INTERNATIONAL STANDARD

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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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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 13968 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 13968:1997), which has been technically revised.

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

1 Scope

This International 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, occurs within the specified diametric deflection.

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 9969, *Thermoplastics pipes — Determination of ring stiffness*

3 Terms and definitions

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

3.1
ring flexibility
ability of a pipe to resist ring diametric deflection without loss of structural integrity

[EN 13476-1:2007, 3.1.2.10]

4 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 at least the specified deflection 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.

NOTE It is assumed that the following test parameters are set by the standard making reference to this International Standard:

a) if appropriate, a greater length of the test pieces than the length specified in ISO 9969, see Clause 6;

b) the deflection, if appropriate, see 8.1.

5 Apparatus

5.1 Compression testing machine, as specified in ISO 9969, but capable of producing at least the specified diametric deflection of the test piece at the applicable speed (see ISO 9969:2007, Table 1).

5.2 Dimensional and force measuring devices, conforming to ISO 9969, but capable of measuring diametric deflections up to at least the specified deflection and the corresponding compressive forces.

6 Test pieces

Prepare three test pieces from a single pipe, as specified in ISO 9969, and designate them a, b, and c respectively. The referring standard may specify longer test pieces than defined in ISO 9969.

7 Conditioning

Condition the test pieces as specified in ISO 9969.

8 Procedure

8.1 Conduct the test in accordance with the procedure given in ISO 9969, but continue compression while measuring the change in either inside diameter or outside diameter until the specified deflection has been achieved. Unless otherwise specified in the referring standard, the deflection shall be 30 % of the outside diameter.

During the compression, monitor for signs of failure (see 8.2), until either the specified deflection has been reached or the test piece has failed, whichever occurs first.

If desired, the deflection may be continued after a failure has occurred or the specified deflection has been reached in order to determine other properties of the pipe.

8.2 For each test piece, prepare a force/deflection graph, and inspect and record the type and the position of each event [a) to e)] with respect to the corresponding force and deflection.

a) Inspect the force/deflection graph for compliance to the requirements in the referring standard.

b) Check for any cracking or crazing in any part of the wall structure.

c) Check for any wall delamination.

d) Check for any permanent buckling in any part of the structure of the pipe wall.

e) Make any other observation as specified in the referring standard.

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

9 Test report

The test report shall include at least the following information:

a) a reference to this International Standard and to the referring standard;

b) the 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) where appropriate, the force and deflection at which any of the events specified in 8.2 occurred;

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 International Standard;

h) the date of test.

Bibliography

[1] EN 13476-1:2007, *Plastics piping systems for non-pressure underground drainage and sewerage — Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) — Part 1: General requirements and performance characteristics*