

General

This Technical Booklet has been prepared by the Department of Finance and Personnel and provides for certain methods and standards of building which, if followed, will satisfy the requirements of the Building Regulations (Northern Ireland) 2000 ("the Building Regulations").

There is no obligation to follow the methods or comply with the standards set out in this Technical Booklet.

If you prefer you may adopt another way of meeting the requirements of the Building Regulations but you will have to demonstrate that you have satisfied those requirements by other means.

Other regulations

This Technical Booklet relates only to the requirements of regulation L2, L3, L4, L5, L6 and L7. The work will also have to comply with all other relevant Building Regulations.

British Standards and European Technical Specifications

In this introduction and throughout this Technical Booklet any reference to a British Standard shall be construed as a reference to-

- (a) a British Standard or British Standard Code of Practice;
- (b) a harmonised standard or other relevant standard of a national standards body of any Member State of the European Economic Area;
- (c) an international standard recognised for use in any Member State of the European Economic Area;
- (d) any appropriate, traditional procedure of manufacture of a Member State of the European Economic Area which has a technical description sufficiently detailed to permit an assessment of the goods or materials for the use specified; or
- (e) a European Technical Approval issued in accordance with the Construction Products Directive,

provided that the proposed standard, code of practice, specification, technical description or European Technical Approval provides, in use, equivalent levels of safety, suitability and fitness for purpose as that provided by the British Standard.

Products conforming with a European Council Directive

Any product designed and manufactured to comply with the requirements of a European Council Directive does not have to comply with any other standard or part of a standard, whether British, International or other, which relates to the same characteristic or specific purpose as the EC Directive.

CE marked construction products

Any construction product (within the meaning of the Construction Products Directive) which bears a CE marking shall be treated as if it satisfied the requirements of any appropriate British Board of Agrément Certificate, British Standard or British Standard Code of Practice relating to such a product, where the CE marking relates to the same characteristic or specific purpose as the Certificate, Standard or Code of Practice.

Testing of materials and construction

Where for the purposes of this Technical Booklet testing is carried out it shall be carried out by an appropriate organisation offering suitable and satisfactory evidence of technical and professional competence and independence. This condition shall be satisfied where the testing organisation is accredited in a Member State of the European Economic Area in accordance with the relevant parts of the EN 45000 series of standards for the tests carried out.

Materials and workmanship

Any work to which a requirement of the Building Regulations applies must, in accordance with Part B of the Building Regulations, be carried out with suitable materials and in a workmanlike manner. You can comply with the requirements of Part B by following an appropriate British Standard or you may demonstrate that you have complied with those requirements by other suitable means, such as an acceptable British Board of Agrément Certificate, Quality Assurance Scheme, Independent Certification Scheme or Accredited Laboratory Test Certificate.

Diagrams

The diagrams in this Technical Booklet supplement the text. They do not show all the details of construction and are not intended to illustrate compliance with any other requirement of the Building Regulations. They are not necessarily to scale and should not be used as working details.

References

Any references in this Technical Booklet to a publication shall, unless otherwise stated, be construed as a reference to the edition quoted, together with any amendments, supplements or addenda thereto current at 30 June 2006.

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General

- 1 Part L of the Building Regulations deals with the requirements for the safe and efficient use of combustion appliances in buildings and the safe installation of any associated fuel storage systems.

This is a very wide-ranging subject and there is other legislation that deals with some very specific issues. This foreword provides some background information regarding this other legislation so that you get a broader understanding of the full range of legal requirements in this field.

It is essential to note that these Building Regulations are not intended to replace any of this legislation. It is also important to note that due attention must be paid to the requirements of the other parts of the Building Regulations when considering such topics as structural stability, ventilation and fire safety.

Other legislation

Gas Safety (Installation and Use) Regulations (Northern Ireland) 2004

- 2 All combustion installations must be accommodated in ways that meet the requirements of the Building Regulations. However gas installations also have to comply with the Gas Safety (Installation and Use) Regulations (Northern Ireland) 2004 which require professional work to be undertaken by a member of a class of persons approved by the Health and Safety Executive Northern Ireland (HSENI). The Gas Safety (Installation and Use) Regulations (Northern Ireland) 2004 cover the safe installation of gas fittings, appliances and flues. The following paragraphs give an outline of some of the main requirements of the Gas Safety (Installation and Use) Regulations (Northern Ireland) 2004 but for further information reference should be made to the Health and Safety Commission's Approved Code of Practice and Guidance L56.
- 3 The Gas Safety (Installation and Use) Regulations (Northern Ireland) 2004 require that –
 - (a) gas fittings, appliances and gas storage vessels must only be installed by a person with the required competence;
 - (b) any person having control to any extent of gas work must ensure that the person carrying out that work has the required competence; and
 - (c) any gas installation business, whether an employer or self-employed, must be a member of a class of persons approved by the HSENI.

The Gas Appliances (Safety) Regulations 1995

- 4 The Gas Appliances (Safety) Regulations 1995 require that particular combinations of appliance, flue box (where required) and flue must be selected from those stated in the manufacturer's instructions as having been shown to be safe by a Notified Body.

Control of Oil Pollution

- 5 The control of pollution of groundwater and waterways within Northern Ireland is currently covered by The Groundwater Regulations (Northern Ireland) 1998 and The Water (Northern Ireland) Order 1999.

This legislation will be enhanced by a new Regulation, The Control of Pollution (Oil storage) Regulations (Northern Ireland) 2006 which will be introduced following a statutory consultation period. When it is adopted, it will cover above ground oil storage installations, on premises used wholly or mainly as one or more private dwellings, storing more than 3,500 litres of oil. It will also cover any industrial, commercial and institutional sites storing more than 200 litres of oil.

Liquefied Petroleum Gas (LPG) Installations

- 6 LPG installations are controlled by legislation enforced by the HSENI or its agents. Factors that determine the amount of building work necessary for a LPG storage installation to comply include its capacity, whether or not tanks are installed above or below ground and the nature of the premises they serve. LPG storage installations shall be shown to comply with the legislation by constructing it in accordance with:

- (a) LPGA Code of Practice 1: Bulk LPG Storage at Fixed installations: Parts 1 to 4; or
- (b) LPGA Code of Practice 24: Use of LPG Cylinders: Part 1: The use of propane cylinders at residential premises where applicable.

0.1 In this Technical Booklet the following definitions apply –

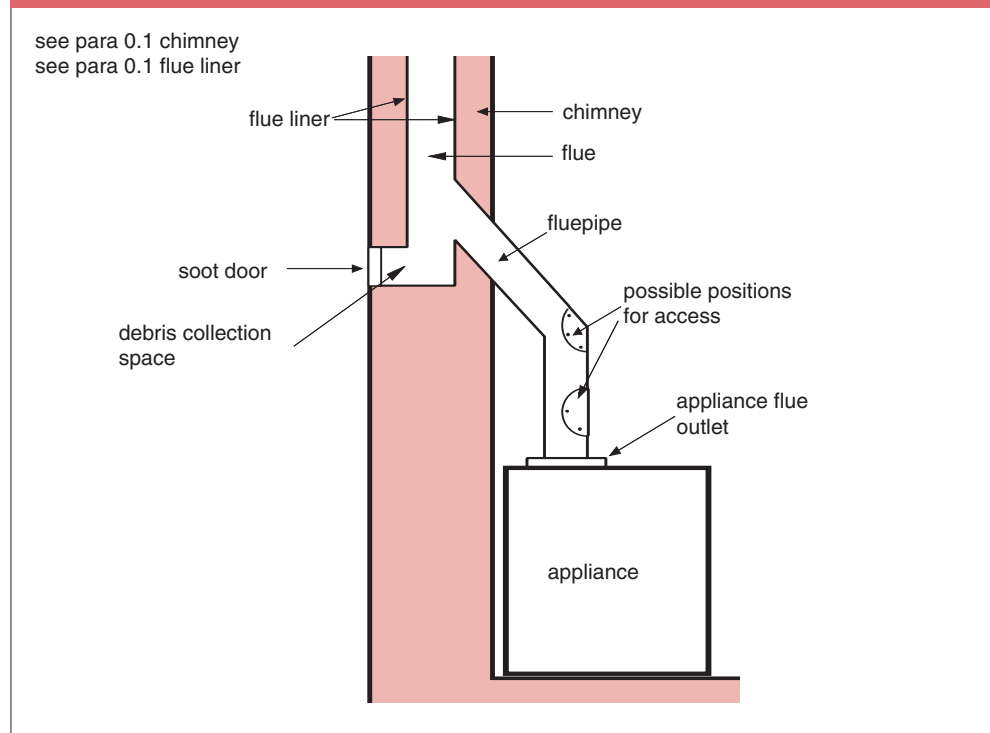
Appliance compartment – an enclosure specifically constructed or adapted to accommodate one or more gas or oil-fired appliances.

Balanced compartment – a method of installing an open-flued appliance into a compartment which is sealed from the remainder of the building and whose ventilation is so arranged in conjunction with the appliance flue as to achieve a balanced flue effect.

Balanced flue appliance – a type of room-sealed appliance that draws its combustion air from a point outside the building adjacent to the point at which the combustion products are discharged, the inlet and outlet being so disposed that wind effects are substantially balanced.

Capacity (of an oil or gas tank) – the nominal volume of the tank as stated by the manufacturer.

Diagram 0.1 Chimneys and flues



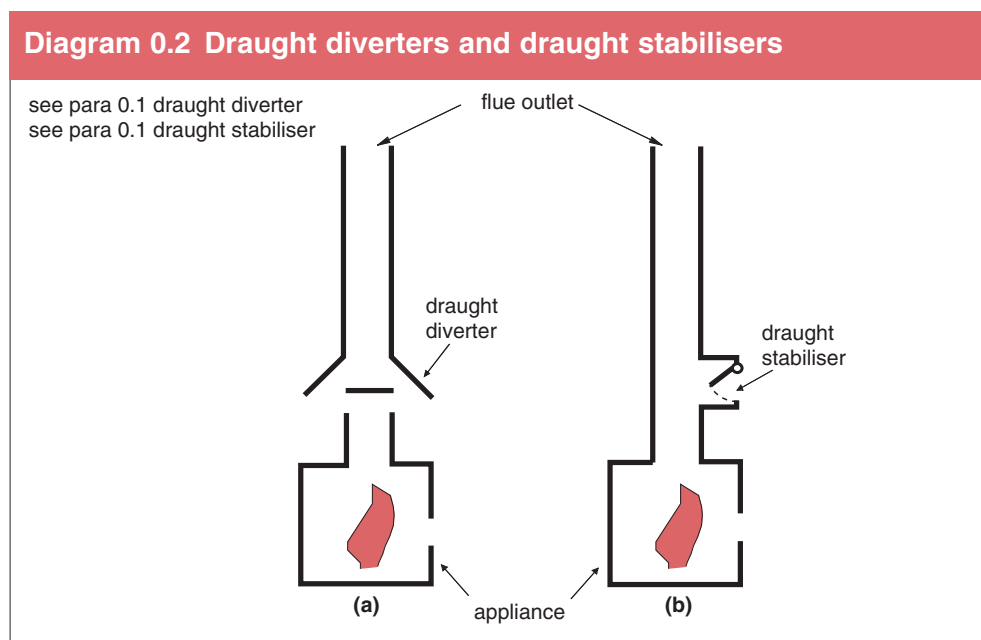
Chimney – a structure consisting of a wall or walls enclosing one or more flues (see Diagram 0.1).

Designation – BS EN 1443: 2003 expresses the performance characteristics of a flue or its components, as assessed in accordance with an appropriate European product standard, by means of a code such as EN 1234 T400 P1 S W 1 R22 C50. This code is known as the designation for the flue or its components.

Draught break – an opening formed by a factory-made component into any part of the flue serving an open-flued appliance.

Draught diverter – a form of draught break intended to prevent conditions in the main length of flue from interfering with the combustion performance of an open-flued appliance (see Diagram 0.2(a)).

Draught stabiliser – a factory made counter-balanced flap device admitting air to the flue, from the same space as the combustion air, to prevent excessive variations in the draught (see Diagram 0.2(b)).



Factory-made metal chimneys (also known as system chimney) – prefabricated chimneys that are commonly manufactured as sets of components for assembly on site (although they can be supplied as one unit), having the performance appropriate for the intended appliance.

Fanned draught installation – the proper discharge of the flue gases depends upon the operation of a fan, which may be separately installed in the flue or may be an integral part of the combustion appliance (see Diagram 0.3).

Forced draught appliances – an appliance with a fan that provides the combustion air, common in oil-fired and many gas-fired boilers (see Diagram 0.3).

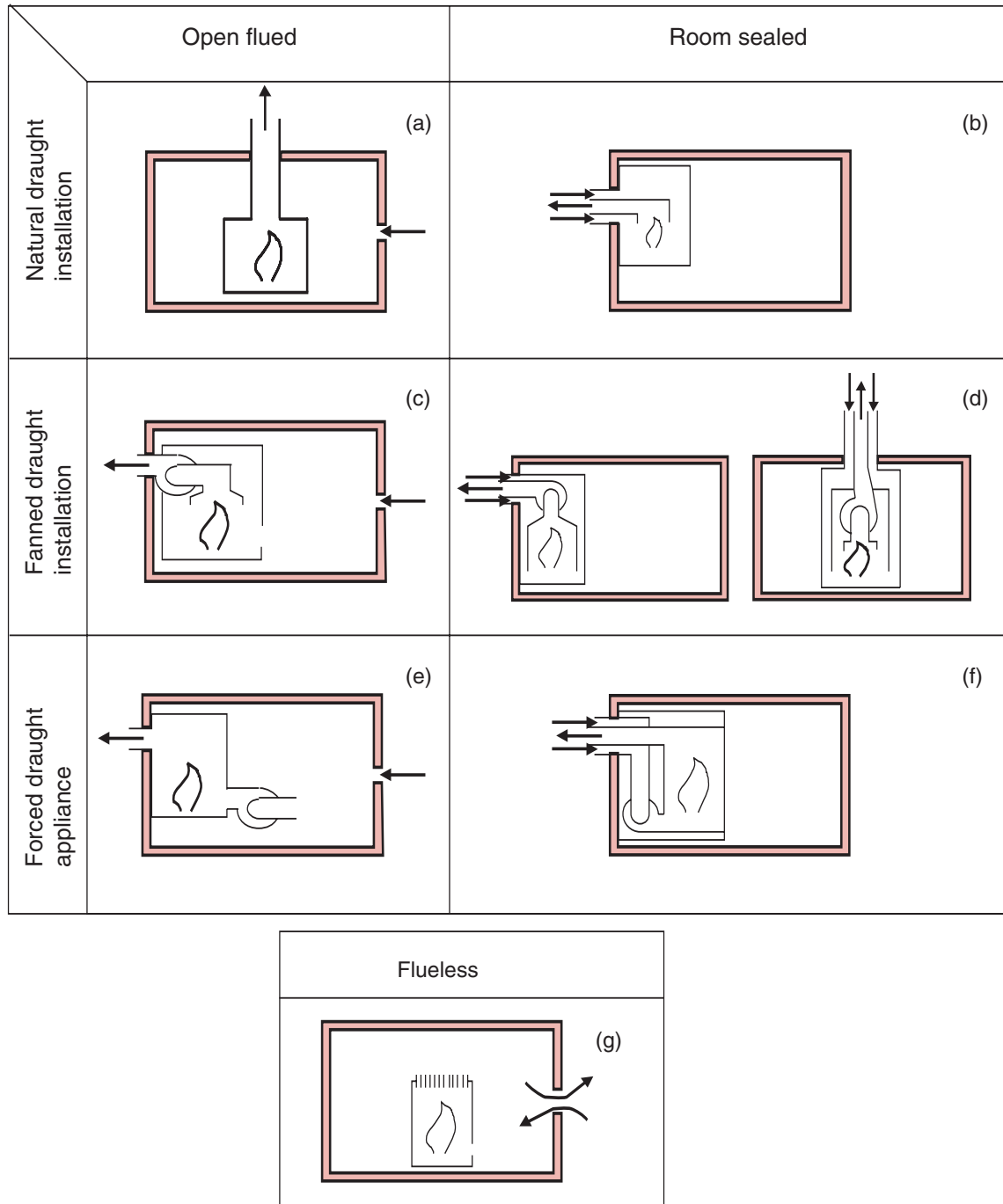
Fire compartment – a building or part of a building comprising one or more rooms, spaces or storeys, constructed to prevent the spread of fire to or from another part of the same building, or an adjoining building. A roof-space above the top storey of a fire compartment is included in that fire compartment.

Fireplace recess – a structural opening (sometimes called a builder's opening) formed in a wall or in a chimney breast, from which a chimney leads and which has a hearth at its base (see Diagram 0.4).

Fire resistance (of a component or construction) – a measure of its ability to withstand the effects of fire in one or more ways for a stated period of time. Provisions on determination of performance in terms of fire resistance are given in Technical Booklet E (Fire safety).

Diagram 0.3 Types of installation

see para 0.1 fanned draught
 see para 0.1 forced draught
 see para 0.1 flueless appliance
 see para 0.1 open flued appliance
 see para 0.1 room sealed appliance

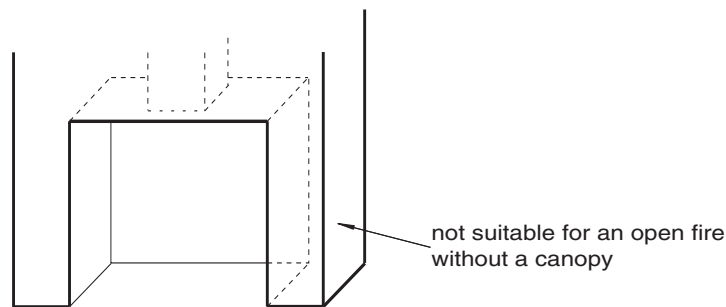


Note - For gas appliances only: CEN CR1749 classifies gas appliances according to their method of evacuating the products of combustion:
 Type A - Flueless appliances
 Type B - Open flued
 Type C - Room sealed

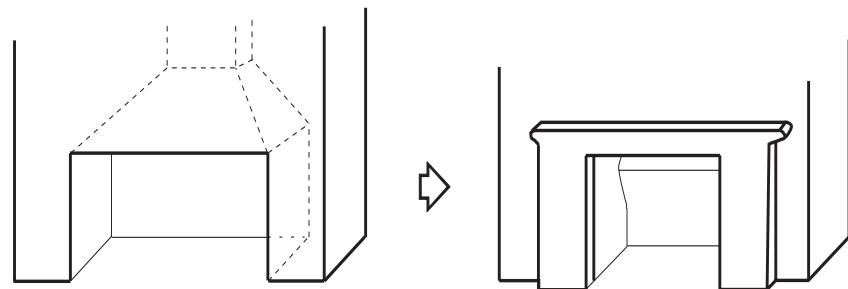
The letters A, B and C are further qualified by numbers to identify the existence and mode of use of fans and draught diverters, as applicable (e.g. B₁₁ for an open flued natural draught appliance with draught diverter).

Diagram 0.4 Fireplace recesses

see para 0.1 fireplace recess
see para 0.1 natural draught flue
see dia 2.13



Simple recess suitable for closed appliances such as roomheaters and cookers that are connected to their flues



(b) Structural opening prepared to receive an appliance such as a free standing fire basket

Recess comprising structural opening (as (b)) lined to receive an inset open fire and with decorative surround. (See also Diagram 2.12)

Firewall – a method of shielding a fuel tank from the thermal radiation from a fire in the adjoining building or boundary.

Flueblock chimney systems – a set of factory-made components made from precast concrete, clay or other masonry units that are designed for assembly on site to provide a complete chimney having the performance appropriate for the intended appliance.

Flue box – a factory made unit, usually made of metal, which is similar to a prefabricated appliance chamber except that it is designed to accommodate a gas-burning appliance in conjunction with a factory-made chimney.

Flueless appliance – one which is designed to be used without connection to a flue (see Diagram 0.3(g)).

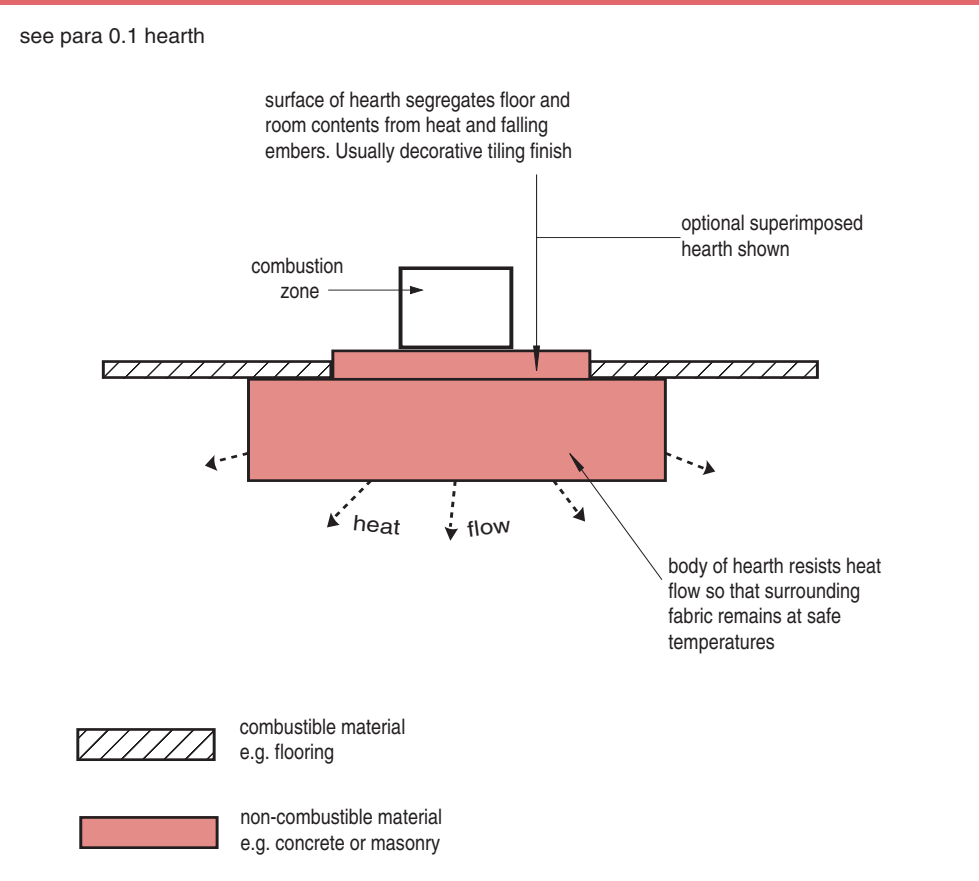
Flue liner – the wall of the chimney that is in contact with the products of combustion (see Diagram 0.1), such as a concrete flue liner, the inner liner of a factory-made chimney system or a flexible liner fitted into an existing chimney.

Flue outlet – the point at which the products of combustion are discharged from the flue to the outside atmosphere, such as the top of a chimney pot or flue terminal.

Fluepipe – a pipe, either single walled (bare or insulated) or double walled, which connects a combustion appliance to a flue in a chimney.

Hearth – a base intended to safely isolate a combustion appliance from people, combustible parts of the building fabric and soft furnishings (see Diagram 0.5).

