

**Plastics piping systems —
Thermoplastics piping systems
for soil and waste discharge
inside buildings —
Test method for resistance to
elevated temperature cycling**

The European Standard EN 1055 : 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 September 1996

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National foreword

This British Standard has been prepared by Technical Committee PRI/61 and is the English language version of EN 1055 : 1996 *Plastics piping systems — Thermoplastics piping systems for soil and waste discharge inside buildings — Test method for resistance to elevated temperature cycling*, 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 1111A : 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 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 of 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 has been amended or revised to make reference to this method and any requirements adjusted as appropriate. No existing British Standard is superseded by this method.

Reference is made to ISO/TR 7024 for which there is no identical British Standard.

Warning note. This British Standard, which is identical with EN 1055 : 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.

ICS 23.040.20

Descriptors: Sanitation, water removal, sewage, buildings, interior, plastic tubes, thermoplastic resins, thermal tests, high temperature tests, thermal cycling tests, thermal resistance

English version

Plastics piping systems — Thermoplastics piping systems for soil and waste discharge inside buildings — Test method for resistance to elevated temperature cycling

Systèmes de canalisations en plastiques —
Systèmes de canalisations thermoplastiques pour
évacuation des eaux-vannes et des eaux usées à
l'intérieur des bâtiments — Méthode d'essai de
résistance à des cycles à température élevée

Kunststoff-Rohrleitungssysteme –
Rohrleitungssysteme aus Thermoplasten für
Abwasserleitungen innerhalb von Gebäuden —
Prüfverfahren für die Temperaturbeanspruchbarkeit

This European Standard was approved by CEN on 1995-12-21. 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 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.

This draft standard is based on annex D of the International Standard ISO 3633 : 1991 'Unplasticized poly(vinyl chloride) (PVC-U) pipes and fittings for soil and waste discharge (low and high temperature) systems inside buildings — Specifications', published by the International Organization for Standardization (ISO). It is a modification of annex D of ISO 3633 : 1991 for reasons of applicability to other plastics materials and alignment with texts of other standards on test methods.

The modifications are:

- no material is mentioned;
- no material-dependent requirements are given;
- editorial changes have been introduced.

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

No existing European Standard is superseded by this standard.

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

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 and the United Kingdom.

1 Scope

This standard specifies a method for testing the resistance of thermoplastics piping systems for soil and waste discharge inside buildings, marked 'B', or buried in the ground within the building structure, marked 'BD' or 'UD', to 1500 cycles of elevated temperature cycling.

The method assesses leaktightness and resistance to sagging.

NOTE. Definitions for application area codes, such as 'B', are given in the referring standards.

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.

ISO/TR 7024 *Above-ground drainage — Recommended practice and techniques for the installation of unplasticized polyvinyl chloride (PVC-U) sanitary pipework for above-ground systems inside buildings*

3 Definitions and symbols

3.1 Definitions

For the purposes of this standard, the following definitions apply:

3.1.1 nominal outside diameter (d_n)

The specified diameter, in millimetres, assigned to a nominal size (DN/OD) (prEN 1329-1 : 1994).

3.1.2 expansion gap (L_E)

The distance between the bottom of a socket and the spigot of the inserted component allowing expansion of the system.

3.2 Symbols

For the purposes of this standard, the symbols given in ISO/TR 7024 apply.

3.3 free length between fixed points

The maximum permitted span between support centres in an above ground installation.

4 Principle

A test assembly of pipes and fittings is subjected to a given pattern of thermal cycling by using hot and cold water alternately for a given number of cycles, during which the leaktightness of joints is verified by inspection and sagging of pipe is checked against a given limit.

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

the minimum value for the expansion gap, L_E , for a pipe/socket joint (see clause 6).

5 Apparatus

5.1 Thermometer or other temperature measuring device, capable of checking conformity of the test assembly inlet water temperature to the specified temperature limits (see 5.2, 5.3 and clause 6).

NOTE. It is recommended that the device is capable of recording and/or controlling the relevant temperature/time cycles (see clause 7).

5.2 Cold water source, capable of supplying, every 4 min, the following quantity(ies) of water at $(15 \pm 5)^\circ\text{C}$ (see 7.3);

- a) for programme A, $(30 \pm 0,5)$ l in (60 ± 2) s;
- b) for programme B, $(15 \pm 0,5)$ l in (60 ± 2) s.

