

INTERNATIONAL  
STANDARD

**ISO**  
**9093-1**

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**Small craft — Seacocks and through-hull fittings —**

**Part 1:**  
Metallic

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*Navires de plaisance — Vannes de coque et passe-coques —*

*ISO 9093-1:1994*  
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*Partie 1: Construction métallique*



Reference number  
ISO 9093-1:1994(E)

## 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.

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.

International Standard ISO 9093-1 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*

# Small craft — Seacocks and through-hull fittings —

## Part 1: Metallic

### 1 Scope

This part of ISO 9093 specifies requirements for metallic through-hull fittings, seacocks and hose fittings that specifically form part of water intake and discharge lines, and for wet exhaust outlets used in small craft of up to 24 m length of hull. Through-hull fittings for other purposes are not covered.

This part of ISO 9093 applies to seacocks and through-hull fittings with cylindrical pipe threads in accordance with ISO 228-1, and with joints for conical pipe threads in accordance with ISO 7-1, with nominal diameters of 1/4 in, 3/8 in, 1/2 in, 3/4 in, 1 in, 1 1/4 in, 1 1/2 in, 2 in, 2 1/2 in, 3 in or 4 in.

NOTE 1 The reasons for developing this part of ISO 9093 are that detail dimensions of components of water intake and discharge lines, and wet exhaust outlets passing through a craft hull differ considerably, thus limiting the interchangeability of these parts.

### 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9093. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9093 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. 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 228-1:1994, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*.

### 3 Definitions

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

**3.1 through-hull fitting:** Any fitting designed to permit passage of liquids or gases through the hull.

**3.2 seacock:** Any valve of the ball, cylinder, plug, gate or butterfly type directly fitted to a hull or a through-hull fitting.

**3.3 corrosion-resistant:** Material used for a fitting which, within a service time of five years, does not display any defect that will impair tightness, strength or function.

**3.4 protection against corrosion:** Any metallic or non-metallic sheathing or coating on materials that are not corrosion-resistant such that the fitting within a service time of five years does not display any defect that will impair tightness, strength or function.

**3.5 readily accessible:** Capable of being reached for operation, inspection or maintenance without removal of any craft structure or use of any tools or removal of any item of portable equipment stowed in places intended for storage of portable equipment such as lockers, drawers or shelves.

## 4 Corrosion resistance

### 4.1 Selection of materials

The materials used 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).

### 4.2 Material combinations

The combination of different materials shall take into consideration the possibility of galvanic action. Materials in contact with each other shall be galvanically compatible and shall not prevent the device from acting as intended.

### 4.3 Corrosion prevention

Materials that have no adequate corrosion resistance in the environment they are used in or that will act galvanically with others used in the system may be used if they are isolated. Fastening elements such as screws shall not act galvanically with either of the materials they fasten in a way that the strength of the through-hull fittings or its tightness are impaired. Non-ferrous metals other than aluminium alloys shall not be used when aluminium is incorporated in the system.

## 5 Through-hull fittings for water

### 5.1 Types

Some examples of through-hull fittings covered by this part of ISO 9093 are given in table 1. Other solutions are acceptable if comparable strength and tightness are achieved.

### 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. The area under and immediately around the through-hull fitting shall have a mechanical strength in excess of the hull itself.

### 5.3 Detail design requirements

#### 5.3.1 Stem

The stem length shall take into account the varying hull thicknesses, depending on the hull material and construction.

The stem length shall be such that after screwing the flange nut down (if fitted), 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 this part is adequate for the torque during installation and use of the fitting.

#### 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.

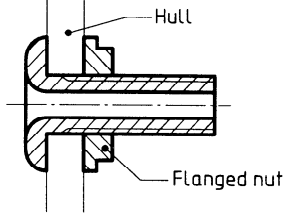
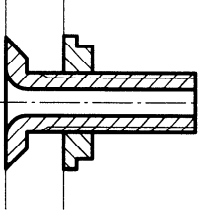
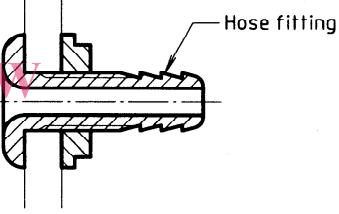
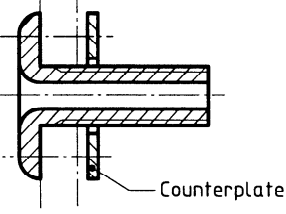
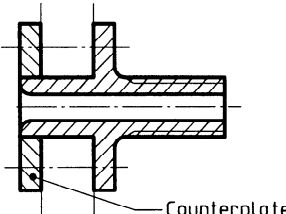
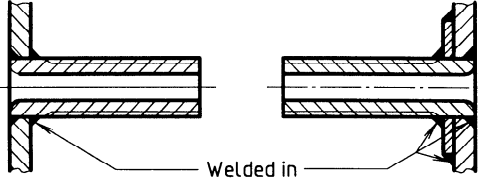
## 6 Seacocks — Design requirements

The seacock shall be so designed as to permit

- positive operation under any condition likely to be encountered under normal service conditions;
- a visual check of the open and closed position.

The minimum threaded length of the attachment of through-hull fittings, hose fittings and other connecting parts shall comply with table 2 (see also figure 1).

**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.	
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 fitting.	
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.	
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.	
6	Fitting consisting of a pipe or stud welded to the hull.	