Diagram 0.5 The functions of hearths



Natural draught flue – the combustion products flow into the flue as a result of the buoyancy force produced due to the difference between the temperature of the gases within the flue and the temperature of the ambient air. Draught increases with the height of the flue. Except for those balanced flue appliances which are designed to discharge directly through the wall adjacent to the appliance, a satisfactory natural draught requires an essentially vertical run of flue (see Diagram 0.4 (a) and (b)).

Non-combustible material – This is the highest level of reaction to fire performance. A non-combustible material is –

- (a) a material classified as non-combustible in tests following the procedures in BS 476: Part 4: 1970;
- (b) a material which when tested to BS 476: Part 11: 1982 does not flame nor cause any rise in temperature on either the centre (specimen) or furnace thermocouples; or
- (c) a material classified as Class A1 in accordance with BS EN 13501: 2002 Fire classification of construction products and building elements: Part 1: Classification using test data from reaction to fire tests when tested to –
 - (i) BS EN ISO 1182: 2002 Reaction to fire tests for building products – Non-combustibility test; and
 - (ii) BS EN ISO 1716: 2002 Reaction to fire tests for building products – Determination of the heat of combustion.

Typical examples of such materials to be found in buildings include totally inorganic materials such as concrete, fired clay, ceramics, metals, plaster and masonry containing not more than 1% by weight or volume of organic material. (Use in buildings of combustible metals such as magnesium-aluminium alloys shall be assessed in each individual case).

Notified Body – for the purposes of the Gas Appliances (Safety) Regulations (1995), means –

- (a) A body which is approved by the Secretary of State for Trade and Industry as being competent to carry out the required Attestation procedures for gas appliances and whose name and identification number has been notified by him/her to the Commission of the European Community and to other member States in accordance with the Gas Appliances (Safety) Regulations 1995;
- (b) A body which has been similarly approved for the purposes of the Gas Appliances Directive by another member State and whose name and identification number has been notified to the Commission and to other member States pursuant to the Gas Appliances Directive.

Open-flued appliance – one which draws its combustion air from the room or space within which it is installed and which requires a flue to discharge its products of combustion to the outside air (see Diagram 0.3 (a), (c) and (e)).

Prefabricated appliance chamber – a set of factory-made pre-cast concrete components designed to provide a fireplace recess to accommodate an appliance such as a stove, and incorporates a gather when used with an open fire.

Rated heat input (sometimes shortened to rated input) – for a gas appliance means the maximum heat input rate (kW) at which it can be operated, as declared on the appliance data plate.

Rated heat output – for an oil or solid fuel appliance means the manufacturer's maximum declared energy output rate (kW) for the appliance as declared on the appliance data plate.

Room-sealed appliance – an appliance with a combustion system that is sealed from the room in which it is located, and which obtains air for combustion, from a ventilated uninhabited space within the building, or directly from the open air outside the building and vents the products of combustion directly to the open air outside the building (see Diagram 0.3 (b), (d) and (f)).

Separated part – of a building means a form of compartmentation in which part of a building is separated from another part of the same building by a compartment wall. The wall runs the full height of the part and is in one vertical plane.

Throat – a contracted part of the flue between a fireplace recess and its chimney (see Diagram 2.5).

Air supply for combustion appliances

- 1.1 All combustion appliances require the supply of air for combustion and to ensure the proper operation of the flue. A flueless appliance also needs air to ensure that the products of combustion are safely dispersed to the outside air. In some cases, combustion appliances may also require air for cooling control systems and/or to ensure that casings remain safe to touch.
- 1.2 The size of air vent required, which is dependent upon the type of fuel burned, is given in Sections 2, 3 and 4 and is for one combustion appliance only. If a room contains more than one combustion appliance the air supply provisions will have to be increased.

Ventilation of appliance compartments

- 1.3 An appliance compartment that encloses an open-flued appliance shall be provided with an air vent(s) large enough to admit all of the air required for combustion and the proper operation of the flue.
- 1.4 High and low level vents shall be provided where the combustion appliance requires cooling air and the appliance compartment shall be large enough to enable the air to circulate effectively.
- 1.5 Where the combustion appliance is to be installed within a balanced compartment special provisions will be necessary. In such circumstances the manufacturer's instructions for the combustion appliance and ventilation system shall be followed.

Ventilation via other rooms or spaces

- 1.6 If a combustion appliance is room-sealed but takes its combustion air from another space in the building, or if a flue has a permanent opening to another space in the building, that space shall have ventilation openings directly to the outside air.
- 1.7 Where a flued appliance is supplied with combustion air through an air vent(s) that opens into an adjoining room or space, the adjoining room or space shall have air vent openings of at least the same size directly to the outside air.

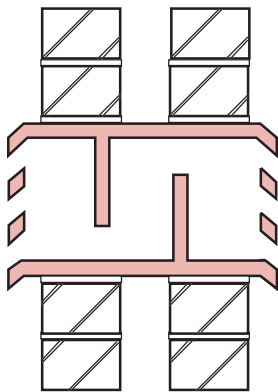
An air vent(s) for a flueless appliance shall always open directly to the outside air.

- 1.8 Where ventilation is to be provided via a single proprietary assembly the equivalent free area of the air vent shall be taken to be the manufacturer's value. The manufacturer may call this a free area or equivalent free area (see Diagram 1.1(a)).

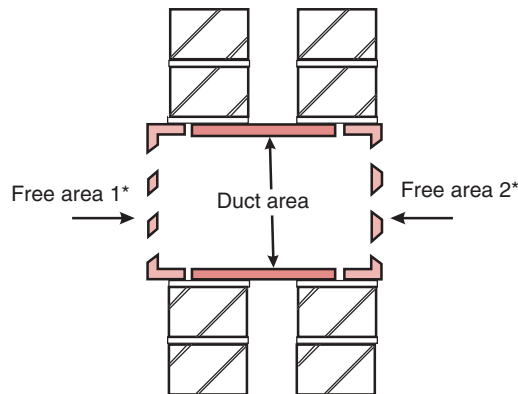
- 1.9 Where two or more components are to be used to provide a non-proprietary ventilation assembly, the assembly shall be kept as simple and smooth as possible. The assembly shall be taken to have an equivalent free area equal to that of the component with the smallest free area in the assembly. The free area of each component shall be its manufacturer's figure or, where that is not available, its free area measured in accordance with paragraph 1.10 (see Diagram 1.1(b)).
- 1.10 The measured free area of a ventilator component is its total unobstructed cross sectional area, measured in the plane where this area is at a minimum and at right angles to the direction of airflow. For an airbrick, grille or louvre, it will be the aggregate free area of the individual apertures (see Diagram 1.1(c)).
- 1.11 Grilles or meshes protecting air vents from the entry of animals or birds shall have individual aperture dimensions of not less than 5 mm.

Diagram 1.1 Ventilator free areas

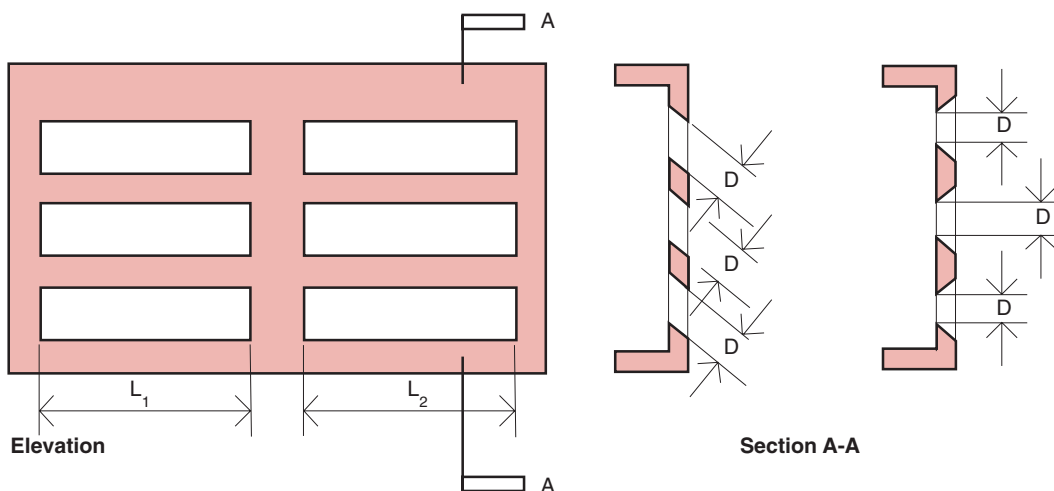
see paras 1.8, 1.9 and 1.10



(a) Proprietary unit incorporating baffles, grilles etc: use the manufacturer's stated free area



**(b) Ventilator assembled on site from components (*free area as marked on component or as measured on site - see below)
Use whichever is the smaller of Free area 1, Free area 2 or the Duct area**



**(c) Measuring the free area of components on site -
net free area = $(L_1 + L_2) \times D \times N$
(where N = the number of slots)**

Permanently open ventilation of rooms

- 1.12 A room containing an open-flued appliance must receive a continuous supply of air from outside. The volume of air required will depend on the type and rating of the appliance. This will normally mean the installation of permanently open air vents into that room.
- 1.13 A permanently open air vent shall be non-adjustable and be positioned where it is unlikely to become blocked. It shall be so installed that the building occupants are not provoked into sealing it against draughts or noise.
- It shall not be positioned in a fire resisting wall other than an external wall that is not part of an external wall shielding a LPG or oil storage tank. A permanently open air vent shall not be located within a fireplace recess.
- 1.14 A permanently open air vent shall be sized so that the free area, or the equivalent free area of a more complex design, is sufficient for the appliance to be installed, taking account where necessary of obstructions such as grilles and anti vermin mesh.
- 1.15 Any discomfort from cold draughts can be avoided by placing the air vent close to the appliance, drawing air from other parts of the building or by ensuring a good mix of the incoming cold air by placing the air vent close to the ceiling. (see Diagrams 1.2 and 1.3). In a noisy area, it may be necessary to install proprietary noise attenuated air vents to limit the entry of noise into the building but these shall not diminish the required air supply.

Diagram 1.2 Location of perimeter air vents openings, some examples

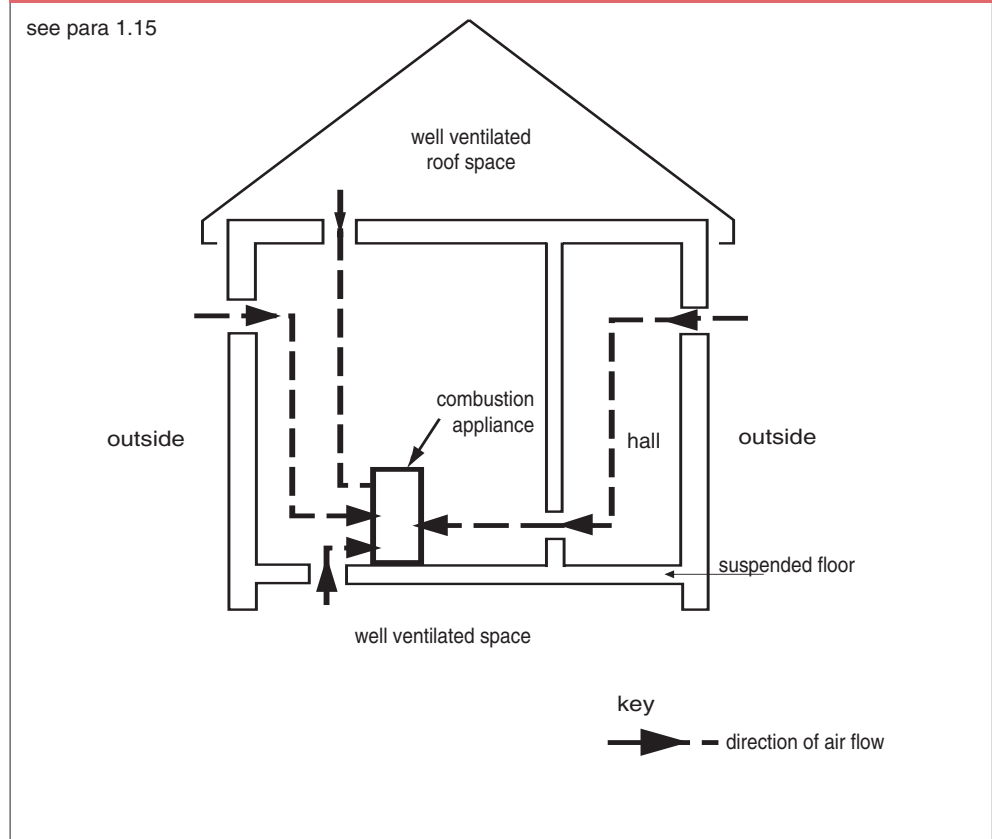
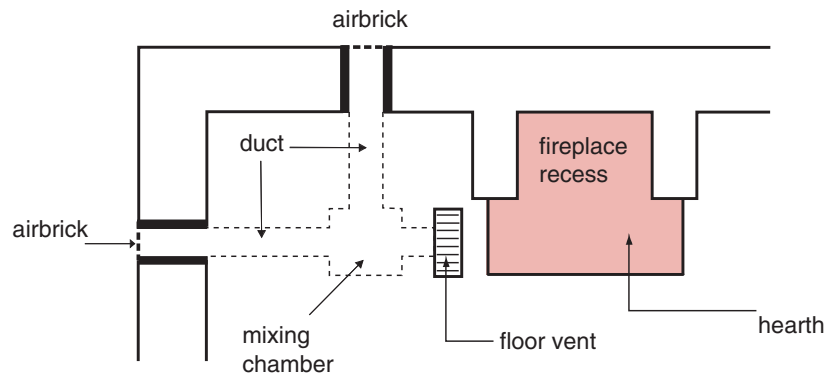


Diagram 1.3 Permanent vent openings in a solid floor

see para 1.15



Plan

airbrick, duct and grille shall have an equivalent free area at least that recommended in Sections 2, 3 or 4 as relevant

Interaction of mechanical extract ventilation and open-flued combustion appliances

- 1.16 Extract fans lower the pressure in a building and this can cause the spillage of combustion products from an open-flued appliance.
- 1.17 In a building where it is intended to install an open-flued appliance and an extract fan the combustion appliance shall operate safely whether or not the fan is running. To minimise the risk of spillage of flue gas the following provisions shall apply.
- For a gas appliance – where a room contains an open-flued appliance, the room extract fan rate shall not exceed 20 litres/second (72 m³/hour), and a spillage test as recommended in BS 5440 -1: 2000 shall be carried out.
 - For an oil appliance – the room extract fan capacity shall be limited as described in OFTEC Technical Information Note TI/112 and a flue draught interference test as described in TI/112 shall be carried out.
 - For a solid fuel appliance – a room extract fan shall not be installed in the same room unless such an installation follows HETAS guidance.
 - For commercial and industrial installations – specialist advice from a mechanical/services engineer shall be necessary with regard to the possible need for the interlocking of gas heaters and any mechanical ventilation system.

Provision of flues

- 1.18 This Technical Booklet provides deemed-to-satisfy provisions on how to construct a flue or chimney that serves only one appliance. A flue designed to serve more than one appliance shall follow the recommendations of BS 5410 Part -1: 1997 for oil and BS 5440 Part -1: 2000 for gas-fired combustion appliances. Each solid fuel appliance shall have its own flue.
- 1.19 A combustion appliance, other than a flueless appliance, shall incorporate or be connected to a suitable flue that discharges to the outside air.

Condensates in flues

- 1.20 A flue shall provide satisfactory control of water condensation. This can be achieved by adopting one of the following provisions –
- (a) the flue for a non-condensing combustion appliance shall be insulated so that flue gas does not condense during normal operation; or
 - (b) the flue for a condensing combustion appliance shall –
 - (i) be lined with components that are impervious to condensates and resistant to corrosion, avoiding ledges, crevices etc; and
 - (ii) a suitable drain shall be fitted to the combustion appliance for the disposal of condensate.

Construction of masonry chimneys

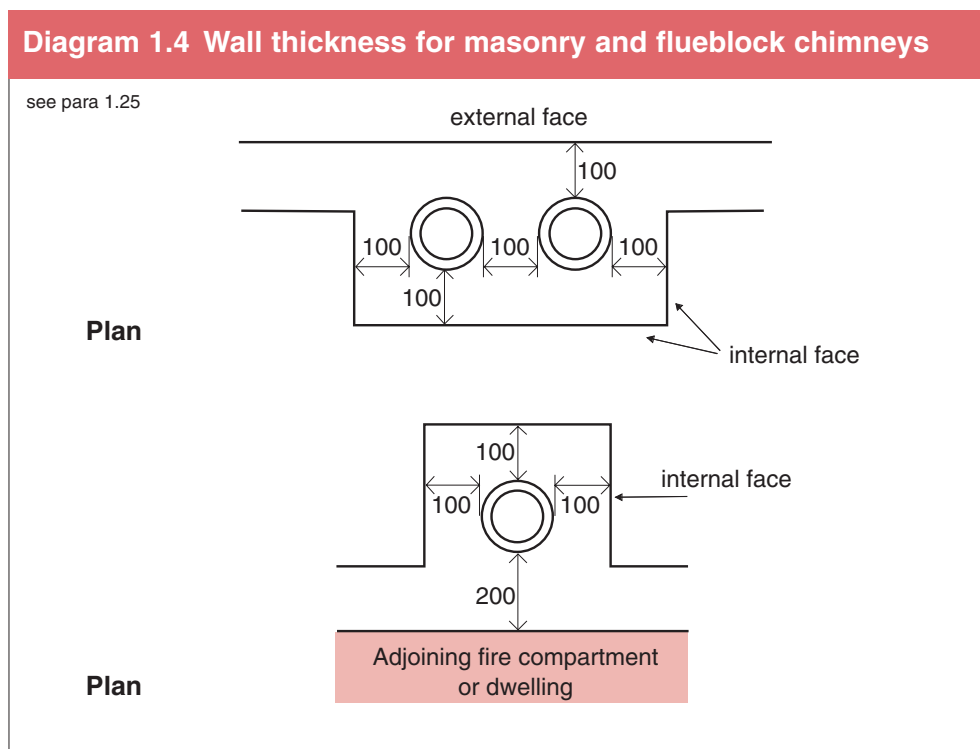
- 1.21 A new chimney shall be constructed with a flue liner and masonry suitable for the intended application. The following liners are suitable for a solid fuel appliance as well as being generally suitable for other fuels –
- (a) a liner with a performance that is equal to that corresponding to the designation T400 N2 D 3 G, as described in BS EN 1443: 2003, such as –
 - (i) clay flue liners, with rebates or sockets for jointing, meeting the requirements for Class A1 N2, A1 N1, B1 N2 or B1 N1 as described in BS EN 1457: 1999; or
 - (ii) concrete flue liners independently certified as meeting the requirements for the classification Type A1, A2, B1, B2, C1 or C2 as described in BS EN 1857: 2003; and
 - (b) imperforate clay pipes with jointing sockets as described in BS EN 1457: 1999.
- 1.22 A liner shall be installed in accordance with the manufacturer's instructions. Appropriate components shall be selected to form the flue without cutting and to keep joints to a minimum. Bends and offsets shall only be formed with matching factory-made components. Liners shall be placed with the sockets or rebate ends uppermost to contain moisture and other condensates in the flue. Joints shall be sealed with fire cement, refractory mortar or installed in accordance with their manufacturer's instructions.
- Spaces between the lining and the surrounding masonry shall not be filled with ordinary mortar. In the absence of the liner manufacturer's instructions, the space shall be filled with one of the following weak insulating concrete mixes –
- (a) one part ordinary Portland cement to 20 parts suitable lightweight expanded clay aggregate, minimally wetted;
 - (b) one part ordinary Portland cement to 6 parts Vermiculite; or
 - (c) one part ordinary Portland cement to 10 parts Perlite.

Construction of flueblock chimneys

- 1.23 A flueblock chimney shall be constructed of factory-made components suitable for the intended application and installed in accordance with the manufacturer's instructions. The flueblocks shall have a minimum performance that corresponds to the designation T400 N2 S D 3, as described in BS EN 1443: 2003, such as clay flueblocks of Class FB1 N2 as described in BS EN 1806: 2000.
- 1.24 Joints shall be sealed in accordance with the flueblock manufacturer's instructions. Bends and offsets shall only be formed with matching factory-made components.

Thickness of masonry and flue block chimneys

- 1.25 The thickness of the walls for a masonry chimney around the flue, excluding the thickness of any flue liner, shall be in accordance with Diagram 1.4.



Fluepipes

- 1.26 A fluepipe shall be constructed from –
- cast iron complying with BS 41: 1973 (1998);
 - mild steel complying with BS 1449: Part 1: 1991 Section 1.1, with a flue wall thickness of not less than 3 mm;
 - stainless steel as described in BS EN 10088-1: 2005 grades 1.4401, 1.4404, 1.4432 or 1.4436 with a flue wall thickness of not less than 1 mm; or
 - vitreous enamelled steel pipe complying with BS 6999: 1989 (1996).

-
- 1.27 A fluepipe with spigot and socket joints shall be fitted with the socket facing upwards to contain moisture and other condensates in the flue. Joints shall be made gas-tight by the use of proprietary jointing accessories or, where appropriate, by packing joints with non-combustible rope or fire cement.
- 1.28 A plastic fluepipe is only acceptable where the fluepipe is supplied by or specified by the appliance manufacturer and approved by a Notified Body or independently certified as being suitable for purpose.

Repair or re-use of existing flues

- 1.29 Where it is proposed to bring an existing flue back into use, or an existing flue is to be used with a different type or rating of combustion appliance, it shall be cleaned, visually inspected and if necessary altered to ensure that it is suitable for the proposed use.
- 1.30 A defective flue shall be lined using the materials and components described in Sections 2, 3, and 4 dependent upon the type of combustion appliance proposed.
- 1.31 The use of an oversized flue can be unsafe so a flue shall be lined to reduce the flue area to suit the intended combustion appliance.
- 1.32 If a chimney has been relined in the past using a metal lining system and the appliance is being replaced, the metal liner shall also be replaced, unless it can be proven that it was recently installed and it can be seen to be in good condition.

Use of flexible metal flue liners for the relining of chimneys

- 1.33 A chimney may be relined using an independently certified flexible metal flue liner, specifically made to suit the types of fuels to be burnt. Flexible flue liners shall only be used to reline a chimney and shall not be used as the primary liner of a new chimney. They can be used to connect gas back boilers to chimneys where the appliance is located in a fireplace recess.

