RUSSIAN MARITIME REGISTER OF SHIPPING

CIRCULAR LETTER **No. 391-06-1384c** dated 27.04.2020

Re:

amendments to the Rules for Planning and Execution of Marine Operations, 2017, ND No. 2-090601-006-E

Item(s) of supervision:

technical documentation on marine operations designs

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

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Appendices:

Appendix 1: information on amendments introduced by the Circular Letter

Appendix 2: text of amendments to Part III "Special Requirements"

Director General Konstantin G. Palnikov

Text of CL:

We hereby inform that the Rules for Planning and Execution of Marine Operations 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 of the technical documentation on marine operations designs.

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

Part III: paras 4.3.2.1, 4.3.3.2, 4.3.3.3, 4.3.4.4, 4.3.5, 4.3.6, 4.3.7.1, 4.5.2, 4.5.4, 4.5.7 – 4.5.10 and 6.1.2

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Appendix 1 to Circular Letter
No. 391-06-1384c dated 27.04.2020

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	Part III, para 4.3.2.1	The unit for design resistance in calm water has been specified	391-06-1384c of 27.04.2020	27.04.2020
2	Part III, para 4.3.3.2	The unit of design value of added resistance in waves has been specified. Formula (4.3.2.3-4) has been renumbered (4.3.3.2-4) (for the Russian version only). Table 4.3.2.3 has been renumbered 4.3.3.2	391-06-1384c of 27.04.2020	27.04.2020
3	Part III, para 4.3.3.3	The explications for Formulae (4.3.3.3-2) and (4.3.3.3-3) have been specified	391-06-1384c of 27.04.2020	27.04.2020
4	Part III, para 4.3.4.4	The unit of aerodynamic resistance due to wind has been specified. The formula and the explication have been amended	391-06-1384c of 27.04.2020	27.04.2020
5	Part III, para 4.3.5	Formula (4.3.5-1) and the explication have been amended. The explication to Formula (4.3.5-6) has been amended. The symbol of the Froude number has been specified. Formula (4.3.5-7) has been deleted. Formulae (4.3.5-8) and (4.3.5-9) have been renumbered (4.3.5-7) and (4.3.5-8), accordingly	391-06-1384c of 27.04.2020	27.04.2020
6	Part III, para 4.3.6	Formula (4.3.6-1) has been amended. Table 4.3.6 has been supplemented by the Note	391-06-1384c of 27.04.2020	27.04.2020

Nos.	Amended paras/chapters/sections	Information on amendments	Number and date of the Circular Letter	Entry-into-force date
7	Part III, para 4.3.7.1	Number of the para has been deleted. Formula (4.3.7.1-1) and the explication to Formula (4.3.7.1-2) have been amended. Formulae (4.3.7.1-1) and (4.3.7.1-2) have been renumbered (4.3.7-1) and (4.3.7-2), accordingly	391-06-1384c of 27.04.2020	27.04.2020
8	Part III, para 4.5.2	Calculation of the towline pull required has been amended	391-06-1384c of 27.04.2020	27.04.2020
9	Part III, para 4.5.4	Calculation of the tug efficiency has been amended	391-06-1384c of 27.04.2020	27.04.2020
10	Part III, paras 4.5.7 – 4.5.10	Para 4.5.7 has been deleted. Paras 4.5.8 – 4.5.10 have been renumbered 4.5.7 – 4.5.9, accordingly	391-06-1384c of 27.04.2020	27.04.2020
11	Part III, para 6.1.2	Conditions for developing the installation design have been specified	391-06-1384c of 27.04.2020	27.04.2020

RULES FOR PLANNING AND EXECUTION OF MARINE OPERATIONS, 2017,

ND No. 2-090601-006-E

PART III. SPECIAL REQUIREMENTS

4 TRANSPORTATION/TOWING OF THE OBJECT

1 **Para 4.3.2.1**. The first paragraph is replaced by the following text:

"**4.3.2.1** The most accurate method for calculating R_{CW}, in kN, is the model basin test which allows to consider hull shape peculiarities of the object.".

