

INTERNATIONAL  
STANDARD

**ISO**  
**9393-1**

First edition  
1994-05-15

---

---

**Thermoplastics valves — Pressure test  
methods and requirements —**

**Part 1:**  
General

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

*Robinets en matériaux thermoplastiques — Méthodes d'essai de pression  
hydrostatique et exigences —*  
*Partie 1. Généralités*



Reference number  
ISO 9393-1:1994(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 9393-1 was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Sub-Committee SC 7, *Valves and auxiliary equipment of plastics materials*.

ISO 9393 consists of the following parts, under the general title *Thermoplastics valves — Pressure test methods and requirements*:

- Part 1: *General*
- Part 2: *Test conditions and basic requirements for PE, PP, PVC-U and PVDF valves*

# Thermoplastics valves — Pressure test methods and requirements —

## Part 1: General

### 1 Scope

This International Standard specifies the test methods and requirements for the resistance to internal pressure and leaktightness of thermoplastics valves.

This International Standard applies to thermoplastics valves intended for the transport of fluids. The requirements given in parts 1 and 2 of this International Standard are applicable to valves intended for use with cold water. Reference should be made to the relevant product standards for requirements or test methods applicable to valves intended for use with other fluids and/or fluids at other temperatures.

### 2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 9393. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9393 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1167:—<sup>1)</sup>, *Thermoplastics pipes for the transport of fluids — Resistance to internal pressure — Test method.*

### 3 Definitions

For the purposes of this part of ISO 9393, the following definitions apply.

**3.1 nominal pressure (PN):** An alphanumeric designation of pressure, used for reference purposes, which is related to the mechanical strength of the valve.

Usually it corresponds to the maximum allowable pressure of water at 20 °C, in bars, for which the valve is designed.

**3.2 test pressure:** The internal pressure to which a valve is subjected during a test.

It is usually expressed in bars (1 bar = 0,1 MPa).

**3.3 closing torque:** The torque required to close a valve to full tightness at the nominal pressure.

Closing torque is usually expressed in newton-metres.

**3.4 materials test:** A test intended to determine the long-term behaviour, under internal hydrostatic pressure, of thermoplastics materials in the form of injection-moulded pipe.

**3.5 shell test:** A test intended to determine the long-term behaviour, under internal hydrostatic pressure, of thermoplastics materials in the form of a valve body.

**3.6 long-term behaviour test of a complete valve:** A test intended to determine the pressure-resistance capability of a complete valve assembly.

**3.7 seat and packing test:** A test on a valve to determine

— the leaktightness of the valve seat when the valve is closed (in one direction for unidirectional valves,

1) To be published. (Revision of ISO 1167:1973)

- and in each of the directions for bi- or multidirectional valves);
- the leakproofness of the complete valve assembly when the valve is open.

#### 4 Classification of pressure tests

There are four categories of valve pressure test, as follows:

- a) Tests intended to establish the long-term internal-pressure resistance of the thermoplastics materials from which the valve components were manufactured (materials tests).
- b) Tests intended to verify the performance of the pressure-sustaining components of the valve (shell tests).
- c) Tests intended to verify that the design of the valve does not adversely affect the long-term behaviour of the valve (long-term behaviour tests of complete valves).
- d) Tests intended to verify the leaktightness of the completely assembled valve (seat and packing tests).

#### 5 Test specimens

##### 5.1 Test specimens for materials tests

Test specimens for hydrostatic pressure testing shall be pipes made from exactly the same material as the valve body and manufactured by injection moulding (pipes with an external diameter  $D \geq 50$  mm and a free length  $l_0 = 3D$ , minimum length 150 mm).

For connection of the test specimens to the test apparatus and for other features, see ISO 1167.

##### 5.2 Test specimens for shell tests

Test specimens for shell tests shall be a valve body connected to the test apparatus by fusion or mechanical jointing.

