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Working Party on the Standardization of Technical and
Safety Requirements in Inland Navigation
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**AMENDMENT OF THE RECOMMENDATIONS ON TECHNICAL
REQUIREMENTS FOR INLAND NAVIGATION VESSELS
(ANNEX TO RESOLUTION No. 17, REVISED)**

Addendum 1

Note: Reproduced below are the Rules for the Classification and Construction of Inland Navigation Vessels (chapter 1, section 15 of the Russian River Register) (Bulletin No. 1 of addenda and amendments to the Rules of the Russian River Register, adopted by decision of the Ministry of Transport of the Russian Federation No. NS-183r of 31 December 2003 and brought into force on 31 March 2004).

15 MANOEUVRABILITY

15.1 APPLICABILITY

15.1.1 This section sets out manoeuvrability requirements for displacement vessels, which apply to:

- .1** Self-propelled cargo vessels that are 40 metres long or more;
- .2** Displacement passenger vessels, small general-service craft¹ and special-purpose vessels that are 20 metres long or more.

15.1.2 The requirements in this section do not apply to pushed convoys, vessels in formation, catamarans or vessels with water-jet or cycloidal propellers or paddle wheels.

15.2 DEFINITIONS AND EXPLANATIONS

15.2.1 The terms used in this section should be understood as follows:

- .1** Propulsion and steering system - the propeller and its steering devices (rudders and/or nozzles);
- .2** Vessel propulsion and steering system - all the propulsion and steering systems that are present on the vessel and ensure its longitudinal movement and manoeuvrability;
- .3** Turning capacity - the vessel's ability to turn within a fairly small radius of curvature;
- .4** Directional stability - the vessel's ability to maintain the chosen straight course in deep still water;
- .5** Manoeuvrability under wind conditions - the vessel's ability to:
 - Maintain any chosen straight course while all propellers are rotating at rated speed and the wind velocity in the navigational zone does not exceed that indicated in 15.9.2;
 - Turn on the spot in the chosen direction under wind conditions by simultaneously operating the main controls and the bow steering device;
- .6** Manoeuvrability with propellers not in operation - the vessel's ability to mechanically maintain a straight course under its own momentum, to turn in the chosen direction and to invert the direction of the turn;
- .7** Emergency stopping - quickly changing the operating mode of all the propellers from full speed ahead to full speed astern in deep still water, when loaded as indicated in 15.3.2.

15.3 GENERAL INSTRUCTIONS FOR SETTING MANOEUVRABILITY STANDARDS

15.3.1 A vessel is considered to meet the manoeuvrability requirements set out in this section if, when loaded in accordance with 15.3.2, it satisfies the following criteria:

- .1 Turning capacity (see 15.5);
- .2 Directional stability (see 15.6);
- .3 Manoeuvrability with propellers not in operation (see 15.7);
- .4 Emergency stopping (see 15.8);
- .5 Manoeuvrability under wind conditions (see 15.9).

15.3.2 The manoeuvrability test shall be conducted when the vessel is fully loaded, with an even-keel trim, and fully stocked and refuelled.

Manoeuvrability tests for cargo vessels under wind conditions in accordance with 15.9.2.1 shall be conducted only for vessels in ballast, without cargo, and with 10% of stock and fuel.

Manoeuvrability tests for passenger vessels under wind conditions in accordance with 15.9.2.1 shall be conducted only for vessels without cargo or passengers, and with 10% of stock and fuel.

15.3.3 The vessel manoeuvrability criteria set out in this section apply to vessels with the following types of propulsion and steering systems:

- .1 Screw propellers in steering nozzles;
- .2 Screw propellers in steering nozzles with a centre rudder;
- .3 Rudders behind uncovered screw propellers;
- .4 Rudders behind nozzle propellers.

Manoeuvrability criteria values for vessels with the propulsion and steering systems listed are calculated in accordance with the instructions set out in the **“Manual for calculating manoeuvrability and conducting full-scale manoeuvrability tests on inland and combined navigation vessels”** (hereinafter referred to as the Manual).

15.3.4 Other well-founded methods can be used to determine manoeuvrability criteria for vessels with the propulsion and steering system types indicated in 15.3.3; the calculation performed in accordance with the Manual shall be submitted to the River Register at the same time.

15.3.5 Methods of determining manoeuvrability criteria for vessels with propulsion and steering system types not indicated in 15.3.3 shall be the subject of special consideration by the River Register.

15.3.6 Criteria for assessing a vessel's turning capacity, directional stability and manoeuvrability with propellers not in operation can also be determined by:

- .1 Testing an autonomous self-propelled vessel model which is geometrically similar to the vessel;
- .2 Conducting full-scale tests in accordance with the Manual.

In these cases, criteria values do not have to be calculated.

15.4 TABLE OF MANOEUVRABILITY CHARACTERISTICS

15.4.1 To facilitate speedy reference, a table of each vessel's manoeuvrability characteristics shall be posted in a visible place in the deckhouse.

15.4.2 The table shall be drawn up by the organization responsible for the design of the vessel, and the results of the calculations shall be supplemented or corrected on the basis of data from full-scale tests and tests with self-propelled models.

