

Plastics inspection chambers for drains and sewers — Specification

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Committees responsible for this British Standard

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- Institute of Building Control
- Institute of Plumbing
- Land Drainage Contractors Association
- National Association of Plumbing and Heating
- Plastics Land Drainage Manufacturing Association
- Department of the Environment, Transport and the Regions
- British Adhesives and Sealants Association
- Papers Department of the Environment for Northern Ireland
- Health and Safety Executive
- Chartered Institute of Water and Environment
- The Scottish Office
- British Plastics Federation

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Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
Introduction	1
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Materials	3
5 Dimensions	5
6 Appearance	5
7 Performance requirements	5
8 Marking	7
Annex A (normative) Methods of test for watertightness (for inspection chambers shallow)	8
Annex B (normative) Method of test for resistance to angular deflection	8
Annex C (normative) Method of test for resistance to diametric distortion of chamber joint assemblies with flexible pipe systems	9
Annex D (normative) Method of test for shear resistance of chamber joint assemblies with rigid pipe systems	10
Annex E (normative) Method of test for resistance to elevated temperature cycling (for inspection chambers shallow)	12
Annex F (normative) Method for the determination of specific tangential initial stiffness (STIS)	13
Annex G (normative) Method of test for resistance to vertical loading	15
Annex H (informative) Guidance on use of inspection chambers relative to surface load and installation procedures	17
Annex I (normative) Method of test for resistance to negative pressure (for inspection chambers deep)	17
Annex J (informative) Guidance on quality control testing	19
Bibliography	21
Figure C.1 — Typical features of equipment for diametric distortion test	10
Figure D.1 — Typical features of equipment for shear resistance test	11
Figure F.1 — Typical loading arrangement for non-circular sections with variable cross-section	14
Figure I.1 — Test assembly	18
Table 1 — Classification of specific tangential initial stiffness (STIS)	6
Table D.1 — Support distance for shear resistance tests	12
Table G.1 — Loads	17
Table I.1 — Classification of internal negative pressure	19
Table J.1 — Applicability of requirements and test methods	20

Foreword

This British Standard has been prepared by sub-committee PRI/88/1, Thermoplastics piping systems and components for non-pressure applications. It is a revision of BS 7158:1989, which is now withdrawn.

It comprises a specification for inspection chambers made of specified plastics materials and is intended for use in the construction of drains based on rigid pipes and/or flexible pipes in accordance with BS EN 752.

Annex A to Annex G are normative and give methods of test.

Annex H is informative and gives guidance on the use and installation of plastics inspection chambers.

Annex I is normative and introduces a method of test for resistance to negative pressure (for inspection chambers deep).

Annex J is informative and gives guidance on quality control for the manufacture of plastics inspection chambers.

Attention is drawn to BS 5955-6, which gives guidance on the installation, testing, cleaning and repair of unplasticized PVC pipework for gravity drains and sewers.

Attention is drawn to BS 4346-3 and to BS 6209, which include requirements for cements suitable for jointing PVC-U pipes for non-pressure applications and are applicable to pipework systems conforming to BS EN 1401-1.

It has been assumed in the preparation of this British Standard that the execution of its provisions is entrusted to appropriately qualified and experienced personnel.

This revision of the first edition of BS 7158 introduces the following principal changes.

- a) In clause 4, the materials allowed have been extended to include recycled material, as defined by BS ISO 472:1988, but controlled by adding an item f) to 4.2 with requirements similar to those which apply to reprocessed material, i.e. the material shall be a PE, PP or PVC-U traceable to a single source of known origin. The definitions for reworked and recycled materials have been updated to align with the current edition of BS ISO 472.
- b) In clause 6, the choice of colour is now unrestricted, i.e. no longer confined to only brown or black.
- c) Subclause 7.8 and Annex I introduce additional requirements for inspection chambers deep, incorporated from prEN 13598-1.
- d) In clause 8, the marking requirements have been modified with two objectives in mind:
 - 1) to eliminate the need for all components of an assembly, e.g. riser and frame and cover, to each carry all the markings;
 - 2) to eliminate the final sentence of item f) which was subjective and not considered essential for relatively shallow chambers.
- e) References are updated to cater for withdrawn British Standards and/or the introduction of relevant BS ENs.

