INTERNATIONAL STANDARD

ISO
13729

Ships and marine technology — Ship's mooring and towing fittings — Closed chocks

Navires et technologie maritime — Corps-morts et ferrures de remorquage de navires — Chaumards fermés

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Foreword

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ISO 13729 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 4, *Outfitting and deck machinery*.

Introduction

The closed chock is a type of ship's mooring and towing fitting installed on the shipside to lead the mooring and towing rope from the ship's inboard to outboard.

The closed chocks are normally adopted for ships which use wire ropes. The radius of chock surface was designed based on the bending ratio of rope through the chock of not less than twelve times of the wire rope diameter.

Ships and marine technology — Ship's mooring and towing fittings — Closed chocks

1 Scope

This International Standard specifies the design, size and technical requirements for closed chocks installed to lead the mooring and towing rope of a ship.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IMO Circular MSC/Circ.1175, *Guidance on shipboard towing and mooring equipment*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
safe working load
SWL
maximum load in kN on the rope that should normally be applied in service conditions

4 Classification

4.1 Type

The closed chock is to be classified by its installation site as follows:

— Type A – Deck-mounted closed chock;

— Type B – Bulwark-mounted closed chock.

4.2 Nominal sizes

The nominal sizes, L x H x D of closed chocks are denoted by reference to the width and height of the opening and depth of the chock in millimetres. For the closed chocks having the same size, the alphabetical character is followed by nominal size for the different SWL.

The nominal sizes are:

250x200x214, 300x250x286, 350x250x333, 400x250x381, 450x250x381, 500x250x381, 400x250x428, 450x250x428, 500x250x428, 500x400x428, 500x250x525A, 500x400x525A, 500x250x525B, 500x400x525B

5 Dimensions

Closed chocks have dimensions and particulars in accordance with Tables 1 and 2, and Figures 1 and 2.

6 Materials

The following material is to be used for manufacturing the closed chocks:

— Chock: steel casting material having a yield point of not less than 235 N/mm^2 or equivalent.

The carbon contents of the steel casting shall not be more than 0,23 % considering weldability.

7 Construction

The foundation of the closed chocks shall be determined by considering the actual load direction. The foundation and welding connections to the hull shall be guaranteed reliable transmission of the maximum loading of the closed chocks to hull construction without any plastic deformation or cracks.

8 Manufacturing and inspection

8.1   All surfaces of the closed chocks including welding shall be free from any visible flaws or imperfections.

8.2   All surfaces in contact with the ropes shall be free from surface roughness or irregularities likely to cause damage to the ropes by abrasion.

8.3   The closed chocks shall be coated externally with an anti-corrosion protective finish.

9 Marking

9.1   The SWL intended for the use of the closed chocks shall be noted in the towing and mooring plan available on board for the guidance of the shipmaster, as specified in MSC/Circ.1175.

9.2   The actual SWL on board shall be determined by considering the foundation and under deck reinforcement, and it shall be marked on the towing and mooring plan. The actual SWL shall not be over the SWL indicated in this International Standard.

9.3   The closed chocks shall be clearly marked with their SWL by weld bead or equivalent. The SWL shall be expressed in tonnes (letter 't') and be placed so that it is not obscured during operation of the fitting.

