BRITISH STANDARD

BS EN
1704 : 1997
BS 2782 :
Part 11 :
Method 1133B :
1997

Plastics piping systems — Thermoplastics valves — Test method for the integrity of a valve after temperature cycling under bending

The European Standard EN 1704 : 1997 has the status of a British Standard

ICS 23.060.01

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
Chartered Institution of Water and Environmental Management
Department of the Environment (British Board of Agrèment)
Department of the Environment (Building Research Establishment)
Department of Transport
Electricity Association
Health and Safety Executive
Institute of Building Control
Institute of Materials
Institution of Civil Engineers
Institution of Gas Engineers
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 represented in the drafting of this 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 June 1997

Amendments issued since publication

Amd. No.	Date	Text affected

The following BSI references relate to the work on this standard:
Committee reference PRI/61
Draft for comment 95/120948 DC

ISBN 0 580 27378 4

Contents

National foreword

This British Standard has been prepared by Technical Committe PRI/61 and is the English language version of EN 1704 : 1996 *Plastics piping systems — Thermoplastics valves — Test method for the integrity of a valve after temperature cycling under bending*, 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 1133B : 1997, 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 plastics piping and ducting 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-references

Publication referred to	Corresponding British Standard
EN 837-1 : 1996	BS EN 837 : 1997 *Pressure gauge — Part 1: Bourdon tube pressure gauges — Dimensions, metrology, requirements and tests*
EN 28233	BS EN 28233 : 1992 *Thermoplastics valves — Torque — Test method* [BS 2782 : Part 11 : Method 1131 : 1992]
EN 45501 : 1993	BS EN 45501 : 1994 *Specification for metrological aspects of non-automatic weighing instruments*

NOTE 1. In the descriptors, the term 'cocks' should be read as 'valves'.

NOTE 2. In **4.1**, the specification of the bending frame given in the first paragraph corresponds to that for testing a length of pipe under bending, for which a constant bending radius can be achieved. This cannot be achieved for a test piece in which a significant portion comprises a relatively stiff valve body. It is necessary therefore to interpret figure 1 as requiring displacement of the valve body by the specified radial distance from its position between two straight pipes before bending is applied. Depending on the relative lengths and stiffness of the valve body and the two adjacent pipes which complete the span shown in figure 1, the radius of bending of the actual pipes may differ from and cannot be expected or required to conform to a constant radius of $25d_n$.

NOTE 3. In **4.1,** reference has been introduced to a specific classification in accordance with EN 45501, which should therefore have been listed as a dated reference in clause **2**.

NOTE 4. In **5.1.1**, reference has been introduced to the 'MRS-class' of the materials of the pipes and the valve, without reference to the basis thereof. The Technical Committee considers this to be a reference to the classification number according to EN ISO 12162 : 1995 (≡ BS EN ISO 12162 : 1996 and BS 2782 : Part 11 : Method 1121 : 1996)

Warning note. This British Standard, which is identical with EN 1704 : 1997, 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.

In particular, it is the opinion of UK Technical Committee PRI/61 that the method as written gives test conditions known to be appropriate and required for some applications, including polyethylene valves for gas distribution. For testing of valves of more brittle materials and/or intended for other applications, the test conditions may be inappropriate, *e.g.* conditioning to − 20 °C as required for **6.3** and **6.6.** The Technical Committee therefore draws particular attention to clause **3** and the note thereto, including item c), and to the note which follows **6.9**.

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

Summary of pages

This document comprises a front cover, and inside front cover, pages i and ii, the EN title page, pages 2 to 6, an inside back cover and a back cover.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1704

January 1997

ICS 23.060.00

Descriptors: Plastic tubes, cocks, thermoplastic resins, leak tests, bend tests, thermal cycling tests, verification

English version

Plastics piping systems — Thermoplastics valves — Test method for the integrity of a valve after temperature cycling under bending

Systémes de canalisations en plastique — Robinets thermoplastiques — Méthode d'essai pour la vérification d'un robinet aprés des cycles thermiques sous flexion

Kunststoff-Rohrleitungssysteme — Thermoplast-Armaturen — Prüfverfahren der Unversehrtheit einder Armatur nach Temperaturwechseln unter Beigung

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 Technical Committee CEN/TC 155, Plastics piping systems and ducting systems, the secretariat of which is held by NNI.