##### 5.3 Test specimens for long-term behaviour of a complete valve

Test specimens for long-term behaviour testing of a complete valve shall comprise a complete valve assembly together with ancillary fittings appropriate to the valve and/or test, as follows:

- a) Valves with flanges  
Test specimens shall be assembled with a backing flange for connection to the test apparatus.
- b) Valves with threaded ends (male and/or female)  
Test specimens shall be assembled with a threaded fitting for connection to the test apparatus.
- c) Valves with ends for fusion or solvent-cement jointing  
Test specimens shall consist of a valve jointed by fusion or solvent-cementing to one or more thermoplastics-pipe sections. The minimum free length of each pipe section connected to the valve shall be three times its nominal diameter.  
The pipe shall be cut at right angles to its longitudinal axis and jointed to the valve in accordance with the valve manufacturer's instructions.  
The ends of the specimen shall be closed by any suitable means.
- d) Valves with compression-fitting ends

Test specimens shall be jointed to one or more pipe sections. The minimum free length of each pipe section connected to the valve shall be three times its nominal diameter.

##### 5.4 Test specimens for seat and packing tests

Test specimens shall comprise a complete valve assembly having the open ends of the valve closed off by, for example, plugs and flexible seals.

#### 6 Test apparatus

**6.1 Pressurizing device**, as specified in ISO 1167, capable of being connected to the specimen and capable of progressively applying the water pressure specified in the appropriate product standard and maintaining the pressure constant for the length of time specified in part 2 of this International Standard,<sup>2)</sup> while maintaining the temperature at that specified in the product standard.

For seat and packing tests, if air is used as the test medium, the device shall be capable of applying a constant air pressure of 0,6 MPa (6 bar) and shall include a temperature-controlled **water bath** large enough for the test specimen to be immersed in it.

2) Part 2 of this International Standard (ISO 9393-2, *Thermoplastics valves — Pressure test methods and requirements — Part 2: Test conditions and basic requirements for PE, PP, PVC-U and PVDF valves*) is in course of preparation. Until such time as it is available, the test conditions may be agreed between the interested parties.

If air is used as the test medium, it is necessary to take appropriate safety precautions for the use of compressed gases.

For long-term behaviour tests of complete valves and shell tests, the specimen shall be suspended or placed so that the induced stress in the test assembly is not affected by external forces, nor shall the test device provide additional reinforcement or support to the valve.

**6.2 Pressure gauges**, capable of being read to within  $\pm 1\%$  at full-scale reading.

**6.3 Thermometers**, accurate to within  $\pm 0,5\text{ }^{\circ}\text{C}$ .

## 7 Procedure

### 7.1 Materials tests

Test the test specimen using the method specified in ISO 1167 and any applicable conditions given in part 2 of this International Standard.<sup>2)</sup>

### 7.2 Shell tests

Prepare the test specimen in accordance with clause 5 and proceed as follows:

Connect the test specimen to the test apparatus.

Position the test specimen so that the entire valve shell will be subjected to the test pressure.

Fill the test specimen with water at ambient temperature.

Release any trapped air from the test specimen.

Subject the test specimen to the test conditions (except pressure) specified in part 2 of this International Standard.<sup>2)</sup>

Raise the pressure in such a way that the test pressure specified in part 2 of this International Standard<sup>2)</sup> is attained within 60 s and maintain the pressure at this level for the length of time specified in part 2 of this International Standard.<sup>2)</sup>

Decrease the pressure to atmospheric pressure.

### 7.3 Long-term behaviour tests of complete valves

Test the test specimen using the method specified in ISO 1167 and any applicable conditions given in part 2 of this International Standard.<sup>2)</sup>

## 7.4 Seat and packing tests

**7.4.1 Fully closed valve test** (for each direction — see 3.7)

Connect one end of the test specimen to the pressure line and the other end(s) to a device capable of detecting leakage.

Fill the closed test specimen with the test fluid at ambient temperature.

Release any trapped air from the test specimen.