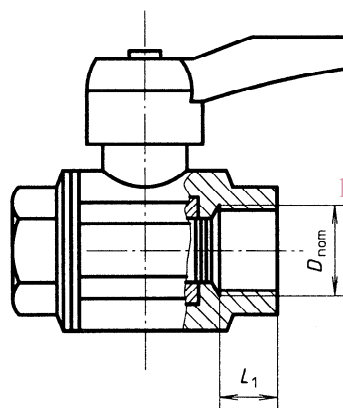
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**Table 2 — Seacock minimum thread lengths**

Nominal diameter, $D_{\text{nom}}$ 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 1/2	25
G 3	28
G 4	30

**Figure 1 — Seacock**

The length of the handle and the clear distance between handle and intake and discharge line shall be sufficient to allow for easy operation.

The design of the seacock assembly shall be such as to ensure that no part may come loose even under severe service conditions.

Seacocks shall be either directly fitted to the hull or a through-hull fitting.

## 7 Hose fittings

### 7.1 Design requirements

The hose fitting end may show the following configurations:

- ribbed or serrated (all nominal sizes);
- plain pipe end with nominal size 1 1/4 in and above.

The clamping length,  $L$  (see figure 2) shall allow for double clamp fastening of the hose and shall be not less than

25 mm for nominal sizes 1 in and below;

35 mm for nominal sizes 1 1/4 in and above.

The end of the hose fitting shall be rounded or chamfered.

### 7.2 Hose connection

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Hoses shall be fastened by double clamps where the centreline of the through-hull fitting is lower than

300 mm (sailboats and motorsailers), or

150 mm (motorboats)

above the static waterline in the fully loaded condition. Double clamps shall be fitted in any case if plain pipe ends are used.

Metallic hose clamps shall be made of stainless steel, type Cr18 Ni8 or higher corrosion resistance property and they shall be reusable.

Clamps depending on spring tension shall not be used.

Clamps shall be fastened to the plain or serrated end of the stem.

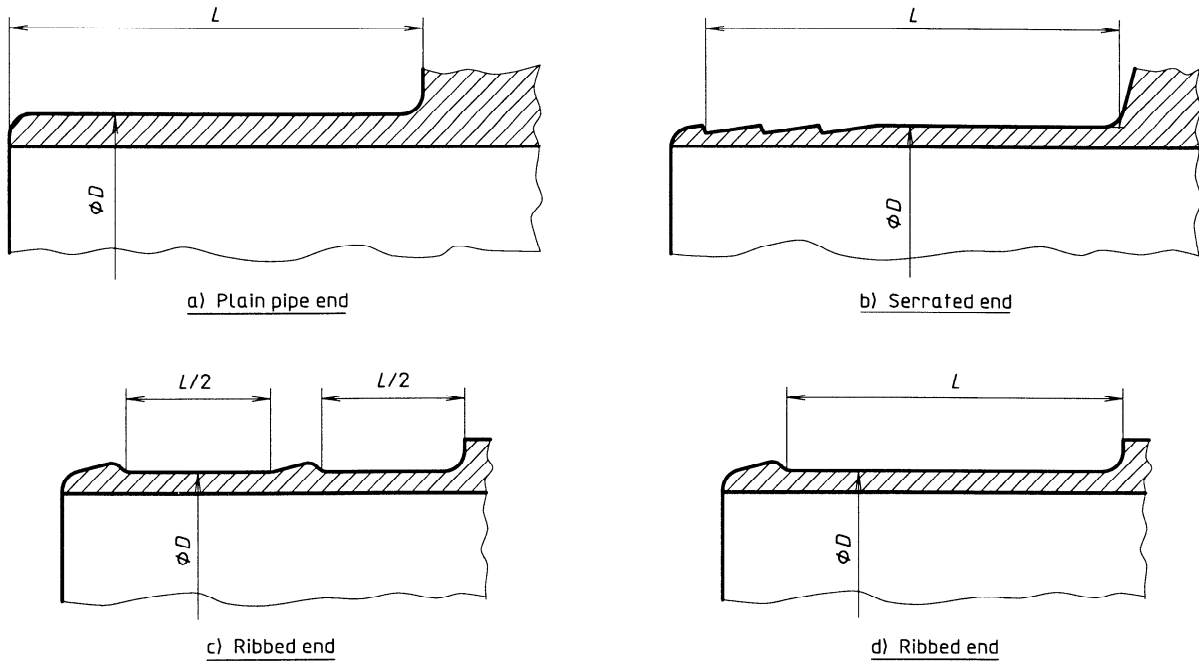


Figure 2 — Examples of hose fittings

## 8 Water scoops and outboard water strainers

Water intake connections may be fitted with outboard strainers and/or water scoops. Where cleaning of the intake piping and through-hull connection cannot be accomplished by other means, outboard strainers and/or water scoops shall be removable.

## 9 Installation

**9.1** Where the fitting of a seacock or through-hull fitting impairs the local strength of the hull, a reinforcement or a backing block shall be installed to compensate for the loss of strength.

In reinforced plastics hulls built in sandwich construction, the core material shall be replaced by a

material that cannot be compressed when tightening the through-hull fitting, or the area around the fitting shall be built in single skin construction with local reinforcement.

**9.2** The attachment of through-hull fittings and seacocks to the hull shall be watertight and so installed as to prevent loosening under normal operating conditions.

**9.3** Seacocks shall be readily accessible.

**9.4** Seacocks shall be securely fastened to the hull to permit easy operation without damage to the hull structure or to the seacock itself and without destroying the watertight integrity or the seacock installation.

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**ICS 47.080.00**

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