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

Navires et technologie maritime — Corps-morts et ferrures de remorquage de navires — Écubiers de Panama

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Foreword

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ISO 13728 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 4, *Outfitting and deck machinery*.

Introduction

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

The Panama chocks are normally adopted for ships passing through the Panama Canal which are normally assisted by locomotives using steel towing wire.

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

1 Scope

This International Standard specifies the design, size and technical requirements for Panama chocks suitable for installation on ships passing through the Panama Canal which are normally assisted by locomotives using steel towing wires. These chocks meet normal mooring requirements and Panama Canal requirements.

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*

Panama Canal Requirements — OP Notice to shipping N-1-2010 — Vessel requirements

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 Panama chock shall be classified by its installation site as follows:

— Type A – Deck-mounted Panama chock;

— Type B – Bulwark-mounted Panama chock.

4.2 Nominal sizes

The nominal sizes of Panama chocks are denoted by reference to the width of the opening, in millimetres.

The nominal sizes are 310 and 360.

5 Dimensions

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

5.2 The minimum opening size of Panama chocks is decided as specified in *Panama Canal Requirements — OP Notice to shipping N-1-2010 — Vessel requirements.*

6 Materials

The following material shall be used for manufacturing the Panama 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 Panama 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 Panama chocks to hull construction without any plastic deformation or cracks.

8 Manufacturing and inspection

8.1 All surfaces of the Panama 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 Panama chocks shall be coated externally with an anti-corrosion protective finish.

9 Marking

9.1 The safe working load (SWL) intended for the use of the Panama 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.

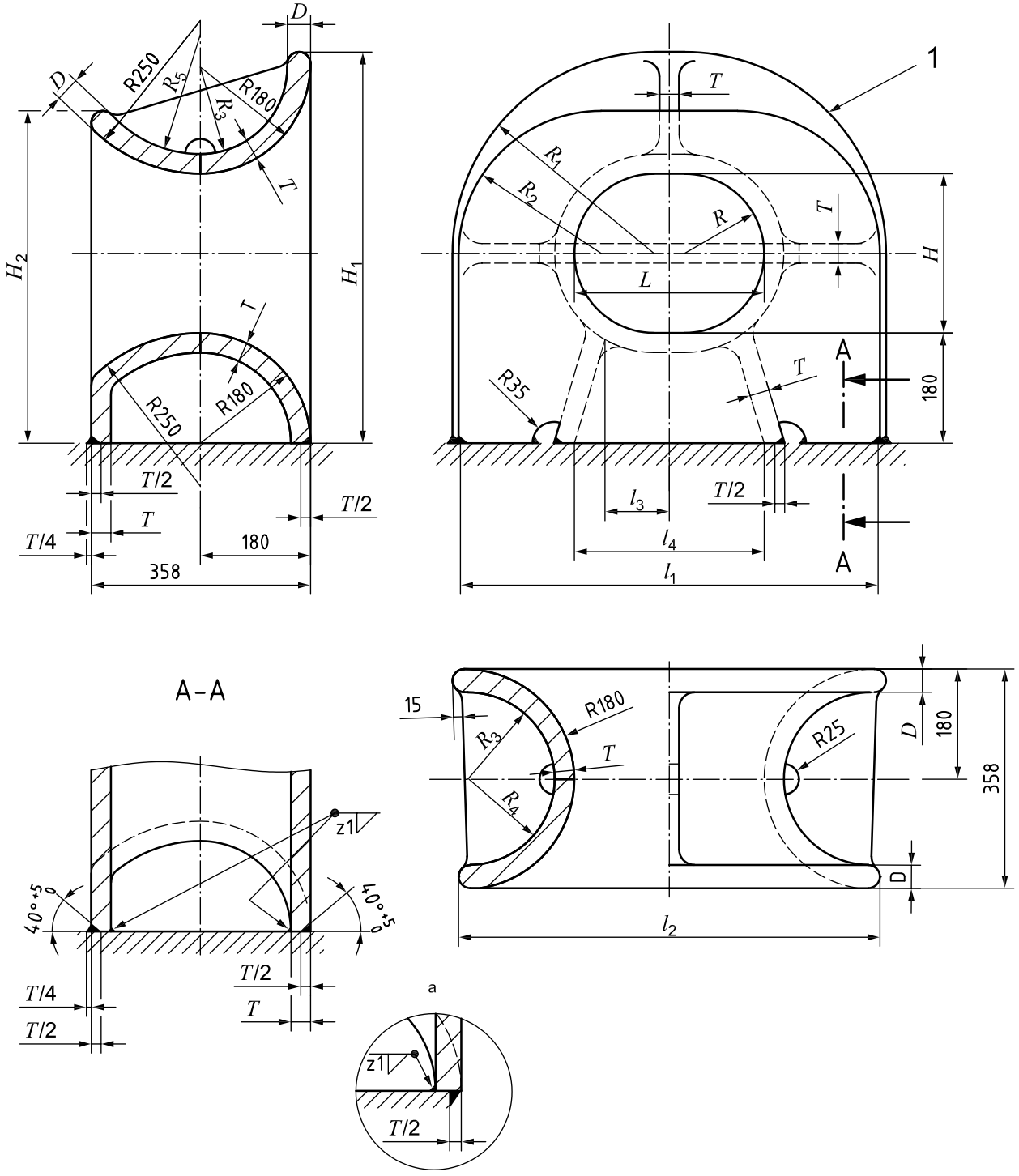
9.3 The Panama chock shall be clearly marked with its SWL by weld bead or equivalent. The SWL shall be expressed in tonnes (letter ‘t’) and be located so that it is not obscured during operation of the fitting.

