

BS 5834-2:2011



BSI Standards Publication

Surface boxes, guards and underground chambers for the purposes of utilities

Part 2: Specification for surface boxes

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Summary of pages

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Foreword

Publishing information

This part of BS 5834 is published by BSI and came into effect on 31 July 2011. It was prepared by Technical Committee B/504, *Water supply*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This part of BS 5834 supersedes BS 5834-2:1983 and BS 5834-3:1985, which are withdrawn.

Relationship with other publications

BS 5834 is published in three parts:

- Part 1: *Specification for guards and plinths*;
- Part 2: *Specification for surface boxes*;
- Part 4: *Specification for utility chambers*.

Information about this document

This standard is a revision and an amalgamation of BS 5834-2:1983 and BS 5834-3:1985. It has been extended to include surface boxes made from cast iron, cast aluminium, plastics and fabricated steel and to include surface boxes designed for use with all types of utility.

Product certification. Users of this British Standard are advised to consider the desirability of third-party certification of conformity to 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.

Presentational conventions

The provisions of this standard 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.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

1 Scope

This part of BS 5834 specifies requirements for surface boxes to be used with guards and underground chambers designed for the purposes of utilities including those intended for factory infill having a maximum designated overall clear opening of 450 mm × 450 mm. This British Standard specifies surface boxes made from cast iron, cast aluminium, plastics and fabricated steel. The selection, use and surface finish of infill materials for factory infilled covers is outside the scope of this standard.

A test method for loading tests is specified in Annex A and a summary of the optional items to be agreed between the manufacturer and the purchaser is given in Annex B.

NOTE 1 See Table 4 for permitted intrusions to the clear opening.

NOTE 2 Requirements for covers having a larger clear opening than 450 mm × 450 mm are specified in BS EN 124. In BS EN 124, such covers are referred to as gully or manhole tops.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 3412:1992, *Methods of specifying general purpose polyethylene materials for moulding and extrusion*

BS 4190, *ISO metric black hexagon bolts, screws and nuts – Specification*

BS 4439:1991, *Specification for screwed studs for general purposes – Metric series*

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

BS 5834-1:2009, *Surface boxes, guards and underground chambers for the purposes of utilities – Part 1: Specification for guards and plinths*

BS 7668, *Weldable structural steels – Hot finished structural hollow sections in weather resistant steels – Specification*

BS EN 1561, *Founding – Grey cast irons*

BS EN 1563, *Founding – Spheroidal graphite cast iron*

BS EN 1676, *Aluminium and aluminium alloys – Alloyed ingots for remelting – Specification*

BS EN 1706, *Aluminium and aluminium alloys – Castings – Chemical composition and mechanical properties*

BS EN 10025-1, *Hot rolled products of structural steels – Part 1: General technical delivery conditions*

BS EN 10025-2, *Hot rolled products of structural steels – Part 2: Technical delivery conditions for non-alloy structural steels*

BS EN 10025-3, *Hot rolled products of structural steels – Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels*

BS EN 10025-4, *Hot rolled products of structural steels – Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels*

BS EN 10025-5, *Hot rolled products of structural steels – Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance*

BS EN 10025-6, *Hot rolled products of structural steels – Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition*

BS EN 10029, *Specification for tolerances on dimensions, shape and mass for hot rolled steel plates 3 mm thick or above*

BS EN 10210-1, *Hot finished structural hollow sections of non-alloy and fine grain steels – Part 1: Technical delivery measurements*

BS EN 12390-3, *Testing hardened concrete – Part 3: Compressive strength of test specimens*

BS EN 14598-3, *Reinforced thermosetting moulding compounds – Specification for sheet moulding compound (SMC) and bulk moulding compound (BMC) – Part 3: Specific requirements*

BS EN ISO 527-2:1996, *Plastics – Determination of tensile properties – Part 2: Test conditions for moulding and extrusion plastics*

BS EN ISO 580:2005, *Plastics piping and ducting systems – Injection-moulded thermoplastics fittings – Methods for visually assessing the effects of heating*

BS EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods*

BS EN ISO 2063, *Thermal spraying – Metallic and other inorganic coatings – Zinc, aluminium and their alloys*

DD CEN/TS 14541:2007, *Plastics pipes and fittings for non-pressure applications – Utilisation of non-virgin PVC-U, PP and PE materials*

3 Terms and definitions

For the purposes of this part of BS 5834 the following terms and definitions apply.