Product certification/inspection/testing. Users of this British Standard are advised to consider the desirability of third party certification/inspection/testing of product conformity to this British Standard. Appropriate conformity attestation arrangements are described in BS EN 45011. Users seeking assistance in identifying appropriate conformity assessment bodies or schemes may ask BSI to forward their enquiries to the relevant association.

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 and ii, pages 1 to 21 and a back cover.

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Introduction

The publication of this British Standard as an individual standard is intended to avoid duplication of specification and confusion of marking of plastics inspection chambers used in drainage systems otherwise made of different materials which may or may not be plastics.

The chambers can be designed for use with one or more different systems made in accordance with other standards. Provision is made for marking integral connections on the chambers to indicate the system components and sizes, in accordance with other standards with which the connection is dimensioned, to allow direct connection as applicable. At least two of the systems with which such chambers are expected to be used, namely those specified in BS EN 295-1 and BS EN 1401-1, embody fundamentally different philosophies in respect of sampling requirements and inspection systems. Attention is drawn to Annex J and to the advice concerning certification.

Since BS 8301 is now obsolescent, attention is drawn to parts 1 to 7 of BS EN 752, which give recommendations for the design, construction and use of drainage systems, including inspection chambers, under and around buildings and their connections to downstream systems. Attention is drawn also to BS EN 1610, which gives general requirements for testing of drains, including inspection chambers.

This revision has been prepared taking into account the National Annex to BS EN 752-3:1997 which defines UK national installation practice for underground drainage products. The 2000 version of that National Annex makes provision for the first time in the UK for having deep non-man-entry inspection chambers. This change was made to enhance the safety aspects of deep access by relying on more modern surface-based techniques. Attention is drawn to *Safe work in confined spaces* [1], which encourages the use of non-man-entry inspection systems.

The additional testing requirements added to this revision of BS 7158 allow chambers to be used at depths down to 6 m.

1 Scope

This British Standard specifies requirements for plastics inspection chambers for use at depths to invert not exceeding 6 m in the construction of drainage and sewerage systems.

It is applicable to non-man-entry chambers with or without raising pieces and having a nominal cross-section as recommended in Table NB.2 of BS EN 752-3:1997, as amended in 2000.

The chambers are classified into four grades as a function of stiffness (see 7.6) and strength (see 7.7), to suit different depths of installation and location for exposure to surface loading (see Annex H). Attention is drawn to BS EN 124:1994 and BS 4660 which specify requirements for covers and frames for drainage purposes that are applicable to inspection chambers.

This standard specifies materials, dimensions and tolerances, physical and performance characteristics and marking for plastics inspection chambers for drains and sewers.

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 903-A26, *Physical testing of rubber — Method for determination of hardness (hardness between 10 IRHD and 100 IRHD)*.

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

BS 3396-1, *Woven glass fibre fabrics for plastics reinforcement — Part 1: Specification for loom-state fabrics*.

BS 3396-2, *Woven glass fibre fabrics for plastics reinforcement — Part 2: Specification for desized fabrics*.

BS 3396-3, *Woven glass fibre fabrics for plastics reinforcement — Part 3: Specification for finished fabrics for use with polyester resin systems*.

BS 3412, *Methods of specifying general purpose polyethylene materials for moulding and extrusion*.

BS 3447:1962, *Glossary of terms used in the glass industry*.