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 1997, and conflicting national standards shall be withdrawn at the latest by July 1997.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of 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 and the United Kingdom.

1 Scope

This standard specifies a method for determining the leaktightness and ease of operation of a valve under bending following the application of temperature cycling.

This standard is applicable to thermoplastics valves with DN 63 or smaller.

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 837-1	*Pressure gauges — Part 1: Bourdon tube pressure gauges — Dimensions, metrology, requirements and testing*
EN 28233	*Thermoplastics valves — Torque — Test method*

3 Principle

A valve assembly is exposed to a continuous temperature cycling between a low and a high temperature for a specified number of cycles. Unless otherwise specified in the referring standard, the lower and upper test temperatures are −20 °C and +40 °C respectively. During the test the assembly is held at a fixed bend radius. Following temperature cycling the valve is tested for ease of operation and leaktightness.

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

a) the bending radius if other than 25 d_n (see **5.1.2**);

b) the number of test pieces to be tested in each configuration (see clause **5**);

c) the lower and/or upper cycle temperatures, if not as given in **6.3**;

d) the number of cycles (see **6.4**).

4 Apparatus

4.1 *A bending frame*, capable of producing a constant bending radius of 25 d_n, using a three point bending load over a span of 10 d_n as shown in figure 1.

The stationary frame of the machine shall include two supports, S, with a 5 mm radius of curvature, having parallel axes and adjustable spacing (see figure 1).

Depending upon the type of valve, the moving part of the machine shall make contact via a tool having a 5 mm radius or a semi-cylindrical face or a yoke, the axis of which is parallel to that of the supports. The tool and the supports shall be made of hardened steel.

The apparatus shall include force and deflection measuring indicators conforming to accuracy class 2 in accordance with EN 45501.

4.2 *A temperature-controlled water bath*, maintained at (20 ± 1) °C and capable of receiving the bending frame.

4.3 *A temperature-controlled environment*, capable of receiving the bending frame and being cycled between two temperatures as specified (see **6.3**).

4.4 *Other equipment, as follows:*

a) a device for measuring the operating torque of the valve;

b) a compressed air supply, variable up to at least 6 bar (see **6.9**);

c) a manometer, with a range of 0 mbar to 50 mbar (class 0,6 or better conforming to EN 837-1);

d) a thermometer capable of checking conformity to the temperature(s) specified in **4.2** and/or **6.3**, as appropriate;

e) end closures connected to the ends of the valve, allowing, by means of an appropriate system, sealing and connecting to the pressurising equipment. By means of an appropriate system, both end closures shall allow sealing, connection to pressurising equipment and venting (see **6.10** and **6.12**).

5 Test pieces

5.1 Preparation

5.1.1 Two test pieces shall be prepared as assemblies as follows. The valve shall be assembled between two pipes of the same d_n as the valve and of sufficient length to provide a span of at least 10 d_n when the applicable bending radius is achieved (see **5.1.2**), as shown in figure 1.

The free ends of the pipes shall be fitted with closures conforming to e) of **4.4**. If a pipe is to be connected to the valve by fusion, the material of the pipe shall conform to the same MRS-class as the material of the valve.

5.1.2 One test piece, with the valve fully closed, shall be held in a bending frame (**4.1**), with the valve spindle in the plane of bending and the operating cap in the outer circumference as shown in figure 1.

The assembly shall be put into the bending frame in such a way that a constant bending radius is assured. Unless otherwise specified in the referring standard, the radius shall be 25 d_n.

The other test piece, with the valve in the half open position, shall be held in a bending frame (**4.1**) with the valve spindle perpendicular to the plane of bending.

5.2 Number of test pieces

The number of test pieces to be tested in each configuration shall be as specified in the referring standard.

6 Procedure

6.1 Apply the procedures given in **6.2** to **6.12** inclusive to each test piece in each configuration (see clause **5**).

6.2 Measure and record the opening and closing torques of the valve in accordance with EN 28233. Restore the valve to its initial position, i.e. closed or half open (see **5.1**).

6.3 [See c) in the note to clause **3**]. Place the fixture in a temperature-controlled environment at (-20 ± 2) °C for 10 h. Then raise the temperature of the environment to (40 ± 2) °C and maintain that temperature for 10 h.

