BRITISH STANDARD

BS 4514:2001

Unplasticized PVC soil and ventilating pipes of 82.4 mm minimum mean outside diameter, and fittings and accessories of 82.4 mm and of other sizes — Specification

ICS 83.140.30; 91.140.80

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee PRI/88/, Plastic piping systems, to Subcommittee PRI/88/1, Thermoplastic piping systems and components for non-pressure applications, upon which the following bodies were represented:

British Adhesive and Sealants Association

British Plastics Federation

BSI Testing Services

Chartered Institution of Water and Environment Management

DETR British Board of Agrement

DETR Central Transport Group

Department of Environment for Northern Ireland

Department of Environment, Transport and Waste

Institute of Building Control

Institute of Plumbing

Land Drainage Contractors Association

National Association of Plumbing, Heating and Mechanical Services Contractors

Plastic Land Drainage Manufacturers Association

Scottish Executive

Water Research Centre Plc

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Contents

Foreword

This revision of this British Standard was entrusted by Technical Committee PRI/88, Plastic piping systems, to Subcommittee PRI/88/1, Thermoplastic piping systems and components for non-pressure applications. It supersedes the 1983 edition, which is now withdrawn. The major changes between this revision and the previous edition as amended are as follows.

a) The conventional products of the 36, 43, 56, 110 and 160 sizes have been withdrawn as these products are now covered by BS EN 1329-1:2000.

b) Where possible, reference has been made to the methods of test as described in BS EN 1329-1:2000. Attention is drawn to the provisions of the Health and Safety at Work etc. Act 1974 [1], and the need to ensure that appropriate precautions are taken to ensure the safety of personnel when carrying out the methods of test required by this standard.

Annex A and Annex B are normative.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for the correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 13 and a back cover.

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1 Scope

This British Standard specifies the material, appearance, dimensions and physical requirements for unplasticized poly(vinyl chloride) soil and ventilating pipes of 82.4 mm minimum mean outside diameter, fittings of size 82.4 mm and other sizes of accessories, including coated metal fittings. It also specifies jointing materials for use in above-ground drainage systems of application area B (see BS EN 1329-1:2000) intended to convey domestic effluents and surface rainwater.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 21, *Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads (metric dimensions).*

BS 1006:A02:1990, *Methods of test for colour fastness of textiles and leather — Grey scale for assessing change in colour (including half-steps).*

BS 1006:B01C:LFS5:1998, *Methods of test for colour fastness of textiles and leather — Blue wool standards — Reference standard for no. 5.*

BS 2779, *Specification for pipe threads for tubes and fittings where pressure-tight joints are not made on the threads (metric dimensions).*

BS 2782-11:Method 1101A:1981, *Methods of testing plastics — Thermoplastics pipes, fittings and valves — Measurement of dimensions of pipes.*

BS 2782-11:Method 1103V:1995, *Plastics piping and ducting systems — Thermoplastics pipes and fittings — Determination of Vicat softening temperature (VST).*

BS 2782-11:Method 1107A:1996, *Plastics piping and ducting systems — Plastics pipes and fittings — Method for exposure to direct (natural) weathering.*

BS 4346-3, *Joints and fittings for use with unplasticized PVC pressure pipes — Part 3: Specification for solvent cement.*

BS 5504-1, *Wall hung WC pan — Wall hung WC pan with close coupled cistern — Part 1: Connecting dimensions.*

BS 5504-2, *Wall hung WC pan — Wall hung WC pan with independent water supply —Part 2: Connecting dimensions.*

BS 5504-3, *Wall hung WC pan — Wall hung WC pan — Part 3: Materials, quality and functional dimensions other than connecting dimensions.*

BS 5627, *Specification for plastics connectors for use with horizontal outlet vitreous china WC pans.*

BS 6209, *Specification for solvent cement for non-pressure thermoplastics pipe systems.*

BS EN 33, *Pedestal WC pans with close-coupled flushing cistern — Connecting dimensions.*

BS EN 37, *Pedestal WC pans with independent water supply — Connecting dimensions.*

BS EN 681-1:1996, *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber.*

BS EN 681-2, *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Part 2: Thermoplastic elastomers.*

BS EN 1329-1:2000, *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure — Unplasticized poly(vinyl chloride) (PVC-U) — Part 1: Specifications for pipes, fittings and the system.*

BS EN 1462:1997, *Brackets for eaves gutters — Requirements and testing.*

3 Materials

3.1 Pipes and fittings

The material from which the pipes and fittings are produced shall consist substantially of unplasticized PVC, together with the materials necessary to enable manufacture and to ensure conformity to this standard, except for snap caps which may be produced from thermoplastics other than unplasticized PVC. The requirements for the utilization of non-virgin materials shall be as specified in Annex A of BS EN 1329-1:2000.

