

BS 1251:2015



BSI Standards Publication

Open-fireplace components

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Published by BSI Standards Limited 2015

ISBN 978 0 580 57839 7

ICS 97.100.30

The following BSI references relate to the work on this document:

Committee reference RHE/28

Draft for comment 13/30157623 DC

Publication history

First published November 1945

Second edition October 1959

Third edition November 1970

Fourth edition October 1987

Fifth (present) edition March 2015

Amendments issued since publication

Date	Text affected
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Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 March 2015. It was prepared by Technical Committee RHE/28, *Domestic solid mineral fuel appliances*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 1251:1987, which is withdrawn.

Information about this document

The principal changes introduced by this revision are as follows.

- Mention of different materials currently used in the construction of fireplaces and their suitability.
- The minimum projection of the hearth of inset open fires has been decreased in accordance with the Building Regulations [1], [2] and [3].
- Requirements are specified for mechanical fixings for cut stone and boxed section fireplace surrounds to secure them to chimney breasts.

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.

It should be noted that many desirable properties of open-fireplace components cannot be specified objectively. However, attention is drawn to the notes in this standard and to BS 8303, which gives guidelines for their assembly.

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 British Standard specifies requirements for components which, when assembled in accordance with BS 8303, form the setting for inset open fires of nominal sizes 400 mm and 450 mm (see Figure 1).

Clause 3 specifies requirements for firebacks for inset open fires without boilers or underfloor air supply used with solid fuel.

Clause 4 specifies requirements for prefabricated fireplace surrounds and hearths and excludes constructional hearths at floor level (see Figure 1).

Clause 5 specifies requirements for precast, reinforced concrete throat-forming lintels, excluding those designed to form part of a complete appliance.

NOTE 1 Lintels conforming to this British Standard are suitable for use as load-bearing supports for brickwork.

NOTE 2 Requirements for fireguards are specified in BS 8423.

2 Normative references

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

BS 4550-3, *Methods of testing cement – Part 3: Physical tests*

BS 4550-6, *Methods of testing cement – Part 6: Standard sand for mortar cubes*

BS 8303, *Installation of domestic heating and cooking appliances burning solid mineral fuels*

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

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

BS EN 12620, *Aggregates for concrete*

BS EN 14647, *Calcium alumina cement – Composition, specifications and conformity*

3 Firebacks

3.1 Design

Firebacks shall be designed for installation in two, four or five pieces, as shown in Figure 2a).

NOTE Two-piece firebacks may be manufactured in two separate sections, or in one section with suitable horizontal scribing to enable the pieces to be readily separated before installation.

3.2 Dimensions

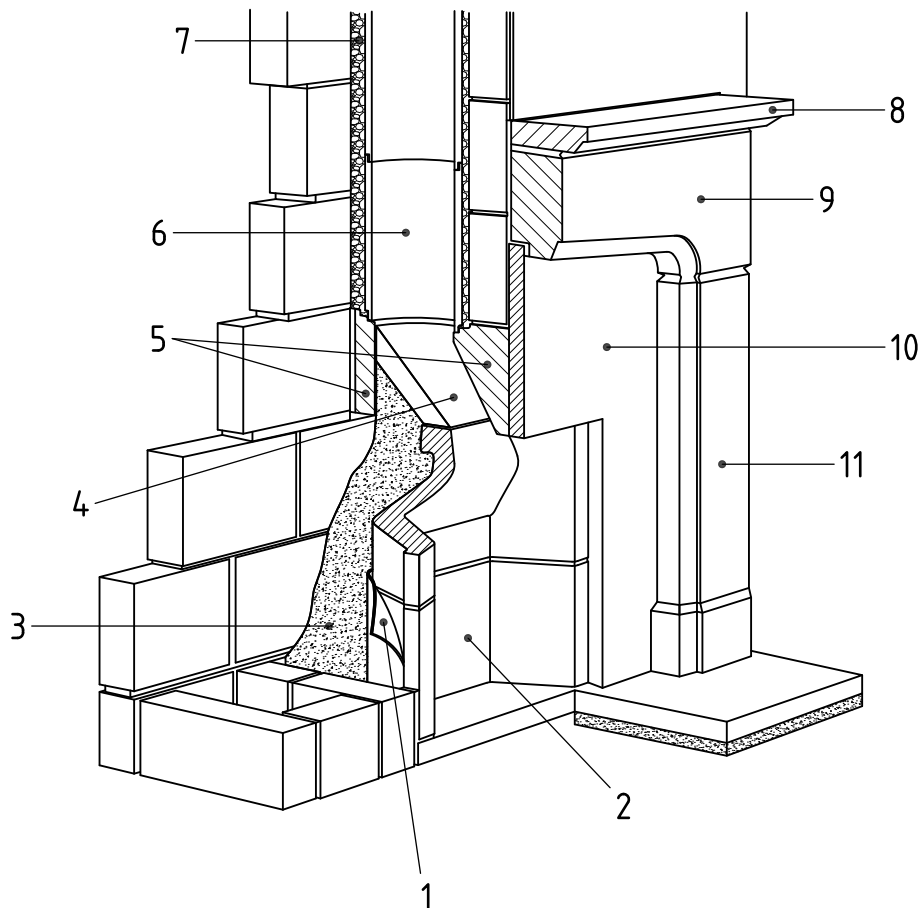
The dimensions of firebacks, when assembled without jointing, shall be as given in Figure 2b) and Table 1.

NOTE 1 Internal and vertical external angles may be sharp or rounded to a radius not exceeding 10 mm. External edges at the rear may be rounded to reduce the risk of damage to the edges.

Dimensions A and B shall be measured at the point where straight lines along the wings intersect straight lines along the front and back of the firebacks. The minimum thickness of the firebacks at any point shall be 40 mm.

NOTE 2 It is desirable for firebacks to be made with a shallow groove in the front face not less than 20 mm from the inner edge, to permit the insertion of non-combustible rope to ensure that the fireback forms an adequate seal to the back of the fireplace surround.

