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Surface boxes, guards and underground chambers for gas and waterworks purposes —

Part 3: Specification for large surface boxes

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- British Foundry Association
- British Gas Corporation
- British Plastics Federation
- British Precast Concrete Federation Ltd.
- British Steel Industry
- Clay Pipe Development Association Limited
- Department of the Environment (Property Services Agency)
- Institution of Gas Engineers
- Institution of Mechanical Engineers
- Institution of Water Engineers and Scientists
- Ironfoundries National Association
- Metal Trades Organizations
- National Clayware Federation
- Severn Trent Water Authority
- Water Companies Association
- Coopted members

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Foreword

This Part of BS 5834 has been prepared under the direction of the Road Engineering Standards Committee.

With the replacement of BS 1185 and BS 1426 & BS 3461 by BS 5834-1 and BS 5834-2 it became apparent that surface boxes for gas and waterworks purposes were only standardized in small sizes and then only in grey cast iron. A standard to cover surface boxes for a complete range of the popular sizes, in a variety of materials, was badly needed therefore, particularly by the water industry.

For convenience, different size ranges of surface boxes have been dealt with in separate Parts of BS 5834. Part 2 dealing with small surface boxes was published in 1983 and this Part deals with rectangular boxes of larger sizes. Surface boxes are now made in materials other than grey cast iron and this Part covers boxes made from grey iron, ductile iron, steel and reinforced concrete.

The designations in Part 2 and in this Part have been changed from those in BS 1426 & BS 3461 with heavy, medium and light boxes now being graded A, B and C respectively.

This brings both Parts into line with BS 497-1:1976.

Some aspects of this specification are performance based to afford opportunity to improve designs and to permit various alternative materials to be used. It is desirable to check manufacturers' catalogues to ensure that units will meet the requirements of the user, in particular whether the base of the unit being offered will suit the chamber over which it will be placed. It is intended that preformed underground chambers will be the subject of a future Part 4 of this standard.

Close liaison has been maintained with the Technical Committee dealing with BS 750 which specifies underground fire hydrants and surface box frames and covers, with the result that the latest hydrant box specification is similar to this standard.

Purchasers may find it useful to consider BS 750, BS 497-1 and BS 5834-2 when purchasing surface boxes.

Certification. Attention is drawn to the certification facilities described on the inside back cover of 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 12, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 5834 specifies requirements for surface boxes with rectangular clear openings, at least one dimension of which exceeds 300 mm, manufactured from cast iron, steel or reinforced concrete.

A summary of the optional items to be agreed between the manufacturer and the purchaser is given in Appendix B.

NOTE The titles of the publications referred to in this standard are listed on page 12.

2 Definitions

For the purposes of this Part of BS 5834 the following definitions apply.

2.1

surface box

an assembly of a frame and cover to give access to a valve, regulator or meter chamber

2.2

frame

a part of a surface box that receives and supports the cover

2.3

cover

a removable part of a surface box that covers the access opening and that is constructed in one or more sections

2.4

clear opening

the access opening in the surface box through which a horizontal rectangular plate of the specified minimum dimensions will pass unimpeded, ignoring permitted intrusions (see asterisked note to Table 2), without deviation from a vertical axis when the surface box is placed in its normal position but with the cover fully open

2.5

composite frame

a metal frame set in a concrete surround and suitable for bedding on the concrete that forms the walls of a valve, regulator or meter chamber

NOTE A metal frame subsequently embedded in concrete on site does not constitute a composite frame.

2.6

reinforced concrete unit

a surface box in which the cover is substantially concrete reinforced with steel and in which the frame may be cast iron, steel or a composite frame

3 Materials

3.1 General

The materials used for the manufacture of large surface boxes shall comply with 3.2, 3.3 or 3.4.

3.2 Cast iron units

The metal used for the manufacture of iron castings shall be either:

- a) grey iron (flake graphite iron) of a quality not less than that specified as grade 150 of BS 1452; or
- b) ductile iron (spheroidal graphite iron or nodular graphite iron) complying with grades 450/10, 500/7, 600/3 or 700/2 of BS 2789:1985, as selected by the manufacturer to suit the design and dimensions of the unit.

3.3 Fabricated steel units

The material used for fabricated steel units shall comply with BS 1449 or BS 4360.

