

Chapter 6.8

Fireplaces, chimneys and flues



6.8 Fireplaces, chimneys and flues

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SCOPE

This Chapter gives guidance on meeting the Technical Requirements and recommendations for fireplaces, chimneys and flues.

DESIGN STANDARDS

6.8 - D1 Design shall meet the Technical Requirements

Design that follows the guidance below will be acceptable for fireplaces, chimneys and flues.

In this Chapter a number of terms are used. Details are given in Appendix 6.8-C.

STATUTORY REQUIREMENTS

6.8 - D2 Design shall comply with all relevant statutory requirements

Design should be in accordance with relevant Building Regulations and other statutory requirements.

GENERAL CONSIDERATIONS

6.8 - D3 Chimneys and flues shall enable efficient operation of the appliance for which they are designed while protecting the fabric of the building

The design of dwellings which incorporate chimneys and flues should ensure that all details of the associated elements are considered and, where necessary, provided. This should include the following:

- combustion air supply
- constructional hearth
- chimneys and flues, including where they project through the roof
- terminals
- construction adjacent to hearths and flues
- limitations on the type of appliance or open fire which can be installed or fuel which can be used.

Where a chimney or flue is provided it should be continuous from the hearth or appliance to the outside air.

A notice plate containing safety information about any hearths and flues should be securely fixed in an unobtrusive but obvious position within the home.

Solid fuel

FIREPLACES AND HEARTH

6.8 - D4 Fireplaces and hearths shall be designed to ensure proper combustion of fuel and to minimise the risk of the building catching fire in consequence of their use

Where appliances are not provided, it is important to construct fireplaces and hearths to suit the appliance most likely to be fitted.

Items to be taken into account include:

(a) combustion air

Combustion air is vital to the safe and efficient operation of appliances. Solid fuel appliances should have an air supply either directly or indirectly from the external air

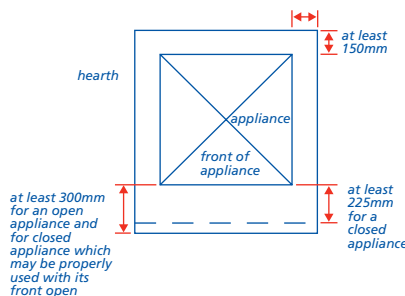
to comply with statutory requirements and manufacturers' recommendations. Reference should be made to Appendix 6.8-A.

(b) provision of hearths and recesses

HEARTH

Constructional hearths of sufficient dimensions should be provided for open fires or closed combustion appliances to comply with statutory requirements and manufacturers' recommendations. The dimensions shown in Clause S2 are for a concrete hearth at least 125mm thick below an open fire.

The hearth for a freestanding appliance should have minimum dimensions of 840mm. The following diagram shows the minimum dimensions from the appliance to the edge of the hearth.



RECESSES

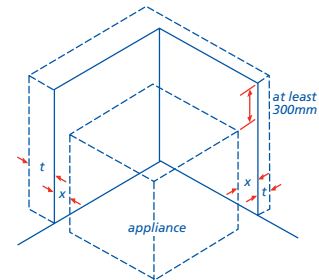
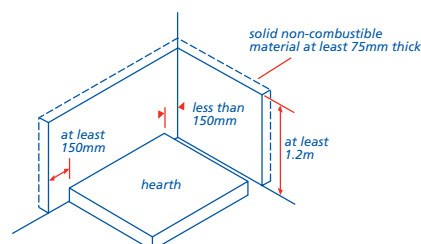
Recesses for open fires or closed combustion appliances should be provided to comply with statutory requirements and manufacturers' recommendations. Appendix 6.8-C gives some recess dimensions. The diagrams in Clause S2 show minimum masonry thickness surrounding the fireplace recess. Recesses are generally lined with a fire back or fire bricks.

For recess openings up to 500mm x 550mm, a 200mm diameter flue or square section of equivalent area can be used. For openings larger than this the flue size should be 15% of the area of the recess opening.

WALLS NEAR APPLIANCES

6.8 - D5 Walls near appliances and their hearths shall be located to minimise the risk of fire to the building

Walls near an appliance or its hearth should be non-combustible or the appliance should be positioned not closer to the wall than shown in the following diagrams.



*t = thickness of solid non-combustible material as follows:
if x is 50mm or less, $t =$ at least 200mm
if x is 50mm to 150mm, $t =$ at least 75mm*

FLUE PIPES

6.8 - D6 Flue pipes shall be correctly designed to safely connect an appliance to a flue

Items to be taken into account include:

(a) size

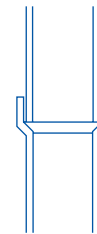
Flue pipes should be equal to the cross-section of the outlet of the appliance they serve.

(b) direction

Flue pipes for solid fuel appliances should be vertical or inclined at 45° or less from vertical. A short horizontal section not exceeding 150mm long may be used to connect a back outlet appliance to a flue.

(c) jointing

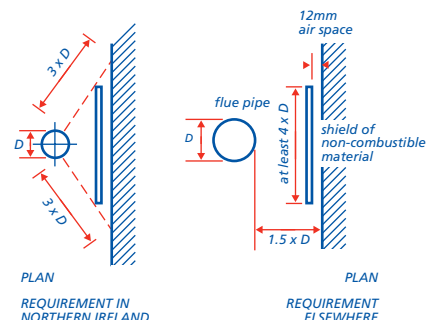
Flue pipes which have spigot and socket joints should be fitted socket up.



(d) separation from combustible materials

Flue pipes should be separated from combustible materials by at least the following:

- 200mm of non-combustible materials, or
- an airspace at least 4 times the diameter of the flue pipe, or
- shielded by a non-combustible shield at least 3 times the diameter of the flue pipe in width. The shield should be at least 12mm from the combustible material and the combustible material at least 1.5 times the diameter either side of the flue pipe.



CHIMNEYS AND FLUES

6.8 - D7 Chimneys shall incorporate flues capable of safely conducting products of combustion to the external air. The structure shall be capable of supporting the flue lining and shall provide adequate protection to the adjacent structure

A notice plate containing safety information about any hearths and flues should be securely fixed in an unobtrusive but obvious position within the home.

Items to be taken into account include:

(a) flue size

A flue should serve only one appliance. Flues should be of sufficient cross sectional area to remove all combustion gases from the open fire or appliance they serve.

Appendix 6.8-B gives flue sizes for:

- open fires
- solid fuel appliances.

(b) flue direction and length

Flues for solid fuel appliances should:

- be vertical where possible but not have more than two bends
- not have bends more than 45° from the vertical
- be not less than 4.5m high for solid fuel appliances measured above the fireplace opening.

(c) separation from adjacent spaces and materials

Combustible materials close to any brick or blockwork chimney should be:

- at least 200mm from the inside surface of a flue, or
- in all areas except Scotland, 40mm from the face of the chimney.

This does not apply to a floorboard, skirting, dado or picture rail, mantelshelf or architrave.

Materials used for chimneys should be capable of resisting fluctuating temperatures up to 1100°C. Suitable materials are described in the Materials section of this Chapter.

Flues for solid fuel appliances should be formed within masonry walls at least 100mm thick or 200mm thick if separating the flue from another compartment of the same building, another building or another dwelling. In Scotland, suitable masonry materials are described in the Building Standards (Scotland) Regulations.

Flues in the same chimney should be separated by masonry at least 100mm thick.

Timber framed wall design should include full details of separation proposals.

(d) flue liners

Flue liners should:

- have rebated or socketed joints with socket or internal rebate uppermost

- be non-combustible
- be reasonably smooth internally
- be correctly jointed with mortar with the space between the liners and the brickwork filled with weak insulating concrete unless the manufacturer recommends an alternative specification
- incorporate compatible purpose made bends at changes of direction; cut pipes are not acceptable
- be properly jointed at their junctions with the starter block or lintel and the outlet terminal.

(e) cleaning

Where a chimney is not directly over an appliance or opening, a soot box accessible for emptying should be formed.

(f) resistance to frost attack

Clay brick chimneys above roof level which are not protected by a capping with adequate overhang and drip should be constructed with F2,S1 or F2,S2 bricks to BS EN 771 bedded in mortar of 1 : ½ : 4 to 4½, cement : lime : sand or 1 : 3 or 4, cement : sand with plasticiser (see Chapter 6.1 'External masonry walls', Appendix 6.1-C). In Scotland, all external facing brickwork should be constructed using frost resistant bricks.

Sulfate resisting cement should be used in the mortar where flue gases are liable to affect the masonry, eg above roof level.

If external chimneys built with clay bricks of F2,S1 designation are rendered, sulfate resistant cement should be used.

(g) resistance to weather

Cavities in *Very Severe* and *Severe* exposure areas should be continuous up to roof level. This only applies below roof level where the stack forms part of an external cavity wall and applies to the complete structure including the fireplace recess. Where the chimney breast is gathered in, the lower projecting masonry should be protected against damp penetration with a suitable capping and cavity trays. Reference should be made to Appendix 6.8-C for typical construction details. Alternatives may be suitable.

Above the roof, chimney dpcs should link with flashings. Two dpcs should be used at suitable levels when the roof is steeply pitched, that is where the difference in level between the lower and higher intersection of the chimney with the roof will be more than 450mm. Lead trays should be protected with a thick coat of bitumen or bitumen paint where in contact with mortar. Plastic dpcs are not suitable. Weatherproofing details are included in Appendix 6.8-C.

Face brickwork above roof level should not have recessed joints.

If chimneys are to be rendered, the rendering should be as described in Chapter 6.1 'External masonry walls'.

(h) stability

FOUNDATIONS

Where a chimney forms part of a wall, the foundation should project at least 100mm wider than the chimney base. Where the chimney will exert higher loading on the supporting sub-soil than the adjacent wall, the chimney foundation spread should be designed to avoid uneven settlement. The depth of chimney foundations should be the same as adjacent wall foundations.

HEIGHT

The height **H** of an unrestrained chimney should not exceed 4½ times the least plan dimension of the chimney, **W** (see diagram in Clause S4), provided the density of the masonry is at least 1500kg/m³, unless designed by an Engineer in accordance with Technical Requirement R5.

(i) factory-made insulated chimneys

This type of chimney should be designed in accordance with BS 4543 and BS EN 1859 and installed in accordance with BS 7566 or be assessed in accordance with Technical Requirement R3.

