
**Ships and marine technology —
Marine environment protection —
Oil booms —**

**Part 3:
End connectors**

*Navires et technologie maritime — Protection de l'environnement
marin — Barrages de rétention de pétrole —*

Partie 3: Connecteurs d'extrémité



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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 by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 2, *Marine environment protection*.

A list of all parts in the ISO 17325 series can be found on the ISO website.

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

This document specifies the design of end connectors of oil booms. It has been developed after considering the existing ASTM standards and national legislative requirements, and discussions with individuals involved in the development of these standards. This document incorporates and acknowledges the use of and refers to many of the elements provided in ASTM F962 and F2438.

This document gives some general guidelines for oil boom manufacturers as well as users with regard to subjects dealing with producing and purchasing such types of equipment. This document does not define any specific type and size of connector for a particular application, as so many variables have to be taken into consideration.

The American Society for Testing and Materials (ASTM) Committee F-20 has published two standards relating to boom connectors (ASTM F962 and F2438). ASTM F1093 specifies static laboratory tests of the strength of an oil spill response boom under tensile loading. ASTM F1523 provides a guide on the selection of a containment boom that may be used to control spills of oil and other substances that float on the water.

The Japanese Industrial Standard JIS F9900 (Parts 1 and 2) provides the necessary conditions and specifications for the design, manufacture, and other aspects of oil booms and connectors.

It is the responsibility of the user of this document to establish appropriate safety and health practices prior to use.

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Ships and marine technology — Marine environment protection — Oil booms —

Part 3: End connectors

1 Scope

This document specifies the requirements for the design of end connectors of oil booms used for the prevention of spreading of oil spills on water. These criteria are intended to define minimum mating characteristics and are not intended to be restricted to a specific configuration.

It should be considered that different types of connectors are preferably used in different areas. This document does not define any priority. It remains the responsibility of manufacturers and users to select the right connector for the intended application.

Stability features of boom connectors are the result of interaction between bodies of booms and connectors.

This document does not purport to address all safety concerns, if any, associated with its use. However, it is the responsibility of the user of this document to establish the appropriate safety and health procedures, and to determine the applicability of regulatory limitations.

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.

ISO 16165, *Ships and marine technology — Marine environment protection — Terminology relating to oil spill response*

ISO 17325-2, *Ships and marine technology — Marine environment protection — Oil booms — Part 2: Strength and performance requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16165 apply.

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

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

4 Design considerations

The design of end connectors shall have the following characteristics:

- adequate mechanical strength;
- minimize oil leakage;

- neither male nor female connections (nor right or left handed);
- full height of the boom to which it is mounted;
- not impair stability of the boom;
- not reduce freeboard;
- require no special tools for assembly.

Other desirable features include:

- quick and easy connection in water;
- lightweight;
- immunity to sand and debris;
- easy installation or replacement.

5 Types of connectors

5.1 General

Careful consideration shall be taken regarding the maximum forces which the different types of connectors are able to withstand in relation to the booms to which they are attached. It is the responsibility of the boom manufacturer to select the connector type according to the permissible forces on the entire boom assembly.

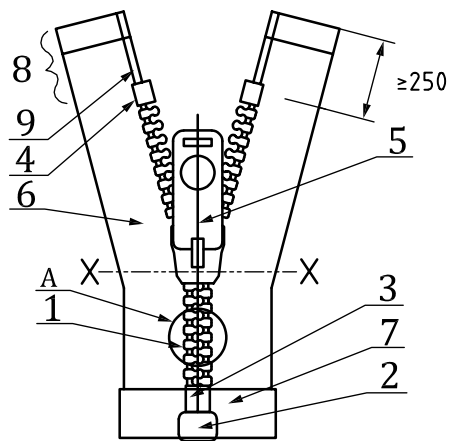
The user should be aware that there are different conditions under which connector halves are put together. The user needs to take into consideration the conditions (on shore, afloat, under tension, etc.) under which the booms are to be connected. Thus, the user is responsible for selecting the equipment suitable for the application.

Special attention should be given to direct the towing forces acting on the connector into the tension members of the boom body as well as a safe interlocking surface.

5.2 Zip connector

[Figures 1](#) to [3](#) provide the details associated with the components of the zip connector.

