BRITISH STANDARD

BS 5255:1989

Specification for

Thermoplastics waste pipe and fittings

Confirmed
December 2009

UDC 628.245:696.122:621.643.2–036.5:678.073–462

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Plastics Standards Policy Committee (PLM/-) to Technical Committee PLM/9, 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 (Construction Industries Directorate)
Department of the Environment (Property Services Agency)
Department of Transport
Electricity Supply Industry in England and Wales
Engineering Equipment and Materials Users Association
Health and Safety Executive
Institution of Civil Engineers
Institution of Gas Engineers
Institution of Production Engineers
Institution of Water and Environmental Management (IWEM)
National Association of Plumbing, Heating and Mechanical Services Contractors
Plastics and Rubber Institute
Plastics Land Drainage Manufacturers' Association
Royal Institute of Public Health and Hygiene
Water Authorities Association
Water Companies Association
Water Research Centre

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

British Adhesives and Sealants Association
British Board of Agrément
Heating and Ventilating Contractors' Association
Institute of Plumbing
Land Drainage Contractors Association
Ministry of Agriculture, Fisheries and Food

This British Standard, having been prepared under the direction of the Plastics Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 29 September 1989

First published January 1976
First revision September 1989

The following BSI references relate to the work on this standard:
Committee reference PLM/9
Draft for comment 86/43672 DC

ISBN 0 580 17363 1

Amendments issued since publication

Amd. No.	Date of issue	Comments

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Foreword

This British Standard has been prepared under the direction of the Plastics Standards Policy Committee.

It is a revision of BS 5255:1976 which is now withdrawn.

Requirements are given for waste pipes and fittings manufactured from several different thermoplastics materials and intended to convey normal domestic effluent.

This specification is applicable to pipes and fittings in nominal sizes of 1¼/32, 1½/40 and 2/50. The corresponding requirements for diameters and wall thicknesses have been set to ensure that the minimum bores are correspondingly 1¼ in, 1½ in and 2 in (31.75 mm, 38.1 mm and 50.8 mm), for alignment with BS 5572 and approved document H of the Building Regulations, whilst being more practicable than bore measurements for monitoring and verification.

Consideration has been given to the work of Technical Committee 138 of the International Organization for Standardization (ISO) in preparing a variety of specifications related to individual materials of construction, but retention of a specification with rationalized performance requirements is preferred.

Attention is drawn to BS 4514, which specifies requirements for unplasticized PVC soil pipes, fittings and accessories for use in above ground drainage systems intended for normal domestic effluents. The waste pipes and fittings specified in this standard have higher softening temperatures and thus allow the use of thinner walled sections and/or conveyance of hotter discharges.

Attention is drawn to BS 5572 which gives guidance on storage, handling and installation. In addition, if pipes or fittings complying with BS 5255 are to be used externally, those made of ABS, polypropylene or polyethylene materials may require protection by painting or some other means and the manufacturer's guidance should be followed accordingly.

Attention is drawn to BS 5254, in which polypropylene pipes are specified with slightly smaller bores than in this standard.

The major changes between this revision and the previous edition are as follows.

a) The document has been restructured so that requirements for components made of different materials are grouped in respect of the property or performance specified.

b) The dimensions of PE pipes and fittings and of joint sockets for use therewith have been changed.

c) Where possible reference has been made to the methods of test described in BS 2782.

d) Components made of modified unplasticized PVC are more clearly distinguished and are now also subject to specified minimum Vicat softening temperatures.

e) The use of 90° knuckle bends has been incorporated.

f) Information is necessary on whether or how the pipe or fittings may be suitable for exterior use.

g) References to other standards have been updated and the terminology and symbols used have been aligned with those given in BS 1755-1 and ISO 1043-1 as applicable.

Product certification. Users of this British Standard are advised to consider the desirability of third party certification of product conformity with this British Standard based on testing and continuing surveillance, which may be coupled with assessment of a supplier's quality systems against the appropriate Part of BS 5750.

Enquiries as to the availability of third party certification schemes will be forwarded by BSI to the Association of Certification Bodies. If a third party certification scheme does not already exist, users should consider approaching an appropriate body from the list of Association members.

Attention is drawn to the provisions of the Health and Safety at Work etc. Act 1974 and the need to ensure that appropriate precautions are taken to ensure the safety of personnel when carrying out methods of test required by this standard.

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

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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1 Scope

This British Standard specifies requirements for thermoplastics waste pipes and fittings intended to convey domestic effluent and made from the following plastics:

a) acrylonitrile-butadiene-styrene [ABS];

b) modified unplasticized polyvinyl chloride [MUPVC] (see **2.1**);

c) polypropylene [see **2.2** and **3.1** c)] or propylene plastics [see **2.3** and **3.1** c)];

d) polyethylene [PE].

It is applicable to waste pipes and fittings with nominal sizes of 1¼/32, 1½/40 and 2/50 which may be used internally or, if suitably compounded or protected (see **3.1** and clause **8**) externally. It includes requirements for jointing materials and seals for use with such waste pipes and fittings. Methods of test are given in a Appendix A and Appendix B. Guidance on quality control testing in the manufacture of such pipes and fittings is given in Appendix C.

NOTE 1 As this standard gives requirements for pipes and fittings manufactured from materials which have different coefficients of expansion and design features, it is essential that the manufacturer's fixing instructions are followed.
NOTE 2 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this British Standard, the definitions given in BS 1755-1, BS 4118, BS 4778-1; BS 4778-2 and BS 5572 apply together with the following.

2.1
modified unplasticized polyvinyl chloride [MUPVC] plastic

a vinyl chloride plastic (1.1.107[1)]) modified by inclusion of one or more other polymers and made without addition of a plasticizer, the vinyl chloride being in the greatest amount by mass

NOTE The symbol "MUPVC" has been retained for consistency with terminology and marking requirements and equipment established by the previous edition of BS 5255 and used in BS 5572. It is not in conflict with BS 1755 and it is not to be taken to imply that "M" signifies "modified" in any other symbol for polymers or their characteristics, or that the sequence of letters "UPVC" should be used to represent "unplasticized polyvinyl chloride" in any other context.