3.2 Weather resistance

When tested using the method described in Annex A, there shall be no visible change in colour between the exposed and shaded parts of the specimens.

3.3 Coated metal fittings

Metal fittings, such as pipe brackets, shall meet the material and corrosion requirements of BS EN 1462:1997, clauses **4** and **5**.

3.4 Elastomeric sealing rings

If elastomeric sealing rings are used in joints they shall conform to BS EN 681-1:1996 Type WC or to BS EN 681-2.

3.5 Solvent cements

If solvent cements are used in joints, they shall conform to BS 6209 or BS 4346-3.

NOTE Cements conforming to BS 6209 are preferred.

4 Appearance

4.1 Internal and external surfaces

The internal and external surfaces of pipes and fittings shall be smooth, clean and free from grooving and blistering, except for surfaces deliberately roughened for jointing to other materials.

4.2 Colour

The pipes and fittings shall be coloured throughout the wall.

NOTE The recommended colour of pipes and fittings is grey.

5 Dimensions

5.1 General

Measurement of dimensions of pipes and fittings shall be carried out in accordance with the methods described in BS 2782-11:Method 1101A:1981 at (23 ± 2) °C.

5.2 Pipes

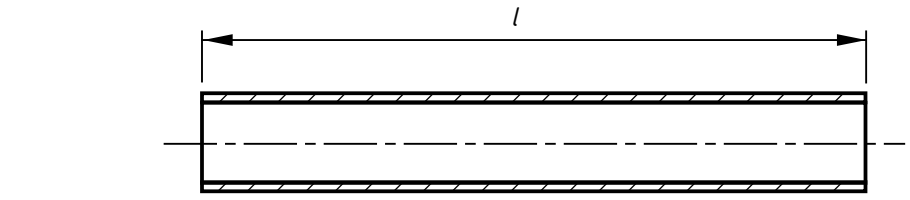
Pipe diameters and wall thicknesses shall conform to the dimensions given in Table 1. The length of a pipe shall be as shown in Figure 1.

NOTE The preferred lengths of pipe are 2.0 m, 3.0 m and 4.0 m.

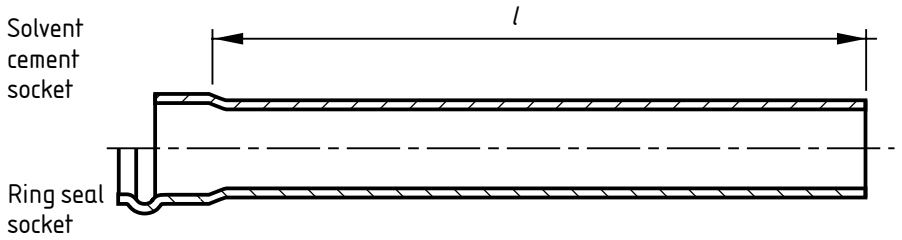
Table 1 — Dimensions of pipes

Nominal size	Mean outside diameter		Extreme outside diameter[a]		Min. wall thickness
	min. mm	max. mm	min. mm	max. mm	mm
82	82.4	82.8	81.0	84.3	3.0

[a] The extreme outside are the minimum and maximum measured directions



a) Plain ended pipe



b) Pipe with a socket end

Figure 1 — Pipe lengths

5.3 Fittings

5.3.1 *General*

All fittings other than connectors for WCs (see **5.3.9**) and knuckle bends for soil stack connections shall conform to the requirements given in Table 2. All threaded components shall have a thread form conforming to BS 21 or BS 2779 and shall have a length of engagement of not less than four full threads.

