



RUSSIAN MARITIME REGISTER OF SHIPPING

CIRCULAR LETTER

No. 314-47-1265c

dated 17.09.2019

Re:

amendments to the Rules for the Classification and Construction of Sea-Going Ships, 2019, ND No. 2-020101-114-E

Item(s) of supervision:

ice class ships

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Appendices:

Appendix 1: information on amendments introduced by the Circular Letter

Appendix 2: text of amendments to Parts I "Classification" and XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships"

Director General

K.G. Palnikov

Text of CL:

We hereby inform that the Rules for the Classification and Construction of Sea-Going Ships shall be amended as specified in the Appendices to the Circular Letter.

It is necessary to do the following:

1. Familiarize the RS surveyors and interested organizations in the area of the RS Branch Offices' activity with the content the Circular Letter.
 2. Apply provisions of the Circular Letter in the RS practical activity.
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List of the amended and/or introduced paras/chapters/sections:

Part I: para 2.2.3.3.5;

Part XVII: Section 19

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**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	No. and date of the Circular Letter	Entry-into-force date
1	Part I "Classification", para 2.2.3.3.5	Definition "Double acting ships" has been introduced; requirements regarding assignment of the distinguishing mark DAS (ice class mark) have been introduced	314-47-1265c of 17.09.2019	17.09.2019
2	Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships", Section 19	Part has been supplemented with new Section 19 "Requirements for hull ice-strengthening structures of ships intended for stern-first operation"	314-47-1265c of 17.09.2019	17.09.2019

RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF SEA-GOING SHIPS, 2019,

ND No. 2-020101-114-E

PART I. CLASSIFICATION

2.2 CLASS NOTATION OF A SHIP

1 **New para 2.2.3.3.5** is introduced reading as follows:

"**2.2.3.3.5** Double acting ships (DAS) are ice navigation ships fitted with podded propulsion units designed to operate stern first in ice.

If double acting ships comply with the requirements of Section 19, Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships", at the shipowner's discretion, the distinguishing mark **DAS (ice class mark)** may be added to the character of classification, where the RS ice class is indicated in brackets according to 2.2.3.3.1 or 2.2.3.3.4 in case of stern-first operation".

PART XVII. DISTINGUISHING MARKS AND DESCRIPTIVE NOTATIONS IN THE CLASS NOTATION SPECIFYING STRUCTURAL AND OPERATIONAL PARTICULARS OF SHIPS

2 The Part is supplemented with **new Section 19** reading as follows:

«19 REQUIREMENTS FOR HULL ICE-STRENGTHENING STRUCTURES OF SHIPS INTENDED FOR STERN-FIRST OPERATION

19.1 APPLICATION

19.1.1 At the shipowner's discretion, ships complying with the requirements of this Section, may be assigned the distinguishing mark **DAS (ice class mark)** added to the character of classification in accordance with 2.2.3.3.5, Part I "Classification".

19.2 REQUIREMENTS FOR HULL STRUCTURE

19.2.1 The requirements of this Chapter apply to the ships operating stern first in ice, and are additional to the requirements of Chapter 3.10, Part II "Hull".

19.2.2 Regions of ice strengthening.

19.2.2.1 There are ice strengthening regions lengthwise as follows:

for ships designed for both bow- and stern- first ice operation:

forward region – A;

intermediate region – A₁;

midship region – B;

aft region – C;

for ships designed for stern-first ice operation only:

forward region – A;

midship region – B;

aft region – C.

19.2.2.2 There are ice strengthening regions transversely as follows:

region of alternating draughts and similar regions – I;

region from the lower edge of region I to the upper edge of bilge strake – II;

bilge strake – III;

region from the lower edge of bilge strake where the shell is inclined 7° from horizontal, to the centre line – IV.

