



SFA Guide to Open Fire Installation



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Open Fires

Introduction

If the open fire is the main heat source in a room then to comply with Approved Document J 1A and 1B the minimum efficiency of the finished installation must be at least 37%. To achieve this, the installation will need to meet BS 8303 and have a sealed in, controlled, open fire.

The installation of a simple inset open fireback is not an easy task and must be undertaken correctly and with care. If this is done it will provide the end user with many years of trouble free use.

The main components commonly employed in a typical installation are as follows:-

1. Fireback or boiler set
2. Throat forming lintel
3. Fire surround and superimposed hearth
4. Appliance

Note: the appliance should be constructed in accordance with BS 4834 and with components (items 1 to 4 above) manufactured to the requirements of BS 1251 (Specification for open fireplace components). When manufactured to these requirements, a minimum efficiency of 37% is deemed to have been met. Where an inset open fire includes a boiler, the efficiency must be confirmed using the test given in BS 4834.

All of the above components are installed or fixed to an appliance recess supported by a constructional hearth both of which are fully described later in this chapter and additional information in BS 8303.

The installation methods described later deal with fireback or boiler set into a recess where a new surround is to be fitted or where the existing tiled surround is to be used. Cast iron inset open fires follow similar procedures taking into consideration any specific manufacturers' instructions and have appropriate seals and fixings.

Pre-Installation Check List

For any solid fuel fired appliance to operate successfully it needs to be correctly installed into a suitable recess constructed on a suitable constructional hearth and connected to a suitable chimney. To ensure that any work carried out results in a successful installation suitability of the following items should be checked.

The constructional hearth

The back hearth

The superimposed hearth

The fire place recess

The chimney

The throat forming lintel

The levels of ventilation

If all the above are found to be satisfactory (within normal building tolerances) the installation can then be carried out.

Requirements for Open Fires

Hearth

All domestic solid fuel fired appliances are required by law to be sited on a hearth. Hearths should be constructed of suitably robust materials and to appropriate dimensions such that, in normal use, they prevent combustion appliances setting fire to the building fabric and furnishings, and they limit the risk of people being accidentally burnt as required by J3 of the Building Regulations. (Fig OF-1).

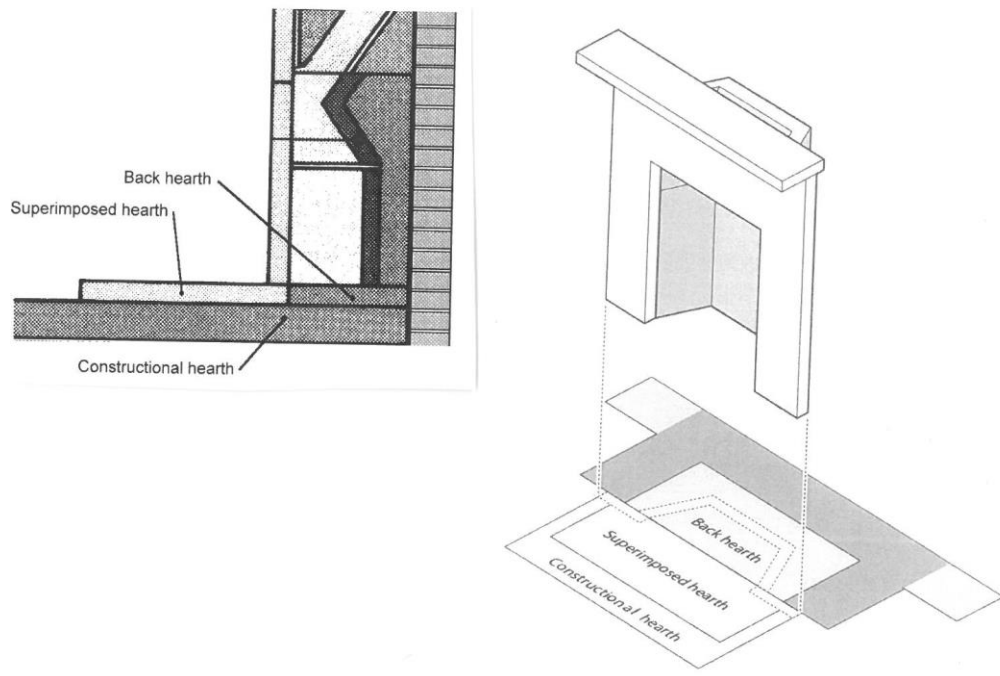


Fig OF-1

In a typical installation the hearth will consist of three separate components thus:-

1. The constructional hearth which may be part of the structure of the building.
2. The superimposed hearth which is of non-combustible material, usually decorative and set upon the constructional hearth.
3. The back hearth which can be part of the constructional hearth, or concrete infill, contained within a fireplace recess.

Constructional Hearth (thickness)

This component should be constructed from solid non-combustible material at least 125mm thick.

This dimension may include the thickness of any solid, non-combustible floor under the hearth and/or decorative surface (E.g. a superimposed hearth), see clauses 2.22 to 2.25 and diagram 25 of Approved Document J).

Constructional Hearth (size)

The fireplace recess should be filled and the hearth should project 500mm in front of the brick/blockwork used to construct the recess and 150mm each side of the recess (see clause 2.24 and 2.25 diagram 24 of Approved Document J).

Superimposed Hearth

There are two sets of dimensions to consider here, one is the regulatory minimum sizes given in the Approved Document J and the other is the best practice sizes as stated in Technical Handbook (BS 1251) see diagram 26 of the Approved Document J and Fig OF-2 below.

