INTERNATIONAL STANDARD

**ISO 9969**

Second edition
2007-12-15

# Thermoplastics pipes — Determination of ring stiffness

*Tubes en matières thermoplastiques — Détermination de la rigidité annulaire*

Reference number
ISO 9969:2007(E)

**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.



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

Published in Switzerland

 

# 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 9969 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 second edition cancels and replaces the first edition (ISO 9969:1994), which has been technically revised.

# Thermoplastics pipes — Determination of ring stiffness

## 1 Scope

This International Standard specifies a test method for determining the ring stiffness of thermoplastics pipes having a circular cross section.

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

## 3 Symbols

For the purposes of this document, the following symbols apply.

| | | Units |
|---|---|---|
| $d_n$ | nominal diameter of pipe | mm |
| $d_i$ | inside diameter of pipe | mm |
| $e_c$ | construction height | mm |
| $F$ | force (of loading) | kN |
| $L$ | length of the test piece | mm |
| $p$ | pitch of ribs or windings | mm |
| $S$ | ring stiffness | kN/m$^2$ |
| $y$ | vertical deflection | mm |

## 4 Principle

The ring stiffness is determined by measuring the force and the deflection while deflecting the pipe at a constant deflection speed.

A cut length of pipe supported horizontally is compressed vertically between two parallel flat plates moved at a constant speed that is dependent upon the diameter of the pipe.

A plot of force versus deflection is generated. The ring stiffness is calculated as a function of the force necessary to produce a 3 % diametric deflection of the pipe.

NOTE It is assumed that the test temperature is set by the referring standard, if appropriate (see 8.1).

## 5 Apparatus

**5.1 Compressive testing machine**, capable of a constant rate of crosshead movement, via a pair of parallel plates (5.2), as appropriate to the nominal diameter of the pipe in conformance with Table 1, with sufficient force and travel to produce the specified diametric deflection (see Clause 8).

**Table 1 — Deflection speeds**

| **Nominal diameter, $d_n$, of pipe** mm | **Deflection speed** mm/min |
|---|---|
| $d_n \leqslant 100$ | $2 \pm 0{,}1$ |
| $100 < d_n \leqslant 200$ | $5 \pm 0{,}25$ |
| $200 < d_n \leqslant 400$ | $10 \pm 0{,}5$ |
| $400 < d_n \leqslant 710$ | $20 \pm 1$ |
| $d_n > 710$ | $0{,}03 \times d_i \pm 5$ % [a] |
| [a] $d_i$ shall be determined in accordance with 6.3. | |

**5.2 A pair of hard and rigid plates**, through which the testing machine can apply the necessary force, $F$, to the test piece.

The plates shall have flat, smooth and clean surfaces for contact with the test piece.

The stiffness and hardness of each plate shall be sufficient to prevent bending or deformation to an extent that would affect the results.

The length of each plate shall be at least equal to the length of the test piece. The width of each plate shall not be less than the width of the contact surface with the test piece while under load plus 25 mm.

**5.3 Dimensional measuring devices**, capable of determining

— individual values for the length of a test piece (see 6.2.2 and 6.2.3) to within 1 mm,

— the inside diameter of a test piece to within 0,5 %, and

— the change of inside diameter of a test piece in the direction of loading with an accuracy of 0,1 mm or 1 % of the deflection, whichever is the greater.

An example of a device for measuring the inside diameter of corrugated pipe is shown in Figure 1.

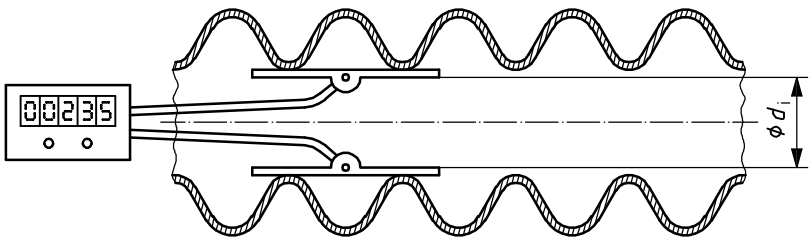


**Figure 1 — Example of device for measuring inside diameter of corrugated pipe**

**5.4 Force measuring device**, capable of determining to within 2 % the force necessary to produce a deflection of up to 4 % of the test piece.