
**Ships and marine technology —
Ship's mooring and towing fittings —
Universal fairleads with upper roller**

*Navires et technologie maritime — Corps-morts et ferrures de
remorquage de navires — Chaumards universels avec rouleau
supérieur*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 13733:2012), which has been technically revised.

The main changes compared to the previous edition are as follows:

- technical guidelines have been added in [7.3](#) and [7.4](#);
- the definition of SWL ([3.1](#)) has been reworded;
- the object lines and mark numbers in [Figures 1, 2, 3](#) and [4](#) have been amended;
- the values of “*t*” for the vertical roller, lower horizontal and upper horizontal roller in [Table 5](#) (former Table 3) have been amended;
- the thickness of the bushes and washers have been added in [Table 5](#) (former Table 3);
- the description in [Clause A.1](#) has been amended;
- the dimension line (θ_1) in [Figure A.2](#) has been amended;
- the descriptions in [Clause A.3](#) have been amended;
- technical information on FEM and strength calculation have been added in [A.3.2](#) and [A.3.3](#).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The universal fairlead is a type of ship's mooring fitting installed on board to lead the mooring rope from the ship's inboard to outboard.

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Ships and marine technology — Ship's mooring and towing fittings — Universal fairleads with upper roller

1 Scope

This document specifies the types, nominal sizes, dimensions and materials, as well as construction, manufacturing and marking requirements, for universal fairleads with upper roller(s) installed to lead the mooring rope of a ship.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

safe working load

SWL

safe load limit (maximum permissible load) of the fittings used for mooring and towing

4 Classification

4.1 Type

Depending on the construction, universal fairleads shall be classified as belonging to one of the following four types:

- a) Type 4R: with one rope-passing opening;
- b) Type 5RL: with one rope-passing opening with an additional guide roller on the left side;
- c) Type 5RR: with one rope-passing opening with an additional guide roller on the right side;
- d) Type 7R: with two rope-passing openings.

4.2 Nominal sizes

The nominal sizes, D_n , of universal fairleads are denoted by reference to the outside diameter of the main roller, in millimetres, in terms of the nearest number drawn from a basic series of preferred numbers. For the universal fairleads having the same roller diameter, the code, i.e. 4R, 5RL, 5RR or 7R, is followed by the nominal size for the different SWLs.

The nominal sizes are:

140, 160, 180, 200, 250, 300A, 300B, 400A, 400B and 400C.

5 Dimensions

Universal fairleads shall have dimensions and particulars in accordance with [Tables 1, 2, 3, 4, 5](#) and [6](#), and [Figures 1, 2, 3, 4](#) and [5](#).

6 Materials

The following materials shall be used for manufacturing the components of universal fairleads.

- a) Frame and other plates: weldable steel plates having a yield point of not less than 235 N/mm², except for the frames with a rope guide for nominal sizes 400A, 400B and 400C, which shall be made of weldable steel plates having a yield point of not less than 315 N/mm².
- b) Roller: weldable steel plates having a yield point of not less than 235 N/mm², except for the rollers for nominal sizes 400A, 400B and 400C, which shall be made of weldable steel plates having a yield point of not less than 315 N/mm², or equivalent steel tubes.
- c) Axle: carbon steel having a yield point of not less than 345 N/mm².
- d) Bush: brass or bronze or equivalent.

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7 Construction

7.1 The rollers of the universal fairleads shall be constructed from steel tubes or formed from plate.

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7.2 The foundation of the universal fairleads shall be determined by the manufacturer. The foundation and welding connections to the hull shall guarantee a reliable transmission of the maximum loading of the universal fairleads to the hull construction without any plastic deformation or cracks.

7.3 The selection of ship's mooring fittings and mooring lines should take into account the diameter, D , of surfaces of mooring fittings that are in contact with the mooring line diameter, d , (D/d ratio) to reduce or mitigate bend loss of strength.

7.4 The tensile strength of mooring rope may be reduced depending on bend radius (D/d ratio) through the mooring fittings, in accordance with the rope manufacturer's guidelines.

8 Manufacturing and inspection

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

8.4 All rotating parts shall be greased.

9 Marking

9.1 The safe working load (SWL) for the intended use of the universal fairleads shall be noted in the towing and mooring plan available on board for the guidance of the shipmaster as specified in IMO circular 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 in this document.