An operating life of at least 30 years is required.

CHIMNEY TERMINALS

6.8 - D8 The terminal to a chimney shall enable satisfactory discharge of flue gases

Items to be taken into account include:

(a) position of the outlet

Outlets should be positioned as shown in Appendix 6.8-D. Refer to approved Document J where roof coverings are easily ignitable.

(b) pressure zones

The design should, where possible, allow for the effects of adjacent trees, buildings etc. on the "low pressure" zone as the efficiency of the flue may be affected.

A low pressure zone generally occurs on the lee side and at the ridge of a pitched roof and close to the windward side of a flat roof. The flue will generally function more effectively if the outlet is in this zone, taking account of prevailing winds.

Where down-draughts occur, for example on hillsides or near tall trees and buildings, the height of the flue outlet may have to be increased or a fan assisted flue installed.

(c) terminals

Terminals may be purpose-made components, built into the top of the chimney to a depth of not less than 125mm into the masonry or one-quarter the length of the terminal, whichever is the greater. The terminal should be sealed to the flue liners. The top flue liner projecting at least 20mm above the chimney capping is an acceptable terminal.

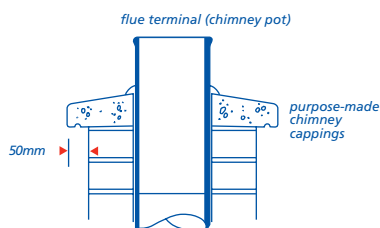
(d) chimney cappings

Chimney cappings should be designed to protect the masonry below. Cappings should preferably be monolithic slabs, weathered, projecting at least 50mm with a drip to shed water clear of the masonry. Brick chimneys which do not have this type of capping should be constructed using frost resistant masonry.

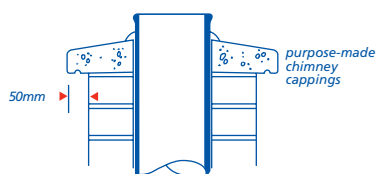
All external face brickwork in Scotland should be constructed using frost resistant bricks.

Cappings may be designed as a cover slab supported on piers to reduce the rain penetration into the top of the flue. The height of the supporting piers should be sufficient to allow a total free opening area at least twice the area of the flue outlet.

CHIMNEY POT



FLUE LINING ACTING AS FLUE TERMINAL



Gas

FIREPLACES AND HEARTHES

6.8 - D9 Fireplaces and hearths shall safely accommodate the fire or appliance for which they are designed

Items to be taken into account include:

(a) combustion air

Combustion air is vital to the safe and efficient operation of appliances. Requirements for combustion air are given in Appendix 6.8-A.

(b) provision of hearths and recesses

SOLID FUEL EFFECT APPLIANCES

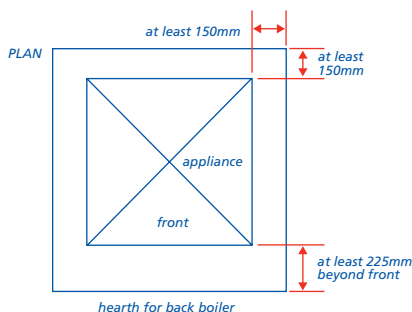
Hearths and recesses for solid fuel effect appliances should be as described for solid fuel installations or in accordance with BS 6714 or BS 5871 or the manufacturer's instructions when the appliance has been tested by an approved authority.

BACK BOILERS

Hearths for back boilers should be constructed of solid non-combustible materials at least:

- 125mm thick, or
- 25mm thick placed on non-combustible supports at least 25mm high.

The diagram below shows minimum projections for the hearth beyond the appliance.



ALL OTHER GAS APPLIANCES

Hearths for other types of appliance should be at least 12mm thick non-combustible material to the same plan dimensions as above. In some cases the provision of a hearth is not required, for example if the flame or incandescent material is at least 225mm above the floor.

Where a hearth has been provided, its edges should be marked to provide a warning to the home owner and to discourage combustible floor finishes such as carpet from being laid too close to the appliance. A way of achieving this would be to provide a change in level.

(c) separating appliances from combustible materials

Appliances should not be closer than 75mm to combustible material. This applies to the back, sides and top of the appliance and any draught-diverter. It does not apply if a 25mm thick non-combustible shield is used or the appliance complies with the appropriate parts of BS 5258 or BS 5386.

FLUE PIPES

6.8 - D10 Flue pipes shall safely connect an appliance to a chimney or a flue to a terminal

Items to be taken into account include:

(a) size

Flue pipes should be at least the area of the outlet of the appliance and have no adjustable draught control.

(b) direction

Apart from balanced flues, horizontal runs should be avoided. No pipe should exceed 45° with the vertical.

(c) jointing

Flue pipes with spigot and socket joints should be fixed socket up.

(d) connections and support

Purpose-made connections should be used particularly in roof spaces when connecting to flue blocks and to ridge terminals. The connecting flue pipe should be supported on straps at centres not greater than 1.8m and have support directly below each socket.

(e) separation from combustible materials

Single wall flue pipes should be separated from combustible materials by:

- at least 25mm
- a non-combustible sleeve enclosing an air space of at least 25mm around the pipe where it passes through a wall, floor or roof
- non-combustible casing material with at least half the fire resistance needed for the wall or floor where passing through a compartment wall or compartment floor.

The 25mm may be measured from the outside of the inner pipe in the case of double-walled pipes (see BS 5440).

CHIMNEYS

6.8 - D11 Chimneys shall incorporate flues capable of safely conducting products of combustion from an appliance to the external air. The structure shall be capable of supporting the flue and providing adequate protection to adjacent materials

Chimneys for gas appliances must not incorporate an adjustable draught control.

Items to be taken into account include:

(a) masonry chimneys

Flues should be of the minimum sizes given in Appendix 6.8-B.

Masonry chimneys as described for solid fuel are acceptable.

Brick or blockwork chimneys for gas appliances should provide at least the fire resistance of any compartment wall or floor of which it forms part or passes through (the compartment wall may form the chimney wall if it is a masonry material).

(b) flue liners

Flue liners should be as described for solid fuel or comply with BS 715 (see Clause D7(d)). Flexible flue liners are not acceptable for new build.

(c) flue block chimneys

Flue blocks should comply with BS EN 1858 or BS EN 1806 with a performance class of at least FB4 N2. The chimney should only be constructed of flue blocks if suitable for the appliance.

Flue block chimneys should be constructed, jointed and weatherproofed in accordance with manufacturers' instructions.

Flue blocks should be correctly bonded to the flanking masonry.

In all areas, the nominal cavity width as required in Chapter 6.1, should be maintained by either:

- increasing the overall width of the cavity, or
- making the flue block flush with the inside of the cavity but projecting into the room as a false chimney breast.

6.8 Fireplaces, chimneys and flues

Flue blocks projecting into the cavity should be protected by providing a vertical dpm. The dpm may be supported by building in a layer of suitable non-combustible insulation.

Plaster should not be applied directly to flue blocks. A plasterboard lining with an airspace or non-combustible insulation behind should be provided.

Flue blocks should not be built into separating walls unless it can be shown that the wall has adequate sound resistance.

(d) factory-made insulated chimneys and terminals

Factory-made insulated chimneys should:

- comply with the requirements of BS 4543 and be installed in accordance with BS 6461 or comply with BS 715 and installed in accordance with BS 5440.

Factory-made insulated chimneys should be assembled, erected, anchored and protected in accordance with manufacturers' instructions.

(e) terminals to masonry chimneys

If appropriate, flue terminals should comply with the appliance manufacturer's recommendations.

Proprietary terminals should comply with BS 715 and BS EN 1858.

Where proprietary terminals are not used, the free opening area should be at least twice the area of the flue. The openings should be uniformly distributed around the terminal or be on two opposite faces. The openings in the terminal should admit a 6mm diameter ball but exclude a ball over 25mm diameter.

(f) direction

Flues should be vertical where possible. Any necessary bend in a flue should not make an angle exceeding 45° with the vertical.

(g) outlets not serving balanced flue appliances

A flue outlet serving a gas appliance should be:

- situated at roof level, so that air can pass freely across it at all times
- at least 600mm from any opening into the building
- fitted with a flue terminal where the flue diameter is less than 170mm. Larger diameter flues should be fitted with a terminal where required by Building Regulations.

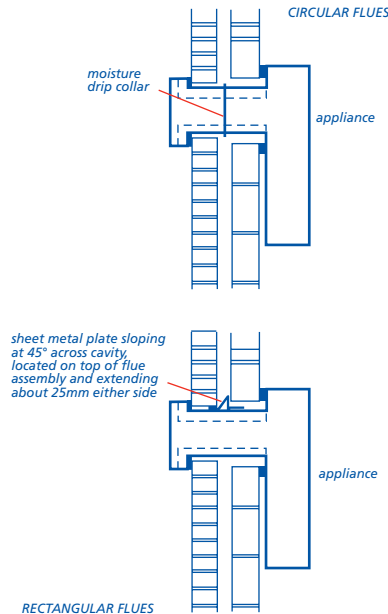
(h) outlets serving balanced flue appliances

See Appendix 6.8-E for position of balanced flue outlets.

(i) damp penetration

Precautions should be taken where appropriate to prevent damp penetration as described for solid fuel chimneys.

Balanced flues which bridge the cavity of an external wall should have a means of preventing moisture crossing the cavity, for example, a moisture drip collar set in the centre of the cavity.



(b) direction

As for solid fuel.

(c) separation from adjacent spaces and materials

See Clause D14 (c).

CHIMNEYS

6.8 - D14 Chimneys shall incorporate flues capable of safely conducting products of combustion from an open fire or other appliance to the external air. The structure shall be capable of supporting the flue lining and shall provide adequate protection to adjacent materials

Items to be taken into account include:

(a) size of flue

Flue sizes should be in accordance with Appendix 6.8-B.

(b) direction of flues

As for gas flues.

(c) separation from adjacent spaces and materials

Separation should be in accordance with the following table.