Factory-made metal chimneys

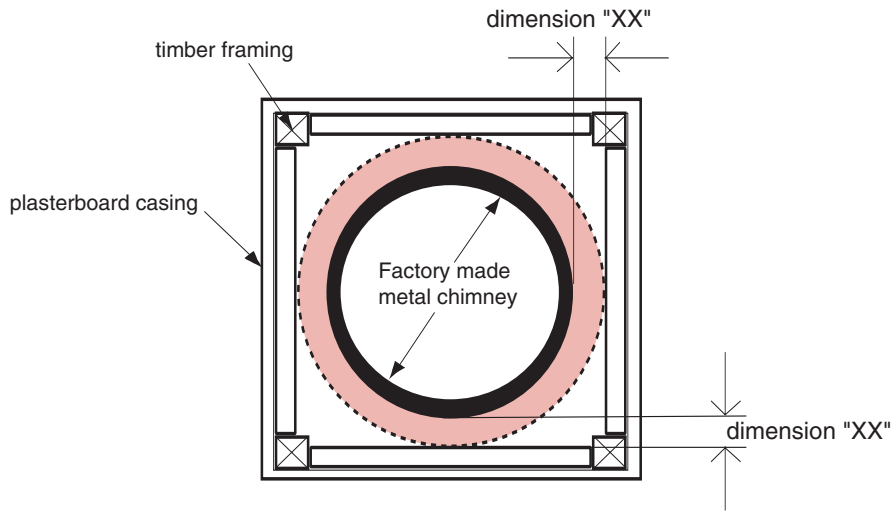
- 1.34 A factory-made metal chimney shall be –
- (a) a component system independently certified as complying with the relevant sections of BS EN 1856 - 1: 2003 or BS EN 1859: 2000. Installed in accordance with the relevant recommendations in BS 7566 Part 1: 1992, BS 7566 Part 2: 1992, BS 7566 Part 3: 1992 and BS 7566 Part 4: 1992 (1998); or
 - (b) a twin wall component system for an oil fired appliance and a single wall component system for gas complying with the recommendations of BS EN 1856 - 1: 2003 and BS EN 1856-2: 2004 and installed in accordance with the recommendations of BS 5440-1: 2000, where the flue temperatures will not normally exceed 250°C.
- 1.35 Where a factory-made metal chimney passes through a wall, sleeves shall be provided to prevent damage to the flue or building through thermal expansion. To facilitate the checking of gas-tightness, joints between chimney sections shall not be concealed within ceiling joist spaces or within the thickness of walls.

-
- 1.36 A factory-made metal chimney shall be installed so that the appliance can be withdrawn without the need to dismantle the chimney.
- 1.37 A factory made metal chimney shall be kept a safe distance away from any combustible material. For a chimney that complies with the recommendations of BS EN 1856-1: 2003. The following provisions are a reasonable method of achieving this –
- (a) locate the chimney not less than the distance “XX” from the combustible material, where “XX” is the dimension defined in BS EN 1443: 2003 as shown in diagram 1.5; or
 - (b) where the chimney passes through a cupboard, storage space or roofspace, a suitable guard shall be provided no closer to the outer wall of the chimney than “XX” as specified by the manufacturer in accordance with the requirements of BS EN 1443: 2003 (see Diagram 1.5).

In no circumstances shall the separation “XX” between the chimney and the combustible material, or suitable guard be less than 25 mm.

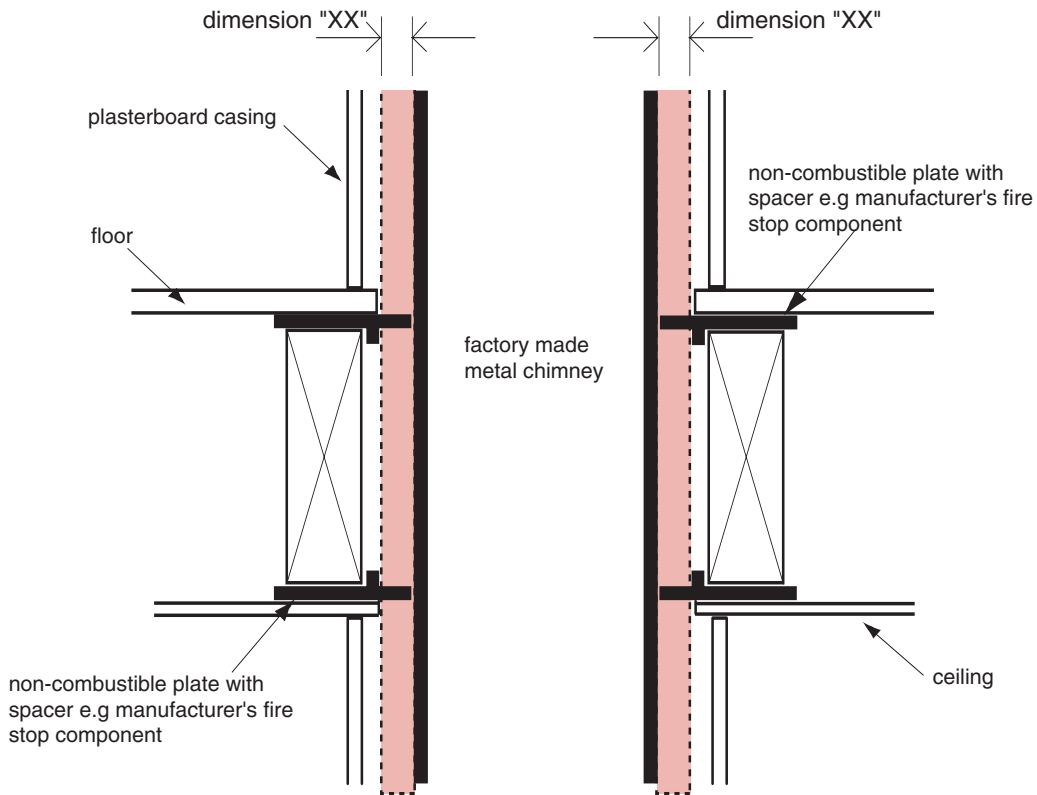
Diagram 1.5 The separation of combustible material from a factory made metal chimney passing through a cupboard, storage space or roofspace, meeting BS EN 1443: 2003

see para 1.37



No combustible material in shaded zone. Width of shaded zone at least equal to manufacturer's declared minimum distance (XX mm) as defined by testing to BS EN 1443: 2003 or 25 mm, whichever is the greatest.

Plan



Section

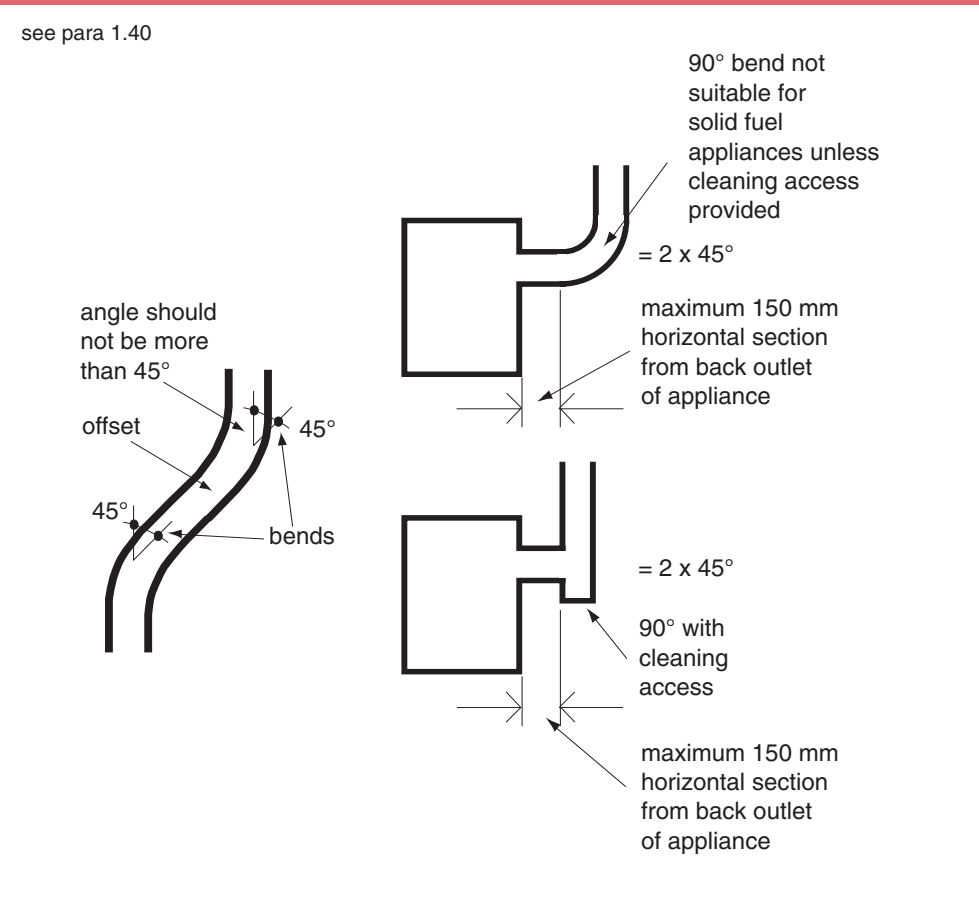
- 1.38 Where a factory made metal chimney penetrates a fire compartment wall or floor the casing of the chimney shall be of non-combustible construction and have a period of fire resistance of not less than half that for the compartment wall or floor (see Part E, Fire safety).

Configuration of natural draught flues serving open-flued appliances

- 1.39 A flue system shall offer least resistance to the passage of the flue gas by minimising changes in direction or horizontal length. Where practicable the flue shall be straight and vertical except for the connection to a combustion appliance with a rear outlet. The connecting horizontal section shall not be greater than 150 mm in length and where bends are essential, they shall be angled at not more than 45° to the vertical.
- 1.40 Provisions shall be made to enable the flue to be swept and inspected. The number of changes of direction between the combustion appliance outlet and the flue outlet shall be limited to not more than four 45° bends with not more than two of these being between an intended point of access for sweeping and either another point of access for sweeping or the flue outlet. 90° factory made bends, elbows or tee pieces in fluepipes shall be treated as being equal to two 45° bends (see Diagram 1.6).

However in accordance with BS 6461 Part1 1984, no flue bend serving a solid fuel appliance shall have an angle greater than 45°, and shall preferably be less than 30°.

Diagram 1.6 Bends in flues



Openings in flues for inspection and cleaning

- 1.41 A flue shall not have an opening into more than one room or space except for the purposes of –
- (a) inspection or cleaning; or
 - (b) fitting an explosion door, draught break, draught stabiliser or draught diverter.
- 1.42 Openings for inspection and cleaning shall be formed using purpose factory made components that are compatible with the flue system. The access cover to the opening shall have the same level of gas-tightness as the flue system and an equal level of thermal insulation.
- 1.43 Openings for cleaning the flue shall allow easy passage of the sweeping brush and be non combustible except where fitted to a combustible fluepipe, such as a plastic fluepipe. It shall be possible to sweep the whole flue after the appliance has been installed.

Dry lining around fireplace openings

- 1.44 Where a decorative treatment, such as a fireplace surround, masonry cladding or dry lining, is provided around a fireplace opening, any gaps that could allow flue gas to escape from the fireplace opening into the void behind the decorative treatment shall be sealed to prevent such leakage. The sealing material shall be capable of remaining in place despite any relative movement between the decorative treatment and the fireplace recess.

Condition of combustion installations at completion

- 1.45 A flue shall be checked at completion to ensure that it is free from obstructions, satisfactorily gas-tight and constructed with materials and components of sizes that suit the intended application.

Where the building work includes the installation of a combustion appliance, all of the tests shall include the fluepipe and the gas-tightness of the joint between the fluepipe and the combustion appliance outlet. A spillage test shall be carried out with the appliance under fire.

Notice plates for hearths and flues

- 1.46 To satisfy the requirements of Regulation L5 a durable notice shall be provided to convey –
- (a) the location of the hearth, fireplace (or flue box) or the location of the beginning of the flue;
 - (b) the generic type(s) of combustion appliances that can be safely accommodated;
 - (c) the type and size of the flue (or its liner if it has been relined) and the manufacturer's name; and
 - (d) who installed the hearth, fireplace, flue or chimney and the date of installation.

Diagram 1.7 Notice plates for hearths and flues

see para 1.48

Important Safety Information	
This notice must not be removed or covered	
Property address:	20 Main Street, Anytown
Location of hearth & chimney:	Lounge
Suitable for:	Decorative fuel effect gas fire only
Chimney liner:	Double skin stainless steel flexible, 200 mm diameter
Suitable for condensing appliance:	No
Date installed:	dd/mm/yyyy
Installed by:	A N Other & Co.
Other information: (e.g. Product trade names, installation and maintenance advice, European flue product designations, warnings on performance limitations of imitation elements etc.)	Designation of stainless steel liner stated by manufacturer to be T450 N2 S D 3

Essential information

Additional information

- 1.47 Notice plates shall be robust, indelibly marked and securely fixed in an unobtrusive but obvious position within the building such as –
- (a) next to the electricity consumer unit; or
 - (b) next to the chimney or hearth described.
- 1.48 For flue products whose performance characteristics have been assessed in accordance with a European Standard (EN) and which are supplied or marked with a designation as defined in Section 0, the installer shall include this designation, under additional information, on the notice plate as shown in Diagram 1.7.

Access to combustion appliances for maintenance

- 1.49 A permanent means of safe access shall be provided to a combustion appliance for maintenance.

Section 2

Solid fuel burning appliances with a rated heat output up to 50 kW

This section sets out the additional provisions that shall be met for a solid fuel burning combustion appliance over and above those given in Section 1.

Air supply to appliances

- 2.1 Any room or space containing a combustion appliance shall have a permanent air vent opening of a size not less than that shown in Table 2.1. For an appliance designed to burn a range of different solid fuels the air supply shall be designed to accommodate burning the fuel that produces the highest heating output.
- 2.2 Where the manufacturer's installation instructions require greater areas of permanently open air vents than those specified in Table 2.1, the manufacturer's advice shall be followed.

Table 2.1 Air supply to solid fuel burning appliances

Type of appliance	Type and amount of ventilation ⁽³⁾
Open appliance such as an open fire with no throat, e.g. a fire under an open canopy as in Diagram 2.7	Permanently open air vent(s) with a total free area of not less than 50% of the cross-sectional area of the flue
Open appliance, such as an open fire with a throat as in Diagram 2.6 and 2.13	Permanently open air vent(s) with a total free area of not less than 50% of the throat opening area ⁽¹⁾
Other appliance, such as a stove, cooker or boiler, with a flue draught stabiliser.	Permanently open air vent(s) with a total free area of not less than 300 mm ² per kW for each of the first 5 kW of appliance rated heat output, PLUS, a total free area of not less than 850 mm ² for every kW of appliance rated heat output above 5 kW ⁽²⁾
Other appliance, such as a stove, cooker or boiler, with no flue draught stabiliser.	Permanently open air vent(s) with a total free area of not less than 550 mm ² for every kW of appliance rated heat output above 5 kW

Notes

1. For simple open fires as depicted in Diagram 2.13 the air supply requirement can be met with room ventilation areas as follows -

Nominal fireplace opening size (As per BS 8303-1:1994 Fig. 9)	500 mm	450 mm	400 mm	350 mm
Total free area of permanently open air vents	20500 mm ²	18500 mm ²	16500 mm ²	14500 mm ²

2. Example: an appliance with a flue draught stabiliser and a rated heat output of 7 kW would require a permanently open air vent with a free area of -

$$[5 \times 300] + [2 \times 850] = 3200 \text{ mm}^2$$

3. Extract fans shall not be installed in the same room or space as a solid fuel burning appliance

Size of flues

- 2.3 A flue shall be sized to suit the intended appliance to ensure an adequate discharge velocity of the flue gas that will prevent flow reversal problems but will not impose excessive flow resistance.
- 2.4 A fluepipe shall have the same diameter or equivalent cross sectional area as that of the appliance flue outlet and shall not be smaller than the size recommended by the appliance manufacturer.
- 2.5 A flue shall not be less than the size shown in Table 2.2 that is relevant to the particular appliance, and not less than the size of the appliance flue outlet or that recommended by the appliance manufacturer.
- 2.6 For a multifuel appliance, the flue shall be sized to accommodate burning the fuel that generates the greatest rated heat output.
- 2.7 A fireplace with an opening greater than 500 mm x 550 mm or a fireplace exposed on two or more sides, such as a fireplace under a canopy or open on both sides of a central chimney breast, shall have a flue with a cross sectional area equal to 15% of the total face area of the fireplace opening(s).
- 2.8 The opening area of a fireplace shall be calculated using the following formula –

$$\text{Face area (mm}^2\text{)} = \text{Total horizontal length of fireplace opening } \mathbf{L} \text{ (mm)} \times \text{Height of fireplace opening } \mathbf{H} \text{ (mm)}$$

Examples of L and H for large or unusual fireplace openings are shown in Diagram 2.1.

Diagram 2.1 Examples of large or unusual fireplace openings

see paras 2.8 and 3.6(b)

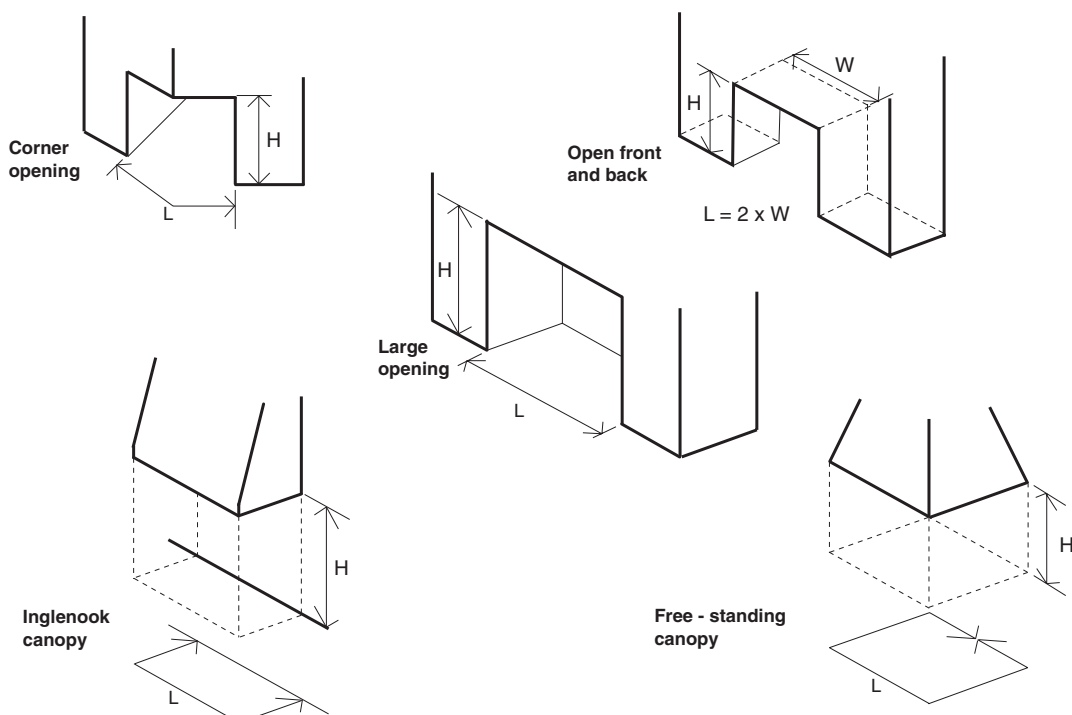


Table 2.2 Sizes of flues for chimneys

Installation ⁽¹⁾	Minimum flue size
Fireplace with an opening of up to 500 mm x 550 mm.	200 mm diameter or a rectangular/square section having the equivalent cross sectional area and a minimum side dimension of 175 mm.
Fireplace with an opening greater than 500 mm x 550 mm or a fireplace exposed on two or more sides.	See paragraph 2.7. If a rectangular/square section flue is used the minimum side dimension shall be not less than 200 mm.
Closed appliance with a rated heat output not greater than 20 kW which - a. burns smokeless or low volatiles fuel ⁽²⁾ ; or b. is an appliance which meets the requirements of the Clean Air Act when burning an appropriate bituminous coal.	125 mm diameter or rectangular/square section having the equivalent cross sectional area and a minimum side dimension of 100 mm.
Other closed appliances with a rated heat output not greater than 30 kW burning any fuel.	150 mm diameter or rectangular/square section having the equivalent cross sectional area and a minimum side dimension of 125 mm.
Closed appliances with a rated heat output greater than 30 kW but not exceeding 50 kW burning any fuel.	175 mm diameter or rectangular/square section having the equivalent cross sectional area and a minimum side dimension of 150 mm.
<p>Notes</p> <p>1. Closed appliance includes cookers, stoves, room heaters and boilers.</p> <p>2. Fuels such as bituminous coal, untreated wood or compressed paper are not smokeless or low volatiles fuel.</p> <p>3. Should an offset be necessary in a flue, each flue size dimension shall be increased by 25 mm (i.e. diameter or side).</p>	

Height of flues

- 2.9 A flue shall be high enough to ensure a sufficient draught to clear the products of combustion. The height necessary for this will depend upon the type of the appliance, the height of the building, the type of flue and the number of bends in it, and a careful assessment of local wind patterns. A flue shall be satisfactory if –
- (a) it is at least 4.5 m in height and the provisions of paragraphs 2.11 to 2.13 are adopted; or
 - (b) the calculation procedure within BS 5854: 1980 (1996) is used as the basis for deciding whether a flue design will provide sufficient draught.
- 2.10 The height of a flue serving an open fire is measured vertically from the highest point at which air can enter the fireplace to the level at which the flue discharges into the outside air. The highest point of air entry into the fireplace shall be the top of the fireplace opening or, for a fire under a canopy, the bottom of the canopy.

Outlets from flues

- 2.11 The outlet from a flue shall be above the roof of the building in a position where the products of combustion can discharge freely and will not present a fire hazard, whatever the wind conditions.

- 2.12 The flue outlet position, in common circumstances, shall be in accordance with Table 2.3. However, the flue outlet position and/or separations shown in Table 2.3 may have to be increased, in particular cases, where the wind exposure, surrounding tall buildings, high trees or high ground have an adverse effect on the flue draught.
- 2.13 Where a flue discharges onto, or in close proximity to, a roof with a surface that is readily ignitable, such as thatch or shingles, the clearances to the flue outlet shall be increased to that shown in Diagram 2.2.

