

BS 5911-3:2022



BSI Standards Publication

Concrete pipes and ancillary concrete products

Part 3: Concrete manholes, inspection chambers and
soakaways (complementary to BS EN 1917:2002) —
Specification

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Foreword

Publishing information

This part of [BS 5911](#) is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 August 2022. It was prepared by Technical Committee B/505 *Wastewater engineering*. A list of organizations represented on this committee can be obtained on request to the committee manager.

Supersession

This part of [BS 5911](#) supersedes BS 5911-3:2010+A1:2014 and BS 5911-4:2002+A2:2010, which are withdrawn.

Information about this document

This is a full revision of the standard, and introduces the following principal changes:

- the inclusion of unreinforced and reinforced concrete inspection chambers, previously specified in [BS 5911-4](#);
- the types of cement and cementitious content is required to conform to the requirements of BS 8500-1:2015+A2:2019; and
- the introduction of additional manhole strength class.

Product certification/inspection/testing

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Presentational conventions

The provisions of this document are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is “shall”.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. “organization” rather than “organisation”).

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1 Scope

BS EN 1917:2002 specifies requirements and describes test methods for precast concrete manholes and inspection chambers of circular and rectangular (with or without chamfered or rounded corners) or elliptical cross-section, unreinforced, steel fibre and reinforced, with nominal sizes or nominal lengths not exceeding DN 1250 or LN 1250 respectively. The intended use of BS EN 1917:2002 is to permit access to, and to allow aeration of, drain or sewer systems for the conveyance of sewage, rainwater and surface water under gravity or occasionally at low head of pressure, mainly installed in areas subjected to vehicular and/or pedestrian traffic.

This part of [BS 5911](#) specifies complementary requirements to those in BS EN 1917:2002 for unreinforced and reinforced concrete manholes and inspection chambers of circular and rectangular cross-section (with or without chamfered or rounded corners), as provided for in BS EN 1917:2002, i.e. units with nominal sizes or nominal lengths not exceeding DN 1250 or LN 1250, respectively. Full requirements for unreinforced and reinforced circular concrete manholes with nominal sizes greater than DN 1250, but not exceeding DN 3000, are also specified. The manholes are intended to be installed in carriageways of roads (including pedestrian streets), hard shoulders and parking areas for all types of road vehicles, though provision is also made for units subject to lighter traffic loading. Requirements for base units, elastomeric load bearing seals, soakaways, landing slabs and corbel slabs are also specified. This part also specifies requirements for inspection chambers less than or equal to DN 1000 or LN/WN 1000/675 intended for installation in both areas outside the highway where vehicle loading is restricted and where they are subject to vehicular traffic.

NOTE 1 Rectangular manholes greater than LN 1250 are to be treated as structures and should be accompanied by appropriate calculations in accordance with the relevant Eurocodes.

NOTE 2 BS EN 752, BS EN 1295-1 and BS EN 1610 relate to the planning, design, installation and testing of drains and sewers.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions of this document¹⁾. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[BS 3123](#), *Specification for spring calipers and spring dividers*

[BS 4449](#), *Steel for the reinforcement of concrete — Weldable reinforcing steel — Bar, coil and decoiled product — Specification*

[BS 4482](#), *Steel wire for the reinforcement of concrete products — Specification*

[BS 4483](#), *Steel fabric for the reinforcement of concrete — Specification*

[BS 4484-1](#), *Specification for measuring instruments for constructional works — Part 1: Metric graduation and figuring of instruments for linear measurement*

BS 8500-1:2015+A2:2019, *Concrete — Complementary British Standard to BS EN 206 — Part 1: Method of specifying and guidance for the specifier*

BS EN 197-1, *Cement — Part 1: Composition, specifications and conformity criteria for common cements*

BS EN 450-1, *Fly ash for concrete — Part 1: Definition, specifications and conformity criteria*

¹⁾ Documents that are referred to solely in an informative manner are listed in the Bibliography.