For ships designed for stern-first operation only, the position of the forward, midship and aft regions of ice strengthening are set relative to the borderline of the flat side of hull:

forward region – from the stem to a line at a distance of L_3 aft from the forward boundary of the flat side of hull;

midship region – from the aft boundary of the forward region to a line at a distance of L_3 forward from the aft boundary of the flat side of hull;

aft region – from the aft boundary of the midship region to the sternframe.

Ice belt extension in the forward region of the bottom is regulated by parameter L_2 , which is equal to a distance from point *A* to the point of intersection of the base line with the vertical line that defines the bow region boundary at the level of the lower limit of the ice belt.

These requirements shall be complied with both at the upper and lower service waterlines.

Position of point *K* is defined as a point located at a distance of at least five standard spacings (refer to 1.1.3, Part II "Hull") forward of the fore point of the skeg.

19.2.2.2 The length of ice strengthening regions of ice class ships shall be determined according to Fig. 19.2.2.2 and Table 3.10.1.3.2, Part II "Hull".

19.2.2.3 For the Arctic double acting ships occasionally involved in icebreaking operations with ice class mark **Icebreaker6** or **Icebreaker7** in the class notation when operating stern first, the length of ice strengthening regions shall be determined according to Fig. 19.2.2.3 and Table 19.2.2.3.

19.2.2.4 Proceeding from the ice class, the requirements of this Section apply to the regions of ice strengthening marked with "+" in Table 19.2.2.4-1 (for ships designed for both bow- and stern- first ice operation) and Table 19.2.2.4-2 (for ships designed for stern-first ice operation only). For the purpose of Tables 19.2.2.4- 1 and 19.2.2.4-2, the absence of mark "+" means that the particular region of ice strengthening is not covered by the requirements of this Section.