15.4.3 The form of the table is given in the Manual.

15.5 TURNING CAPACITY

15.5.1 In these Rules, the criterion for measuring turning capacity is the minimum relative mean steady-turning diameter $(D_t/L)_{\min}$, measured from the centre of gravity, that is, the ratio between the diameter D_t of the smallest possible turn which the vessel can make in deep still water and the length L of the vessel at the DWL,² where the speed of rotation of all the propeller screws is the same prior to the commencement of the manoeuvre and is not subsequently regulated.

15.5.2 The vessel's turning capacity is considered to satisfy the requirements set out in the Rules if the relative steady-turning diameter satisfies the condition

$$(D_t/L)_{\min} \leq 2. \quad (15.5.2)$$

15.6 DIRECTIONAL STABILITY

15.6.1 In these Rules, the criterion for measuring directional stability is the minimum relative mean steady-turning diameter, measured from the centre of gravity, which the vessel makes in deep still water with the rudder angle at zero and all propeller screws rotating at the same speed.

15.6.2 The vessel's directional stability is considered to satisfy the requirements set out in the Rules if the steady-turning diameter is 10 or more times the vessel's length, and also if the vessel continues to move on a straight course without turning, with the rudder angle at zero.

15.7 MANOEUVRABILITY WITH PROPELLERS NOT IN OPERATION

15.7.1 The criterion for measuring manoeuvrability with propellers not in operation is the vessel's capacity to come out of a steady turn, made with the rudder at a 20° angle, after the main propellers have stopped, without using the steering device.

15.7.2 The vessel is considered to satisfy the requirements set out in the Rules if it can be taken out of a steady turn, made with the rudder at a 20° angle, after the main propellers have stopped, by operating the main controls, without using the steering device.

15.8 EMERGENCY STOPPING CAPACITY

15.8.1 The criterion for measuring emergency stopping capacity is the vessel's stopping course S_{AT} - the distance, m, which the vessel travels relative to the water from the moment when the order to make an emergency stop is given to the moment when the vessel has come to a complete stop relative to the water.

15.8.2 The vessel is considered to satisfy the requirements set out in this section if the stopping course S_{AT} , m, satisfies the condition

$$S_{AT} = 30.7 \sqrt[3]{V} + 1.28L, \quad (15.8.2)$$

where V is the displacement of the vessel, m³;

L is the length of the vessel, m.

15.9 MANOEUVRABILITY UNDER WIND CONDITIONS

15.9.1 The criteria for measuring manoeuvrability under wind conditions are:

- .1** Wind velocity in navigational zone, m/s, which allows the vessel to move along any chosen straight course with all propellers rotating at the rated speed;
- .2** The specific thrust of the steering device, kN/m², required for the vessel to turn on the spot using the main controls and the steering device.

The specific thrust of the steering device of a cargo vessel is the ratio $T_E/(L \cdot T)$ between the thrust of the steering device T_E , kN, and the product of the length of the vessel at the DWL L and the full-load draught T . The specific thrust of the steering device of a passenger vessel is the ratio T_E/S between the thrust of the steering device T_E , kN, and the sail area S , m².

15.9.2 The vessel's manoeuvrability under wind conditions is considered to satisfy the requirements set out in 15.9.1.1 if the wind velocity in the navigational zone which still allows the vessel to move on any chosen straight course with all the propellers rotating at rated speed is:

For "M" and "O" class vessels - no less than 19 m/s;

For "P" and "L" class vessels - no less than 14 m/s.³

15.9.3 The requirement set out in 15.9.1.2 shall be met by installing a bow steering device on the vessel with a specific thrust of no less than the following:

For cargo vessels:

$$T_E (L \cdot T) = 0.03; (15.9.3-1)$$

For passenger vessels with $SL \geq 20,000 \text{ m}^3$

$$T_E/S = 0.04. (15.9.4-2)$$

15.10 FULL-SCALE TESTS

15.10.1 Full-scale tests designed to determine whether the vessel's manoeuvrability is in compliance with the requirements set out in the Rules, as well as additions and corrections to the table of the vessel's manoeuvrability characteristics, must be effected together with acceptance tests:

- .1 On the prototypes of series-built vessels;
- .2 On individually built vessels;
- .3 On vessels that have been repaired, re-equipped or modernized, if this can alter their manoeuvrability.

15.10.2 Full-scale tests must be carried out in accordance with 15.3.2. Deviations with regard to draught must not exceed 10%.

15.10.3 Full-scale manoeuvrability tests on location shall be conducted in deep still water (the depth of the water in the test area must be no less than three times the draught of the vessel), with waves no greater than 1-2 points⁴ and wind velocity no greater than 3-4 m/s.

15.10.4 Full-scale manoeuvrability tests on location shall be conducted using the programme drawn up on the basis of the instructions set out in the Manual and in the appropriate Russian River Register Technical Regulations.⁵

Notes

- ¹ A small general-service craft is a vessel designed to carry no more than 12 passengers.
- ² DWL = design waterline.
- ³ Chapter 1 of the annex to Resolution No. 17, revised, provides that in the Russian Federation, navigational zones 1, 2 and 3 correspond to zones O, P and L, respectively. Zone M covers waters where wave height can reach 3m.
- ⁴ On the scale of the Central Hydrometeorological Department of the Russian Federation.
- ⁵ Technical Regulations for monitoring vessel construction and materials and goods manufacture.