Dimensions in millimetres



Key

- | | | |
|-----------------|-----------------|------------------|
| 1 element | 4 upper stopper | 7 auxiliary tape |
| 2 box | 5 slider | 8 upper end |
| 3 butterfly bar | 6 tape | 9 core string |

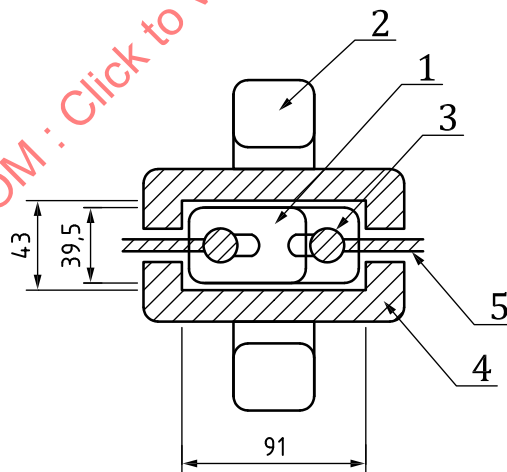
A See [Figure 3](#).

NOTE 1 X-X cross section is shown in [Figure 2](#).

NOTE 2 2, 3, and 7 are open parts.

Figure 1 — Overall view of a zip connector

Dimensions in millimetres

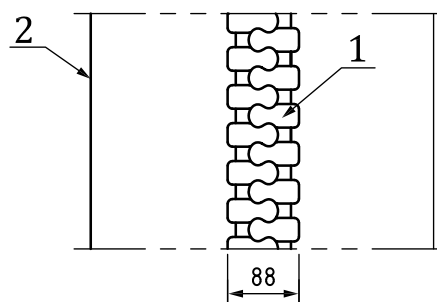


Key

- | | | |
|-----------|---------------|--------|
| 1 element | 3 core string | 5 tape |
| 2 column | 4 body | |

Figure 2 — Details of the X-X cross section in Figure 1

Dimensions in millimetres

**Key**

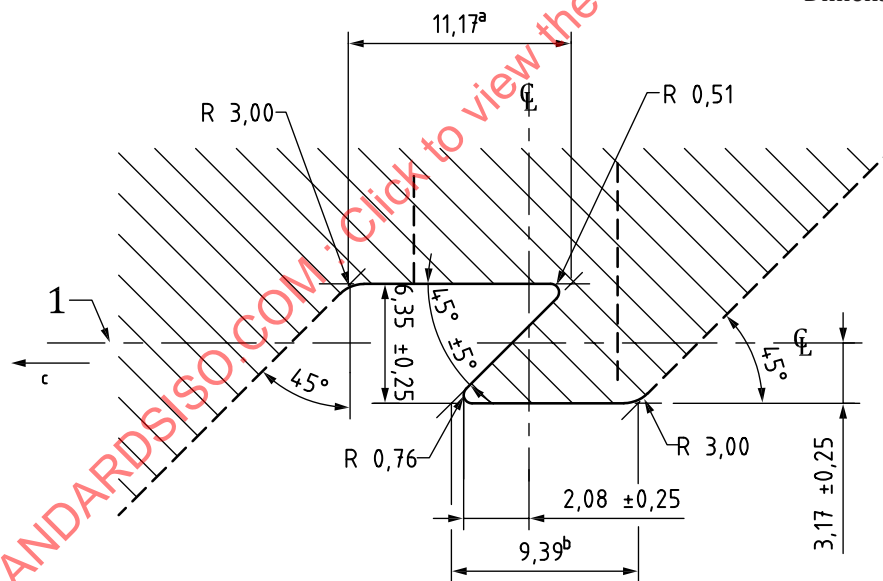
1 element 2 tape

Figure 3 — Details of "A" in Figure 1**5.3 Z-connector**

[Figure 4](#) provides the details associated with the locking part of the Z-connector. It does not describe the full connector. Those parts forming the interface to the boom wall and tension members may be individually designed according to the requirements of the attached boom type and size.

This type of connector requires one or multiple locking pins to become functional. See [5.4.1](#).

Dimensions in millimetres

**Key**

1 centreline of boom membrane

a Minimum.

b Maximum.

c To boom.

All top and bottom corners of each connector shall have a minimum 1,52 mm radius to reduce the possibility of injury to boom handlers.

NOTE 1 Surface of connector to be defined by the manufacturer where shown in dashed lines on this figure, provided that no part of the surface protrudes beyond these dashed lines.