BS 3496, *Specification for E glass fibre chopped strand mat for the reinforcement of polyester resin and other liquid laminating systems.*

BS 3532, *Method of specifying unsaturated polyester resin systems.*

BS 3691, *Specification for E glass fibre rovings for the reinforcement of polyester and epoxy resin systems.*

BS 3749, *Specification for E glass fibre woven roving fabrics for the reinforcement of polyester and epoxy resin systems.*

BS 5139:1991, *Method of specifying general purpose polypropylene and propylene copolymer materials for moulding and extrusion.*

BS ISO 472:1988, *Plastics — Vocabulary.*

BS EN 124:1994, *Gully tops and manhole tops for vehicular and pedestrian areas — Design requirements, type testing, marking, quality control.*

BS EN 681-1, *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 752-3:1997 (including amendments No. 1 and No. 2), *Drain and sewer systems outside buildings — Part 3: Planning.*

BS EN 1295-1, *Structural design of buried pipelines under various conditions of loading — Part 1: General requirements.*

BS EN 1401-1, *Plastics piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinyl chloride) (PVC-U) — Part 1: Specifications for pipes, fittings and the system.*

GREAT BRITAIN. Great Britain Highways Agency. *Manual of contract documents for highway works — Vol. 1 Specification for highway works.* ISBN 0 115 51979 3. London: TSO, 1998.

GREAT BRITAIN. Great Britain Department of Transport. *Specification for the reinstatement of openings in highways — A code of practice.* ISBN 0 115 51143 1. London: TSO, 1992.

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS ISO 472:1988 and BS 3447:1962 and the following apply.

3.1

C-glass

alkali calcium glass with an enhanced boron trioxide content and intended for applications requiring enhanced chemical resistance accordingly

NOTE This definition is consistent with ISO 2078:1985 and equivalent to the definition given in DIN 1259-1:1986.

3.2

inspection chamber

chamber with a removable cover constructed on a drain or sewer that provides access from surface level only, but does not permit entry of a person

NOTE Term reproduced from BS EN 752-1:1996.

3.3

inspection chamber deep

inspection chamber, constructed on a drain or sewer at unrestricted depth, that provides access for inspection and maintenance by remotely operated equipment with minimum size of access to prevent personnel entry and a depth to invert not exceeding 6 m

3.4

inspection chamber shallow

inspection chamber, constructed on a drain or sewer and with a removable cover, that provides access for inspection, testing, maintenance, clearance of obstructions and removal of debris, all when operating from surface level with a depth to invert not exceeding 1.2 m

3.5**recycled plastic**

plastic derived from discarded articles which have been cleaned and ground

NOTE 1 Recycled plastics can be reformulated by the addition of e.g. fillers, plasticizers, stabilizers and pigments.

NOTE 2 Term reproduced from BS ISO 472:1988.

3.6**reprocessed plastic**

thermoplastic prepared from scrap industrial plastic by other than the original processor

NOTE 1 Reprocessed plastics may or may not be reformulated by the addition of e.g. fillers, plasticizers, stabilizers, and pigments.

NOTE 2 Term reproduced from BS ISO 472:1988.

3.7**reworked plastic**

thermoplastic prepared from trimmings or rejected mouldings that has been reprocessed in a fabricator's plant after having been previously processed in that plant

NOTE 1 Term reproduced from BS ISO 472:1988.

NOTE 2 Examples of processing are moulding and extrusion.

3.8**visible cracking**

presence of cracks apparent under close inspection by eye without magnification

4 Materials**4.1 General**

The material from which the main body of the inspection chamber and/or the raising piece is produced shall comprise a thermoplastics material in accordance with 4.2 or a reinforced thermosetting resin in accordance with 4.3, based on the corresponding monomers or polymers as applicable. The material shall incorporate other ingredients or reinforcement as necessary for the manufacture of an inspection chamber and/or raising piece in accordance with the other requirements of this standard as applicable (e.g. pigments or dyes to satisfy the requirements of clause 6).

Elastomeric joint rings used in drainage and sewerage connections to and from inspection chambers, for the connection of chamber bases to raising pieces and for fabrication on site, shall satisfy the requirements for rings of vulcanized rubber given in BS EN 681-1 or thermoplastic elastomers given in BS EN 681-2.

NOTE Seals of cellular vulcanized rubber conforming to BS EN 681-3 or cast polyurethane conforming to BS EN 681-4 may be used for the connection of chamber bases to raising pieces or the connection of raising pieces to raising pieces.