[BS EN 752:2017](#), *Drain and sewer systems outside buildings — Sewer system management*

[BS EN 934-2](#), *Admixtures for concrete, mortar and grout — Part 2: Concrete admixtures — Definitions, requirements, conformity, marking and labelling*

[BS EN 1008:2002](#), *Mixing water for concrete — Specification for sampling, testing and assessing the suitability of water, including water recovered from processes in the concrete industry, as mixing water for concrete*

[BS EN 1917:2002](#), *Concrete manholes and inspection chambers, unreinforced, steel fibre and reinforced*

[BS EN 12620:2002+A1:2008](#), *Aggregates for concrete*

[BS EN 13101:2002](#), *Steps for underground man entry chambers — Requirements, marking, testing and evaluation of conformity*

[BS EN 15167-1](#), *Ground granulated blast furnace slag for use in concrete, mortar and grout — Part 1: Definitions, specifications and conformity criteria*

3 Terms and definitions

For the purposes of this part of [BS 5911](#), the terms and definitions given in [BS EN 1917:2002](#) and the following apply.

3.1 cementitious content

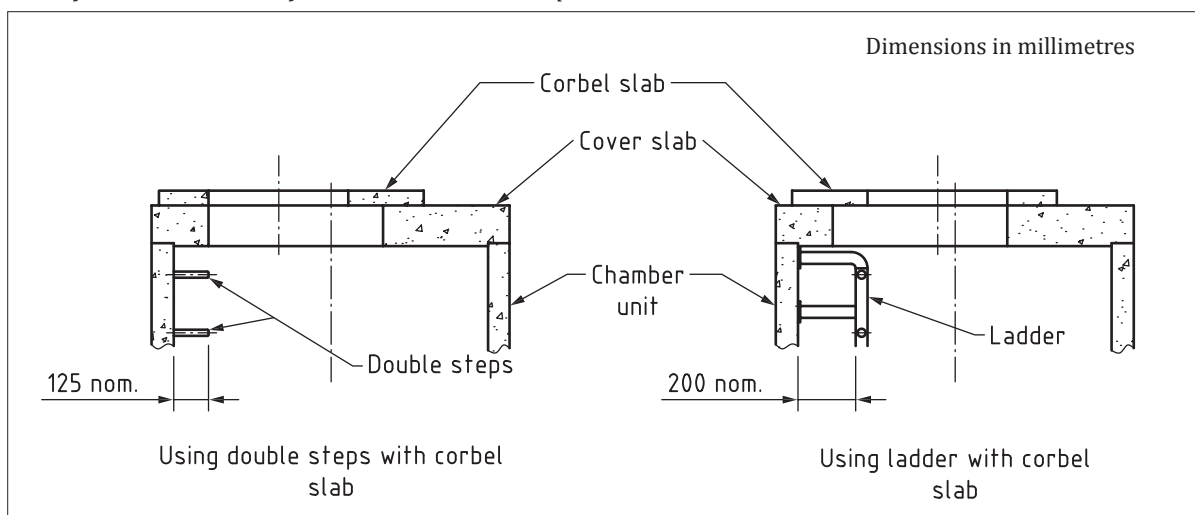
amount of cement plus any pozzolanic or latent hydraulic addition in the concrete mix

3.2 corbel slab

component without a joint or installed step incorporating a load-bearing overhang, used to adjust the total height of a structure and/or to accommodate an appropriate frame or cover

NOTE See [Figure 1](#).

Figure 1 — Use of corbel slabs in conjunction with double steps or ladder



3.3 elastomeric seal with load distributing element

combination of seal and load distributing element designed to be watertight and evenly distribute vertical loads generally manufactured in EPDM (Ethylene Propylene Diene Monomer)

NOTE See [BS EN 1917:2002](#), *Figure 2.a*.

3.4 landing slab

component forming an intermediate horizontal platform within a manhole and having an access opening

3.5 manufacturing diameter

diameter of a circular unit that a manufacturer seeks to achieve

3.6 manufacturing size

dimensions of a rectangular unit that a manufacturer seeks to achieve

3.7 minimum crushing load

load that a unit is required to withstand

[SOURCE: BS EN 1917:2002, 3.1.22]

3.8 plastomeric seal

deformable non-cured compound of rubber and mineral fibre

NOTE See BS EN 1917:2002, Figure 2.b and Figure 2.c.