2.2
polypropylene [polypropene] [PP] plastic (1.1.76[1)])

a propylene [propene] plastic based on polymers made with propylene [propene] as essentially the sole monomer

2.3
propylene [propene] plastic (1.1.95[1)])

a plastic based on polymers of propylene [propene] or copolymers of propylene [propene] with other monomers, the propylene [propene] being in the greatest amount by mass

NOTE For the purposes of this standard the symbol PP is used to represent materials comprising or items made from propylene plastics, i.e. including but not restricted to polypropylene plastics.

3 Materials

3.1 Pipes and fittings

Except for seal-retaining components (see **3.2**), the material from which the pipe or fitting is produced shall comprise one of the following plastics incorporating or blended with other ingredients as necessary to enable manufacture of a pipe or fitting complying with the other requirements of this standard as applicable:

a) acrylonitrile-butadiene-styrene [ABS] plastic (1.1.4[1)]), to be specified in accordance with BS 4935 including the designation applicable to the method of processing to be used for the manufacture of the pipe or fitting and in respect of other ingredients and/or properties as appropriate (see note 1);

b) modified unplasticized polyvinyl chloride [MUPVC] plastic (see **2.1**), to be specified in respect of processing characteristics and other ingredients and/or properties as appropriate (see note 2);

c) polypropylene plastic (see **2.2**) or propylene plastic (see **2.3**), to be specified in accordance with BS 5139 including the designation applicable to the method of processing to be used for the manufacture of the pipe or fitting and in respect of other ingredients and/or properties as appropriate (see note 1);

d) polyethylene [PE] plastic (1.1.65[1)]), to be specified in accordance with BS 3412 including the designation applicable to the method of processing to be used for the manufacture of the pipe or fitting and in respect of other ingredients and/or properties as appropriate (see note 1).

The manufacturer of the pipe or fitting shall establish whether and how the material should be modified and/or the pipe or fitting otherwise protected for external use (see clause **8**).

[1)] Term defined in BS 1755-1:1982.

NOTE 1 If necessary to satisfy the requirements of this clause and clause **8**, the material may be specified and obtained as a grade that is light- and weather-resistant, e.g. grade W in accordance with BS 3412:1976, or it may subsequently be modified by, for example, incorporation of carbon black during extrusion of the pipe, or protected in service by painting or by screening from direct sunlight.

NOTE 2 The nature and quantity of the other polymers incorporated in the MUPVC plastic is limited by the other requirements of this standard. One suitable material for inclusion in MUPVC is ABS and attention is drawn to the requirement for Vicat softening temperature given in **6.1**.

NOTE 3 Fittings may be made of different plastic or of a different grade of the same plastic to that used for the pipe subject to the method of jointing (see **3.5**). The design of systems using pipes and/or fittings made of different plastics should take account of the effects of any relevant differences in their properties, e.g. thermal expansion coefficients.

3.2 Seal-retaining components

Seal-retaining components, for example snap caps, shall be made from any of the materials specified in **3.1**, irrespective of which of those materials the pipe or fitting otherwise accommodating the seal is made, or shall be made of any other thermoplastics material.

NOTE Fittings incorporating seal-retaining components are subject to the other requirements of this standard for fittings, as applicable.

3.3 Reworked material (A.1326[2])

If reworked material is added or used, it shall comprise the manufacturer's own clean reworked material from products complying with the requirements of this standard for the corresponding material for pipes or fittings, as applicable, and of the same type and compatible with any material to which it is added.

3.4 Elastomeric joint

Except for seals mechanically compressed by threaded components, if elastomeric rings are used in joints, they shall comply with the requirements of BS 2494 for joint rings for drainage applications.

3.5 Solvent cements

If a solvent cement is used for jointing pipes and/or fittings of ABS or MUPVC, it shall comply with BS 6209.

NOTE Solvent cement jointing is not applicable to pipes or fittings of PE, PP or propylene plastics.

4 Appearance

Except in so far as appropriate surfaces may be deliberately roughened for jointing to other materials, the internal and external surfaces of the pipe or fitting shall be clean, smooth and free from grooving and other features that would prevent compliance with clauses **6**, **7** and **8** as applicable.

The spigot ends of the pipes and fittings shall be cleanly cut or moulded and square with the axis of the end.

5 Dimensions

5.1 General

Measurement of dimensions of pipes and fittings shall be carried out in accordance with BS 2782:Method 1101A except that for measurement of mean outside diameters both the following variations shall apply:

a) readings and results shall be expressed to the nearest 0.05 mm;

b) the alternative procedure of averaging individual outside diameters shall not be restricted to nominal mean outside diameters of 40 mm or less but shall be applicable to all of the nominal sizes covered by this standard.

NOTE Attention is drawn to guidance given for quality control purposes (see Appendix C) and the possibility of using other methods of measurement to produce pipes or fittings with dimensions which comply with this standard when measured in accordance with **5.1**.

5.2 Nominal size

The nominal size of the pipe or fitting shall be one of the sizes given in Table 1 or Table 2 as applicable.

5.3 Pipes

Pipe diameters and wall thicknesses shall comply with the limits given in Table 1 or Table 2, as applicable.

NOTE 1 These dimensions are designed to ensure that the minimum bores of pipes or fittings of nominal size 1¼/32, 1½/40 and 2/50 are respectively 31.75 mm, 38.1 mm or 50.8 mm.

If the length of a pipe is specified, the length shall be not less than that specified when measured at 23 ± 2 °C between the positions shown in Figure 1, as applicable.

NOTE 2 The preferred lengths of pipe are 3.0 m and 4.0 m.

[2] Term defined in BS 1755-1:1982.

Table 1 — Dimensions of pipes and fittings of ABS, MUPVC and PP

Nominal size	Mean outside diameter of pipe	Maximum wall thickness of pipe	Minimum wall thickness	
			Pipes and fittings of MUPVC having VST ⩾ 90°C, ABS' or PP	Fittings of MUPVC having 90 °C > VST ⩾ 80° C[a]
	mm	mm	mm	mm
1¼/32	36.30 ± 0.15	2.2	1.8	2.7
1½/40	42.90 ± 0.15	2.3	1.9	2.7
2/50	55.90 ± 0.15	2.4	2.0	2.7

[a] See **6.1**.