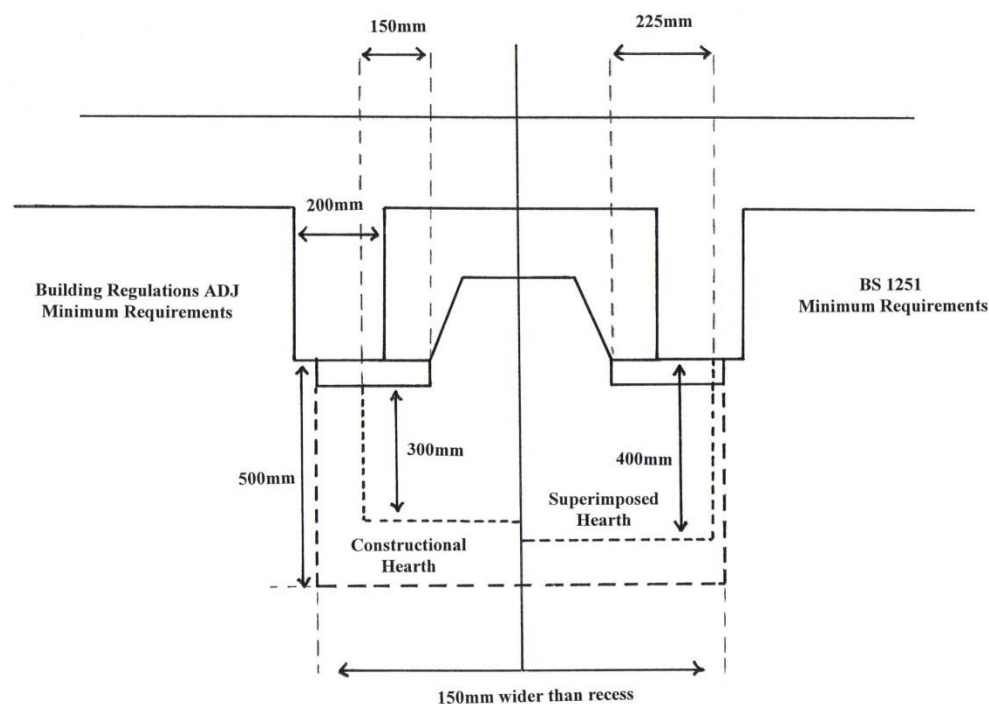


Fig OF-2

Building Regulations

The superimposed hearth, or decorative surface, is intended to mark the safe perimeter from the fire for combustible material.

In Approved Document J it states there should be a change in level to mark this perimeter but does not give any recommended height. This perimeter must be 300mm in front of the fire itself (the furthest forward point from which hot fuel or ashes can fall) and be at least 150mm either side of the fire.

Approved Document J also gives information about the proximity of combustible material adjacent to the constructional hearth and under a superimposed hearth and ways of providing a hearth (Clauses 2.26, 2.27, 2.28, 2.30 and diagram 27 of Approved Document J).

British Standards

When a British Standard superimposed hearth is used it should be manufactured to BS 1251 and be made of non-combustible material, typically at least 48mm thick, and should project not less than 300mm in front of the face of the fireplace surround. It is regarded as a way of providing a warning to the building occupants of getting too close to the fire and to discourage combustible floor finishes, such as carpets, from being laid too close to the appliance. A superimposed hearth need not be as large as the constructional hearth.

Back Hearth

The back hearth upon which the fireback or boiler set stands must be flush and level with the finished surface of any superimposed hearth. This can be cast in-situ or precast and bedded in position. The back hearth may form part of the constructional hearth, or the superimposed hearth, but the overall thickness of the hearth must comply with the constructional hearth requirements (125mm).

Fireplace Recess

The fireplace recess is sometimes known as the builders opening or appliance recess. However BS 1846 Glossary of Terms, relating to solid fuel burning equipment, defines the fireplace recess as the space formed in a wall or chimney breast into which a heating appliance may be placed and from which a flue leads.

Fig OF-3 shows the size recommended in BS 8303.