3.1 bedding load

load applied to a surface box to achieve bedding-in of the load-bearing parts

3.2 clear opening

access opening in a surface box through which a horizontal disc or a horizontal rectangular plate passes unimpeded, without deviation from a vertical axis, when a surface box is placed in its normal position and with the cover fully open

NOTE See Note A to Table 4 for permitted intrusions.

3.3 combination unit

cover and frame set in a concrete surround and suitable for bedding on a sectional-type guard or chamber

NOTE A surface box embedded in concrete post-production does not constitute a combination unit.

3.4 cover

moveable part of a surface box that covers the access opening

NOTE The cover may comprise one or more sections.

3.5 designation

categorization of a small surface box by grade and type

3.6 frame

part of a surface box that receives and supports the cover

3.7 horizontal disc

theoretical disc used to assess the clear opening of a small surface box when passed through at a horizontal angle

3.8 horizontal rectangular plate

theoretical rectangular plate used to assess the clear opening of a large surface box when passed through at a horizontal angle

3.9 planar surface

horizontal plane of a surface box cover, the vertical location of which is determined by the percentage covered by raised or recessed pattern

3.10 raised pattern

areas of a surface box cover raised above the cover planar surface

3.11 recessed pattern

areas of a surface box cover recessed below the cover planar surface

3.12 surface box

assembly of a frame and cover to allow access to any utility apparatus

3.13 test load

load applied to a surface box cover for the determination of load-bearing capacity

4 Classification and grading

4.1 Classification

Surface boxes shall be classified as one of the following.

- a) *Small surface box*. A surface box having a clear opening of 225 mm or less in diameter.
- b) *Large surface box*. A surface box having at least one specified clear opening dimension exceeding 225 mm, up to a maximum overall clear opening of 450 mm × 450 mm.

4.2 Grading

Surfaces boxes shall be graded in accordance with Table 1.

Table 1 Surface box grades

Grade	Description
Grade A (heavy)	Surface boxes suitable for use in carriageways carrying fast-moving commercial vehicles having wheel loads ^{A)} up to 5 tonnes, and in accordance with 8.10 .
Grade B (medium) ^{B)}	Surface boxes capable of bearing wheel loads up to 5 tonnes, for use in areas to which vehicles would have only occasional access.
Grade C (light) ^{B)}	Surface boxes for use in situations not intended for use by vehicles.

^{A)} The magnitude of the stated wheel load is as exerted by a stationary vehicle.

^{B)} Grade B1 and Grade C1 boxes (see **8.1** and Table 3) are suitable for use for pipe-type guards conforming to BS 5834-1.

5 Materials

5.1 General

The materials used for the manufacture of surface boxes or combination units shall conform to 5.2, 5.3, 5.4, 5.5 and 5.6, as applicable.

5.2 Cast iron

The metal used for the manufacture of iron covers or frames shall be either:

- a) grey cast iron (flake graphite iron) conforming to BS EN 1561; or
- b) ductile cast iron (spheroidal graphite iron or nodular graphite iron) conforming to BS EN 1563.

5.3 Cast aluminium

The metal used for the manufacture of aluminium castings shall suit the design and dimensions of the surface box and conform to the applicable grade in accordance with either BS EN 1676 or BS EN 1706.

5.4 Plastics

5.4.1 Thermoplastic

Thermoplastic materials used shall comprise one of the following plastics, incorporated or blended with other ingredients in accordance with Table 2.

- a) Unplasticized poly(vinylchloride) (PVC-U).
- b) Polyethylene (PE), specified as Code W in accordance with BS 3412:1992, Table 2.
- c) Polypropylene (PP), specified as Code L in accordance with BS 5139:1991, Table 2.
- d) Non virgin materials in accordance with DD CEN/TS 14541:2007, 3.1.2 and 3.1.5.