Table 2 — Dimensions of pipes and fittings of PE and of ring seal sockets for use with PE pipe (see Figure 2a)

Nominal size	Mean outside diameter of PE pipe	Maximum wall thickness of PE pipe	Minimum wall thickness of PE pipes and fittings (see **5.4.1**)	Minimum dimensions of ring seal sockets	
				b	*c*
	mm	mm	mm	mm	mm
1¼/32	38.25 ± 0.15	3.17	2.9	25	3.0
1½/40	44.60 ± 0.15	3.17	2.9	25	3.0
2/50	57.30 ± 0.15	3.17	2.9	30	3.0

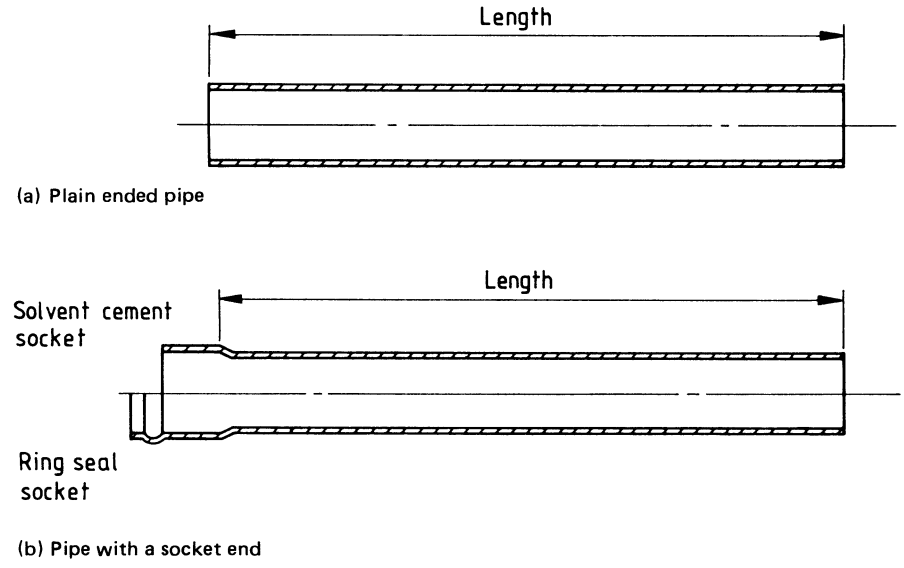


Figure 1 — Pipe lengths

5.4 Fittings

5.4.1 *General.* The dimensions of fittings shall comply with the limits given in Table 1, Table 2 and Table 3 (see note), as applicable, except that for those fittings or parts of fittings not intended according to the manufacturer's design to come into contact with the fluid being conveyed, the wall thickness requirements given in Table 1 and Table 2 shall not apply.

Except for access caps (see **5.4.2**) and certain adaptors (see **5.4.3**), the minimum cross section area of the bore of any fitting shall comply with the applicable limit as follows:

a) for 1¼/32 nominal size fittings, 791 mm^2;

b) for 1½/40 nominal size fittings, 1 140 mm^2;

c) for 2/50 nominal size fittings, 2 026 mm^2.

Typical fittings with nominal size descriptions and, as applicable, fitting angles (θ) are shown in Figure 3 to Figure 10 inclusive.

If a fitting for use with PE pipe in accordance with Table 2 is manufactured from one of the materials listed in Table 1, it shall comply with the wall thickness requirements of Table 1.

NOTE Expansion fittings of the type shown in Figure 9 and having dimensions corresponding to the minimum values given in Table 3 are intended to operate with a maximum laying length of 2.5 m.

5.4.2 *Access caps.* For nominal sizes 1¼/32 and 1½/40, the minimum bore shall be not less than 20 mm and for nominal size 2/50, the minimum bore shall be not less than 38 mm.

5.4.3 *Adaptors for connections to waste outlets complying with BS 3380.* The minimum cross section area of the bore of the adaptor shall comply with the applicable limit as follows:

a) for 1¼/32 nominal size adaptor, 640 mm^2;

b) for 1½/40 nominal size adaptor, 958 mm^2;

c) for 2/50 nominal size adaptor, 1 780 mm^2.

5.4.4 *Swept fittings.* Except for a 90° knuckle bend, all bends and branches with fitting angles of 67½° or greater shall be swept and shall have a swept radius of not less than 25 mm (see Figure 3 and Figure 4).

5.4.5 *Threaded adaptors to metal components.* 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.

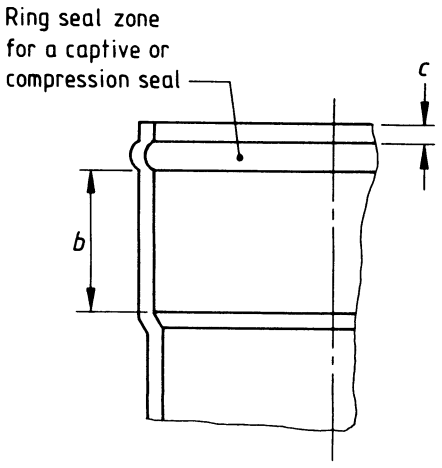
All threads shall have a minimum internal radius of 0.25 mm.

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 [see Figure 8(b)] and the minimum wall thickness given in Table 1 and Table 2 shall not apply at the recess.

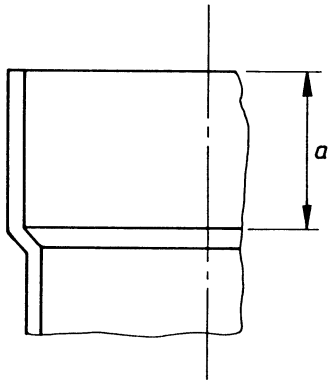
Table 3 — Dimensions of joint sockets for use with pipes complying with the dimensions given in Table 1 (see Figure 2 and Figure 9)

Nominal size	Minimum dimensions		
	Solvent weld sockets	Ring seal sockets and multi-vane sockets	
	a	*b*	*c*
	mm	mm	mm
1¼/32	18.16	25	3.8
1½/40	21.46	25	3.8
2/50	27.24	25	3.8

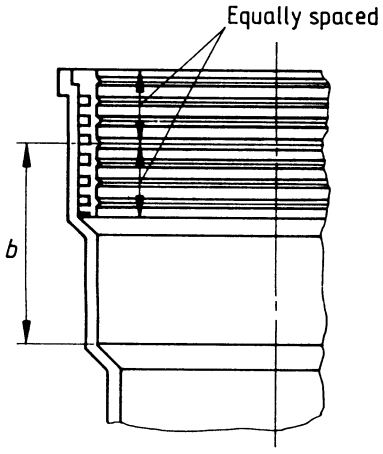
NOTE See Figure 2.



