
**Thermoplastics pipes, fittings and
assemblies for the conveyance of
fluids — Determination of the resistance
to internal pressure —**

Part 1:

General method

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*Tubes, raccords et assemblages en matières thermoplastiques pour le
transport des fluides — Détermination de la résistance à la pression
interne*

ISO 1167-1:2006

<https://standards.iteh.ai/catalog/standards/sist/66f598c3-9586-4466-9a63-f89f46b94334/iso-1167-1-2006>

Partie 1: Méthode générale



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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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

ISO 1167-1 was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 5, *General properties of pipes, fittings and valves of plastic materials and their accessories — Test methods and basic specifications*.

This first edition of ISO 1167-1, together with ISO 1167-2, cancels and replaces ISO 1167:1996 and, together with ISO 1167-3, cancels and replaces ISO 12092:2000, of which it constitutes a technical revision.

ISO 1167 consists of the following parts, under the general title *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure*:

- Part 1: *General method*
- Part 2: *Preparation of pipe test pieces*
- Part 3: *Preparation of components*
- Part 4: *Preparation of assemblies*

Introduction

Tests for determining resistance to internal pressure are essential for assessing the properties and durability of thermoplastics piping system parts. In fact, they constitute a basis for determining short-term and long-term characteristics.

Many International Standards contain requirements for the determination of the resistance to pressure of pipes, fittings or assemblies. All these documents describe the equipment for pressurizing the different test pieces considered as well as the testing procedure and the test report.

In order to avoid unnecessary repetition, it is desirable to group together all these documents and to establish one International Standard divided into several parts.

ISO 1167-1 contains a description of the equipment used to pressurize test pieces, the testing procedure to be applied and the test report.

ISO 1167-2, ISO 1167-3 and ISO 1167-4 describe the method of preparation of test pieces corresponding to each case considered: pipes, components or assemblies.

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Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure —

Part 1: General method

1 Scope

This part of ISO 1167 specifies a general test method for determining the resistance to internal hydrostatic pressure at a given temperature of thermoplastics pipes, fittings and piping systems for the transport of fluids.

The method accommodates water-in-water, water-in-air and water-in-liquid tests.

2 Normative references

The following referenced documents are indispensable for the application 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 1167-2:2006, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 2: Preparation of pipe test pieces*

ISO 1167-3, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 3: Preparation of components*¹⁾

ISO 1167-4, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 4: Preparation of assemblies*¹⁾

ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions*

ISO 9080, *Plastics piping and ducting systems — Determination of the long-term hydrostatic strength of thermoplastics pipe materials in pipe form by extrapolation*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

component

fitting or valve, in single or multiple form, that is supplied as an integral unit

3.2

standard dimension ratio

SDR

ratio of the nominal outside diameter d_n of a pipe to its nominal wall thickness e_n

1) To be published.

4 Principle

After conditioning, test pieces are subjected to a specified constant internal hydrostatic pressure for a specified period of time or until a test piece or pieces fail.

Throughout the test, the test pieces are kept in an environment at a specified constant temperature: this is either water ("water-in-water" test), another liquid ("water-in-liquid" test) or air ("water-in-air" test).

The following test parameters shall be specified by the standard or specification making reference to this part of ISO 1167:

- a) the type of end cap to be used (see 5.1 and ISO 1167-2:2006, 4.1);
- b) the test temperature;
- c) for evaluation purposes, the SDR or S-series or size of pipe or fitting to be used;
- d) the number of test pieces;
- e) the test pressure, p , or the circumferential (hoop) stress, σ , to be induced by the test pressure;
- f) the type of test, i.e. "water-in-water", "water-in-liquid" or "water-in-air";
- g) the duration of the test under pressure and the criteria for a failure;
- h) the requirements, or patterns of requirements, if any, which determine the initiation of additional testing.

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5 Apparatus

5.1 End caps, fixed to the ends of the test piece. By means of an appropriate system or procedure, end caps shall allow sealing and connection to the pressurizing equipment and shall allow purging of the air before testing.

The end caps shall be one of the following types.

Type A: fittings rigidly connected to the test piece but not to each other, and hence transmitting the hydrostatic end thrust to the test piece, e.g. as shown in Figure 1, or equivalent. They may comprise flanged plates on the ends of a large diameter pipe, optionally fused when flanges, caps, plugs or plates are of a compatible material to the test pieces.

Type B: sockets, made of metal, fitted with joints ensuring sealing onto the external surface of the test piece and connected to one another, and hence not transmitting the hydrostatic end thrust to the test piece. They may comprise one or more metal rods, see Figure 1, allowing sufficient longitudinal movement at the ends of the test pieces, to avoid buckling due to thermal expansion. If external rods are used, contact of the outside surface of the test piece with one or several rods shall be avoided during the test. In this case, the test shall be disregarded.