If a connection is to be made to a metal threaded component, the thread form shall comply with BS 21 or BS 2779, as applicable, and shall have a length of engagement of not less than four full threads. If it is necessary to have a recess in the mating end of a threaded adaptor to accommodate the fitting to which it is being connected, the recess shall not extend under the threaded portion by more than 7 mm and the minimum wall thickness given in Table 3 shall not apply at the recess.

NOTE Attention is drawn to BS EN 1329-1 which specifies the requirements for conventional 110 and 160 fittings.

Table 2 — Configuration of fittings

Designated fitting angle θ[a] Degree	Bends excluding WC connectors	Equal junctions (single and double)	Unequal junctions (single and double)
> 45	Swept	Swept	Swept or unswept
⩽ 45	Swept or unswept	Unswept	Swept or unswept

[a] See Figure 8.

5.3.2 *Wall thickness*

The wall thickness of fittings (see Figure 2) for sockets and spigots and, in addition, for bosses and boss insertion combinations (see Figure 3) shall conform to the requirements given in Table 3.

The value of e_2 in a coupling, when it relates to where the wall forms the transition between sockets and spigots of different nominal diameters, shall conform to the requirements related to the larger diameter.

The positions for measuring the wall thickness dimensions of a typical snap cap shall be as shown in Figure 4.

Fittings and those parts of fittings not intended to come into contact with the fluid being transported are not required to conform to the wall thicknesses given in Table 3.

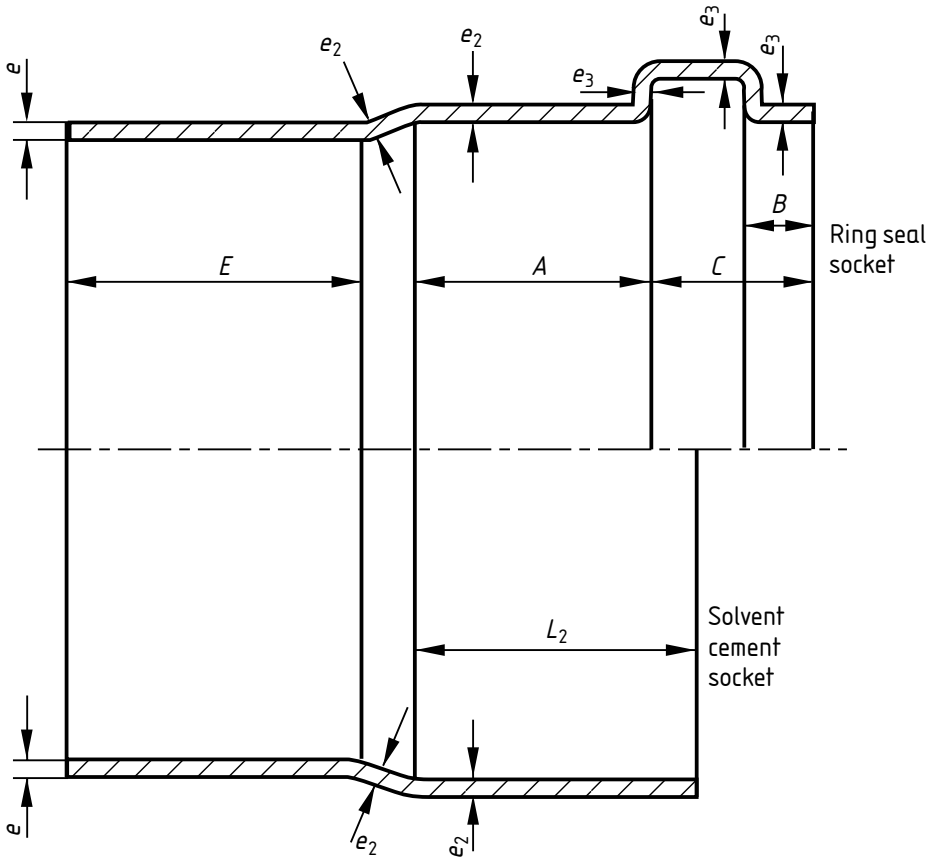


Figure 2 — Location of dimensions and spigots

5.3.3 *Lengths*

The lengths of designated parts of sockets and spigots (see Figure 2) shall conform to the appropriate requirements of Table 3, except as follows:

a) for joints fabricated or assembled in workshop conditions dimension L_2 can be reduced to 50 % of the values given in Table 3.

b) for reducers, adapters and plugs, the length E can be reduced to that given for $C_{max.}$ in Table 3 provided that there is a stop to prevent entry beyond the seal zone.