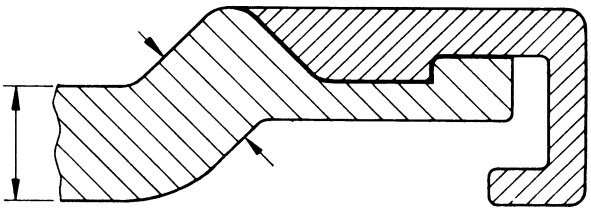
(a) Ring seal socket



(b) Solvent weld socket



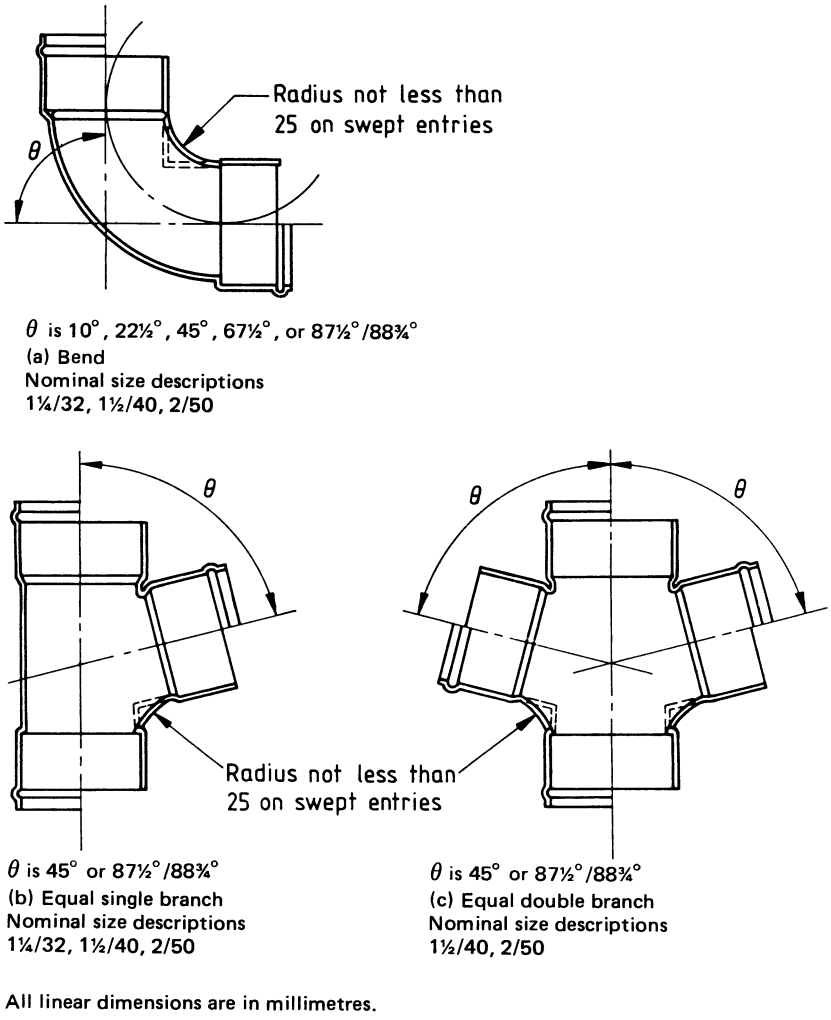
(c) Multi-vane socket



(d) Positions for measurement of snap cap wall thicknesses

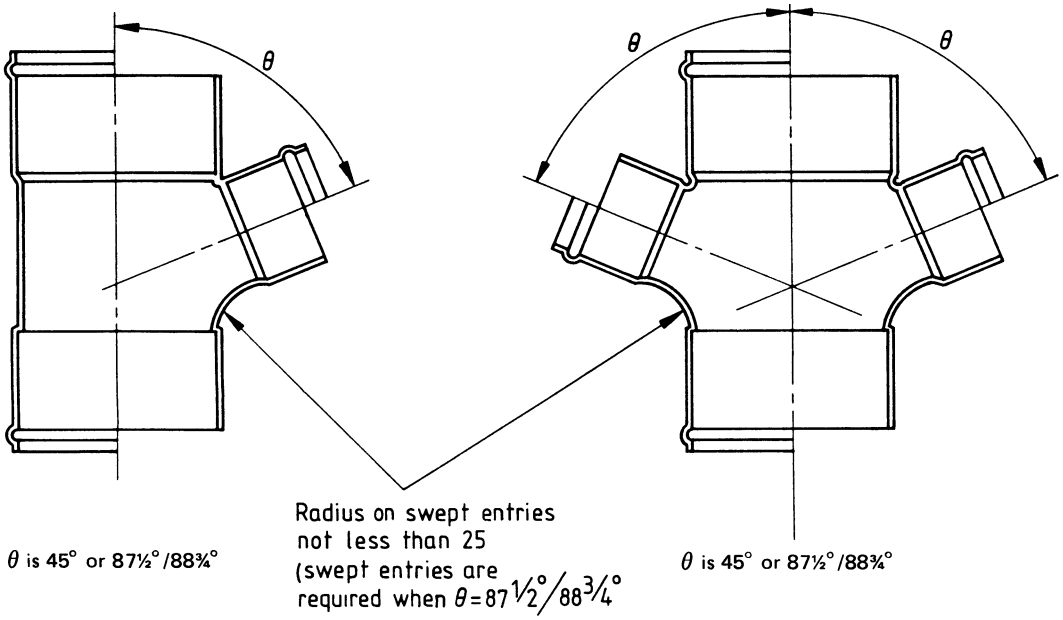
NOTE 1 Values for *a*, *b* and *c* are given in Table 2 or Table 3 as applicable.
NOTE 2 If a ring seal is retained by means of a snap cap, there is no requirement in respect of dimension c.