Protecting buildings from hot flues for flue gas temperatures not more than 250°C	
Flue within:	Protection measures
Connecting fluepipe	Flues should be at least 25mm from any combustible material (measured from the outer surface of the flue wall, or the outer surface of the inner wall in the case of multi-walled products). Where passing through a combustible wall, floor or roof (other than a compartment wall floor or roof) this separation can be achieved by a non-combustible sleeve enclosing the fluepipe or chimney with a 25mm airspace to the relevant flue wall. (The airspace could be wholly or partially filled with non-combustible insulating material).
Factory-made chimney complying with BS 715:1993	Refer to appropriate British Standards and Manufacturers recommendations.
Masonry chimney	Provide at least 25mm of masonry between flues and any combustible material.
Flueblock chimney	Provide flueblock walls at least 25mm thick.

Oil

FIREPLACES AND HEARTHES

6.8 - D12 Fireplaces and hearths shall safely accommodate the fire or appliance for which they are designed

Items to be taken into account include:

(a) combustion air

Combustion air is vital to the safe and efficient operation of appliances. Reference should be made to Appendix 6.8-A.

(b) provision of hearths

If the temperature of the hearth below the appliance is likely to exceed 100°C, or the temperature is not known, a hearth should be provided as described for solid fuel appliances. If this temperature is unlikely to be exceeded the appliance may stand on a rigid, non-combustible imperforate sheet of material without a constructional hearth.

(c) shielding appliances

Appliances which are likely to have back or side temperatures exceeding 100°C should be shielded as described for gas appliances (see Clause D9(c)).

FLUE PIPES

6.8 - D13 Flue pipes shall safely connect an appliance to a chimney

Items to be taken into account include:

(a) size

Flue pipes should be at least the size of the outlet to the appliance. Reference should be made to Appendix 6.8-B.

Flue assemblies for roomed-sealed appliances	<p>a) flues passing through combustible walls should be surrounded by insulating material at least 50mm thick.</p> <p>b) provide a clearance of at least 50mm from the edge of the flue outlet to any combustible wall cladding.</p>
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* BS 4543-1:1990 (1996) withdrawn April 2000; partially superseded by BS EN 1859:2000

(d) flue liners

As for gas if the flue gases are unlikely to exceed a temperature of 250°C. As for solid fuel if the flue gases are likely to exceed a temperature of 250°C or the temperature is not known.

(e) resistance to heat

As for gas flue pipes if the flue gases are unlikely to exceed a temperature of 250°C. As for solid fuel flue pipes if the flue gases are likely to exceed a temperature of 250°C or the temperature is not known.

(f) resistance to chemical attack

As for solid fuel.

(g) resistance to weather

As for solid fuel.

(h) separation from combustible materials

As for gas flue pipes if the flue gases are unlikely to exceed a temperature of 250°C. As for solid fuel flue pipes if the flue gases are likely to exceed a temperature of 250°C or the temperature is not known.

(i) stability

As for solid fuel if of masonry construction.

(j) factory-made insulated chimneys

This type of chimney should be designed in accordance with BS 4543 : Part 1 to Part 3 BS EN 1859 and installed in accordance with BS 7566 : Part 2 or be assessed in accordance with Technical Requirement R3. An operating life of at least 30 years is required. Component systems to be BS 715 installed in accordance with BS 5440.

(k) outlets

See Appendix 6.8-F for positions of flue outlets.

All balanced flue terminals should be positioned to allow free intake of air to the appliance.

(l) terminals

As for solid fuel if of masonry construction, unless otherwise stated in the appliance manufacturer's instructions, which should be followed.

General

TIMBER FRAME CONSTRUCTION

6.8 - D15 Fireplaces, chimneys and flues in timber frame construction shall be designed to minimise the risk of the building catching fire

The design of timber frame construction should ensure that combustible material is either far enough away from heat sources or, where permitted, shielded.

Designers may find the following 'Institution of Gas Engineers' publications useful:

- 'Guide for gas installation in timber framed housing'
- 'Specification for flues for class II appliances in timber framed housing'.

Appendix 6.8-C contains a detail of an external fireplace recess and chimney. Other details for internal chimneys and chimneys in separating walls are available in TRADA publications.

PROVISION OF INFORMATION

6.8 - D16 Design and specifications shall be produced in a clearly understandable format and include all relevant information

For fireplaces and flues the drawings should show:

- position and size of hearths and fireplaces
- position and size of chimneys and flues
- position and proximity of combustible materials
- position and details of flue terminals or outlets
- position of dpcs and flashings
- construction details of fireplace openings and chimney connections
- details of materials to be used
- limitations on the type of appliance or open fire which can be installed or fuel which can be used
- details of tests required on chimneys and flues including who is responsible for carrying them out.

6.8 - D17 All relevant information shall be distributed to appropriate personnel

Ensure that design and specification information is issued to site supervisors and relevant specialist subcontractors and/or suppliers.

Where proprietary products are to be used, manufacturers usually have specific requirements for fixing and/or assembly of their products. This information should also be made available for reference on site so that work can be carried out satisfactorily in accordance with the design and specification.

MATERIALS STANDARDS

6.8 - M1 All materials shall: (a) meet the Technical Requirements (b) take account of the design

Materials that comply with the design and the guidance below will be acceptable for fireplaces, chimneys and flues.

Materials for fireplaces, chimneys and flues shall comply with all relevant standards, including those listed below. Where no standard exists, Technical Requirement R3 applies (see Chapter 1.1 'Introduction to the Standards and Technical Requirements').

References to British Standards and Codes of Practice include those made under the Construction Products Directive (89/106/EEC) and, in particular, appropriate European Technical Specifications approved by a European Committee for Standardisation (CEN).

BRICKS

6.8 - M2 Bricks shall be capable of supporting intended loads and have appropriate resistance to the adverse effects of frost and sulfates

Bricks should be selected in accordance with BS 6461 and BS EN 771.

In external chimney stacks clay bricks should be of durability rating F2,S1 as described in BS EN 771 unless protected by a projecting capping bedded on a dpc. In Scotland frost resistant bricks should be used for all external facing brickwork.

Reference should also be made to Chapters 6.1 'External masonry walls' (Materials) and 6.3 'Internal walls' (Materials).

CONCRETE BLOCKS

6.8 - M3 Blocks shall be capable of supporting intended loads and have appropriate resistance to the adverse effects of frost and sulfates

Blocks should be selected in accordance with BS 6461 Part 1, BS EN 771 or satisfactorily assessed in accordance with Technical Requirement R3. Block density should be minimum 1500 kg/m³, unless designed by an Engineer in accordance with Technical Requirement R5.

Reference should also be made to Chapters 6.1 'External masonry walls' (Materials) and 6.3 'Internal walls' (Materials).

In Scotland, 100mm thick blockwork in chimney construction should have a density of at least 1600 kg/m³. Other suitable masonry specifications for Scotland are given in the Building Standards (Scotland) Regulations.

6.8 Fireplaces, chimneys and flues

STONE MASONRY

6.8 - M4 Stone masonry shall be capable of supporting intended loads and have appropriate resistance to the adverse effects of frost and sulfates

Stone for masonry should comply with the requirements of BS EN 771 and BS 6461 : Part 1.

Reconstructed stone masonry units should comply with BS EN 771-5 and BS 6461 : Part 1.

MORTAR

6.8 - M5 Mortar shall be batched and mixed to achieve adequate strength and durability to comply with design

Mortar should be as specified for areas of *Severe* or *Very Severe* exposure in Chapter 6.1 'External masonry walls' Appendix 6.1-B. (1 : ½ : 4 to 4½ cement : lime : sand or 1 : 3 or 4 cement : sand with plasticiser).

Sulfate resisting cement should be used in the mortar where flue gases are liable to affect the masonry, eg above roof level.

FLUE LINERS

6.8 - M6 Flue liners shall be unaffected by flue gases and suitable for their purpose

Special fittings should be specified at changes of direction of the flue.

Liners suitable for solid fuel appliances (and generally suitable for other fuels) could be:

- liners whose performance is at least equal to that corresponding to the designation T450 N2 S D 3, as described in BS EN 1443: 1999, such as:
 - clay flue liners with rebates or sockets for jointing meeting the requirements for Class A1 N2 or Class A1 N1 as described in BS EN 1457: 1999; or
 - concrete flue liners meeting the requirements for the classification Type A1, Type A2, Type B1 or Type B2 as described in prEN 1857(e18) January 2001; or
 - other products that are independently certified as meeting the criteria in a); or
- imperforate clay pipes with sockets for jointing as described in BS 65: 1991 (1997).

Liners should be installed in accordance with their manufacturer's instructions. Appropriate components should be selected to produce the flue path without cutting and to keep joints to a minimum. Bends and offsets should only be formed with purpose-made components. Liners need to be placed with the sockets or rebate ends uppermost to contain water and other condensates in the flue. Caulking can be effected with fire cement or refractory mortar. Spaces between the lining and the surrounding masonry should not be filled with ordinary mortar.

In the absence of liner manufacturer's instructions, the space could be filled with a weak insulating concrete such as mixtures of:

- one part ordinary Portland cement to 20 parts suitable lightweight expanded clay aggregate, minimally wetted; or
- one part ordinary Portland cement to 6 parts Vermiculite; or
- one part ordinary Portland cement to 10 parts Perlite.

FLUE PIPES

6.8 - M7 Flue pipes shall be suitable for their purpose

Cast iron flue pipes should comply with BS 41.

Mild steel flue pipes should have a minimum wall thickness of 3mm and comply with BS 1449.

Stainless steel flue pipes should be at least 1mm thick as described in BS EN 10088 and should be one of the following grades: 1.4401, 1.4404, 1.4432 or 1.4436.

Vitreous enamelled flue pipes should be of low carbon steel coated internally and externally with acid resisting enamel and conform to the description given in BS 6999.

Flue pipes for gas appliances should comply with BS 715.

All flue pipes should be jointed in accordance with manufacturers' instructions.

FLUE TERMINALS

6.8 - M8 Flue terminals shall be suitable for their purpose

Clay flue terminals should comply with or be constructed from materials which comply with BS 1181.

Chimneys serving gas appliances should have terminals complying with BS EN 1858. Flue pipes serving gas appliances should have terminals complying with BS 715.

FLUE BLOCKS FOR GAS APPLIANCES

6.8 - M9 Flue blocks for gas appliances shall be unaffected by flue gases and suitable for their purpose

Flue blocks for use with gas appliances should comply with BS 1289 : Part 1 (Concrete) or Part 2 (Clay). In situations where the cavity width is reduced by the flue block all insulation and vertical dpms should be in accordance with manufacturers' instructions.

