RUSSIAN MARITIME REGISTER OF SHIPPING

CIRCULAR LETTER	**No.** 314-26-1047c	dated 12.10.2017

Re:

requirements for ships which are periodically grounded in operation (NAABSA ships)

Item of technical supervision:

sea-going ships under construction and in service

Implementation:	from the date of signing
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Appendices:	amendments to the Rules for the Classification and Construction of Sea-Going Ships, 2017, ND No. 2-020101-095-E
Director General	K.G. Palnikov

Amends — Rules for the Classification and Construction of Sea-Going Ships, 2017, ND No. 2-020101-095-E

We hereby inform that Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships" of the Rules for the Classification and Construction of Sea-Going Ships, 2017, ND No. 2-020101-095-E will be amended with the requirements for ships which are periodically grounded in operation (**NAABSA** ships).

It is necessary to do the following:

1) Familiarize the surveyors of the RS Branch Offices and interested organizations in the area of the RS Branch Offices' activity with the content of the Circular Letter.
2) Apply provisions of the Circular Letter during the RS practical activity.

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Appendix to Circular Letter No. 314-26-1047c

dated 12.10.2017

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

New **Section 11** shall be introduced reading as follows:

11 REQUIREMENTS FOR SHIPS NOT ALWAYS AFLOAT BUT SAFELY AGROUND (NAABSA SHIPS)

11.1 GENERAL

11.1.1 Application.

11.1.1.1 The requirements of this Section apply to NAABSA ships (Not Always Afloat But Safely Aground) which may lie aground in safety with partial or full hull baring in places fit for grounding the ships.

11.1.1.2 At the shipowner's request, one of the following distinguishing marks may be added to the character of classification of a ship complying with the requirements of this Section:

.1 NAABSA1 – partial or full ship hull baring is permitted on plane homogeneous sand-and-shingle or sand-and-mud sea beds with no motion in calm water as harbours or sheltered areas.

.2 NAABSA2 – in addition to **NAABSA1** notation specified, motion and ship bow impact contact with sea bed at defined wave parameters are permitted.

.3 NAABSA3 – in addition to **NAABSA2** notation, hull baring of moored ship is permitted at specified distance from seashore line in rolling conditions with impact contact against the seabed in any point of the seabed.

11.2 REQUIREMENTS FOR HULL STRUCTURE

11.2.1 Requirements for hull structures specified in this Section are in addition to the requirements of Part II "Hull".

11.2.2 Symbols.

The following symbols have been adopted in this Chapter:

Δ_N = design displacement of **NAABSA** ship equal to the maximum value at the beginning of baring or upon emersion from the ground, but in all cases not more than summer load line displacement, in t;

L_{BN} = design length of ship's bottom along the keel line, in m;

L_N = design length of bottom, in m, considering the bow (*1*) and stern (*2*) external structural strengthening of hull (refer to Fig. 11.2.2.1);

Δd = change of midship mean draft relative to level d_N corresponding to design displacement Δ_N, in m;

ψ_0 = design trim angle of the ship, in deg. (positive nose-up trim);

ψ_N = design sea bed slope angle along the ship, in deg.;

ψ_S = operating trim angle of the ship, in deg.;

ψ_{ON} = ship trim angle due to grounding on the move, in deg.;

R_{ON} = initial bow response to ship grounding on the move, in kN;

R_N^m = static end (local) response for the ship, in kN;

R_N^n = static nominal (distributed) response for the ship, in kN;

M_N = ship hull bending moment considering the sea bed response, in kN·m;

N_N = ship hull shear force considering the sea bed response, in kN;

B_N = width of flat horizontal section of the bottom, in m;

β_k = deadrise angle, in deg.;

h_k = design height of external structural protection below the keel line, in m;

v_N = design forward speed of ship upon grounding, in knots;

h_N = design (allowable) wave height for **NAABSA** conditions, in m.