Table 2.3 Flue outlet positions for solid fuel appliances

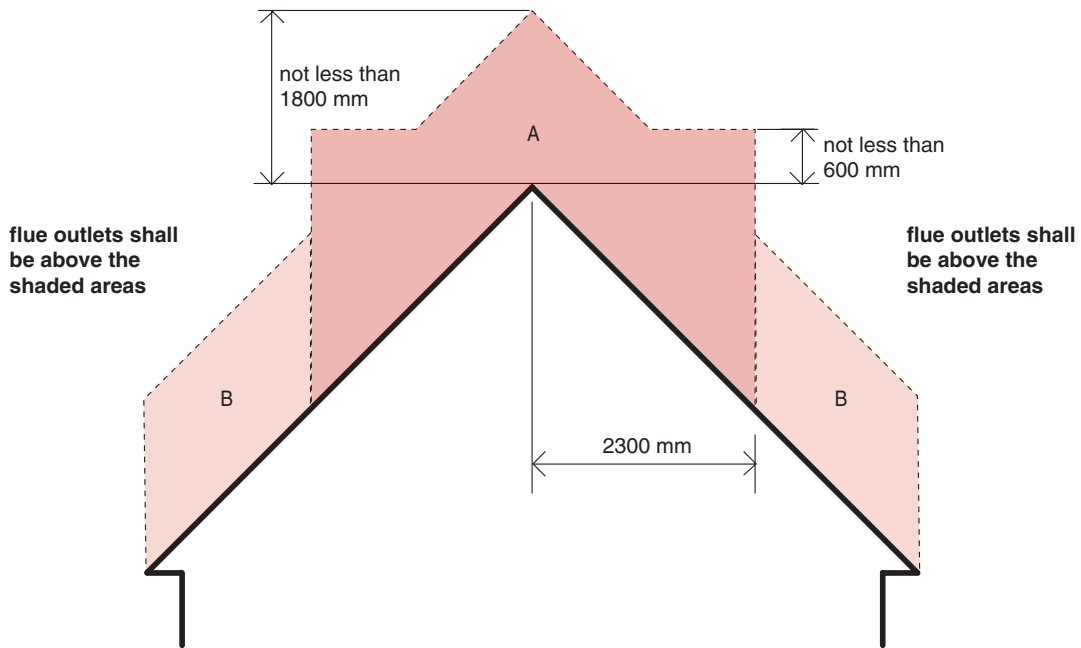
Item	Point where flue passes through weather surface ⁽¹⁾⁽²⁾	Clearance to flue outlet
1	At or within 600 mm of the ridge.	Not less than 600 mm above the ridge.
2	Elsewhere on a roof, whether pitched or flat.	Not less than 2300 mm horizontally from the nearest point on the weather surface; and (a) not less than 1000 mm above the highest point of intersection of the flue/chimney and the weather surface; or (b) not less than as high as the ridge.
3	Below (on a pitched roof) or within 2300 mm horizontally to an openable rooflight, dormer window or other opening ⁽³⁾ .	Not less than 1000 mm above the top of the opening.
4	Within 2300 mm of an adjoining building, whether or not beyond the boundary ⁽³⁾ .	Not less than 600 mm 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 clearances given for items 1 and 2, as appropriate, will also apply.

Diagram 2.2 Flue outlet positions for solid fuel appliances - clearances to easily ignited roof

see para 2.13



Area	Location of flue outlet
A	not less than 1800 mm vertically above the weather surface and not less than 600 mm above the ridge.
B	not less than 1800 mm vertically above the weather surface and not less than 2300 mm horizontally from the weather surface

This diagram must be read in conjunction with Table 2.3

Location and shielding of fluepipes

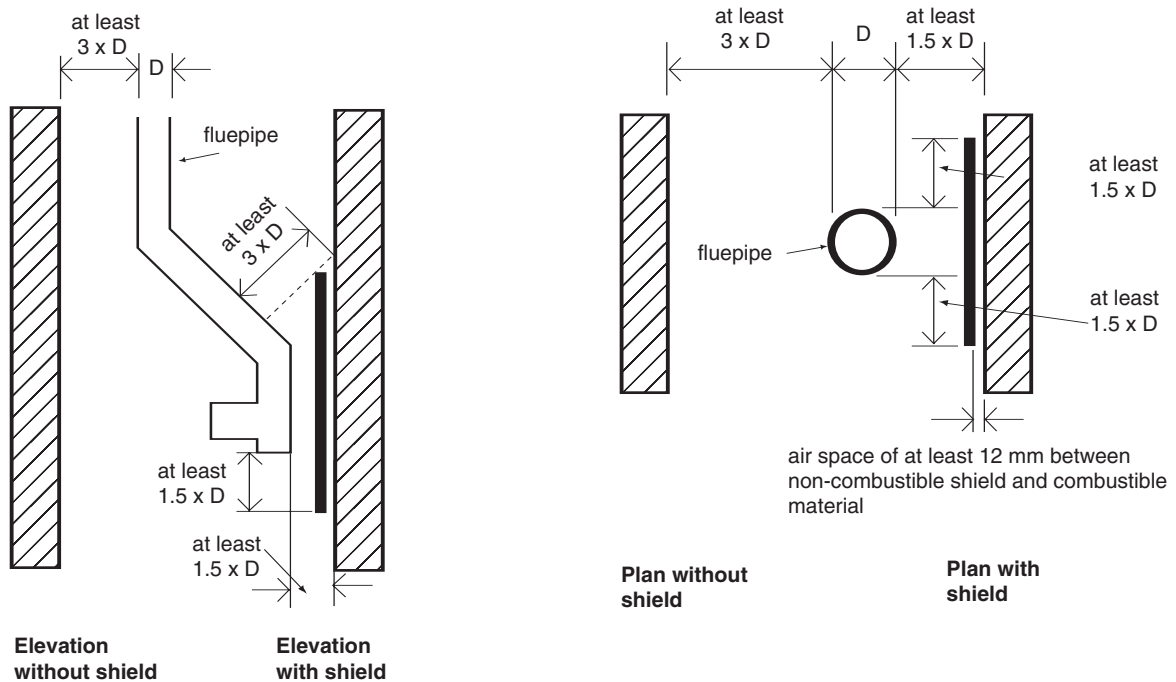
- 2.14 A fluepipe shall only be used to connect an appliance to its flue. It shall not pass through any roof space, partition, internal wall or floor, except to pass directly into a flue through either a wall of the chimney or a floor supporting the chimney. A fluepipe shall also be guarded if it could be at risk of damage or if the burn hazard it presents to people is not immediately apparent.
- 2.15 A fluepipe shall be located so that it cannot ignite any combustible material.

To ensure this, an insulated fluepipe, which has insulation not less than 12 mm thick and a thermal conductivity not greater than 0.065 W/mK, shall be separated from the combustible material by a clear gap of not less than three-quarters of the outside diameter of the insulated fluepipe.

All other fluepipes shall be protected by shielding in accordance with Diagram 2.3.


Diagram 2.3 Protecting combustible material from uninsulated fluepipes for solid fuel appliances

see para 2.15 (b)



shields shall either:

- extend beyond the fluepipe by at least 1.5 X D; or
- make any path between fluepipes and combustible material at least 3 X D long

 indicates combustible material

Debris collection space

- 2.16 Where a flue cannot be cleaned through the appliance, a debris collecting space that is accessible for emptying and suitably sized opening(s) for cleaning shall be provided at appropriate locations in the flue.

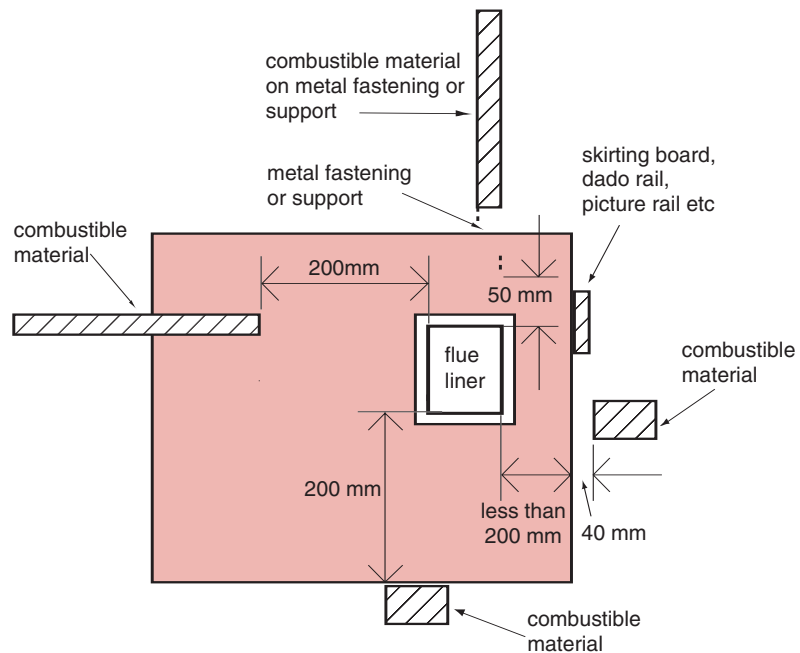
Separation of combustible material from fireplaces and flues

- 2.17 Combustible material shall not be located where the heat dissipating through the walls of a fireplace or flue could ignite it. The minimum separation distances for combustible material shall be –
- 200 mm from the inside surface of a flue or fireplace recess; or
 - 40 mm from the outer surface of a masonry chimney or fireplace recess unless it is a floorboard, skirting board, dado rail, picture rail, mantel shelf or architrave. Metal fixings in contact with combustible materials shall be not less than 50 mm from the inside surface of a flue.

(See Diagram 2.4.)

Diagram 2.4 Minimum separation distances from combustible material in or near a chimney

see para 2.17



Lining or relining flues in chimneys

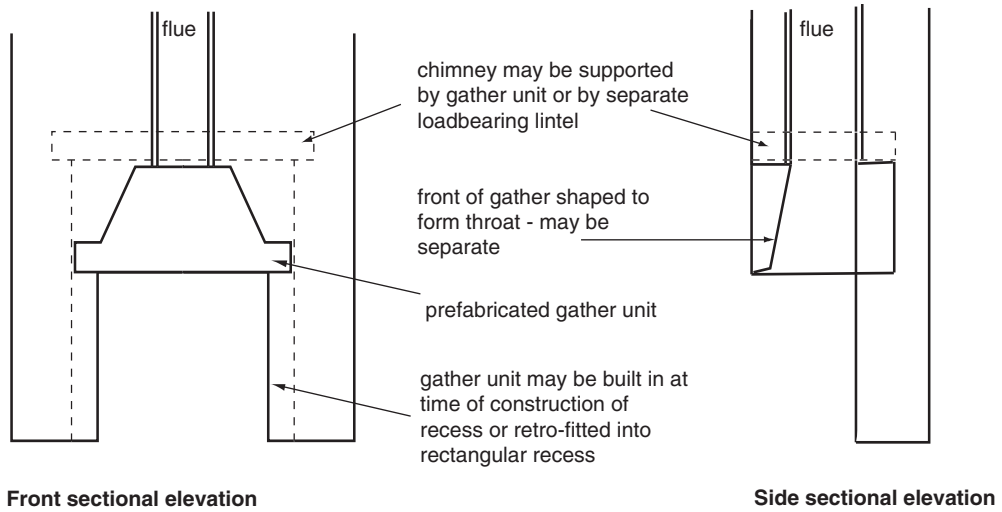
- 2.18 The lining of a flue shall correspond to the designation T400 N2 D3 G, as described in BS EN 1443: 2003.

Formation of gathers

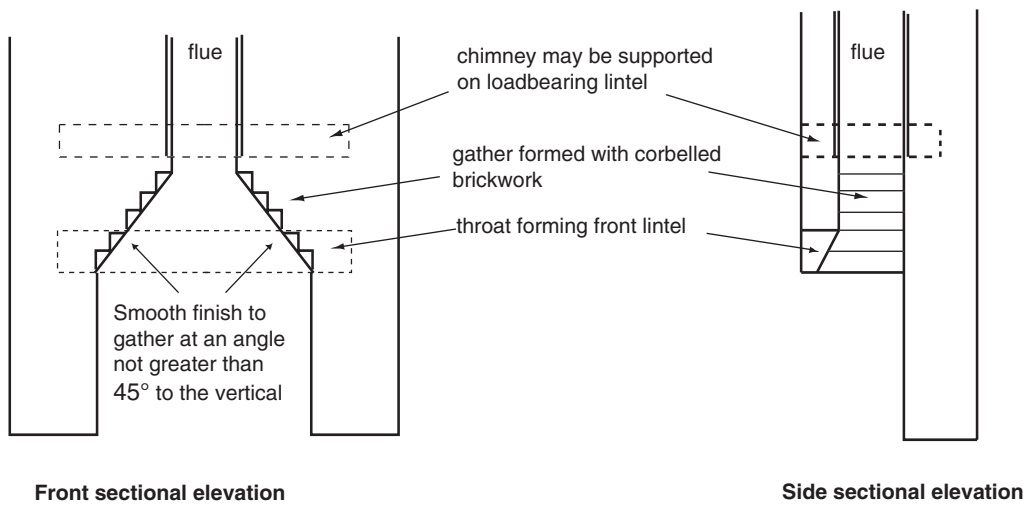
- 2.19 To minimise resistance to the proper working of a flue, a tapered gather shall be provided in the fireplace for an open fire. This shall be formed by –
- using prefabricated gather components built into a fireplace recess as shown in Diagram 2.5(a);
 - the corbelled masonry as shown in Diagram 2.5(b); or
 - using a suitable canopy, as shown in Diagram 2.6.

Diagram 2.5 Construction of gathers

see para 0.1 throat
see para 2.19 (a) & (b)



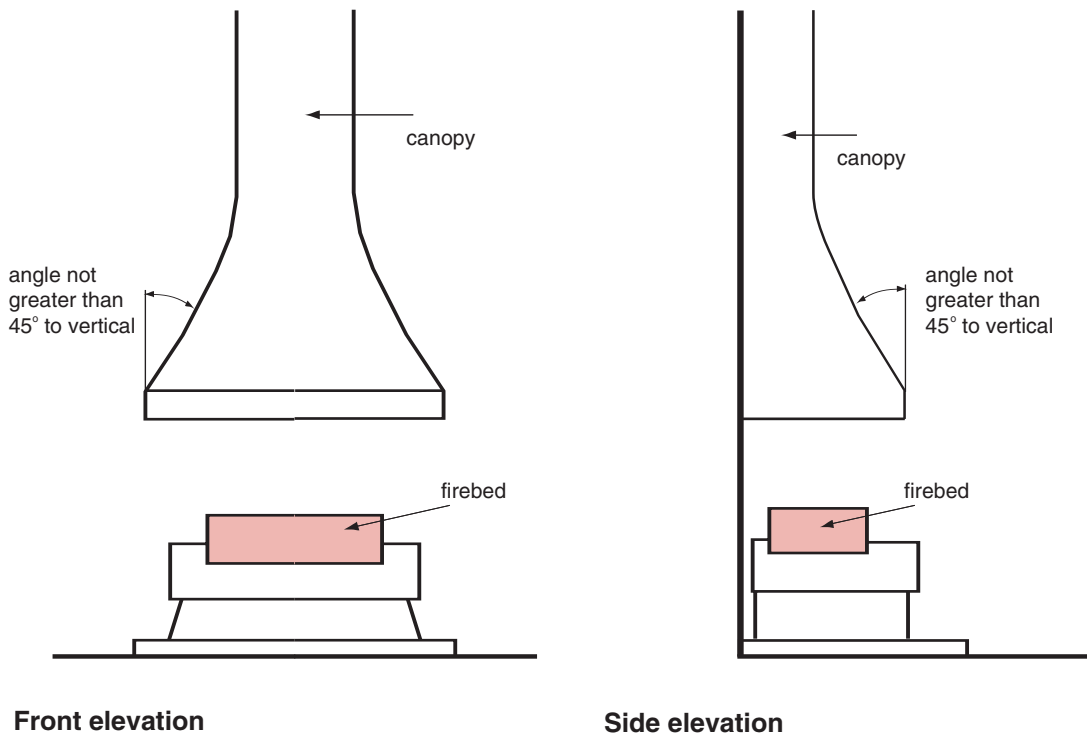
(a)



(b)

Diagram 2.6 Canopy for an open solid fuel fire

see para 2.19 (c)



Hearths

- 2.20 A hearth shall be constructed of suitably robust materials and to appropriate dimensions so that, in normal use, it prevents the combustion appliance setting fire to the building fabric and furnishings.

If the chimney is not independently supported, the hearth shall be able to accommodate the weight of the combustion appliance and its chimney.

- 2.21 Where an appliance is not to be located in an appliance recess and it has been independently certified that it cannot cause the temperature of the hearth to exceed 100°C, it shall stand wholly on a hearth made of non-combustible board, sheet material or tiles not less than 12 mm thick (see Diagram 2.10(a)).

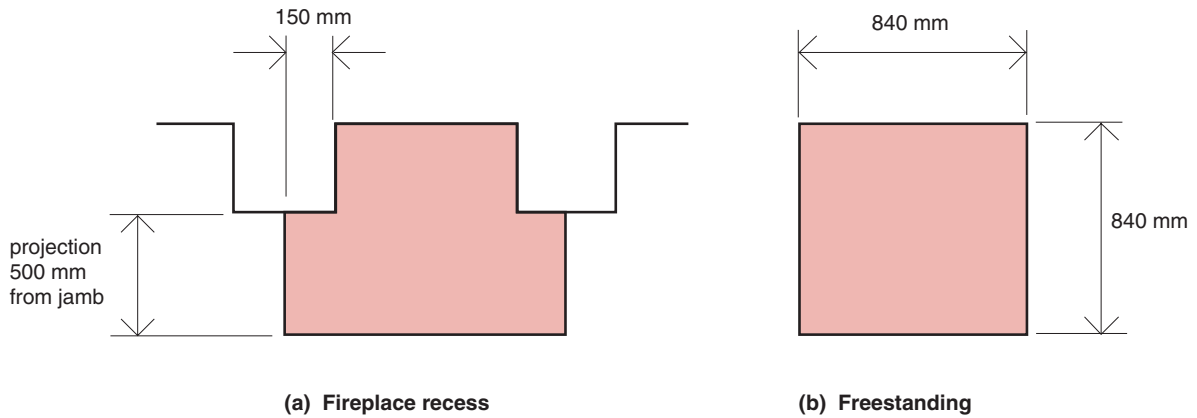
All other appliances shall be placed on a constructional hearth in accordance with paragraphs 2.22 to 2.26 (see Diagram 2.10(b) and (c)).

Constructional hearths

- 2.22 A constructional hearth shall –
- have plan dimensions not less than those shown in Diagram 2.7; and
 - be made of solid, non-combustible material, such as concrete or masonry, not less than 125 mm thick, including the thickness of any non-combustible floor and/or decorative surface.

Diagram 2.7 Constructional hearth suitable for a solid fuel appliance (including open fires)

see paras 2.22, 3.33 and 4.27(a)

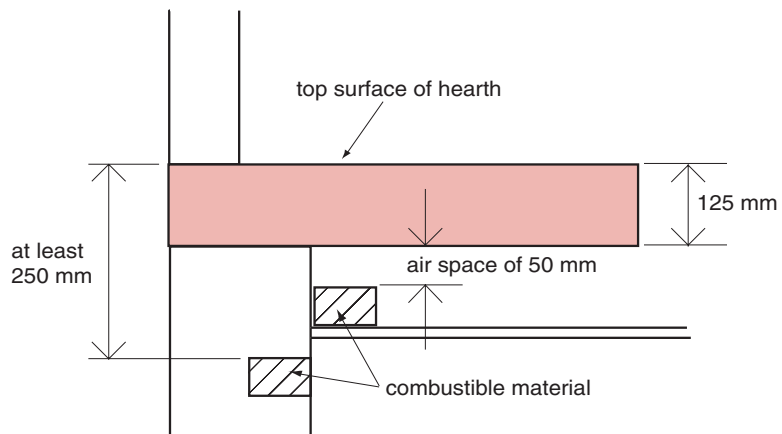


Plan

- 2.23 Combustible material shall not be placed beneath a constructional hearth unless –
- there is an air-space of not less than 50 mm between the underside of the hearth and the combustible material; or
 - the combustible material is not less than 250 mm below the top of the hearth (see Diagram 2.8).

Diagram 2.8 Minimum separation distances for combustible materials below a constructional hearth

see para 2.23
see para 4.28

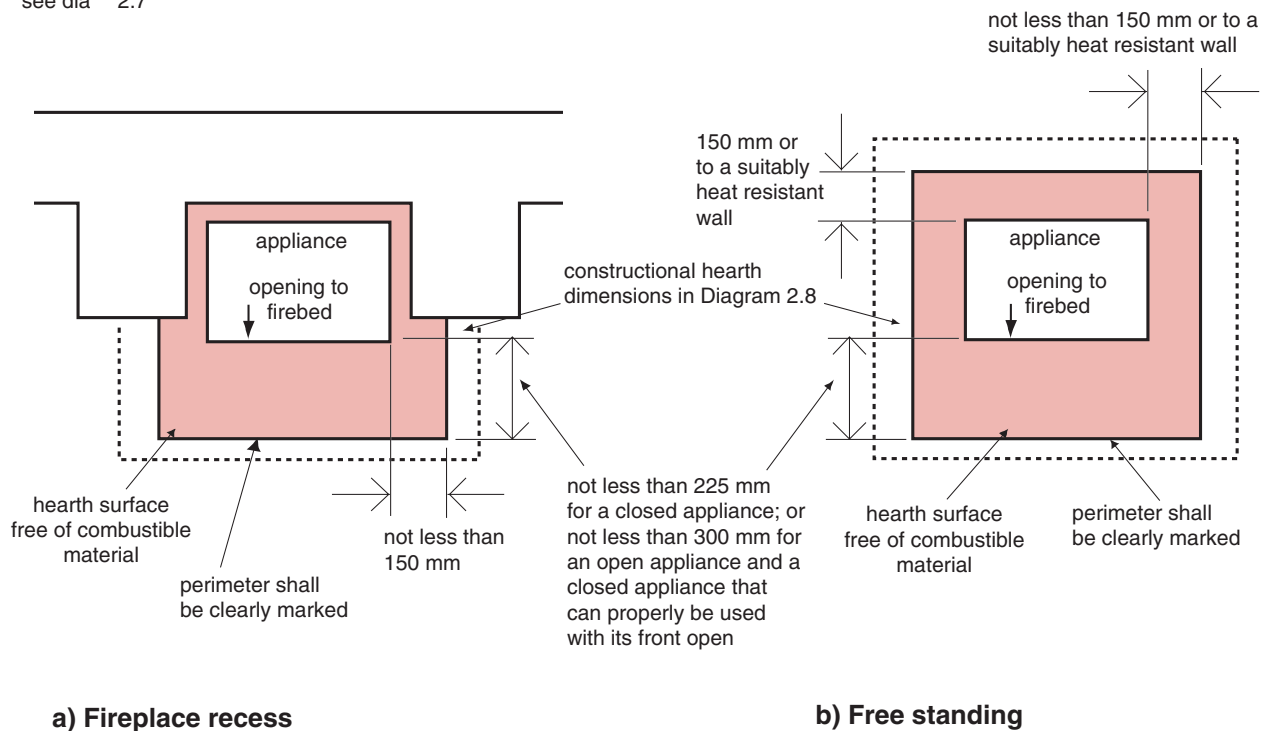


Section through hearth

- 2.24 An appliance shall be located on a hearth so that it is surrounded by a surface free of combustible material as shown in Diagram 2.9. This surface may be part of the surface of the constructional hearth or it may be the surface of a superimposed hearth laid wholly or partly upon a constructional hearth. The edges of this surface shall be marked with a change in level to provide a warning to the building occupants and to discourage combustible floor finishes such as carpet from being laid too close to the appliance.