TWIN WALL FLUE SYSTEMS

6.8 - M10 Twin wall flue systems shall be suitable for their purpose

Twin wall flue systems should comply with BS 715 or be assessed in accordance with Technical Requirement R3.

FLASHINGS

6.8 - M11 Flashings and trays shall be capable of adequately resisting the entry of moisture into the building

Suitable materials for flashings and trays are:

- milled sheet lead (at least Code 4) complying with BS EN 12588
- aluminium and aluminium alloys complying with BS 1470 (0.6mm to 0.9mm thick)
- zinc alloy complying with BS 6561 and 0.6mm thick.

DAMP-PROOF COURSE

6.8 - M12 Materials for damp-proofing shall resist adequately the passage of moisture into the building

The following are acceptable for use as dpms:

- bitumen to BS 6398
- polyethylene to BS 6515 (not in the chimney stack above roof level)
- proprietary materials assessed in accordance with Technical Requirement R3.

SITWORK STANDARDS

6.8 - S1 All sitework shall:

- meet the Technical Requirements
- take account of the design
- follow established good practice and workmanship

Sitework that complies with the design and the guidance below will be acceptable for fireplaces, chimneys and flues. Gas appliances should be fitted by a Gas Safe Register (GSR) installer to comply with the Gas Safety (Installation and Use) Regulations 1998.

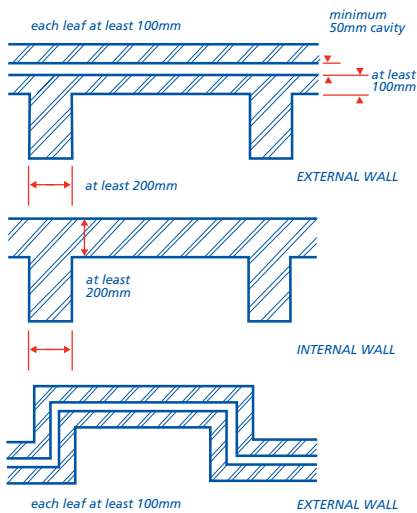
Good workmanship and effective supervision during construction are essential to ensure that fireplaces, chimneys and flues function correctly in use.

Additional construction details are shown in Appendix 6.8-C.

FIREPLACES AND HEARTHES

6.8 - S2 Fireplaces and hearths shall safely accommodate the appliances for which they are designed

Fireplace recesses should be constructed of solid non-combustible material as shown below:

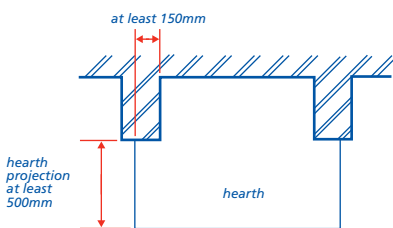


The space between a fireback and any masonry forming the recess should be filled with vermiculite concrete (1 : 4, lime : vermiculite with water).

Combustible material should not be placed under a constructional hearth unless it is:

- to support the edges of the hearth or
- separated from the underside of the hearth by an airspace of at least 50mm or
- at least 250mm from the material to the top of the hearth.

Hearths should be at least the sizes shown below. Hearths for freestanding appliances should be at least 840mm square.



FLUES

6.8 - S3 Flues shall provide an unrestricted passage for combustion gases between the fireplace or appliance and the outlet

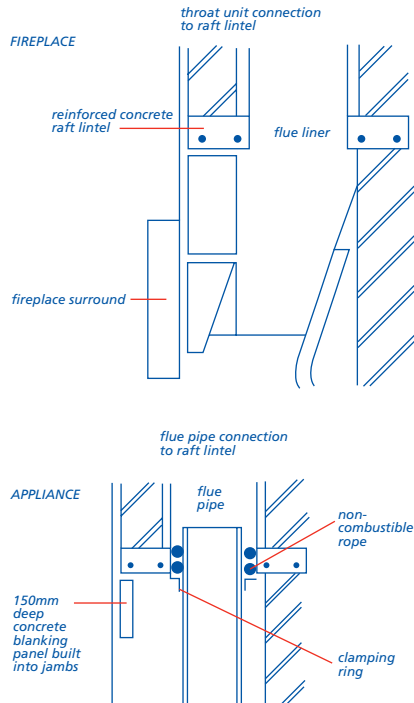
Items to be taken into account include:

(a) cleaning

The bottom of flues not directly over an appliance should be provided with a means of access for cleaning and inspection.

(b) connections to appliances

The connection between a fireplace or appliance and the flue should be correctly constructed (see details in Appendix 6.8-C).

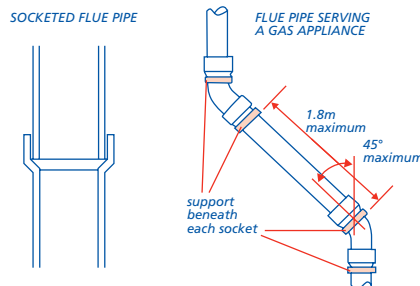


(c) flue draught control unit

Where adjustable throat units are specified they should be fitted in accordance with manufacturers' instructions. Adjustable flue draught control units are not permitted where gas burning appliances are installed.

(d) flue pipes

Flue pipes should be fixed 'socket up' and correctly aligned. Longer flue pipes forming flues from gas appliances should be supported at a maximum of 1.8m centres and have support directly below each socket.



(e) flue liners

The space between flue liners and masonry should be filled with weak insulating concrete or manufacturers' recommendations with specified material providing adequate protection.

Flue linings to chimneys should be clay or purpose made concrete as specified by the design.

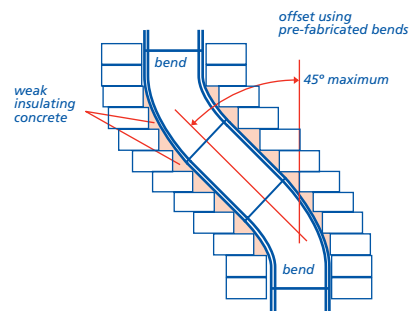
Flue linings should be handled carefully to prevent chipping or cracking.

Bends or tees should be purpose made for use with the lining system being installed.

Flue linings should be sealed at their joint with the starter block or throat unit. No cavity should be formed between the linings and the starter elements.

Flue linings should be installed socket up.

Changes of direction of flue liners should be formed using purpose made fittings.



Jointing material for flue liners should be fire cement or refractory mortar, unless the manufacturers' instructions require an alternative jointing to be used.

Each joint should be fully filled and all surplus material cleared from the inside of each joint as the flue is built.

(f) fire hazards

Combustible materials close to any brick or blockwork chimney should be:

- at least 200mm from a flue, or
- except in Scotland, 40mm from the face of the chimney.

This does not apply to a floorboard, skirting, dado or picture rail, mantelshelf or architrave.

Metal fixings in contact with combustible materials should be at least 50mm from a flue.

CHIMNEYS

6.8 - S4 Chimneys shall provide fire protective casing for flues, and shall be capable of adequately supporting the flue liner and resisting damp penetration and the products of combustion

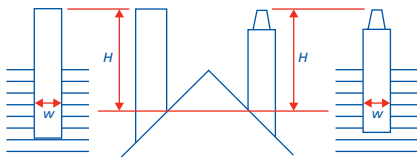
Items to be taken into account include:

(a) stability

Masonry chimneys should be properly bonded to, or supported by, adjoining walls of the building. The depth of chimney foundations should be the same as any adjacent wall foundation.

6.8 Fireplaces, chimneys and flues

The height **H** of an unrestrained chimney should not exceed 4½ times the least plan dimension of the chimney **W** (see diagram), provided the density of the masonry is at least 1500kg/m³, unless designed by an Engineer in accordance with Technical Requirement R5.



(b) wall thickness

Chimneys of block, brick or stone should have a minimum wall thickness of 100mm excluding the lining thickness.

A chimney forming part of a compartment wall and not back to back with an adjacent chimney should have a wall thickness of at least 200mm separating it from the other building or dwelling.

Chimneys built in a cavity separating wall should form two leaves each of at least 100mm thickness between the flue and adjoining building.

(c) damp penetration

The damp proof course to the main walls should be carried through the base of chimneys.

Damp proof courses, flashings and gutters should be provided at the intersection point of the chimney with the surface of the roof through which the chimney passes.

Metal elements making up dpcs and flashing should be compatible non-ferrous metals. Lead trays should be bitumen coated where in contact with cement.

Occasional damp penetration below roof level may occur in chimneys which exit close to the ridge of a pitched roof. This is acceptable in a well ventilated roof space provided that any dampness penetrating downwards is unlikely to reach the living areas.

Where chimneys exit close to the eaves of a pitched roof or through a flat roof, trays and flashings should be installed in the chimney so that all damp penetration is prevented.

The weatherproofing details shown in Appendix 6.8-C should be used in Very Severe and Severe exposure zones. In lower exposure zones the tray upturn may be on the outside of the flue liner.

(d) coring

A core is a sack, full of loose straw or the like, used to block the flue during the construction of a chimney with circular linings. The core, which is attached to a rope to pull it up the flue, keeps the flue clean and free of falling mortar and debris which may later form an impedance to gases passing through the flue.

Ensure that the core is removed on completion of the chimney.

(e) drying

A chimney should be allowed to dry naturally for at least 14 days before use.

(f) masonry chimneys

BRICKS

Frost resistant bricks should be used above the roof unless protected by a capping projecting at least 50mm. In Scotland, frost resistant bricks should be used for all facing brickwork.

Below roof level the bricks and mortar may be the same as those used for general brickwork.

Mortar should be as specified for areas of *Severe* and *Very Severe* exposure in Chapter 6.1 'External masonry walls' Appendix 6.1-C. (1 : ½ : 4 to 4½, cement : lime : sand or 1 : 3 or 4, cement : sand with plasticiser).

Sulfate resisting cement should be used in the mortar where flue gases are liable to affect the masonry, eg. above roof level.

BLOCKS

Hollow or cellular blocks, suitable for the construction of chimneys, should only be used if the voids are filled with concrete as the work proceeds.

