

Thermoplastics pipes and associated fittings for hot and cold water for domestic purposes and heating installations in buildings —

Part 1: General requirements

ICS 83.140.30; 91.140.60

Committees responsible for this British Standard

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- British Adhesives and Sealants Association
- British Plastics Federation
- British Plumbing Fittings Manufacturer’s Association
- Chartered Institution of Water and Environment
- Health and Safety Executive
- Institution of Civil Engineers
- Institution of Gas Engineers
- Institute of Materials
- National Association of Plumbing and Heating
- Standards Association of Australia
- Water UK

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Foreword

This part of BS 7291 has been prepared under the direction of Subcommittee PRI/88/2, Plastics piping systems for pressure applications, under the direction of the Plastics Standards Committee. It supersedes the 1990 edition, which is now withdrawn.

The purpose of this part of BS 7291 is to maintain a specification for general requirements for pipes made from thermoplastics materials and associated fittings for use for hot and cold water under pressure for domestic purposes, including drinking water and water for heating purposes. The major changes between this revision and the previous edition as amended are as follows.

The size range of pipes for which this specification is applicable has been increased from 67 mm to 110 mm nominal outside diameter and therefore also for the associated fittings. Particular ranges of sizes are specified with reference to ISO 4065 and/or BS EN 1057 and/or BS EN 1254-2 and/or BS EN 1254-3 as appropriate by the other parts of BS 7291. These alternative size ranges arise because, in addition to providing for specifications in accordance with metric sizes of plastics pipes, it is considered desirable to standardize the requirements for plastics pipes made and widely used for such applications with dimensions compatible with pipework, fittings and accessories for metric sizes of copper pipes.

Complementary requirements for pipes and fittings made from specific types of thermoplastics materials are given in other parts of BS 7291. In particular, those parts specify requirements and test methods appropriate to ensure the quality of the material, the performance of pipes and fittings of that material and those that specify component dimensions which contribute to the performance. Those parts also rationalize the pipe sizes specified and identify suitable jointing methods. Since dissimilar materials may be incompatible, the guidance of the manufacturer should be sought before jointing pipes or fittings of such materials.

Fittings may also be made of plastics materials other than those from which the pipes are made or of other materials, e.g. metallic fittings conforming to BS EN 1254-2 and/or BS EN 1254-3, subject to conformity to this part of BS 7291 and with any applicable requirements for jointed assemblies given in the other relevant part of BS 7291.

Other parts of BS 7291 specify additional requirements for pipes and/or fittings manufactured from specific thermoplastics materials. Each has to be read in conjunction with this part of BS 7291:

- *Part 2: Specification for polybutylene (PB) pipes and associated fittings;*
- *Part 3: Specification for crosslinked polyethylene (PE-X) pipes and associated fittings.*

Attention is drawn to BS 5955-8 which specifies the installation requirements for plastics pipes and associated fittings falling within the scope of BS 7291, and to reference therein to other relevant codes of practice and specifications.

When used as piping for a domestic hot water primary circuit, it is possible for chemicals which are deleterious to other systems components to be leached out of the pipework. These chemicals can then be transported through the system and can cause degradation of other components of the system.

Similar deleterious effects on other system components can occur if gases, such as oxygen, can permeate the pipework and thus enter the primary circuit. In the case of PB (covered by BS 7291-2) and PE-X (covered by BS 7291-3), it is known that the pipes are, to some extent, permeable to gases. The inclusion of barrier pipes in this system is intended to minimize such permeability.

In order to overcome the deleterious effect such gases can have on system components, a corrosion inhibitor should be added to the primary circuit. If an inhibitor is to be used, note should be taken of advice given in BS 5955-8.

In preparing revisions of the 1990 editions of parts 1, 2 and 3 of BS 7291, account has been taken of concurrent work by Technical Committee 138 of the International Organization for Standardization (ISO) and by CEN TC 155, which is not yet sufficiently advanced or aligned with the philosophies in this standard for use in its place.

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

Annex A, Annex B, Annex C, Annex D and Annex E are normative. Annex F is informative.