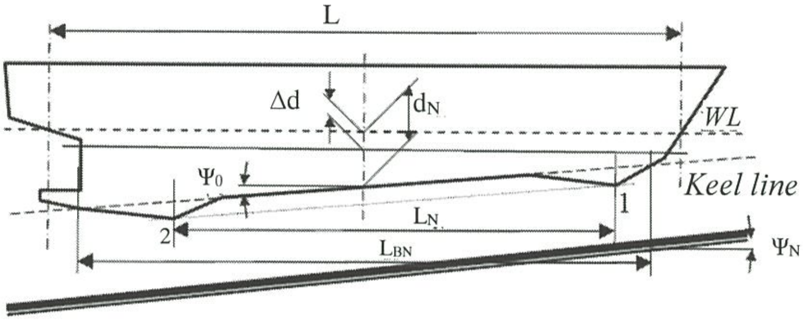


Fig. 11.2.2.1

In Fig. 11.2.2.1, the draft corresponding to design displacement is shown with a dotted line and the draft at hull baring is shown with a solid line.

11.2.3 Requirements for hull shape.

11.2.3.1 For typical transverse sections of **NAABSA** ships are specified in Fig. 11.2.3.1. In the area of impact contact with sea bed it is recommended to reduce the width of the flat horizontal part of the bottom and to increase the deadrise angle.

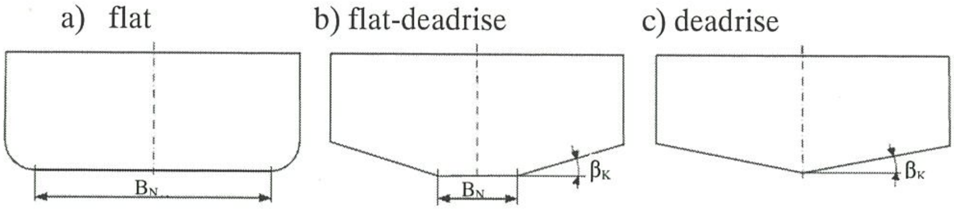


Fig.11.2.3.1

11.2.4 Strengthened areas.

11.2.4.1 The strengthened bottom area over the hull length of **NAABSA** ships is divided into the following:

fore area – *A*;

midship area – *B*; and

aft area – *C*.

11.2.4.2 The length of strengthened bottom areas of **NAABSA** ships is defined according to Fig. 11.2.4.2

The aft boundary of the fore area is located at a distance L_A, in m, from the fore perpendicular equal to:

$L_A = 0{,}3L(1 + 0.175\psi_0) - 20h_k \geq 2L_3$, but not more than 0,3*L* (11.2.4.2-1)

where L_3 = distance between point 3 (refer to Fig. 11.2.4.2) and fore perpendicular, in m;

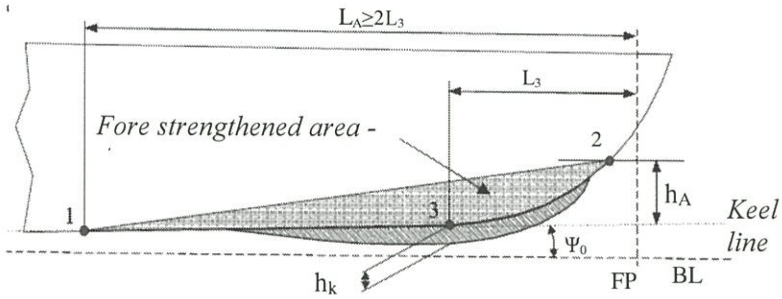
h_k = design height of external structural protection below the keel line, in m.

The forward boundary of the aft area is located at a distance L_C, in m, from the aft perpendicular equal to:

$L_C = 0{,}3L(1 - 0.175\psi_0) - 20h_k \geq 0.05L$, but not more than 0,3*L* (11.2.4.2-2)

If the engine room is located in the aft of the ship, such an engine room shall be attributed to the strengthened area C.

The midship strengthened area *B* is located between fore and aft areas.