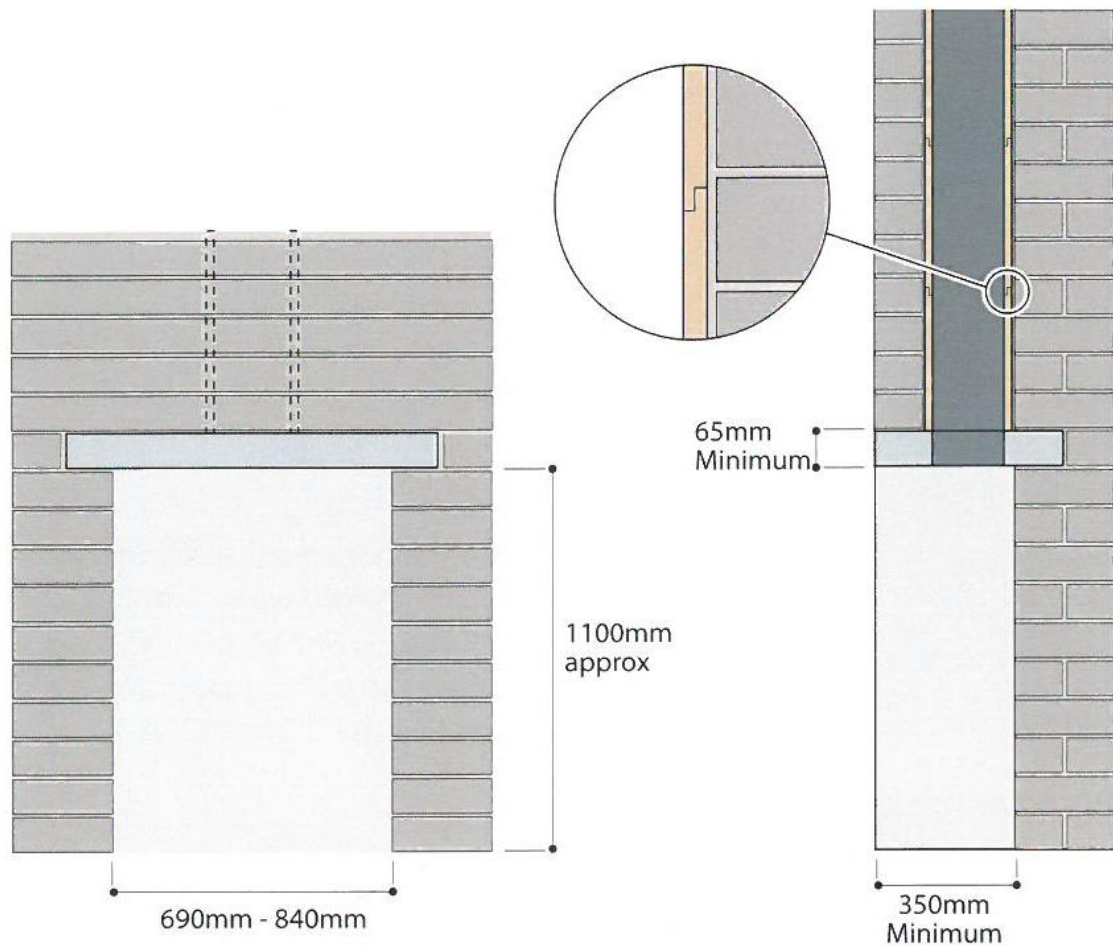


Fig OF-3

Traditionally the fireplace recess will be constructed out of brick or blockwork (but not lightweight blocks) and will usually measure about 580mm wide, 330mm deep and 630mm to 660mm high. In old properties the recess may be appreciably larger.

A recess of this size will accommodate the majority of firebacks or boiler sets currently available.

Please note, the above diagrams are a guide only as fireplace sizes do vary according to the age of the property.

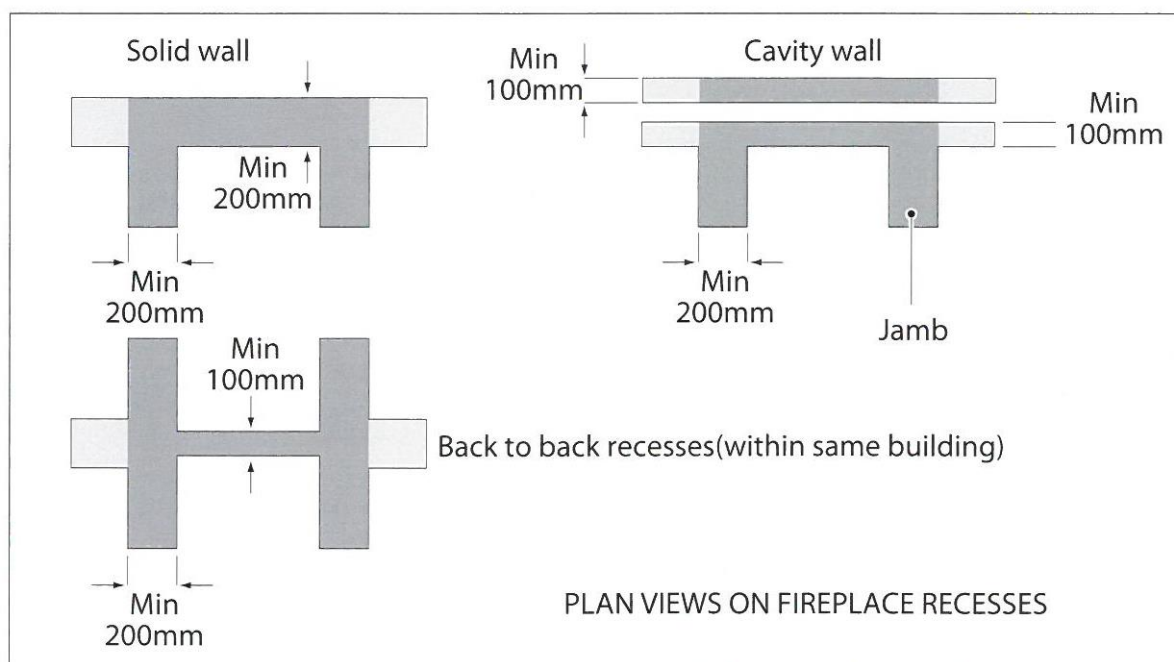


Fig OF-4

Currently, Building Regulations specify that a fireplace recess constructed in conventional materials (E.g. brick or block work) must be in accordance with the requirement shown in Fig OF-4 above (Diagram 28 of Approved Document J). In older dwellings these requirements are often not met and care should be taken to ensure that adequate provision is made to protect any combustible material nearby. Alternatively, a fireplace recess may be a prefabricated factory-made appliance chamber made with insulating concrete. The requirements for these are given in clause 2.30 and Diagram 28 of Approved Document J.