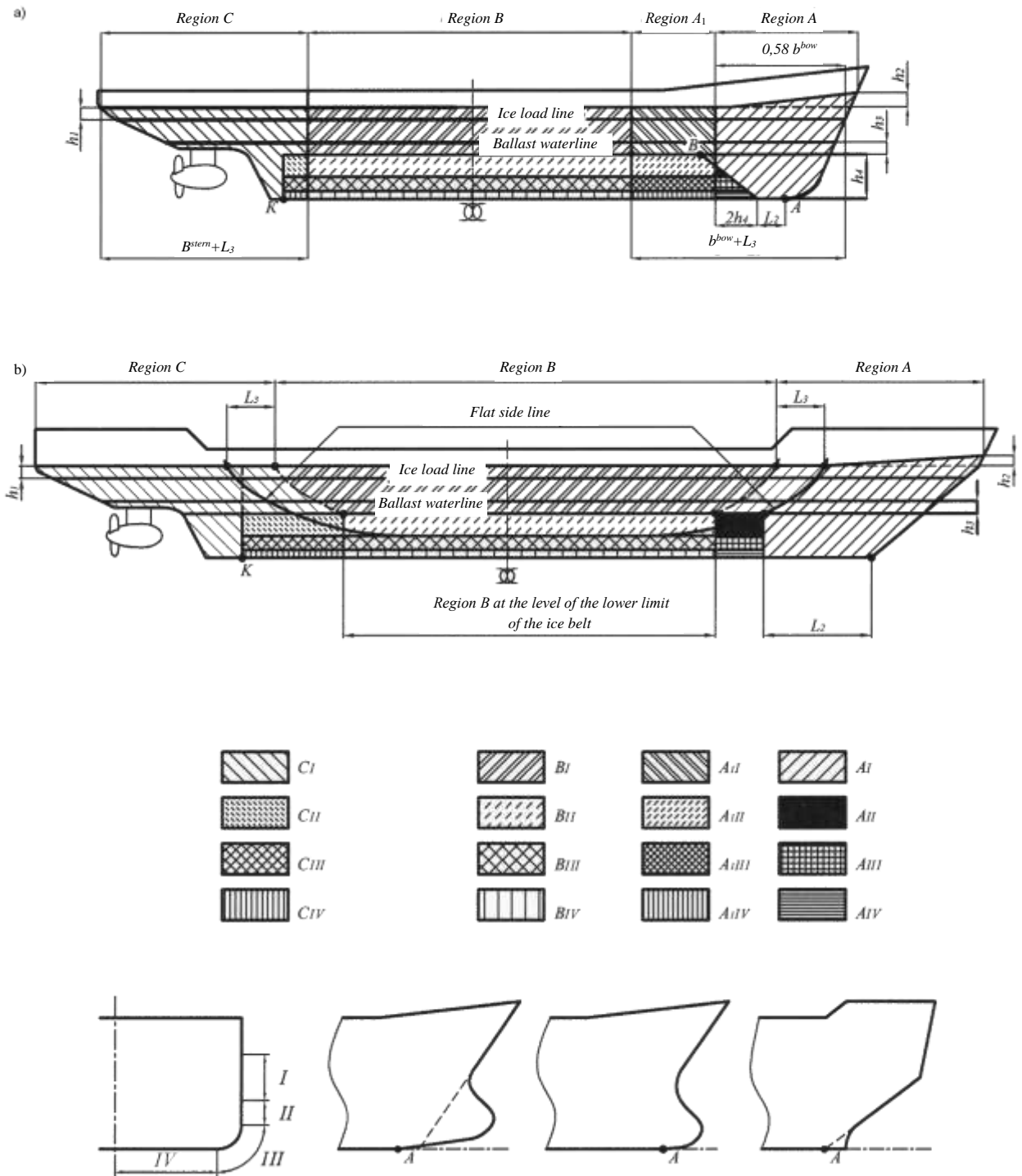


Fig. 19.2.2.2 Regions of ice strengthening of ice class ships:

a) ships designed for both bow- and stern- first ice operation;

b) ships designed for stern-first ice operation only;

b^{bow} = distance from the point of the ice load line and stem intersection to the section where the ice load line is the widest, but no greater than $0,4L$;

b^{stern} = distance from the point of the ice load line and sternframe intersection to the section where the ice load line is the widest, but no greater than $0,2L$

Table 19.2.2.4-2

Ice class	Vertical regioning											
	I			II			III			IV		
	Horizontal regioning											
	A	B	C	A	B	C	A	B	C	A	B	C
Arc9, Arc8	+	+	+	+	+	+	+	+	+	+	+	+
Arc7	+	+	+	+	+	+	+	+	+	+		+
Arc6	+	+	+	+	+	+	+	+	+	+		+
Arc5	+	+	+	+	+	+		+	+			+
Arc4	+	+	+		+	+			+			+
Ice3	+	+	+			+						
Ice2	+	+	+									
Ice1			+									

19.2.3 Structure.

19.2.3.1 Aft end structure.

19.2.3.1.1 To increase stiffness of the aft-end structures, reduce the length of the stern overhang and protect the podded propulsion units against the effects of ice in the stern counter area, it is recommended that the skeg be installed on the centerline.

The lower surface of the skeg shall coincide with the flat bottom. Lengthwise, the skeg shall be consistent with the location of the transverse bulkheads of the aft end.

The framing system of the skeg structures shall be selected proceeding from the condition that the stern counter bottom is consistent with the structural layout.

Given the longitudinal framing of the stern counter bottom, vertical diaphragms are installed inside the skeg that are located in line with the transverse bottom framing of the stern counter, as well as in line with the transverse bulkheads.

Structures of diaphragms, bulkheads and platforms shall comply with the requirements of 3.10.2.4, Part II "Hull".

19.2.3.1.2 The bearing tub of the podded propulsion unit shall have a stiffened thickened flange for the bolted connection to the flange of the azimuth thruster.

The structure of the tub and reinforcements shall provide access to the bolting of the azimuth thruster.

