INTERNATIONAL STANDARD

ISO 16446

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Ships and marine technology — Marine environmental protection — Adaptor for joining dissimilar boom connectors

Navires et technologie maritime — Protection de l'environnement marin — Adaptateur pour le raccordement de barrières antipollution munies de connecteurs dissemblables

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16446 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 2, *Marine environment protection*.

Introduction

ISO/TC 8, SC 2 (*Marine Environment Protection*) has decided to standardize connection methods for oil-spill-containment booms to facilitate joining booms of various types and with different connectors during major oil spills.

Historically, different types of boom-end connectors have been produced. This practice addresses the operational need to connect booms having dissimilar connectors during spill incidents where various operators may join forces to combat an oil spill or where normally incompatible boom stock must be used together.

The American Society for Testing and Materials (ASTM) Committee F-20 (*Hazardous Substances and Oil Spill Response*) has been preparing standards on related subjects for many years. This organization has prepared two standards relating to boom connectors, namely ASTM F962-99 ([1] in the bibliography) and ASTM F1657-96 ([4] in the bibliography).

The first of these standards, ASTM F962, specifies standard mating requirements, or geometry, for boom connectors or adaptors. ASTM F962 was never widely accepted in the international community because many users believe that this mating geometry has inherent design limitations. In particular, the required strict tolerance between the mating faces of the two joining connectors can result in connection problems. Some reported concerns or deficiencies with boom connector designs that use the ASTM F962 mating specifications are as follows.

— Slight bending along the length of the connector can easily occur during operation or, in particular, during roll-up or storage on the boom reel, resulting in the inability to join them together again.

— The design is more susceptible to experiencing difficulties joining connector ends if the connector face has been dented or marred through impact.

— Dirt and debris can be trapped on a mating face, preventing proper fitting and connection, or requiring careful cleaning of the connectors.

— During cold weather operations, ice can form at the mating faces, making connection difficult or impossible.

— The connection is not always secure. The use of a self-locking pin has occasionally resulted in excessive play in the connection and eventual release.

With respect to permanently incorporating a universal mating requirement or standard connector in all boom systems (instead of using an adaptor only when required), discussions with spill-response operators and oil boom producers clearly indicate that, in many cases, this will not provide an appropriate or realistic standard practice. Booms and connectors are often designed or selected by an operator, based on features that are suitable for their particular operating conditions. Also, producers choose connectors based on the needs of the particular boom design. In effect, many users think it is unlikely that any single standard connector mating criteria (as, for example, ASTM F962) will provide the characteristics to satisfy the specific requirements of all users.

The second of these standards, ASTM F1657, was subsequently developed to provide another approach to oil boom connectors. Instead of providing a standard connector design, it provides a common method for joining existing booms with different connector designs in the field during a major spill incident. This standard does not attempt to have all manufacturers and spill responders use universal connectors at all times. Instead, it specifies modifications on existing connectors in the way of incorporating holes at specified locations to allow for this standard connection method during major response incidents. Alternatively, boom manufacturers may provide an adaptor that would accomplish the same end result.

After considering these existing ASTM standards, and discussions with individuals involved in the development of these standards, i.e. spill responders and boom producers, this International Standard has been developed to use the same mating specifications as in ASTM F1657. However, this International Standard encourages the use of separate adaptors in most cases, to avoid the possible adverse effects of modifications to existing connector

designs when incorporating these mating specifications. These mating specifications may be incorporated into existing connectors, if preferred and possible, only when the manufacturer or user can ensure that the modifications will not alter the strength and performance of the connector.

This International Standard contains the essence of ASTM F1657, with changes and additional details incorporated in certain clauses.

Ships and marine technology — Marine environmental protection — Adaptor for joining dissimilar boom connectors

1 Scope

This International Standard specifies a universal method for the joining of oil-spill-containment booms with dissimilar connectors through the use of a standard adaptor with prescribed mating specifications. This standard does not intend to replace the design of existing connectors.

This International Standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 16165 and the following apply.

3.1
boom
floating mechanical barrier used to control the movement of substances that float

3.2
bridle
device attached to a boom to distribute the load exerted by towing or anchoring the boom

3.3
draft
minimum vertical depth of the boom below the waterline

3.4
end connector
device attached to the boom used for joining boom sections to one another or to other accessory devices

3.5
freeboard
minimum vertical height of the boom above the waterline

3.6
tensile strength
force required to stretch the boom material to the point where it fails and tears apart

4 General functional considerations

4.1 The main precondition for the successful use of an adaptor for dissimilar boom connectors is that the design of any boom connector meets the following criteria.

4.2 The boom connector shall be strong enough to withstand the impressing forces relating to the type, size and purpose of the boom it is mounted on.

4.3 Oil leakage shall be avoided between boom sections.

4.4 The boom connector shall be secure as well as easily connected and disconnected in and out of water, in the presence of oil, dirt and ice, in rough water or any combination thereof. Connectors that can be joined by simply drawing the ends together are preferred over those that require one to slide into the other.

4.5 The boom connector shall be symmetrical (no male/female differentiation) and resist distortion (e.g. when winding on a reel).

4.6 The boom connector shall be locked or secured by wing nuts or self-locking pins, which preferably are secured to the boom or end connector, are easy to handle (e.g. when wearing gloves) and do not require the use of tools. Where tools are needed, they shall be commonly used tools.

4.7 The boom connector shall not have any negative influence on the boom's performance (i.e. freeboard and stability) and transfer tensile forces between boom sections if the boom design requires this.