Approved Document J also gives advice concerning separation of combustible material from fireplaces (see clause 2.18 of appendix Approved Document J) and on fireplace lining components as it relates to heat protection of the fireplace recess.

Throat Forming Lintel

The throat forming lintel which is shaped to form part of the throat above the fireback or boiler set is available in a range of sizes to suit different fireplace opening widths, (see Diagram 29 of Approved Document J and Fig OF-5 below).

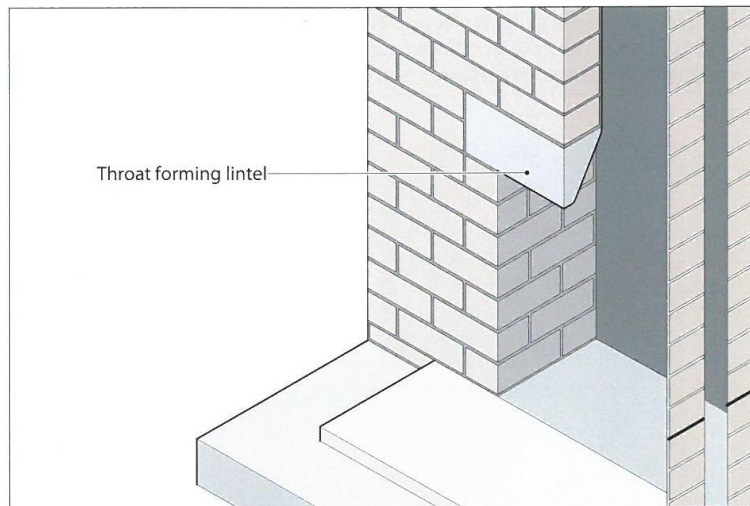
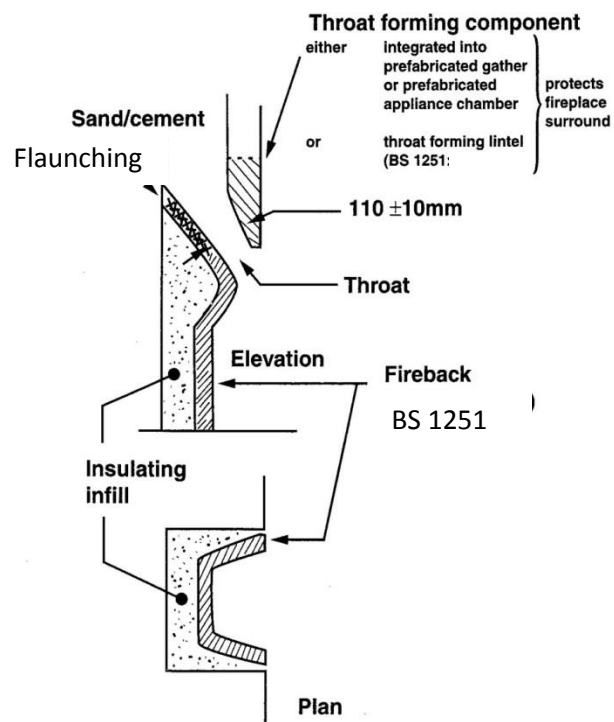


Fig OF 5



Fireplace Gathers

To minimize resistance to the proper working of flues, tapered gathers should be provided in fireplaces for open fires. Ways of achieving these gathers are given in clause 2.21 and Diagram 22 of Approved Document J and OF-6 as shown below.

Older properties may still have corbelled gather that has not been smoothed over. These should not be used as any render applied to smooth out irregularities may not adhere to the existing soot damaged brickwork.