Table 3 — Dimensions of fittings including integral sockets

Nominal size	L_2 min. mm	A min. mm	B min. mm	C max. mm	e min. mm	e_2 min. mm	e_3 min. mm	E min. mm
36	18.0	25.0	3.8	18	3.0	2.7	2.2	18.0
43	21.0	25.0	3.8	18	3.0	2.7	2.2	21.0
56	27.0	25.0	3.8	18	3.0	2.7	2.2	27.0
82	43.0	34.0	5.0	21.0	3.0	2.7	2.3	52.0
110	48.0	40.0	6.0	26.0	3.2	2.9	2.4	60.0
160	58.0	50.0	9.0	32.0	3.2	2.9	2.4	81.0

[a] NOTE e_2 is based upon $0.9e$; e_3 is based upon $0.75e$.

5.3.4 *Groove designs*

Typical groove designs are given in Figure 7 to define positions of dimensions *A, B* and *C*, but other designs that conform to this standard shall not be excluded. Dimensions *A, B* and *C* shall conform to Table 3.

Some designs of sockets incorporate elastomeric ring seal zones longer than those illustrated and if they also include integral sealing membranes, the dimension *C* shall not apply, provided that the initial sealing action is achieved upon insertion of the pipe or spigot to a depth not greater than the maximum value of *C* and that it is possible for the pipe or spigot to be further inserted to a depth at least equivalent to the maximum value of *A*.

The dimensions of snap caps shall conform to the values given in Table 3 except for dimension *B* and dimension e_3 related to *B* in Figure 2.

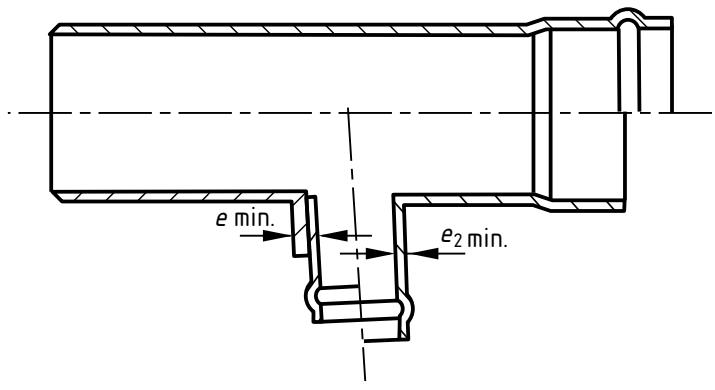


Figure 3 — Wall thickness of boss configurations

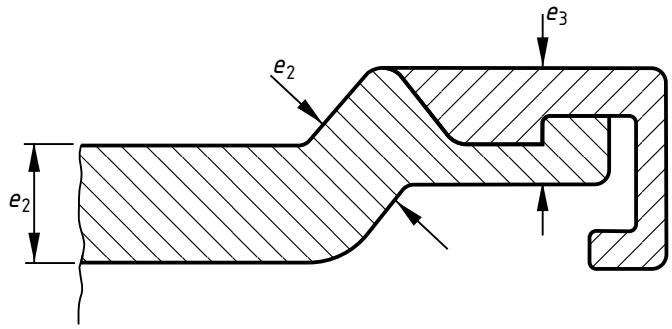


Figure 4 — Positions for measurement of snap cap wall thickness

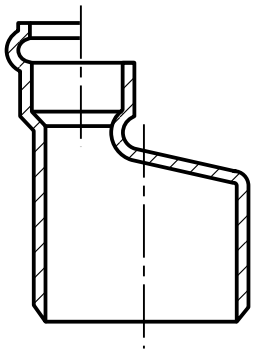


Figure 5 — Typical reducer

5.3.5 ***Access fittings***

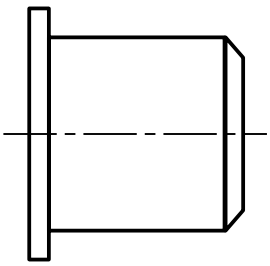
Where fittings provide access to the discharge system, the openings shall be round or oval, and shall conform to the dimensions given in Table 4. The design of the fitting shall make provision to maintain the fitting bore and profile.