3.9 proof load

load that a steel fibre or reinforced concrete unit is required to withstand with a defined limit on cracking

[SOURCE: BS EN 1917:2002, 3.1.24]

3.10 rectangular opening

shaped access hole whose corners may be relieved by nominal 75 mm × 75 mm chamfers, or by nominal 75 mm radii

3.11 soakaway

vertical chamber perforated to allow the passage of water and with or without an access shaft

3.12 ultimate (collapse) load

maximum load reached by the testing machine during a crushing or vertical strength test (i.e. when the load-recording facility does not show any further increase)

[SOURCE: BS EN 1917:2002, 3.1.23]

4 Symbols

The meanings of symbols used in this part of [BS 5911](#) shall be as given in BS EN 1917:2002, Table 2.

5 General requirements**COMMENTARY ON CLAUSE 5**

The numbers in parentheses after subclause headings are the corresponding subclause numbers in BS EN 1917:2002.

5.1 Application

For units with nominal size or nominal length not exceeding DN 1250 or LN 1250, respectively, the requirements of this part of [BS 5911](#) shall be in addition to those specified in BS EN 1917 and for the purposes of the latter, the reference specifications shall be those listed in [Annex A](#).

For manholes with nominal sizes greater than DN 1250, landing slabs, corbel slabs and soakaways, the requirements of BS EN 1917 shall also apply, except as otherwise required by, or stated in, this part of [BS 5911](#).

NOTE Essential details required by the manufacturer so that an enquiry or order can be fully understood are given in [Annex B](#).

5.2 Concrete (4.2) – composition

COMMENTARY ON 5.2

Units manufactured in accordance with **4.3.9** of BS EN 1917:2002 are suitable for slightly aggressive chemical conditions. In the UK, some soils are more aggressive in nature. As a safeguard, the provision of a concrete suitable for ACEC AC-4 conditions as described in Building Research Establishment Special Digest 1 2005 [1] is specified. The preferred method to achieve AC-4 for a 100-year intended working life is the use of a DC-4 concrete with surface carbonation (i.e. precast concrete) and low permeability concrete in accordance with **4.2.7.2** of BS EN 1917:2002 without the need for additional protective measures.

5.2.1 Types of cement

The cement shall conform to BS 8500-1:2015+A2:2019, Table A.6.

5.2.2 Cementitious content

The fully compacted concrete shall have a minimum cementitious content of not less than the amount shown in BS 8500-1:2015+A2:2019, Table A.12.

5.2.3 Mixing water (4.1)

Mixing water for concrete shall conform to BS EN 1008.

NOTE BS EN 1008:2002, **3.1**, specifies that potable water does not need testing.

5.3 Finish (4.3.2) – surface voids

With the exception of the external edges of slabs and of adjusting units and of corbel slabs, when tested in accordance with [Annex C](#), surfaces of units and components shall be free from voids that permit diametrically opposite points of the rim of the gauge to touch the surface of the unit or component simultaneously.

Units and components exhibiting any surface void greater than 12 mm deep shall be deemed not to conform to this part of [BS 5911](#).

NOTE Voids up to and including 12 mm deep may be made good by the manufacturer (see BS EN 1917:2002, **4.3.2**).

5.4 Geometrical characteristics (4.3.3)

5.4.1 General

Subject to the requirements of this clause, the dimensions and thickness of units and components shall conform to those stated in the factory documents.

5.4.2 Nominal sizes

NOTE 1 Nominal size is defined in BS EN 1917:2002, **3.1.16**, as a numerical designation of the size of a component within a structure, which is a convenient integer approximately equal to the manufacturing dimension in millimetres; for a circular unit it is the internal diameter (DN), and for a unit having a rectangular or elliptical internal shape it is the internal length/width (LN/WN).

The nominal sizes of circular and rectangular vertical units and tapers for use with them shall be those given in [Table 1](#) and [Table 2](#), respectively. Steps shall not be permitted in DN 900 shafts or associated components. The manufacturer shall make available information listing the sizes of inspection chamber that are supplied. The internal diameter, length and width shall conform to the requirements of [Table 3](#).