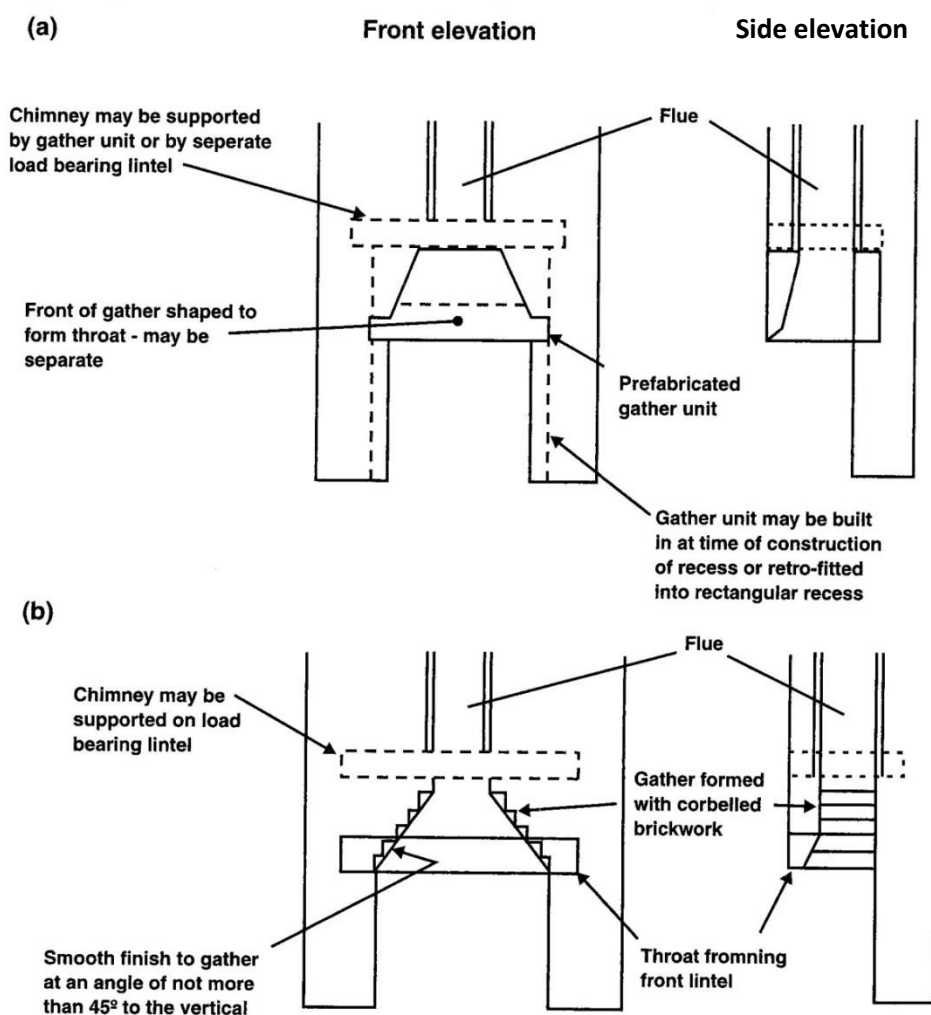


Fig OF-6

Installation of a fireback or boiler set with a new tiled surround and hearth

Preparation

1. It is important to ensure that the tiled surround fits flush against the chimney breast. Any plaster or dry lining preventing this should be cut away approximately 50mm wider on each side and 50mm higher than the dimensions of the surround.
2. The back hearth should be correctly positioned and levelled, being set back from the chimney breast by 12mm. It is important to ensure that the superimposed hearth (which will be fixed at a later stage) and the back hearth are level with each other,

Installation

3. The fireback should be correctly positioned on the back hearth, so that its front edge is in line with the front edge of the back hearth. This can be confirmed by making a trial fitting of the surround ensuring that the opening in the surround matches the front edges of the fireback or boiler set and that the surround and fireback or boiler are plumb.
4. The fireback should now be removed from the recess and split into two parts, along the wire cut set in the rear of the component.
5. Note: - the fireback is split due to the fact that the bottom section is in contact with the fuel bed and expands and contracts far more than the top section, thus preventing cracking. Firebacks are also available in 4 or 5 piece variants.
6. The bottom section of the fireback should now be bedded on the back hearth using lime mortar. The gap on either side of the fireback and the jambs should now be bricked up.
7. Corrugated cardboard should now be wrapped around the rear of the fireback and the cavity filled with a damp Vermiculite/Pearlite concrete (6:1 Vermiculite/cement or 10:1 Pearlite/cement).

8. Note:- once the fire has been used the corrugated cardboard will char away leaving an expansion gap.
9. The top section of the fireback should now be positioned on the bottom section without the use of any jointing material. The gap between the fireback and the jambs should be bricked up and the cavity filled with Vermiculite/Pearlite concrete as before.
10. A throat forming lintel should now be bedded either on to the brickwork either side of the surround or on top of the fireback, depending on the type use. It should be positioned approximately 10mm above the top of the fireback and with its front edge level with the front of the fireback. (See Fig OF-7).