EXAMPLE SWL XXX t

9.4 The SWL mark shall be placed 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 Panama chock

[a] Alternative welding method.

Figure 1 — Type A — Deck-mounted Panama chock

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

Dimensions in millimetres

Nominal size	L	l_1	l_2	l_3	l_4	H	H_1	H_2	R	R_1	R_2
310	310	708	688	105	310	260	639	541	130	329	231
360	360	760	740	130	360	260	640	543	130	330	233

Nominal size	R_3	R_4	R_5	T	D	Welding leg length[a]	SWL[b]		Calculated weight[c]
						z_1	(kN)	(t)	(kg)
310	142	140	198	32	38	8	471	48	257
360	140	138	196	34	40	8,5	687	70	286

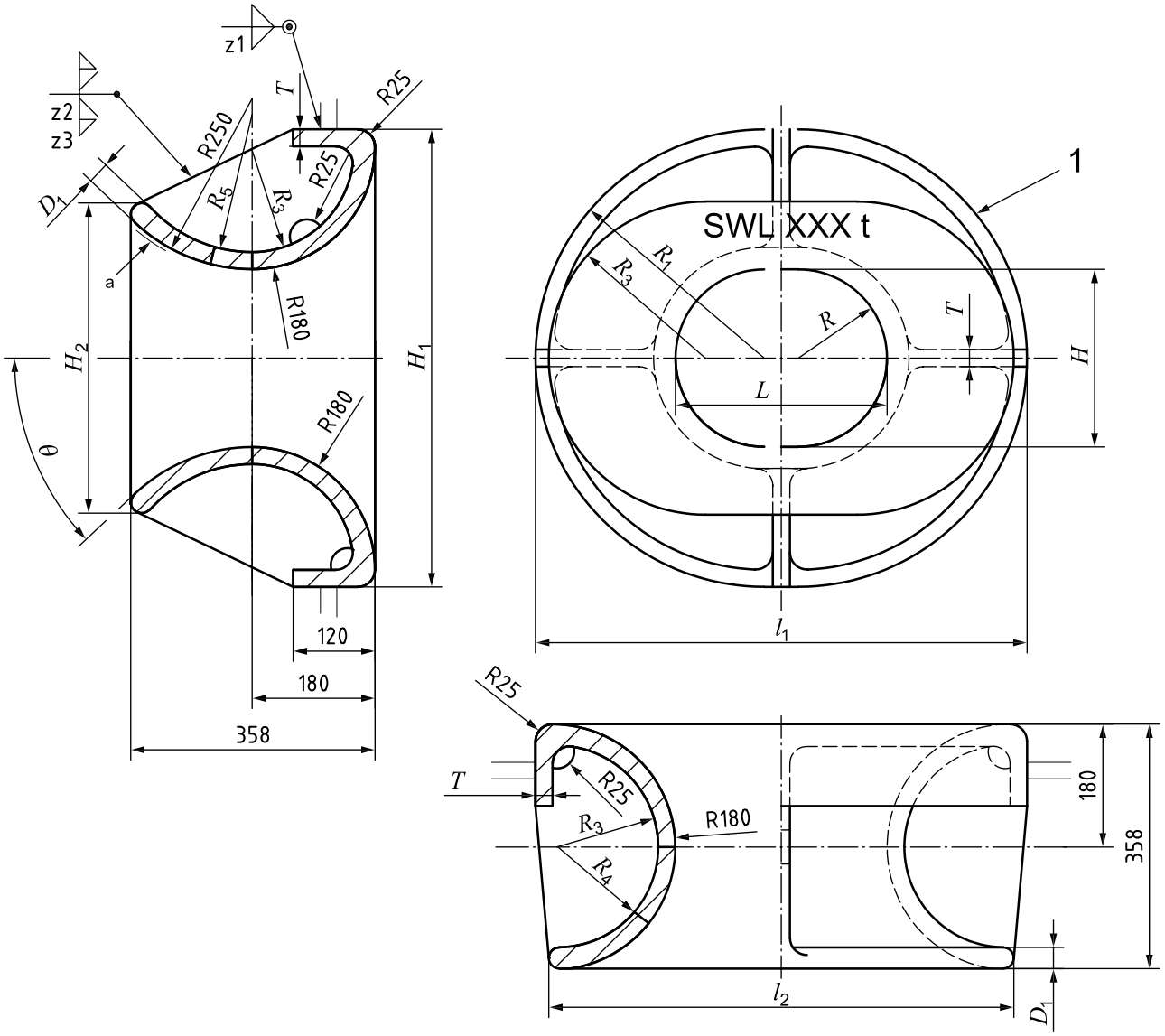
a The welding method may be changed based on the same welding volume/strength.