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

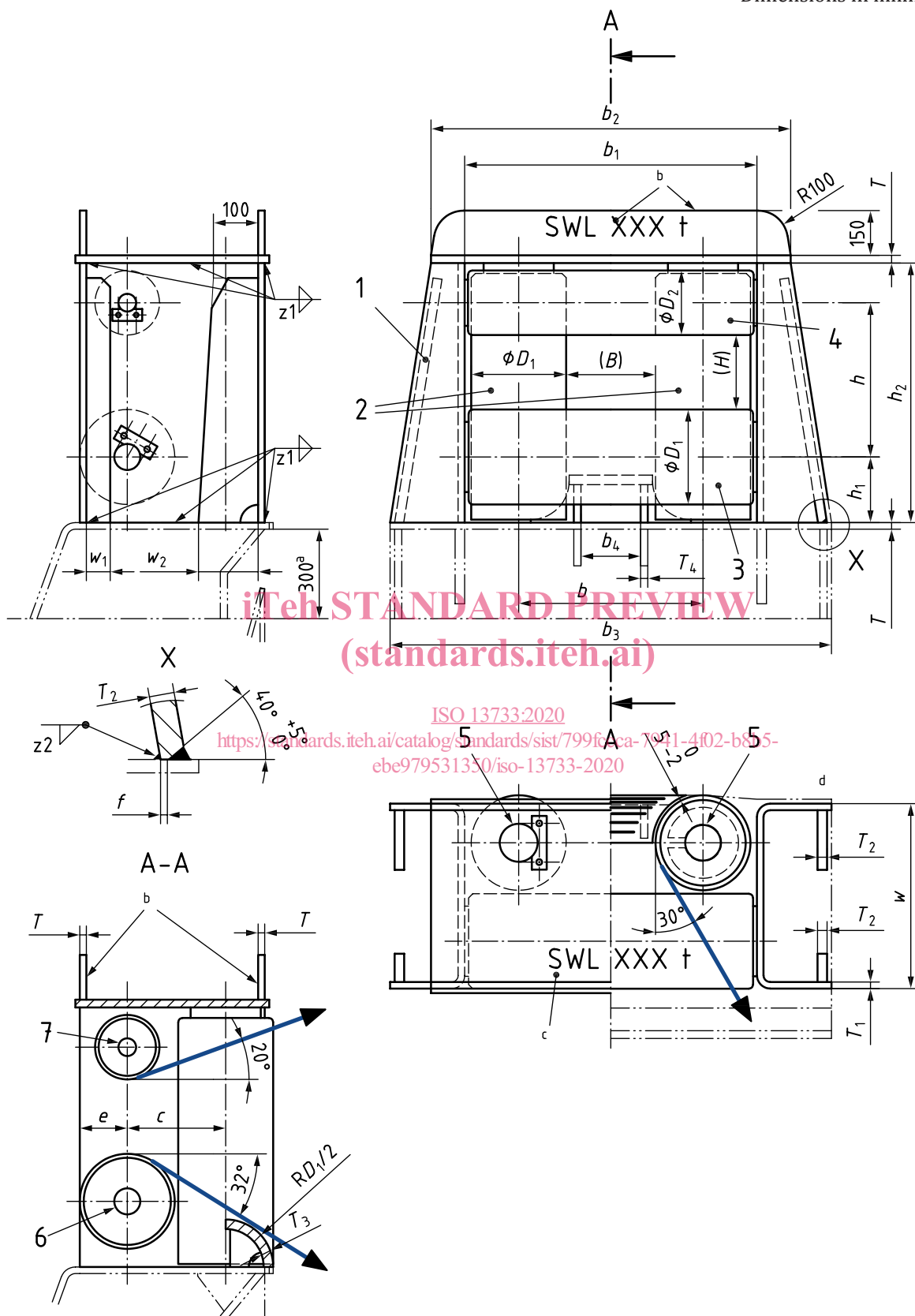
EXAMPLE SWL XXX t

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Dimensions in millimetres



Key

- 1 frame with rope guide
- 2 vertical rollers with housing and washers
- 3 lower horizontal roller with washers

- 4 upper horizontal roller with washers
- 5 vertical axles with stopper
- 6 lower horizontal axle with stoppers
- 7 upper horizontal axle with stoppers
- a Height of seat shall be determined in accordance with the hull construction design.
- b For nominal size 250 and above.
- c For nominal size between 140 and 200 only.
- d Side shell.

Figure 1 — Assembly of type 4R universal fairleads

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