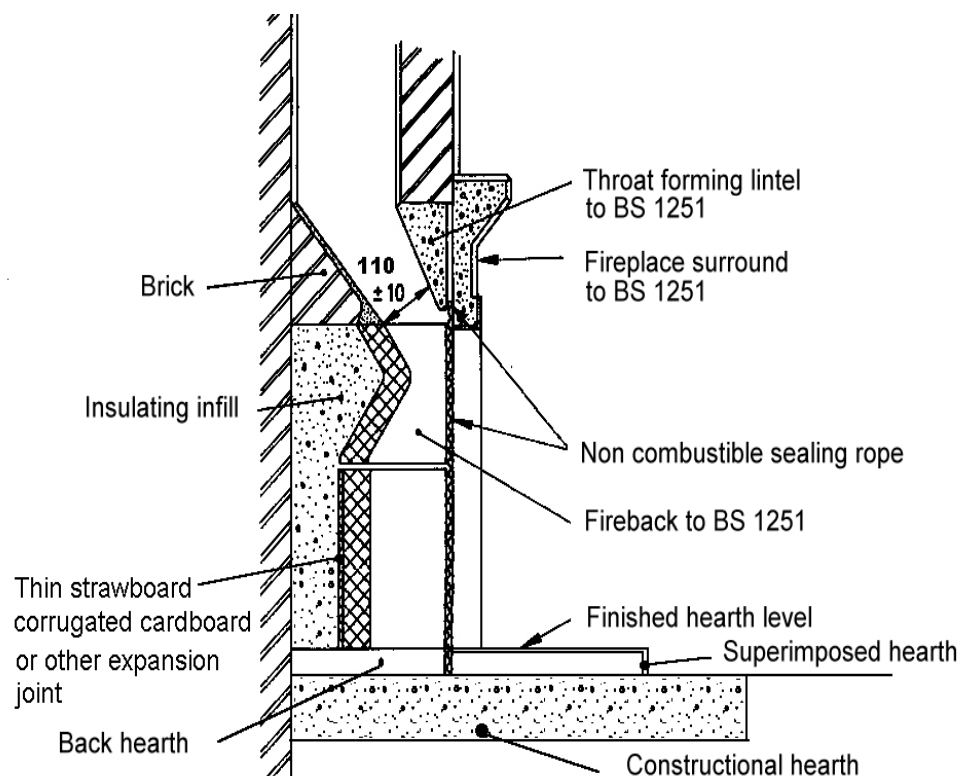


Fig OF-7

11. The space to the back and sides of the fireplace recess above the fireback should be infilled with Vermiculite/Pearlite concrete to eliminate any large spaces above the throat and provide a tapered gather for a smooth entry for the flue gas into the chimney (see clause 2.21 of Approved Document J). The final flaunching finish should be a mix of 1:1:8 cement/lime/sand. (See Fig OF-5). At the back the filling should be angled at no more than 45° so that there is a smooth transition from the knee of the fireback to the rear of the flue wall. The space between the throat forming lintel and the supporting lintel should now be bricked up.
12. The superimposed hearth should now be bedded down and levelled on a weak mix of lime mortar. The tiled surround should now be fixed using the adjustable lugs on either side. The plaster work should be made good and the heat resisting rope packed into the 12mm gap between the back of the surround and the hearth, fireback and throat forming lintel.

13. Fig OF-8

Note: - the lugs are adjustable to ensure that a fixing position in the middle of a brick can be achieved. Where necessary, anchorage points for securing a nursery fire guard may be provided at this stage. If the fire surround is to be constructed on site the maximum thickness at the fireplace opening should be 55mm and it should extend at this thickness for at least 50mm all the way around the opening.

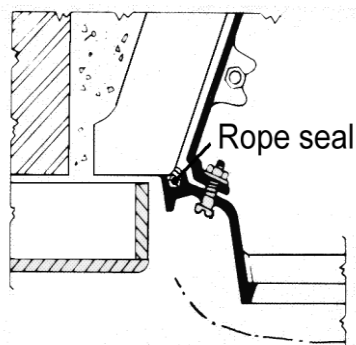


Fig OF-8

14. The open fire should now be installed by screwing it to the back hearth using non-combustible plugs. The base of the open fire should be sealed to the superimposed hearth using fire cement and the side sealed with heat resisting rope pointed with fire cement.

Installation of High Output Back Boiler (boiler flue set)

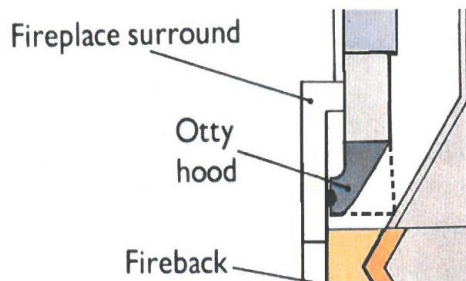
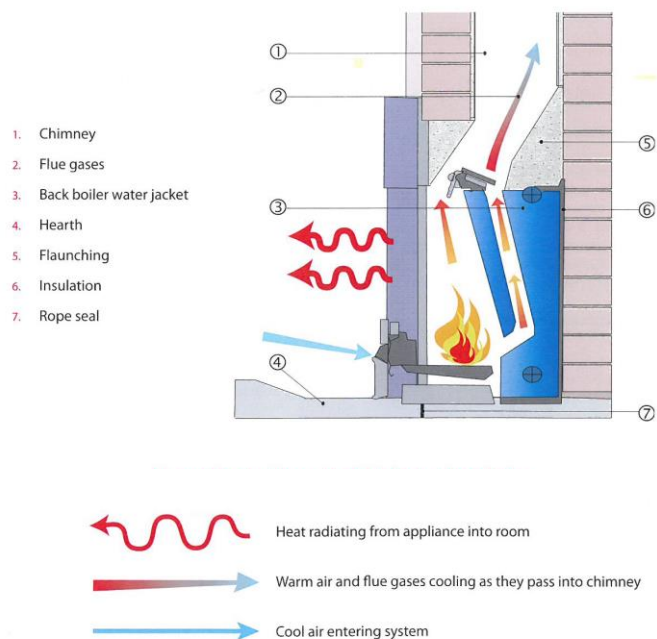


Fig OF-9



A high output back boiler evolved, providing more efficiency and output to hot water. This unit was capable of heating water to supply a central heating system of five radiators and domestic hot water.

The installation procedure for this type of appliance is very similar to that described above. It is important to check that the fireplace recess is deep enough to accommodate the boiler set. Should insufficient depth be available a "hollow backed" tiled surround should be used. This will provide around 60mm of additional depth. Under these circumstances considerable care will need to be taken to ensure that the products of combustion do not impinge on any horizontal surfaces on the rear of the surround.

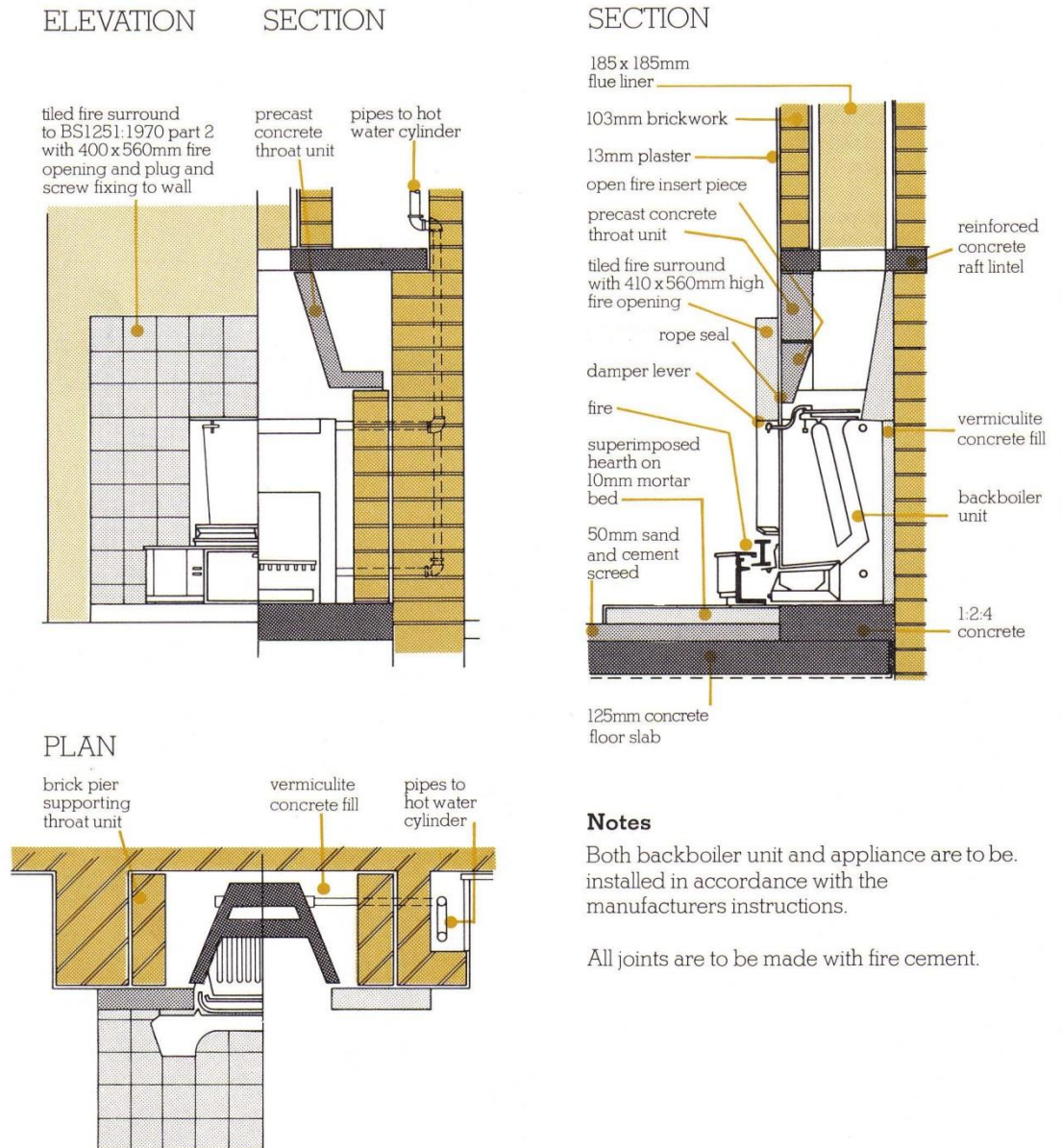


Fig OF-10

Many fireplace component manufacturers produce a smoke hood (sometimes known as an Otty Hood) which should be installed below the supporting lintel to eliminate this risk. (See Fig OF-9).

Additionally, it will be necessary to provide access for the flow and return pipes through the chimney jamb/s. These will need to be large enough to ensure a visual check can be made of the boiler connections. The system should be filled and checked for leaks before the boiler set is bricked in and the cavity behind infilled. Note: - the pipework should be sleeved where it passes through the brickwork and a draincock fitted at the lowest point.

As mentioned earlier in this document the pre-installation check list should be carried out after the fireplace recess has been cleared of all rubble. If on visual inspection a throat forming lintel is found the installation procedure previously described can be followed.

However, in many cases the brickwork above the fire opening will be supported by a bridging bar or square section lintel. Under these circumstances the installation of a small load-bearing throat unit (or Otty Hood) will be required. Having completed the installation of the fireback or boiler set as previously described, the throat unit should be bedded on the top of the fireback at the front. Any space between the hood and the fireback should be sealed with non-combustible rope.

Air Supply



Fig OF-11

All solid fuel fired appliances require an adequate supply of air to ensure that the efficient combustion of the fuel occurs and the chimney functions correctly. Failure to provide sufficient air for combustion and ventilation into the room in which the appliance is installed can have very serious consequences. Smoking back will occur and the poor combustion of the fuel will increase levels of soot deposit and carbon monoxide which is a serious health hazard. Table 1 page 29 of Approved Document J gives values for the total free area of permanently open vents for differing fireplace opening sizes.

Clauses 1.10 to 1.17 of Approved Document J gives guidance on the way to provide the air supply for combustion appliances. In particular Diagram 11 gives useful information regarding the location and provisions for ventilation openings. Ventilation is especially critical with open fires having larger than normal fire openings and where no throat exists.