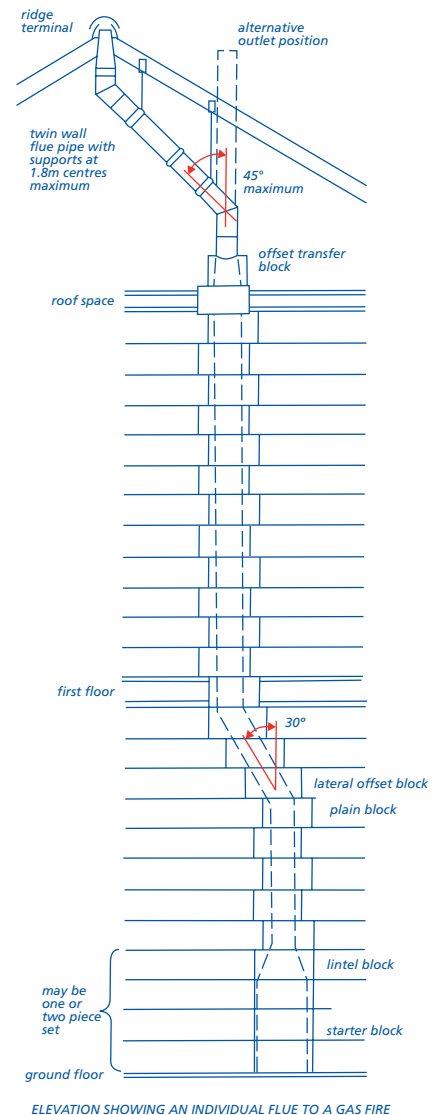
(g) flue block chimneys

Gas flue block chimneys are only suitable for gas appliances. Their suitability should be checked before connecting any appliance.

Flue block chimneys should be constructed, jointed and weather proofed in accordance with the design and manufacturers' instructions. A high standard of workmanship should be maintained to ensure that the flue is clean and sealed.

Flue blocks should be correctly bonded to the flanking masonry.

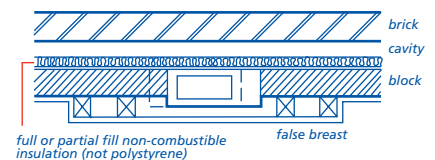
Where gas flue blocks are shown in the design they will be at least 140mm wide. This may be wider than the wall leaf.



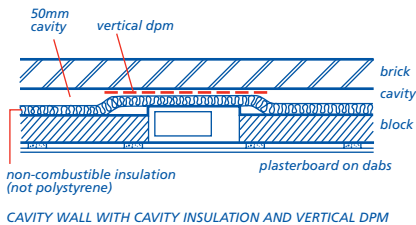
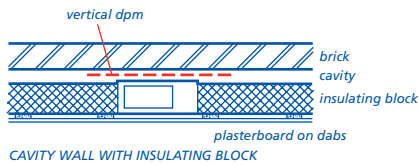
ELEVATION SHOWING AN INDIVIDUAL FLUE TO A GAS FIRE

The design will show how the extra thickness is incorporated by either:

- increasing the overall width of the cavity, or
- making the flue block flush with the inside of the cavity but projecting into the room as a false chimney breast.



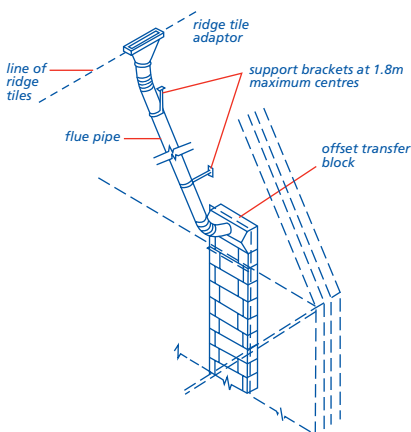
Where the cavity is shown to be reduced the flue block should be protected by a vertical dpm. The dpm should be supported by building in a layer of non-combustible insulation.



Plaster should not be applied directly to flue blocks. A plasterboard lining with an airspace or non-combustible insulation behind should be provided. Insulated dry lining may be unsuitable in this situation unless separated from the flue block.

(h) connection between flue block chimney and roof outlet

Connections between flue blocks and ridge terminals should be made as detailed in the design using the correct fittings and supports as specified by the manufacturers of the flue blocks, flue pipe and the ridge terminal.



(i) factory-made insulated chimneys

Factory-made insulated chimneys should be assembled, erected, anchored and protected in accordance with manufacturers' instructions.

TERMINALS

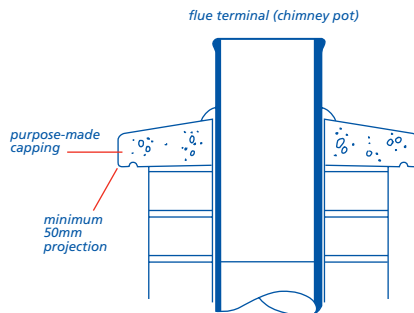
6.8 -S5 Terminals shall assist the proper functioning of the flue

Terminals should be purpose made or formed by extending the flue lining not less than 20mm above the head of the chimney. Various terminals are shown in Appendix 6.8-C.

Items to be taken into account include:

(a) stability

Terminals should be embedded at least 125mm into the chimney excluding any flaunching, or one quarter the length of the terminal, whichever is the greater.



Appendix 6.8-C gives details of brickwork capping.

(b) jointing

The terminal of a masonry flue should be jointed to the flue lining with cement mortar to form a seal.

(c) size

Terminals should be the same cross sectional area as the flue which for solid fuel is not less than 200mm diameter.

(d) draught improvement

In cases where down draughts may occur, special terminals designed to increase up draught should be fitted.

A special terminal will not overcome problems caused by high pressure zones. Where relevant, the Solid Fuel Association or other authoritative body should be consulted.

(e) chimney capping

Where a chimney is to be capped, a single unjointed concrete or stone capping should be used. The capping should project and be throated to cast rainwater away from the face of the chimney. The slab should project 50mm beyond the faces of the chimney. The widths between flues should be carried to the underside of the slab.

Decorative brick cappings should be carefully constructed to avoid rain penetration and frost damage. The use of frost resistant bricks may be required. All bricks used for facing brickwork in Scotland should be frost resistant.

PROVISION OF COMBUSTION AIR

6.8 - S6 Installations shall have an adequate supply of air to ensure satisfactory combustion of fuel and the efficient working of flues and chimneys

Combustion air is vital to the safe and efficient operation of appliances. Reference should be made to Appendix 6.8-A.

TESTING

6.8 - S7 Installations shall be tested before use

ALL FLUES

All flues should be checked during construction to ensure that there are no obstructions in the flue and that mortar or other blockages are removed. When the flue is complete, if practical a visual check should be made and any obstructions cleared.

FLUES FOR SOLID FUEL APPLIANCES

Coring ball test

When a visual test cannot be carried out or is inconclusive, the coring ball test should be carried out.

A suitable concrete or metal ball is attached to a strong cord or rope. The ball is lowered slowly from the flue outlet to the bottom of the flue (the fireplace recess or the appliance connection). If a blockage or obstruction is found it must be removed and the test repeated until the flue is completely clear of obstruction.

Smoke test

This test is designed to show that a flue draws adequately and that there are no leaks between the appliance and the terminal.

The smoke test is carried out when neither the flue to be tested nor adjacent flues are in use. The flue is first warmed for about 10 minutes with a heat source such as a blow lamp. If an appliance is fitted it should be completely closed as should any flue access doors.

Two purpose made smoke pellets are then placed in the appliance firebox or in the bottom of the flue and ignited. The appliance, chimney or fireplace opening should then be closed or sealed off and the smoke allowed to rise. When smoke appears at the top of the flue the outlet should be sealed with a blow-up rubber ball or other air tight closing system.

The whole structure forming the flue should be inspected externally on all sides and from top to bottom for smoke leakage. This should include the top of cavity walls and any other possible smoke paths, even those terminating some distance from the flue. The test should be continued for at least 5 minutes.

FLUES FOR GAS APPLIANCES

More sophisticated flue tests may be required for some gas appliances. These tests should be carried out by the appliance installer.

FLUES FOR OIL APPLIANCES

Flues for oil fired appliances should be tested as required by the appliance manufacturer.

6.8 Fireplaces, chimneys and flues

APPENDIX 6.8-A

Provision of combustion air

	Solid fuel up to 45kW output		Gas *	Oil
	Open	Closed appliance **	Up to 70kW input	Up to 45kW output
England, Wales and Isle of Man	50% of throat area***	550mm ² /kW above 5kW rating	500mm ² /kW above 7kW input for an appliance in a room or space	550mm ² /kW above 5kW rating for an appliance in a room or space
Scotland	1500mm ² for fireplaces up to 450mm wide (measured between firebricks), for fireplaces exceeding 450mm width manufacturers' details should be followed	As England and Wales	As BS 5440: Part 2 (as England and Wales)	As England and Wales
Northern Ireland	As England and Wales	550mm ² up to 6kW rating. Over 6kW add 550mm ² for each kW above 6kW.	450mm ² up to 8kW. Over 8kW add 450mm ² for each kW above 8kW	As solid fuel closed appliance

Notes:

Full details of ventilation requirements for all types of appliances are contained in the relevant building regulations.

* Decorative fuel effect gas appliances should have a provision for combustion air complying with the relevant part of BS 5871.

Normally a minimum of 10,000mm² of purpose provided ventilation is required. Air vents should be direct to the external air or to an adjacent room or internal space which has an air vent or vents to the external air of at least the same free area. Air vents should have aperture dimensions no smaller than 5mm.

** Where closed appliances use a flue fitted with a draught stabiliser the total free area should be increased to 300mm²/kW for the first 5kW plus 850mm²/kW for the balance of appliance output.