EXAMPLE   SWL XXX t

9.4   The SWL mark shall be provided on the foundation of the chock or on deck.

9.5   The radii of edges and corners not shown in Figure 1 shall be of minimum 25 mm.

Dimensions in millimetres
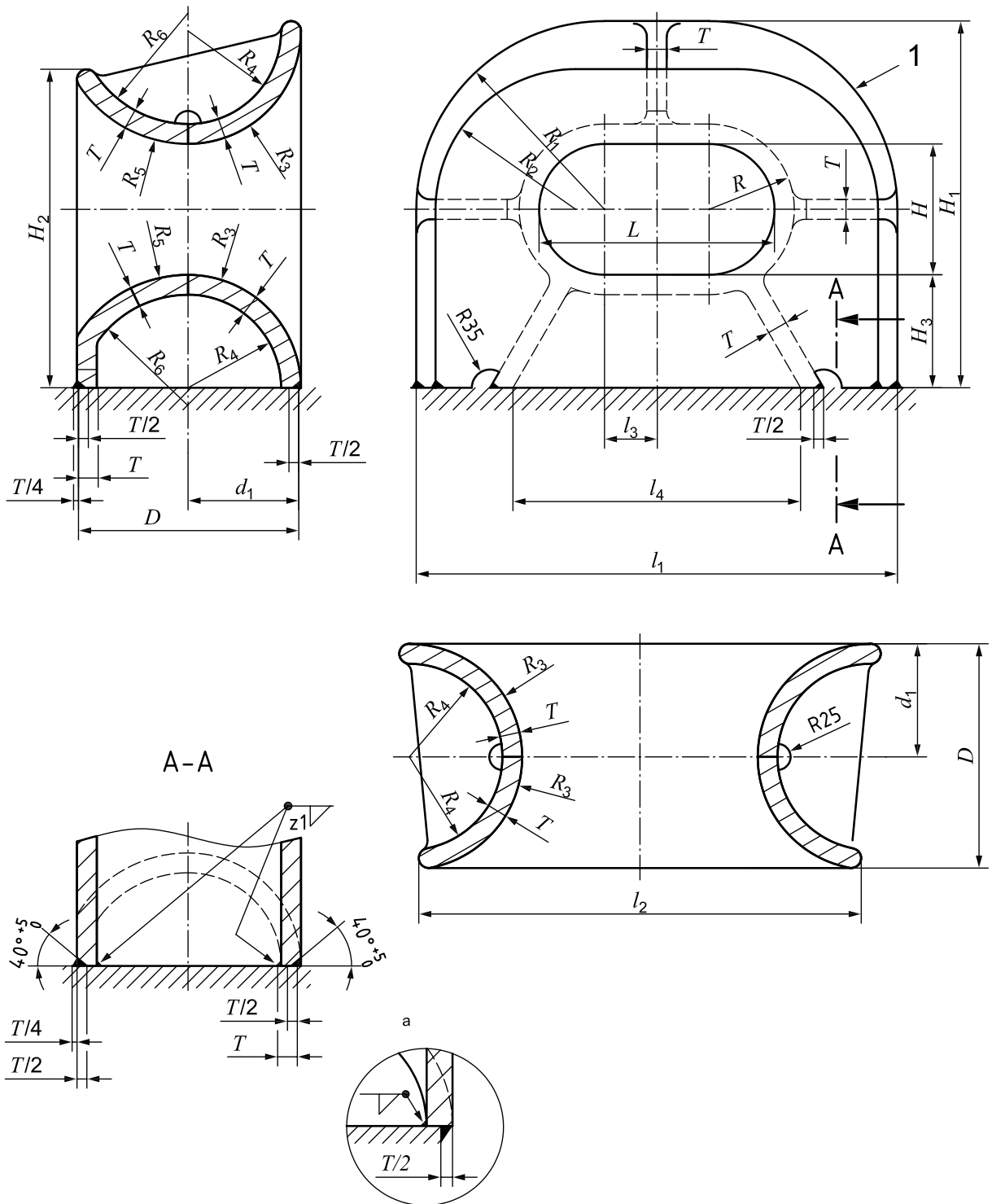
Key

1 closed chock

a Alternative welding method.

