

# European standard

**NF EN ISO 9093-2**

February 2003

## French standard

Classification index: **J 95-045-2****ICS: 47.080**

Small craft

## Seacocks and through-hull fittings

### Part 2: Non-metallic

F : Petits navires — Vannes de coque et passe-coques —  
Partie 2 : Construction non métallique

D : Kleine Wasserfahrzeuge — Seeventile und Außendurchführungen —  
Teil 2: Nicht metallische Teile

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### **French standard approved**

by decision of the Director General of AFNOR on January 20, 2003 taking effect on February 20, 2003.

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### **Correspondence**

The European Standard EN ISO 9093-2:2002 has the status of French standard. It reproduces in full the international standard ISO 9093-2:2002.

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### **Analysis**

This standard defines the manufacturing and installation requirements for non-metallic through-hull fittings and/or assemblies comprising through-hull fittings, seacocks, flexible pipe fittings and/or drain plugs and other fixed components, used on small boats with a hull length of 24 m or less.

It does not apply to motor exhaust pipe fittings, through-hull fittings or drive plates used for sailing boats.

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### **Descriptors**

**Technical International Thesaurus:** shipbuilding, ships, yachts, ship hulls, specifications, pipe fittings, cocks, valves, drain plugs, water pipelines, materials, corrosion resistance, installation, instructions.

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### **Modifications**

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### **Corrections**



**National foreword***References to French standards*

*The correspondence between the standards figuring in the clause "Normative references" and the identical French standards is as follows:*

*ISO 180 : NF EN ISO 180 (classification index: T 51-911)*

*ISO 228-1 ; NF EN ISO 228-1 (classification index: T 03-005-1)*

*ISO 8666 : NF ISO 8666 (classification index: J 95-040)*

*The other standards mentioned in the clause "Normative references" that do not have any correspondence in the collection of French standards are as follows (they may be obtained from AFNOR):*

*ISO 7-1*

*ISO 178*

*ISO 527*

ICS 47.080

English version

**Small craft - Seacocks and through-hull fittings - Part 2: Non-metallic (ISO 9093-2:2002)**

Petits navires - Vannes de coque et passe-coques - Partie  
2: Construction non métallique (ISO 9093-2:2002)

Kleine Wasserfahrzeuge - Seeventile und  
Außenhautdurchführungen - Teil 2: Nicht metallische Teile  
(ISO 9093-2:2002)

This European Standard was approved by CEN on 23 September 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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## **Foreword**

This document (EN ISO 9093-2:2002) has been prepared by Technical Committee ISO/TC 188 "Small craft" in collaboration with CMC.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2003, and conflicting national standards shall be withdrawn at the latest by April 2003.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

**NOTE FROM CMC** The foreword is susceptible to be amended on reception of the German language version. The confirmed or amended foreword, and when appropriate, the normative annex ZA for the references to international publications with their relevant European publications will be circulated with the German version.

### **Endorsement notice**

The text of ISO 9093-2:2002 has been approved by CEN as EN ISO 9093-2:2002 without any modifications.

# 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<sup>2</sup> (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 $D_{\text{thread}}$	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*