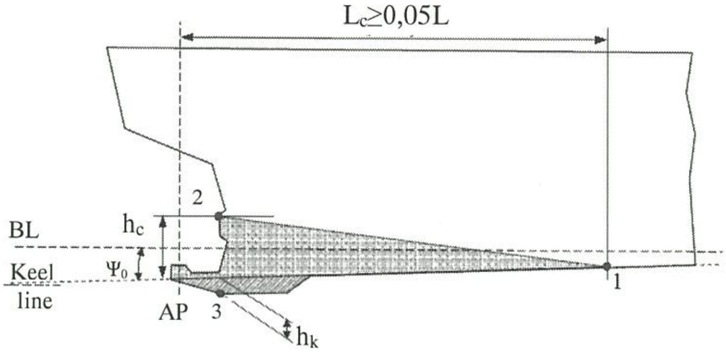


Fig. 11.2.4.2

1 – point of distance from perpendicular; 2 – upper boundary;

3 – point to determine the height of external structural protection

A distance between the upper boundary of the fore strengthened area and the keel line (refer to point 2 in Fig. 11.2.4.2) h_A, in m, is determined by the following formula:

$$h_A = 0{,}1\psi L - h_k \qquad (11.2.4.2\text{-}3)$$

where ψ = design trim angle at rolling in the place of grounding, in rad; if no exact data is available, ψ is determined by Formula (1.3.3.1-4), Part II "Hull" as for a ship operating in restricted area of navigation **R3**.

A distance between the upper boundary of the aft strengthened area and the keel line (refer to point 2 in Fig. 11.2.4.2) h_C, in m, is determined by the following formula:

$$h_C = \frac{0{,}2\psi L}{3} - h_k \qquad (11.2.4.2\text{-}4)$$

A distance between the upper boundary of the midship strengthened area and the keel line h_B, in m, is determined by the formula:

$$h_C = (0{,}5B - B_k) \cdot tg\theta - h_k \le h_{AN} \qquad (11.2.4.2\text{-}5)$$

where B_K = distance from *CL* to the nearest false keel side, in m;

h_{AN} = height to top of floors in case of curved lines and up to the lift point of bottom in case of simplified lines, in m;

θ = design heel angle at rolling in the place of grounding, in rad; if no exact data is available, θ is determined by Formula (1.3.3.1-5), Part II "Hull" as for a ship operating in restricted area of navigation **R3** at $\varphi_r = \varphi$.

11.2.5 Design.

11.2.5.1 For ships with the distinguishing mark **NAABSA2**, the double bottom is required to be fitted in the fore strengthened area. For ships with the distinguishing mark **NAABSA3**, the double bottom is required to be fitted extending along the entire length of the ship – from forepeak to afterpeak bulkhead.

11.2.5.2 For transverse framing system, the flooring shall be installed on each frame. For longitudinal framing system of bottom on ships with **NAABSA2** and **NAABSA3** marks, the flooring shall be installed at two frame spacing intervals.

11.2.5.3 A distance a_{BS}, in m, between bottom stringers, stringer and keel shall not exceed

$$a_{BS} = 1{,}4 + \frac{2{,}5L}{100} - \left(\frac{L}{100}\right)^2, \qquad (11.2.5.3)$$

but not more than:

1,1 m – in strengthened area *A* for ships with the distinguishing mark **NAABSA2** and strengthened areas *A* and *C* for ships with the distinguishing mark **NAABSA3**;

2,2 m – in strengthened area *B* for ships with the distinguishing mark **NAABSA3**.

11.2.5.4 For the upper deck of **NAABSA** ships over 50 m long, the longitudinal framing system in the midship hull area is recommended.

11.2.5.5 Web frames and/or double side diaphragms shall be installed at least 4 frame spacing apart.

11.2.5.6 Plane longitudinal and transverse bulkheads shall be reinforced with vertical stiffeners. Corrugations of corrugated bulkheads shall be vertical.

11.2.5.7 False keels with different cross-section shapes arranged in different places under the bottom (refer to Fig. 11.2.5.7) can be used as external structural protection of **NAABSA** ships. Installed false keels shall be arranged in the plane of longitudinal bulkheads or bottom stringers. False keels shall be fastened to external shell plating by means of an intermediate member, i.e a flat bar welded to the shell plating with an all-round continuous fillet weld. Connection of false keels to intermediate member shall comply with the requirements of 2.2.5.3, Part II "Hull". False keels shall terminate in the stiffened areas of shell plating and shall be gradually tapered at ends in height and width.