***In the case of a fire with a canopy the open air vents should be 50% of the flue area.

APPENDIX 6.8-B

Minimum sizes for flues contained in chimneys

Solid fuel burning appliance up to 45kW output

Serving	Minimum flue size [mm]
Fireplace recess with an opening up to 500mm x 550mm	200 diameter or square section of equivalent area
Fireplace with larger opening	See approved Document J
Closed appliance up to 20kW rated output burning smokeless fuel	125 diameter or square section of equivalent area
Closed appliance up to 30kW rated output burning any fuel	150 diameter or square section of equivalent area
Closed appliance above 30kW and up to 50kW rated output burning any fuel	175 diameter or square section of equivalent area

Non fan-assisted individually flued gas burning appliances up to 70kW input excluding balanced flue

Serving	Minimum flue size
Gas fire	Round flue with a cross-sectional area of at least 12,000mm ² (125mm diameter) or rectangular flue with a cross-sectional area of at least 16,500mm ² with minimum dimension of 90mm
Any other	At least the cross-sectional area of the outlet from the appliance

Inset live or decorative gas fuel effect appliances

Serving	Minimum flue size
Open fire within a fireplace opening up to 500mm x 550mm	Circular or rectangular minimum flue dimension 175mm

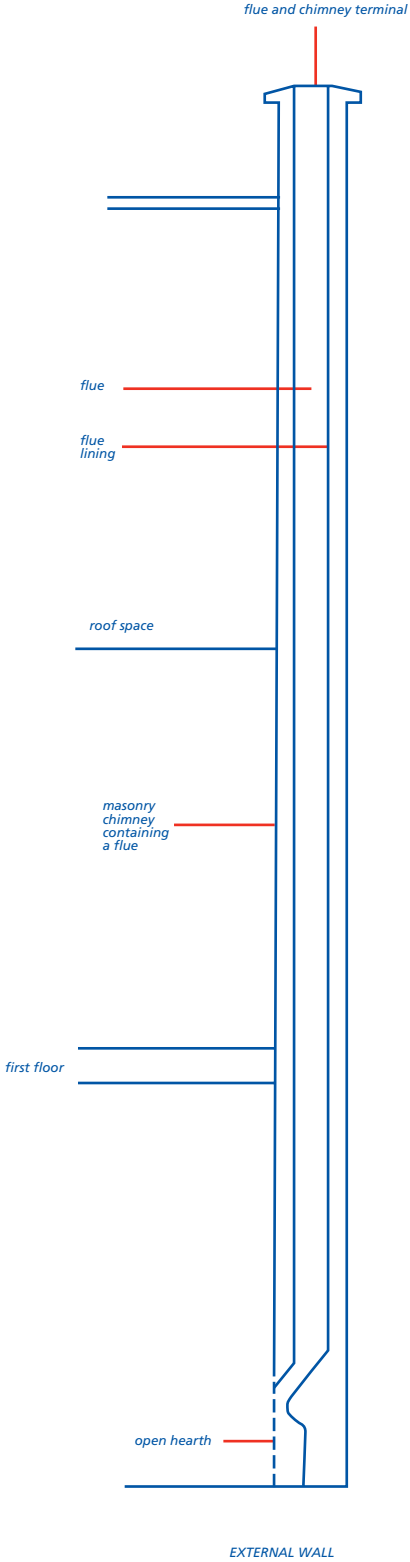
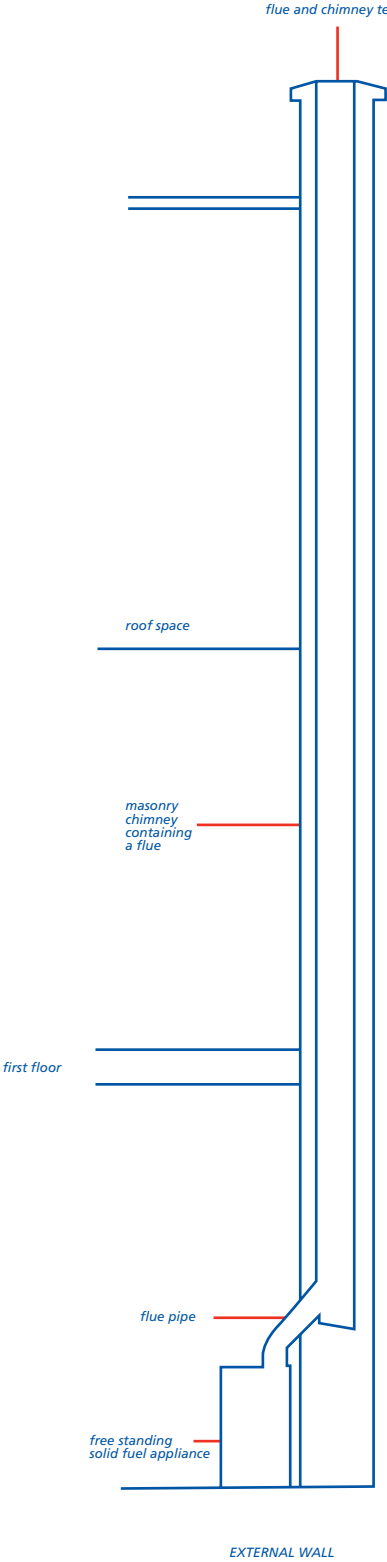
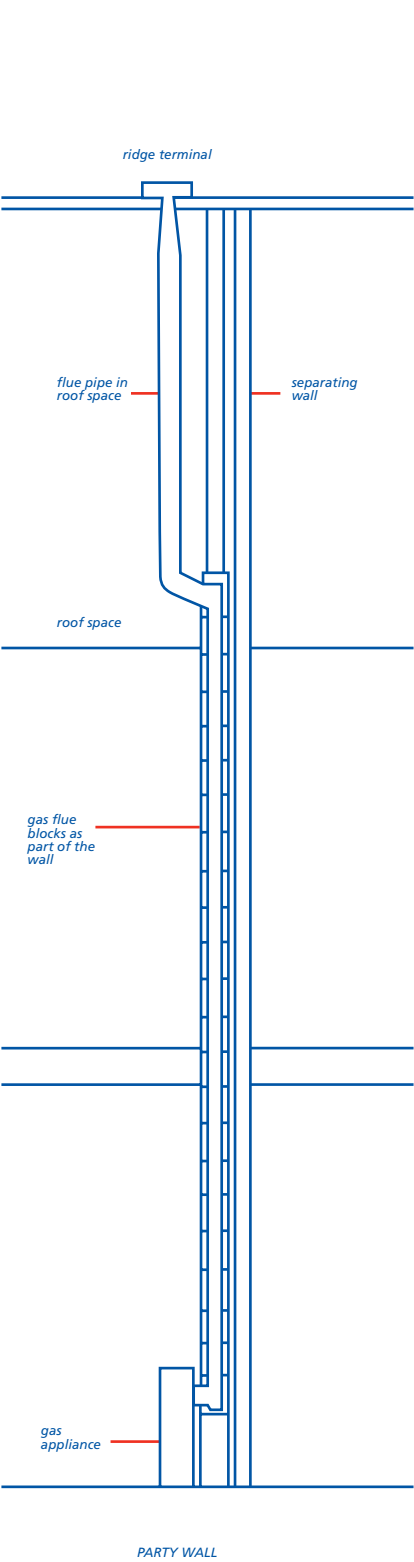
Oil burning appliances up to 45kW output

Not less than the size of the appliance outlet
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APPENDIX 6.8-C

Typical construction details

KEY TO TERMS



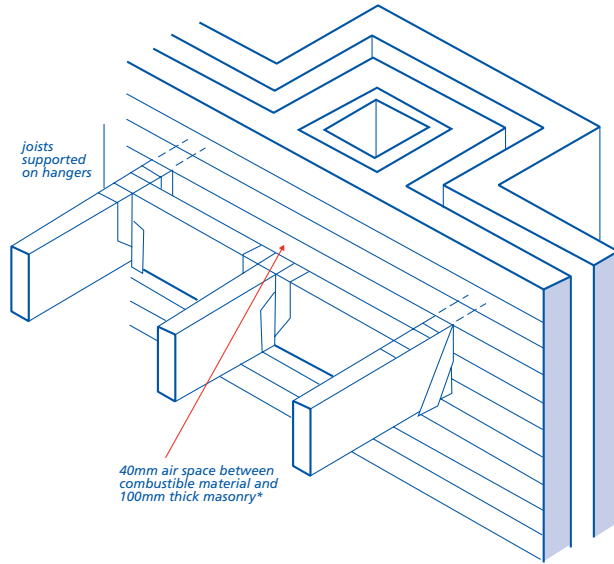
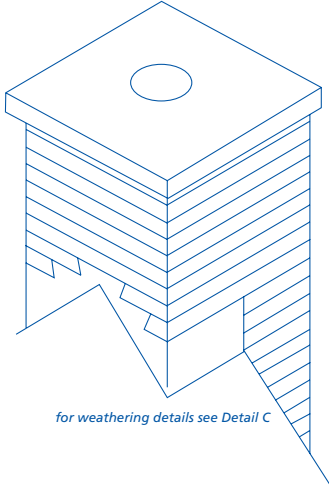
6.8

6.8 Fireplaces, chimneys and flues

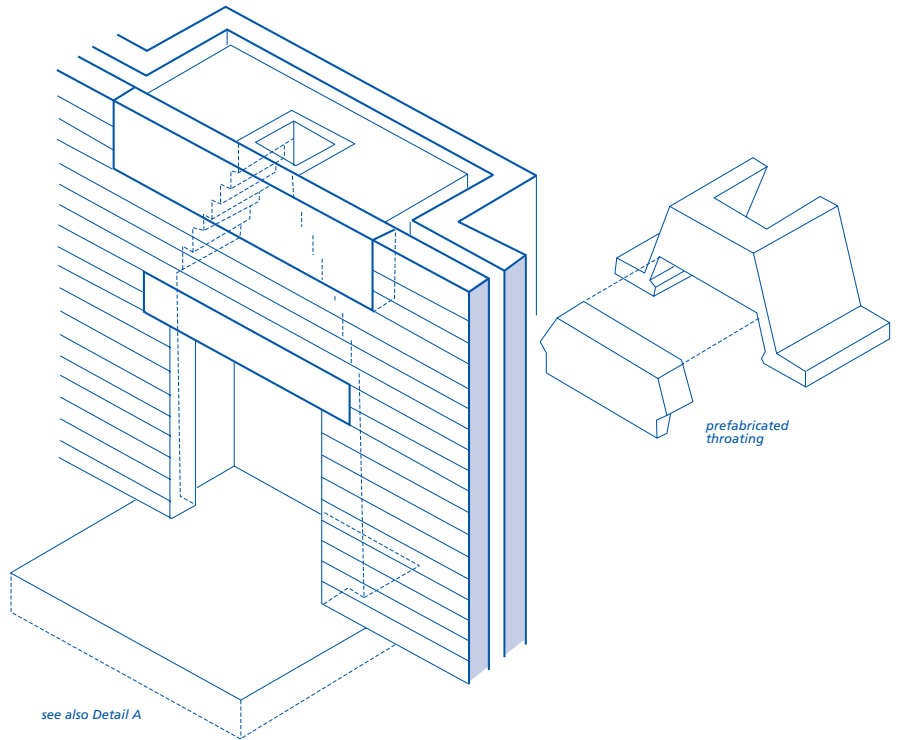
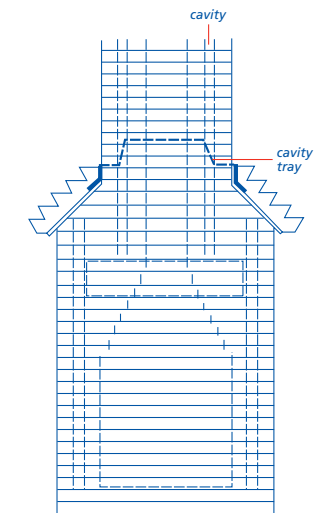
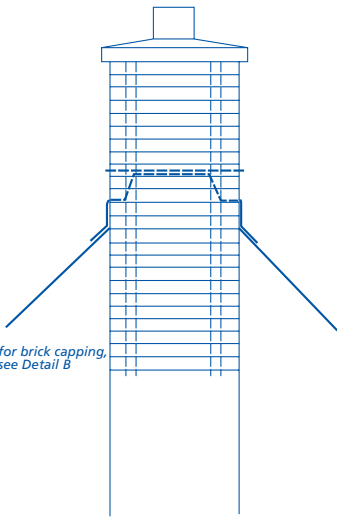
For weathering detail see Detail C

DETAILS OF EXTERNAL CHIMNEY BREAST WITH MASONRY INNER LEAF

Other alternatives may be suitable provided they meet the appropriate Performance Standards.