Figure 2 — Socket dimensions for fittings



NOTE 1 See **5.4.4**.
NOTE 2 The sealing ring type indicated is diagrammatic. Other ring designs are permitted.

Figure 3 — Bends and equal branches



(a) Unequal single branch

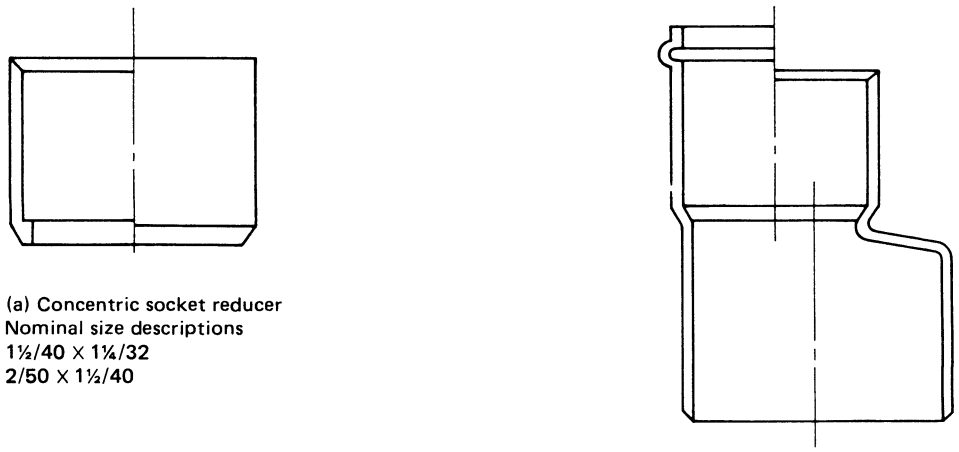
(b) Unequal double branch

Nominal size descriptions
2/50 X 1¼/32
2/50 X 1½/40
1½/40 X 1¼/32

Linear dimension is in millimetres.

NOTE The sealing ring type indicated is diagrammatic. Other ring designs are permitted.

Figure 4 — Unequal branches

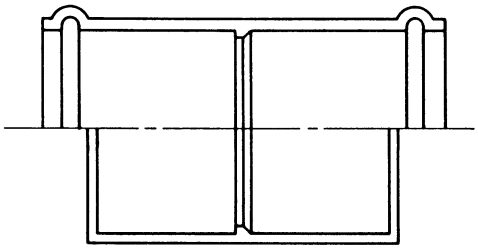


(a) Concentric socket reducer
Nominal size descriptions
1½/40 X 1¼/32
2/50 X 1½/40

(b) Eccentric reducer
Nominal size descriptions
1½/40 X 1¼/32
2/50 X 1¼/32
2/50 X 1½/40

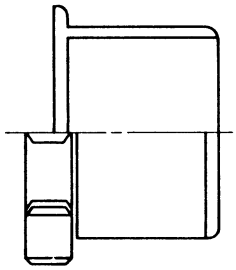
NOTE The sealing ring type indicated is diagrammatic. Other ring designs are permitted.

Figure 5 — Reducers



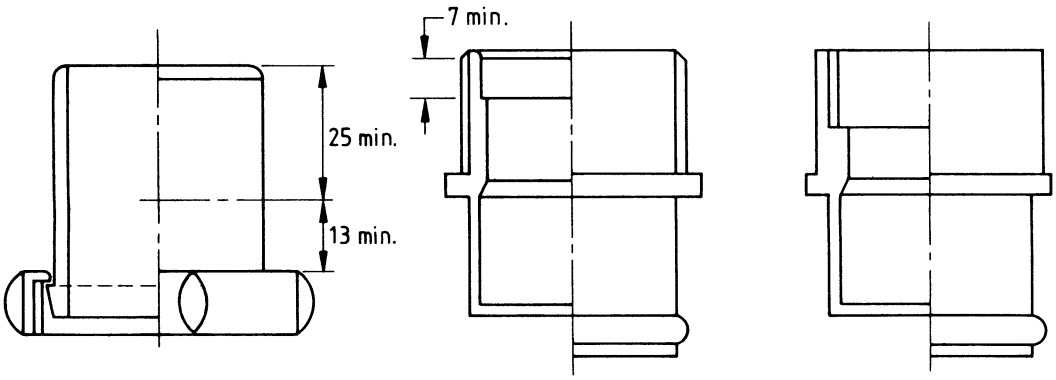
NOTE The sealing ring type indicated is diagrammatic. Other ring designs are permitted.

Figure 6 — Straight coupling (with or without register)



NOTE The sealing ring type indicated is diagrammatic. Other ring designs are permitted.

Figure 7 — Socket plugs (with or without access cap)



(a) Cap and lining adaptor to male brass British Standard thread complying with BS 2779

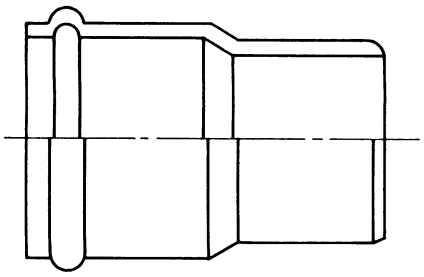
(b) Male adaptor to iron British Standard thread complying with BS 21

(c) Female adaptor to iron British Standard thread complying with BS 21

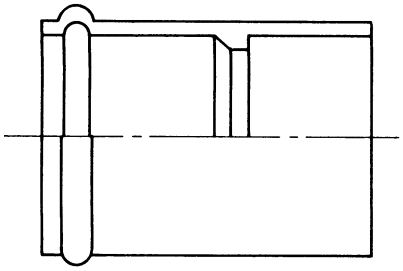
All dimensions are in millimetres.

NOTE The sealing ring type indicated is diagrammatic. Other ring designs are permitted.