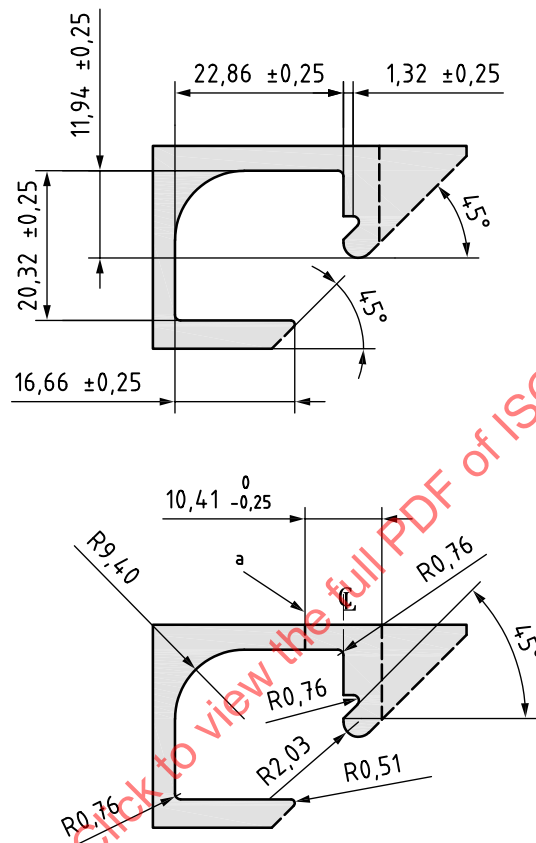
NOTE 2 All items shown are generic and not intended to depict any manufacturer's specific product.

Figure 4 — Z-connector top view

5.4 Slide connector

Figure 5 provides the details associated with the locking part of the slide connector and a top view of the connection. This type of connector requires one or multiple locking pins to become functional. For positioning, see Footnote “a” to Figure 5 and 5.4.2.

Dimensions in millimetres



a 10,41 mm diameter (+0,00 – 0,25) drill through for self-locking pin hole(s).

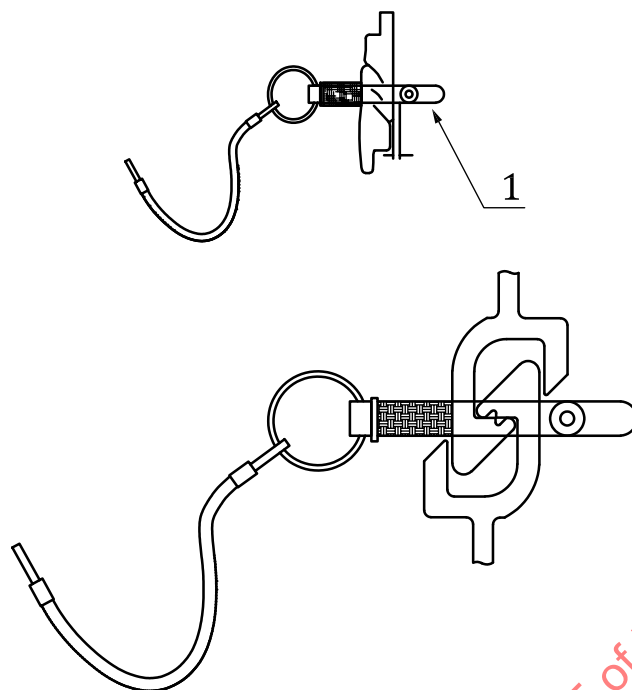
All top and bottom corners of each connector shall have a minimum 1,52 mm radius to reduce the possibility of injury to boom handlers.

NOTE 1 Surface of connector to be defined by the manufacturer where shown in dashed lines on this figure, provided that no part of the surface protrudes beyond these dashed lines.

Figure 5 — Slide connector top view

5.4.1 Locking pin for slide connector

A locking pin is a necessary part of the Z- and slide-connectors (see Figure 6). The diameter of the pin shall exactly fit the bore of the opening in the connector in order to prevent loosening of the connection (and subsequent failure of the connector). The pin shall be of sufficient material compatible with the working and anticipated environmental conditions. It should be noted that the pin shall be designed to require a minimum use of tools for installation.



Key

1 locking pin

Figure 6 — Examples of self-locking pins for connectors

5.4.2 Positioning of the locking pins

The positioning of the pin holes is oriented to the design water line (DWL) of the connected oil barrier.

On all connectors shorter than 609,6 mm in length, a second pin hole shall be located at a distance of $152,4 \text{ mm} \pm 0,038 \text{ mm}$ below DWL.

On all connectors longer than or equal to 609,6 mm in length, multiple pin holes shall be located at a distance of $304,8 \text{ mm} \pm 0,038 \text{ mm}$ from the pin hole on DWL, respectively to each other.

See [Figure 7](#).