Table 2 Performance of thermoplastics materials

Performance	PE	PP	PVC-U	Test method
Tensile strength (N/mm ²)	16	18	42	BS EN ISO 527-2:1996
Elongation at break (%)	140	200	100	BS EN ISO 527-2:1996
Temperature resistance (°C)	150	120	150	BS EN ISO 580:2005

5.4.2 Thermoset

Thermoset materials used shall be either:

- a) BMC conforming to BS EN 14598-3:2005; or
- b) SMC conforming to BS EN 14598-3:2005.

5.5 Steel for fabrication

Steel for fabrication shall conform to BS 7668, BS EN 10029, BS EN 10210-1, BS EN 10025-1, BS EN 10025-2, BS EN 10025-3, BS EN 10025-4, BS EN 10025-5 or BS EN 10025-6, as applicable.

5.6 Concrete surround for combination units

The materials used for the concrete surround shall conform to BS 5834-1:2009, 8.3.

6 Frames for combination units

Frames for combination units shall be set in the concrete surround and conform to the minimum dimensions given in Figure 1 and Figure 2.

Figure 1 Typical section and minimum dimensions for a combination unit and frame for a small surface box (1 of 2)

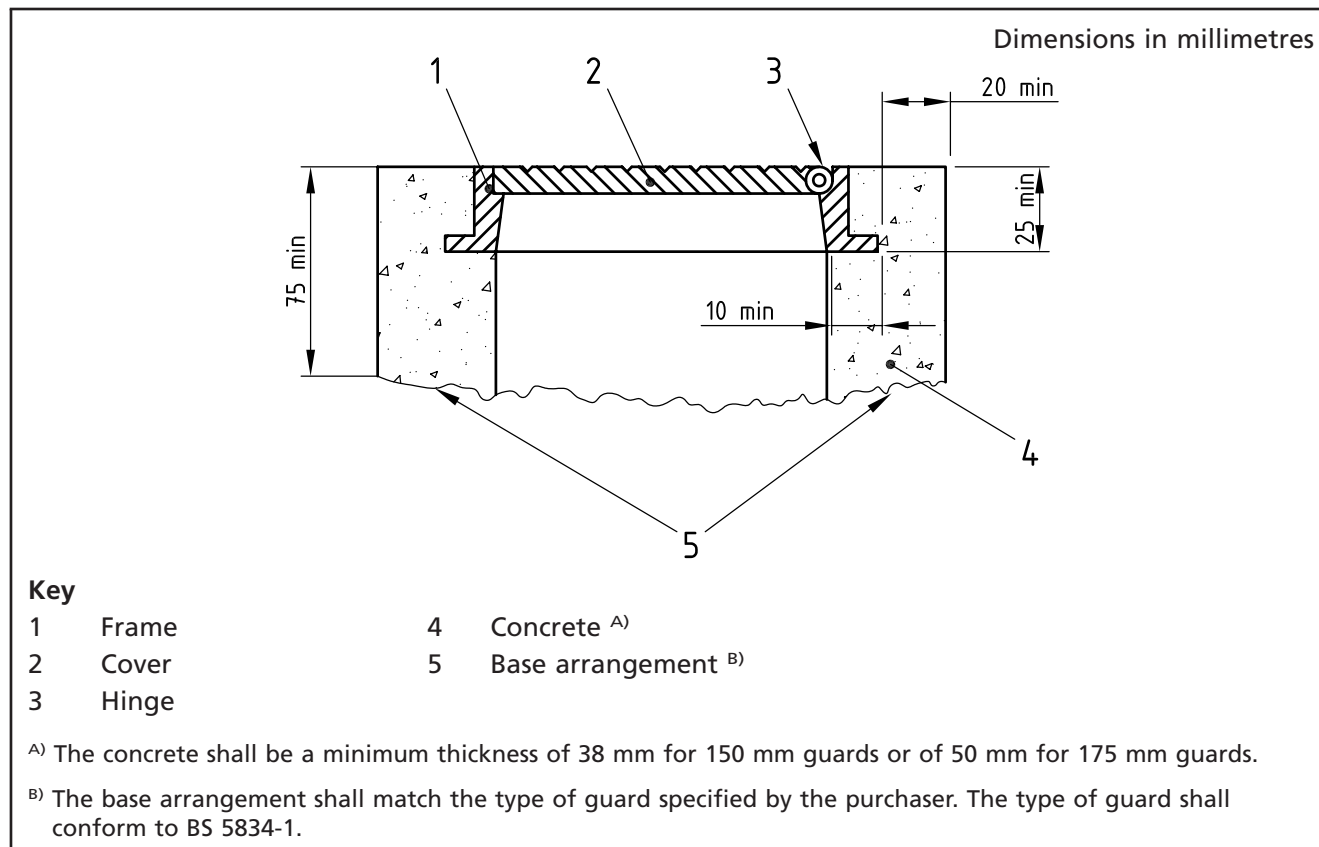
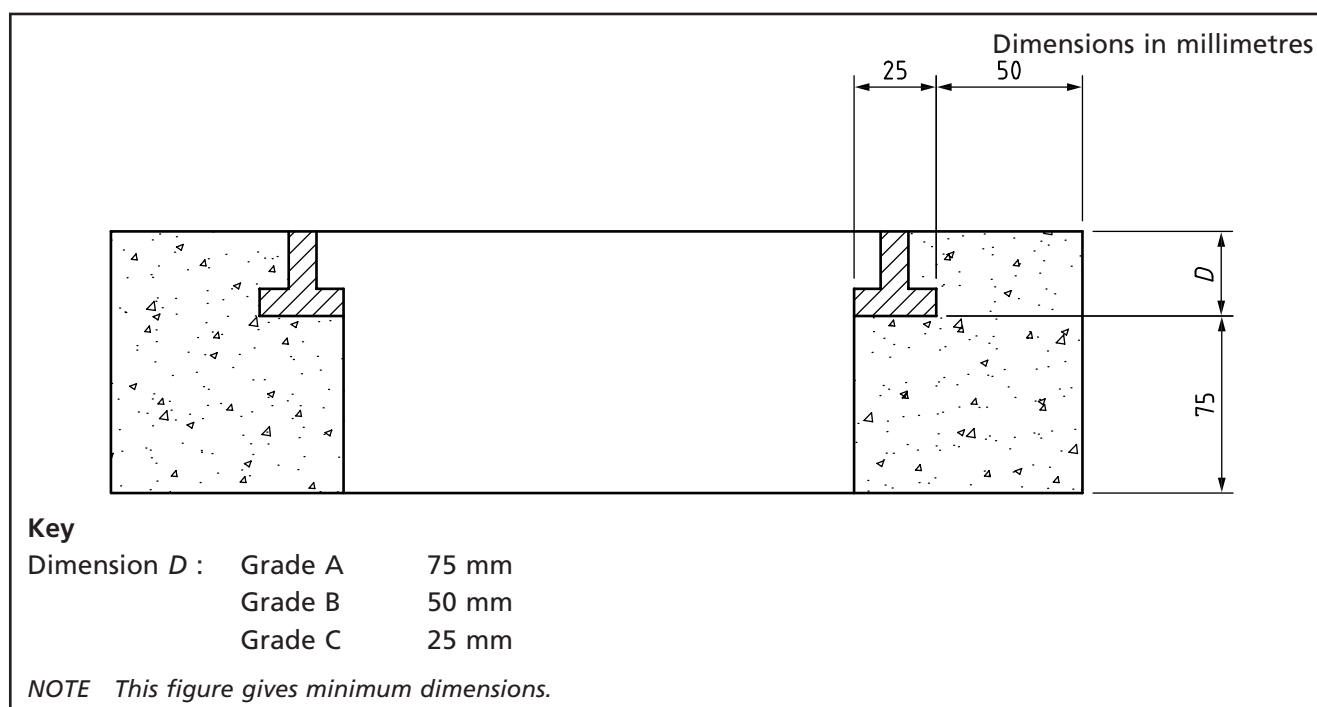