Diagram 2.9 Non-combustible hearth surface surrounding a solid fuel appliance

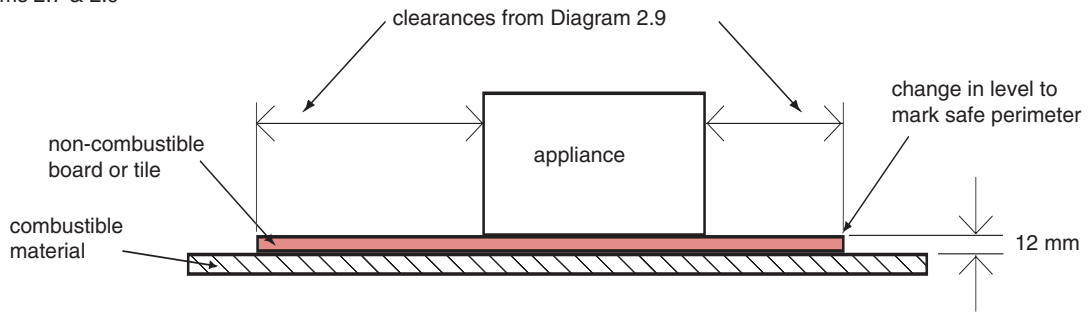
see para 2.24
see dia 2.7



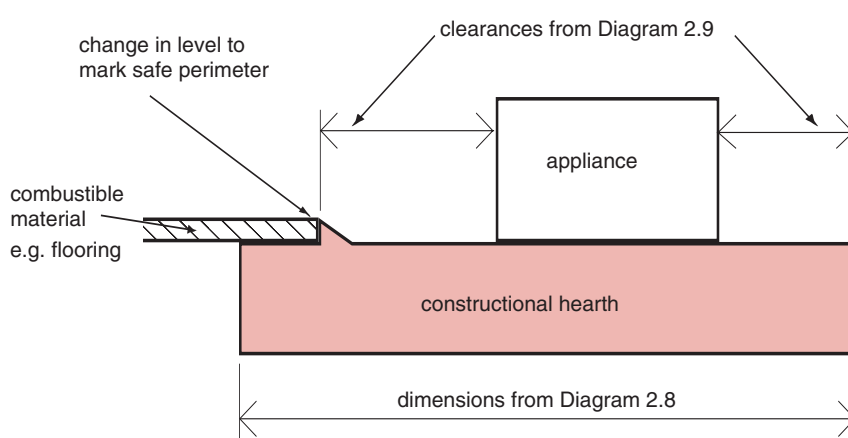
- 2.25 Combustible material placed on or beside a constructional hearth shall not extend under a superimposed hearth by more than 25 mm or closer than 150 mm, measured horizontally, to the appliance (see Diagram 2.10(c)).
- 2.26 Hearths shall be installed as shown in Diagram 2.10 (b) and (c).

Diagram 2.10 Typical hearth installations

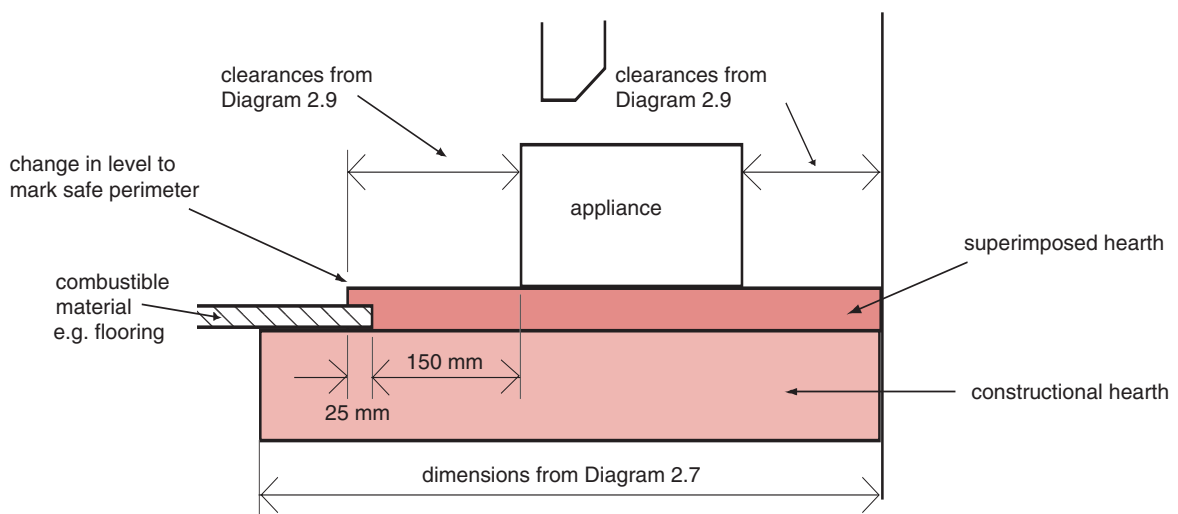
see paras 2.21 and 2.26
see diagrams 2.7 & 2.9



a) Appliance that cannot cause hearth temperature to exceed 100°C



b) Any appliance standing directly on a constructional hearth



c) Any appliance in a fireplace recess with a superimposed hearth

Fireplace recesses and prefabricated appliance chambers

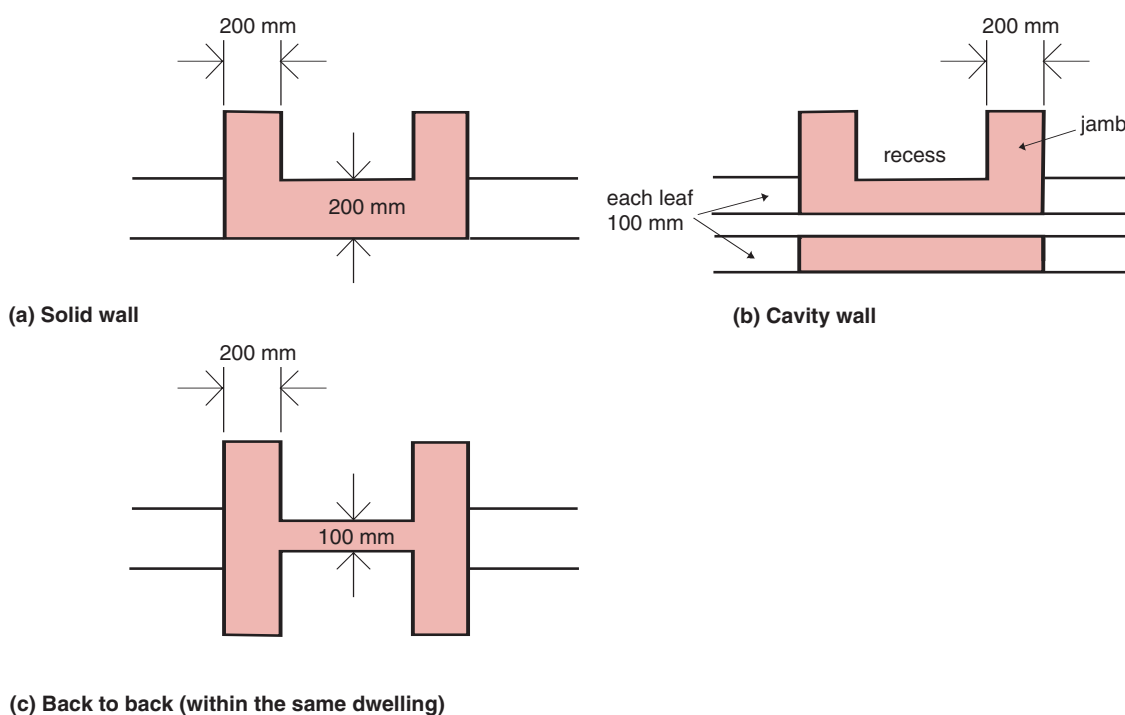
- 2.27 Fireplaces shall be designed and constructed so that they adequately protect the building fabric from catching fire. They shall be built utilising –
- a fireplace recess of masonry or concrete as shown in Diagram 2.11; or
 - a prefabricated factory-made appliance chamber using components that are made of insulating concrete having a density of greater than 1200 kg/m^3 but less than 1700 kg/m^3 and a minimum thickness as shown in Table 2.4. Components shall be supplied as a set for assembly and jointing in accordance with the manufacturer's instructions.

Table 2.4 Minimum thickness of components for prefabricated appliance chambers

Component	Minimum thickness (mm)
Base	50
Side section, forming wall on either side of chamber	75
Back section, forming rear chamber	100
Top slab, lintel or gather, forming top of chamber	100

Diagram 2.11 Fireplace recesses

see para 2.27 (a)



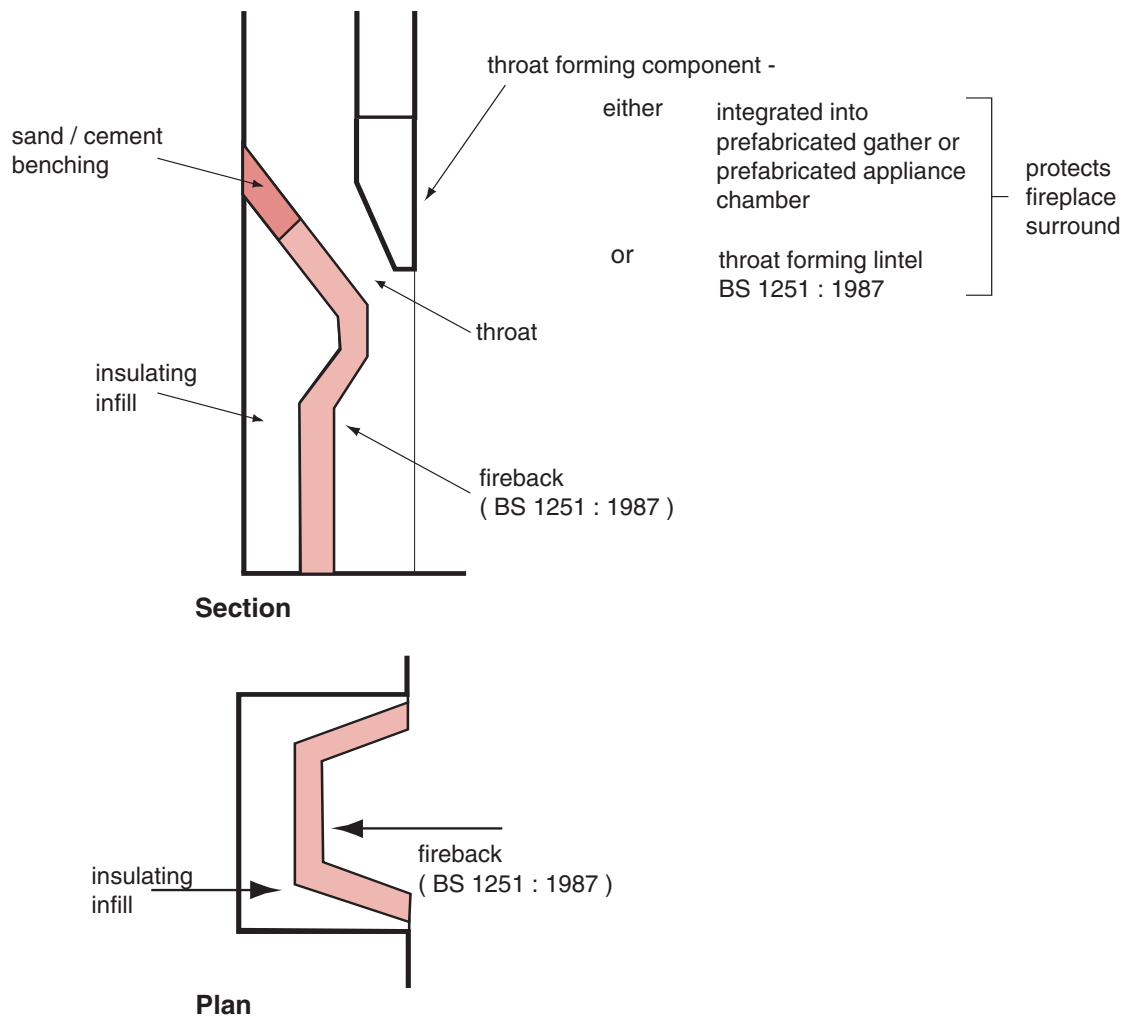
Plans

Fireplace lining components

- 2.28 A fireplace recess shall be protected from the heat of the combustion appliance by suitable fireplace lining components as shown in Diagram 2.12, or by lining the recess with suitable firebricks.

Diagram 2.12 Open fireplaces: throat and fireplace components

see para 2.28



Walls adjacent to hearths

- 2.29 Walls that are not part of a fireplace recess or a prefabricated appliance chamber, but are adjacent to a hearth or appliance, shall protect the building from catching fire. They shall be constructed in accordance with the provisions given in Diagram 2.13 and Table 2.5.

Diagram 2.13 Walls adjacent to hearths

see para 2.29
see dia. 2.9
see table 2.4

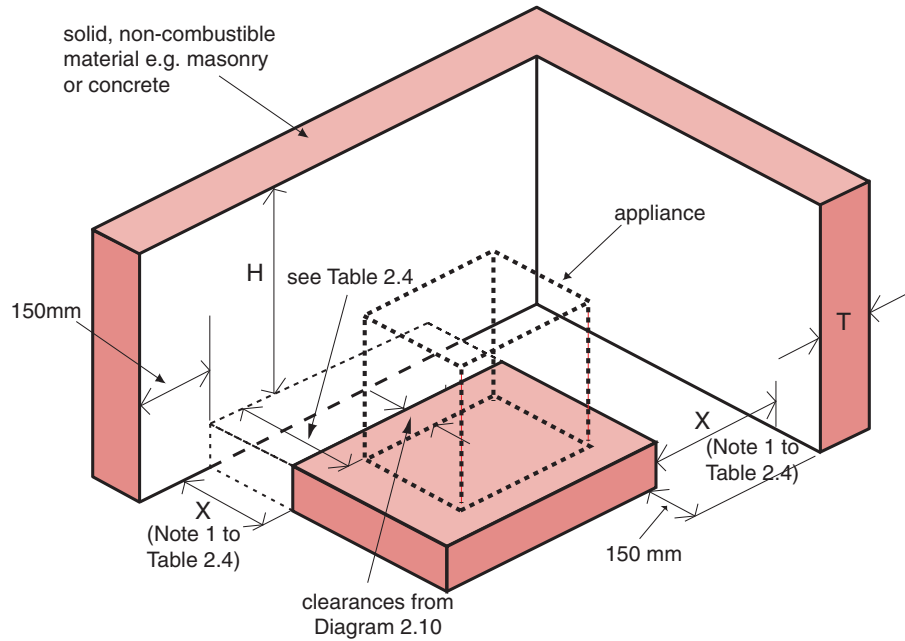


Table 2.5 Dimensions of solid non-combustible walls adjacent to hearths

Location of hearth or appliance	Solid non-combustible material	
	Thickness (T)	Height (H)
where the hearth abuts a wall and the appliance is not more than 50 mm from the wall	200 mm	not less than 300 mm above the appliance and not less than 1200 mm above the hearth
where the hearth abuts a wall and the appliance is more than 50 mm but not more than 300 mm from the wall	75 mm	not less than 300 mm above the appliance and not less than 1200 mm above the hearth
where the hearth does not abut a wall and is not more than 150 mm from the wall (see note below)	75 mm	not less than 1200 mm above the hearth

Note

1. There is no requirement for protection of the wall where X in Diagram 2.13 is more than 150 mm.

Section 3

Gas burning appliances with a rated heat input up to 70 kW (net)

This section sets out the additional provisions that shall be met for gas burning appliances over and above those given in Section 1.

Gas fires (other than flueless gas fires)

- 3.1 Diagram 3.1 shows the three main types of gas fired combustion appliances in this category, the most appropriate deemed-to-satisfy provisions can be different for each type.
- 3.2 A gas fire shall be installed in a fireplace that has –
- (a) a flue designed specifically for a gas appliance; or
 - (b) a flue designed to serve a solid fuel appliance, provided it can be shown to be safe.

The Gas Appliances (Safety) Regulations 1995 (*Northern Ireland Statutory Instrument 1995 No. 1629*) require that particular combinations of appliance, flue box (where required) and flue must be selected from those stated in the manufacturer's instructions as having been shown to be safe by a Notified Body.

Flueless instantaneous water heaters

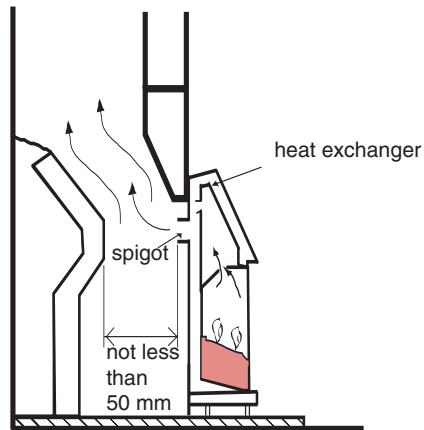
- 3.3 A flueless instantaneous water heater shall not be installed in a room or space having a volume of less than 5 m³.

Appliances fitted in bedrooms, bathrooms and shower rooms

- 3.4 An open-flued gas-fired appliance shall not be installed in a bedroom, bathroom or shower room, as there is an increased risk of carbon monoxide poisoning. If a combustion appliance must be installed in such a room then a room-sealed appliance shall be provided.

Diagram 3.1 Types of gas fire

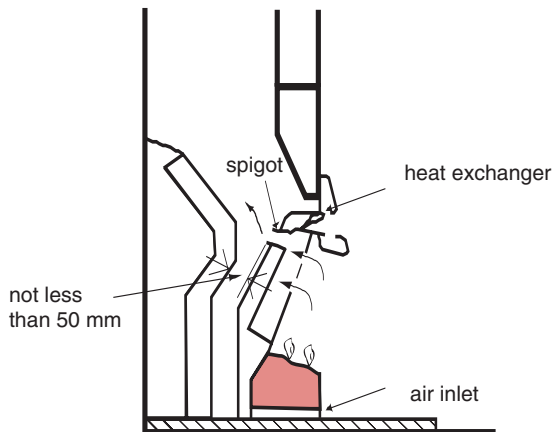
see para 3.1 & 3.32



(a) Radiant convector gas fire

Radiant convector gas fires, convector heaters and fire / back boilers, as described in BS 5871: Part 1: 2005

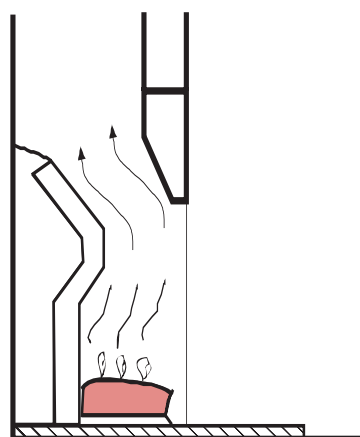
These stand in front of a closure plate which is fitted to the fireplace opening of a fireplace recess or suitable fluebox. The appliance covers the full height of the fireplace opening so that air only enters through purpose designed openings and the flue gases only discharge through the flue spigot.



(b) Inset Live Fuel Effect (ILFE) fire

Inset Live Fuel Effect (ILFE) fires, as described in BS 5871: Part 2: 2005

These stand fully or partially within a fireplace recess or suitable fluebox and give the impression of an open fire. The appliance covers the full height of the fireplace opening so that air only enters through purpose designed openings and the flue gases only discharge through the spigot.



(c) Decorative Fuel Effect (DFE) fire

Decorative Fuel Effect (DFE) fires, as described in BS 5871: Part 3: 2005

These are gas-fired imitations which can be substituted for the solid fuel appliances in open fires. Where suitable, they can also be used in flueboxes designed for gas appliances only.

Common designs include beds of artificial coals shaped to fit into a fireplace recess or baskets of artificial logs for use in larger fireplaces or under canopies.

Note: For illustration purposes, this diagram shows gas fires installed at or within a fireplace recess formed by fireplace components within a builder's opening. The actual setting for an appliance depends upon its type and manufacturer's installation instructions.

Air supply for flued Decorative Fuel Effect (DFE) fires

- 3.5 A permanently open air vent will not be necessary for a DFE fire with a rated heat input not greater than 7 kW (net) provided that it has been independently certified by a Notified Body as having a flue gas clearance rate (without spilling) of not greater than 70 m³/hour.
- 3.6 Any room or space intended to contain any other DFE fire shall have a permanently open air vent as follows –
- (a) for a DFE fire in a fireplace recess with a throat, the air vent free area shall not be less than 10000 mm²; or
 - (b) for a DFE fire in a fireplace with no throat, such as a fire under a canopy, the air vent free area shall be sized in accordance with the provisions in Section 2, Table 2.1, as if the room were intended to contain a solid fuel fire .

Air supply for flued appliances other than Decorative Fuel Effect fires

- 3.7 This type of combustion appliance includes Inset Live Fuel Effect (ILFE) fires, radiant convector fires and boilers, in both room-sealed and open-flued variants.
- 3.8 The size of the free air supply to the combustion appliance shall be in accordance with the provisions shown in Diagram 3.2.

Example of calculation of free area of air vent using Diagram 3.2

- 3.9 An open-flued boiler with a rated input of 15 kW (net) is installed in an appliance compartment such as a boiler room, which is ventilated directly to the outside. The design of the boiler is such that it requires cooling air. In these circumstances –

The cooling air is exhausted via vent **D**, which has an area of –

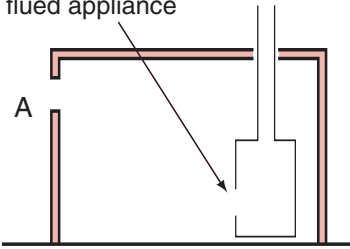
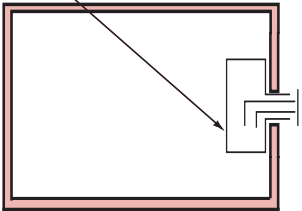
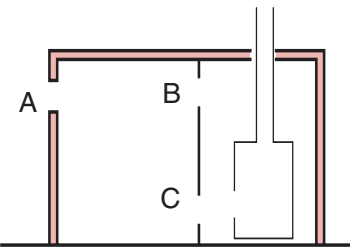
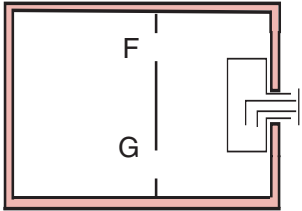
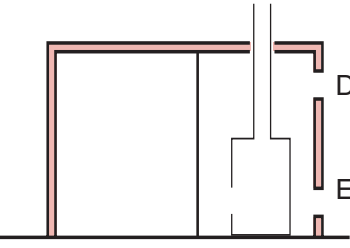
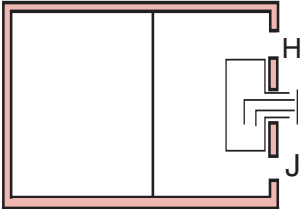
$$15 \times 500 = 7500 \text{ mm}^2$$

The cooling air and the air needed for combustion and the safe operation of the flue enters via vent **E**, which has an area of –

$$15 \times 1000 = 15000 \text{ mm}^2$$

Diagram 3.2 Free areas of permanently open air vents for gas appliance installations (other than decorative fuel effect fires or flueless appliances)

see para 0.1, 3.7 & 3.8

	Open Flued	Room Sealed
Appliance in a room or space	<p>Open flued appliance</p>  <p>A = 500 mm² per kW input (net) in excess of 7 kW (see Note 3)</p> <p>Section</p>	<p>Room sealed appliance</p>  <p>No vent needed</p> <p>Plan</p>
Appliance in an appliance compartment ventilated via an adjoining room or space	 <p>A = 500 mm² per kW input (net) in excess of 7 kW (see Note 3) B = 1000 mm² per kW input (net) C = 2000 mm² per kW input (net)</p> <p>Section</p>	 <p>F = 1000 mm² per kW input (net) G = F</p> <p>Plan</p>
Appliance in an appliance compartment ventilated direct to outside	 <p>D = 500 mm² per kW input (net) E = 1000 mm² per kW input (net)</p> <p>Section</p>	 <p>H = 500 mm² per kW input (net) J = H</p> <p>Plan</p>

Notes

1. A, D, E, H and J are permanently open vents to the outside. B, C, F and G are permanently open vents between an appliance compartment and a room or space.
2. Calculations employ the appliance rated net heat input.
3. The area given above is the free area of the vent(s) or the equivalent free area for ventilators of more complex design.
4. Vents at C, E, G, and J are low level vents
 Vents at B, D, F, and H are high level vents.

