
**Plastics piping and ducting systems —
Thermoplastics pipes — Determination of
ring flexibility**

*Systèmes de canalisations et de gaines en matières plastiques — Tubes
en matières thermoplastiques — Détermination de la flexibilité annulaire*

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Foreword

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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 13968 was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*.

It has also been published (with minor deviations) as EN 1446.

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Printed in Switzerland

Plastics piping and ducting systems — Thermoplastics pipes — Determination of ring flexibility

1 Scope

This standard specifies a method for testing the ring flexibility of a thermoplastics pipe having a circular cross section.

The method enables determination of the deflection, and necessary force, at which physical damage, if any (see 7.2), occurs within 30 % diametric deflection.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard 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 9969:1994, *Thermoplastics pipes — Determination of ring stiffness*.

3 Principle

The ring flexibility of a pipe is tested by measuring the force and the deflection while deflecting a ring section from the pipe diametrically at a constant speed until a deflection of at least 30 % is achieved or prior fracture has occurred.

Each test piece is monitored during testing and subsequently inspected for signs of several specific types of mechanical failure.

4 Apparatus

4.1 Compression testing machine, conforming to that required for ISO 9969:1994 but capable of producing at least 30 % diametric deflection of the test piece at the applicable speed (see table 1 of ISO 9969:1994).

4.2 Dimensional and force measuring devices, conforming to those required for ISO 9969:1994, but capable of measuring diametric deflections up to at least 30 % and the relevant diameters and compressive forces.

5 Test pieces

5.1 Three test pieces shall be prepared from a single pipe, as specified in ISO 9969:1994, and designated a, b and c, respectively.

6 Conditioning

Conditioning shall be as specified in ISO 9969:1994.

7 Procedure

7.1 Conduct the test in accordance with the procedure given in ISO 9969:1994, but continue compression while measuring the change in either inside diameter or outside diameter and monitoring for signs of failure (see 7.2), until either a deflection of at least 30 % in outside diameter has been reached, or the test piece has fractured, whichever occurs first.

7.2 Observe and record the force and the deflection at the first evidence of each of the following events, if they occur:

- a) cracking or crazing of the inside wall or liner of multilayer pipes;
- b) wall cracking of single "layer" pipes;
- c) rupture of the test piece;
- d) change in direction of curvature of the cross section of the test piece (buckling) as specified in the referring standard.

Whitening of the pipe shall not be considered as an indication of one of the above mentioned failures.

7.3 For each test piece, prepare a force/deflection graph and inspect and record the type and the position of each event (see 7.2) with respect to the corresponding force and deflection.

8 Test report

The test report shall include the following information:

- a) a reference to this standard and to the referring standard, if any;
- b) a complete identification of the thermoplastics pipe, including:
 - 1) manufacturer;
 - 2) type of pipe;
 - 3) dimensions;

- 4) production date;
 - 5) lengths of test pieces;
 - 6) mass per metre length of the pipe;
- c) the test temperature;
 - d) the force/deflection graph for each test piece;
 - e) the force and deflection at which any of the following events occurred:
 - 1) cracking or crazing of the inside wall or liner;
 - 2) wall cracking;
 - 3) rupture of the test piece;
 - 4) change in direction of curvature of the cross section of the test piece (buckling);
 - f) the deflection and force at the maximum point, if a maximum occurred;
 - g) any factors which may have affected the results, such as any incidents or any operating details not specified in this standard;
 - h) the date of test.

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