Figure 1 Typical assembly of open-fireplace components



Key

- | | | | |
|---|--------------------------------------|----|---------------------------|
| 1 | Corrugated cardboard | 7 | Insulating backfill |
| 2 | Fireback | 8 | Mantel shelf |
| 3 | Insulating backfill | 9 | Fireplace surround lintel |
| 4 | Flaunching in heat-refractory mortar | 10 | Fireplace surround |
| 5 | Factory-made gather | 11 | Fireplace surround jamb |
| 6 | Flue liner | | |

NOTE Insulating backfill should be either:

- a) 1 part ordinary Portland cement to 20 parts suitable lightweight expanded clay aggregate, minimally wetted;
or
b) 1 part ordinary Portland cement to 6 parts Vermiculite; or
c) 1 part ordinary Portland cement to 10 parts Perlite.

Figure 2 Firebacks

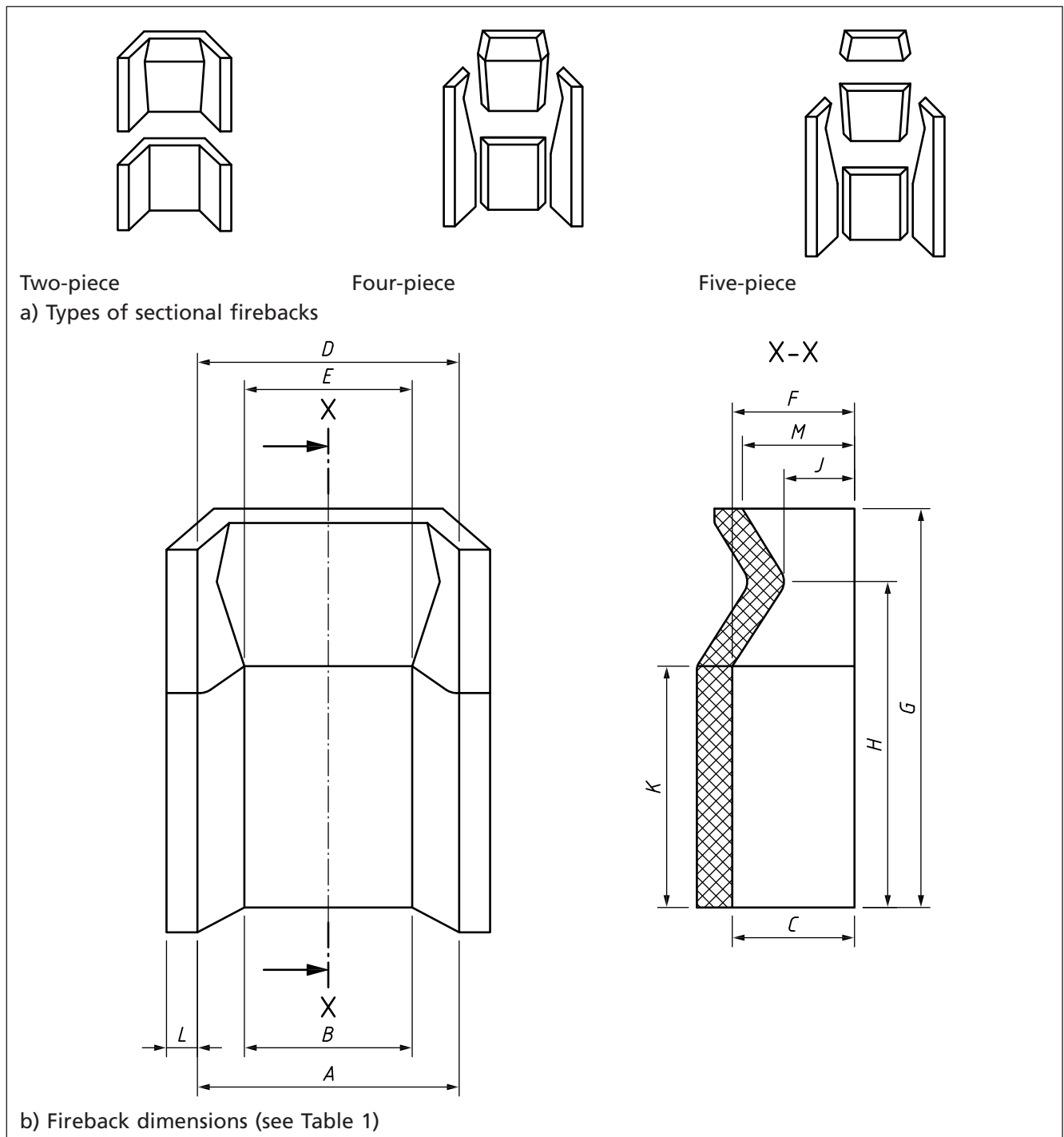


Table 1 Fireback dimensions

Nominal size of fire mm	Dimension											
	A ^{A)} mm	B ^{A)} mm	C ^{A)} mm	D mm	E mm	F mm	G ^{B)} mm	H ^{B)} mm	J ^{C)} mm	K ^{D)} mm	L ^{B)} mm	M ^{B)} mm
400	380	250	170	0 to 3	0 to 3	0 to 3	560	470	100	340	43	150
450	430	300	170	> A	> B	> C	560	470	100	340	43	150

Tolerances on dimensions:

A) +15/0

B) +10/0

C) ±10

D) 0/-10

3.3 Heat resistance

When tested in accordance with A.2, a specimen of the fireback obtained in accordance with A.1 shall show no signs of increased blistering, cracking, powdering or fusing.

3.4 Installation

Where a fireback is intended to be supplied in one piece, it shall be possible to split this along the score line before installation.

4 Prefabricated fireplace surrounds and hearths

4.1 Dimensions

4.1.1 Fire openings in fireplace surrounds

The dimensions of openings in fireplace surrounds shall be as given in Table 2.

Table 2 Dimensions of fireplace openings

Nominal size of fire mm	Dimension	
	Width mm	Height mm
400	410	560
450	460	560

Tolerances on dimensions:

- width: +10/0 mm
- height: 0/-5 mm

4.1.2 Surrounds

4.1.2.1 Flush back surrounds

The back of the surround at its periphery and around the fire opening shall be in the same plane. The thickness of the fireplace surround for a distance of at least 50 mm from the fire opening shall be not greater than 55 mm, including any integral metal fire frame. 25 mm glass fibre rope shall be attached to the slabbing with rope clips around the fire opening.