NOTE 2 DN 900 units are intended only to be used as a winch shaft because, if fitted with steps or a ladder, the clear space to the back of the shaft would be less than the 900 mm as recommended in the HSE publication, "Safe work in confined spaces" [2] and in BS EN 752:2008 Table NA.22²⁾. Equally, ladders should not be fitted to DN 1050 units.

5.4.3 Manhole internal manufacturing diameter and manufacturing size of vertical units

The internal manufacturing diameters and manufacturing sizes of circular and rectangular vertical units shall not be outside the limits given in [Table 1](#) and [Table 2](#), respectively.

Table 1 — Manhole nominal sizes, internal manufacturing diameters and tolerances of circular units

Nominal size of chamber and shaft units	Limits of internal manufacturing size		Tolerance on actual diameter from manufacturer's stated diameter ^{A)}
	Minimum	Maximum	
DN	mm	mm	mm
900	900	950	±8
1 050	1 050	1 100	±8
1 200	1 200	1 250	±9
1 350	1 350	1 400	±10
1 500	1 500	1 550	±11
1 800	1 800	1 850	±12
2 100	2 100	2 150	±14
2 400	2 400	2 450	±15
2 700	2 700	2 750	±15
3 000	3 000	3 050	±15

NOTE Capping units are currently not manufactured in the United Kingdom.

^{A)} See [3.5](#).

Table 2 — Manhole nominal sizes, internal manufacturing sizes and tolerances of rectangular units

Preferred nominal size LN/WN	Limits of internal manufacturing size		Tolerance on actual size from manufacturer's stated size
	Minimum mm	Maximum mm	
900/675	900/675	925/700	±6
1 200/675	1 200/675	1 250/700	±6
1 200/750	1 200/750	1 250/800	±7
1 200/900	1 200/900	1 250/950	±7

²⁾ Withdrawn.

Table 2 — *Manhole nominal sizes, internal manufacturing sizes and tolerances of rectangular units (continued)*

Preferred nominal size LN/WN	Limits of internal manufacturing size		Tolerance on actual size from manufacturer's stated size
	Minimum mm	Maximum mm	
1 000/1 000	1 000/1 000	1 025/1 025	±8
1 250/1 250	1 250/1 250	1 300/1 300	±9

5.4.4 Inspection chamber internal manufacturing diameter, manufacturing size and tolerance of vertical units

The internal manufacturing diameter and manufacturing sizes of circular and rectangular vertical units shall not be outside the limits given in [Table 3](#).

Table 3 — *Inspection chambers*

Inspection chamber type	Dimensions (mm)							
	A	B	C	D	E	F	G	H
Shallow (for chambers not greater than 1.2 m in depth from cover level to invert)	Not less than 600	Not less than 75	Not less than 150	Not more than dimension A	Not less than 450	Not less than 430	Not less than 430	Not less than 430
Deep (for chambers greater than 1.2 m in depth from cover level to invert)	Not less than 450	Not less than 75	Not less than 150	Not more than dimension A	Not less than 450	Not more than 350	Not more than 300	Not more than 300

NOTE 1 Dimensions A to H are shown in [Figure 10](#).

NOTE 2 A larger clear opening is permitted in Type 2 cover slabs provided the access is restricted to the dimensions F, G and H.

NOTE 3 The above guidance is consistent with the recommendations in [BS EN 752:2017 NA.6.4.3](#).

5.5 Finish (4.3.2)

5.5.1 Surface voids

With the exception of the external edges of slabs, when tested in accordance with [Annex C](#) surfaces of units shall be free from voids that permit diametrically opposite points of the rim of the gauge to touch the surface of the unit simultaneously.

Units exhibiting any surface void greater than 12 mm deep shall be deemed not to conform to this part of [BS 5911](#).

NOTE Voids up to and including 12 mm deep may be made good by the manufacturer – see [BS EN 1917:2002, 4.3.2](#).

5.5.2 Channels and benching in base units

The provisions for benching arrangements shall be in accordance with [BS EN 752:2017, NA 6.4.4.4](#).

NOTE Typical units are shown in [Figure 2](#) and [Figure 3](#).