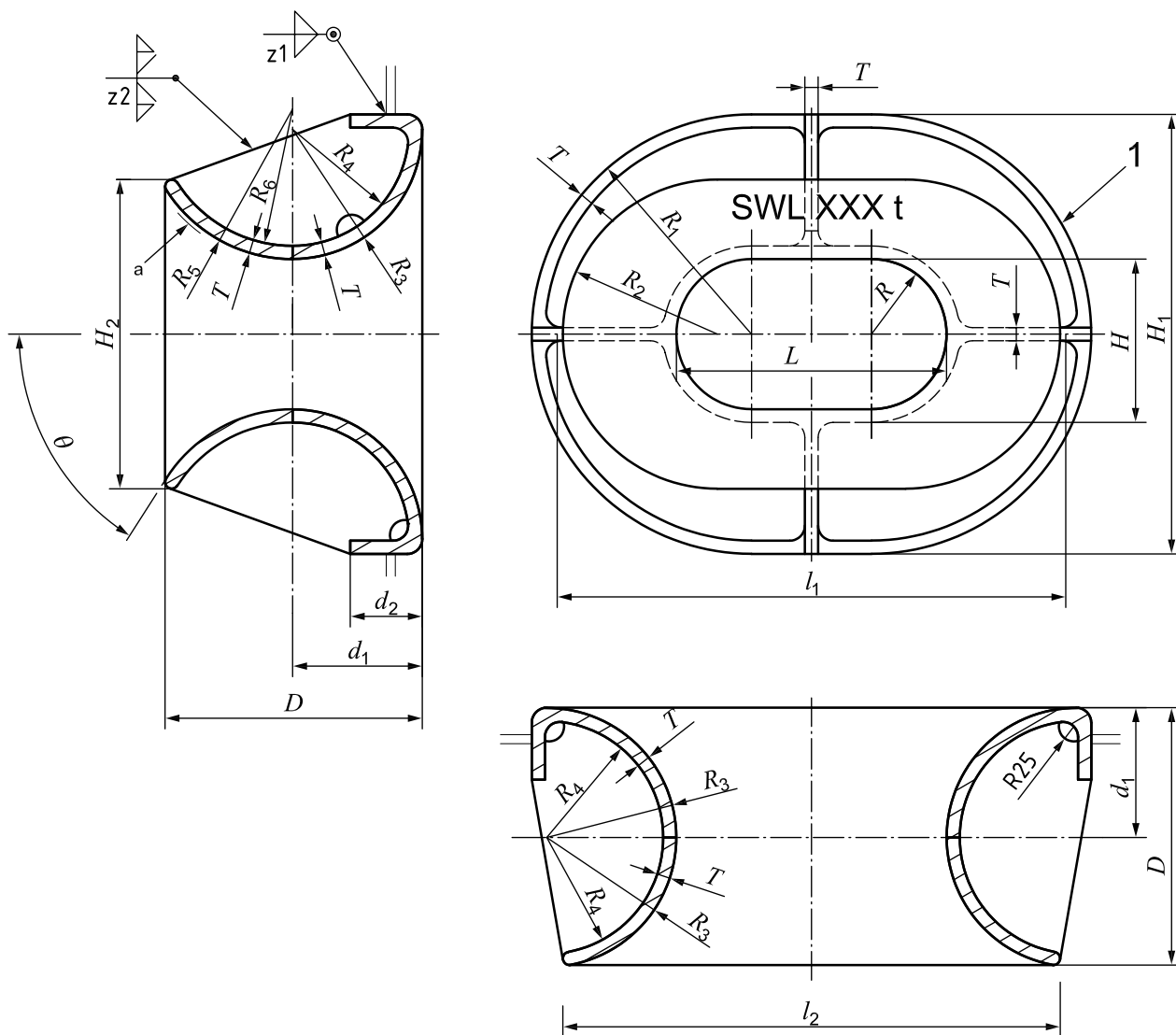**Figure 1 — Type A — Deck-mounted closed chocks**

Table 1 — Dimensions and SWL of Type A — Deck-mounted closed chocks

Dimensions in millimetres

Nominal size $L \times H \times D$	l_1	l_2	l_3	l_4	H_1	H_2	H_3	R	R_1	R_2	R_3
250x200x214	488	453	76	265	427	368	108	100	219	160	108
300x250x286	614	565	89	330	551	481	144	125	282	212	144
350x250x333	716	660	114	403	601	525	168	125	308	232	168
400x250x381	820	754	139	475	652	553	192	125	335	236	192
450x250x381	870	804	164	524	652	553	192	125	335	236	192
500x250x381	920	854	189	574	652	553	192	125	335	236	192
400x250x428	870	796	139	500	701	609	216	125	360	268	216
450x250x428	920	846	164	550	701	609	216	125	360	268	216
500x250x428	970	896	189	600	701	609	216	125	360	268	216
500x400x428	970	896	176	600	851	759	216	200	435	343	216
500x250x525A	1 068	1 000	190	652	798	675	264	125	409	286	264
500x400x525A	1 068	1 000	193	652	948	825	264	200	484	361	264
500x250x525B	1 074	1 000	176	652	801	680	264	125	412	291	264
500x400x525B	1 074	1 000	179	652	951	830	264	200	487	366	264