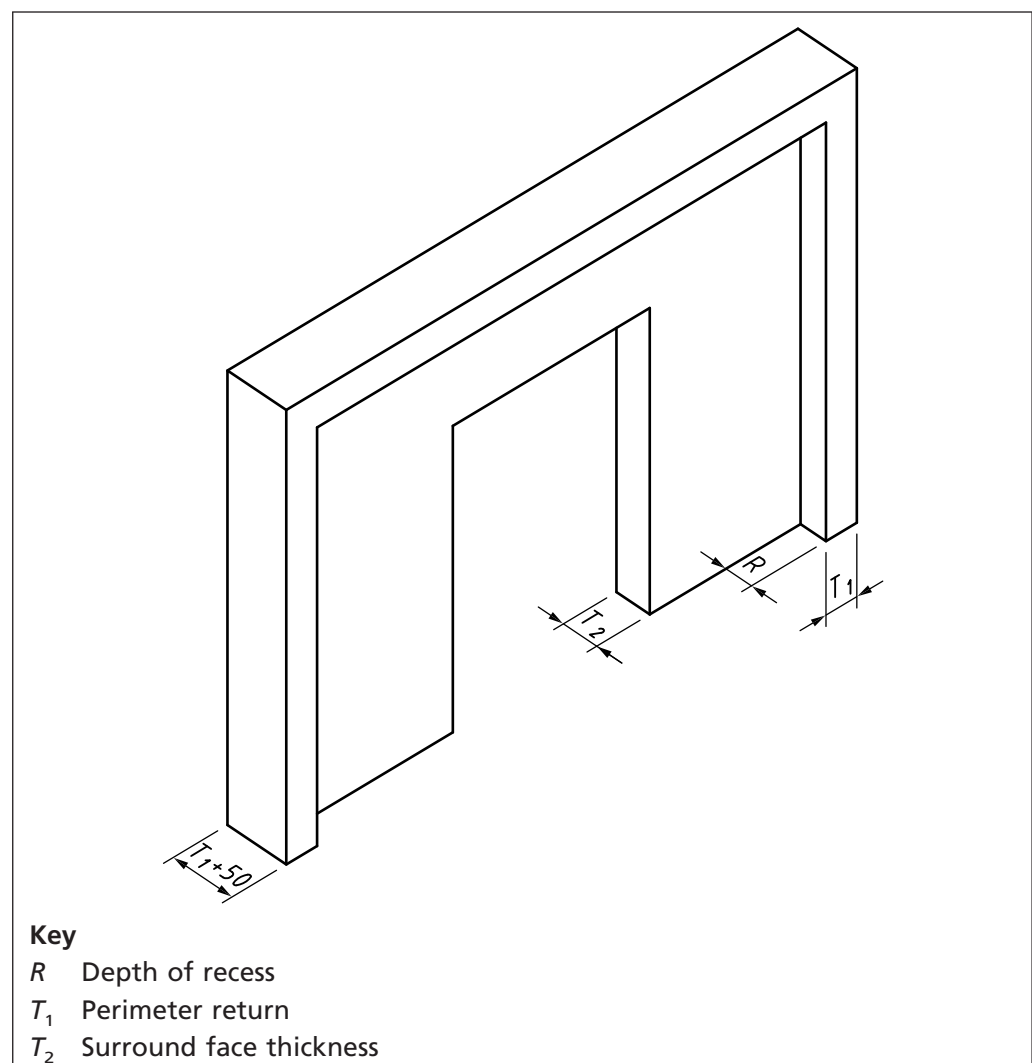
4.1.2.2 Recessed back surrounds

Where a fireplace is to be constructed for use with a shallow chimney breast (less than 350 mm deep) then a standard fireback or other inset appliance can project proud of the chimney breast. In these instances a recessed back surround can be used.

The recess in the back of the surround shall be not more than 50 mm deep and shall be consistent up to a point 50 mm from the perimeter of the surround. The thickness of the return at the perimeter shall be no thicker than the thickness of the face of the surround (see Figure 3).

The thickness of the surround for a distance of at least 50 mm from the fire opening shall be not greater than 55 mm, including any integral metal fire frame. 25 mm glass fibre rope shall be attached to the slabbing with rope clips around the fire opening (see Figure 3).

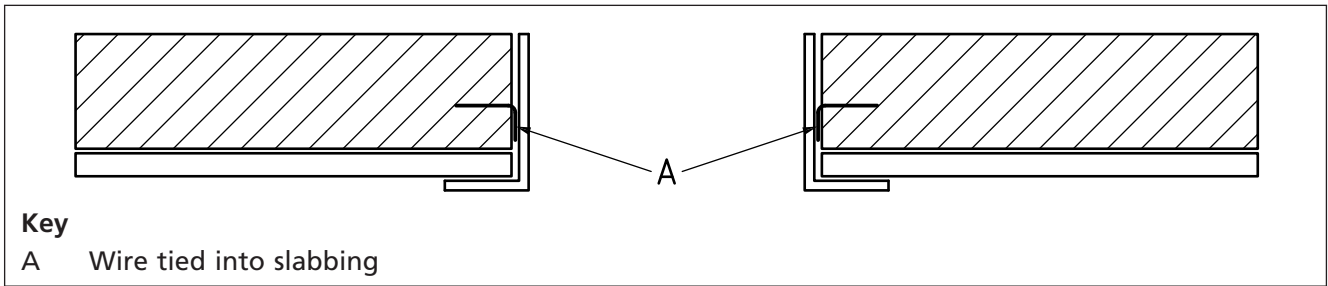
Figure 3 Depth of recess and thickness of surround (Recessed surround viewed from back face)



Metal fire frames shall be attached using wire ties cast into the surround (see Figure 4).

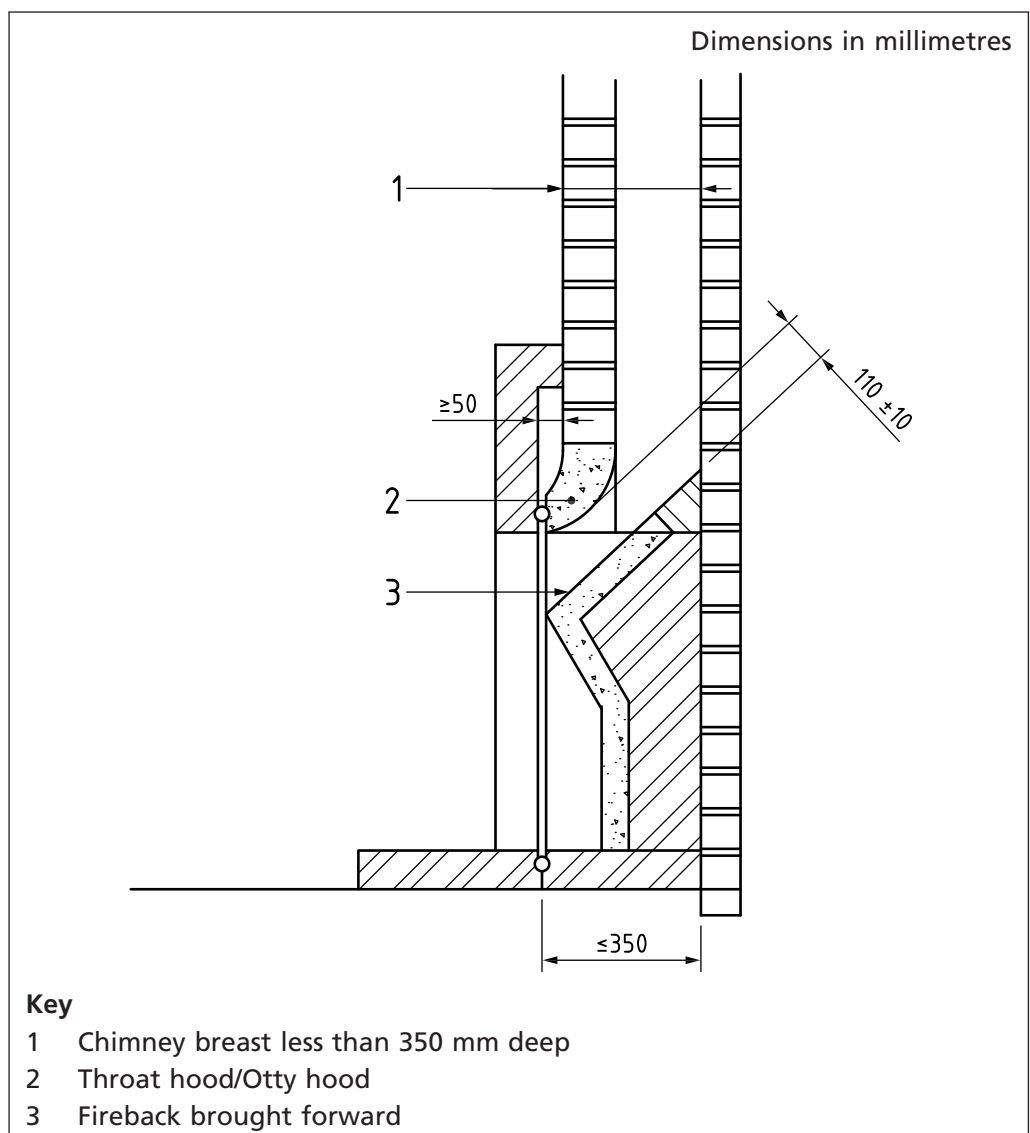
Where a surround is intended to be installed with an open fire, a standard throat forming lintel shall not be used. Instead, an otty hood or throat hood shall be used.

Figure 4 Frame fixing



An otty hood or throat hood shall project forward of the chimney breast and have a recessed groove for the fitting of a rope seal between it and the recessed rear of the fire surround, to ensure there is no gap in the throat formation for the open fire (see Figure 5).

Figure 5 Throat hood/Otty hood



4.1.2.3 Hearths

The hearth shall extend not less than 225 mm beyond each side of the fire opening of the fireplace surround. The hearth shall project at least the minimum dimension specified for the grate or firebed being used, and this dimension shall be not less than 300 mm in front of the face of the fireplace surround at the fire opening. The hearth shall also project at least 300 mm in front of the appliance firebed.

Hearth thicknesses shall be dependent upon the fuel or appliance to be used, with a minimum thickness of 20 mm. The hearth shall not extend under any open fire as a separate cast in situ or prefabricated back hearth will be required to match the level of the hearth supplied.

4.1.2.4 Wooden mantels

Where a fireplace consists of a marble, stone or ceramic back panel and hearth together with a wooden mantel, there shall be a minimum clearance to combustible material of 300 mm above the fire opening and 150 mm either side of the fire opening to the start of the wooden mantel.

NOTE Extra clearance might be needed when the fireplace is constructed for certain types of appliance.

4.2 Construction of fireplaces

4.2.1 General

4.2.1.1 Slabbed fireplace surrounds

For slabbed fireplace surrounds constructed from marble, stone, conglomerate and ceramic tiles on a backing of heat insulating cement mix, the backing of surrounds and hearths shall be constructed of a reinforced lightweight concrete mix having a thickness of not less than 30 mm for marble or stone and 40 mm for tiles. The overall thickness, including any facing material, shall be not less than 48 mm. The backing of the marble or tiles shall be coated with a bonding agent before filling to aid adhesion and seal the material against staining from the process.

NOTE 1 See 4.2.3 for the fixings for fireplace surrounds.

After manufacture, slabbed parts shall be left to dry overnight and covered with a membrane to allow the slabbing to cure evenly and not dry out too quickly. During this process the surround shall be protected from frost.

NOTE 2 High alumina cement has a drying time of approximately six hours and achieves complete setting within 24 hours.

Normal Portland cement shall be left for 24 hours before moving.

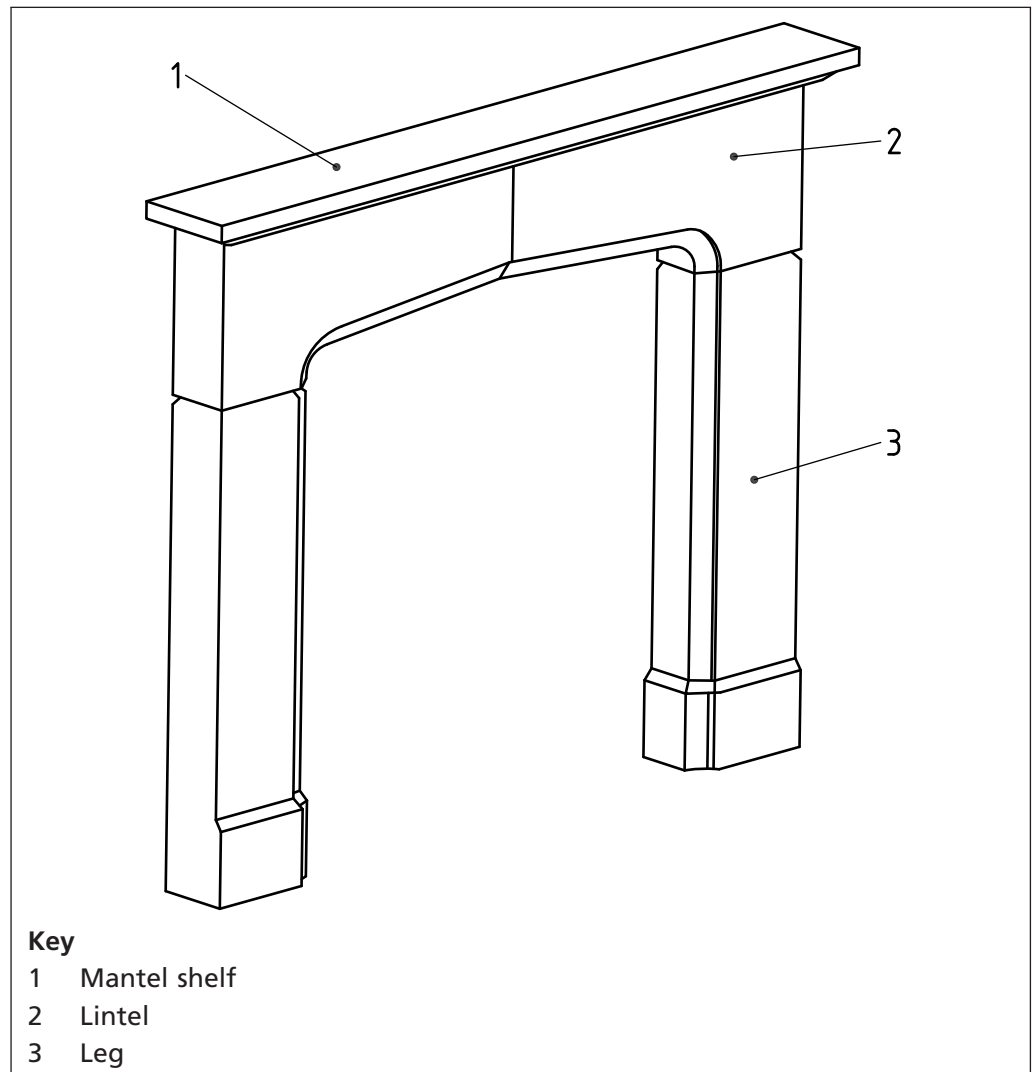
4.2.1.2 Cut stone fireplaces

NOTE 1 Many fire surrounds are produced with an outer surround manufactured from cut heavy stone sections, the most common design consisting of two vertical legs over which rests a horizontal lintel that has a mantel shelf on top (see Figure 6).

Because cut stone surrounds have little inherent stability and are often unstable by design, with a large overhanging mantel shelf in comparison to the width of the vertical legs, they shall be manufactured with provision for mechanical fixing of each stone either directly to the backing wall or to another stone which itself is mechanically fixed to the backing wall.

NOTE 2 See 4.2.3 for the fixings for fireplace surrounds.

Figure 6 Cut stone fire surround



4.2.1.3 Boxed section fireplace surrounds

A boxed section fireplace surround shall be manufactured from natural stone or marble and be marked as to its suitability with either a gas or solid fuel fire. A fireplace for solid fuel use shall either:

- a) have loose slips for the back panel with a minimum thickness of 30 mm if designed to be used with an open convector type fire, or 50 mm if intended to be used with a metal fire trim and refractory fireback; or
- b) be supplied with a slabbed and sectioned back panel.

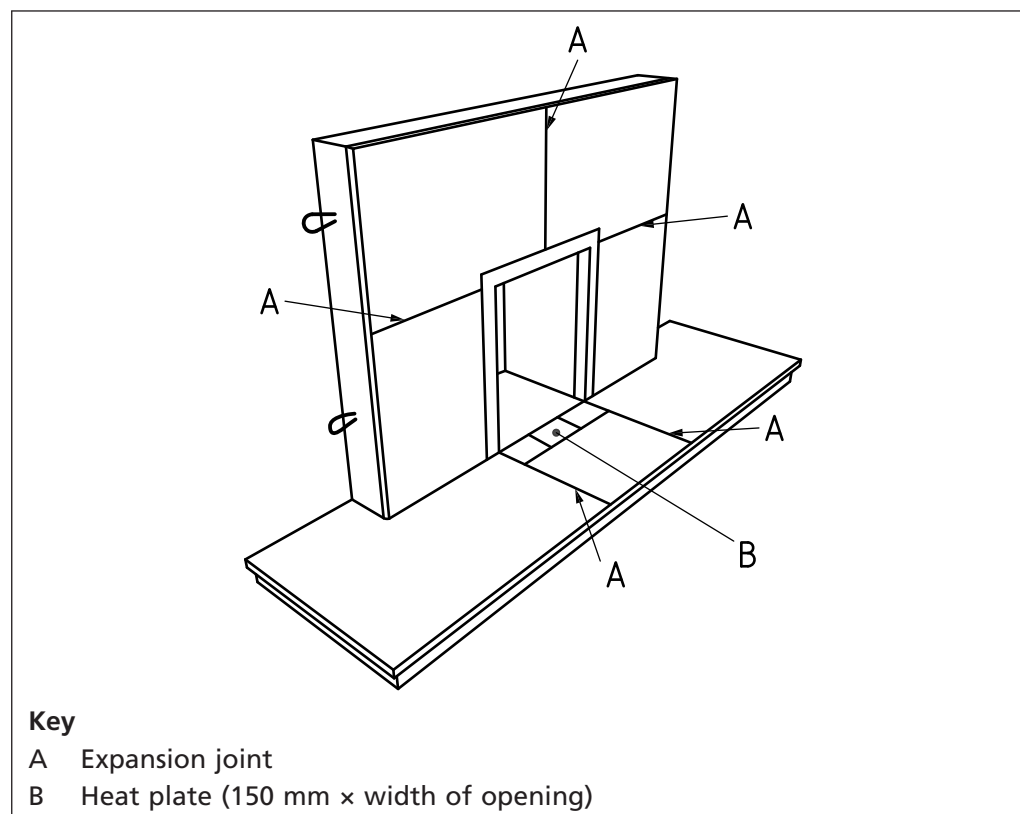
The hearth shall be 50 mm solid and sectioned with a replaceable heat plate of the same material, marble, granite or metal to correspond with the fire opening, or boxed, sectioned and slabbed with a heat plate.

NOTE 1 Facing materials: If marble or limestone is used for a fireplace for a solid fuel appliance they should be natural and not conglomerate (which constitutes a fire risk when used with such appliances). The back panel and hearth should be split, to aid expansion. Back panels should be split into three or four sections before slabbing back panels together, which should comprise legs and a one or two piece head (see Figure 7). Hearths should be split into two or three sections with a marble, limestone, granite or metal heat plate with a fireclay or similar strip directly in front of the fire opening (see Figure 7). If ceramic tiles are used, it is recommended that they have a thickness of not less than 8 mm if their water absorption is greater than 3%. Ceramic tiles having a water absorption of less than 3% should have a thickness of not less than 6 mm. Water absorption should be tested in accordance with BS EN ISO 10545-3.

NOTE 2 See 4.2.3 for the fixings for fireplace surrounds.

NOTE 3 Storage of surrounds and hearths: After manufacture, fireplaces should be stored under cover in weatherproof conditions and should at all times be protected from frost.

Figure 7 Heat plate



4.2.2 Slabbing materials

4.2.2.1 Concrete mix

Concrete shall consist of a mixture of one of the cements specified in 4.2.2.2 and the aggregate specified in 4.2.2.3.

If Portland cement is used, the mix shall contain between 3.5 and 6 parts of aggregate to 1 part of cement by volume. If high alumina cement is used, the mix shall contain between 5 and 7 parts of aggregate to 1 part of cement by volume.

NOTE No material that has been exposed to the action of frost should be used until such material has been completely thawed.

4.2.2.2 Cement

The cement shall conform either to BS 4550-6 or BS EN 14647.

4.2.2.3 Aggregate

The aggregate shall be capable of wholly passing a screen of nominal aperture size 9.5 mm. Alternatively, a lightweight aggregate (Vermiculite or Perlite) can be used, in which case no sand is needed in the mix.

NOTE Aggregates, including sand, should be sharp and free from clay, and organic or soluble matter.

4.2.2.4 Mixing agent

Celacol or similar shall be used in the mix at the manufacturer's specification to aid adhesion.

4.2.2.5 Reinforcement of the concrete.

Reinforcement shall be of low carbon steel rod, low carbon steel mesh or purpose-made corrugated low carbon steel strip. It shall be visibly free from grease, loose rust or scale. Reinforcement shall not be in contact with the back of the facing material.

4.2.2.6 Bonding agent/sealant

A bonding agent/sealant shall be used to coat the back surface of marble or limestone that is being slabbed, to aid adhesion of the slabbing and protect the marble or stone from leaching by the slabbing mix. The bonding agent/sealant shall be applied in accordance with the manufacturer's instructions.

4.2.3 Mechanical fixing arrangements for fireplace surrounds

All individual sections of slabbed fireplace surrounds and/or slabbed back panels shall have four clips or eyelets, two fixed at each side of the surround and the upper pair positioned within 300 mm of the top of the fireplace surround. The projecting portion of the clips or eyelets shall be of either the fixed or swivel type and shall have a minimum length of 65 mm. The fixing hole in each clip or eyelet shall be of 6.5 mm nominal diameter if circular, or of 6.5 mm nominal width if in the form of a slot or eye system.

Cut stone fireplace surrounds shall be provided with full fixing instructions and any necessary fixing brackets and fixings needed to attach the brackets to the fireplace. The instructions shall also make clear to the installer the need to use heatproof fixings appropriate for the type and construction of the backing wall as these might be different to those provided with the fireplace (see Figure 8). Each stone section shall be mechanically fixed back either directly to the chimney breast wall or to another stone which itself is mechanically fixed to the backing wall using appropriate fixings.

The manufacturers of a fireplace surround should provide detailed instructions and diagrams for the particular fireplace surround, which:

- a) *set out the sequence of installation;*
- b) *list the form of bedding/jointing material to be used and the extent to which it is applied;*
- c) *show the location of the mechanical fixings;*
- d) *give the type/form of the mechanical fixing;*
- e) *describe how the mechanical fixings are attached to the surround and secured to the various form of brickwork/blockwork that could form the chimney breast; and*

- f) give the curing time before weight can be applied to the fireplace surround fire lit.

Fixing brackets shall be provided by the manufacturer of the fireplace surround and be purpose-made to locate into holes, rebates or dowel holes provided by the manufacturer into the stone sections. The brackets shall be manufactured from stainless or galvanized steel and be of a size suitable to withstand any dead or imposed load applied to the fireplace surround.

The manufacturer's fixing instructions shall require the installer to assess the chimney breast onto which the fireplace is to be secured, that it is of sound construction and suitable for supporting the weight of the fireplace. The instructions shall require the installer to determine which heatproof fixings are appropriate for the fireplace wall type and construction. Fixings used to secure the brackets to the masonry of the chimney breast shall be of expansive stainless or galvanized steel type masonry fixings for dense concrete block work or brickwork. Where fixings are located into light weight block work or friable aggregate blocks, the fixings shall be of the resin anchor type.

NOTE See Figure 9 for typical fixing locations for cut stone surrounds.

Figure 8 Typical fixing brackets for cut stone surrounds

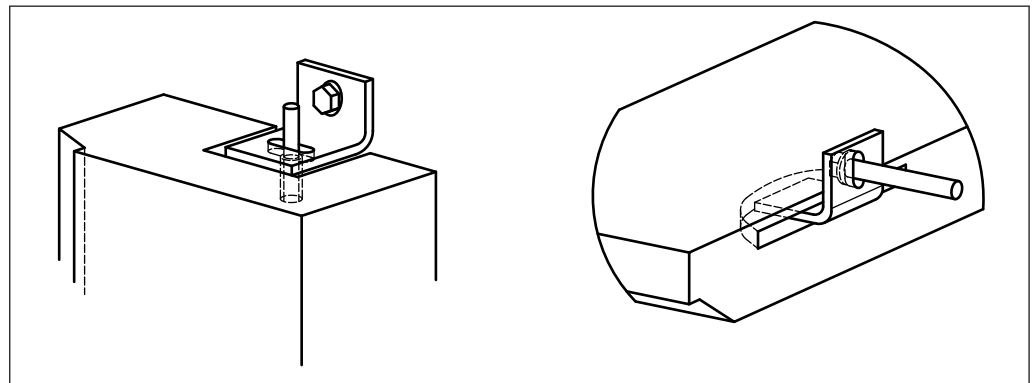
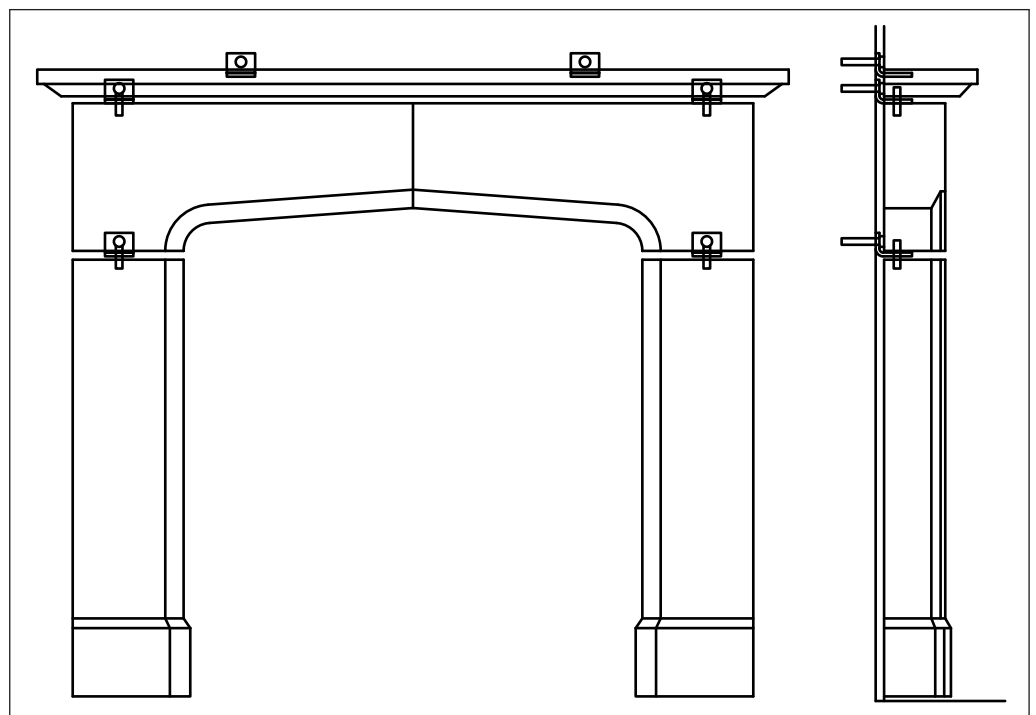


Figure 9 Typical fixing locations for cut stone surrounds



Boxed section fireplace surrounds shall be supplied with fixing wires at each side of the surround, the upper pair positioned within 300 mm of the top of each leg, and to the header section with brackets, clips or eyelets, to allow the fireplace to be screwed back to the wall (if the method of fixing is by blocks glued inside the surround and fixing wires, the adhesive used to secure the blocks to the surround shall be of a type that is not affected by heat and is strong enough to provide a bond equal to that of the mechanical fixings supplied or used). The fixing hole in each clip or eyelet shall be of 6.5 mm nominal diameter if circular, or of 6.5 mm nominal width if in the form of a slot or eye system. The shelf shall also have its own fixing points to secure it to the wall and body, and a method shall be provided with the surround indicating the different requirements for fixings dependent upon shelf overhang. If fixing screws are not supplied, details of the weight shall be provided so that the installer can select the appropriate fixings.

5 Throat forming lintels

5.1 Materials

5.1.1 General

Lintels shall be made from reinforced concrete.

NOTE 1 If lintels are used in conjunction with other fireplace components as shown in Figure 1, they should form a smooth entry for the gases and protect the fireplace surround from excess heat.

NOTE 2 Precautions should be taken against frost damage as described in Note 3 to 4.2.1.3 and the note to 4.2.2.1.

5.1.2 Cement

The whole of the cement used in the manufacture of the lintel shall conform to BS EN 197-1, BS 4550-3 or BS EN 14647, as applicable.

NOTE When Portland cement is used, the lintel should be steam cured or allowed to mature in damp surroundings for a period of not less than 21 days.

5.1.3 Aggregate

Aggregate shall be either crushed firebrick, capable of wholly passing a sieve of nominal aperture size 13.2 mm, or naturally occurring aggregate conforming to BS EN 12620 for an all-in aggregate of 10 mm nominal size.

5.1.4 Reinforcement

The reinforcement shall consist of one low carbon steel bar of 8 mm nominal diameter.

