Polski Rejestr Statków

RULES

PUBLICATION NO. 20/P

SHIP SIDE STRENGTHENING OF FISHING VESSELS MOORING AT SEA ALONGSIDE OTHER VESSELS

1995

Publications P (Additional Rule Requirements), issued by Polski Rejestr Statków, complete or extend the Rules and are mandatory where applicable.

GDAÑSK

PRS Publication No. 20/P “Ship Side Strengthening of Fishing Vessels Mooring at Sea Alongside Other Vessels – 1995” is an extension of the requirements contained in Part II “Hull” of the Rules for the Classification and Construction of Sea-Going Ships – 1995.

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The present Publication replaces its 1986 edition.

PRS/TW, 12/95

CONTENTS

1 General

The requirements of the present Publication are applicable to vessels which, in the course of service, are to be moored at sea using pneumatic fenders or other means having equivalent shock absorption properties (energy absorption). The ship complying with these requirements may be assigned an additional mark CWM affixed to the symbol of class. The present requirements apply to vessels mooring at sea when the state of sea does not exceed 6. The basic characteristics of fenders are to be submitted to PRS for information.

2 Strengthening Regions

2.1 For vessels mooring at sea, the hull strengthening regions are shown in Figs. 2.1–1 and 2.1–2.

The distance h of boundaries of the region of strengthening from the summer load waterline and the ballast waterline is to be determined from Table 2.1, depending on the permissible sea state at which the vessel is expected to be moored at sea.

Table 2.1

State of sea	4	5	6
h, m	0.8	1.2	2.0

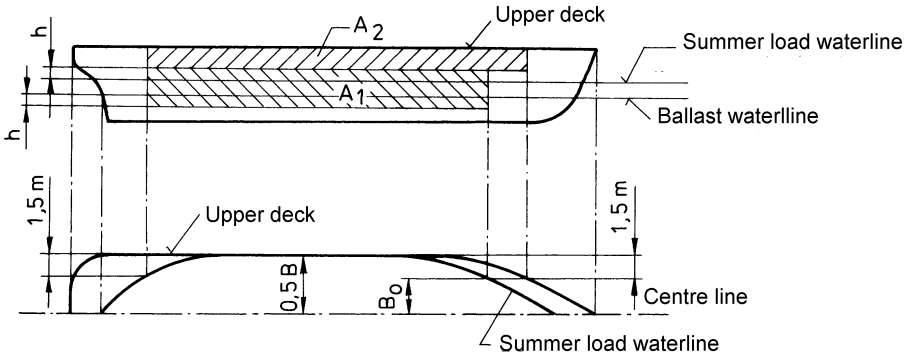

Fig. 2.1-1 Fishing vessels

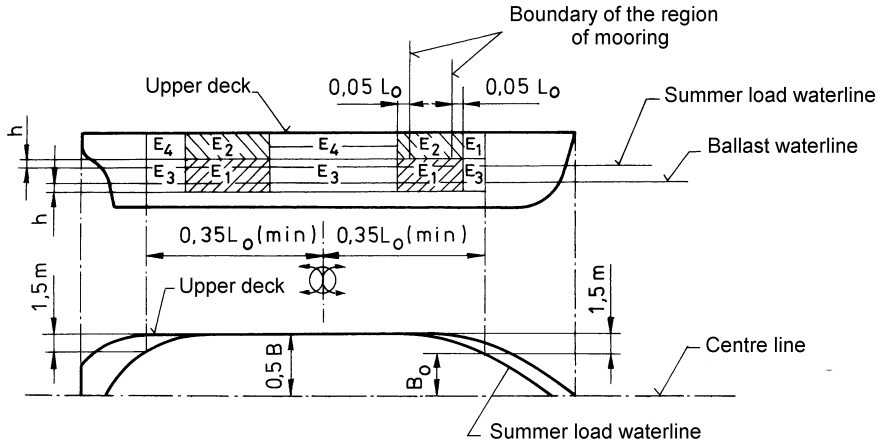

Fig. 2.1-2 Factory ships

2.2 The extent of regions of strengthenings for fishing vessels (2.1-1) is to be as follows:

Region A1:

– within the vessel's length – between sections where 0.5 of the vessel's breadth at the level of the summer load waterline is as follows:

$$B_o = 0.5B - 1.5\text{, m} \qquad (2.2)$$

B – vessel's breadth, m:

– within the vessel's height – from the level at the height h above the summer load waterline to the level at the distance of h below the ballast waterline. The values of h are to be obtained from Table 2.1.

Region A2:

– within the vessel's length – between the cross-section in the fore part of the vessel, where 0.5 of the vessel's breadth at the level of the upper deck is to be determined from formula 2.2 and the aft boundary of the A1 region;
– within the vessel's height – from the upper boundary of the A1 region to the upper deck.

2.3 The extent of regions of strengthenings for factory ships (Fig. 2.1-2) is to be as follows:

Region E1:

– within the ship's length – from the section located at 0.05 L_o forward of the bow-forward boundary of a fendered area to the section located at 0.05 L_o aftward of its aft boundary.