Figure 2 Typical section and minimum dimensions for combination unit and frame for a large surface box (1 of 2)



7 Fasteners

7.1 General

Fasteners supplied for loosely coupling separate sections of covers shall be of steel or ductile iron and shall have cross sections of not less than:

- 28 mm² for small surface boxes having minimum clear opening diameters of 100 mm and 135 mm (see Table 3);
- 50 mm² for small surface boxes having a minimum clear opening diameter of 225 mm (see Table 3);
- 100 mm² for large surface boxes having clear openings of 380 mm × 230 mm and 450 mm × 300 mm (see Table 4);
- 140 mm² for surface boxes having larger clear openings than all of those specified in 7.1a) to 7.1c).

Where bolts or studs are used, they shall conform to BS 4190 or BS 4439.

Small surface boxes having clear openings of 100 mm, 135 mm and 225 mm in diameter, respectively, shall have a nominal size and thread diameter of not less than M6, M8 and M10.

Large surface boxes having clear openings greater than 225 mm in diameter shall have a nominal size and thread diameter of not less than M12.

7.2 Hinge pins for small surface boxes

Hinge pins used shall be solid (e.g. not hollow, roll or split pins) and made from stainless steel, plastic or non-ferrous metals. Plastics hinge pins shall only be used in conjunction with plastic surface boxes.

Hinge pins shall be not less than 6 mm in diameter. Hinged units shall be capable of supporting the specified test loads without the hinge pins forming part of the load-bearing surface.

NOTE A surface box having a hinged cover may be referred to as a “Type H” surface box.

7.3 Swivel pins for small surface boxes

Swivel pins shall be solid (e.g. not hollow, roll or split pins) and made from stainless steel, plastics or non-ferrous metals, securely anchored or integral to the cover, and captive to the frame. Plastic swivel pins shall only be used in conjunction with plastic surface boxes. The swivel pin shall have a minimum diameter of 12 mm and shall be of such a length as to allow the cover to be lifted and swivelled.

NOTE A surface box with a swivel pin may be referred to as a “Type S” surface box.

8 Dimensions and design of surface boxes

8.1 General

With the exception of combination units, the designations and dimensions of surface boxes shall conform to Table 3 or Table 4, as applicable.

The minimum depth of frame for combination units shall conform to the combined surface box and concrete surround measurements given in Figure 1 and Figure 2.

Table 3 Designations and specified dimensions of small surface boxes

Grade	Designations			Minimum clear opening diameter ^{B)}	Minimum depth of frame	Minimum bedding width of frame	Minimum bedding area
	Non-rock ^{A)}	Hinged	Swivel cover				
					mm	mm	mm ²
Grade A (heavy)	100 AN	100 AH	—	100	100	35	—
	135 AN	135 AH	—	135	100	35	—
	225 AN	—	—	225	100	35	—
Grade B1 ^{C)} (medium)	—	100 B1H	100 B1S	100	75	—	See 8.2.2
	—	135 B1H	—	135	75	—	See 8.2.2
Grade B2 ^{D)} (medium)	—	100 B2H	100 B2S	100	75	—	15 000
	—	135 B2H	—	135	75	—	15 000
Grade C1 ^{C)} (light)	—	100 C1H	—	100	75	—	See 8.2.2
	—	135 C1H	—	135	75	—	See 8.2.2
Grade C2 ^{D)} (light)	—	100 C2H	—	100	75	—	10 000
	—	135 C2H	—	135	75	—	10 000

^{A)} A surface box with a non-rock feature is known as a Type N surface box.

^{B)} The minimum clear opening diameter may be ± 1 mm.

^{C)} Grade B1 and C1 boxes conform to 8.2.2 and are suitable for use with or without pipe-type guards conforming to BS 5834-1.

^{D)} Grade B2 and C2 boxes shall be permanently supported over their entire bedding area.

8.2 Small surface boxes

8.2.1 General

The minimum clear opening sizes shall be as specified in Table 3.