4.2 Thermoplastics materials

The thermoplastics material shall be selected from the following.

- a) Polyethylene (PE) plastic¹⁾, to be specified in accordance with BS 3412 together with the designation applicable to the method of processing to be used for the manufacture of the inspection chamber or raising piece and otherwise as necessary to satisfy 4.1 of this standard.
- b) Polypropylene (PP) plastic¹⁾ or propylene plastic¹⁾, to be specified in accordance with BS 5139:1991 as light- and weather-stabilized together with the designation applicable to the method of processing to be used for the manufacture of the inspection chamber or raising piece and otherwise as necessary to satisfy 4.1 of this standard.
- c) Unplasticized polyvinyl chloride (PVC-U) plastic¹⁾ which, when tested in accordance with BS 2782-11: Method 1103V, shall have a Vicat softening temperature of not less than 79 °C for test pieces taken from an inspection chamber or raising piece and shall otherwise be specified as that necessary to satisfy 4.1 of this standard.

¹⁾ Term defined in BS ISO 472:1988.

d) Reworked plastic (see 3.7). If reworked material is added or used it shall be clean, derived under the control of the manufacturer of the inspection chamber or raising piece and, if applicable, of the same type and compatible with the material in accordance with items a), b), c), e) and/or f) of 4.2 to which it is added.

e) Reprocessed plastic (see 3.6). The use of reprocessed material shall be permissible providing the material is clean, free from inclusions and otherwise as specified in accordance with items a), b) or c) of 4.2. The material shall be traceable to a single source of known origin. If blended with material in accordance with items a), b) or c) of 4.2, it shall be of the same type and be compatible therewith.

f) Recycled plastic (see 3.5). The use of recycled material shall be permissible providing the material is clean, free from inclusions and otherwise in accordance with items a), b) or c) of 4.2. The material shall be traceable to a single source of known origin. If blended with material conforming to items a), b) or c) of 4.2, it shall be of the same type and compatible therewith.

4.3 Thermosetting materials

The thermosetting materials shall comprise a reinforced plastic¹⁾ incorporating resin and reinforcement in accordance with items a) and b) of the following list and optionally materials in accordance with one or more of the remainder of the list.

a) Resin. The resin system used shall conform to BS 3532 for polyesters or shall be based on an epoxy resin¹⁾;

b) Reinforcement. Except for alternative surface tissues [see c)], all reinforcement shall be derived from continuously drawn filaments of E-glass [1146²⁾, (see note)] and used in the following forms alone or in any combination subject to compatibility with the resin system used:

1) chopped strand mat in accordance with BS 3496;

2) woven fabric in accordance with BS 3396-1, BS 3396-2 or BS 3396-3 as applicable;

3) woven fabric in accordance with BS 3749;

4) rovings in accordance with BS 3691;

5) individual filaments and/or strands, chopped or continuous, having a minimum diameter of not less than 0.005 mm and having a surface treatment compatible with the resin used in accordance with 4.3a) of this standard.

NOTE Such glass includes either alumino-borosilicate glass or alumino-calco-silicate glass, in either case optionally containing other oxides, especially aluminium trioxide, incorporated for enhanced corrosion resistance and then sometimes described as E.CR glass.

c) Surface tissues, comprising tissues optionally incorporated into the superficial layers of the internal and/or external surfaces of the reinforced plastics article. These tissues shall be made from glass materials in accordance with item b) of 4.3 or otherwise of C-glass (see 3.1) or from woven or non-woven textiles based on polyester or acrylic fibres;

d) Aggregates, in the particle size range 0.05 mm to 0.5 mm, such as graded silica sands, incorporated where they are a designed part of the composite structure;

e) Fillers, comprising fine material with a particle size below 0.05 mm, incorporated either on their own or with aggregates;

f) Additives, incorporated for modifying the properties of the resin, e.g. for viscosity control.

²⁾ Term defined in BS 3447:1962.