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Small craft — Seacocks and through-hull fittings

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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 on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 188, *Small Craft*, SC 2, *Engines and propulsion systems*.

This first edition cancels and replaces the previous two part edition (ISO 9093-1:1994 and ISO 9093-2:2002), which has been technically revised.

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

— the previous 2 parts have been combined into a single standard;

— the definition of corrosion resistance has changed;

— a test for UV stabilisation has been added;

— a test for corrosion resistance has been added;

— an installed strength test has been added.

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.

Small craft — Seacocks and through-hull fittings

1 Scope

This document specifies requirements for through-hull fittings, seacocks, hose connection and fittings used in small craft of up to 24 m length of hull.

This document is not applicable to engine and heater exhaust fittings, and sail drive through-hull fittings.

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 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 6509:1981, *Corrosion of metals and alloys — Determination of dezincification resistance of brass*

ISO 527-1:2012, *Plastics — Determination of tensile properties — Part 1: General principles*

ISO 527-2:2012, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics*

ISO 178:2010/Amd 1:2013, *Plastics — Determination of flexural properties — Amendment 1*

ISO 180, *1/Amd 2:2013, Plastics — Determination of Izod impact strength / Amendment 2: Precision data*

ISO 8666:2016, *Small craft — Principal data*

ISO 6509-1:2014, *Corrosion of metals and alloys — Determination of dezincification resistance of copper alloys with zinc — Part 1: Test method*

ISO 6509-2:2017, *Corrosion of metals and alloys — Determination of dezincification resistance of copper alloys with zinc — Part 2: Assessment criteria*

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 http://www.iso.org/obp

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

3.1
through-hull fitting
fitting designed to permit passage of liquids including suspended solids or gases through the hull

3.2
seacock
shut-off device intended to prevent the ingress of water normally directly fitted to a hull or a through-hull fitting

3.3
readily accessible
capable of being reached quickly and safely for effective use under emergency conditions without the use of tools

3.4
maximum load waterline
waterline of the craft when upright in the M_{LDC} condition according to ISO 8666

3.5
heeled waterline
the level of the water on the hull in the M_{LDC} condition according to ISO 8666 when the craft is inclined to

— 7° for motor boats and sailing multihulls; or

— 30° or immersion of the sheerline, whichever occurs first, for monohull sailing boats.

3.6
hose fitting
component used to connect a through-hull fitting or a seacock to an associated hose

3.7
drain plug
removable plug including plug and related through-hull fitting

4 Material requirements

4.1 General

Materials used below the maximum load waterline shall be corrosion-resistant. Materials used above the waterline shall be corrosion resistant or shall have protection against corrosion, taking into account the various and changing media that pass through the fitting (for example fresh, salt or brackish water with impurities; waste water from toilet systems or holding tanks).

Brass materials shall be dezincification resistant (DZR) when tested according to ISO 6509-1:2014 and ISO 6509-2:2017.

4.2 Material combinations

The combination of different materials including fastening elements shall take into consideration the possibility of galvanic action.

Materials that will act galvanically with others used in the system may be used if they are galvanically isolated.

The combination or choice of non-metallic materials shall be made taking into account the possibility of swelling and/or seizure.

Materials in contact with each other shall not prevent the device and/or system from acting as intended.

Non-ferrous metals other than aluminium alloys shall not be used when aluminium is incorporated in the system.

4.3 Resistance to deterioration/corrosion

The materials used shall be resistant to or protected from deterioration, taking into account the environment and various and changing media that pass through the fitting (e.g. fresh, salt or brackish water with impurities; waste water from toilet systems, bilge water contaminated with oil and/or fuel products and cleaning agents).

All metallic components shall be corrosion resistant. The requirement for corrosion resistance can be met through testing as per Annex B.

All non-metallic parts shall be stabilized against oxidation and UV. The requirement for UV stabilisation can be met through testing as per Annex C.

4.4 Mechanical properties

Materials for fittings shall meet the following minimum physical properties at room temperature in dry condition:

— tensile strength: 60 MPa (ISO 527);

— flexural modulus: 2 700 MPa(ISO 178);

— impact strength: 6 kJ/m^2(ISO 180/A).

NOTE The mechanical properties relate to the materials in the non-stabilized condition.

4.5 Range of operating temperatures

4.5.1 General operating requirements

Seacocks shall be operable through the full temperature range of 0 °C to + 60 °C and shall show no defect that will impair the function.