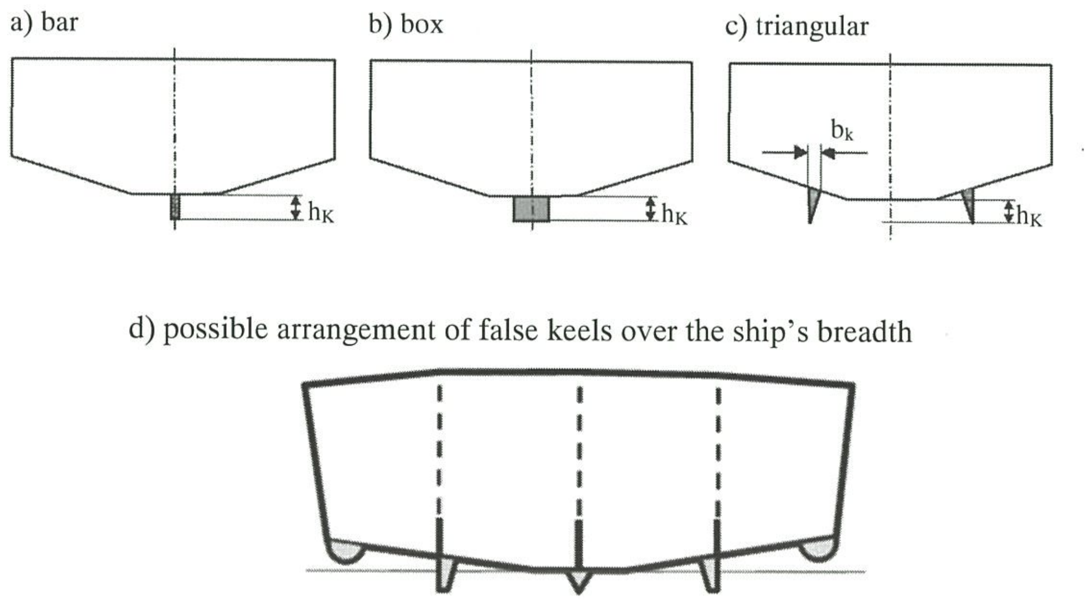


Fig. 11.2.5.7

11.2.5.8 For the longitudinal framing system of bottom on ships with the distinguishing marks **NAABSA2** or **NAABSA3**, the dock and bilge brackets shall be placed at each frame. It is recommended to install lightened dock and bilge brackets between the frames.

11.2.5.9 Support sections of beams.

For designing framing beams by allowable stresses, the support sections and design spans shall be determined according to 1.6.3.1, Part II "Hull".

For designing framing beams by limit state, the support section shall be taken considering availability of brackets and arranged as follows:

at the end of brackets with a free edge stiffened with a face plate;

in the middle of bracket side with unstiffened free edge.

11.2.5.10 Connections of beams shall comply with the requirements of 1.7.2, Part II "Hull". For areas of impact loads on ships with the distinguishing marks **NAABSA2** and **NAABSA3**, it is not recommended to use beam connections with technological gaps.

11.2.5.11 Holes in bottom framing webs.

11.2.5.11.1 Holes in bottom framing webs shall comply with the requirements specified in 2.3.5.2 and 2.4.2.7 of Part II "Hull".

11.2.5.12.2 Holes in primary framing webs for bottom beams in the areas where the bottom contacts the seabed shall be compensated by installation of fixings similar to the intersections specified in Table 3.10.2.4.5 of Part II "Hull". In the areas of impact loads it is recommended to use fixings with edges welded to shell.

11.2.6 Design loads.

11.2.6.1 Design local pressures p_i, in kPa, on the structural members immediately perceiving the seabed are determined by the formula

$$p_i = 10d_N\left(1 + 4/\sqrt{A_i}\right) \qquad (11.2.6.1)$$

where

d_N = refer to 11.2.2;

A_i = calculated area of the member strain zone, in m^2.

11.2.6.2 The required total area of contact with the seabed in case of full ship hull baring A_N^{min}, in m², shall be at least

$$A_N^{min} = g\Delta_N / R_0 \qquad (11.2.6.2\text{-}1)$$

where R_0 = design nominal resistance of ground, in kPa, at least

$$R_0 > 10\,\Delta d. \qquad (11.2.6.2\text{-}2)$$

For **NAABSA** ships, which are loaded/unloaded when grounded in safe mode with use of heavy wheeled and tracked vehicles:

$$R_0 = 100.$$

11.2.6.3 Design static load Q_{OS}, in kN, from the ground to check transverse strength of **NAABSA** ship hull compartment (refer to 11.2.8.11) is determined by the formula

$$Q_{OS} = k_{\varphi} R_N^n \frac{L_{OS}}{L_{BN}} \qquad (11.2.6.3\text{-}1)$$

where k_{φ} = 1,5 – with no design-based justifications;

L_{OS} = length of ship compartment/hold, in m;

R_N^n = static response in case of ship hull baring, in kN.