Requirements

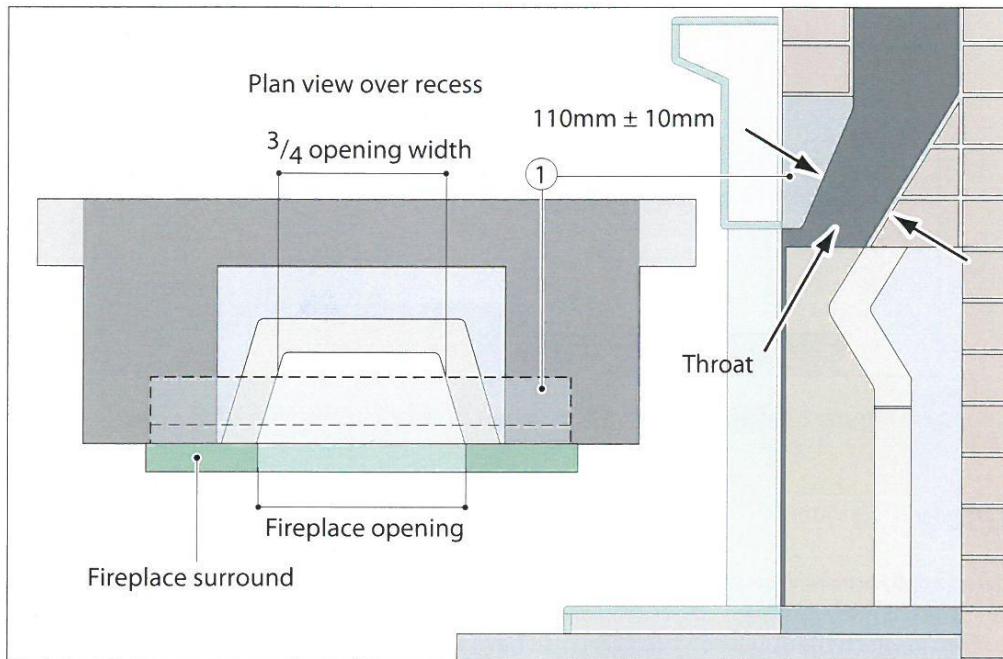


Fig OF-12

In the case of a standard open fire with or without boiler a permanent air opening or openings with a total free area of at least 50 percent of the throat opening should be provided (see clauses 2.1 to 2.3 together with Table 1 of Approved Document J). This requirement will depend on the size of the fire installed and can be determined by measurement which is defined in Fig OF-12.

The flue gas passage above an open fire (the throat) should be formed so that its smallest dimension is 110mm (+ or – 10mm) from front to back and three quarters of the nominal fireplace opening from side to side. (Fig OF-12).

Where a rectangular section boiler is present the throat width may be larger, some also have an adjustable restrictor which means that the manufacturer's recommended air vent sizes must be followed.

It should be noted that fires without a throat require ventilation equivalent to 50% of the cross sectional area of the flue.

Mechanical Extractor Fans

Any domestic solid fuel fired appliance will only work efficiently when connected to a chimney system capable of generating adequate up draught to induce sufficient air for efficient combustion and to overcome any frictional resistance associated with the system. The natural up-draught on a chimney will depend on a number of factors.

The use of a mechanical extractor fan in any room will create a depression. If this depression is greater than the up-draught generated by any open flued appliance installed in the same room the products of combustion will be drawn into the room.

Long term experience backed up by work carried out by the Building Research Establishment confirms the above risks.

Additional research has also indicated that the “natural ventilation” created by a continuous burning open flued appliance will greatly reduce the risk of condensation occurring within the room in which the appliance is installed.

Approved Document J recommends the use of mechanical ventilation in the same room as any open flued appliance should be avoided. (See clauses 1.20 to 1.22 of Approved Document J). However, changes to current Building Regulations require that all cooking areas must be provided with suitable extraction systems. Consequently, today it is not uncommon for open flued appliances to be fitted into areas adjacent to kitchens.

Therefore it is important to ensure there is sufficient free air available to the room for the chimney to perform safely whilst the fan is in operation. Correct levels of ventilation may have to be determined by “trial and error” as extractor fan manufacturers are seldom able to offer advice on suitable air vent sizes.

It is therefore necessary to undertake spillage tests on the appliance and chimney whilst doors and windows are closed, with any extractor fans in operation.

Non-Standard Open Fires

Despite their being recognised as low efficiency appliances, many home owners aspire to fitting an “inglenook” or “period style” fireplace. Traditionally, they comprise a freestanding basket standing in a large rectangular fire opening burning logs, coal or smokeless fuel.

Much of the heat is lost directly up the chimney and the high levels of ventilation necessary for the chimney to work effectively means that much of the heat from within the room is drawn up the chimney.

Such installations are at variance with current good practice, Approved Document L and SAP with regard to energy efficiency and air tightness of the building envelope, yet remain popular.

Building Regulations Approved Document J require the chimney to be correctly sized in direct relationship to the size of the throat opening, and ventilation requirements are related to the cross-sectional area of the flue.

Approved Document J, Paragraph 2.7 states that for a fireplace with an opening larger than 500mm x 550mm or a fireplace exposed on two or more sides, the flue shall have a cross-sectional area equal to 15% of the total face area of the fireplace opening(s).

Examples are to be found in Appendix B on page 70 of Approved Document J. Approved Document J Table 1 also requires that the ventilation needed for this chimney to operate successfully should comprise permanent air vents with a total free area of at least 50% of the cross-sectional area of the flue.

Unfortunately, many open fires of this type do not fulfil the above criteria and as a result cause smoke to blow back into the room.

In existing properties, commonly the flue size is intended for much smaller designs of fire opening.

In new properties the provision of large flue liners i.e. over 300mm diameter are often difficult to obtain and prove costly, resulting in inappropriate sized liners being fitted together with inadequate levels of ventilation.

In such cases the installation of a freestanding stove, freestanding open fire or a well-designed canopy fire are the only alternative options.

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Appliance installations should always be carried out by a qualified installer. This leaflet is for guidance only and should only be used for reference purposes.