4.5.2 Storage temperature requirement

Seacocks shall withstand a storage temperature without operation of - 40 °C to + 60 °C when kept dry.

4.5.3 High temperature operating test

The seacock shall be filled with water and, after preconditioning for 24 h at 60 °C, shall be operable.

4.5.4 Low temperature operating test

The seacock shall be filled with salt water and, after preconditioning for 24 h at 0 °C, shall be operable.

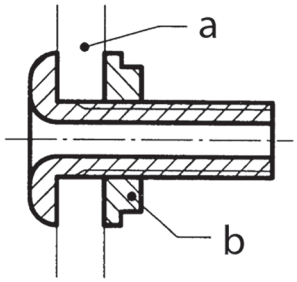
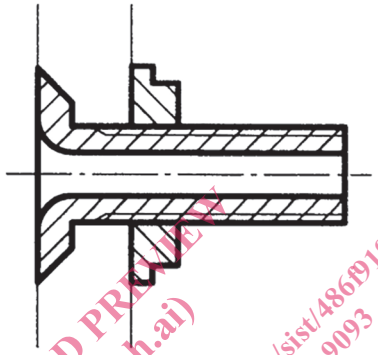
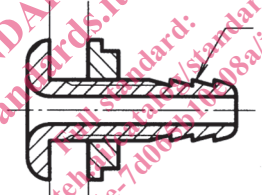
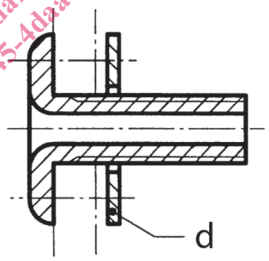
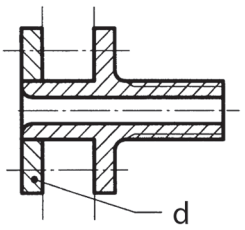
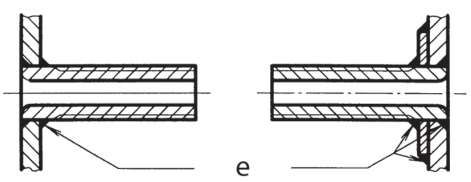
5 Through-hull fittings

5.1 Thread identification

If the fitting is threaded the manufacturer shall identify the size and type of thread by permanently marking the fitting or the packaging

Types - Some examples of through-hull fittings are given in Table 1. Other types are acceptable if comparable strength and tightness are achieved.

Table 1 — Examples of through-hull fittings

No	Description	Illustration
1	Fittings with a flange outside and a flanged nut inside, with the stem threaded, where tightness is achieved by screwing the flange down.	 **a) hull** **b) flanged nut**
2	Fittings as under 1, but with a countersunk outside flange, forming a flat surface with the outside craft hull.	
3	Fittings as under 1, where the end of the stem forms a hose fittings	 **c) hose fittings**
4	Fittings with a flange outside where the flange is fastened to the hull by screws with nuts, or screws with nuts and an internal flange.	 **d) counterplate**
5	Fittings with a flange inside where the flange is fastened to the hull by screws with nuts, or screws with nuts and an external flange	 **d) counterplate**
6	Fittings consisting of a pipe or stud welded to the hull.	 **e) welded in**

5.2 General design requirements

The through-hull fitting shall present a secure, lasting and watertight connection that cannot be dislodged by outside forces due to operation of the fitting and components attached to it, e.g. a seacock.

5.3 Detail design requirements

5.3.1 Stem

The stem length shall be sized considering the varying hull thicknesses, depending on the hull material and construction.

After installation the minimum remaining thread length, shall be at least 1,5 times the necessary thread length specified in Table 2.

The wall thickness of the stem shall be such as to ensure that the remaining strength after machining is adequate for the torque applied during installation and the use of the fitting.

Table 2 — Seacock minimum thread lengths

Nominal thread diameter D_{nom} in	Minimum length of thread L_1 mm
G 1/4	10
G 3/8	11
G 1/2	12
G 3/4	13
G 1	16
G 1 1/4	18
G 1 1/2	20
G 2	22
G 2 1/4	25
G 3	28
G 4	30

5.3.2 Flange diameter

The diameter of the flange shall not be less than that of the flanged nut or counterplate.

5.3.3 Finish

The surface of the flange, nut or counterplate shall not present a sharp edge towards the hull. Edges shall be rounded or chamfered.

6 Seacocks - Design requirements

6.1 The seacock shall be designed as to permit:

— operation under any condition likely to be encountered under normal service conditions;

— a visual check of the open and closed position.