Product certification. Users of this British Standard are advised to consider the desirability of third party certification of product conformity with this British Standard. Users seeking assistance in identifying appropriate conformity assessment bodies or schemes may ask BSI to forward their enquiries to the relevant association.

Assessed capability. Users of this British Standard are advised to consider the desirability of quality system assessment and registration against the appropriate standard in the BS EN ISO 9000 series by an accredited third-party certification body.

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 21 and a back cover.

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1 Scope

This part of BS 7291 specifies general requirements for thermoplastics pipes and/or fittings intended for use within domestic buildings, or for domestic purposes in other buildings, for conveyance of water, under pressure, for distribution of hot and cold water, including drinking water, and for circulation of hot water for heating purposes. The pipes and/or fittings are classified accordingly in Table 1.

Details of specific applications and service conditions are given in Table 2.

This specification is applicable to rigid or flexible plain pipes, or pipes incorporating a polymeric barrier to inhibit gas permeability through the pipe wall and having a nominal outside diameter up to and including 110 mm.

NOTE 1 Methods of test and guidance on quality control testing are given in annexes.

NOTE 2 Other parts of BS 7291 specify additional requirements for pipes and/or fittings manufactured from specific thermoplastics materials. They should be read in conjunction with this part of BS 7291.

NOTE 3 Reference to pressure in this part of BS 7291 means gauge pressure unless otherwise stated.

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 1755-1, *Glossary of terms used in the plastics industry — Part 1: Polymer and plastics technology*.

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

BS 2782-11: Method 1104A, *Methods of testing plastics — Part 11: Method 1104A, Thermoplastics pipes, fitting and valves — Measurement of opacity of thermoplastics pipes and fittings*.

BS 5955-8, *Plastics pipework (thermoplastics materials) — Part 8: Specification for the installation of thermoplastics pipes and associated fittings for use in domestic hot and cold water services and heating systems in buildings*.

BS 6100-2.7, *Glossary of building and civil engineering terms — Section 2.7: Public Health — Environmental engineering*.

BS 6100-3.3, *Glossary of building and civil engineering terms — Section 3.3: Sanitation*.

BS 6920-1, *Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water — Part 1: Specification*.

BS 7291-2, *Thermoplastics pipes and associated fittings for hot and cold water for domestic purposes and heating installations in buildings — Part 2: Specification for polybutylene (PB) pipes and associated fittings*.

BS 7291-3, *Thermoplastics pipes and associated fittings for hot and cold water for domestic purposes and heating installations in buildings — Part 3: Specification for cross-linked polyethylene (PE-X) pipes and associated fittings*.

BS EN 921:1995, including amendment No.2:1996, *Plastics piping systems — Thermoplastic pipes — Determination of resistance to internal pressure*.

BS EN 1057, *Copper and copper alloys — Seamless, round copper tubes for water and gas in sanitary and heating installations*.

BS EN 1254-2, *Copper and copper alloys — Plumbing fittings — Part 2: Fittings with compression ends for use with copper tubes*.

BS EN 1254-3, *Copper and copper alloys — Plumbing fittings — Part 3: Fittings with compression ends for use with plastics pipes*.

ISO 4065:1996, *Thermoplastics pipes — Universal wall thickness table*.

3 Terms and definitions

For the purposes of BS 7291, the terms and definitions given in BS 1755-1, BS 6100-2.7 and BS 6100-3.3, and the following apply.

3.1

flexible pipes

pipes available in coil form

3.2

rigid pipes

pipes only available in straight lengths

3.3

barrier pipes

pipes incorporating a polymeric barrier layer to prevent or greatly diminish the diffusion of oxygen into or through the pipe wall where the design stress requirements are totally met by base polymer

NOTE The performance requirements with the exception of oxygen permeability are the same for plain pipes and barrier pipes.

3.4

maximum system service temperature

T_s

maximum service temperature that can occur during normal operation

NOTE An example is thermal stratification within hot water storage vessels or of the positioning and/or operating tolerances of temperature controls.