The reinforcements of the bearing tub shall be braced to the reinforced floors and the double-bottom stringers. Additionally installed bottom stringers shall be in line with the bulkhead stiffeners of the transverse bulkheads that confine the azimuth thruster compartment and smoothly change into the longitudinal strength members along a length of 3-4 spacings beyond the compartment. The reinforced floors shall be supported by the frames and longitudinal bulkhead stiffeners that are reinforced in height to the nearest deck or platform.

19.2.4 Ice load.

19.2.4.1 Angles of waterline inclinations at the aft end are determined according to Fig. 19.2.4.1:

when one podded propulsion unit installed as for the fore end according to 3.10.1.2.1, Part II "Hull";

when two/three podded propulsion units installed as for the waterline areas located alongside of the propulsion unit centerline.

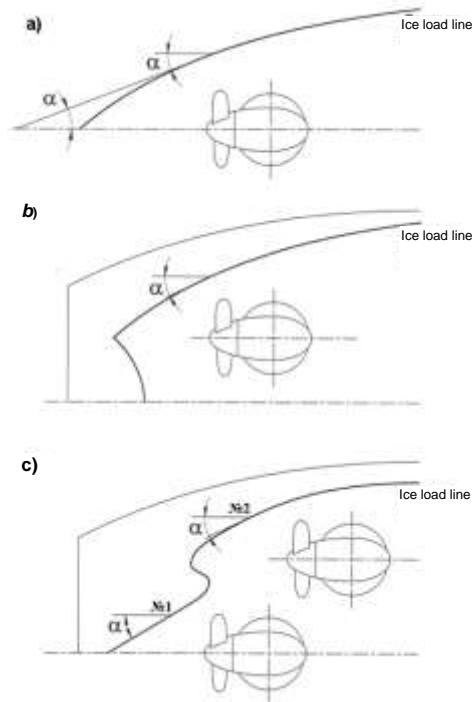


Fig. 19.2.4.1 Determination of waterline inclination angles at the aft end

- a) single podded propulsion unit installation; b) twin podded propulsion unit installation; c) triple podded propulsion unit installation

19.2.4.2 Ice pressure.

19.2.4.2.1 In region A1:

for ships designed for both bow- and stern- first ice operation:

in accordance with 3.10.3.2.1, Part II "Hull";

for ships designed for stern-first ice operation only:

for ice classes **Ice2, Ice3, Arc4, Arc5, Arc6**:

$$p_{AI} = a_4 p_{BI} \quad (19.2.4.2.1-1)$$

where a_4 = factor to be taken from Table 3.10.3.2.1, Part II Hull;

p_{BI} = ice pressure in region BI (refer to 19.2.4.2.2);

for ships of ice classes **Arc7, Arc8, Arc9**:

$$p_{AI} = 0,75 p_{CI} \quad (19.2.4.2.2-2)$$

where p_{CI} = ice pressure in region CI (refer to 19.2.4.2.3).

19.2.4.2.2 In regions A₁I and BI, in accordance with 3.10.3.2.2 and 3.10.3.2.3, Part II "Hull" accordingly. When the ice class in case of bow-first operation differs from that in case of stern- first operation, factor a_3 shall correspond to a higher ice class.

19.2.4.2.3 In region CI:

$$p_{CI} = 2100 a_1 v_m^6 \sqrt{\frac{\Delta}{1000}} \quad (19.2.4.2.3)$$

where a_1 = factor to be taken from Table 3.10.3.2.1 Part II "Hull" depending on the ice class;

v_m = value of the shape factor v , which is the maximum one for the region, as determined at sections within $x = 0; 0,025L; 0,05L; 0,075L$, etc. from the aft boundary of the design ice waterline by the following formula:

$$v = f_v \left(b_0^v + b_1^v \frac{x}{L} + b_2^v \alpha + b_3^v \beta' \right)$$

where b_i^v = factors to be taken from Table 19.2.4.2.3 depending on the number of podded propulsion units.