6.4 Repeat the temperature cycle given in **6.3** to complete the total number of cycles specified in the referring standard.

6.5 With the bending radius still applied, and without any prior operating, measure and record the opening and closing torques of the valve at (40 ± 1) °C, in accordance with EN 28233. Restore the valve to its initial position.

6.6 With the bending radius still applied, condition the valve at (-20 ± 2) °C for 24 h and measure and record the opening and closing torques of the valve, in accordance with EN 28233. Set the valve to its half-open position.

6.7 With the bending radius still applied, connect the assembly to a pneumatic pressure source and place the assembly in a water bath maintained at (20 ± 1) °C. Condition the assembly in that bath for a minimum of 12 h.

6.8 Pressurise the test piece pneumatically to at least 25 mbar greater than the maximum hydrostatic head produced by the water, i.e. that at the lowest point of the outside of the valve.

Maintain this pressure for at least 5 h and monitor the test piece for, and record, any external leakage.

6.9 Increase the pressure pneumatically in the test piece to at least 6 bar. Maintain that pressure for at least 5 h and monitor for, and record, any external leakage.

NOTE. Attention is drawn to the need to contain the possible effects of failure of components subjected to impact testing or destructive testing.

6.10 Close the valve, vent the downstream end of the test piece and remove the non-pressurised end closure from that end of the test piece.

6.11 Repeat once the procedures given in **6.8** and **6.9** and monitor the valves for, and record, any internal leakage.

6.12 Repeat once the procedures given in **6.9** and **6.10** to test the internal leaktightness of the other side of the valve.

7 Test report

The test report shall include the following:

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

b) full identification of the product, including manufacturer and production date;

c) the upper and lower test temperatures;

d) the values of the opening and closing torques measured prior to, and following, temperature cycling at both −20 °C and +40 °C;

e) result of the leaktightness tests (see **6.8**, **6.9**, **6.11** and **6.12**);

f) any factors which may have affected the results, such as any incidents or any operating details not specified in this standard;

g) the date of test.

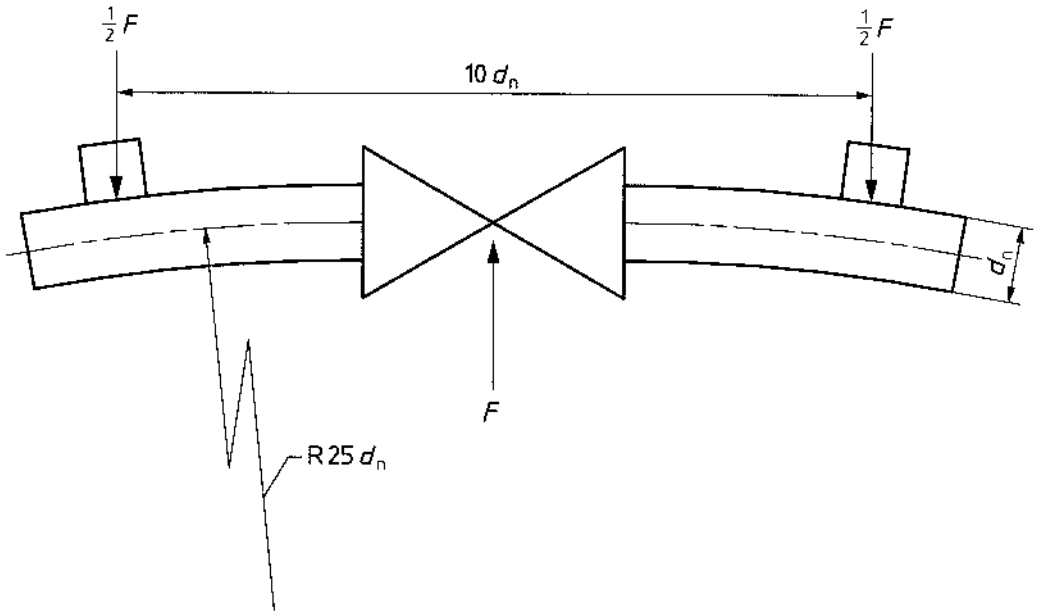

Figure 1. Schematic arrangement for bending radius test

List of references

See national foreword.

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

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.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL