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

## Part 4: Specification for preformed chambers

# Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Road Engineering Standards Policy Committee (RDB/-) to Technical Committee RDB/37, upon which the following bodies were represented:

- British Foundry Association
- British Gas Plc
- British Plastics Federation
- British Precast Concrete Federation Limited
- Clay Pipe Development Association Limited
- Department of the Environment (Property Services Agency)
- Ductile Iron Pipe Committee
- Institution of Gas Engineers
- Institution of Mechanical Engineers
- Institution of Water and Environmental Management (IWEM)
- METCON
- National Clayware Federation
- Water Authorities Association
- Water Companies Association

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## Foreword

This Part of BS 5834 has been prepared under the direction of the Road Engineering Standards Policy Committee and covers a range of the popular sizes of preformed underground chambers for use with surface boxes specified in Parts 2 and 3 of BS 5834.

In this Part, the light grading, grade C, has been subdivided to allow for occasions when chambers need to be located in areas which have only occasional vehicular access such as private drives.

The design loads required in this Part contain agreed factors of safety. It is recognized, however, that such factors would not necessarily be applicable to types of material which, so far, have not been catered for in this standard. Design loads may be reconsidered if other materials are included in future revisions.

**NOTE** Installation techniques (e.g. surrounding in concrete) can significantly contribute to the load bearing qualities of the installed unit. Reference should be made to the appropriate manufacturers' instructions.

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 18, 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.

# Section 1. General

## 1 Scope

This Part of BS 5834 specifies requirements for preformed underground chamber elements for use with surface boxes to BS 5834-2 and BS 5834-3. The materials included are reinforced concrete (RC) and glass fibre reinforced polyester (GRP). This standard relates to GRP units made by hand lay-up and spray-up manufacture only.

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

**NOTE** The titles of the publications referred to in this standard are listed on the inside back cover.

## 2 Definitions

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

### 2.1 GRP

glass fibre reinforced polyester

### 2.2 valve/meter chamber

a chamber constructed to house a valve/meter and providing access for operation and inspection

### 2.3 bearing slab (RC)

a slab with or without an aperture for valve/pipe entry, used at the base of the chamber to provide support for the walling structure

### 2.4 base wall section

the lowest placed wall section unit incorporating slots for pipe entry and exit

### 2.5 intermediate wall section

a wall section unit for extending the wall upwards from the base wall section

### 2.6 adaptor slab (RC)

a slab, incorporating an access opening, used at the top of the chamber and providing support for a surface box

### 2.7 top surface section (GRP)

a unit used at the top of a multi-element chamber providing access for inspection or operation and designed to support the surface box cover

### 2.8 clear opening

the access opening in an adaptor slab, top surface section or unit through which a horizontal plate of the specified minimum dimensions but with the corners removed (see 7.1) will pass unimpeded, without deviation from a vertical axis

### 2.9 one piece chamber (GRP)

a complete unit constructed with open or enclosed base, with or without apertures for pipe entry and providing access for inspection or operation and to support the surface box cover

### 2.10 nominal size

a numerical designation of the size of a unit which is a convenient round number approximately equal to a manufacturing dimension

## 3 Grading

Units shall be graded as follows:

|                         |                                                                                                                                                                                                                                                                     |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (heavy) <i>Grade A</i>  | Chambers for use with surface boxes suitable for use in carriageways carrying fast-moving normal commercial vehicles with wheel loads <sup>a</sup> up to 5 t and slow-moving specially authorized vehicles <sup>b</sup> with wheel loads <sup>a</sup> up to 11.5 t. |
| (medium) <i>Grade B</i> | Chambers for use with surface boxes capable of bearing wheel loads <sup>a</sup> up to 5 t, for use in areas to which vehicles would have only occasional access.                                                                                                    |
| (light) <i>Grade C1</i> | Chambers for use with surface boxes for use in situations not intended for use by vehicles.                                                                                                                                                                         |
| (light) <i>Grade C2</i> | Chambers for use with surface boxes capable of bearing wheel loads <sup>a</sup> up to 1 t, for use in areas to which vehicles would only have occasional access.                                                                                                    |

<sup>a</sup> The magnitude of the stated wheel load is as exerted by a stationary vehicle.

<sup>b</sup> As authorized by Statutory Instrument SI 1078 of 1986 of the Roads Vehicles (Construction) Regulations.

## 4 Marking

Each GRP unit, concrete base section and adaptor slab together with a minimum of 20 % of each delivery batch of concrete wall sections shall be clearly and indelibly marked with the following information:

- a) the number and date of this British Standard and the appropriate grade e.g. BS 5834-4:1988 A or BS 5834-4:1988 Grade A<sup>1)</sup>;
- b) the manufacturer's identification mark.

NOTE This does not preclude the use of adhesive labels or any other marking.

Where sulphate resisting Portland cement has been used all units shall be marked with the letter "S".