For partial baring conditions:

$$R_N^n = g\Delta_N \frac{\Delta d}{d_N} \frac{\alpha}{C_b}. \qquad (11.2.6.3\text{-}2)$$

For full baring conditions:

$$R_N^n = g\Delta_N \qquad (11.2.6.3\text{-}3)$$

where α = waterplane area coefficient for summer load waterline.

For the recommended diagrams of design load application to ship compartments are specified in Fig. 11.2.6.3.

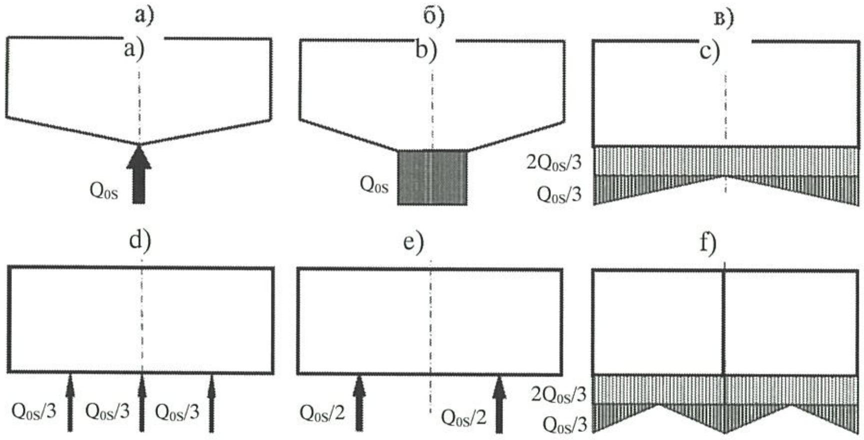


Fig. 11.2.6.3:

a – deadrise; *b* – flat-deadrise; *c* – flat; *d* – with three false keels;

e – with two false keels; *f* – flat with one longitudinal bulkhead at *CL*

If no calculations of ship baring and emersion processes are available, static end response of the ground R_N^m to ship hull, in kN, is determined by the following formula:

$$R_N^m = g\Delta_N\left[\frac{tg(\psi_N-\psi_0-\psi_S-\psi_{ON})}{6}\frac{L}{d_N}\right] + R_{ON} \qquad (11.2.6.3\text{-}4)$$

For **NAABSA1** ships $R_{ON} = 0$ and $\psi_{ON} = 0$ shall be taken.

In any case for full hull baring conditions the value of static end response of the ground R_N^m, in kN, shall be at least

$R_N^m = 3g\Delta_N/12$ – for ship with the distinguishing mark **NAABSA1**;

$R_N^m = 4g\Delta_N/12$ – for ships with the distinguishing mark **NAABSA2**;

$R_N^m = 5g\Delta_N/12$ – for ships with the distinguishing mark **NAABSA3**.

11.2.6.4 Bending moments and shear forces for hull.

11.2.6.4.1 Bending moments and shear forces for hull of a ship which is periodically grounded in operation shall be determined for ships with the distinguishing mark **NAABSA1** and length over 50 m and for ships with the distinguishing mark **NAABSA2** and **NAABSA3** irrespective of the ship's length.

11.2.6.4.2 The values of maximum bending moments, in kNm, and shear forces, in kN, can be determined by approximation formulae specified in 11.2.6.4.3 – 11.2.6.4.6.

11.2.6.4.3 For full hull baring when aground and hull hogging of **NAABSA** ships of all levels:

$$M_N = 0{,}315\Delta_N L; \qquad (11.2.6.4.3\text{-}1)$$

$$N_N = -1{,}03\Delta_N \quad (11.2.6.4.3\text{-}2)$$

For partial hull baring of **NAABSA1** ships, the obtained values can be reduced by replacing Δ_N with the nominal response of the ground R_N^n, but not more than twice.

