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Specification for
**Plastics waste pipe
and fittings**

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The following BSI references relate to the work on this standard:
Committee reference PLC/9 PLC/9/4 Draft for comment 71/52878

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Foreword

This British Standard has been prepared under the authority of the Plastics Industry Standards Committee.

Requirements are given for waste pipe and fittings manufactured from several different plastics materials and intended to convey normal domestic effluent. Detailed material requirements are not specified but there is a requirement to be able to withstand the long term effects of the intermittent discharge of hot water.

Because of the varied nature of the plastics materials in current use, it has been considered advisable to divide the standard into sections each dealing with a particular material.

The various jointing methods in use preclude at present the standardization of the lengths and configurations of fittings.

It is the intention to continue studies towards the introduction of a fully rational range of metric sizes of pipe in line with those being considered internationally by Technical Committee 138 of the International Organization for Standardization (ISO).

Attention is drawn to BS 5254 'Specification for polypropylene waste pipe and fittings (external diameter 34.6 mm, 41.0 mm and 54.1 mm)', in which pipe sizes are specified with slightly smaller bores than in this standard.

Certification. It is strongly recommended that in view of the nature of this specification, manufacturers and purchasers should make use of the certification facilities described on the inside back cover of this standard.

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British Standard Specification for

Plastics waste pipe and fittings

Section one. General

1. Scope

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

- (a) acrylonitrile-butadiene-styrene (ABS);
- (b) modified unplasticized polyvinyl chloride (MUPVC);
- (c) polypropylene (PP);
- (d) polyethylene (PE).

Since the standard gives requirements for pipe and fittings manufactured from materials which have different coefficients of expansion and design features, it is essential that the manufacturers' fixing instructions are followed.

NOTE. If the waste pipe is to be installed outside a building and will be subjected to direct sunlight, it may be necessary to protect it from the degradation effects of ultraviolet light. For some pipe this may be effected by the use of suitable pigments and/or stabilizers in the pipe material but otherwise the pipe should be painted with a suitable paint which has no deleterious effects on the plastics material.

2. References

The titles of the British Standards referred to in this standard are listed on the inside back cover.

3. Joint systems

Two basic jointing methods are covered in this standard. The first, solvent cementing, is suitable for ABS and MUPVC only; the second, rubber ring jointing, is suitable for any of the materials covered. Joints, and other pipe fittings, are illustrated in figures 1 to 10.

When solvent cement joints are used it is necessary to ensure that pipe expansion and contraction can take place. Suitable types of expansion joint are illustrated in figure 9.

Some systems incorporate multi-vane seals which are effective over a wide area of the socket depth. Such joints shall comply with dimension *b* of table 3 when measured at the centre of the gasket zone (see figure 1(c)).

A further design feature dealt with is the mechanical compression joint. With such joints the depth of the socket shall provide a minimum distance of 10 mm beyond the compression zone (see figure 1(d)).

The socket depths shown in figure 1 are designed to operate with maximum lengths of 2.5 m. Longer lengths may be installed strictly in accordance with the manufacturers' instructions.

4. Use of plastics waste pipe and fittings with unplasticized PVC soil pipe complying with BS 4514

BS 4514 specifies the requirements for unplasticized PVC soil pipe, fittings and accessories for use in above-ground drainage systems intended for normal domestic effluents.

The waste pipe and fittings specified in BS 5255 are intended to be complementary to these soil systems but the materials used have higher softening points allowing the use of thinner walled sections.

Because the length of waste pipe from the sanitary apparatus is subjected to waste water at its highest temperature and may also be flowing at full-bore, the elevated temperature cycling test for waste pipe and fittings is carried out using hotter water than the similar test for soil pipe and fittings.

Where it is intended to use these plastics waste systems with non-domestic effluents it is essential to consult the manufacturer as to their suitability and to seek advice regarding connecting these systems to unplasticized PVC drainage systems.

Section two. Acrylonitrile-butadiene-styrene (ABS) waste pipe and fittings

5. General

This section of this British Standard specifies the requirements for acrylonitrile-butadiene-styrene (ABS) pipe and fittings for use in domestic installations.