Flueless appliances

- 3.10 The ventilation for a flueless gas appliance shall be provided in accordance with Table 3.1. For some flueless appliances, it may be necessary to provide permanently open air vents and/or make provision for rapid ventilation as recommended in BS 5440 – 2: 2000.
- 3.11 A room containing a gas point intended for use with a flueless appliance (such as a cooker, or space heater or water heater, with the gas point not adjacent to a flue) shall have the ventilation provision calculated on the basis that an appliance with the largest rating consistent with Table 3.1 could be installed there.

Table 3.1 Ventilation for flueless gas appliances

Flueless appliance type	Maximum appliance rated heat input	Volume of room, space or internal space (m ³)	Free area of permanently open air vent (mm ²) ^{(2) (3)}
Cooker, oven hotplate or grill or combination thereof	Not applicable	< 5	10000
		5 to 10	5000 ⁽⁴⁾
		> 10	no permanently open vent needed
Instantaneous water heater	11 kW (net)	< 5	Installation of water heater not permitted
		5 to 10	10000
		>10 to 20	5000
		> 20	no permanently open vent needed
Space heater not in an internal space ^{(2) (3)}	0.045 kW (net) per m ³ volume of room or space	All cases	10000 PLUS 5500 per kW input (net) in excess of 2.7 kW (net)
Space heater in an internal space ^{(2) (3)}	0.090 kW (net) per m ³ volume of internal space	All cases	10000 PLUS 2750 per kW input (net) in excess of 5.4 kW (net)

Notes:

- The permanent ventilation provisions listed in this table are additional to the openable elements or (for kitchens only) extract ventilation in accordance with Part K.
- An internal space means one which communicates with several rooms or spaces, such as a hallway or landing.
- For LPG fired space heaters conforming to BS EN 449: 2002 the recommendations of BS 5440-2: 2000 shall be followed.
- No permanent open air vent is required if the room or space has a door which opens directly to the outside.

Examples:

- Space heater in a lounge measuring 4 m x 4 m x 2.4 m = 38.4 m³, the appliance rated input should not be greater than 38.4 x 0.045 = 1.73 kW
- Space heater in a hallway with a rated input of 7 kW (net) should have a permanently open air vent with a free area of 10000 + 2750 x (7 - 5.4) = 14400mm²

Size of natural draught flues for open flued appliances

- 3.12 A flue shall be sized in accordance with Table 3.2 to suit the intended appliance and to ensure an adequate discharge velocity to prevent flow reversal problems but not to impose excessive flow resistance.
- 3.13 For an appliance that is CE marked as compliant with the Gas Appliances (Safety) Regulations 1995, the flue shall be sized in accordance with the manufacturer's installation instructions.
- 3.14 The fluepipe shall be the same size as the appliance flue outlet and the flue shall have at least the same cross sectional area as that of the appliance flue outlet.

Table 3.2 Size of flues for gas fired appliances

Intended installation	Minimum flue size
Radiant/convector gas fire (new flue)	Circular - 125 mm diameter Rectangular - 16500 mm ² cross sectional area with a minimum side dimension of 90 mm
Radiant/convector gas fire (existing flue)	Circular - 125 mm diameter Rectangular - 12000 mm ² cross sectional area with a minimum side dimension of 63 mm
ILFE fire or DFE fire within a fireplace opening up to 500 mm x 550 mm	Circular or rectangular - Minimum flue dimension of 175 mm ⁽¹⁾ (diameter and side)
DFE fire installed in a fireplace opening in excess of 500 mm x 550 mm	Calculate in accordance with Section 2, paragraph 2.7 to 2.8.
Note:	
1. Some ILFE and DFE appliances are suitable for use with a circular flue with a diameter not less than 125 mm or a rectangular flue with a cross sectional area of not less than 16500 mm ² with a minimum side dimension of 90 mm.	

Height of natural draught flues for open flued appliances

- 3.15 A flue shall be high enough to ensure sufficient draught to safely clear the products of combustion. For an appliance that is CE marked as compliant with the Gas Appliances (Safety) Regulations 1995, it shall be installed in accordance with the manufacturer's installation instructions.
- 3.16 Where an older appliance that is not CE marked is to be used and it has no manufacturer's installation instructions it shall be installed in accordance with –
- (a) the recommendations in BS 5871 - 3: 2005 for decorative fuel effect (DFE) fires; or
 - (b) the recommended calculation procedures in BS 5440 - 1: 2000 for appliances other than decorative fuel effect fires.

Outlets from flues

- 3.17 The outlet from a flue shall be so situated externally as to allow the safe dispersal of the products of combustion and, if a balanced flue, the intake of air. The flue outlet shall be located as shown in Diagram 3.3, Table 3.3 and Diagram 3.4.
- 3.18 A flue serving a natural draught open-flued appliance, with a diameter not greater than 170 mm, shall be fitted with an outlet terminal that complies with BS EN 1856 - 1: 2003, BS EN 1856 - 2: 2004 and BS EN 1858: 2003.
- 3.19 A flue serving a natural draught open-flued appliance, with a diameter greater than 170 mm, shall be fitted with a protective cage designed for solid fuel use, having a mesh size not less than 6 mm and not greater than 25 mm. The total free area of the cage shall be not less than twice the cross sectional area of the flue.
- 3.20 A flue outlet shall be protected with a guard if –
(a) a person could easily come into contact with it; and
(b) it could be damaged.
- 3.21 If a flue outlet is in a vulnerable position, such as where it discharges at a point within reach of the ground, a balcony, a veranda or window, it shall be designed to prevent the entry of any matter that could obstruct the flow.

Diagram 3.3 Location of outlets from flues serving gas appliances

see para 3.17
see table 3.3

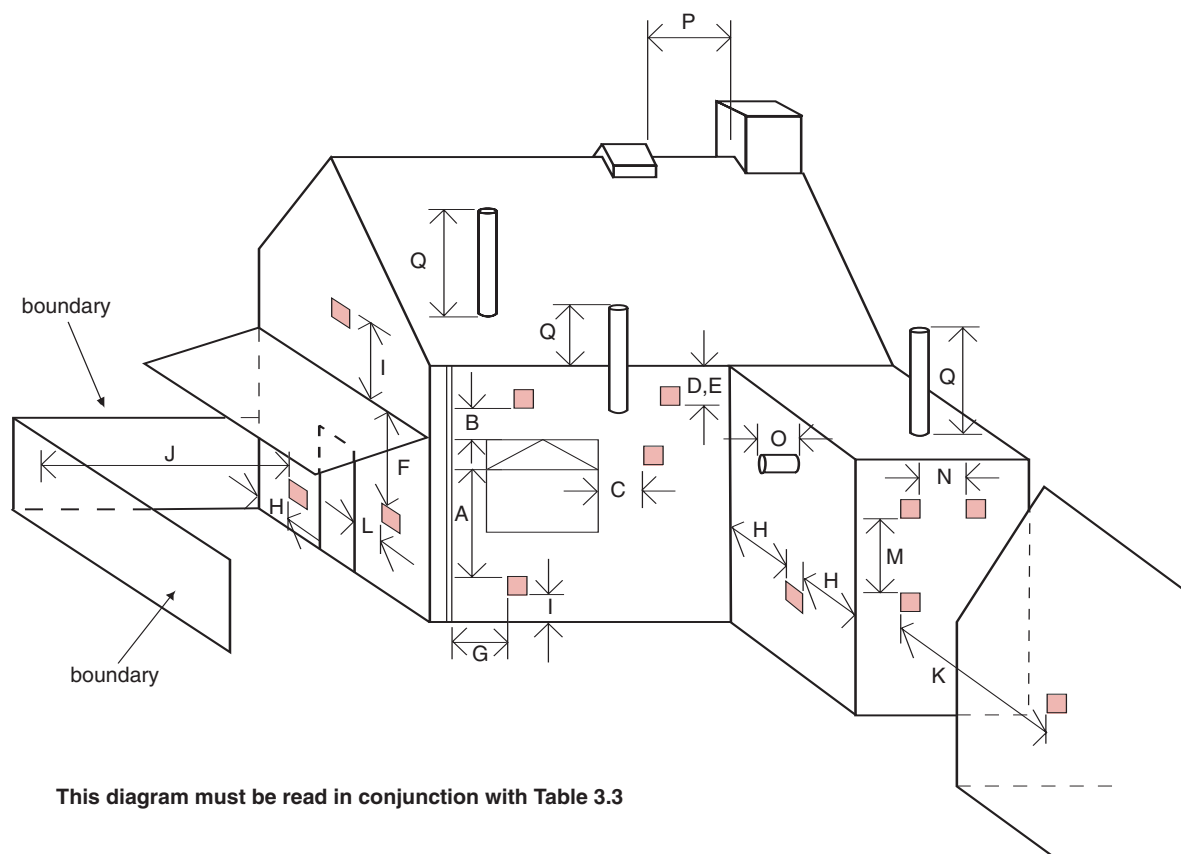


Table 3.3 Locations of flue outlets serving gas appliances

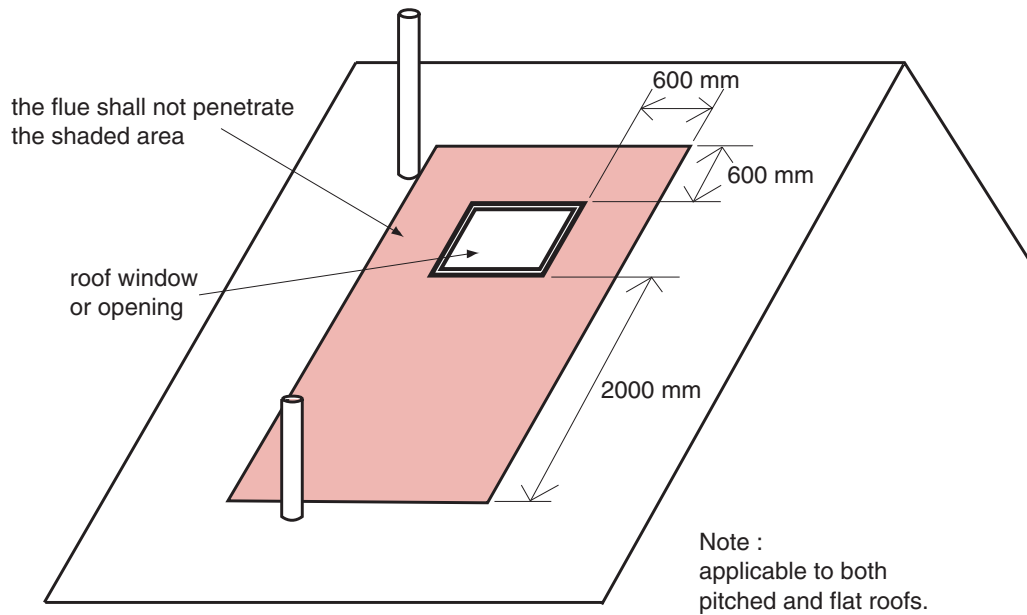
Distance	Location	Minimum separation distances for terminals (mm)			
		Balanced flue		Open flue	
		Natural draught	Fanned draught	Natural draught	Fanned draught
A	Below an opening ⁽¹⁾	Appliance rated heat input (net) 0 – 7 kW: 300 >7 – 14 kW: 600 >14 to 32 kW: 1500 > 32kW: 2000	300	Not to be used	300
B	Above an opening ⁽¹⁾	0 – 32 kW: 300 >32kW: 600	300	Not to be used	300
C	Horizontally to an opening ⁽¹⁾	0 – 7 kW: 300 >7 – 14kW: 400 > 14kW: 600	300	Not to be used	300
D	Below gutters, soil pipes or drains.	300	75	Not to be used	75
E	Below eaves	300	200	Not to be used	200
F	Below balcony or car park roof	600	200	Not to be used	200
G	From a vertical drain or soil pipe	300	150 ⁽³⁾	Not to be used	150
H	From an internal or external corner or to a boundary alongside the terminal ⁽²⁾	600	300	Not to be used	200
I	Above ground, roof or balcony level	300	300	Not to be used	300
J	From a surface or a boundary facing the terminal ⁽²⁾	600	600	Not to be used	600
K	From a terminal facing the terminal	600	1200	Not to be used	1200
L	From an opening in the car port into a building	1200	1200	Not to be used	1200
M	Vertically from a terminal on the same wall	1500	1500	Not to be used	1500
N	Horizontally from a terminal on the same wall	300	300	Not to be used	300
O	From the wall on which the terminal is mounted	Not applicable	Not applicable	Not applicable	50
P	From a vertical structure on the roof	Not applicable	Not applicable	1500 if a ridge terminal. For any other terminal as per BS 5440 – 1: 2000	Not applicable
Q	Above the highest point of intersection with the roof	Not applicable	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 a vent. However, in addition, the outlet shall not be nearer than 150 mm (fanned draught) or 300 mm (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. 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. This dimension may be reduced to 75 mm for an appliance with an input (net) not greater than 5 kW.

Diagram 3.4 Location of outlets near roof windows or openings (from flues serving gas appliances)

see para 3.17



This diagram must be read in conjunction with Diagram 3.3 and Table 3.3

Provision of flues

- 3.22 The flue and fluepipe for a gas appliances shall –
- (a) be designed and constructed following the provisions on the selection of components and the manner of their installation as given in paragraphs 3.23 to 3.28 below; or
 - (b) if the intended appliance is new and of a known type –
 - (i) be built using factory-made components that have been independently certified as achieving a performance at least equal to that corresponding to the designation given in Table 3.4; and
 - (ii) be installed in accordance with the provisions of paragraphs 3.25 to 3.28 and Section 1, as relevant, and in accordance with the appliance manufacturer's and component manufacturer's installation instructions.

Table 3.4 Minimum performance designations for chimney and fluepipe components for use with new gas appliances

Appliance type		Minimum designation ⁽¹⁾⁽²⁾
Boiler: open-flue	Natural draught	T250 N2 D 1 O
	Fanned draught	T250 P2 D 1 O
	Condensing	T160 P2 W 1.O
Boiler: room-sealed	Natural draught	T250 N2 D 1 O
	Fanned draught	T250 P2 D 1 O
Gas fire	Radiant/convector, ILFE or DFE	T250 N2 D 1.O
Air heater	Natural draught	T250 N2 D 1 O
	Fanned draught	T200 P2 D 1 O
	SE-duct	T450 N2 D 1 O

Notes:

1. The designation of chimney products is described in BS EN 1443: 2003.
2. These are default designations. Where appliance manufacturer's installation instructions specify a higher designation, this shall be complied with.

Fluepipe components

- 3.23 The components for a fluepipe shall be –
- (a) any of the options in paragraph 1.26;
 - (b) a sheet metal pipe as described in BS EN 1856 - 1: 2003 and BS EN 1856 - 2: 2004; or
 - (c) a fibre cement pipe as described in BS EN 1857: 2003.

Flueblock chimneys

- 3.24 A flueblock chimney shall be constructed from either –
- (a) a factory-made flueblock system primarily designed for solid fuel, as described in paragraphs 1.23 and 1.24; or
 - (b) a factory-made flueblock system comprising of straight blocks, recess units, lintel blocks, offset blocks, transfer blocks and jointing materials complying with: –
 - (i) BS EN 1858: 2003, for chimneys, components, concrete flueblocks, with a performance Class E1 or Type B Flue blocks; or
 - (ii) BS EN 1806: 2000 for clay/ceramic flueblocks, with a performance class of at least FB4 N2.
- 3.25 A flueblock chimney shall be installed with sealed joints in accordance with the flueblock manufacturer's installation instructions. Where bends or offsets are required, these shall be formed using matching factory-made components. Flueblocks, which are not intended to be bonded into surrounding masonry, shall be supported and restrained in accordance with the manufacturer's installation instructions.

Location and shielding of flues

- 3.26 The combustible materials in the building fabric shall be protected from the heat dissipation from a flue in accordance with the provisions of Table 3.5.
- 3.27 Where a fluepipe or flue penetrates a fire compartment wall or floor, it must not breach the fire separation requirements of Part E of the Building Regulations.
- 3.28 A fluepipe and factory-made chimney shall be guarded where –
- they present a burn hazard to people that is not immediately apparent; or
 - they could be at risk of damage.

Table 3.5 Protecting buildings from hot flues

Flue gas within	Protection measures
Fluepipe	A flue shall be not less than 25 mm 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) a non-combustible sleeve enclosing the fluepipe or flue shall be used which has a 25 mm airspace to the relevant flue wall. The airspace can be wholly or partially filled with non-combustible insulating material.
Factory - made chimney complying with BS EN 1856 - 1: 2003 and BS EN 1856 - 2: 2004	
Factory - made chimney complying with - BS EN 1859: 2000; and BS EN 1856 - 1: 2003	Install in accordance with Section 1, Paragraph 1.37
Masonry chimney	Provide 25 mm of masonry between the flue and any combustible material
Flueblock chimney	Provide flueblock walls with a thickness of not less than 25 mm

Lining or relining flues in chimneys

- 3.29 The lining or relining of a flue serving a gas appliance shall be carried out in accordance with the provisions given in paragraphs 1.21, 1.22 and 2.18 or by using a flexible stainless steel liner independently certified as complying with BS EN 1856 - 1: 2003 and BS EN 1856 - 2: 2004.
- 3.30 A flexible metal flue liner shall be installed in one complete length without joints within the chimney. Other than for sealing at the top and the bottom, the space between the chimney and the liner shall be left empty unless this is contrary to the manufacturer's instructions.
- 3.31 Where a double skin flexible flue liner is used it shall be installed in accordance with the manufacturer's installation instructions. A liner which complies with the recommendations of BS EN 1856 - 1: 2003 and BS EN 1856 - 2: 2004, shall be installed in accordance with BS 5440 - 1: 2000.

Debris collection space for chimneys

- 3.32 A debris collection space shall be provided at the base of a chimney unless it is lined, constructed of flue blocks, or is a factory-made metal chimney with a flue box. The space shall have a volume of not less than 12 litres and a depth of not less than 250 mm below the point where flue gases discharge into the flue. The space shall be readily accessible for clearance of debris.

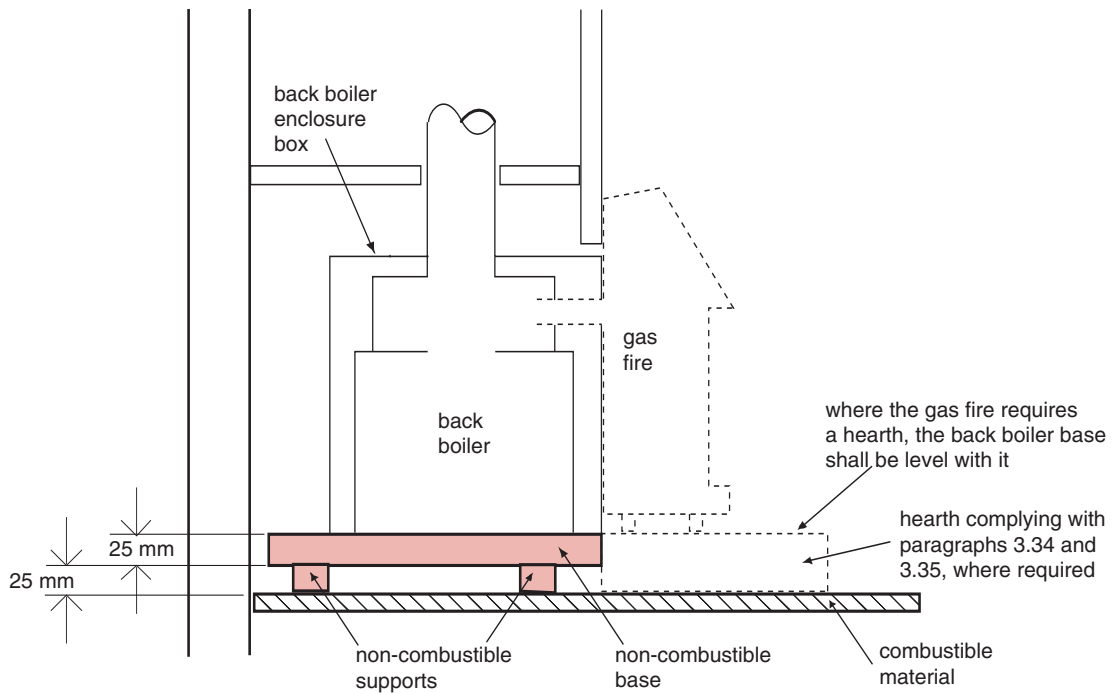
For gas fires of the type illustrated in Diagram 3.1 (a) and (b), there shall be at least 50 mm clearance between the end of the appliance spigot and any surface.

Bases for back boilers

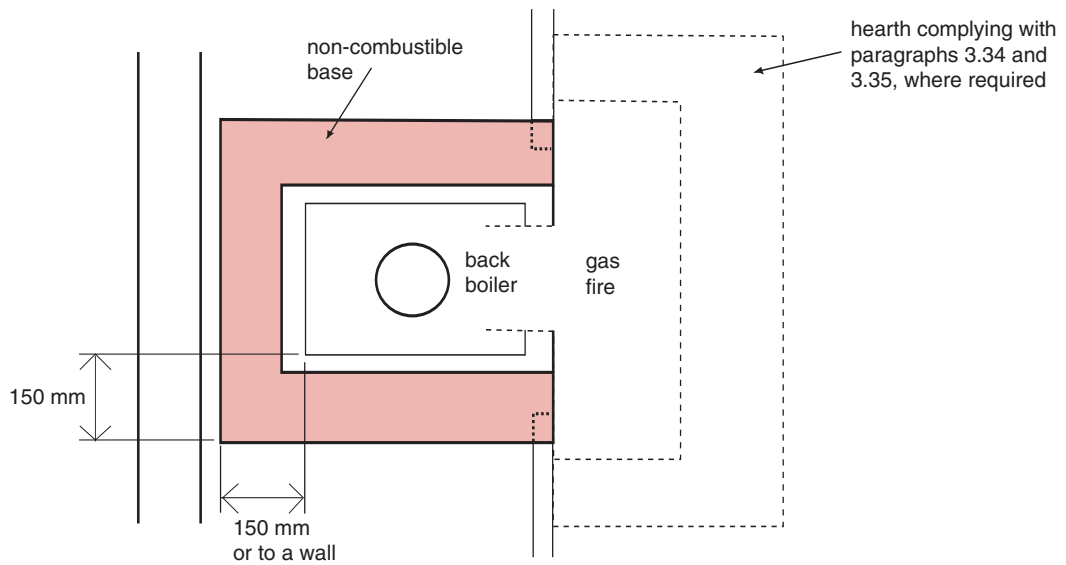
- 3.33 A back boiler shall be adequately protected to shield the fabric of the building from heat by standing it on –
- (a) a hearth intended for a solid fuel appliance (see Diagram 2.7(a)); or
 - (b) unless otherwise stated in the manufacturer's instructions, a base complying with Diagram 3.5.

