BRITISH STANDARD

BS EN 1446 : 1996
BS 2782 : Part 11 : Method 1114C : 1996

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

The European Standard EN 1446 : 1996 has the status of a British Standard

ICS 23.040.20

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee PRI/61, Plastics piping systems and components, upon which the following bodies were represented:

British Gas plc
British Plastics Federation
British Plumbing Fittings Manufacturers' Association
British Valve and Actuator Manufacturers' Association
Department of the Environment (British Board of Agrément)
Department of the Environment (Building Research Establishment)
Department of the Environment (Property and Buildings Directorate)
Department of Transport
Electricity Association
Federation of Civil Engineering Contractors
Health and Safety Executive
Institute of Building Control
Institute of Materials
Institution of Civil Engineers
Institution of Gas Engineers
Institution of Water and Environmental Management
National Association of Plumbing, Heating and Mechanical Services Contractors
Pipeline Industries Guild
Plastics Land Drainage Manufacturers' Association
Society of British Gas Industries
Society of British Water Industries
Water Companies Association
Water Services Association of England and Wales

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

ERA Technology Ltd.
Engineering Equipment and Materials Users' Association
RAPRA Technology Ltd.

This British Standard, having been prepared under the direction of the Sector Board for Materials and Chemicals, was published under the authority of the Standards Board and comes into effect on
15 August 1996

Amendments issued since publication

Amd. No.	Date	Text affected

The following BSI references relate to the work on this standard:
Committee reference PRI/61
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Contents

National foreword

This British Standard has been prepared by Technical Committee PRI/61 and is the English language version of EN 1446 : 1996 *Plastics piping and ducting systems – Thermoplastics pipes – Determination of ring flexibility*, published by the European Committee for Standardization (CEN).

It is incorporated into BS 2782 *Methods of testing plastics : Part 11 : Thermoplastics pipes, fittings and valves*, as Method 1114C : 1996, for association with related test methods for plastics materials and plastics piping components.

This test method has been prepared for reference by other standards under preparation by CEN for specification of reinforced plastics piping systems and components. It has been implemented to enable experience of the method to be gained and for use for other fresh applications.

It is also for use for the revision or amendment of other national standards as practicable, but it should not be presumed to apply to any existing standard or specification which contains or makes reference to a different test method until that standard/specification has been amended or revised to make reference to this method and adjust any requirements as appropriate.

Cross-reference

Publication referred to	Corresponding British Standard
EN ISO 9969 : 1995	BS EN ISO 9969 : 1995 (BS 2782 : Part 11 : Method 1114B : 1995) *Thermoplastics pipes – Determination of ring stiffness*

Warning note. This British Standard, which is identical with EN 1446 : 1996, does not necessarily detail all the precautions necessary to meet the requirements of the Health and Safety at Work etc. Act 1974. Attention should be paid to any appropriate safety precautions and the method should be operated only by trained personnel.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1446

January 1996

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Descriptors: Plastic tubes, thermoplastic resins, tests, bend tests, determination, flexibility

English version

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

Systèmes de canalisations et de gaines en plastiques — Tubes thermoplastiques — Détermination d'essai de la flexibilité annulaire

Kunststoff-Rohrleitungs- und Schutzrohrsysteme — Rohre aus Thermoplasten — Bestimmung 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.

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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.

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List of references

See national foreword.

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British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

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