Close the valve with the closing torque specified in the relevant product standard.

Raise the pressure within 30 s to the test pressure specified in part 2 of this International Standard<sup>2)</sup> and maintain the pressure at this level for the length of time specified in part 2 of this International Standard.<sup>2)</sup>

Decrease the pressure to atmospheric pressure.

**7.4.2 Open or part-open valve test**

Open the valve to an extent such that all the packing will be subjected to the test pressure.

Fill the open test specimen with the test fluid at ambient temperature, and then shut off the water flow downstream of the test specimen.

Release any trapped air from the test specimen.

Raise the pressure within 30 s to the test pressure specified in part 2 of this International Standard<sup>2)</sup> and maintain the pressure at this level for the length of time specified in part 2 of this International Standard.<sup>2)</sup>

Decrease the pressure to atmospheric pressure.

## 8 Test conditions and requirements

See part 2 of this International Standard.<sup>2)</sup>

## 9 Interpretation of results

### 9.1 Materials tests

The test results shall be considered satisfactory if the values extrapolated to 50 years comply with the requirements specified in part 2 of this International Standard.<sup>2)</sup>

If the connection to the test equipment fails, the test shall be considered null and void and shall be repeated on a different specimen.

If a test specimen ruptures and the rupture is at a distance less than  $0,1 l_0$  from the mouth of the pipe, the test shall be repeated on a different specimen.

## 9.2 Shell tests

The test specimen shall be considered satisfactory if no leakage from the valve body is noted, and no rupture or other visible failure occurs during the test period.

The test specimen shall be regarded as unsatisfactory if the valve body bursts before the end of the test period.

If a pipe or a connection fails, the test shall be considered null and void and shall be repeated on a different specimen.

## 9.3 Long-term behaviour tests of complete valves

The test specimen shall be considered satisfactory if no leakage from the valve is noted, and no rupture or other visible failure occurs during the test period.

The test specimen shall be regarded as unsatisfactory if the valve assembly bursts before the end of the test period.

If a pipe or a connection fails, the test shall be considered null and void and shall be repeated on a different specimen.

## 9.4 Seat and packing tests

The test specimen shall be considered satisfactory if no leakage occurs through the valve seat and packing during the test period.

## 10 Test report

The test report shall include the following information:

- a) a reference to this International Standard and the type of test carried out (material, long-term behaviour, shell, seat and packing);
- b) all details necessary for the complete identification of the valve, including:
  - 1) the material of the body,
  - 2) the outside diameter ( $D$ ) of the pipe used,
  - 3) the nominal size (DN) of the valve and the type of valve,
  - 4) the nominal pressure (PN) of the valve,
  - 5) the manufacturer's name or trademark,
  - 6) the closing torque,
  - 7) the flow direction (if appropriate);
- c) the test conditions;
- d) the number of specimens tested;
- e) whether the valve complied with the test requirements — if the valve failed (leakage or rupture), specify under what test conditions and the size and position of the rupture (if present);
- f) details of any operations not specified in this International Standard, as well as details of any incidents which may have affected the results.

**iTeh STANDARD PREVIEW**  
This page intentionally left blank  
**(standards.iteh.ai)**

[ISO 9393-1:1994](https://standards.iteh.ai/catalog/standards/sist/83f0ce71-4ac4-4107-9fee-0277d1d486d7/iso-9393-1-1994)

<https://standards.iteh.ai/catalog/standards/sist/83f0ce71-4ac4-4107-9fee-0277d1d486d7/iso-9393-1-1994>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO 9393-1:1994](#)

<https://standards.iteh.ai/catalog/standards/sist/83f0ce71-4ac4-4107-9fee-0277d1d486d7/iso-9393-1-1994>

---

---

**ICS 23.060.00; 83.140.00**

**Descriptors:** plastics products, thermoplastic resins, valves and fittings, cocks, valves, specifications, tests, pressure tests, determination, leaktightness, generalities.

Price based on 4 pages

---

---