NOTE On some booms, the use of the adaptor may cause a reduction in freeboard near the connector. This potential loss of freeboard is, however, outweighed by the benefits of being able to connect dissimilar booms under emergency circumstances.

4.8 The boom connector shall be inherently safe to personnel.

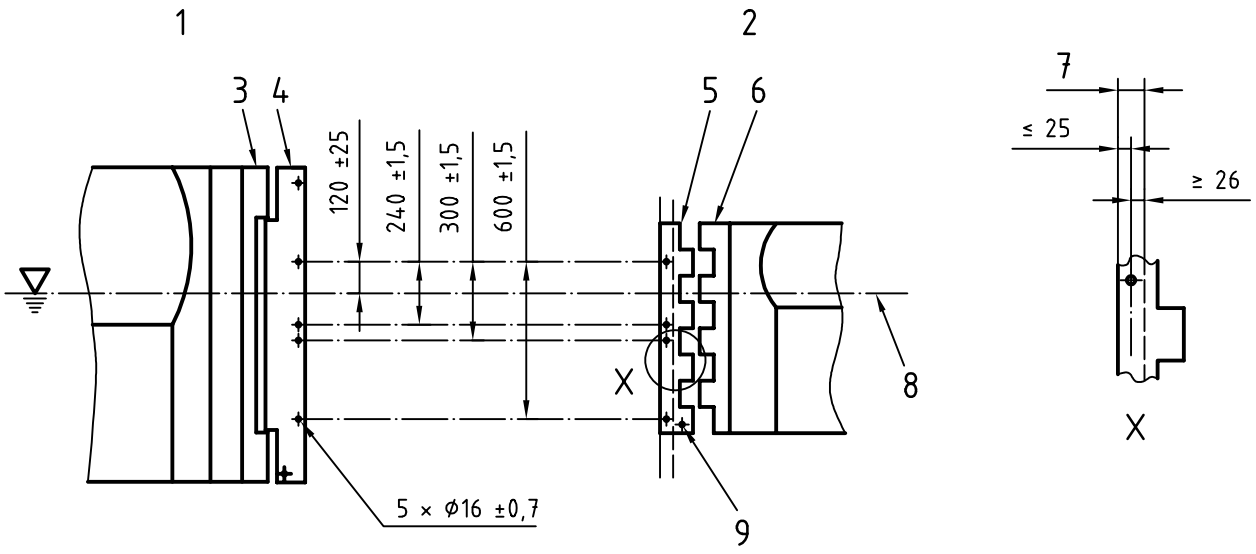
5 Design criteria

5.1 In order to comply with the practice for the joining of booms with incompatible connectors, an appropriate number of adaptors must be provided (by the manufacturer or user) that, on one side, connect to the existing connector and, on the other side, consist of a flat plate that incorporates the mating requirements described below. This International Standard encourages the use of separate adaptors, to avoid the possible adverse effects of modifications made to existing connector designs when incorporating these mating specifications. However, in certain cases, the following mating requirements may be incorporated directly into an existing connector design, and thus preclude the use of a separate adaptor. The latter option is possible only if the connector can accept the holes spaced as required without interfering with existing bolt holes or other connector features and if the manufacturer or user can ensure that the modifications will not alter the strength or performance of the connector.

5.2 The adaptor shall have, on one side, a flat plate with a standard mating face with a minimum of three 16 mm holes, as shown in Figure 1, to accommodate 12 mm diameter AISI 316 stainless steel[1)] bolts (provided with an adaptor). (The shape of the boom connector shown in Figure 1 is simply a generic example.) Using the boom design waterline as a reference point, the centre of the first hole shall be 120 mm above the waterline, the centre of the second hole shall be 240 mm below the centre of the first hole, and the centre of the third hole shall be 300 mm below the centre of the first hole. For larger adaptors, additional holes shall be placed at 300 mm increments from the first hole. To avoid tolerance accumulations, the distance to each hole is measured from the centre of the first hole. To ensure proper mating with other adaptors based on this International Standard, the mating surface shall not exceed 25 mm from the hole centres to the outer edge and shall have a minimum of 26 mm space in from the hole centres. This mating area shall be flat and clear of any interference.

1) AISI 316 stainless steel is an example of a suitable product available commercially. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of this product.

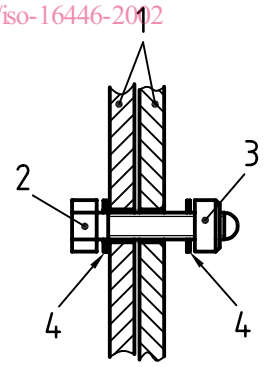
Dimensions in millimetres



a) Boom connection with ISO adaptor

Key

1 Boom/connector with five holes
2 Boom/connector with four holes
3 Type-A connector
4 ISO adaptor for type-A connector
5 ISO adaptor for type-B connector
6 Type-B connector
7 Mating area
8 Design water line
9 Hole(s) for tension member shackle or fastener
10 Holes



Key

1 Adaptor plate
2 12 mm × 60 mm bolt
3 Nylock nut
4 Flat washer

b) Bolt connection detail

NOTE 1 The drawing is a side view of examples of two different connectors and corresponding ISO adaptors.

NOTE 2 Assembly hardware is AISI 316 stainless steel.

NOTE 3 The first hole is above the waterline for accessibility and to minimize leakage.

NOTE 4 The first hole below the water line is generally below the oil layer and in line with the tension member.

NOTE 5 The tension member shackle or fastener hole is located outside the mating area.

NOTE 6 On small booms (e.g. 250 mm), the adaptor may be longer than the original connector in order to accommodate the necessary holes.

Figure 1 — Example of a boom connection with an adaptor