Table 4 — Access dimensions

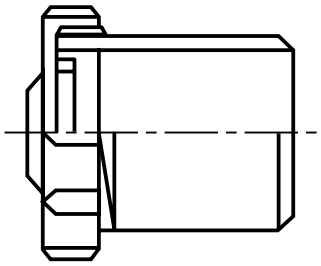
Nominal size	Minimum clear opening size	
	Diameter mm	Oval mm
36	20	n/a
43	20	n/a
56	38	n/a
82	65	75 × 50
110	75	100 × 50
160	100	100 × 50

5.3.6 *Fabricated fittings*

Fabricated fittings shall be manufactured from pipes and/or fittings conforming to this standard. These fabrications shall conform to **6.5**.



a) Push fit, with or without stop flange



b) With screwed access plug

Figure 6 — Typical socket plug

5.3.7 *Swept fittings*

The design dimensions of swept fittings shall conform to Table 5 and Figure 8.

Table 5 — Design dimensions of swept fittings

Designated fitting angle θ degree	Minimum radius r[a] mm	Maximum tangent angle ϕ degree	Minimum arc length L mm
$\leqslant 70$	50	26	36
> 70 and < 80	50	33	38
$\geqslant 80$	50	40	42

[a] The Building Regulations [2] require the 36 mm, 43 mm and 56 mm sizes to have a minimum radius of 25 mm and this table does not apply to these sizes.

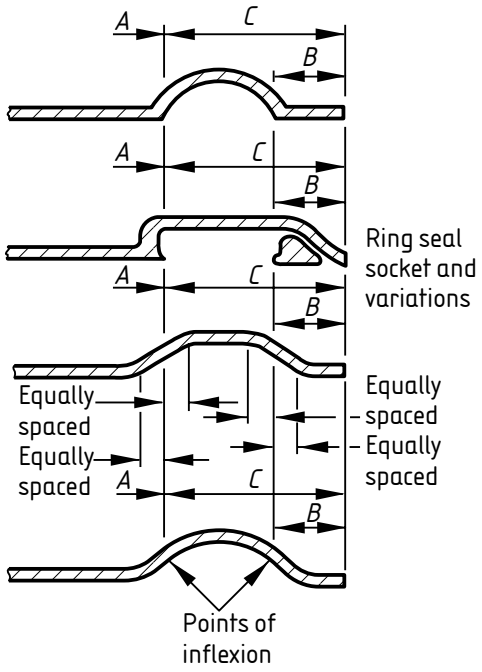


Figure 7 — Typical groove design

5.3.8 *Stand-off distance*

In fittings and clips used to fasten the pipes to a wall, the stand-off distance, i.e. the distance between the wall and the centre line of the installed pipe, shall be not less than the applicable value given in Table 6.

