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### موسسه استاندارد و ترقیات صنعتی ایونیو

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

## Part 2: Preparation of pipe test pieces

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

## Partie 2: Préparation des éprouvettes tubulaires



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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 1167-2 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 1167-2, together with ISO 1167-1, 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*

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

### Part 2: Preparation of pipe test pieces

#### 1 Scope

This part of ISO 1167 specifies the dimensions and method for preparation of extruded, or injection-moulded tubular, test pieces used to determine the resistance of thermoplastics pipes to internal hydrostatic pressure according to ISO 1167-1.

#### 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 1167-1:2006, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 1: General method*

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

#### 3 Principle

Pipe test pieces may be obtained by extrusion or injection-moulding. The extruded test pieces are used for material and pipe testing, whereas the injection-moulded tubular test pieces are used for testing injection moulding materials only.

The injection-moulded tubular test pieces make it possible to determine the time-related behaviour of the injection moulding material for fittings under hydrostatic pressure and under the same conditions as specified for extruded pipes. It is possible to extrapolate the results in accordance with a method such as that specified in ISO 9080 in order to determine the MRS (minimum required strength) and to classify the material using ISO 12162. The tubular test pieces also make it possible to verify individual points on previously established stress/time regression curves as a minimum material test requirement.

**NOTE** If the compound used for the injection-moulding of components can also be extruded, then its time-related behaviour can be investigated using either injection-moulded or extruded tubular test pieces.

After conditioning, test pieces consisting of a portion of pipe sufficient to provide the required free length as a function of the diameter of the pipe are subjected to a specified internal hydrostatic pressure or stress for a specified period of time or until the test piece(s) fail(s), in accordance with ISO 1167-1.

The number of test pieces, conditioning and details of the test report are given in ISO 1167-1.

## 4 Apparatus

- 4.1 End caps, as specified in the standard making reference to ISO 1167-1.
- 4.2 Means of measuring the wall thickness, conforming to ISO 3126.
- 4.3 Means of measuring the mean outside diameter of the pipe, conforming to ISO 3126, e.g. Pi-tape.

## 5 Test pieces

### 5.1 Extruded test pieces

#### 5.1.1 Free length

The free length,  $l_0$ , of the pipe between the end caps shall be at least three times the nominal outside diameter  $d_n$ , with a minimum of 250 mm.

If, for pipes with  $d_n$  greater than 315 mm, the specified minimum free length cannot be achieved, a shorter free length may be chosen with a minimum of two times  $d_n$ , unless otherwise specified in the referring standard or specification.

#### 5.1.2 Total length

For type B end caps (see ISO 1167-1:2006, 5.1), the total length of the test piece shall be such that movement of the test piece between the end caps is accommodated during the test, thus making allowance for thermal expansion.

### 5.2 Injection-moulded tubular test pieces

Injection-moulded test pieces shall conform to the following requirements for the dimensions shown in Figure 1.

The nominal outside diameter  $d_n$  of the test pieces shall be between 25 mm and 110 mm inclusive. The wall thickness will depend on the material concerned.

The free length  $l_0$  of the test pieces, excluding the ends, shall be  $3d_n$ , except for test pieces  $d_n \geq 50$  mm, for which the minimum free length shall be 140 mm.

Injection-moulded test pieces with a longitudinal fusion line and both ends open should preferably be used for comparative and investigative purposes only.

The injection-moulding parameters can strongly influence the stresses in the injection-moulded test piece.

### 5.3 Measurement of dimensions

If necessary for the calculation of the test pressure (see ISO 1167-1:2006, 7.2), find and determine, in accordance with ISO 3126, the minimum wall thickness and the mean outside diameter of the free length of the test piece, using apparatus conforming to 4.2 and 4.3. These measurements shall be used for further calculations. The rounding up procedure of ISO 3126 shall not be applied.

## 6 Test report

Record the information required in order to comply with ISO 1167-1:2006, Clause 11 and include the method of manufacture of the test piece, i.e. by extrusion or by injection moulding.

## Bibliography

- [1] ISO 9080, *Plastics piping and ducting systems — Determination of the long-term hydrostatic strength of thermoplastics pipe materials in pipe form by extrapolation*
- [2] ISO 12162, *Thermoplastics materials for pipes and fittings for pressure applications — Classification and designation — Overall service (design) coefficient*