Figure 8 — Adaptors



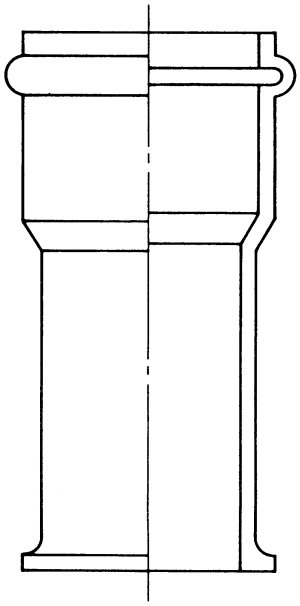
(a) For fitting into socket



(b) For fitting on to a pipe spigot

NOTE 1 Where these fittings comply with the minimum dimensions for joint sockets given in Table 3 they are designed to operate with a maximum laying length of 2.5 m.
NOTE 2 The sealing ring type indicated is diagrammatic. Other ring designs are permitted.

Figure 9 — Expansion fittings (solvent joint systems)



NOTE The sealing ring type indicated is diagrammatic. Other ring designs are permitted.

Figure 10 — Typical caulking bush

6 Physical properties

6.1 Vicat softening temperature (VST)

When tested in accordance with BS 2782-1:Method 120B using test pieces stamped from the pipe or fitting, as applicable, the VST of fittings of MUPVC having a minimum wall thickness of 2.7 mm (see Table 1) shall be not less than 80 °C, otherwise for pipes and fittings of MUPVC, the VST shall be not less than 90 °C.

6.2 Impact resistance of pipes

When tested in accordance with BS 2782:Method 1108A, such that no test piece is subjected to more than one blow by the striker and using a (weighted) striker with a nominal mass of 1.25 kg, the pipe shall have an estimated true impact rate (TIR) below 10 %, where failure shall comprise either breakage or the presence of one or more cracks through the full thickness of the pipe wall.

6.3 Heat reversion of pipes

When tested in accordance with either BS 2782:Method 1102A or BS 2782:Method 1102B using the applicable test temperature given in Table 4 for either 30 min using Method 1102B or, and in case of dispute, 15 min using Method 1102A, the longitudinal reversion of the pipe shall not exceed the applicable limit given in Table 4.

Table 4 — Longitudinal reversion of pipes

Pipe material	Test temperature	Maximum longitudinal reversion
	°C	%
ABS	120	2.5
MUPVC	120	2.5
PP	120	1.0
PE	110	3.0

[a] See **2.3** and **3.1**.

6.4 Stress relief behaviour of individual moulded fittings other than snap caps

When tested, as moulded and unassembled, in accordance with BS 2782:Method 1103A for 30 min using a temperature of 120 ± 2 °C for fittings moulded from PE plastics or using a temperature of 150 ± 2 °C for fittings moulded from any other material in accordance with **3.2**, fittings or components shall satisfy the following as applicable:

a) moulded fittings shall show no weld line splitting (see note);

b) for fittings with one or more injection points, the depth of crack penetration in the area of the injection point(s) shall be not greater than 50 % of the wall thickness at the point of measurement;

c) for fittings with an interior ring gate, the depth of crack penetration in the area of the ring gate shall be not greater than 50 % of the wall thickness at the point of measurement;

d) for fittings with an end ring gate, the depth of crack penetration shall be not greater than 25 % of the socket depth.

NOTE Weld lines may become more pronounced and exhibit localized sinking, but this does not constitute failure if it is not accompanied by splitting.

6.5 Resistance to stress cracking of individual PE pipes and fittings

When tested in accordance with BS 2782:Method 1109A, using a reagent bath temperature of 80 ± 2 °C and a test piece comprising either a complete section of pipe having a minimum length of 150 mm between ends cut clean and square to the longitudinal axis or a complete fitting, as applicable, the pipe or fitting shall not exhibit any cracking or delamination visible without magnification.

7 Performance

7.1 General

The pipes and/or fittings shall comply with **7.2** to **7.4** as applicable, for each compound used and whenever any change is made in the compound composition or design.

The relevant tests shall be applied to items from a production run from which the product has complied with all the preceding requirements of this standard.

7.2 Leaktightness of pipework assemblies

When tested in accordance with BS 2782:Method 1112A, and using a test pressure of 0.5 bar[3)], any jointed assembly of fittings with pipes in accordance with Table 1 or Table 2, as applicable, shall show no visible leakage.

7.3 Resistance to elevated temperature cycling

When tested in accordance with Appendix A, assembled pipe(s) and/or fitting(s) shall comply with the following:

a) no leaks shall occur during thermal cycling;

b) after completion of the thermal cycling schedule, the maximum deflection at any place in the system between the two adjacent supports shall be not greater than 1/10 of the nominal bore of the pipe incorporated in the test assembly;

c) no leak shall occur under a static head of 1 m of water for 10 min;

d) after completion of the wet testing, the system, excluding the trap, shall allow a ball to pass through which has a diameter 6 mm less than the nominal bore of the pipe incorporated in the test assembly.

7.4 Stress relief behaviour of assembled fittings

This requirement shall only be applicable to injection moulded PE fittings which, when assembled with any fastening nuts or other attachments in position as they would be under service conditions for which they were designed and tested in accordance with Appendix C, shall not crack or show any surface degradation.

8 Marking

8.1 Each pipe, at intervals not exceeding 1 m, and each fitting shall be clearly and indelibly marked with the following:

a) the manufacturer's identification;

b) the number and date of this British Standard, e.g. BS 5255:1989[4)];

c) the applicable symbol as follows:

1) ABS for acrylonitrile-butadiene-styrene plastics;

2) MUPVC for modified unplasticized polyvinyl chloride plastics;

3) PP for polypropylene and propylene plastics;

4) PE for polyethylene plastics;

[3)] 1 bar = 10^5 N/m^2 = 0.1 MPa.

[4)] Marking BS 5255:1989 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

5) for a seal-retaining component (see **3.2**) made of a thermoplastics material other than those listed in 1) to 4), the appropriate symbol in accordance with BS 1755-1 or ISO 1043-1, as applicable;

d) the nominal size in accordance with **5.2**.