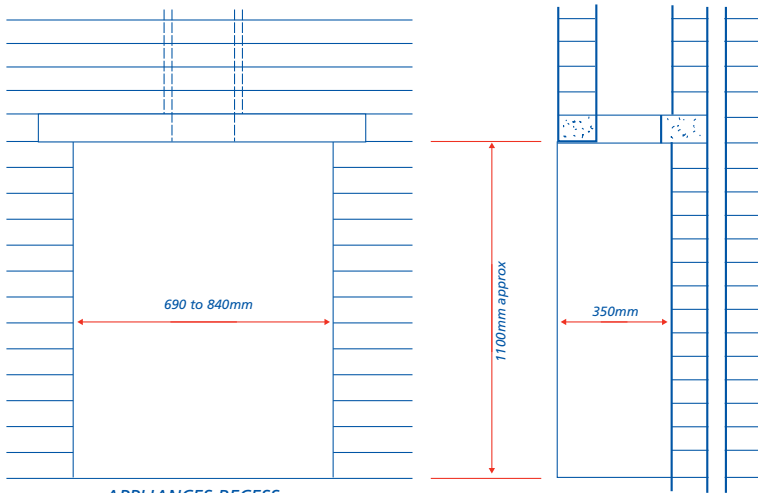


*in Scotland, joists, etc should be at least 200mm from inner surface of flue. Brickwork or blockwork in chimney construction should be at least 100mm thick and have a density of at least 1600 kg/m³. Aircrete blocks may be used if at least 150mm thick

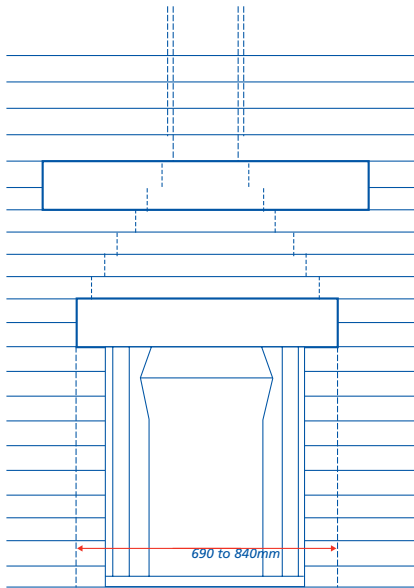


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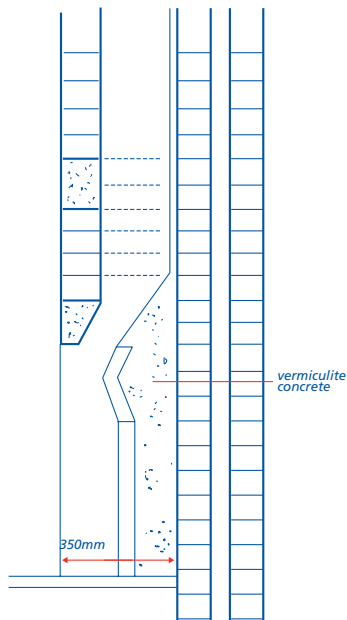
DETAIL A



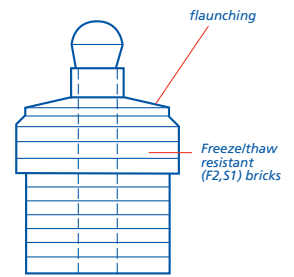
APPLIANCES RECESS - WITH RAFT LINTEL, SUITABLE FOR FREE STANDING ROOM HEATER



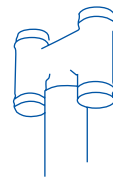
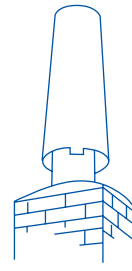
FIREPLACE RECESS - FOR INSET OPEN FIRE (WITHOUT BOILER UNIT)



DETAIL B



CHIMNEY DETAIL WITH BRICK CAPPING



VARIOUS TERMINALS (see Clause S5)

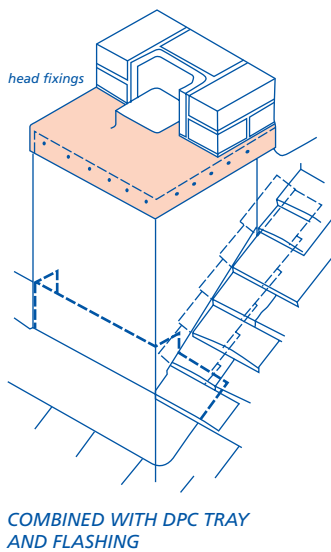
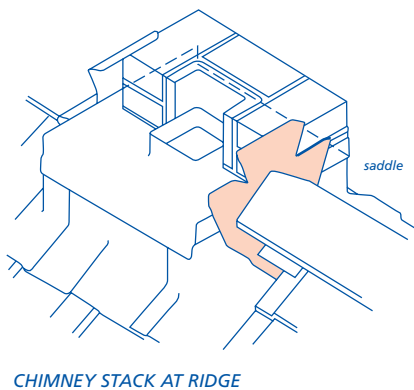
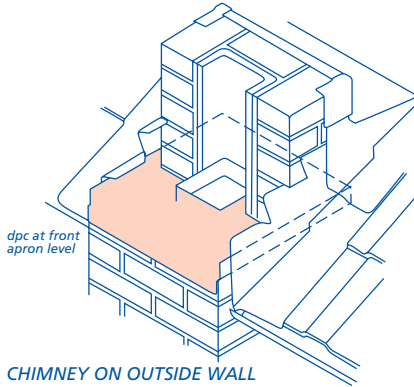
6.8 Fireplaces, chimneys and flues

DETAIL C

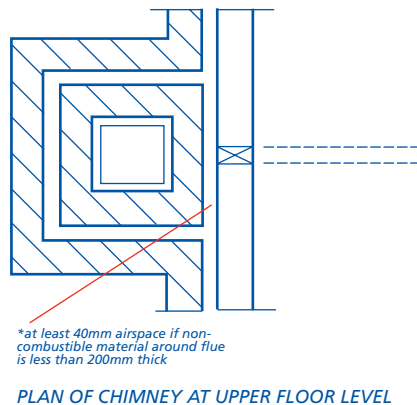
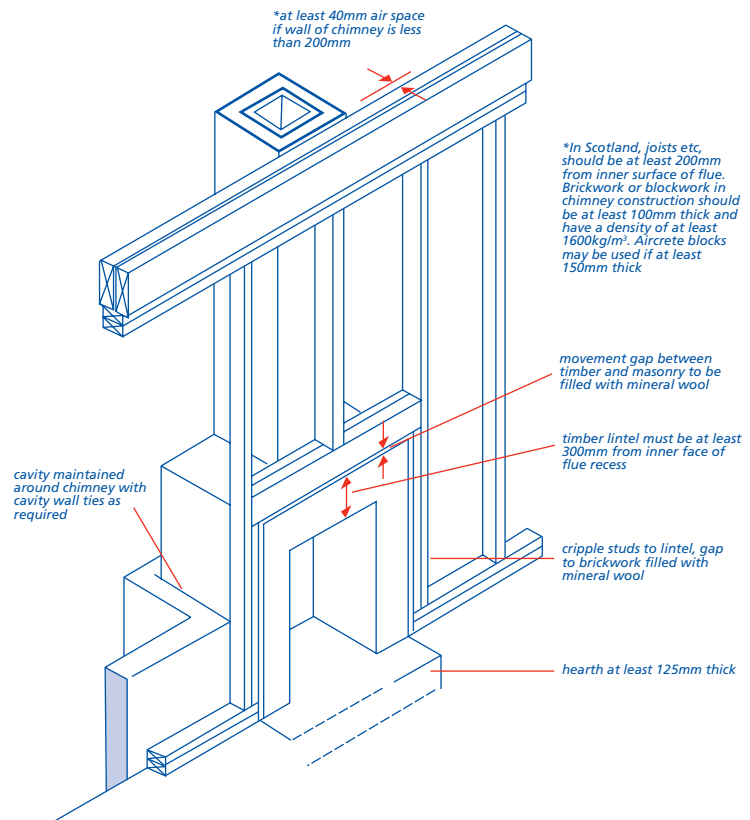
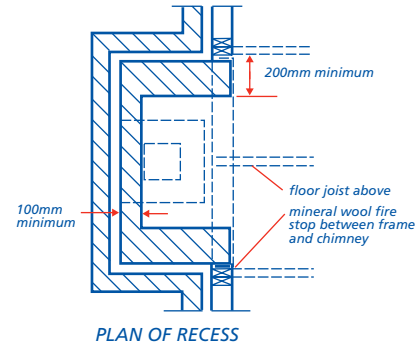
Weatherproofing details recommended for use in *Very Severe* and *Severe* exposure zones.

In other exposure zones the dpc tray can be dressed up the outside of the flue liner.

Note: All flashings and trays in chimneys to be metal (see Clause M11).