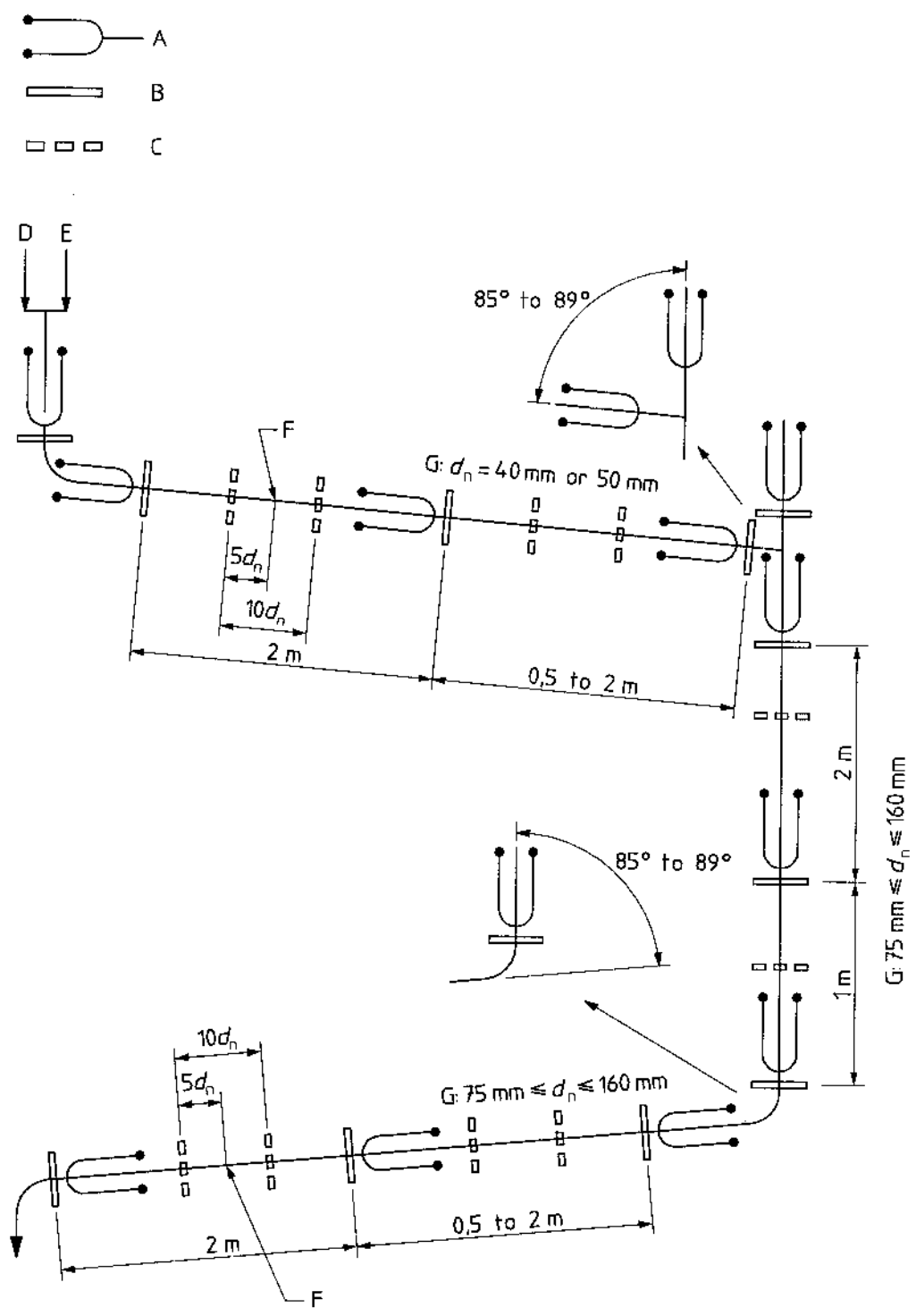
5.3 Hot water source, capable of supplying, every 4 min, the following quantity(ies) of water at $(93 \pm 2)^\circ\text{C}$ (see 7.3):

- a) for programme A, $(30 \pm 0,5)$ l in (60 ± 2) s;
- b) for programme B, $(15 \pm 0,5)$ l in (60 ± 2) s.