11.2.6.4.4 In case of action of end force and hull sagging of ships with the distinguishing mark **NAABSA1**:

$$M_N = -0{,}363\Delta_N L; \quad (11.2.6.4.4\text{-}1)$$

$$N_N = 2{,}45\Delta_N. \quad (11.2.6.4.4\text{-}2)$$

11.2.6.4.5 In case of action of end force, including bow impact of ships with the distinguishing mark **NAABSA2**:

$$M_N = -0{,}629\Delta_N L; \quad (11.2.6.4.5\text{-}1)$$

$$N_N = 3{,}27\Delta_N. \quad (11.2.6.4.5\text{-}2)$$

11.2.6.4.6 In case of action of end force, including bow or stern impact of ships with the distinguishing mark **NAABSA3**:

$$M_N = -0{,}921\Delta_N L; \quad (11.2.6.4.6\text{-}1)$$

$$N_N = 4{,}09\Delta_N. \quad (11.2.6.4.6\text{-}2)$$

11.2.6.4.7 The formulae specified in 11.2.6.4.3 – 11.2.6.4.6 determine maximum values of bending moments in the midship area of the hull and shear forces on the bow and stern. In case of sagging due to end forces, including impacts forces, the obtained values shall be summed up algebraically with design bending moments for the ship in still water.

11.2.7 Ultimate section modulus of a ship's hull cross section.

Ultimate section modulus of hull cross section for **NAABSA** ships by the end of service life shall be not less than permissible residual ultimate section modulus of hull cross section $W_{LM(bot)}$, in cm^3, determined by the formula:

$$W_{LM(bot)} = 1{,}1 \cdot \frac{|0{,}92M_N + M_{SW}|}{R_{eH}} \cdot 10^3 \quad (11.2.7)$$

where M_N = design bending moment according to 11.2.6.4, in kNm;

M_{SW} = design bending moment in case of ship sagging in still water, in kNm;

R_{eH} = upper yield stress of deck (bottom) material.

When determining ultimate section modulus of hull cross section of **NAABSA** ships by the end of service life, the following shall be taken into account:

wear of structural members is 30 %;

deformations of bottom structures breadthwise in design section are 50 % of the permissible values;

compressed flexible braces of the deck and upper part of sides are not allowed;

tension braces of the bottom with deformations are not allowed.

11.2.8 Dimensions of structural members.

11.2.8.1 Thickness of the bottom and bilge plating s, in mm, in the strengthened bottom area of **NAABSA** ships shall be at least:

$$s = 15{,}8ak_{\alpha}\sqrt{\frac{k_p p}{k_{\sigma}R_{eH}}} \cdot m_n^{-1} \qquad (11.2.8.1)$$

where a = dimension of the smaller side of the panel, in m;

b = dimension of the larger side of the panel, in m;

$k_{\alpha} = \frac{1-\alpha+\frac{\pi\alpha}{6}}{1-\alpha+\frac{\pi\alpha}{2}}$ – ratio of panel sides;

$\alpha = \frac{a}{b}$;

k_p – safety factor taken equal to:

$k_p = 1{,}5$ in case of no external structural protection in the area concerned;

$k_p = 1{,}0$ if external structural protection is available in the area concerned;

p – design pressure of seabed, in kPa, according to 11.2.6.1 at $A_i = a \times b$;

k_{σ} – factor of allowable stresses taken equal to:

$k_{\sigma} = 0{,}95 - \frac{0{,}42L}{100}$ in case of transverse framing system in the midship strengthened area;

$k_{\sigma} = 0{,}9$ – in other cases;

R_{eH} = upper yield stress, in MPa;

m_n = coefficient taken equal to:

$m_n = 0{,}75$ – in case of no external structural protection in the area concerned;

$m_n = 0{,}65$ – if external structural protection is available in the concerned area.

11.2.8.2 In the area of impact loads with no external structural protection in the area concerned the thickness of the bottom and bilge plating of ships with the distinguishing marks **NAABSA2** and **NAABSA3** shall be at least:

$$s = \frac{10{,}6}{R_{eH}} \cdot p \cdot b \qquad (11.2.8.2)$$

where R_{eH} = upper yield stress, in MPa;

p = design pressure of seabed, in kPa, according to 11.2.6.1 at $A_i = a \times b$;

b = dimension of the larger side of the panel, in m.