Nominal size $L \times H \times D$	R_4	R_5	R_6	d_1	T	Welding leg length[a] z_1	SWL[b] (kN)	SWL[b] (t)	Wire rope diameter[c] (recommended)	Calculated weight[d] (kg)
250x200x214	86	150	128	108	22	6	226	23	18	73
300x250x286	118	180	154	144	26	6,5	422	43	24	142
350x250x333	138	200	170	168	30	7,5	549	56	28	222
400x250x381	156	250	214	192	36	9	687	70	32	310
450x250x381	156	250	214	192	36	9	706	72	32	322
500x250x381	156	250	214	192	36	9	765	78	32	337
400x250x428	178	250	212	216	38	9,5	883	90	36	434
450x250x428	178	250	212	216	38	9,5	912	93	36	452
500x250x428	178	250	212	216	38	9,5	932	95	36	472
500x400x428	178	250	212	216	38	9,5	893	91	36	528
500x250x525A	224	320	280	264	40	10	1 148	117	44	657
500x400x525A	224	320	280	264	40	10	1 158	118	44	724
500x250x525B	218	320	274	264	46	11,5	1 413	144	44	753
500x400x525B	218	320	274	264	46	11,5	1 383	141	44	825

[a]   The welding method may be changed based on the same welding volume/strength.

[b]   SWLs shown are for reference only. These are based on the loadings as mentioned in Annex A.

"SWL" may be adjusted depending on the actual loading conditions, and the actual marking shall be agreed between the user and the manufacturer.

[c]   The wire rope diameter (recommended) is only for reference based on a bending ratio of rope through the chock of 12 times.

[d]   The calculated weight is for reference only.

Dimensions in millimetres

Key

1   closed chock

$\theta°$ maximum available line leading angle limited by the end of curve surface (for reference)

a   SWL marking.

NOTE 1   The SWL mark shall be provided on the chock or on the shell plate near the chock.

NOTE 2   The radii of edges and corners not shown in this figure shall be of minimum 25 mm.

Figure 2 — Type B — Bulwark-mounted closed chocks

Table 2 — Dimensions and SWL of Type B — Bulwark-mounted closed chocks

Dimensions in millimetres

Nominal size L x H x D	l_1	l_2	H_1	H_2	R	R_1	R_2	R_3	R_4	R_5
250x200x214	516	441	466	306	100	233	153	108	96	150
300x250x286	638	554	588	410	125	294	205	144	128	180
350x250x333	736	646	636	449	125	318	224.5	168	150	200
400x250x381	834	736	684	450	125	342	225	192	172	250
450x250x381	884	786	684	450	125	342	225	192	172	250
500x250x381	934	836	684	450	125	342	225	192	172	250
400x250x428	882	778	732	515	125	366	257.5	216	194	250
450x250x428	932	828	732	515	125	366	257.5	216	194	250
500x250x428	982	878	732	515	125	366	257.5	216	194	250
500x400x428	982	878	882	665	200	441	332.5	216	194	250
500x250x525A	1 078	976	828	551	125	414	275.5	264	240	320
500x400x525A	1 078	978	978	701	200	489	350.6	264	240	320
500x250x525B	1 078	976	828	554	125	414	277	264	238	320
500x400x525B	1 078	978	978	704	200	489	352	264	238	320

Nominal size L x H x D	R_6	d_1	d_2	T	θ	Welding leg length[a]		SWL[b]		Wire rope diameter[c] (recommended)	Calculated weight[d] (kg)
						z_1	z_2	(kN)	(t)		
250x200x214	138	108	80	12	44°	6	5	226	23	18	49
300x250x286	164	144	100	16	44°	8	6,5	422	43	24	100
350x250x333	182	168	120	18	55°	9	7	549	56	28	141
400x250x381	230	192	120	20	47°	10	8	687	70	32	184
450x250x381	230	192	120	20	47°	10	8	706	72	32	194
500x250x381	230	192	120	20	47°	10	8	765	78	32	202
400x250x428	228	216	120	22	56°	10	9	883	90	36	264
450x250x428	228	216	120	22	56°	10	9	912	93	36	276
500x250x428	228	216	120	22	56°	10	9	932	95	36	288
500x400x428	228	216	120	22	56°	10	9	893	91	36	311
500x250x525A	296	264	120	24	53°	10	9,5	1 148	117	44	379
500x400x525A	296	264	120	24	53°	10	9,5	1 158	118	44	408
500x250x525B	294	264	120	26	53°	10	10,5	1 413	144	44	405
500x400x525B	294	264	120	26	53°	10	10,5	1 383	141	44	442

[a]   The welding method may be changed based on the same welding volume/strength.

[b]   The SWLs shown in this table are for reference only. These are based on the loadings as mentioned in Annex A.

"SWL" may be adjusted depending on the actual loading conditions, and the actual marking shall be as agreed between the user and the manufacturer.

[c]   The wire rope diameter (recommended) is only for reference based on bending ratio of rope through the chock of 12 times.

[d]   The calculated weight is for reference only.

Annex A
(informative)

Basis for strength assessment of closed chocks

A.1 General

The strength of the closed chocks was evaluated by finite element model analysis and determined based on the following design criteria.

A.2 Loading

The closed chocks shall be designed to withstand the horizontal and vertical load cases.

The horizontal and vertical loadings were considered individually, but both loadings were not considered simultaneously.
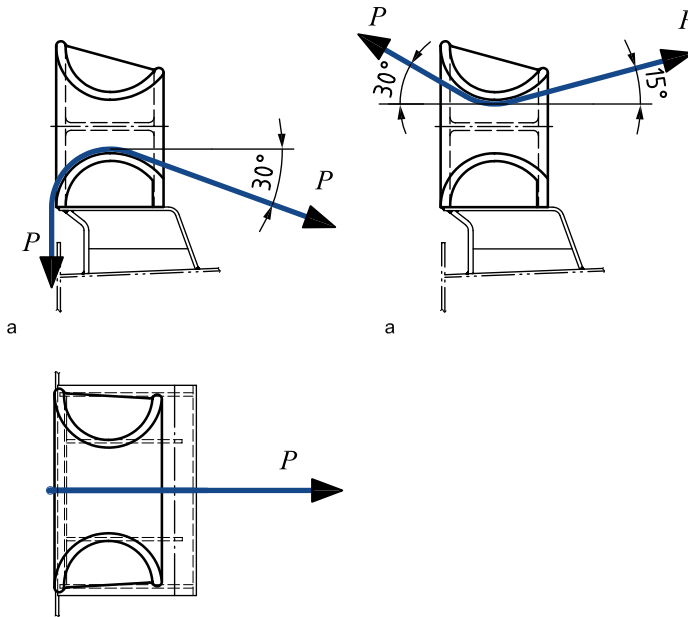
A.2.1 Case 1 — Horizontal loading

Key
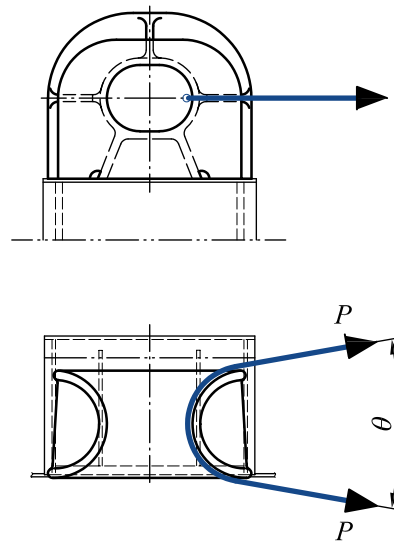
P mooring force or towing force

NOTE   The loads were considered for a rope deflected 180° ($\theta = 0°$) through the closed chock.