5.4 Plugs or other closures, to seal temporarily the water outlet (see 7.1 and 7.4).

5.5 Device, capable of measuring pipe sagging as shown in figures 1, 2 and 3, as applicable, to an accuracy of 0,1 mm.

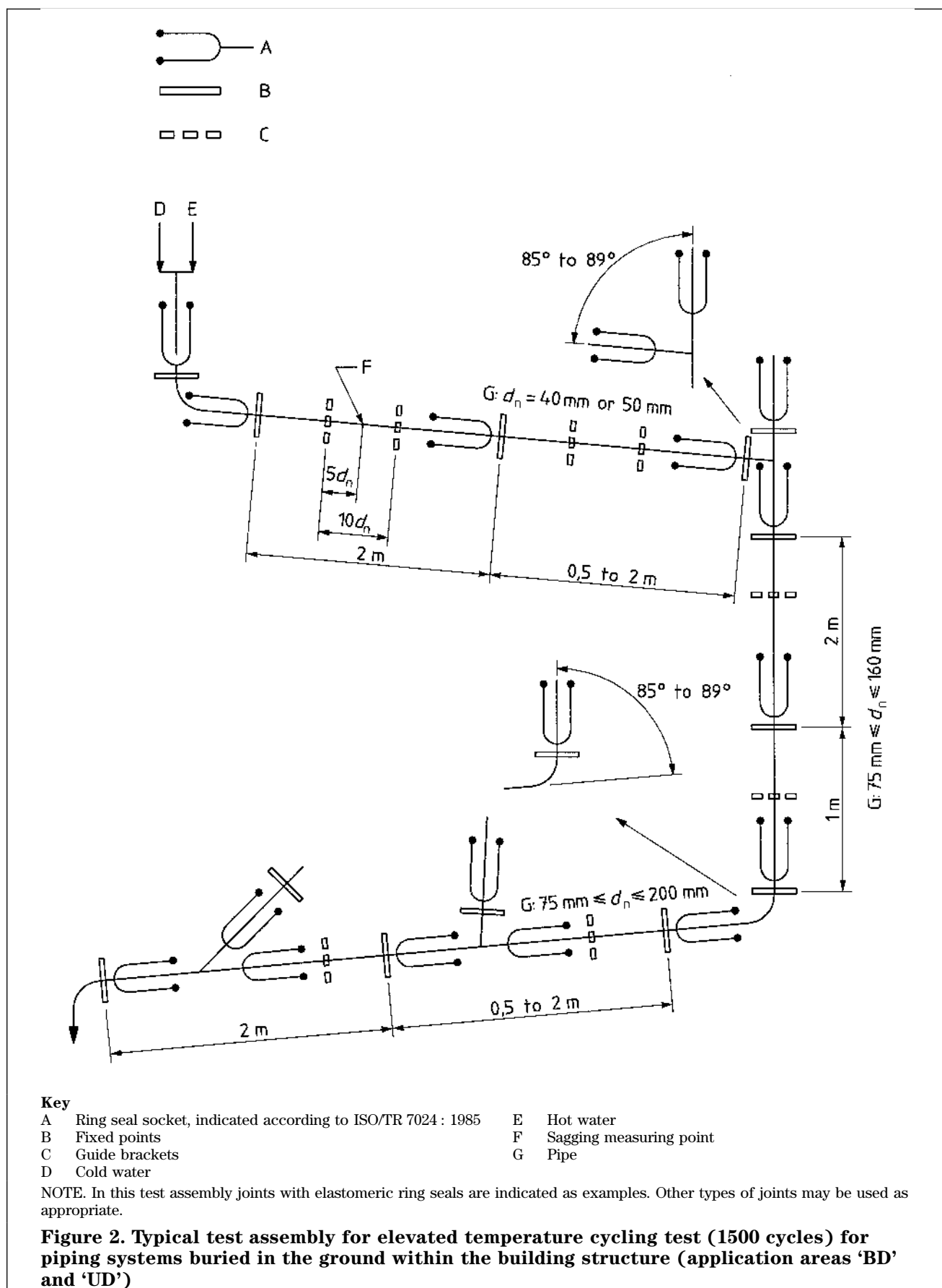
5.6 Supporting brackets, as appropriate, comprising anchor brackets (fixed points) capable of restraining piping components, and guide brackets, capable of supporting piping components without inhibiting longitudinal movement (see clause 6 and figures 1, 2 and 3).