2 **Paras 4.3.3.2 and 4.3.3.3** are replaced by the following text:

"**4.3.3.2** The value of R_{AW}, in kN, for objects of type 1 may be determined by the following formulae:

object with vertical front wall:

$$R_{AW} = \frac{Bh_p}{4}\left[\sqrt{\frac{2\pi g}{\lambda}} \cdot \frac{h_p}{2} + V\right]^2; \qquad (4.3.3.2\text{-}1)$$

object with a hull undercut in the fore end for the case when the wave amplitude remains within the undercut:

$$R_{AW} = \frac{Bh_p}{4}\left[\sqrt{\frac{2\pi g}{\lambda}} \cdot \frac{h_p}{2} + V\right]^2 \cdot \sin^2\psi; \qquad (4.3.3.2\text{-}2)$$

object with a hull undercut in the fore end for the case when the wave amplitude exceeds the undercut height:

$$R_{AW} = \frac{Bh_p}{4}\left[\sqrt{\frac{2\pi g}{\lambda}} \cdot \frac{h_p}{2} + V\right]^2 \cdot \left[1 - \left(\frac{h_p/2 + c}{h_p}\right)^2 \cdot \left(1 - \sin^2\psi\right)\right], \qquad (4.3.3.2\text{-}3)$$

where B = breadth of the towed object, in m;
$h_p = h_{3\%}/k_1$ is a design wave height, in m;
$h_{3\%}$ = wave height with 3 per cent probability, in m;
k_1 = reduction factor depending on V and obtained from Table 4.3.3.2;
for V, refer to Formula (4.3.2.1-3);

Table 4.3.3.2

Towing speed V, in knots	k_1
2	1,20
4	1,30
6	1,45

$$\lambda = 1{,}56\ T_z^2, \qquad (4.3.3.2\text{-}4)$$

where λ = wave length, in m;
T_z = average wave period, in s;

c = distance between undercut in the fore end and waterline of floatation (when $c < h_p/2$), in m;
ψ = angle of the front wall inclination to the base line of the object.

When the data on T_z are unavailable, it is recommended to assume $\lambda = L$ where *L* is the object length, in m.

4.3.3.3 For objects of type 2, it is recommended to obtain added resistance in irregular waves for different values of the Froude number from the relationships shown in Fig. 4.3.3.3.