b The 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 calculated weight is for reference only.

Dimensions in millimetres



Key

1 Panama chock

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

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 Panama chocks

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

Dimensions in millimetres

Nominal size	L	l_1	l_2	H	H_1	H_2	R	R_1	R_2	R_3	R_4
310	310	720	681	260	670	453	130	335	226,5	149	147
360	360	770	733	260	670	456	130	335	228	147	145

Nominal size	R_5	T	D_1	θ	Welding leg length[a]			SWL[b]		Calculated weight[c]
					z_1	z_2	z_3	(kN)	(t)	(kg)
310	205	25	31	44°	10	6	4	687	70	228
360	203	27	33	43°	10	6	5	775	79	248

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

[b] The 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 per the agreement between the user and the manufacturer.

[c] The calculated weight is for reference only.

Annex A
(informative)

Basis for strength assessment of Panama chocks

A.1 General

The Panama chocks were designed in accordance with the technical requirements of the Panama Canal as listed below:

— Bearing surface radius: not less than 180 mm.

— Single chock: opening area: min. 650 cm^2, 305 × 230 mm, 45,36 t SWL.

— Double chock: opening area: min. 900 cm^2, 355 × 255 mm, 64,00 t SWL.

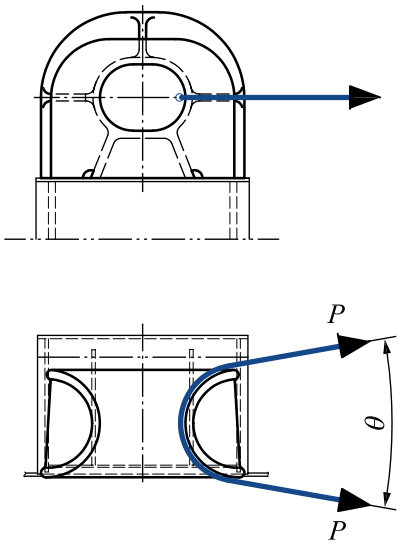
The strength of the Panama chocks was evaluated by finite element model analysis and determined based on the design criteria.

