INTERNATIONAL STANDARD

ISO 9093-2

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Small craft — Seacocks and through-hull fittings —

Part 2: Non-metallic

Petits navires — Vannes de coque et passe-coques —

Partie 2: Construction non métallique

Reference number
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Foreword

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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 part of ISO 9093 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 9093-2 was prepared by Technical Committee ISO/TC 188, *Small craft*.

ISO 9093 consists of the following parts, under the general title *Small craft — Seacocks and through-hull fittings*:

— *Part 1: Metallic*

— *Part 2: Non-metallic*

Annex A forms a normative part of this part of ISO 9093.

Small craft — Seacocks and through-hull fittings —

Part 2: Non-metallic

1 Scope

This part of ISO 9093 specifies requirements for the manufacture and installation of non-metallic through-hull fittings and/or assemblies comprising through-hull fittings, seacocks, hose fittings and/or drain plugs and components attached thereto, used in small craft of up to 24 m length of hull.

This part of ISO 9093 is not applicable to engine exhaust fittings and sail drive through-hull connections.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 9093. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 9093 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7-1:1994, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 178:2001, *Plastics — Determination of flexural properties*

ISO 180:2000, *Plastics — Determination of Izod impact strength*

ISO 228-1:2000, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 527 (all parts), *Plastics — Determination of tensile properties*

ISO 8666:2002, *Small craft — Principal data*

3 Terms and definitions

For the purposes of this part of ISO 9093, the following terms and definitions apply.

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

3.4
drain plug
removable plug assembly including plug and related through-hull fitting

3.5
readily accessible
capable of being reached for operation, inspection or maintenance without removal of any boat structure or use of any tools or removal of any item of portable equipment, stowed in places intended for the storage of portable equipment such as lockers, drawers or shelves

3.6
heeled waterline
the level of the water on the hull in the fully loaded, ready-for-use condition according to ISO 8666 when the craft is inclined to

— an angle of 7° for motor boats and multihulls; or

— the level of the sheer amidships or 30°, whichever is lower, for sailboats and motorsailers

4 Material requirements

4.1 General

Material used for a fitting shall be free from any visible defect that will impair tightness, strength or function.

NOTE For the purposes of this part of ISO 9093, the term “fitting” means any through-hull fitting, seacock, hose fitting or drain plug.

4.2 Material combinations

The combination or choice of 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.

4.3 Resistance to deterioration

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).

4.4 Protection from UV radiation and oxidation

Materials used for the manufacture of through-hull fittings in accordance with this part of ISO 9093 shall be UV-stabilized.

All parts shall be stabilized against oxidation.

4.5 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: 9 kJ/m^2 (ISO 180/A).

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

4.6 Range of operating temperatures

4.6.1 General operating requirements

The seacock shall be operable through its full temperature range and shall show no defect that will impair the function.

4.6.2 Storage temperature requirement

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

4.6.3 High temperature operating test

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

4.6.4 Low temperature operating test

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

5 Thread

5.1 Type of thread

The fitting shall have one of the following threads:

— cylindrical pipe threads in accordance with ISO 228-1, with joints for conical pipe threads in accordance with ISO 7-1 and pipe thread diameters of G 3/8, G 1/2, G 3/4, G 1, G 1 1/4, G 1 1/2, G 2, G 2 1/2, G 3 and G 4; or

— other threads within the same size range (e.g. buttress threads according to ASME B1.9 – 1992, or other applicable national standards).

5.2 Thread identification

Where types of thread other than pipe threads according to ISO 228-1 or ISO 7-1 are used, the manufacturer shall identify the type of thread by permanently marking the fitting or the packaging accordingly.

6 Through-hull fittings — Requirements

6.1 The minimum internal diameter shall be stated by the manufacturer on the component or the packaging.

6.2 The minimum threaded stem length of the through-hull fitting connected to a seacock shall be such that after screwing the flange nut down (if fitted), the remaining thread length shall be at least $L_1 + 5$ mm (see Table 1).

7 Seacocks — Requirements

7.1 The seacock design shall permit

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

— a visual indication of the open and closed position, such as by position of the handle, or other suitable means.

7.2 The minimum threaded length for the attachment of through-hull fittings, hose fittings and other connected parts shall comply with Table 1.