Diagram 3.5 Base for back boiler

see paras 3.33 to 3.5



Section



Plan

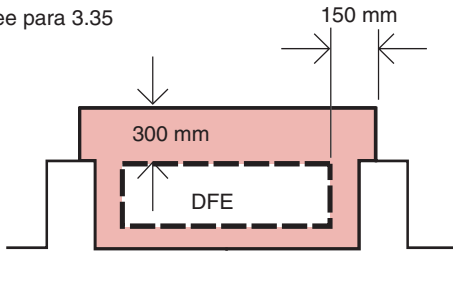
Hearths for gas burning appliances

- 3.34 A gas fired appliance shall be placed on a hearth unless –
- it is installed so that every part of any flame or incandescent material will be not less than 225 mm above the floor; or
 - the manufacturer's instructions state that a hearth is not required.

3.35 Where a hearth is required, instructions on its minimum plan dimensions are given in Diagrams 3.6 and 3.7. The hearth shall comprise of at least a layer of non-combustible, non-friable material not less than 12 mm thick. The edges of the hearth shall be marked by a change in level to provide a warning to the building occupants and to discourage combustible floor finishes such as carpet being laid too close to the appliance.

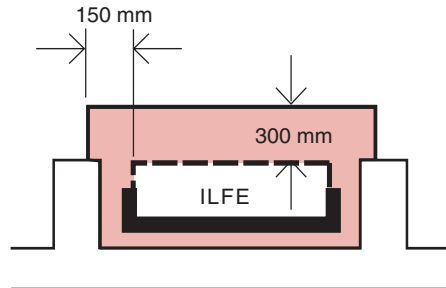
Diagram 3.6 Hearths for Decorative Fuel Effect (DFE) and Inset Live Fuel Effect (ILFE) fires: minimum plan dimensions of non-combustible surfaces

see para 3.35

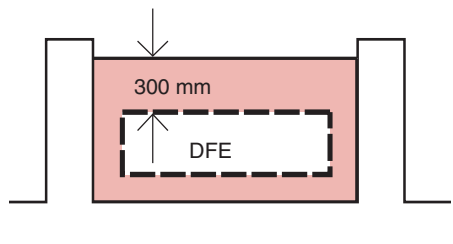


Hearth projecting beyond fireplace recess

Plan



Plan



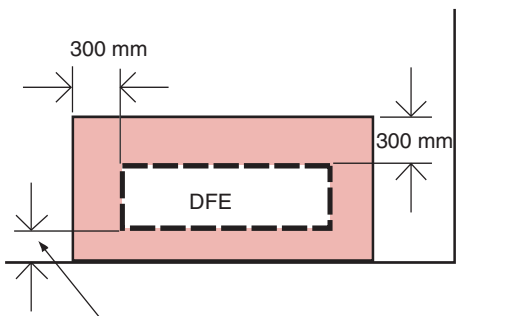
Hearth contained entirely within fireplace recess

Plan

key

----- extent of incandescent part of fire
(In some ILFE designs this may project beyond the fireplace opening)

■ surface to be kept free of combustible material

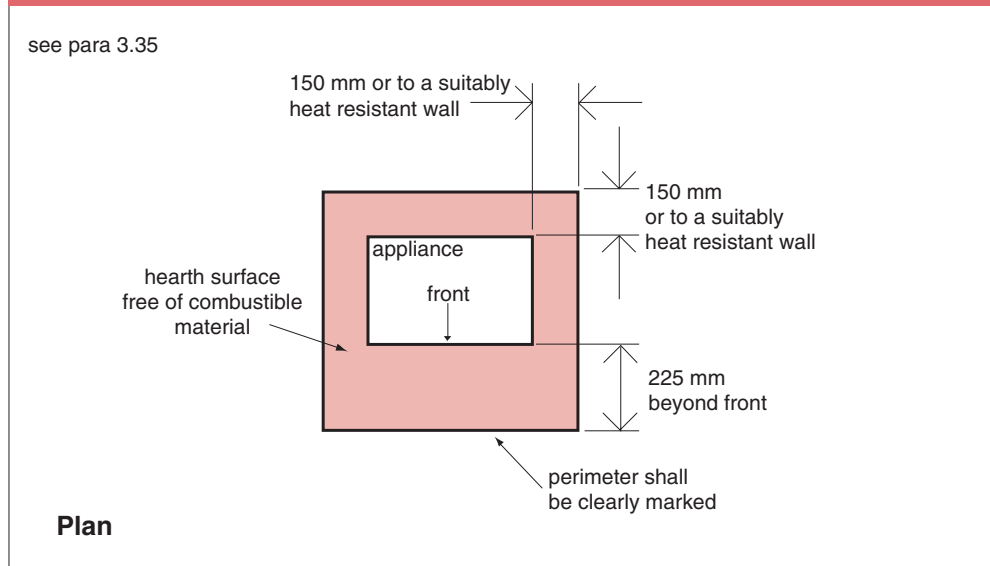


Less than 300 mm if hearth extends to a wall

Free standing hearth

Plan

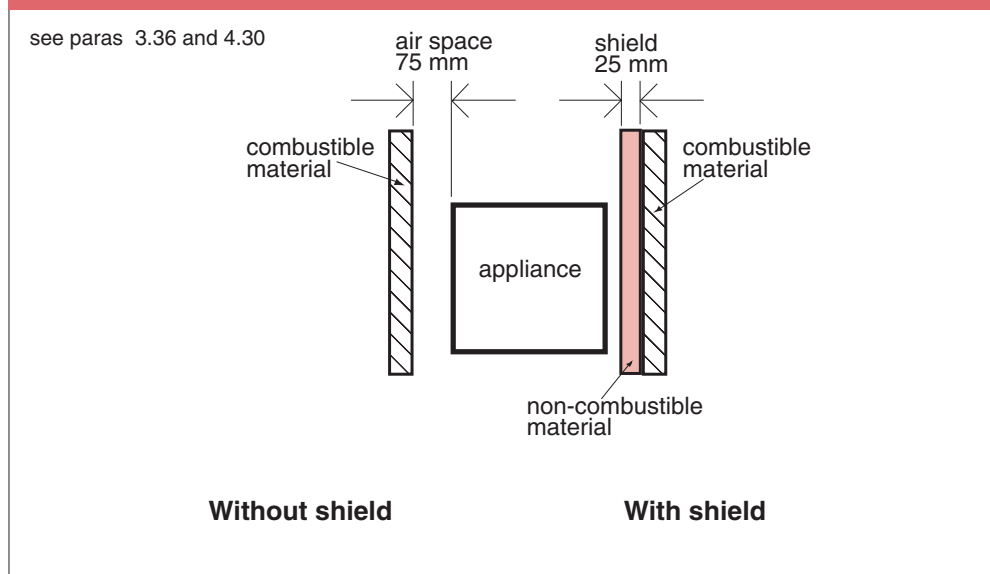
Diagram 3.7 Hearths for other appliances: plan dimensions of non-combustible surfaces



Shielding of appliances

- 3.36 A gas fired appliance shall be located where accidental contact is unlikely and it shall be surrounded by a non-combustible surface which provides adequate separation from combustible materials. The appliance shall be installed –
- with a shield of non-combustible material with a minimum thickness of 25 mm, between the appliance and the combustible material (see Diagram 3.8); or
 - with an air space of not less than 75 mm between the appliance and the combustible material.
- 3.37 A gas fired appliance that is CE marked as compliant with the Gas Appliances (Safety) Regulations 1995, shall be installed in accordance with the manufacturer's instructions.

Diagram 3.8 Shielding of appliances



This section sets out the additional provisions that shall be met for oil burning appliances over and above those given in Section 1.

Class of oil

- 4.1 The provisions in this Section are relevant to combustion installations designed to burn oils meeting the specifications for Class C2 (Kerosene) and Class D (Gas oil) given in BS 2869: 2006.

Appliances fitted in bedrooms, bathrooms and shower rooms

- 4.2 An open-flued oil-fired appliance shall not be installed in a bedroom, bathroom or shower room as there is an increased risk of carbon monoxide poisoning. If a combustion appliance must be installed in such a room then a room-sealed appliance shall be provided.

Air supply to appliances

- 4.3 The permanently open air vent for an oil burning appliance shall have the free area as given in Diagram 4.1. However, if the manufacturer's installation instructions require a greater area of permanently open air vent then the manufacturer's advice shall be followed.

Example of calculation of free area of air vent using Diagram 4.1

- 4.4 An open-flued appliance is installed in an appliance compartment such as a cupboard, which is ventilated via an adjoining room. The appliance has a rated output of 11 kW.

Air for combustion and the safe operation of the flue enters the adjoining room via vent **A**, which has an area –

$$(11 - 5) \times 550 = 3300 \text{ mm}^2$$

The cooling air for the appliance compartment is exhausted through vent **B** which has an area –

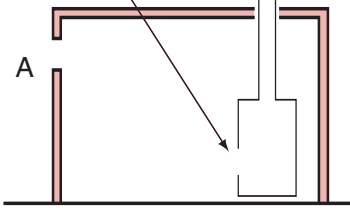
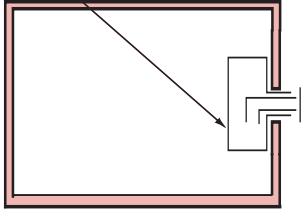
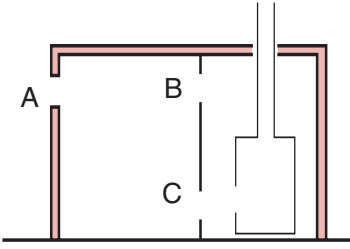
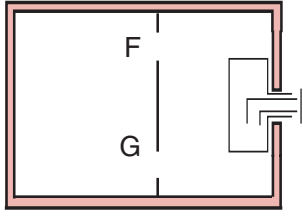
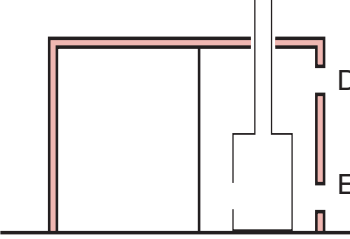
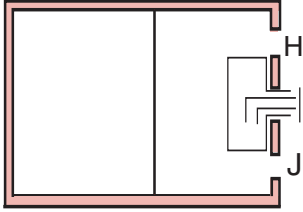
$$11 \times 1100 = 12100 \text{ mm}^2$$

All of the air for combustion and the safe operation of the flue as well as cooling air enters the appliance compartment through vent **C** which has an area –

$$11 \times 1650 = 18150 \text{ mm}^2$$

Diagram 4.1 Free areas of permanently open air vents for oil fired appliance installations

see para 4.3

	Open Flued	Room Sealed
Appliance in a room or space	<p>Open flued appliance</p>  <p>A = 550 mm² per kW output in excess of 5 kW (see Note 3)</p> <p>Section</p>	<p>Room sealed appliance</p>  <p>No vent needed</p> <p>Plan</p>
Appliance in an appliance compartment ventilated via an adjoining room or space	 <p>A = 550 mm² per kW output in excess of 5 kW (see Note 3) B = 1100 mm² per kW output C = 1650 mm² per kW output</p> <p>Section</p>	 <p>F = 1100 mm² per kW input (net) G = F</p> <p>Plan</p>
Appliance in an appliance compartment ventilated direct to outside	 <p>D = 550 mm² per kW output E = 1100 mm² per kW output</p> <p>Section</p>	 <p>H = 550 mm² per kW output J = H</p> <p>Plan</p>

Notes

- 1) A, D, E, H and J are permanently open vents to the outside. B, C, F and G are permanently open vents between an appliance compartment and a room or space.
- 2) The area given above is the free area of the vent(s) or the equivalent free area for ventilators of more complex design.
- 3) Vent A shall be increased by a further 550 mm² per kW output if the appliance is fitted with a draught break.
- 4) Vents at C, E, G, and J are low level vents.
 Vents at B, D, F, and H are high level vents.
- 5) The information in this diagram is based on the recommendations of BS 5410 - 1: 1997.

Size of flues (other than balanced flues and flues designed to discharge through or adjacent to walls)

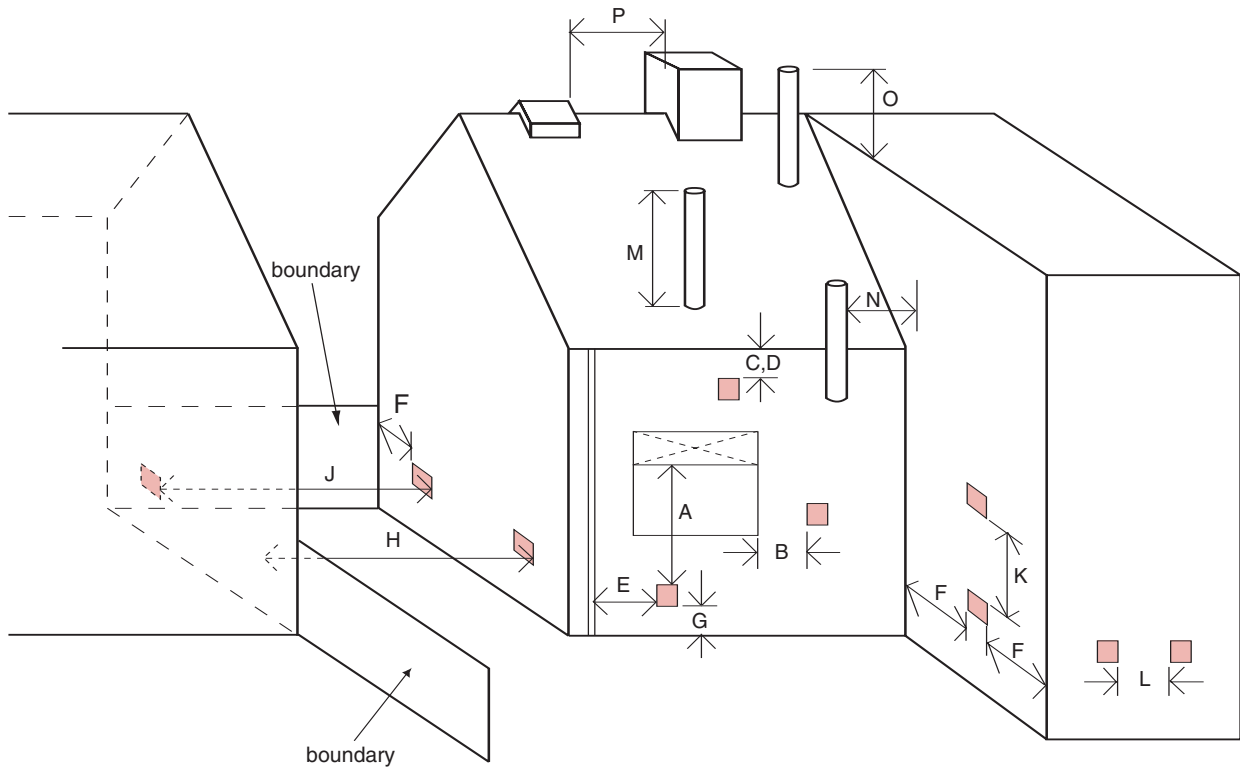
- 4.5 A flue shall be sized to suit the intended appliance such that it ensures an adequate discharge velocity to prevent flow reversal problems but does not impose excessive flow resistance.
- 4.6 The fluepipe shall be the same size as the appliance flue outlet and the flue shall be the same cross sectional area as the appliance flue outlet unless the appliance manufacturer specifies otherwise.
- 4.7 The flue in a masonry or flueblock chimney shall be the same size as the appliance flue outlet or of a larger size that will allow for the later insertion of a suitable flexible flue liner matching the appliance to be installed.

Outlets from flues and flue heights

- 4.8 The outlet from a flue shall be so situated externally as to allow the safe dispersal of the products of combustion, the correct operation of a natural draught flue and, if a balanced flue, the intake of air. The flue outlet shall be located as shown in Diagram 4.2 and Table 4.1.
- 4.9 A flue outlet shall be protected by a guard where –
 - (a) a person could easily come into contact with it; or
 - (b) it could be damaged.
- 4.10 If a flue outlet is in a vulnerable position, such as where the flue discharges at a point within reach of the ground, a balcony, a veranda or window, it shall be designed to prevent the entry of any matter that could obstruct the flow.

Diagram 4.2 Location of outlets from flues serving oil fired appliances

see para 4.8
see table 4.1



this diagram must be read in conjunction with Table 4.1

Table 4.1 Location of outlets for flues serving oil-fired appliances

Distance	Location of outlet ⁽¹⁾ ⁽⁷⁾ ⁽⁸⁾	Minimum separation distances for terminals (mm)	
		Appliance with pressure jet burner	Appliance with vaporising burner
A	Below an opening ⁽²⁾ ⁽³⁾	600	Shall not be used
B	Horizontally to an opening ⁽²⁾ ⁽³⁾	600	Shall not be used
C	Below a plastic/painted gutter, drainage pipe or eaves if combustible material is protected ⁽⁴⁾	75	Shall not be used
D	Below a plastic/painted gutter, drainage pipe or eaves if combustible material is not protected	600	Shall not be used
E	From vertical sanitary pipework	300	Shall not be used
F	From an external or internal corner or from a surface or boundary alongside the terminal	300	Shall not be used
G	Above ground or balcony level	300	Shall not be used
H	From a surface or boundary facing the terminal	600	Shall not be used
J	From a terminal facing the terminal	1200	Shall not be used
K	Vertically from a terminal on the same wall	1500	Shall not be used
L	Horizontally from a terminal on the same wall	750	Shall 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 750 mm (pressure jet) or 2300 mm (vaporising jet) horizontally from the side of the terminal	600 ⁽⁶⁾	1000 ⁽⁵⁾
P	From a ridge terminal to a vertical structure on the roof	1500	Shall not be used

Notes:

1. A terminal shall only be positioned on a wall where an appliance has been approved for such configuration when tested in accordance with BS EN 303 – 1: 1999 or OFTEC standards OFS A100 or OFS A101.
2. An opening means an openable element, such as an openable window, or a permanent opening such as a permanent open air vent.
3. Notwithstanding the dimensions above, a terminal shall be not less than 300 mm from combustible material, e.g. window frame.
4. Combustible material shall be protected by the fitting of a heat shield at least 750 mm wide.
5. Where a terminal is used with a vaporising burner, it shall be at least 2300 mm horizontally from the roof.
6. Outlets for vertical balanced flues in locations M, N and O shall be in accordance with the manufacturers instructions.
7. The terminating point of any flue shall be not less than 1800 mm from an oil storage tank unless a fire wall as described in Section 5 is provided between the tank and the flue termination.
8. A terminal shall be positioned so as to avoid products of combustion accumulating in stagnant pockets around the building or entering into buildings.

Flues for oil-fired appliances

- 4.11 The satisfactory provision of a flue and fluepipe depends upon the flue gas temperature to be expected in normal service. Separate provisions are given according to whether the proposed installation will have a flue gas temperature not greater than 250°C, or greater than 250°C, as measured in accordance with OFTEC Standards A100, A101 or A102.
- 4.12 The flue gas temperature depends upon the appliance type and the age of its design. Older and second hand appliances are likely to produce flue gas temperatures greater than 250°C.

Boilers bearing the CE mark, indicating compliance with the Boiler (Efficiency) Regulations 1993, normally have a flue gas temperature not greater than 250°C.

Information for individual appliances shall be sought from the manufacturer's installation instructions, the manufacturer, or OFTEC.

Where this information is not available, a flue shall be constructed for an assumed flue gas temperature greater than 250°C.

Provisions for flue gas temperatures greater than 250°C

- 4.13 The chimney, flue and fluepipe for an oil burning appliance, with a flue gas temperature greater than 250°C, shall be –
- (a) in accordance with the provisions given in Sections 1 and 2 for a masonry or flueblock chimney; or
 - (b) a factory-made metal chimney in accordance with Section 1.

Provisions for flue gas temperatures not greater than 250°C

- 4.14 The chimney, flue and fluepipe for an oil burning appliance, with flue gas temperatures not greater than 250°C, shall –
- (a) be constructed in accordance with the provisions on the selection of components and the manner of their installation given in paragraphs 4.15 to 4.20; or
 - (b) if the intended appliance is of known type –
 - (i) be built using factory-made components that have been independently certified as achieving a performance at least equal to that corresponding to the designation given in Table 4.2 for the intended appliance type, when tested to an appropriate European chimney standard; and
 - (ii) be installed in accordance with the provisions of paragraphs 4.17 to 4.20 and Section 1, as relevant, and in accordance with the appliance manufacturer's and component manufacturer's installation instructions.

Table 4.2 Minimum performance designations for chimney, flue and fluepipe components for use with new oil fired appliances with flue gas temperatures not greater than 250°C

Appliance type	Fuel oil	Minimum designation
Boiler, including combination boiler – pressure jet burner	Class C2	T250 N2 D 1 O
Cooker – pressure jet burner	Class C2	T250 N2 D 1 O
Cooker and room heater – vaporizing burner	Class C2	T250 N2 D 1 O
Cooker and room heater – vaporizing burner	Class D	T250 N2 D 2 O
Condensing pressure jet burner appliance	Class C2	T160 N2 W 1 O
Condensing vaporizing burner appliance	Class D	T160 N2 W 2 O

Notes:

1. The designation of chimney products is described in BS EN 1443: 2003. The BS EN for the product will specify its full designation and marking requirements.
2. These are default designations. Where the appliance manufacturers installation instructions specify a higher designation, this shall be complied with.

Fluepipe components

- 4.15 A fluepipe shall be constructed using the following components –
- (a) any of the relevant options in paragraph 1.26;
 - (b) sheet metal as described in BS 715: 2005, BS EN 1856 - 1: 2003 and BS EN 1856 - 2: 2004; or
 - (c) fibre cement pipes as described in BS EN 1857: 2003.

Flueblock chimneys

- 4.16 A flueblock chimney shall be constructed from either –
- (a) a factory-made flueblock system primarily designed for solid fuel, as described in paragraphs 1.23 and 1.24; or
 - (b) a factory-made flueblock system comprising of straight blocks, recess units, lintel blocks, offset blocks, transfer blocks and jointing materials complying with –
 - (i) BS EN 1858: 2003 for concrete flueblocks; or
 - (ii) BS EN 1806: 2000 for clay/ceramic flueblocks, with a performance not less than the designation given in Table 4.2 for the intended appliance type.

- 4.17 A flueblock chimney shall be installed with sealed joints in accordance with the flueblock manufacturer's installation instructions. Where bends or offsets are required, these shall be formed using matching factory-made components. Flueblocks that are not intended to be bonded into surrounding masonry shall be supported and restrained in accordance with the manufacturer's installation instructions.

Location and shielding of flues

- 4.18 Where the flue gas temperature is not expected to exceed 250°C the combustible materials in the building fabric shall be protected from the heat dissipation from a flue in accordance with the provisions of Table 4.3.
- 4.19 Where a fluepipe or flue penetrates a fire compartment wall or floor, it must not breach the fire separation requirements of Part E of the Building Regulations.
- 4.20 A fluepipe flue and factory-made chimney shall be guarded where –
- (a) they present a burn hazard to people that is not immediately apparent; or
 - (b) they could be at risk of damage.