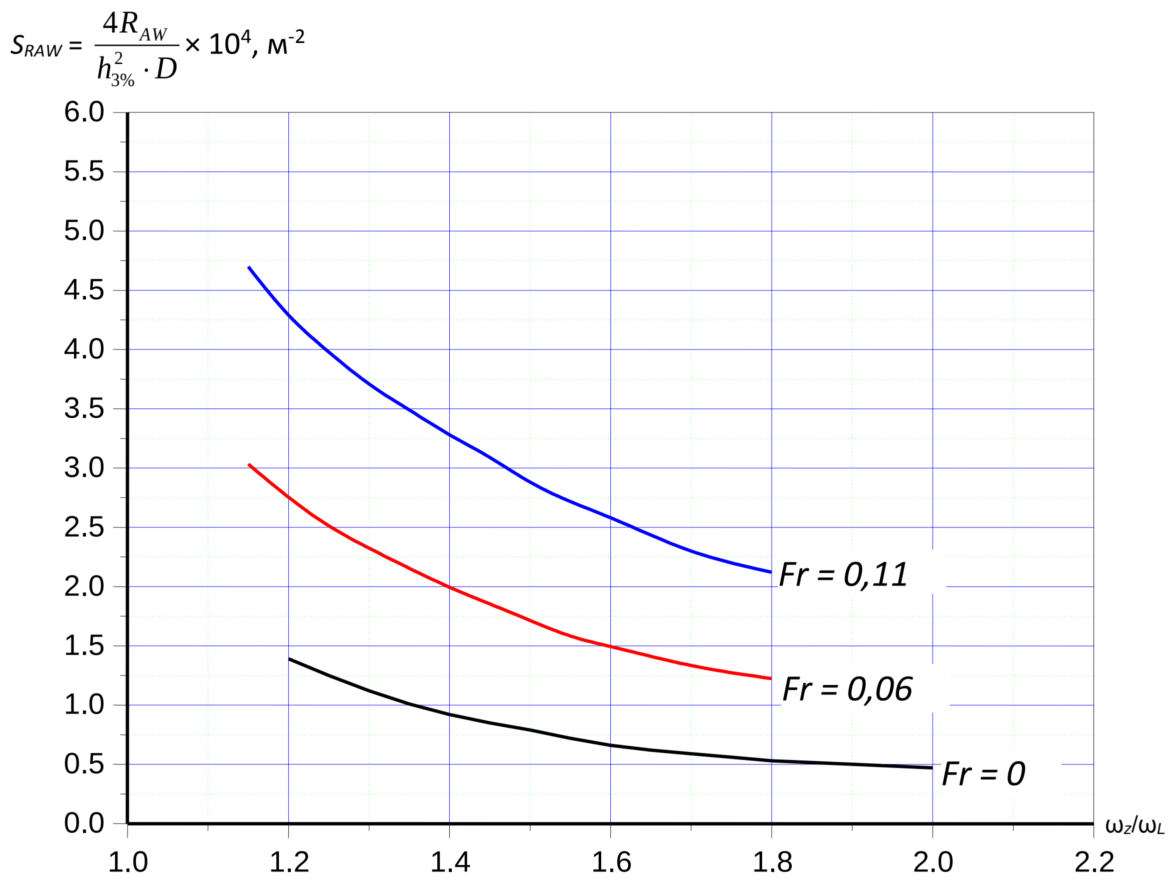

Fig. 4.3.3.3
Relationship between the relative added resistance for object of type 2 being towed through waves and the dimensionless average wave frequency

$$S_{RAW} = \frac{4R_{AW}}{h_{3\%}^2 \cdot D}, \qquad (4.3.3.3\text{-}1)$$

where S_{RAW} = relative added resistance in waves, in 1/m^2;
R_{AW} = added resistance in waves, in kN (refer to 4.3.3.2);
D = weight displacement of the object, in kN;
ω_z/ω_L = dimensionless wave frequency;

$$\omega_z = 2\pi/T_z, \qquad (4.3.3.3\text{-}2)$$

where ω_z = average wave frequency, in 1/s;
for T_z, refer to Formula (4.3.3.2-4);

$$\omega_L = \sqrt{\frac{2\pi g}{L}}, \qquad (4.3.3.3\text{-}3)$$

where ω_L = wave frequency with the length of the wave equal to the length of the object, in 1/s;
for *L* and *Fr*, refer to Formula (4.3.2.1-3).".

3 **Para 4.3.4.4** is replaced by the following text:

"**4.3.4.4** To determine the approximate value of R_{Air}, in kN, it is recommended to use the formula

$$R_{Air} = C\frac{\rho}{2}(V + V_w)^2 S \cdot 10^{-3} \qquad (4.3.4.4)$$

where C = 0,82 in a head wind parallel to centerline (CL);
C = 1,0 for wind at an angle of 30° to CL;
S = above-water projected area to midship section plane, in m^2;
ρ = 1,225 = air density, in kg/m^3;
for V, refer to Formula (4.3.2.1-3);
V_w = wind speed, in m/s.".