Table 19.2.4.2.3

	b_0^v	b_1^v	b_2^v	b_3^v
One podded propulsion unit	0,8731	0,1537	0,0011	-0,0012
Two podded propulsion units	0,8721	0,2090	0,0009	-0,0011
Three podded propulsion units, area No. 1 (Fig. 19.2.4.1)	0,8265	0,2474	0,0011	0,0004
Three podded propulsion units, area No. 2 (Fig. 19.2.4.1)	0,8660	-0,1016	0,0010	-0,0007

19.2.4.2.4 In regions II, III and IV, the ice pressure is determined as a part of the ice pressure in region I at the appropriate section of the ship length:

$$p_{kl} = a_{kl} p_k \quad (19.2.4.2.4)$$

where $k = A, A_1, B, C;$

$l = \text{II, III, IV};$

a_{kl} = factor to be taken from Table 19.2.4.2.4.

Table 19.2.4.2.4

Ice class	Horizontal regioning								
	forward and intermediate regions (A, A ₁)			midship region (B)			aft region (C)		
	Vertical regioning								
	II	III	IV	II	III	IV	II	III	IV
Ice3	0,4	–	–	–	–	–	0,4	–	–
Arc4	0,5	0,4	0,35	0,4	–	–	0,5	0,4	0,35
Arc5	0,65	0,65	0,45	0,5	0,4	–	0,65	0,65	0,45
Arc6	0,65	0,65	0,5	0,5	0,45	–	0,65	0,65	0,5
Arc7	0,65	0,65	0,5	0,5	0,45	–	0,65	0,65	0,5
Arc8	0,7	0,65	0,5	0,55	0,45	0,25	0,7	0,65	0,5
Arc9	0,4	–	–	–	–	–	0,4	–	–

19.2.4.3 Vertical distribution of ice pressure.

19.2.4.3.1 In regions AI, AII, AIII, AIV:

for ships designed for both bow- and stern- first ice operation:

in accordance with 3.10.3.3.1, Part II "Hull";

for ships designed for stern-first ice operation only:

for ice classes **Ice2**, **Ice3**, **Arc4**, **Arc5**, **Arc6**:

$$b_A = 0,8b_B \quad (19.2.4.3.1-1)$$

where b_B = refer to 3.10.3.3.3;

for ships of ice classes **Arc7**, **Arc8**, **Arc9**:

$$b_A = b_C \quad (19.2.4.3.1-2)$$

where b_C = refer to 3.10.3.3.4.

19.2.4.3.2 In regions A₁I, A₁II, A₁III и A₁IV, in accordance with 3.10.3.3.2, Part II "Hull", and in regions BI, BII, BIII и BIV, in accordance with 3.10.3.3.3, Part II "Hull".

19.2.4.3.3 In regions CI, CII, CIII, CIV:

$$b_C = C_1 k_{\Delta} u_m \quad (19.2.4.3.3)$$

where C_1 and k_{Δ} = factors to be taken from 3.10.3.3.1, Part II "Hull";

u_m = value of the shape factor u , which is the maximum one for the region, as determined at sections within $x = 0; 0,025L; 0,05L; 0,075L$, etc. from the aft boundary of the design ice waterline by the following formula:

$$u = f_u \left(b_0^u + b_1^u \frac{x}{L} + b_2^u \alpha + b_3^u \beta' + b_4^u \frac{x}{L} \beta' + b_5^u \alpha \beta' \right)$$

where b_i^u = factors to be taken from Table 19.2.4.3.3 depending on a number of podded propulsion units.