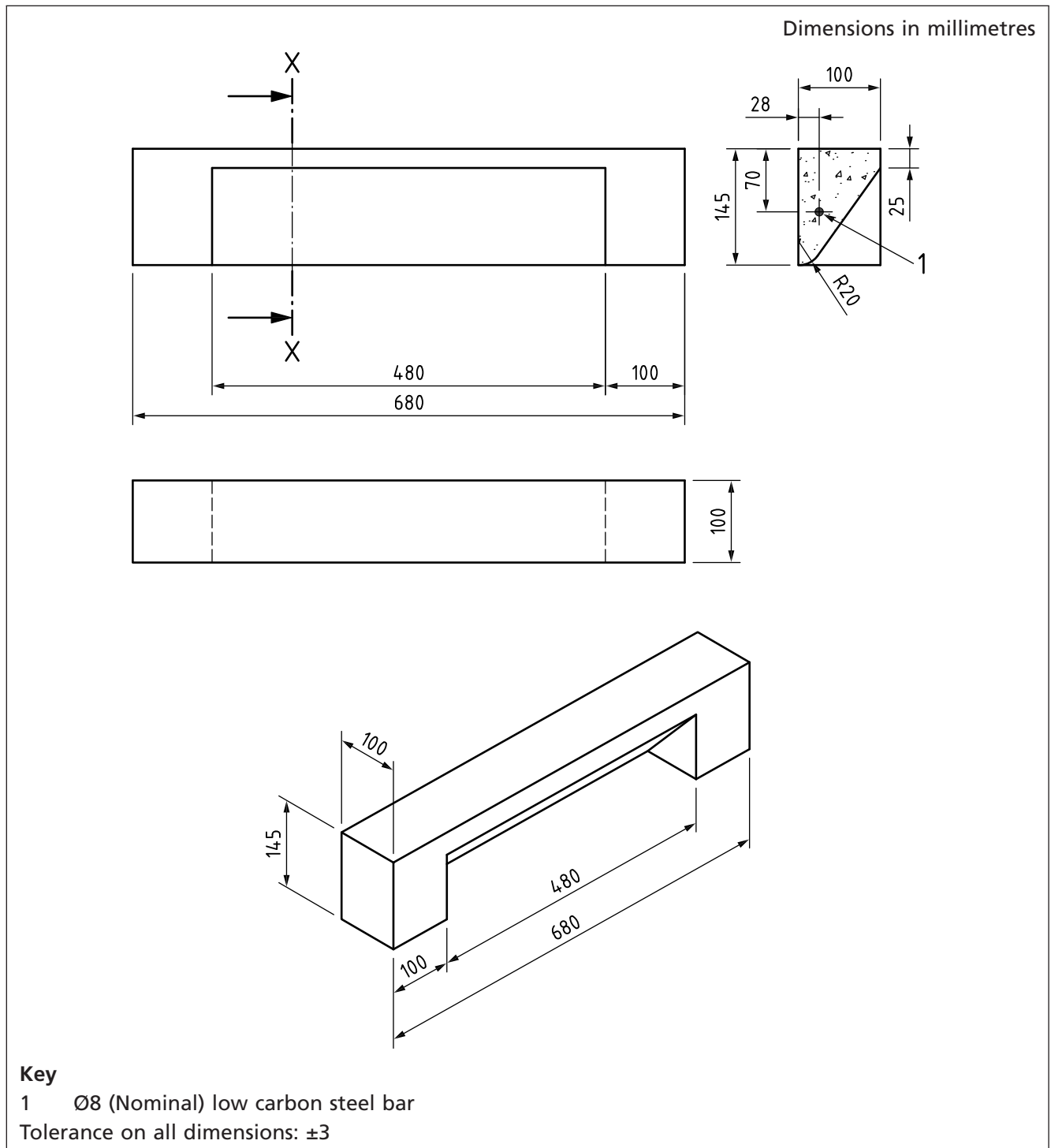
5.2 Dimensions

The dimensions of the lintel shall be as given in Figure 10. The reinforcement bar shall extend to within 25 mm of each end of the lintel and be set in the approximate position shown in Figure 10. The concrete covering the bar shall be at least 20 mm thick.

5.3 Compressive strength

The material comprising the lintel shall have a compressive strength of not less than 17 N/mm² at 28 days. This shall be determined for concrete cubes cast in a manner similar to the lintel, by the method described in BS EN 12390-3.

Figure 10 Precast concrete throat-forming lintel



6 Marking

Each fireplace component shall be permanently and legibly marked with the following information:

- a) the number and year of this British Standard ¹⁾;
- b) the nominal size of the fire (unless the component is suitable for all four sizes of fire); and
- c) the manufacturer's identification mark (to avoid confusion between parts of different design).

NOTE In addition, it is recommended that an adhesive label carrying the information in items a) to c) is fixed to the face of each surround or hearth.

¹⁾ Marking BS 1251:2015 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 solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

Annex A (normative)

Heat resistance test

A.1 Specimens

A.1.1 *Two specimens of full thickness with facial dimensions of (150 × 150) ±10 mm, cut from any area of the fireback.*

A.2 Procedure

Place one specimen (**A.1.1**) on a flat refractory support, with one face fully exposed, in a kiln or oven capable of holding it without touching the sides. Raise the temperature at a rate not exceeding 250 K/h to a temperature of 1 280 °C to 1 320 °C. Hold within this temperature range for 1 h.

Allow the kiln or oven to cool at a rate not exceeding 250 K/h to ambient temperature. Compare the visible condition of the tested specimen with that of the untested specimen.

NOTE If a flame-heated kiln or oven is used, the atmosphere within the kiln or oven should contain excess air throughout the test.

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 8423, *Fireguards for fires and heating appliances for domestic use – Specification*

BS EN ISO 10545-3, *Ceramic tiles – Determination of water absorption, apparent porosity, apparent relative density and bulk density*

Other publications

- [1] ENGLAND AND WALES. The Building Regulations 2010 (England and Wales), as amended. London: The Stationery Office.
- [2] SCOTTISH PARLIAMENT. The Building (Scotland) Regulations 2004, as amended. Edinburgh: The Stationery Office.
- [3] NORTHERN IRELAND. The Building Regulations (Northern Ireland) 2012. London: The Stationery Office.

Further reading

STONE FEDERATION GREAT BRITAIN. *Fireplace Surrounds*. Folkstone: Stone Federation GB. March 2013.

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