Table 1 — Minimum seacock thread lengths

Nominal diameter D_{thread}	Minimum length of thread L_1 mm
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 1/2	25
G 3	28
G 4	30

8 Hose fittings — Requirements

8.1 Hose fittings

The hose fittings shall be ribbed, serrated or beaded.

The end of the hose fitting shall have a smooth surface finish to assure watertightness and prevent hose damage.

8.2 Clamping length

The clamping length shall be of sufficient length to allow for double clamping of the hose and shall be not less than the outside diameter of the hose fitting, but no less than 25 mm.

9 Drain plugs — Requirements

9.1 All drain plugs shall be designed to be watertight when properly secured.

9.2 Expandable type drain plugs shall be adjustable and designed to prevent inadvertent disassembly, e.g. due to water pressure.

10 Installation

10.1 General

10.1.1 Hull reinforcements

Where the fitting of a seacock, through-hull fitting or drain plug impairs the required strength of the hull, the area shall be reinforced to compensate for the loss of strength.

10.1.2 Installation requirements

When installed, through-hull fittings, seacocks and drain plugs to the hull shall be watertight and secure to prevent loosening under normal operating conditions.

When installed, the device or fitting shall be secure, durable and watertight so that it cannot be dislodged by outside forces due to operation of the fitting and components attached to it.

10.1.3 Corrosion prevention

Metallic components and fastening elements such as screws shall be corrosion resistant and shall not act galvanically with each other, with the boat or with any other fitting with which they are in contact.

10.1.4 Bedding compounds

Bedding compounds used in the installation of a fitting shall not impair the mechanical properties of the fitting.

10.2 Seacocks, through-hull fittings, hose fittings

10.2.1 Seacocks shall

— normally be connected directly to the hull or a through-hull fitting**;**

— be readily accessible.

10.2.2 The seacock assembly shall ensure that no part can come loose under any operating conditions.

10.2.3 Seacocks and through-hull fittings shall be located so as to minimize the likelihood of damage to them or inadvertent operation.

10.2.4 Seacocks, through-hull fittings and hose fittings installed below the heeled waterline shall fulfil the requirements of the strength test (see annex A).

10.3 Hose connection

The sizes of hoses shall be compatible with the hose fitting and shall allow for a tight fit.

10.4 Fastening of hoses

Metallic hose clamps shall be reuseable and made entirely of stainless steel, type Cr18 Ni8 or other material with equal or higher strength and corrosion resistance. Clamps depending on spring tension shall not be used.

11 Manufacturers installation information

The fitting manufacturer shall supply the following information in writing with any device:

— material of the fitting;

— type of thread and relevant International Standard or other standard (see 5.2);

— nominal bore diameter or thread size;

— chemical types of bedding compounds to be used or regarded as incompatible;

— installation requirements;

— maximum torque for tightening during installation;

— installation limitations (if relevant).

12 Owner's manual

The owner's manual for the boat shall contain at least the following information:

— location of the seacocks;

— operating instructions, if relevant;

— warning notice as to keeping seacocks closed when not needed for operation to minimize the risk of flooding (e.g. water inlet of toilet flushing line).

13 Service manual

When a service manual of the boat is provided, it shall contain the following information:

— nominal bore diameter or thread size;

— maintenance requirements;

— replacement requirements.

Annex A
(normative)

Strength test

The test shall be conducted at room temperature.

Fit the through-hull fitting securely to a test rig baseplate, rigid enough to prevent flexing of the rig during test. Apply a force of at least 1 500 N for 10 cycles from a position 20 mm off the end in the most vulnerable direction of the fitting or assembly to the most inward part of the assembly, e.g.

a) the through-hull fitting; or

b) the seacock; or

c) the hose fitting.

The assembly shall show no leakage to the outside of the assembly when subjected to an internal water pressure of 0,1 MPa (1 bar) after this strength test and shall perform as intended.

Disassemble the assembly. No part of the fitting or assembly shall display any sign of damage effecting its function and the seacock shall remain operable.

Bibliography

[1] ISO 75-1:1993, *Plastics — Determination of temperature of deflection under load — Part 1: General test method*

[2] ISO 75-2:1993, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite*

[3] ISO 75-3:1993, *Plastics — Determination of temperature of deflection under load — Part 3: High-strength thermosetting laminates and long-fibre-reinforced plastics*

[4] ASME B1.9:1992, *Buttress Inch Screw Threads 7°/45° Form With 0.6 Pitch Basic Height of Thread Engagement*

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