NOTE. If it is intended to use this pipe and these fittings other than in installations for normal domestic effluent it is essential to seek expert advice from the manufacturer on the suitability for the particular application.

6. Material

6.1 The material from which the pipe and fittings are produced shall consist substantially of a suitable grade of acrylonitrile-butadiene-styrene copolymer with only those additives that are needed for the manufacture of the polymer and for its subsequent conversion into sound, durable extrusions or mouldings of good surface finish and mechanical strength.

6.2 The addition of the manufacturer's own clean rework material resulting from the manufacture of pipe and/or fittings to this standard is permissible; no other rework material shall be used.

6.3 When a snap cap is used in a fitting to retain the sealing ring it may be made of a material other than ABS.

7. Appearance

7.1 The internal and external surfaces of the pipe and fittings shall be clean, smooth and free from grooving and other defects that would impair their performance in service.

7.2 The ends of the pipe and fittings shall be square with the axis of the component.

8. Pipe dimensions

Pipe shall conform to the relevant dimensions given in table 1.

9. Fitting dimensions

9.1 Fittings shall conform to the relevant dimensions given in tables 1 and 3 and figure 1, except that fittings or those parts of fittings not intended to come into contact with the fluid being transported are not required to comply with the wall thicknesses given in table 1.

The effective bore of fittings shall be not less than the minimum bore of the pipes complying with the requirements of this standard to which they fit except for adaptors used for connections to waste outlets complying with the requirements of BS 3380 : Part 1, when the cross-sectional area shall be not less than

640 mm² for 1¼/32 nominal adaptors

958 mm² for 1½/40 nominal adaptors

1780 mm² for 2/50 nominal adaptors.

The positions for measuring the wall thickness dimensions of a typical snap cap shall be as illustrated in figure 1(e).

9.2 Branch fittings and bends of 91¼°/92½° and 112½° shall be swept and shall have a radius of not less than that shown in figures 3 and 4.

9.3 If a connection is to be made to a metal threaded component the thread form shall comply with the requirements of BS 21 or BS 2779 and shall have a length of engagement of not less than four full threads.

9.4 All thread forms shall have a minimum internal radius of 0.25 mm.

*1 bar = 10⁵ N/m² = 100 kPa.

9.5 All fittings shall comply with the requirements specified in 9.1 to 9.4. Apart from the specified dimensions, figures 1, 3 and 4 are only intended to be generally illustrative of the range of fittings.

9.6 If it is necessary to have a recess in the mating end of a threaded adaptor to accommodate the geometry of the fitting to which it is being connected, the minimum wall thickness values shall not apply at the recess. The recess shall not extend under the threaded portion by more than 7 mm.

10. Length of pipe

The standard length of pipe as supplied shall be 4 m. Other lengths may be supplied as agreed between the purchaser and the supplier.

11. Marking

Each length of pipe and every fitting shall be clearly and durably marked to show the manufacturer's identification, the number of this British Standard, i.e. 'BS 5255', the material code (ABS) and the nominal size description as shown in the appropriate table or figure. Marking of the pipe shall be at intervals of not more than 1 m.

12. Heat reversion requirement for pipe

When tested by the method described in appendix A, samples of pipe shall not alter in length by more than 2.5 %.

At least one test specimen shall be tested from each 24 h production batch.

13. Impact requirement for pipe

When tested by the method described in appendix B using an impact energy of 24 J, compliance shall be judged on the failure rate (a failure being defined as a test specimen fracturing or cracking right through the complete wall thickness) as follows:

(a) if the first 14 specimens tested contain no failures the batch of pipe shall be deemed to be satisfactory;

(b) if the first 14 specimens tested contain four or more failures the batch of pipe shall be deemed to be unsatisfactory;

(c) if the first 14 specimens tested contain one, two or three failures a further 28 test specimens shall be tested; if during this further testing the total number of failures exceeds five, the batch of pipe shall be deemed to be unsatisfactory.

14. Hydrostatic pressure requirement

When tested by the method described in appendix C at a pressure of 0.7 bar*, any joint assembly of pipe and fittings shall show no signs of leakage or any other defects.