The boundaries of each region of mooring are to be as follows:

– within the ship's length – the forward edge of the bow pneumatic floating fender and the aft edge of the stern pneumatic floating fender; the boundaries of the regions are to be determined for extreme locations of fenders taking into account all possible variations of mooring;
– within the ship's height – from the level at the height, h, above the summer load waterline to the level at the distance h below the ballast waterline (the values of h are to be determined from Table 2.1).

Region E2:

– within the whole length of the E1 region and from its upper boundary to the level of the upper deck.

Region E3:

– within the ship's length – from the outer boundaries of E1 regions to the sections for which the value of 0.5 of the ship's breadth at the summer load waterline is equal to that determined from formula 2.2, as well as between E1 regions in ships with two regions of mooring;
– within the ships's height – within the E1 region.

The forward and aft boundaries of the region are to be at the distance not less than 0.35 L_o from the midship section.

Region E4:

– within the ship's length – within the E3 region;
– within the ship's height – from the upper edge of the E3 region to the upper deck.

3 Design Loads

3.1 Design loads for the regions of changing draughts, i.e. A1, E1 and E3 are to be determined from the following formula:

$$p = a_1 a_2 \left(190 + 51\sqrt{D\,10^{-3} - 0.464}\right), \text{ kPa} \qquad (3.1)$$

D – for fishing vessel – displacement of a ship to the summer load waterline, t;
– for factory ships – displacement of the largest ship to be moored, t;
In each case the displacement of D may be taken not greater than 7500 t;

a_1 – factor taken from Table 3.1-1, depending on the maximum permissible state of sea in which the ship is to be moored;

a_2 – factor depending on the region of strengthening, taken from Table 3.1-2.

Table 3.1-1

Factor a_1

Displacemet, t	State of sea		
	4	5	6
Up to 2000	1.00	1.15	1.60
Above 2000	0.82	1.00	1.16

Table 3.1-2

Factor a_2

Region	A1	E1	E3
a_2	1.0	1.1	0.8

3.2 The design load, for the regions A2, E2 and E4 may be by 10 per cent less than that given in 3.1 for the regions A1, E1 and E3.

4 Side Framing

4.1 In way of side strengthenings for mooring at sea, the vessel is to be framed transversely. Longitudinal framing is permitted only in the upper 'tween deck. The spacing of web frames in this case is not to exceed three frame spacings or 2.4 m, whichever is the lesser.

With transverse side framing in regions A1 and E1, it is recommended to fit intermediate frames.

4.2 The attachment of the lower ends of frames in the hold is to comply with the requirements of Part II "Hull" of the Rules for the Classification and Construction of Sea-going Ships.

4.3 The attachment of the lower ends of frames in the 'tween deck (where the frames are cut at decks) is to be in accordance with the requirements of Part II "Hull" of the Rules. The ends of frames are to be welded to the deck plating or other means are to be provided to ensure structural continuity.

4.4 The upper ends of frames are to extend to the deck plating and are to be welded thereto. Deck beams are to be carried to the inner edge of frames, and the brackets of the beams are to have a face plate or a flange along the free edge.

4.5 The ends of intermediate frames are to be attached to intercostal longitudinal members, fitted between frames. Attachment of intermediate frames to decks and platforms above the upper boundary of A1 and E1 regions may be effected by welding. It is not allowed to snip the ends of intermediate frames.

4.6 Longitudinal – side web girders are to comply with the requirements of Part II "Hull" of the Rules.

5 Frames

5.1 Where no intermediate frames are fitted, the section modulus of the frames in the holds and 'tween decks within strengthening regions is to be not less than that determined by the formula:

$$W = 10\,K\frac{ps}{R_e}\left(2\cdot l - 1.5\right),\ cm^3 \qquad (5.1\text{-}1)$$

s – spacing of frames, in m;
l – frame span, measured along the chord connecting the upper edge of the inner bottom plating or the face plate of the floor to the lower edge of the deck at side (the lower edge of side stringer in case it is considered as an effective support of side frames, in m;
p – design load, determined in accordance with 3.1, in kPa;
K – factor determined from the formula:

$$K = \frac{7.2}{K_1 \cdot K_2 \cdot K_3} \qquad (5.1\text{-}2)$$

K_1 – factor taken from Table 5.1, depending upon the number of intercostal side stringers within the frame span and the frame scantlings;

Table 5.1

Ratio of stringer web plates depth to frame depth	Factor K_1 at the number of stringers equal to:	
	1	2 or more
0.75	$1.0 + 0.017\frac{l}{s}$	$1.1 + 0.017\frac{l}{s}$
1.0	$1.0 + 0.034\frac{l}{s}$	$1.1 + 0.034\frac{l}{s}$