4 **Para 4.3.5**. **Formula (4.3.5-1) and the explication** are replaced by the following text:

$$"R_I = g\left[\rho_I\sqrt{rh_I}\left(\frac{B}{2}\right)^2 k_1\left(1+2f_{ID}\alpha_B\frac{L}{B}\right)+k_2\rho_I rh_I B\left(f_{ID}+\alpha_B\ tg\alpha_0\right)Fr + k_3\rho_I rh_I L\ tg^2\alpha_0 Fr^2\right]10^{-3} \qquad (4.3.5\text{-}1)$$

where for g, refer to Formula (4.3.2.1-3);
ρ_I = ice density, in kg/m^3, in calculations it is recommended to assume the value of ρ_I equal to 850 kg/m^3;
rh_I = typical parameter of floating ice, in m^2;
h_I = floating ice thickness, in m;
for B, refer to 4.3.3.2;
k_1, k_2, k_3 = dimensionless empirical coefficients, which are chosen depending on the ice concentration (refer to Table 4.3.5);
f_{ID} = coefficient of friction between ice and shell plating. In calculations it is recommended to assume the value of f_{ID} equal to 0,1 for freshly painted hull, and f_{ID} equal to 0,15 for the hull coating being in service;
for L, refer to Formula (4.3.2.1-2);
α_B = coefficient of fineness of waterline fore end of the towed object;
α_0 = waterline fore end angle to CL, in deg.;
for Fr, refer to Formula (4.3.2.1-3).".

The explication to Formula (4.3.5-6) is replaced by the following text:

"for objects of type 3, α_B shall be obtained from the lines plan;
$\alpha_B \approx$ 0,59 for waterline fore end in the form of semi-circle.".

Formula (4.3.5-7) is deleted. **Formulae (4.3.5-8) and (4.3.5-9)** are renumbered (4.3.5-7) and (4.3.5-8), accordingly.

Existing Formulae (4.3.5-8) and (4.3.5-9) (new Formulae (4.3.5-7) and (4.3.5-8)). **The symbol of F_r** is replaced by ***Fr***.

5 **Para 4.3.6**. **Formula (4.3.6-1)** is replaced by the following:

$$"R_t = \Delta C\cdot K_t\cdot c\cdot l_t\cdot D_t\cdot\frac{\rho}{2}\cdot V^2\cdot 10^{-2}".$$

Table 4.3.6 is supplemented by the Note reading as follows:

"Note. Angle α of the steel towline ends of more than 400 m in length inclination to the horizon may be calculated by the formula

$$tg\alpha = \frac{P}{R_0}$$

where P = towline weight, in kN;
R_0 = total towing resistance of the towed object, in kN (refer to Formula (4.3.1)).".

6 **Para 4.3.7.1** is replaced by the following text with the number deleted:

"Resistance of fixed propeller R_{pf}, in kN, may be determined by the formula

$$R_{pf} = 5\rho \frac{A_E}{A_0} V^2 D^2 \cdot 10^{-2} \qquad (4.3.7\text{-}1)$$

where for ρ, refer to Formula (4.3.6-1);

$\frac{A_E}{A_0}$ = plate area ratio;

A_E = total expanded blade area, in m^2;
A_0 = disc area, in m^2;
V = water speed in the propeller disc, in m/s;
D = propeller diameter, in m.

It is preferable to determine the resistance of free-running propeller R_{pr}, in kN, based on its hydrodynamic characteristics (propeller performance curves), however, to get a rough estimate the approximation formulae may be used. In particular, the value of R_{pr} may be determined by the formula

$$R_{pr} = 0{,}35 R_{pf} \qquad (4.3.7\text{-}2)$$

where for R_{pf}, refer to Formula (4.3.7-1).".

7 **Para 4.5.2** is replaced by the following text:

"**4.5.2** The relationship between F_{PR}, equal to total towing resistance of the towed object, and the continuous static bollard pull of the tug(s) F_{BP} shall be determined by the formula

$$F_{PR} \leq \Sigma F_{eff} \cdot 1/k \qquad (4.5.2)$$

where $F_{eff} = (F_{BP} \cdot T_{eff}/100)$ – tug efficiency of each tug, in kN;
T_{eff} = coefficient of tug efficiency, in per cent;
F_{BP} = continuous static bollard pull of each tug, in kN;
k = irregularity coefficient equal to:
1,00 for one tug;
1,15 for two tugs;
1,30 for three or more tugs.".