3.4 Reinforced concrete units

3.4.1 General. Reinforced concrete covers shall not be permitted for grade A or grade B boxes.

3.4.2 Minimum concrete grade. The minimum concrete grade shall be C30 as defined in BS 5328.

3.4.3 Minimum cement content. The minimum cement content shall be 300 kg/m³.

NOTE The purchaser should state on his order or enquiry whether sulphate resistance is required and if possible the concentration of sulphates expected in the ground in which the units are to be placed. Where the concentration of sulphates is high additional cement may be required.

3.4.4 Cement. The cement used shall be one of the following:

- a) ordinary and rapid-hardening Portland cement complying with BS 12;
- b) ordinary and rapid-hardening Portland cement complying with BS 12 when used in conjunction with:
 - 1) ground granulated blast-furnace slag¹⁾;
 - 2) pulverized-fuel ash complying with BS 3892-1;
- c) Portland blast-furnace cement complying with BS 146;
- d) sulphate-resisting Portland cement complying with BS 4027.

3.4.5 Aggregates. The aggregates shall comply with BS 882, BS 1047 or BS 3892-2 except that the gradings may be modified to suit the manufacturing processes.

¹⁾ A British Standard for ground blast-furnace slag is in preparation. Until its publication ground blast-furnace slag in accordance with Agrément Certificate 82/1023 is suitable.

The maximum size of the aggregate shall not exceed the least of the following:

- 20 mm;
- three-quarters of the minimum space between reinforcing bars;
- the nominal cover to the reinforcement minus 5 mm.

3.4.6 Admixtures. Admixtures, where used, shall comply with BS 5075-1.

3.4.7 Chloride content. The total chloride content of the concrete mix arising from the aggregate together with that from any admixtures and any other source shall not exceed the limits given in Table 1, expressed as a percentage relationship between chloride ion and mass of cement in the mix.

Table 1 — Maximum total chloride content

Type or use of concrete	Maximum total chloride content expressed as percentage of chloride ion by mass of cement
Heat-cured concrete	0.1
Concrete made with cement complying with BS 4027	0.2
Concrete containing embedded metal and made with cement complying with BS 12, BS 146 or combinations with slag or pulverized-fuel ash	0.40 for 95 % of test results with no result greater than 0.50
NOTE Marine aggregates and some inland aggregates contain chlorides. Both should be selected carefully. Wherever possible, the total chloride content should be calculated from the mix proportions and the measured chloride content of each of the constituents.	

3.4.8 Reinforcement. All reinforcing steel used in concrete units shall comply with BS 4449, BS 4461, BS 4482 and BS 4483 as appropriate. Reinforcement shall be free from loose rust, scale, oil, grease or other deleterious matter.

3.4.9 Water. Water shall be clean and free from harmful matter in such quantities as would affect the properties of the concrete in plastic or hardened state. (See Appendix A of BS 3148:1980.)

3.5 Composite frames

The materials used in the construction of composite frames shall comply with 3.2 and 3.4 or 3.3 and 3.4.

3.6 Fasteners

Bolts or studs supplied for loosely coupling separate sections of covers shall comply with BS 4190 and shall not be smaller than M12. If other fasteners are supplied they shall be of steel or ductile iron and shall have cross sections of not less than 100 mm² for boxes of 380 mm × 230 mm and 450 mm × 300 mm designated openings and not less than 140 mm² for larger openings.

4 Design features

4.1 Shape and size

Large surface boxes shall be nominally rectangular in plan, and the frames shall comply with the requirements for minimum clear opening, depth and bedding width given in Table 2.

NOTE 1 The actual dimensions may be determined by the manufacturer.

When assembled, the top of the cover shall be flush with the top of the frame.

NOTE 2 A raised pattern may stand proud of the frame.

4.2 Displacement by traffic

The design of surface boxes shall be such that the covers will not be displaced by traffic.

4.3 Drainage and skid resistance

Covers shall be self-draining and metal covers shall have a raised pattern, e.g. chequers, to enhance skid resistance.

4.4 Prising slots

At least one prising slot per cover element shall be provided to facilitate loosening of the cover. The dimensions of the prising slots shall be 10^{+5}_{-2} mm wide × 35^{+10}_{-5} mm long measured on the upper surface.

4.5 Keyways

At least one keyway, either open or closed, and complying with the dimensions shown in Figure 1 shall be incorporated in each cover element for lifting purposes.

The larger size of keyway shall be provided in grade A and B covers. In grade C covers the keyway shall be either the smaller or larger whichever is appropriate to the design and mass of the cover.

NOTE The purchaser should specify in his enquiry and/or order if open or closed keyways are required.