Table 19.2.4.3.3

	b_0^u	b_1^u	b_2^u	b_3^u	b_4^u	b_5^u
One podded propulsion unit	0,6445	1,0425	0,0035	0,0010	-0,0201	-0,0001
Two podded propulsion units	0,6584	0,8894	0,0036	0,0005	-0,0128	-0,0001
Three podded propulsion units, area No. 1 (Fig. 19.2.4.1)	0,6075	1,3355	0,0037	0,0025	-0,0225	-0,0001
Three podded propulsion units, area No. 2 (Fig. 19.2.4.1)	0,6021	1,3103	0,0040	0,0024	-0,0368	-0,0001

19.2.4.4 Horizontal distribution of ice pressure.

19.2.4.4.1 In regions AI, AII, AIII, AIV:

for ships designed for both bow- and stern- first ice operation:

in accordance with 3.10.3.4.1, Part II "Hull";

for ships designed for stern-first ice operation only:

$$l_A^H = 6b_A \geq 3,5\sqrt{k_\Delta} \quad (19.2.4.4.1)$$

where b_A = vertical distribution of ice pressure in accordance with 19.2.4.3.1-1 or 19.2.4.3.1-2.

19.2.4.4.2 In regions A₁I, A₁II, A₁III и A₁IV, in accordance with 3.10.3.3.2, Part II "Hull", and in regions BI, BII, BIII и BIV, in accordance with 3.10.3.3.3, Part II "Hull".

19.2.4.4.3 In regions CI, CII, CIII, CIV:

$$l_C^H = 11,3\sqrt{b_C \sin \beta_m^C} \geq 3,5\sqrt{k_\Delta} \quad (19.2.4.4.3)$$

where b_C = vertical distribution of ice pressure in accordance with 19.2.4.3.3;

β_m^C = angle β in the design section of region C, for which the u parameter is maximum.

19.2.4.5 Ice pressure for Arctic ships of ice classes **Icebreaker6** and **Icebreaker7**.

19.2.4.5.1 In regions AI, A₁I, BI ice pressure is determined according to 3.10.3.5.1 and 3.10.3.5.2, Part II "Hull". Value of p_{AI}^0 is determined in accordance with 19.2.4.2.1.

19.2.4.5.2 In region CI, ice pressure is determined according to 3.10.3.5.2, Part II "Hull".

19.2.4.5.3 In regions II, III, IV ice pressure is determined according to 3.10.3.4.1, Part II "Hull":

$$P_{mn} = a_{mn} P_{ml} \quad (19.2.4.5.3)$$

where a_{mn} , m , n = refer to 3.10.3.5.3, Part II "Hull".

19.2.4.6 As far as Arctic ships of ice classes **Icebreaker6** and **Icebreaker7** are concerned, the vertical distribution of ice pressure in regions A, A₁ and B shall be adopted equal for all regions and shall be determined in accordance with 3.10.3.3.1, Part II "Hull" as for the forward region of the ship whose ice class number coincides with the ice class number of the icebreaker. In region C, the vertical distribution of ice pressure shall be determined in accordance with 19.2.4.3.3 as for the aft region of the ship whose ice class number coincides with the ice class number of the icebreaker.

19.2.4.7 As far as Arctic ships of ice classes **Icebreaker6** and **Icebreaker7** are concerned, the horizontal distribution of ice pressure in regions A, A₁ and B shall be adopted equal for all regions and shall be determined in accordance with 3.10.3.4.1, Part II "Hull" as for the forward region of the ship whose ice class number coincides with the ice class number of the icebreaker. In region C, the horizontal distribution of ice pressure shall be determined in accordance with 19.2.4.4.3 as for the aft region of the ship whose ice class number coincides with the ice class number of the icebreaker.

19.2.5 Scantlings of ice-strengthening structures.

19.2.5.1 Scantlings of ice strengthening structures shall be determined based on the requirements of 3.10.4, Part II "Hull" for the ice load parameters determined according to the calculation procedure in 19.2.4.

19.2.5.2 Scantlings of skeg and stern counter shall be determined based on the dependencies in 3.10.4, Part II "Hull" for hull structures (shell plating, conventional and web frames, framing members and plate structures) using the ice load parameters determined according to calculation procedure in 19.2.4.