8 **Para 4.5.4** is replaced by the following text:

"**4.5.4** The tug efficiency F_{eff} in the different sea states (wave height) is shown in Fig. 4.5.4.

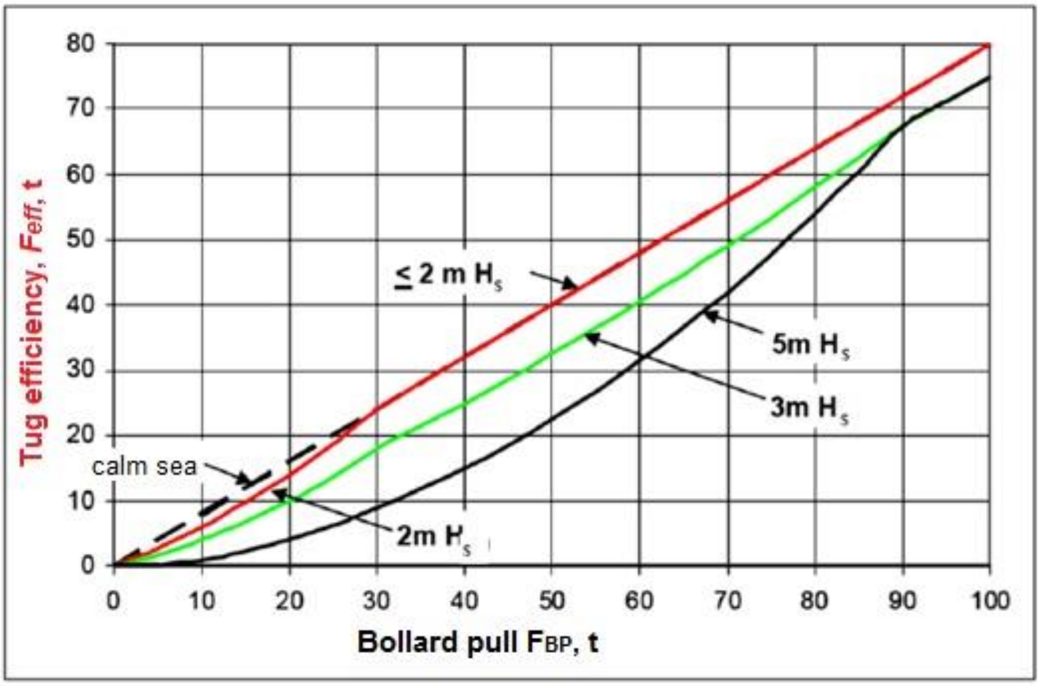

Fig. 4.5.4
Tug efficiency F_{eff} in the different sea states (wave height)
N o t e . To convert into kN, the ton values shall be multiplied by 9,8.

9 **Para 4.5.7** is deleted.

10 **Existing paras 4.5.8 – 4.5.10** are renumbered 4.5.7 – 4.5.9, accordingly.

11 **Para 6.1.2** is replaced by the following text:

"**6.1.2** Position of the installation site shall be given by the customer and established in the marine operation design (or work performance design).

When developing the installation design, consideration shall be given to the following:

compliance with the prescribed allowable deviations;

prevailing wave, wind, current directions;

capability of using available technical means as applied to the structural particulars of the object and ambient conditions;

capability of using technical monitoring means providing the required accuracy of the object position;

scope and productivity of ballasting operations;

need for monitoring the object position by means of divers and/or remotely operated vehicle (ROV), and the time period when such monitoring shall be performed, as well as the duration thereof.".