

Thermoplastics pipes  
Determination of ring flexibility  
English version of DIN EN 1446

**DIN**  
**EN 1446**

ICS 23.040.20

Descriptors: Plastics, pipes, thermoplastics, flexibility, testing.

Kunststoff-Rohrleitungs- und Schutzrohrsysteme; Röhre aus Thermoplasten; Bestimmung der Ringflexibilität

**European Standard EN 1446:1996 has the status of a DIN Standard.**

#### National foreword

This standard has been prepared by CEN/TC 155.

The responsible German body involved in its preparation was the *Normenausschuß Kunststoffe* (Plastics Standards Committee).

EN comprises 4 pages.

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**English version**

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

Systèmes de canalisations et de gaines  
en plastiques; tubes thermoplastiques;  
essai de la flexibilité annulaire

Kunststoff-Rohrleitungs- und Schutzrohr-  
systeme; Rohre aus Thermoplasten; Be-  
stimmung der Ringflexibilität

This European Standard was approved by CEN on 1996-01-04.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

**Central Secretariat: rue de Stassart 36, B-1050 Brussels**

## Foreword

This European Standard has been prepared by the Technical Committee CEN/TC 155 "Plastics piping systems and ducting systems" of which the secretariat is held by NNI.

This draft standard is based on clause 6 of the latest version of the draft for the international standard ISO/DIS 9971-1 "Light weight pipes and fittings of unplasticized polyvinyl chloride (PVC-U) for buried drain and sewer - Specifications" prepared by the International Organization for Standardization (ISO). It is a modification of clause 6 for reasons of the need for a separate supporting standard.

The material-dependent parameters and/or performance requirements are incorporated in the System Standard(s) concerned.

This standard is one of a series of standards on test methods which support System Standards for plastics piping systems and ducting systems.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 1996, and conflicting national standards shall be withdrawn at the latest by July 1996 .

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

## 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 references

This standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter.

For dated references, subsequent amendments to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision.

For undated references the latest edition of the publication referred to applies.

EN ISO 9969:1995      *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 EN ISO 9969 but capable of producing at least 30 % diametric deflection of the test piece at the applicable speed (see table 1 of EN ISO 9969:1995).

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

## 5 Test pieces

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

## 6 Conditioning

Conditioning shall be as specified in EN ISO 9969.

## 7 Procedure

7.1 Conduct the test in accordance with the procedure given in EN ISO 9969, 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 mechanical failures, if they occur:

- a) cracking or crazing of the inside wall or liner;
- b) wall cracking;
- c) wall delamination;
- d) rupture of the test piece;
- e) change in direction of curvature of the cross section of the test piece (buckling).

Whitening of the pipe shall not be considered as an indication of one of the above mentioned mechanical 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;
- 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) wall delamination;
  - 4) rupture of the test piece;
  - 5) 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.