8.2 Guidance on the conditions under which the pipe or fitting is suitable for exterior use shall be provided as additional information, in labelling, packaging and/or product literature. The information shall include the following:

a) a statement that the pipe or fitting is suitable for exterior use without additional protection in and/or out of direct sunshine as applicable; or

b) guidance and/or an effective source of information on or more methods of protection recommended by the manufacturer to enable use of the pipe or fitting in and/or out of direct sunshine as applicable.

8.3 The marking shall remain legible under handling, storage and installation procedures in accordance with BS 5572, as applicable. Marking by indentation to a depth not greater than 0.15 mm shall be deemed to comply with this clause without infringing the wall thickness requirements of **5.3** or **5.4.1**, as applicable.

Appendix A Method of test for resistance to elevated temperature cycling

A.1 Installation

Figure 11 shows a typical form of installation and test assembly required. The installation and test assembly shall include:

a) an assembly of test piece pipes and/or fittings, as applicable, mounted between a waste trap on a waste outlet and a vertical bossed discharge pipe having centre lines at least 2.5 m apart and with a fall of between 1° and 5° along the test assembly;

b) means for locating and measuring any deflection of the test assembly from its initial position;

c) means for subjecting the test assembly to a static head of 1 m of water.

NOTE 1 For example, by plugging the foot of the discharge system (including the trap if necessary) or connecting it to a standpipe and filling the system with cold water.

d) a rigid ball having a specified diameter [see **7.3** d)].

The waste trap shall comply with BS 3943.

The discharge pipe shall comply with BS 4514.

The test assembly shall involve two fixed points anchored at least 2.5 m apart.

NOTE These may comprise the waste trap and discharge pipe joints or other anchorages.

A.2 Test piece assembly

The test pieces shall be incorporated into the test assembly and installation (see **A.1**) by assembling and fixing in accordance with the manufacturer's instructions with particular regard to bracketing and expansion provisions and such that, with the exception of the trap, the assembly can drain between cycles.

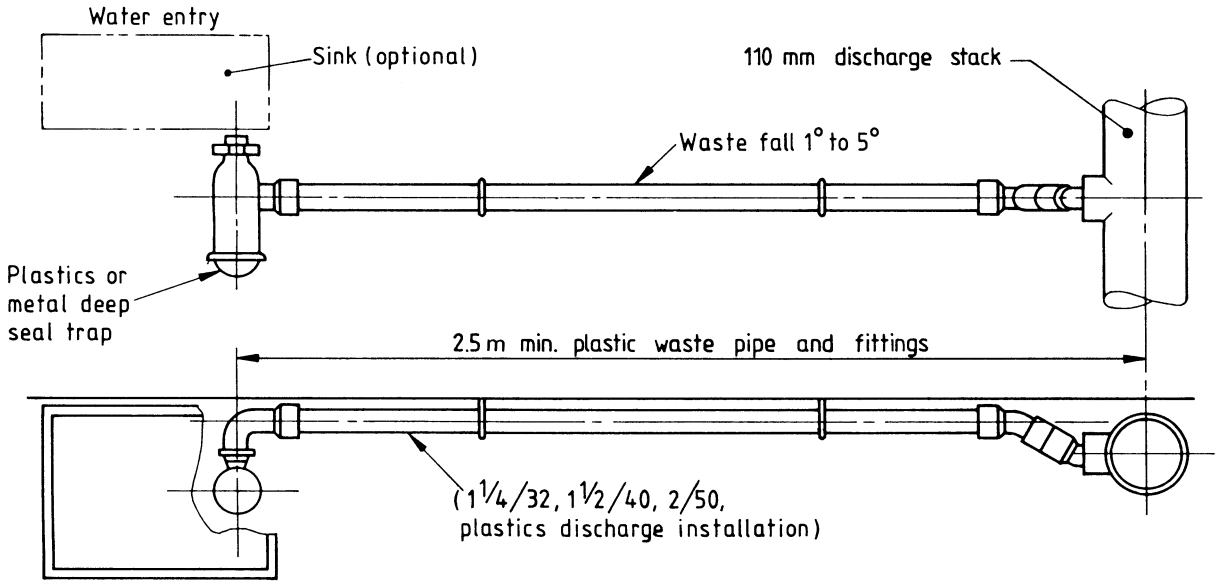


Figure 11 — Typical installation and test assembly for elevated temperature cycling test

A.3 Procedure

A.3.1 *Temperature cycling*

While maintaining the ambient temperature at 17 ± 5 °C and monitoring the test assembly for leaks, subject the assembly to the following schedule for 2 500 continuous cycles:

a) pass 35 ± 3 L of water at 93 ± 1 °C, when measured at the waste trap, over a period of 90 s to 95 s;

b) rest and drain the installation for 60 s to 70 s;

c) pass 35 ± 3 L of water at 12 ± 8 °C, when measured at the waste trap, over a period of 90 s to 95 s;

d) rest and drain the installation for 60 s to 70 s;

e) return to a).

A.3.2 *Assessment of deflection*

After completion of the temperature cycling schedule, locate and measure the maximum deflection at any place in the system between two adjacent supports.

A.3.3 *Application of a static hydraulic head*

Subject the test assembly to a static head of 1 m of water for 10 min and inspect the test assembly for leaks.

A.3.4 *Assessment of deformation*

Disengage the test assembly from the waste trap and determine whether the ball [see **A.1** d) and **7.3** d)] will pass through the assembly.

A.4 Test report

The test report shall include the following:

a) identification of the components under test;

b) a reference to this method of test, i.e. Appendix A of BS 5255:1989;

c) a report of any leakage observed during temperature cycling or while subjected to a static hydraulic head;

d) the nominal bore of the pipe components in the test assembly;

e) the maximum deflection of the test assembly between adjacent supports;

f) a report of whether or not the test ball passed through the test assembly following the wet testing;

g) the date of the test.

Appendix B Method of test for stress relief behaviour of assembled fittings

B.1 Apparatus

B.1.1 Vessel for containing a boiling reagent (see **B.2**) in sufficient quantity to submerge one or more fitting assemblies (see **B.1.2**, **B.3** and **B.4**).