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<sup>1)</sup> Marking BS 5834-4 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

## Section 2. Reinforced concrete units

### 5 Materials

#### 5.1 Cement

The cement used shall be one of the following:

Ordinary and rapid-hardening Portland cement complying with BS 12

Ordinary and rapid-hardening Portland cement complying with BS 12 when used in conjunction with the following materials:

Ground granulated blastfurnace slag complying with BS 6699

Pulverized-fuel ash complying with BS 3892-1

Portland blast-furnace cement complying with BS 146-2

Sulphate resisting Portland cement complying with BS 4027

Portland p.f.a. cement complying with BS 6588

#### 5.2 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.

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

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

#### 5.3 Admixtures

Admixtures, where used, shall comply with BS 5075.

#### 5.4 Chloride content

The total chloride content of the concrete mix 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, BS 6588 or combinations with slag or p.f.a.                                                                                                                                  | 0.4                                                                                      |
| 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. |                                                                                          |

#### 5.5 Reinforcement

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

#### 5.6 Cover to reinforcement

The concrete cover to the reinforcing steel shall be not less than 20 mm.

#### 5.7 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. (Information on the suitability of water for making concrete is contained in Appendix A of BS 3148:1980.)

## 6 Manufacture and workmanship

### 6.1 Minimum concrete grade

The concrete shall have a minimum characteristic strength of 30 N/mm<sup>2</sup> at 28 days.

Compliance shall be checked in accordance with the requirements of clause 9.

### 6.2 Minimum cement content

The minimum cement content shall be 300 kg/m<sup>3</sup>.

NOTE The purchaser should state on his order or enquiry whether sulphate resisting cement is required.

### 6.3 Work in cold weather

Concrete shall have a temperature of at least 5 °C, which shall be maintained until the concrete has hardened.

NOTE If required, aggregates and water may be heated before mixing, to a temperature not exceeding 60 °C.

Other materials and moulds, if at a temperature below 0 °C, shall not be used. Concrete units shall be protected from frost for at least 48 h after casting.

### 6.4 Compaction

All units shall be compacted so that when hardened they shall be free from honeycombing and from any individual large (greater than 6 mm) void as defined in 4.4.1 of BS 1881-120:1983.

### 6.5 Freedom from burrs

Reinforced concrete units shall be free from burrs.

## 7 Design features and dimensions

### 7.1 Chamber sizes

The range of sizes of chambers shall be as given in Table 2.

**Table 2 — Nominal internal size of chamber**

| mm        |
|-----------|
| 230 × 230 |
| 305 × 305 |
| 380 × 230 |
| 430 × 280 |
| 610 × 455 |
| 610 × 610 |
| 915 × 610 |

The allowable tolerances for internal length and width are ± 6 mm up to and including 610 mm and ± 10 mm over 610 mm.

Any rounded or splayed corners shall not reduce the related minimum chamber area in the horizontal plane by more than 1 600 mm<sup>2</sup> at each corner for chambers up to and including 430 mm × 280 mm and 3 800 mm<sup>2</sup> for larger sizes.

### 7.2 Bearing slabs

Bearing slabs shall have a minimum depth of 75 mm.

### 7.3 Bearing slab aperture sizes

Where apertures are provided in bearing slabs they shall be as given in Table 3.

**Table 3 — Bearing slab aperture sizes**

| Nominal chamber size                                                                        | Aperture size |
|---------------------------------------------------------------------------------------------|---------------|
| mm                                                                                          | mm            |
| 230 × 230                                                                                   | 100 × 100     |
| 305 × 305                                                                                   | 295 × 295     |
| 430 × 280                                                                                   | 380 × 230     |
|                                                                                             | 230 diameter  |
| 610 × 455                                                                                   | 600 × 445     |
| NOTE The allowable tolerances for apertures are $\begin{matrix} +10 \\ -0 \end{matrix}$ mm. |               |

The aperture shall be positioned centrally in the bearing slab.

NOTE A 230 mm diameter aperture may be offset.

Bearing slabs with circular apertures shall each be supplied in two pieces (see Figure 1).

### 7.4 Base wall sections

Base wall sections shall have a depth of 150 ± 5 mm, 200 ± 5 mm or 280 ± 5 mm.

Base wall sections shall be supplied in either one or two pieces.

### 7.5 Intermediate wall sections

Intermediate wall sections shall have a depth of 75 ± 5 mm, 100 ± 5 mm, 150 ± 5 mm, 200 ± 5 mm or 300 ± 5 mm.

### 7.6 Wall thickness

Wall thickness shall be  $65^{+6}_{-2}$  mm,  $75^{+6}_{-2}$  mm or  $100^{+6}_{-2}$  mm.

### 7.7 Pipe slots

The sizes of slots, for units up to and including 610 mm × 455 mm nominal internal size, shall be given in Table 4.