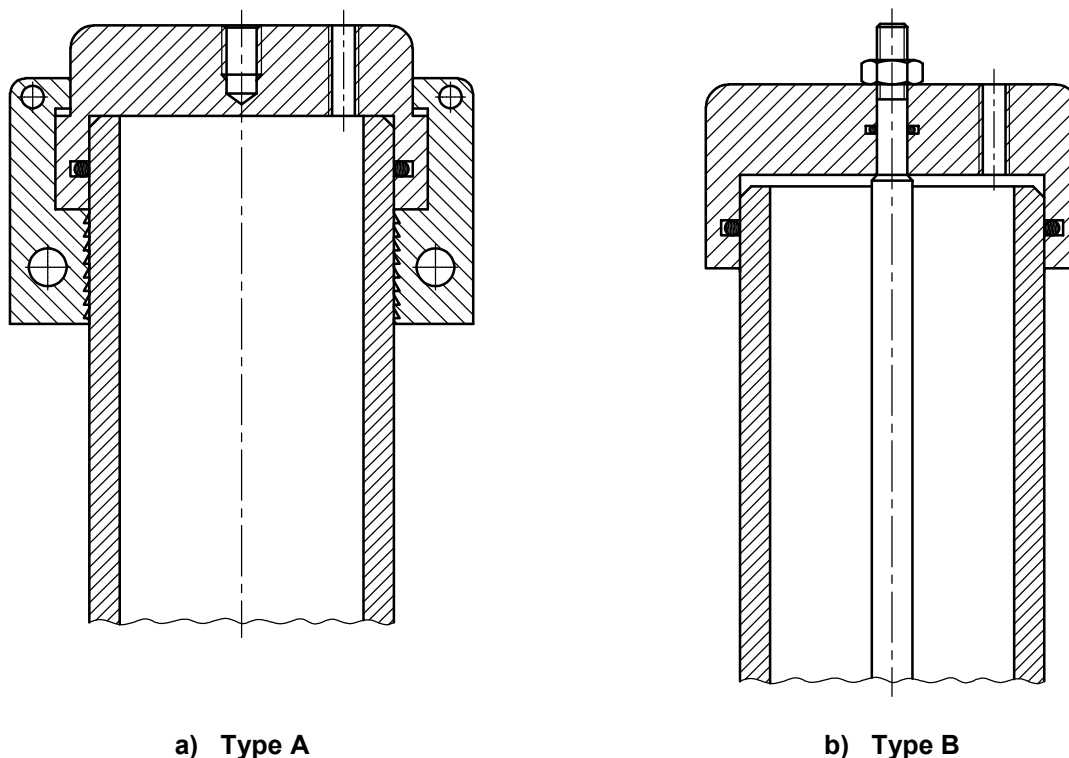
Other than toothed grips, any sharp edges which would come into contact with the outside surface of the pipe shall be rounded off.

The constituent material of the end cap might have an adverse effect on the test piece under test and such materials should therefore be avoided as far as possible.

For testing of components, the end caps shall be replaced by pressure-tight devices as specified in ISO 1167-3.

End caps of type A shall be used for determination of the long-term hydrostatic strength of materials in accordance with ISO 9080.

NOTE It is recognized that times to failure can be different depending upon the type of end caps used.



a) Type A

b) Type B

Figure 1 — Examples of end caps for internal pressure testing

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5.2 Tank, filled with water or other liquid, kept at a constant temperature as specified in the referring standard to within ± 1 °C, or **oven**, the temperature of which shall be kept at the specified value to within ± 2 °C.

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When an environment other than water is used, necessary precautions shall be taken, in particular those concerning safety and any interaction between liquid and the material(s) of the test piece.

When environments other than water are used, tests which are intended to be comparative shall be carried out in the same environment.

As the results are strongly influenced by temperature, the tolerance on temperature should be kept as small as possible within the specified limits e.g. by using forced circulation of the fluid.

When testing in air, the pipe surface temperature should be checked in addition to the air.

Potable water should be used and it is necessary to avoid contamination of the water by any substance likely to affect the results, e.g. detergents, lubricants.

5.3 Support or hangers, enabling test pieces to be placed in the tank or oven (5.2) such that contact between them or with the sidewalls of the tank/oven is avoided as far as possible so as not to influence the test results.

5.4 Pressurizing equipment, capable of applying the required pressure gradually and smoothly in accordance with Clause 9 and then of keeping this indicated (or measured) pressure to within ± 2 % for the duration of the test.

As the results are strongly influenced by pressure, the tolerance on pressure should be kept as small as possible within the specified limits.

The pressure should preferably be applied individually to each test piece. However, the use of equipment enabling the pressure to be applied simultaneously to several test pieces is also permitted if there is no