This is a type test and shall be carried out for each formulation used and when any change is made in composition or method of manufacture of pipe or fittings.

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15. Stress relief requirement (for injection moulded fittings only)

When an injection moulded fitting is tested by the method described in appendix D, no part of the weld line shall open completely. For fittings moulded by conventional techniques, special care shall be taken in examining the area around the point of injection where no cracks or delaminations shall penetrate to a depth greater than 50 % of the wall thickness. For fittings moulded by end-gating techniques, e.g. ring or diaphragm methods, cracks or delaminations in the wall of the fitting adjacent to the injection area shall be parallel to the axis and shall not penetrate to a depth of more than 25 % of the socket depth.

Three samples as moulded shall be tested from each 24 h production batch. If only one of the three fittings fails to comply with the requirements, a retest is permissible and a further six fittings from the same batch shall be tested. If any of these six fittings fails to comply with the requirements, the batch of fittings shall be deemed not to comply with the requirements of this standard.

16. Elevated temperature cycling requirement

When tested for 2500 cycles by the method described in appendix E, the following requirements shall be met.

- (a) No leaks shall have occurred during the test sequence.
- (b) The maximum deflection in any place in the system, between any two adjacent supports, shall not be greater than 1/10 of the nominal bore of the pipe.
- (c) Upon completion of the cycling test the system shall be exposed to a static head of 1 m by plugging the foot of the soil vent stack and then filling the system with cold water. There shall be no leak in the waste run over a period of 10 min.
- (d) After the completion of the test, the system, exclusive of the trap, shall be capable of accommodating the passage of a ball of diameter 6 mm less than the nominal bore of the pipe.

This is a type test and shall be carried out for each formulation used and when any change is made in composition or method of manufacture of pipe or fittings.

17. Rubber sealing rings

Rubber sealing rings supplied with the pipe or fittings shall comply with the requirements of BS 2494.

Section three. Modified unplasticized polyvinyl chloride (MUPVC) waste pipe and fittings

18. General

This section of this British Standard specifies the requirements for modified unplasticized polyvinyl

chloride (MUPVC) pipe and fittings for use in domestic installations.

NOTE 1. If it is intended to use this pipe and these fittings other than in installations for normal domestic effluent it is essential to seek expert advice from the manufacturer on the suitability for the particular application.

NOTE 2. Pipe and fittings made from MUPVC have similar combustion characteristics to pipework systems manufactured in accordance with BS 4514.

19. Material

19.1 The material from which the pipe and fittings are produced shall consist substantially of a suitable grade of chlorinated polyvinyl chloride (CPVC) and/or MUPVC, with only those additives that are needed for the manufacture of the polymer and for its subsequent conversion into sound, durable extrusions or mouldings of good surface finish and mechanical strength.

19.2 The addition of the manufacturer's own clean rework material resulting from the manufacture of pipe and/or fittings to this standard is permissible; no other rework material shall be used.

19.3 When a snap cap is used in a fitting to retain the sealing ring it may be made of a material other than CPVC or MUPVC.

20. Appearance

20.1 The internal and external surfaces of the pipe and fittings shall be clean, smooth, and free from grooving and other defects that would impair their performance in service.

20.2 The ends of the pipe and fittings shall be square with the axis of the component.

21. Pipe dimensions

Pipe shall conform to the relevant dimensions given in table 1.

22. Fitting dimensions

22.1 Fittings shall conform to the relevant dimensions given in tables 1 and 3 and figure 1, except that fittings or those parts of fittings not intended to come into contact with the fluid being transported are not required to comply with the wall thicknesses given in table 1.

The effective bore of fittings shall not be less than the minimum bore of the pipes complying with the requirements of this standard to which they fit except for adaptors used for connections to waste outlets complying with the requirements of BS 3380 : Part 1, when the cross-sectional area shall be not less than

- 640 mm² for 1¼/32 nominal adaptors
- 958 mm² for 1½/40 nominal adaptors
- 1780 mm² for 2/50 nominal adaptors.

The positions for measuring the wall thickness dimensions of a typical snap cap shall be as illustrated in figure 1(e).