11.2.8.3 In all cases the thickness of the bottom and bilge plating shall be not less than that specified in 2.2.4.8, Part II "Hull".

11.2.8.4 Ultimate section modulus W_0, in cm^3, of cross section of primary members in the strengthened bottom area of **NAABSA** ships shall be at least:

$$W_0 = \frac{1000 k_p p a l^2}{m k_\sigma R_{eH}} \cdot k_\alpha \cdot k_k \cdot m_n^{-1} \qquad (11.2.8.4)$$

where a = distance between primary members;

l = span length, in m;

$k_\alpha = 1 - \frac{\alpha^2}{2} + \frac{\alpha^3}{8}$;

$\alpha = \frac{a}{l}$;

p = design pressure of seabed, in kPa, according to 11.2.6.1 at $A_i = 2a \times l$;

$k_k = 0{,}914$ – load distribution coefficient;

$m_n = 0{,}75$ – in case of no external structural protection in the area concerned;

$m_n = 0{,}65$ – if external structural protection is available in the area concerned;

$m = 12$ – bending moment coefficient;

$k_\sigma = 0{,}95 - \frac{0{,}42L}{100}$ – for bottom longitudinal girders in the midship strengthened area;

$k_\sigma = 0{,}9$ – in other cases;

R_{eH} – upper yield stress, in MPa;

$k_p = 1{,}35$ in case of no external structural protection in the area concerned;

$k_p = 1{,}0$ if external structural protection is available in the area concerned;

11.2.8.5 Actual section modulus of girder section is determined according to 3.10.4.2.6, Part II "Hull".

11.2.8.6 The beam web area in the strengthened bottom area of **NAABSA** ships f_c, in cm^2, shall be not less than the value determined by the formula

$$f_c = \frac{5 k_p p a l \left(1 - \frac{\alpha}{2}\right)}{0.57 m_n k_\sigma R_{eH}} \qquad (11.2.8.6)$$

where $k_p = 1{,}35$ in case of no external structural protection in the area concerned;

$k_p = 1{,}0$ if external structural protection is available in the area concerned;

a = distance between primary members;

l –span length, in m;

$\alpha = \frac{a}{l}$;

p = design pressure of seabed, in kPa, according to 11.2.6.1 at $A_i = 2a \times l$;

$k_k = 0{,}914$ – load distribution coefficient;

$m_n = 0,75$ – in case of no external structural protection in the area concerned;

$m_n = 0,65$ – if external structural protection is available in the area concerned;

$k_\sigma = 0,95 - \frac{0,42L}{100}$ for longitudinal beams of bottom framing in the midship strengthened area;

$k_\sigma = 0,9$ – in other cases;

R_{eH} – upper yield stress, in MPa.

11.2.8.7 Actual area of web is determined according to 3.10.4.2.5, Part II "Hull".

11.2.8.8 Scantlings of floors, centre girder and bottom stringers shall be selected proceeding from the calculation of bottom grillage, using beam model. Design static loads on bottom grillage are determined according to 11.2.6.3. It is recommended to take into account the effect of brackets. If pillars are available, the interaction of bottom grillage with superstructures shall be considered.

Reduced stresses (by von Mises criterion) obtained by results of calculation shall not exceed:

$0,75 \cdot \left(0,95 - \frac{0,42L}{100}\right) \cdot R_{eH}$ – for longitudinal framing in the strengthened area *B*;

$0,68 \cdot R_{eH}$ – in all other cases.

11.2.8.9 Dimensions of pillars and struts shall be not less than the those specified in 2.9, Part II "Hull". Compression loads shall be determined by calculation using beam model.

11.2.8.10 The web thickness of floors, bottom stringers, centre girder, bilge brackets and plates of transverse and longitudinal bulkheads adjoining the shell in the strengthened bottom area of **NAABSA** ships shall be not less than that specified in 2.2.4.9, Part II "Hull" where external structural protection is available in the area concerned and 2.4.4.3.2, Part II "Hull" where there is no external structural protection.