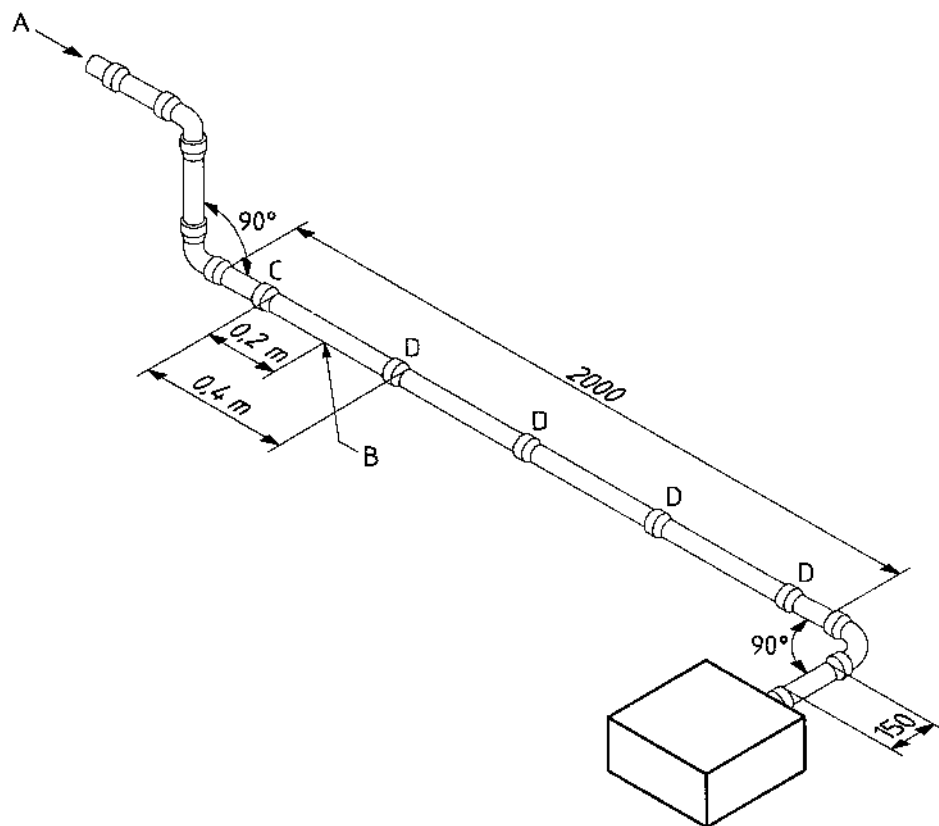


Key
A Ring seal socket, indicated according to ISO/TR 7024 : 1985
B Fixed points
C Guide brackets
D Cold water
E Hot water
F Sagging measuring point
G Pipe

NOTE. In this test assembly joints with elastomeric ring seals are indicated as examples. Other types of joints may be used as appropriate.

Figure 1. Typical test assembly for elevated temperature cycling test (1500 cycles) for piping systems inside buildings (application area 'B' only)





Key

- A Water inlet
- B Sagging measuring point
- C Fixed bracket
- D Guide brackets

Dimensions in millimetres.

Figure 3. Typical test assembly for elevated temperature cycling test (1500 cycles) for piping systems with components with nominal outside diameter d_n smaller than 40 mm for use inside buildings (application area 'B')

6 Test assembly

The test assembly shall comprise a vertical stack of pipes with fittings and two near-horizontal pipe assemblies with fittings. The assembly shall depend upon the purposes for which the components are intended as follows:

- a) for components intended for use in systems inside buildings (application area 'B' only);
- b) as a test assembly supplementary to a) for components intended for use in systems buried in the ground within the building structure (application areas 'BD' and 'UD').

Typical test assemblies are shown in figure 1 (application area 'B' only), figure 2 (application areas 'BD' and 'UD') and figure 3 (application area 'B' for nominal diameters d_n smaller than 40 mm), where the positions and the types of the joint or fitting are indicative only. For application areas 'BD' and 'UD', the components shall be assembled so that the weld lines will be in the water flow. The position and the type of joint(s) to be used shall be as appropriate for the system under test (e.g. cemented joint, welded joints, lip seal joints). The assembly of the joint(s) shall be carried out in accordance with the manufacturer's instructions and any applicable recommended practice for installation, e.g. to avoid undue stress in the test assembly. The symbols used to specify or report on a test assembly shall conform to ISO/TR 7024.