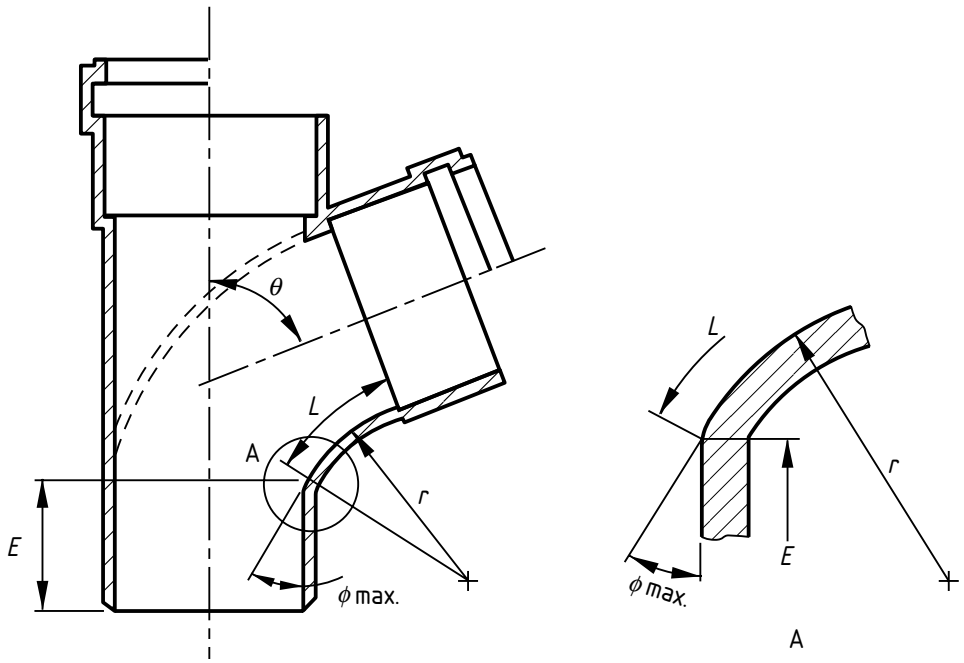
Table 6 — Stand-off distances

Nominal size	Stand-off distance mm
82	70
110	85
160	110

5.3.9 *Connectors for WCs*

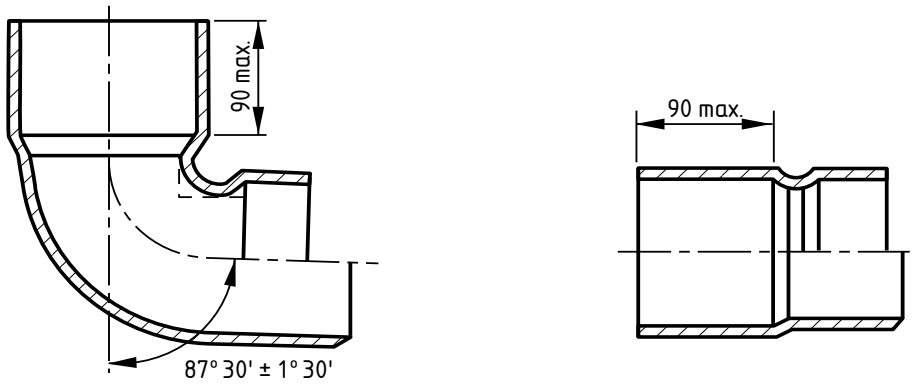
Connectors to be used for connection to vitreous china WC pans with horizontal outlets conforming to BS EN 33 and BS EN 37 or to BS 5504, Parts 1, 2 and 3 shall conform to BS 5627.

Where connectors are used for connection to the traditional, 14° inclined outlet spigot, washdown WC pans, the connectors shall conform to the dimensions shown in Figure 9a) or b) subject to a minimum length of socket of 63 mm and all other requirements of this standard except for the elevated temperature cycling test for an assembly as specified in **6.6**, which is not applicable to such connectors.



NOTE For minimum dimensions of *E*, see Table 3.

Figure 8 — Fittings dimensions for design purposes



a) 87° 30′ bend for turned 'P'

b) Straight connector

Figure 9 — Dimensions of plastics connectors

6 Physical properties

6.1 Vicat softening temperature

When tested in accordance with the method described in BS 2782-11:Method 1103V, the Vicat softening temperature of test pieces taken from pipes and fittings shall be not less than 79 °C.

6.2 Impact resistance of pipes

When tested in accordance with the methods described in BS EN 1329-1:2000, Table 16, 82.4 mm pipes shall conform to the requirements for nominal size 82 of that standard.

6.3 Longitudinal reversion of pipes

When tested in accordance with the longitudinal reversion method described in BS EN 1329-1:2000, Table 19, 82.4 mm pipes shall conform to the requirements of that standard.

6.4 Stress relief of moulded fittings

When tested in accordance with the method described in BS EN 1329-1:2000, Table 20, plastics fittings shall conform to the requirements of that standard.

6.5 Proof pressure resistance of fabricated fittings

When tested in accordance with the method described in Annex B, the fabricated fitting shall not leak.

6.6 Elevated temperature cycling test for an assembly

When tested in accordance with the method described in BS EN 1329-1:2000, Table 21, the assembly shall conform to the requirements of that standard in respect of application area B.

