International Standard

ISO 18824

First edition
2024-09

Ships and marine technology — Ship's mooring and towing fittings — Horizontal roller fairleads

Reference number
ISO 18824:2024(en)

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Published in Switzerland

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Foreword

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

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Ships and marine technology — Ship's mooring and towing fittings — Horizontal roller fairleads

1 Scope

This document specifies the design, size and technical requirements for horizontal roller fairleads installed to brace the mooring rope over other obstacle fittings.

This document is applicable to the design, manufacture and inspection of horizontal roller fairleads.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
safe working load
SWL
maximum load applied on the rope in service conditions

Note 1 to entry: The SWL is expressed in tonnes (1 t = 9,8kN).

3.2
horizontal roller fairlead
type of mooring fitting installed on board a ship to brace the mooring rope over other obstacle fittings

4 Nominal sizes

The nominal sizes, D_n, of horizontal roller fairleads are denoted by reference to the nominal diameter. The length, L, of horizontal roller fairleads are expressed in millimetres.

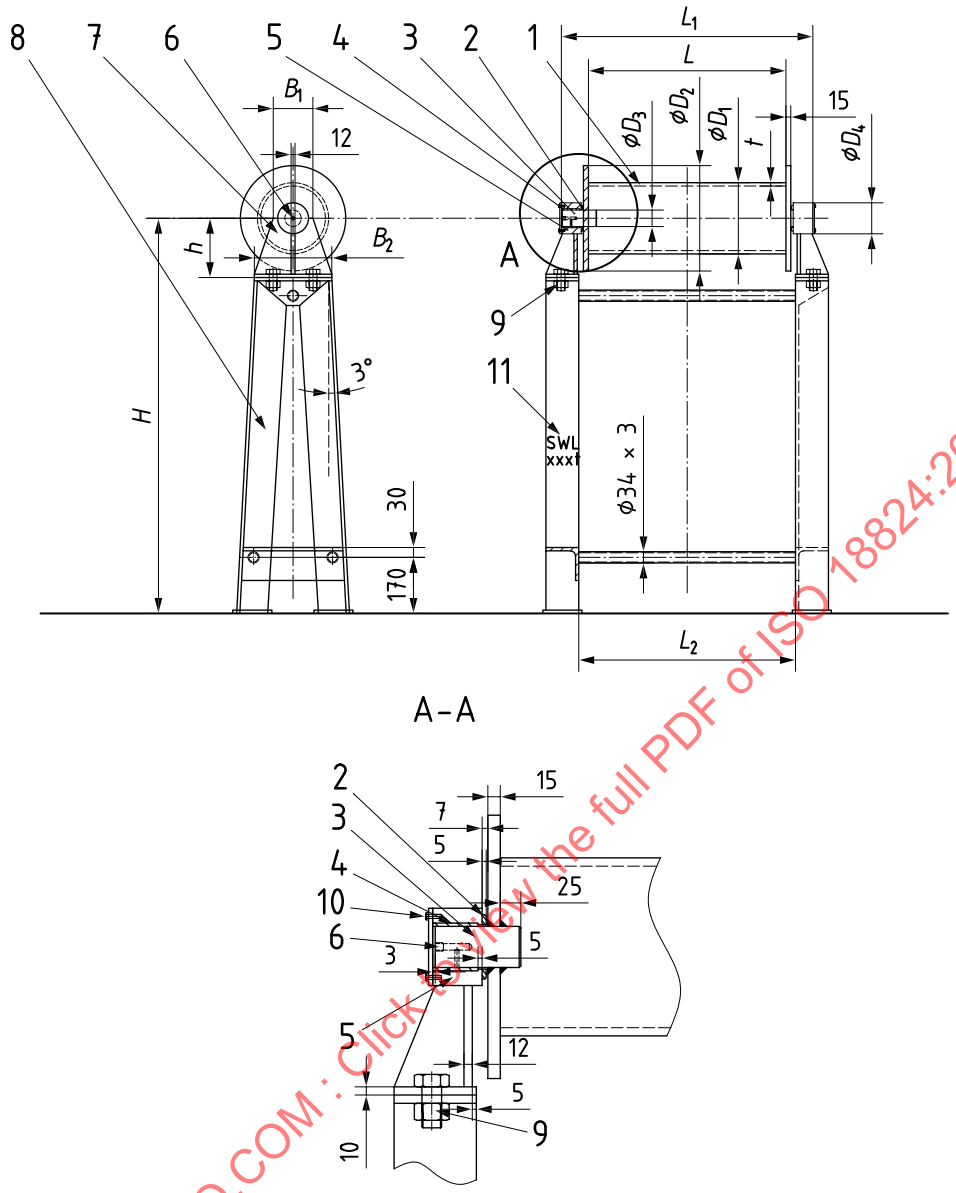
The typical nominal sizes, defined together as $D_n \times L$, are expressed in millimetres:

200 × 600, 200 × 800, 250 × 800, 250 × 1 000, 250 × 1 200.

5 Structure and dimension

Figure 1 shows the structure and dimension of horizontal roller fairleads. Table 1 shows the main parameters of horizontal roller fairleads.