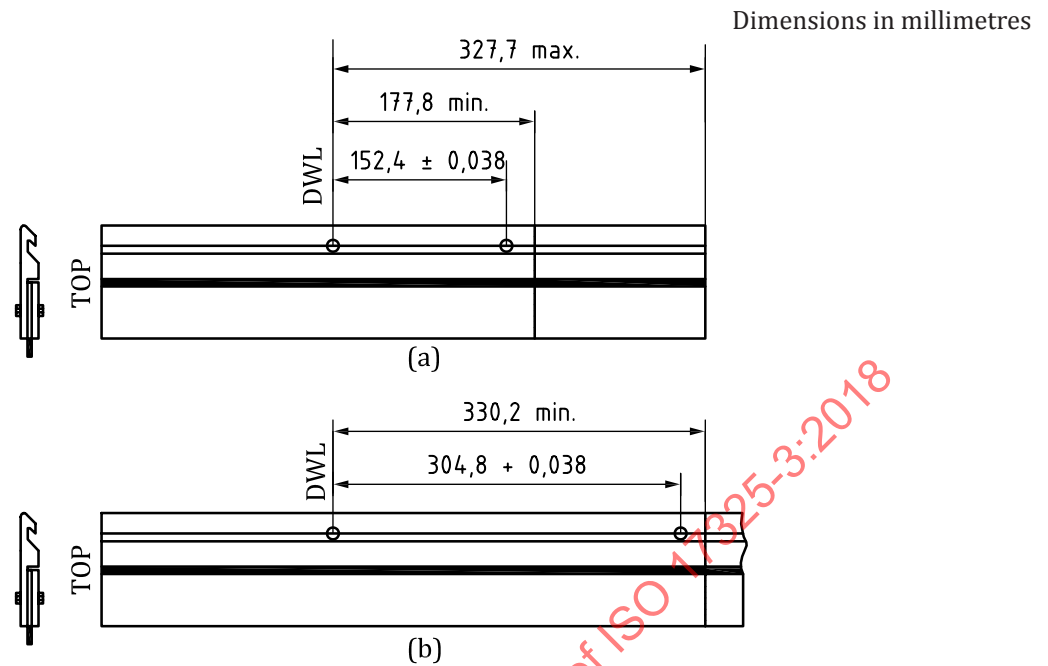


Figure 7 — Connector hole location including self-locking pin

5.5 Hinge connector

See [Figure 8](#).



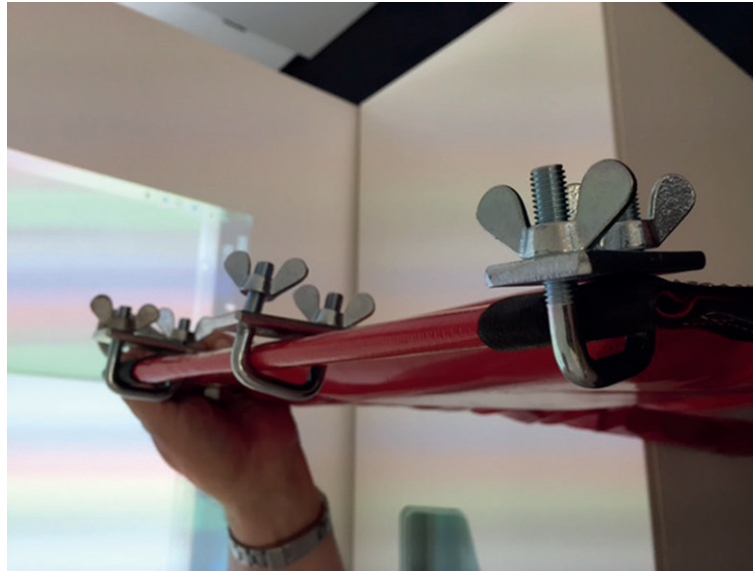
Figure 8 — Example of hinge connector

5.6 U-bolt connectors

This connector is suitable for longer lasting connections of booms, and is comparatively inexpensive. They can be used for booms that are stored on a boom winder because they are less bulky than other types of connectors. A self-locking nut can be used on the U-bolts, particularly for storage on the winder.

The transmission of forces is dependent on the stability or durability of the boom material.

See [Figure 9](#).



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Figure 9 — U-bolt connector

5.7 "Eyelet, loop and lace" connector

This connector is suitable only for small and light booms. Ability of transmitting forces is dependent on the material comprising the eyelet and loop. The design shall ensure sufficient tightness to prevent the seepage of oil through the connection.

See [Figure 10](#).

6 Material characteristics

End connectors and ancillary parts shall be of corrosion resistant material, providing the necessary mechanical strength, for intended application and working conditions.

If different metal alloys are used, galvanic corrosion shall be avoided.

7 Tests and records

Tests and records shall be according to ISO 17325-2.