11.2.8.11 The webs of floors, bottom stringers, centre girder, bilge brackets and plates of transverse and longitudinal bulkheads adjoining the shell in strengthened bottom area of **NAABSA** ships shall be reinforced with stiffeners. The distance between stiffeners shall not exceed the distance between the bottom longitudinals in the area concerned. Stability of stiffeners shall be ensured in worn-out state at the end of structure service life.

11.2.8.12 The web thickness of floors, bottom stringers, centre girder, as well as bilge brackets and plates of transverse and longitudinal bulkheads adjoining the shell in strengthened bottom area of **NAABSA** ships shall be not less than that specified in 3.10.4.9.2, Part II "Hull". Design pressures shall be not less than those determined by the formula

$$p = 10d_N \cdot \left(1 + 4/\sqrt{A_i}\right) \cdot k_p$$

where d_N = refer to 11.2.2;

A_i = calculated area of the member strain zone, in m^2;

$k_p = 1,5$ – safety factor;

11.2.8.13 Stems.

11.2.8.13.1 Stem construction shall comply with the requirements of 2.9, Part II "Hull".

11.2.8.13.2 The lower part of the stem on **NAABSA** ships at the transition area to keel shall protrude beyond the shell surface or shall be made as an outboard bar.

11.2.8.13.3 The approved cross section dimensions of the stem shall be checked based on the calculation of the curvilinear variable section beam, which rests on decks, platforms and transverse bulkheads. Design load shall be not less than the response of the seabed R_N^m according to 11.2.6 distributed as a triangle along the length L_3 (refer to 11.2.4.2); coefficient of allowable stresses shall be taken equal to $k_\sigma = 0{,}68$.

11.2.8.13.4 The lower part of the sternframe on **NAABSA** ships at the transition area to keel shall protrude beyond the shell surface or shall be made as an outboard bar.

11.2.8.13.5 The approved dimensions of sternframe members shall be checked based on the direct strength calculation taking the coefficient of allowable stresses $k_\sigma = 0{,}68$ and design end loads according to 11.2.6. If the solepiece is lifted in the stern direction at an angle of not less than 6° for ships with the distinguishing mark **NAABSA1**, 8° for ships with the distinguishing mark **NAABSA2** and 10° for ships with the distinguishing mark **NAABSA3**, the load is considered distributed in the form of a triangle, in other cases the load is evenly distributed.

11.3 EQUIPMENT, ARRANGEMENTS AND OUTFIT

The **NAABSA** ships shall have at least one embarkation ladder on each side. The length of such embarkation ladders shall equal the distance from the upper deck to the seabed to provide safe transfer of the crew. The design of embarkation ladders shall comply with the requirements of 6.20.7, Part II "Life-Saving Appliances" of the Rules for the Equipment of Sea-Going Ships.

11.4 STABILITY AND SUBDIVISION

11.4.1 The requirements of this Section are in addition to the requirements of Part IV "Stability" and Part V "Subdivision".

11.4.2 For the purpose of this Chapter the following symbols have been adopted:

L_1 – ship's length as determined in the Load Line Rules for Sea-Going Ships;

B – ship's breadth.

11.4.3 The Stability Booklet shall include the following:

.1 it shall be specified that in case of grounding and emersion the ship shall be trimmed in way to have the bottom plane parallel to the ground plane in the place of grounding;

.2 it shall be specified that during loading/unloading operations aground, the changes in ship load shall be strictly weighed. If the exact data on the height of the center of gravity is not available, the height of center of gravity shall be taken equal to the upper dimensional limit;

.3 it shall be specified that prior to emersion, the ship trim and stability afloat shall be estimated to confirm that the ship complies with all applicable requirements for stability and that the load line draught is not exceeded.

11.4.4 Under all loading conditions to be encounted in service (icing disregarded), the trim and stability of an intact ship shall be sufficient to meet the requirements of 3.3 and 3.4, Part V "Subdivision" after obtaining the following bottom damages located anywhere in the ship length:

.1 longitudinal extent – $\frac{1}{3}L_1^{2/3}$ or 14,5 m (whichever is less);

.2 transverse extent – $B/6$ or 10 m (whichever is less);

.3 vertical extent – $B/20$ or 2 m (whichever is less).