Dimensions in mm



Key

1	roller	7	bearing seat
2	retainer ring	8	foundation
3	axle	9	bolts (4 × M24)
4	bush	10	end cover (with gasket)
5	bearing	11	SWL marking
6	grease nipple	D	nominal size
B_1	width of bearing seat (upper)	D_1	diameter of roller (tube)
B_2	width of foundation (upper)	D_2	diameter of roller (dam-plate)
L	length of roller (net)	D_3	diameter of axle
L_1	length of axle (total)	D_4	diameter of bearing
L_2	length of foundation (inside)	H	height of the centre of roller with foundation
t	thickness of roller (tube)	h	height of the centre of roller

Figure 1 — Horizontal roller fairleads

Table 1 — Main parameters of horizontal roller fairleads

Nominal size D mm	D_1 mm	D_2 mm	D_3 mm	D_4 mm	t mm	h mm	L mm	L_1 mm	L_2 mm	B_1 mm	B_2 mm	**Foundation (Angle bar)** mm
200	219	320	50	94	12	180	600	764	658	120	235	100 × 100 × 10
200	219	320	50	94	12	180	800	964	858	120	235	100 × 100 × 10
250	273	380	65	125	14	210	800	964	858	150	300	125 × 125 × 14
250	273	380	65	125	14	210	1 000	1 164	1 058	150	300	125 × 125 × 14
250	273	380	65	125	14	210	1 200	1 364	1 258	150	300	125 × 125 × 14

Nominal size D_n mm	**SWL**[b]						**Calculated mass**[c] kg
	θ [a] = 175°	θ = 170°	θ = 165°	θ = 160°	θ = 155°	θ = 150°	
	t	t	t	t	t	t	H [d] = 1 200
200	1 470	1 225	833	627	510	421	155
200	1 470	1 225	833	627	510	421	169
250	1 470	1 470	1 421	1 058	843	706	265
250	1 470	1 470	1 421	1 000	804	666	284
250	1 470	1 470	1 176	833	686	568	304

[a] θ is the relative angle of rope across the horizontal roller fairlead (see Annex A).

[b] The SWL is the maximum applicable rope tension based on θ. The SWLs shown in this table are based on the load mentioned in Annex A. The SWL may be adjusted depending on the actual loading conditions. It shall be determined by the user and the manufacturer and evaluated on a case by case basis. See Annex A. The SWL is expressed in tonnes (1 t = 9,8kN).

[c] The calculated mass is for reference only.

[d] $500 \leq H \leq 1\,500$. The actual height shall be determined in accordance with the actual rope height across the horizontal roller fairlead.

6 Materials

The following material shall be used for manufacturing the horizontal roller fairleads:

— roller: steel plate having a yield point of not less than 235 N/mm^2;

— axle: round bar having a yield point of not less than 245 N/mm^2;

— bush: brass, bronze or equivalent;

— retainer ring: tin bronze, or equivalent.

7 Construction

7.1 The rollers of the horizontal roller fairleads should be constructed from welded or seamless steel tubes (see ISO 4200).

7.2 The foundation of the horizontal roller fairleads shall be determined by the manufacturer. The foundation and welding connections shall be guaranteed by the reliable transmission of the maximum loading of the horizontal roller fairleads to hull construction.

7.3 Grease nipples should be provided according to ISO 6392-1, or as required by customer.

8 Manufacturing and inspection

8.1 All surfaces of the horizontal roller fairleads, including welded surfaces, 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 horizontal roller fairleads shall be coated externally with an anti-corrosion protective paint.

8.4 The horizontal roller fairleads shall be rotated smoothly and fairly.

8.5 All rotating parts shall be provided with greasing.

9 Marking

9.1 The safe working load (SWL) for the intended use for the horizontal roller fairleads should be noted in the towing and mooring plan available on board as guidance for the shipmaster.

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 Table 1.

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

EXAMPLE SWL XXX t.

NOTE 1 t = 9,8 kN.

Annex A
(informative)

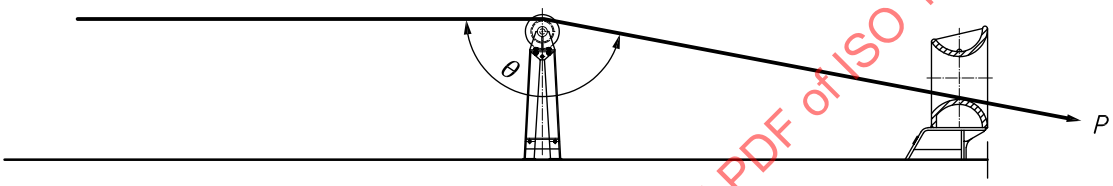
Basis for strength assessment of horizontal roller fairleads

A.1 General

The strength of the horizontal roller fairleads was evaluated by finite element model analysis and simple beam theory calculation, and determined based on the design criteria specified in A.2 to A.4.

A.2 Loading

The horizontal roller fairleads shall be designed to withstand load cases given in Figure A.1.



Key

P mooring force applied on the rope

θ relative angle of rope across the horizontal roller fairlead

NOTE 1 The deck can be with camber or not, only the relative angle of rope is concerned.

NOTE 2 The leading direction of rope is shown just for reference, only the relative angle of rope is concerned.

NOTE 3 The loads were considered with rope relative angle θ across the horizontal roller fairlead as shown in this figure.

NOTE 4 The loads can be increased according to the relative angle of the rope if θ is bigger than the specified value.

Figure A.1 — Loading on horizontal roller fairleads

A.3 Load and stress criteria

Under the design load, the following stress criteria were adopted:

— the bending stress is limited to 85 % of the yield stress of the material;

— the shear stress is limited to 60 % of the yield stress of the material;

— the combined stress is limited to 100 % of the yield stress of the material.

The design load shall be 1,25 times SWL.

A.4 Wear-down allowances and corrosion additions

The wear-down margin and corrosion margin were already included in the stress criteria specified in A.3.