3.5

nominal system flow temperature

T_f

intended maximum flow temperature of a system for a particular application as recommended in codes of practice and other guidance documents

3.6

system malfunction temperature

T_m

maximum temperature likely to be applied to pipes and fittings in the event of control thermostat failure or malfunction

4 Classifications

Pipes and fittings shall be classified as given in Table 1 with reference to their intended applications by symbols for which the corresponding purposes and service conditions are given in Table 2.

Table 1 — Classification by application

Class	Applications
W	A, B, C
H	A, B, C, D, E, F
S	A, B, C, D, E, F, G

NOTE The requirements and references to associated test methods for establishing acceptable performance for each class, with the appropriate factors of safety, are given in clause 6; in particular, 6.3, 6.4 and 6.5 discriminate between the classes.

5 Dimensions

5.1 General

Subject to 5.2 and 5.3, the dimensions and their tolerances for specific pipes shall be as given in the other parts of this standard and shall be compatible with either:

- a) outside diameters up to and including 110 mm for pipe systems conforming to ISO 4065:1996;
- b) compression fittings conforming to BS EN 1254-2 and/or BS EN 1254-3 to suit sizes of tube up to and including 35 mm conforming to BS EN 1057.

NOTE 1 The sizes adopted for a specific part may be selected from either or both of the ranges in a) and b).

NOTE 2 The dimensions and associated tolerances for fittings to suit a given pipe and application are not specified but are controlled by the need for conformity to the performance requirements of this part and of the other part of BS 7291 applicable to the relevant pipe. The method of designating the size or pattern of a fitting is given in 7.6.

5.2 Wall thickness of pipes

When determined in accordance with BS 2782: Method 1101A, the wall thickness of pipe shall be not less than one eleventh of the outside diameter, subject to a minimum value of 1.5 mm. The wall thickness shall conform to the relevant clauses of the other parts of this standard.

5.3 Coatings

If pipe is coated, the coating shall be sufficiently thin and/or removable to enable jointing with fittings and materials as specified in the part of BS 7291 applicable to the pipe material.

NOTE Attention is drawn to 6.1; consideration should be given to the possibility of diffusion of external coating constituents through the wall of the pipe to its interior.

6 Performance

6.1 Effect of materials on the quality of drinking water

When used under the conditions for which they are designated, non-metallic products in contact or likely to come into contact with drinking water shall conform to BS 6920-1.

NOTE 1 Non-metallic products for installation and use in the United Kingdom which are verified and listed under the UK Water Regulations Advisory Scheme are deemed to satisfy the requirements of this subclause. Details of the Scheme are obtainable from the Water Research Centre Regulation Advisory Service, WRc Evaluation and Testing Centre Ltd, Fern Close, Pen-y-fan Industrial Estate, Oakdale, Gwent, NP1 4EH.

Non-metallic products approved by the Department of the Environment Committee on Chemicals and Materials of Construction for use in Public Water Supply and Swimming Pools shall be considered free from adverse health effects for the purposes of conformity to this subclause.

NOTE 2 A list of approved chemicals and materials and details of the approvals scheme is available from the Secretary of the Committee at the Department of the Environment, The Drinking Water Inspectorate, Floor 2/A1 Ashdown House, 123 Victoria Street, London, SW1E 6DE, or can be viewed and downloaded from the following website: www.dwi.dtlr.gov.uk.

NOTE 3 There is no corresponding British Standard and associated test methods generally applicable to metallic products which might come into contact with drinking water. Attention is drawn to the UK Water Regulations Advisory Scheme (see note 1) and to the relevant requirements for fittings conforming to BS EN 1254-2 and/or BS EN 1254-3 or equivalent.

6.2 Effect of materials on reactivity of recirculated water

6.2.1 Leaching of chemicals from pipes and fittings

If the material constituting a pipe or fitting can transfer to recirculating water one or more substances which are deleterious to other systems components, one of the following shall apply.

- a) Where the pipe or fitting is of a material covered by a part of BS 7291, the substance shall be identified and the requirements and test methods in that part on preventing or controlling the amount of the substance transferred to the recirculating water shall apply.
- b) Where a fitting is of a material not covered by another part of BS 7291, 6.2.3 shall apply.