Application of the alternative arrangements providing the equivalent leakage protection shall be technically justified.

**6.3.5** The hydraulic machinery shall be provided with a sufficient amount of the instruments to monitor its operation.

Russian Maritime Register of Shipping

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Part IX  
Machinery**

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