Installation of the test assembly shall be carried out on a firm wall or frame using both fixed and guide brackets, with no other support of the test assembly.

Anchor brackets shall be located directly on, below or behind the sockets of each pipe length. Except for the following:

- a) the first pipe in the near-horizontal line from the inlet, where a possible sagging is to be measured (see figure 1, figure 2 or figure 3, as applicable);
- b) pipe with nominal outside diameter d_n smaller than 40 mm, where the distance between the brackets always shall be 0,4 m.

Guide brackets for near-horizontal assemblies shall be placed not less than 10 d_n apart.

Room for expansion of pipes shall be provided for all spigot ends of pipes, but not for the spigot ends of fittings, and shall be not less than the minimum value for the gap, L_E , as specified by the referring standard.

The entry of hot water into the test assembly shall be direct, i.e. there shall be no heat-absorbing intermediate pieces.

7 Procedure

7.1 Fill the test assembly with water, at a temperature not exceeding 20 °C, to a head of 0,5 m above the highest point of the centreline of the upper lateral pipe.

Leave for a minimum period of 15 min and then visually check for and record any leaks.

7.2 If any leaks were observed, check and rectify the joint assembly (see clause 6) and repeat the watertightness test given in 7.1.

If any further leaks are observed, stop the test and report the observations in accordance with clause 8.

If no further leaks are observed, proceed in accordance with 7.3 to 7.5.

7.3 While monitoring the test assembly for any signs of leaks or changes of appearance, subject the test assembly to the passage of hot and cold water for 1500 cycles of either programme A or programme B, as applicable, as follows. In case of dispute, maintain the ambient temperature at (20 ± 5) °C.

Programme A (nominal flow rate 30 l/min). For components with nominal outside diameter d_n equal to or greater than 40 mm:

- a) $(30 \pm 0,5)$ l of water at (93 ± 2) °C, measured at the point of entry, over a period of (60 ± 2) s;
- b) rest and drain period of (60 ± 2) s;
- c) $(30 \pm 0,5)$ l of water at (15 ± 5) °C, measured at the point of entry, over a period of (60 ± 2) s;
- d) rest and drain period of (60 ± 2) s;
- e) return to a).

Programme B (nominal flow rate 15 l/min). For components with nominal outside diameter d_n smaller than 40 mm:

- a) $(15 \pm 0,5)$ l of water at (93 ± 2) °C, measured at the point of entry, over a period of (60 ± 2) s;
- b) rest and drain period of (60 ± 2) s;
- c) $(15 \pm 0,5)$ l of water at (15 ± 5) °C, measured at the point of entry, over a period of (60 ± 2) s;
- d) rest and drain period of (60 ± 2) s;
- e) return to a).

7.4 On completion of the 1500 cycles, fill the test assembly with water, at a temperature not exceeding 20 °C, to a head of 0,5 m above the highest point of the centreline of the upper lateral pipe.

Leave for a minimum period of 15 min and then visually check for and record any leaks.

7.5 Check for any sagging at the midpoint between the guide brackets separated by $10d_n$, as shown in figures 1 and 2, or the brackets separated by 0,4 m, as shown in figure 3, as applicable. Record any incidence of sagging greater than $0,1d_n$, in millimetres.

7.6 Inspect the test piece components for any changes in appearance, including any visible opening of weld lines and record them.

8 Test report

The test report shall include the following information:

- a) a reference to this standard and to the referring standard;
- b) the identity of the components (e.g. fitting(s), pipe(s), seal(s) comprising the joint(s) under test) and their application area code, 'B' or 'BD' and 'UD';
- c) the test temperatures, in degrees Celsius;
- d) any observations of leakage before the cycling test (see 7.2);
- e) any relevant observations during the cycling test e.g. any signs of leakage or deformation (see 7.3);
- f) the results of the watertightness test after the cycling test (see 7.4);
- g) any sagging found at the end of the cycling test (see 7.5);
- h) any changes observed in the appearance of the test pieces during the test, or immediately afterwards, including any visible opening of weld lines (see 7.3 and 7.6);
- i) any factors which may have affected the results, such as any incidents or any operating details not specified in this standard;
- j) the date of the test.

List of references

See national foreword.

BSI — British Standards Institution

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