A.2 Loading

The Panama 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



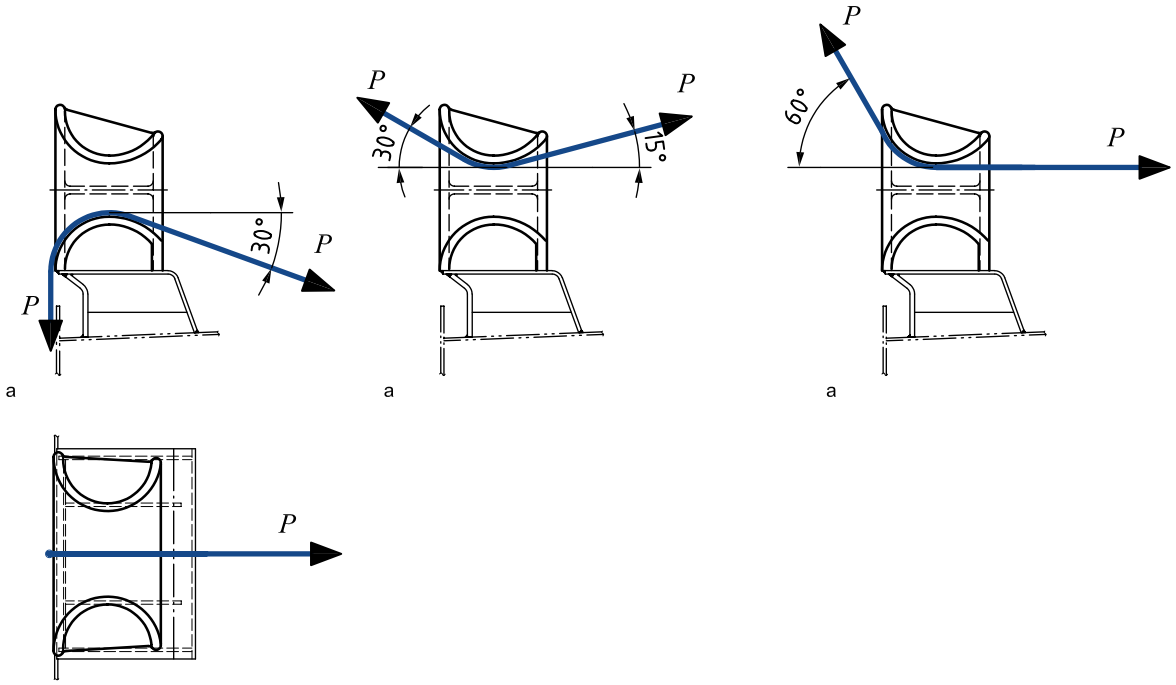
Key

P mooring force or towing force

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

Figure A.1 — Horizontal loading

A.2.2 Case 2 — Vertical loading



a Ship side.

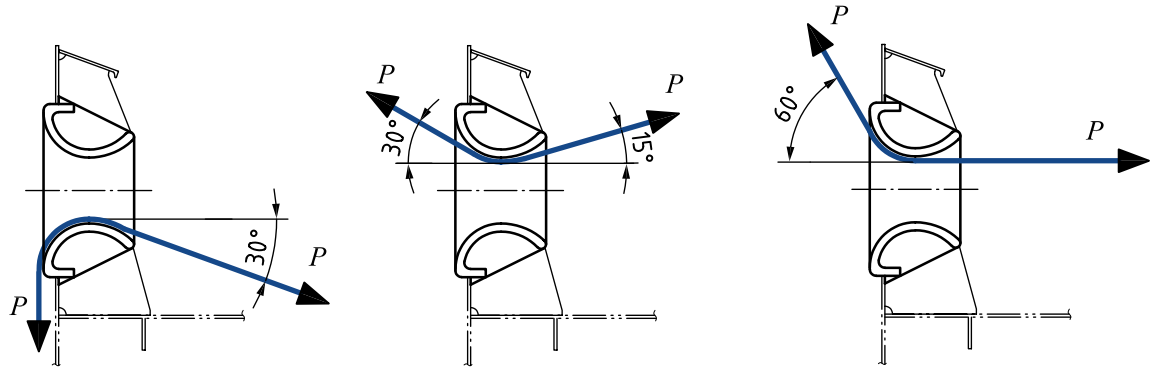
NOTE The loads were considered for a rope deflected through the Panama chock as shown in this figure.

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

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

Outboard up 60 °, Inboard up 0 °

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



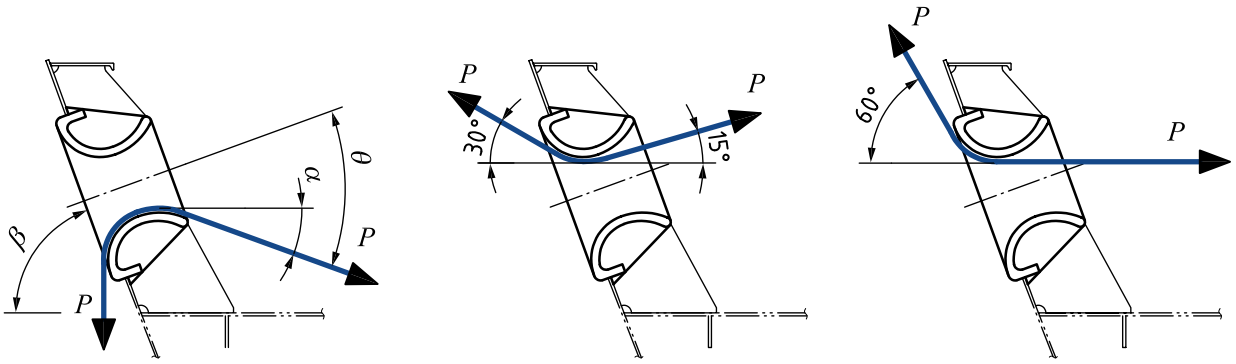
a) Bulwark-mounted Panama chocks without bulwark inclination

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

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

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

Outboard up 60 °, Inboard up 0 °



b) Bulwark-mounted Panama chocks with bulwark inclination

Key

P mooring force or towing force

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

Vertical down side: Outboard down 90 °, Inboard down $\theta°$ is not 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) $\alpha°$
310	14
360	13

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

Outboard up 60 °, Inboard up 0 °

Figure A.3 — Vertical loading for Type B — Bulwark-mounted Panama 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*

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