K_2 – factor depending on the number of side stringers within the frame span and their construction;
K_2 = 1,0 – where intercostal stringers are fitted or where no stringers are fitted;
K_2 = 1,12 – where one continuous stringer is fitted;
K_2 = 1,15 – where two continuous stringers are fitted;
K_3 – factor depending upon the frame curvature, whereas:

if no intercostal stringers are fitted:

$$K_3 = 1.0 + 6.8\sqrt{\frac{f}{l}\left(\frac{f}{l} + 0.28\right)} - 12.5\frac{f_1}{l} \qquad (5.1\text{-}3)$$

if intercostal stringers are fitted:

$$K_3 = 1.0 + 7.0\frac{f}{l} - 8.0\frac{f_1}{l} \qquad (5.1\text{-}4)$$

f – distance from the lower support of the frame to the tangent to the frame at the point of its upper support, measured along the perpendicular to the tangent (see Fig. 5.1), m;

f_1 – the maximum ordinate of frame camber, determined from Fig. 5.1;

R_e – material yield stress, MPa.

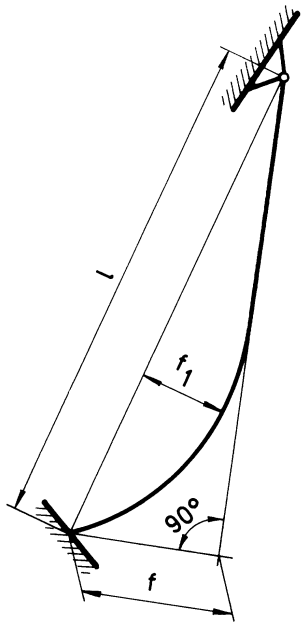

Fig. 5.1

5.2 In way of intermediate frames with end attachments according to 4.5, the frame section modulus may be determined by the formula:

$$W = W_0 - 0.5W_1, \text{ cm}^3 \qquad (5.2\text{-}1)$$

W_0 – section modulus of the frame, determined according to formula 5.1-1, cm^3.

W_1 – section modulus of the intermediate frame, cm^3.

The scantlings of intermediate frames are to comply with the following requirement:

$$W_1 \geq 0.75W_0 \qquad (5.2\text{-}2)$$

5.3 Where side longitudinals are fitted in way of the upper 'tween deck, their section modulus is to be not less than that determined by the following formula:

$$W = 27\frac{p \cdot s \cdot l^2}{R_e},\ cm^3 \qquad (5.3)$$

s – spacing of frames, in m;
l – span of frames, in m;
p – load determined in accordance with 3.1, kPa;
R_e – material yield stress, MPa.

5.4 The section modulus of side transverse is to be not less than that required by Part II "Hull" of the Rules – concerning machinery space.

5.5 In each case the section modulus of frames fitted in the holds and 'tween decks is to be not less than that determined in Part II "Hull" of the Rules.

5.6 It is recommended that the face plates of frames be symmetrical in relation to their webs and the least possible depth of frame webs be employed, the required section modulus of frames being maintained.

6 Side Plating

6.1 The thickness of side plating and of the sheerstrake in the regions of strengthening is to be not less than that determined by the formula:

$$t = 22s\sqrt{\frac{p}{R_e} - 0.266} + C,\ mm \qquad (6.1)$$

s – frame spacing, in m, (distance between the frame and intermediate frame if intermediate frames are fitted);
p – load acting on the side plating, determined in accordance with 3.1 for the lower edge of the plate, kPa;
C = 3, if the side under consideration is also used during trawling;
C = 2 in other case:
R_e – material yield stress, MPa.

6.2 In any case the thickness of the side plating and of the sheerstrake in vessels with $L_0 < 80$ m is to be increased by 1 mm as compared with that required by Part II "Hull" of the Rules.

7 Bulkheads and Partial Bulkheads

In way of side strengthening, bulkheads and partial bulkheads are to have horizontal stiffeners fitted between the side and the nearest vertical stiffener. The depth of the horizontal stiffeners is to be equal to at least 75 per cent of that of vertical stiffeners. In vessels with $L_0 \leq 80$ m, such stiffeners are to be spaced not more than 600 mm apart, and in vessels with $L_0 \geq 150$ m, not more than 800 mm apart. For

vessels of intermediate lengths, the spacings may be determined by linear interpolation. The ends of horizontal stiffeners are to be welded to the vertical stiffeners and are to be snipped at side.

8 Superstructures and Bulwarks

8.1 The superstructure sides and bulwarks are to have an inclination in relation to the centre line not less than one tenth, or are to be at a distance from the vessel's side not less one tenth of their height.

8.2 Bulwark stays welded to the deck stringer plate are to be of such construction as to prevent damaging the deck plating when the vessel leans along its bulwark against the side of the vessel it is moored to.

9 Bilge Keels

The arrangement of bilge keels on the shell plating is to be, as far as practicable, such that the tangent to the frame passing through the extreme free edge of bilge keel forms an angle with the vertical line which for vessels $L_0 \leq 80$ m is not less than 15°. For vessels with $L_0 \geq 150$ m, such angle may be equal to 0°. For vessels of intermediate lengths, the value of this angle is to be determined by linear interpolation.