7 Marking

Each fitting and each length of pipe, at intervals of maximum 1 m, but at least once per pipe, shall be clearly and durably marked with the following:

a) the manufacturer's identification;

b) the number of this British Standard, i.e. BS 4514:2001[1)];

c) the nominal size.

NOTE In the case of a fitting, e.g. an adaptor, which is designed more than one nominal size, c) may be omitted.

8 Testing requirements

8.1 Type testing

Type tests shall demonstrate that the products conform to the requirements given in the appropriate clause. In addition, they shall be carried out whenever there is a change in design, in material and/or in the production method, other than routine in-process adjustments, and to extensions of the product range as indicated.

NOTE See DD ENV 1329-2 for guidance.

82 mm fittings shall be tested in conjunction with pipe to this standard. All other fittings shall be tested in conjunction with pipe conforming to BS EN 1329-1.

8.2 Quality assurance

Quality testing shall be carried out using the following clauses only:

4.1, **5.2**, **5.3.2**, **6.2**, **6.3**, **6.4** and **6.5**.

[1)] Marking BS 4514:2001 on or in relation to a product is a claim by the manufacturer that the product has been manufactured in accordance with the requirements of the standard. The accuracy of such a claim is therefore solely the manufacturer's responsibility.

Annex A (normative)
Weather resistance test

A.1 General

Testing shall be carried out as described in BS 2782-11:Method 1107A:1996 with the following additional conditions.

A.2 Apparatus

The apparatus shall be as described in clause **4** except that a lid consisting a framed sheet of glass shall be fixed to the top of the rack. The glass shall be of good quality "flat glass", 3 mm thick, uniformly transparent and without defects, having a transmittance of approximately 90 % at 370 nm and throughout the visible region of the spectrum, and a transmittance of less than 1 % at 300 nm and shorter wavelengths. To maintain these characteristics it is usually necessary to replace the glass at intervals of not less than 2 years. The lid shall be spaced 75 mm from the rack carrying the specimens to ensure adequate ventilation, and its unobstructed area shall be sufficiently greater than that of the rack, to avoid shading.

A.3 Solar radiation

The solar radiation shall be measured by fixing a 100 mm × 25 mm strip of blue wool standard 5 cloth conforming to BS 1006:B01C:LFS5:1998 onto the frame under the glass.

A.4 Test pieces

Test pieces shall consist of 3 mm × 100 mm long strips of pipe cut longitudinally and about 20 mm wide. They shall be mounted in the frame under the glass such that 50 mm of one end of the test piece is exposed, the other end being completely shaded.

A.5 Procedure

Follow the procedure described in BS 2782-11:Method 1107A:1996 but do not measure radiant exposure (**6.2.4**). Instead, terminate the exposure when the blue standard cloth fades equal to stage 4 of the grey scale (BS 1006:A02:1990).

Annex B (normative)
Proof pressure test for fabricated fittings

B.1 Apparatus

The apparatus shall consist of two end sealing devices for the open ends of the fittings: one shall be connected to a hydraulic pressure source and the other shall be capable of allowing the fitting to be bled. They shall be fixed to prevent movement when pressure is applied but no axial load shall be exerted on the fitting.

B.2 Procedure

Assemble the fitting with the sealing devices, fill with water ensuring all air is removed. Apply a pressure of 0.5 bar[2)] for no less than 15 s or for such longer period, to a maximum of 60 s, needed to examine the fitting for leaks.

B.3 Test report

The test report shall include the following:

a) reference to this method;

b) identification and date of fabrication of the fitting;

c) observation during the test;

d) date of test.

2) 1 bar = 10^5 N/m^2 = 10^5 Pa.

Bibliography

Standards publications

DD ENV 1329-2, *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure — Unplasticized poly(vinyl chloride) (PVC-U) — Part 2: Guidance for the assessment of conformity*.

Other documents

[1] GREAT BRITAIN. Health and Safety at Work etc. Act 1974. London: The Stationery Office.

[2] GREAT BRITAIN. The Building Regulations 1991 (S.I. 1991 No. 2768) (as amended by S.I. 1994 No.1850). London: The Stationery Office.

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