B.1.2 Stirrups or sinkers, with means for attachment to a fitting assembly and of sufficient mass and density to submerge an assembly which would otherwise float in the reagent.

B.2 Materials

An aqueous solution containing both of the following solutes:

a) 0.2 % (*m*/*m*) of either a sodium alkyl aryl sulphonate (e.g. dodecyl benzene sulphonic acid, sodium salt) or, and in case of dispute, an alkyl aryl polyethylene glycol[5)];

b) 0.5 % (*m*/*m*) of margarine.

B.3 Test piece assembly

Assemble the fitting to any compatible pipes or fittings using fastening nuts or other attachments in position as they would be under the service conditions for which they were designed.

B.4 Procedure

Submerge the assembled fitting in the boiling reagent (**B.1.1**), using sinkers if necessary. After 30 min, remove the assembly, allow it to cool without additional constraint, and examine the fitting for cracks or surface degradation visible without magnification.

B.5 Test report

The test report shall include the following:

a) the identification of the fitting;

b) a reference to this method of test, i.e. Appendix B of BS 5255:1989;

c) an account of any cracking and/or surface deterioration observed or a report that the fitting remained undamaged;

d) the date of the test.

[5)] For information on the availability of these reagents, apply to Enquiry Section, BSI, Linford Wood, Milton Keynes MK14 6LE, enclosing a stamped addressed envelope for reply.

Appendix C Guidance on quality control testing

The following guidance on the nature of the requirements and test methods specified in this British Standard is provided to assist in the preparation of quality plans for the manufacture of individual types of waste pipes and fittings complying with this standard.

The applicability of specific requirements and associated methods of test to different types of pipe or fitting is summarized in Table 5, in which each requirement is classified as being particularly suitable for type test and/or inspection test purposes.

Type tests are intended to prove the suitability and performance of a material composition, a compounding or processing technique or a design or size of pipe, fitting, accessory or joint assembly. Such tests should be performed when any introduction or change is made in one or more of those aspects, but they may be performed more frequently by incorporation into a plan for monitoring the consistency of manufacture.

Inspection tests are carried out during and/or following manufacture to monitor the quality of a product item as applicable. Certain test methods and associated requirements have been included because of the practicality and speed with which they may be performed in conjunction with a production process in comparison with some of the type tests.

Some of the requirements in this standard are relevant to both type test and inspection purposes, e.g. those for dimensions. Attention is drawn to guidance given in **4.14** of BS 5750-5:1981 concerning possible use of alternative inspection procedures and equipment for quality control purposes under production conditions, e.g. on-line monitoring of dimensions, to the methods required by a British Standard for establishing the properties of the final product under laboratory conditions specified in that standard.

Attention is drawn to the desirability of evidence of compliance with **7.1**, in the form of a test report, as evidence may be sought for purposes of certification.

Table 5 — Applicability of requirements and test methods

Product	Property	Clause	Method	Test type	
				Type test	Inspection test
All	Materials	**3**		X	
All	Appearance	**4**			X
All	Dimensions	**5**	See 5.1 and BS 2782: Method 1101A	X	X
MUPVC components	Vicat softening temperature	**6.1**	BS 2782: Method 120A	X	
All pipes	Impact resistance	**6.2**	BS 2782: Method 1108A		X
All pipes	Longitudinal reversion	**6.3**	BS 2782: Method 1102A or BS 2782: Method 1102B		X
Moulded fittings	Stress relief	**6.4**	BS 2782: Method 1103A		X
PE components	Resistance to stress cracking	**6.5**	BS 2782: Method 1109A	X	
Joint assemblies	Leaktightness	**7.2**	BS 2782: Method 1112A	X	
All	Resistance to elevated temperature cycling	**7.3**	Appendix B	X	
PE moulded fittings	Stress relief behaviour of assembled fittings	**7.4**	Appendix C	X	

Publications referred to

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

BS 1755, *Glossary of terms used in the plastics industry.*

BS 1755-1, *Polymer and plastics technology.*

BS 2494, *Specification for elastomeric joint rings for pipework and pipelines.*

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

BS 2782, *Methods of testing plastics.*

BS 2782:Method 120A to BS 2782:120E, *Determination of the Vicat softening temperature of thermoplastics.*

BS 2782:Method 1101A, *Measurement of dimensions of pipes.*

BS 2782:Method 1102A, *Longitudinal reversion of pipes: immersion bath method.*

BS 2782:Method 1102B, *Longitudinal reversion of pipes: oven method.*

BS 2782:Method 1103A, *Stress relief test for injection moulded fittings: oven method.*

BS 2782:Method 1108A, *True impact rate (TIR) boundaries of pipes.*

BS 2782:Method 1109A , *Resistance to environmental stress cracking of polyethylene pipes and fittings for non-pressure applications.*

BS 2782:Method 1112A, *Leaktightness of thermoplastics pipes and fittings for non-pressure applications.*

BS 3380, *Specification for wastes (excluding skeleton sink wastes) and bath overflows.*

BS 3412, *Specification. Polyethylene materials for moulding and extrusion.*

BS 3943, *Specification for plastics waste traps.*

BS 4118, *Glossary of sanitation terms.*

BS 4514, *Specification for unplasticized PVC soil and ventilating pipes, fittings and accessories.*

BS 4778, *Quality vocabulary.*

BS 4778-1, *International terms.*

BS 4778-2, *National terms.*

BS 4935, *Specification for acrylonitrile-butadiene-styrene (ABS) moulding and extrusion materials.*

BS 5139, *Classification for polypropylene plastics materials for moulding and extrusion.*

BS 5254, *Specification for polypropylene waste pipe and fittings (external diameter 34.6 mm, 41.0 mm and 54.1 mm)*[6)].

BS 5572, *Code of practice for sanitary pipework.*

BS 5750, *Quality systems.*

BS 5750-5, *Guide to the use of BS 5750-2 "Specification for manufacture and installation".*

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

ISO 1043/1, *Plastics — Symbols and codes.*

ISO 1043/1-1, *Symbols for basic polymers and their modifications and for plasticizers.*

[6)] Referred to in the foreword only.

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