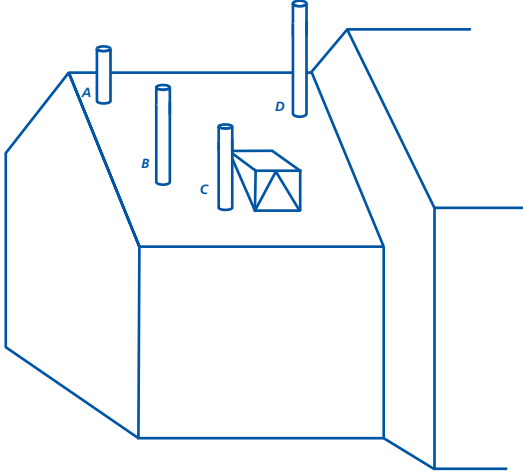


TYPICAL EXTERNAL FIREPLACE RECESS AND CHIMNEY-TIMBER FRAME CONSTRUCTION



APPENDIX 6.8-D

Flue outlet positions for solid fuel appliances



	Point where flue passes through weather surface (Notes 1,2)	Clearance to flue outlet
A	at or within 600mm of the ridge.	at least 600mm above the ridge.
B	elsewhere on a roof (whether pitched or flat)	at least 2300mm horizontally from the nearest point on the weather surface and: <ul style="list-style-type: none"> a) at least 1000mm above the highest point of intersection of the chimney and the weather surface: or b) at least as high as the ridge.
C	below (on a pitched roof) or within 2300mm horizontally to an openable rooflight, dormer window or other opening, (Note 3)	at least 1000mm above the top of the opening.
D	within 2300mm of an adjoining or adjacent building, whether or not beyond the boundary, (Note 3)	at least 600mm above the adjacent building.

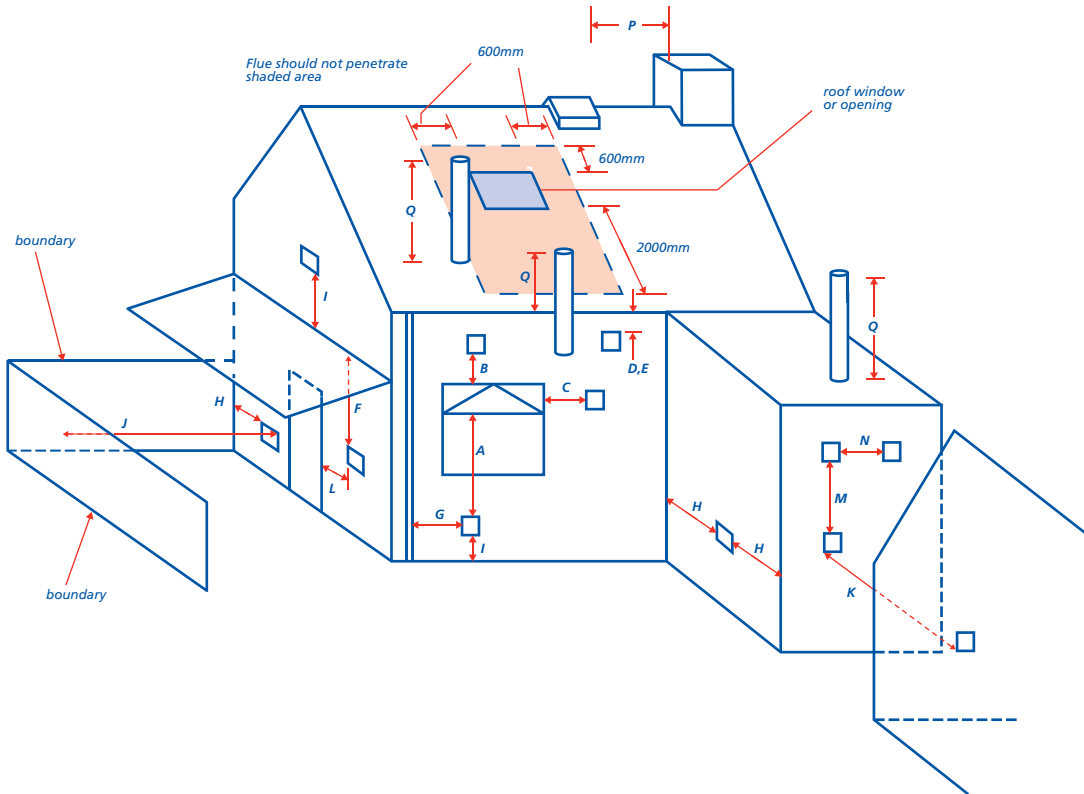
Notes

- 1 The weather surface is the building external surface, such as its roof, tiles or external walls.
- 2 A flat roof has a pitch less than 10°.
- 3 The clearance given for A or B, as appropriate, will also apply.

6.8 Fireplaces, chimneys and flues

APPENDIX 6.8-E

Location of outlets from flues servicing gas appliances



6.8

Location of outlets from flues serving gas appliances

Minimum separation distances for terminals in mm

Location	Balanced flue		Open flue	
	Natural draught	Fanned draught	Natural draught	Fanned draught
A Below an opening (1)	Appliance rated heat input (net)	300	(3)	300
	0-7kW >7-14kW >14-32kW >32kW	300 600 1500 2000		
B Above an opening (1)	0-32kW >32kW	300 600	300	(3) 300
C Horizontally to an opening (1)	0-7kW >7-14kW >14kW	300 400 600	300	(3) 300
D Below gutters, soil pipes or drain pipes	300		75	(3) 75
E Below eaves	300		200	(3) 200
F Below balcony or car port roof	600		200	(3) 200
G From a vertical drainpipe or soil pipe	300		150 (4)	(3) 150
H From an internal or external corner or to a boundary alongside the terminal (2)	600		300	(3) 200
I Above ground, roof or balcony level	300		300	(3) 300
J From a surface or a boundary facing the terminal (2)	600		600	(3) 600
K From a terminal facing the terminal	600		1200	(3) 1200
L From an opening in the car port into the building	1200		1200	(3) 1200
M Vertically from a terminal on the same wall	1200		1500	(3) 1500
N Horizontally from a terminal on the same wall	300		300	(3) 300
P From a structure on the roof	N/A		N/A	1500mm if a ridge terminal. For any other terminal, as given in BS 5440-1:2000 N/A
Q Above the highest point of intersection with the roof	N/A		Site in accordance with manufacturer's instructions	Site in accordance with BS 5440-1:2000 150

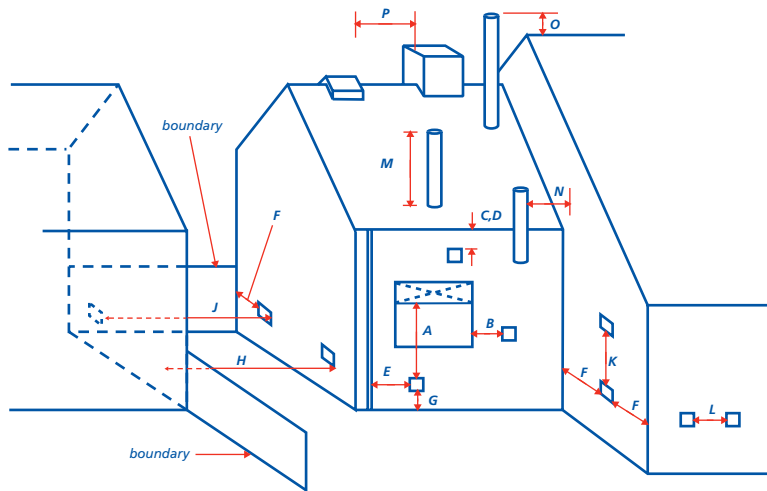
Notes:

- 1 An opening here means an openable element, such as an openable window, or a fixed opening such as an air vent. However, in addition, the outlet should not be nearer than 150mm (fanned draught) or 300mm (natural draught) to an opening into the building fabric formed for the purpose of accommodating a built in element, such as a window frame.
- 2 Boundary as defined in Paragraph 0.4. of Approved Document J: smaller separations to the boundary may be acceptable for appliances that have been shown to operate safely with such separations from surfaces adjacent to or opposite the flue outlet.
- 3 Should not be used.
- 4 This dimension may be reduced to 75mm for appliances of up to 5kW input (net).
- 5 N/A means not applicable.

6.8 Fireplaces, chimneys and flues

APPENDIX 6.8-F

Location of outlets from flues serving oil-fired appliances



Minimum separation distances for terminals in mm

Location of outlet (1)	Appliance with pressure jet burner	Appliance with vaporising burner	
A	Below an opening (2, 3)	600	should not be used
B	Horizontally to an opening (2, 3)	600	should not be used
C	Below a plastic/painted gutter, drainage pipe or eaves if combustible material protected (4)	75	should not be used
D	Below a balcony or a plastic/painted gutter, drainage pipe or eaves without protection to combustible material	600	should not be used
E	From vertical sanitary pipework	300	should not be used
F	From an external or internal corner or from a surface or boundary alongside the terminal	300	should not be used
G	Above ground or balcony level	300	should not be used
H	From a surface or boundary facing the terminal	600	should not be used
J	From a terminal facing the terminal	1200	should not be used
K	Vertically from a terminal on the same wall	1500	should not be used
L	Horizontally from a terminal on the same wall	750	should not be used
M	Above the highest point of an intersection with the roof	600 (6)	1000 (5)
N	From a vertical structure to the side of the terminal	750 (6)	2300
O	Above a vertical structure which is less than 750mm (pressure jet burner) or 2300mm (vaporising burner) horizontally from the side of the terminal	600 (6)	1000 (5)
P	From a ridge terminal to a vertical structure on the roof	1500	should not be used

Notes:

- Terminals should only be positioned on walls where appliances have been approved for such configurations when tested in accordance with BS EN 303-1:1999 or OFTEC standards OFS A100 or OFS A101.
- An opening means an openable element, such as an openable window, or a permanently open air vent.
- Notwithstanding the dimensions above, a terminal should be at least 300mm from combustible material, e.g. a window frame.
- A way of providing protection of combustible material would be to fit a heat shield at least 750mm wide.
- Where a terminal is used with a vaporising burner, the terminal should be at least 2300mm horizontally from the roof.
- Outlets for vertical balanced flues in locations M, N and O should be in accordance with manufacturer's instructions.

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