Figure A.1 — Horizontal loading

A.2.2   Case 2 — Vertical loading

Key

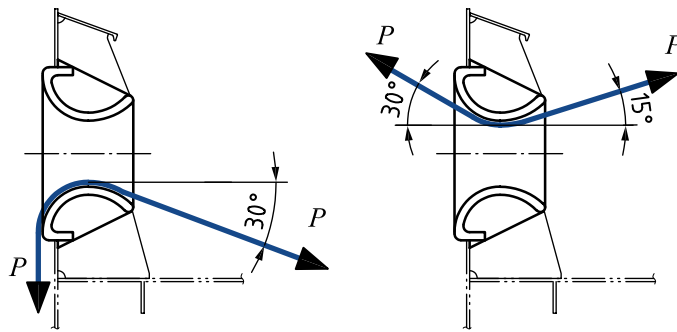P mooring force or towing force

a   Ship side.

NOTE   The loads were considered for a rope deflected as shown in this figure through the closed chock.

Vertical down side: Outboard down 90 °, Inboard down 30 °.

Vertical up side: Outboard up 30 °, Inboard up 15 °.

Figure A.2 — Vertical loading for Type A — Deck-mounted closed chocks
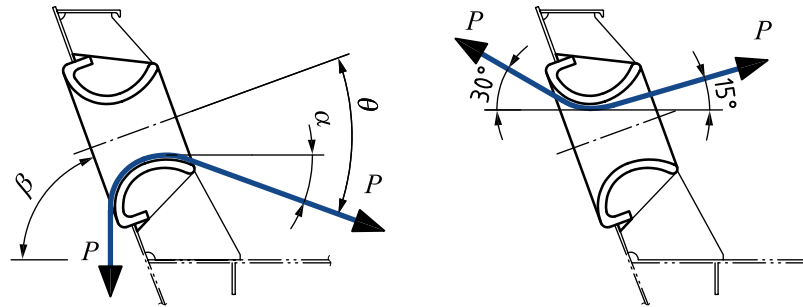

a) Bulwark-mounted closed chocks without bulwark inclination

NOTE   The loads were considered for a rope deflected as shown in Figure A.3a) through the closed chock.

Vertical down side: Outboard down 90 °, Inboard down 30 °.

Vertical up side: Outboard up 30 °, Inboard up 15 °.

b) Bulwark-mounted closed chocks with bulwark inclination

Key

P mooring force or towing force

NOTE   The loads were considered for a rope deflected as shown in Figure A.3b) through the closed chock.

Vertical down side: Outboard down 90 °, Inboard down $\theta°$ is not to go over the figures in Table 2.

($\alpha°$: Refer to below table for instance, at the design bulwark angle of $\beta = 60°$)

Nominal size	(Maximum available angle)
L x H x D	$\alpha°$
250x200x214	14
300x250x286	14
350x250x333	25
400x250x381	17
450x250x381	17
500x250x381	17
400x250x428	26
450x250x428	26
500x250x428	26
500x400x428	26
500x250x525A	23
500x400x525A	23
500x250x525B	23
500x400x525B	23

Vertical up side: Outboard up 30 °, Inboard up 15 °.

Figure A.3 — Vertical loading for Type B — Bulwark-mounted closed chocks

A.3   Load and stress criterion

Under the SWL, the following stress criterion was adopted:

—   The combined stress is limited to 85 % of the yield stress of the material.

A.4   Wear-down allowances and corrosion additions

The wear-down margin and corrosion margin were already included in the safety factor.

Bibliography

[1]   IACS UR A2, *Shipboard fittings and supporting hull structures associated with towing and mooring on conventional vessels*

[2]   OCIMF, *Mooring Equipment Guidelines (MEG3)*

[3]   ISO 4990, *Steel castings — General technical delivery requirements*

[4]   ISO 2408, *Steel wire ropes for general purposes — Minimum requirements*