Table 4.3 Protecting buildings from hot flue gas temperatures not greater than 250°C

Flue gas within	Protection measures
Fluepipe	A flue shall be not less than 25 mm 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) a non-combustible sleeve enclosing the fluepipe or chimney shall be used which has a 25 mm airspace to the relevant flue wall. The airspace can be wholly or partially filled with non-combustible insulating material.
Factory-made chimney complying with BS 715: 1993	
Factory-made chimney complying with - BS EN 1859: 2000; and BS EN 1856 – 1: 2003	Install in accordance with Section 1 paragraph 1.37 of this Technical Booklet
Masonry chimney	Provide 25 mm of masonry between the flues and any combustible material
Flueblock chimney	Provide flueblock walls with a thickness of not less than 25 mm
Flue assemblies for room-sealed appliances	<ul style="list-style-type: none"> (a) flues passing through combustible walls shall be surrounded by insulation material not less than 50 mm thick. (b) provide a clearance of not less than 50 mm from the edge of the flue outlet to any combustible wall cladding.

Lining or relining flues in chimneys

- 4.21 Where the flue gas temperature is expected to be greater than 250°C the liner shall be –
- (a) as per the provisions in paragraph 1.22;
 - (b) as per the provisions in paragraph 2.18; or
 - (c) a flexible stainless steel liner independently certified as complying with BS 715: 2005.
- 4.22 Where the flue gas is expected not to be greater than 250°C the liner shall be –
- (a) any of the linings described in 4.21 above; or
 - (b) if the appliance is new and of known type, flue lining systems that have been independently certified as having a performance not less than that corresponding to the designation given in Table 4.2 for the intended appliance type.
- 4.23 A flexible metal flue liner shall be installed in one complete length without joints within the chimney. Other than for sealing at the top and the bottom, the space between the chimney and the liner shall be left empty unless this is contrary to the manufacturer's instructions. Double skin flexible flue liners shall be installed in accordance with manufacturer's installation instructions. BS 715: 1993 liners shall be installed in accordance with BS 5440-1: 2000.

Debris collection space for chimneys

- 4.24 A debris collection space shall be provided at the base of a chimney unless it is lined or constructed of flue blocks, or is a factory-made metal chimney with a flue box. The space shall have a volume of not less than 12 litres and a depth of not less than 250 mm below the point where flue gases discharge into the flue and be readily accessible for the clearance of debris.

Flues for appliances burning Class D (Gas oil) fuel

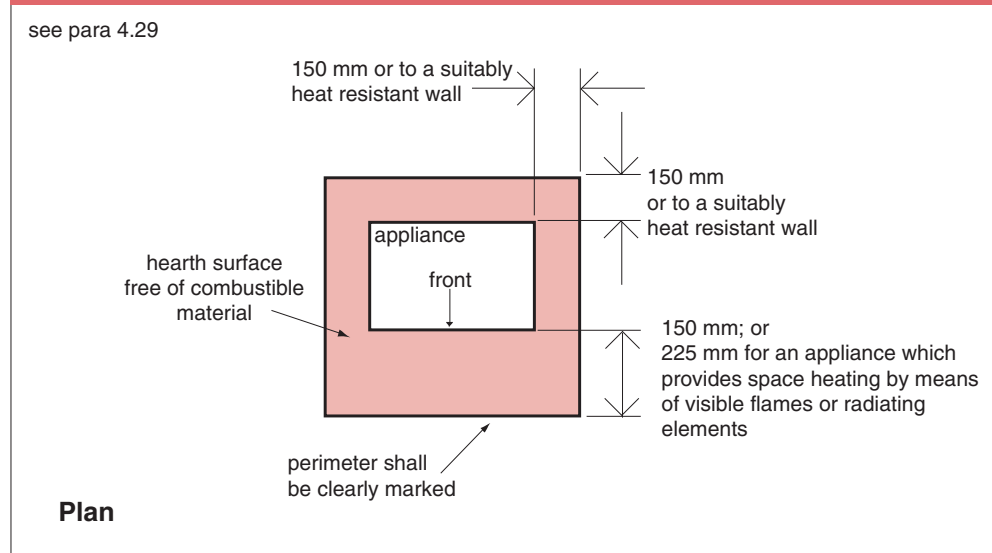
- 4.25 A flue serving an appliance burning Class D (Gas oil) fuel shall be made of materials which are resistant to the acids of sulphur.

Hearths for oil fired appliances

- 4.26 Where an appropriate test procedure, such as in OFTEC Standards A100, A101 and A102, shows that the temperature of the floor below an appliance will not be greater than 100°C, a rigid, imperforate and non-absorbent sheet of non-combustible material, such as a steel tray, shall be provided. This may be included as an integral part of the appliance.
- 4.27 Where the appliance will cause the temperature of the floor below it to be greater than 100°C, a hearth of solid non-combustible material shall be provided. It shall –
- (a) have plan dimensions not less than those shown in Diagram 2.8; and
 - (b) be made of solid non-combustible material, such as concrete or masonry, not less than 125 mm thick, including the thickness of any non-combustible floor and/or decorative surface.

- 4.28 Combustible materials shall not be placed beneath a constructional hearth unless –
- there is an air space of not less than 50 mm between the underside of the hearth and the combustible material; or
 - the combustible material is not less than 250 mm below the top of the hearth (see Diagram 2.8).
- 4.29 The appliance shall not be placed closer to the edges of the hearth nor closer to any combustible material that is laid over the hearth than the distances shown in Diagram 4.3. The perimeter of this safe region shall be marked by a change in level to provide a warning to the building occupants and to discourage combustible floor finishes such as carpet from being laid too close to the appliance.

Diagram 4.3 Location of an oil-fired appliance in relation to its hearth. Minimum dimensions of the heat resistant material in the hearth and the clear zone of non-combustible surface



Shielding of oil fired appliances

- 4.30 An oil fired appliance shall be located where accidental contact is unlikely and it shall be surrounded by a non-combustible surface which provides adequate separation from combustible materials. The appliance shall be installed –
- with a shield of non-combustible material, having a minimum thickness of 25 mm, between the appliance and the combustible material (see Diagram 3.8); or
 - with an air space of not less than 75 mm between the appliance and the combustible material (see Diagram 3.8).
- 4.31 An appliance independently certified as having a surface temperature, during normal operation of not greater than 100°C (as shown using an appropriate test procedure such as in OFTEC Standards A100, A101 or A102) shall not require shielding. Such certification shall be prominently displayed on the appliance.

Oil storage installations

Heating oil

- 5.1 The provisions given in this part of the Section are related to heating oil that is Class C2 (kerosene) or Class D (gas oil) as specified in BS 2896: 1998.

Oil tank construction

- 5.2 An oil storage tank shall be constructed in accordance with the recommendations of -
- (a) BS 799-5: 1987, for steel storage tanks; and
 - (b) OFS T 100: 1995, for medium density polyethylene tanks.

Protective measures against fire

- 5.3 An above ground oil storage tank shall be placed on a hard surface constructed of concrete or paving slabs not less than 42 mm thick. The hard surface shall extend beyond the perimeter of the tank, or its external skin if it is an integrally banded type, by not less than 300 mm.

The protection of an above ground or semi-buried oil tank from a fire, which may start in a building or beyond the site boundary, shall be in accordance with the provisions given in Table 5.1.

Detailed provisions for a buried tank are not given in this Technical Booklet but it should be installed in accordance with the recommendations of BS 5410: 1997.

- 5.4 A firewall shall be so constructed that it does not pose a danger to people around it.

Automatic isolation

- 5.5 The fuel pipework shall be resistant to the effects of fire and be fitted with a fire valve system where it enters the building, in accordance with the relevant recommendations in BS 5410 Part 1: 1997, Sections 8.2 and 8.3.

Table 5.1 Fire protection for oil storage tanks

Location of tank	Protective measures
Less than 1800 mm from any part of a building	Any eaves less than 1800 mm from the tank shall have 30 minutes fire resistance for integrity and insulation extending 300 mm beyond each side of the tank, and either <ol style="list-style-type: none">any part of the building wall less than 1800 mm from the tank shall be imperforate⁽¹⁾ with a minimum 30 minutes fire resistance in terms of insulation, integrity and stability to internal fire ; orprovide a fire wall ⁽²⁾ between the tank and any part of the building which is less than 1800 mm from the tank. The fire wall shall extend not less than 300 mm higher and 300 mm wider than the tank.
1800 mm or more from a building	No protection required
Less than 750 mm from a boundary	Provide a fire wall ⁽²⁾ between the tank and the boundary or a boundary wall, which has a minimum of 30 minutes fire resistance in terms of insulation, integrity and stability to fire on either side. The fire wall or fire resistant boundary wall must extend not less than 300 mm higher and 300 mm beyond the ends of the tank.
750 mm or more from a boundary	No protection required
Note: <ol style="list-style-type: none">Excluding small openings such as air bricks etc.Fire walls shall be imperforate non-combustible walls or screens, such as a masonry wall.The terminating point of any flue shall be not less than 1800 mm from an oil storage tank unless a fire wall as described in (b) above is provided between the tank and the flue termination.	

Control of oil pollution

- 5.6 Where Regulation L7 applies, the oil shall be stored in an integrally banded prefabricated tank. The bund shall have a capacity of not less than 110% of the tank it contains.

Liquefied Petroleum Gas (LPG) storage installations

The provisions in this part of the Section are limited to LPG storage installations with a capacity not greater than 1.1 tonne.

Tank location and protective measures

- 5.7 A LPG storage installation with a capacity not greater than 1.1 tonne, comprising of one tank standing in the open air, shall be installed in accordance with the LP Gas Association, Code of Practice 1: Bulk LPG Storage at Fixed Installations: Part 1, and the following paragraphs.
- 5.8 The LPG tank shall be installed in the open air and not within an open pit. The tank shall be adequately separated from buildings, the boundary and any fixed sources of ignition to enable safe dispersal of the gas in the event of venting or leaks. [If there is a fire at any of these locations these measures will reduce the risk of the fire spreading.]
- 5.9 The tank shall be placed so that the minimum separation distances given in Table 5.2 and shown in Diagram 5.1 are achieved. Drains, gullies and cellar hatches within the separation distances shall be protected from gas entry.
- 5.10 The LPG tank shall be sited such that there is a clear line of sight between the tank and the delivery vehicle to ensure that the person in control of the product transfer can quickly detect any problem at either point. If this cannot be achieved a remote fill point for the tank shall be provided in clear view of the point at which the delivery vehicle is normally parked.
- 5.11 Combustible materials, including weeds, long grass, deciduous shrubs and trees, shall be removed from an area around the tank for a distance equal to that given in Table 5.2, Column (B).
- 5.12 Where a visual screen is to be erected to hide an LPG tank, (e.g. at domestic installations), it shall not interfere with the ventilation and shall only be located at one side of the tank. For the purpose of such screening, any evergreen shrubs, trees or a non-flammable open ranch type fence shall be located at a distance equal to that given in Table 5.2, Column (B) from the tank.

Firewalls for LPG installations

- 5.13 Where a firewall is part of a building or a boundary wall it shall be located in accordance with Diagram 5.1(c) and if part of a building it shall be constructed in accordance with Diagram 5.1(d).
- 5.14 A firewall shall be imperforate and substantially constructed from brick, concrete or solid masonry. It shall have a fire resistance (insulation, integrity and stability) of not less than 30 minutes, but where it forms part of a building, 60 minutes fire resistance.

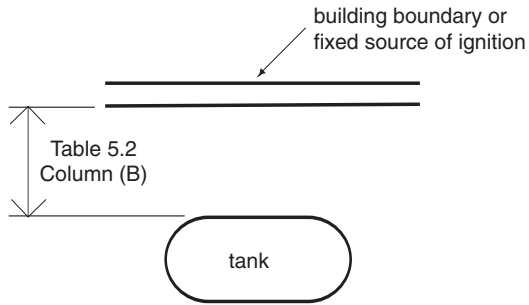
- 5.15 A firewall shall be not less than the height of the pressure release valve and shall extend horizontally such that the separation distance specified in Table 5.2, Column (B) is maintained -
- (a) when measured around the ends of the firewall as shown in Diagram 5.1(b); or
 - (b) when measured to the ends of the firewall as shown in Diagram 5.1(c), if the firewall is the boundary or part of the building.

Table 5.2 Fire protection for LPG storage tanks

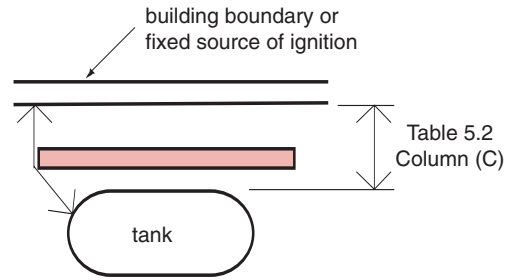
Capacity of tank (tonnes) (A)	Minimum separation distances from buildings, boundaries or fixed sources of ignition (mm)	
	To a tank with no firewall or to a tank around a firewall (B)	To a tank shielded by a firewall (C)
Not more than 0.25	2500	300
More than 0.25 but not more than 1.10	3000	1500

Diagram 5.1 Separation or shielding of liquified petroleum gas tanks of up to 1.1 tonne capacity from buildings, boundaries and fixed sources of ignition

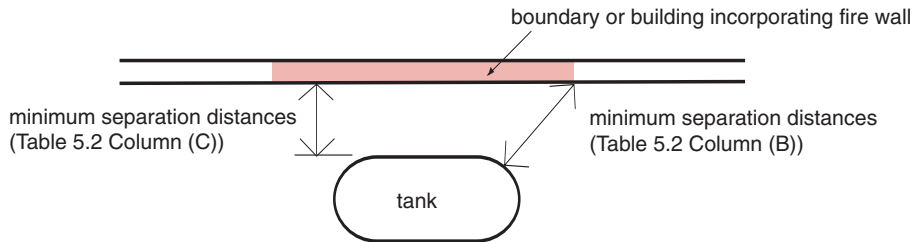
see para 5.9, 5.13 and 5.15 (a) & (b)
see table 5.2 columns (b) & (c)



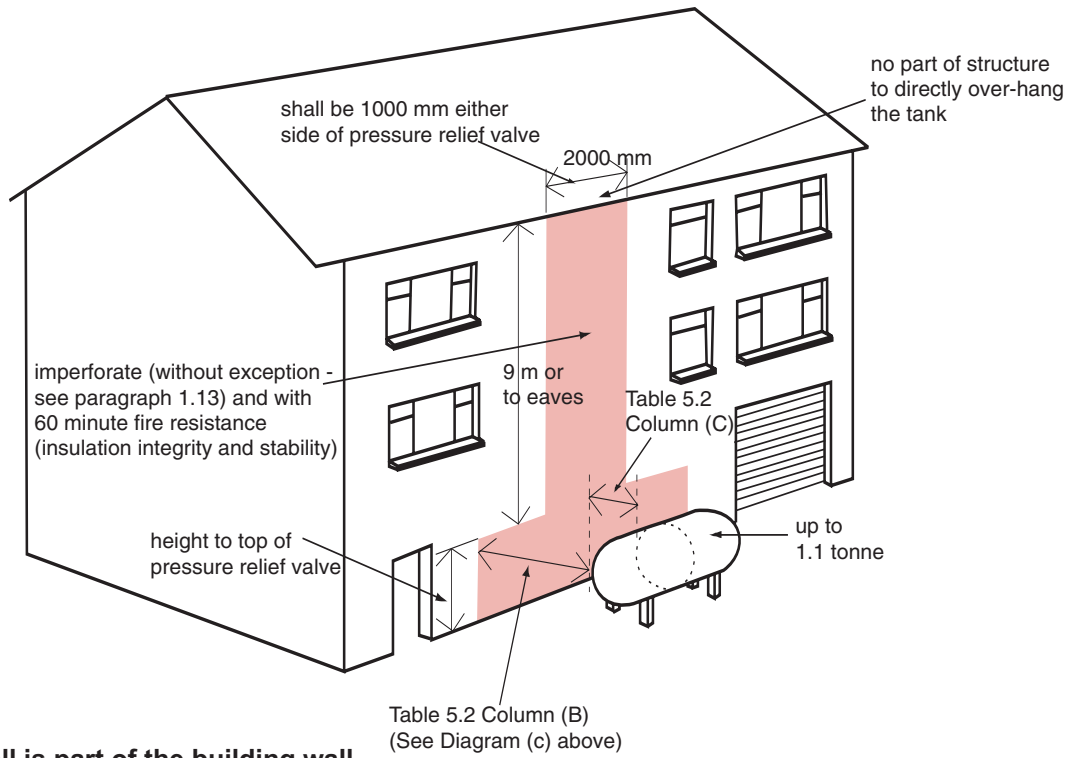
(a) No fire wall



(b) Separate fire wall



**(c) Boundary incorporating firewall
or
Building incorporating firewall
(see also Diagram (d) below)**



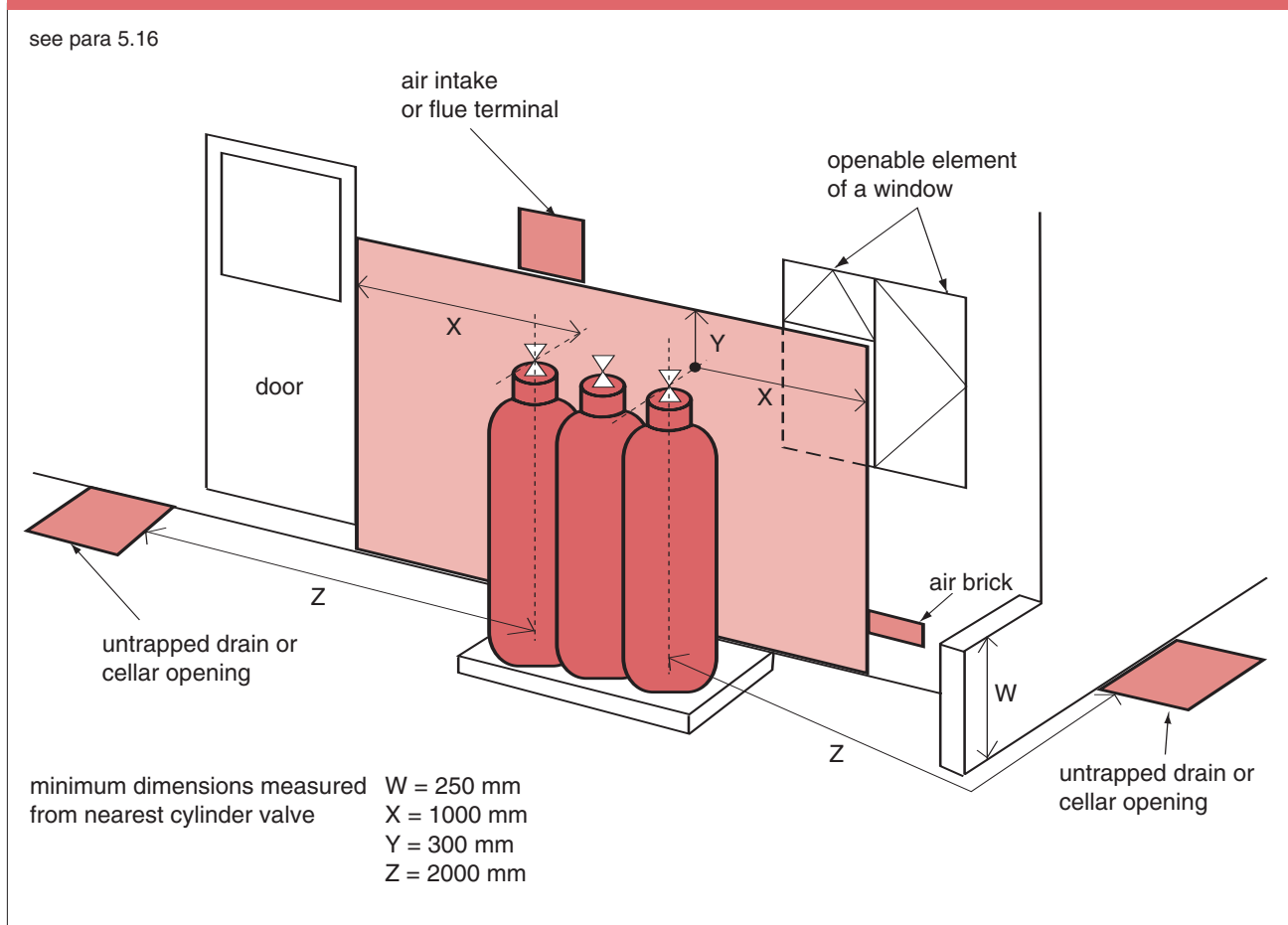
(d) Fire wall is part of the building wall

Table 5.2 Column (B)
(See Diagram (c) above)

Location and support of LPG cylinders

- 5.16 Where an LPG storage installation consists of a set of cylinders, the provisions shown in Diagram 5.2 shall be followed.
- 5.17 A cylinder shall stand upright, be secured by straps or chains against a wall outside the building in a well ventilated position at ground level. It shall be readily accessible, reasonably protected from physical damage and located where it does not obstruct exit routes from the building. A firm level base, such as concrete not less than 50 mm thick or paving slabs bedded on mortar shall be provided. The cylinder valves shall be not less than -
- 1000 mm horizontally and 300 mm vertically from openings in the building or heat sources such as flue terminals and tumble-dryer vents; and
 - 2000 mm horizontally from drains without traps, unsealed gullies and cellar hatches, unless an intervening wall not less than 250 mm high is provided.

Diagram 5.2 Location of LPG cylinders



Appendix A Publications referred to

BS 41: 1973	Specification for cast iron spigot and socket flue or smoke pipes and fittings.
BS EN 303	Heating boilers.
Part 1: 1999	Heating boiler with forced draught burners. Terminology, general requirements, testing and marking.
BS EN 449: 2002	Specification for Dedicated Liquified Petroleum Gas Appliances. Domestic Flueless Space Heaters (Including Diffusive Catalytic Combustion Heaters).
BS 476:	Fire Tests on Building Materials and Structures.
Part 4: 1970	Noncombustibility Test for Materials AMD 2483 and AMD 4390.
Part 11: 1982	Method for Assessing the Heat Emission from Building Materials.
BS 715: 2005	Specification for metal flue boxes for gas fired appliances not exceeding 20 kW.
BS 799	Oil burning equipment.
Part 5: 1987	Specification for oil storage tanks.
BS EN ISO 1182: 2002	Reaction to fire tests for building products – Non-combustibility test.
BS 1251: 1987	Specification for open fireplace components. AMD 8454
BS EN 1443: 2003	Chimneys. General Requirements.
BS 1449	Steel plate, sheet and strip.
Part 1: 1991	Carbon and carbon-manganese plate, sheet and strip.
Section 1.1	General specification.
BS EN 1457: 1999	Chimneys. Clay/Ceramic Flue Liners. Requirements and Test Methods, AMD 14077.
BS EN ISO 1716: 2002	Reaction to fire tests for building products – Determination of heat of combustion.
BS EN 1806: 2000	Chimneys. Clay/Ceramic Flue Blocks for Single Wall Chimneys. Requirements and Test Methods.
BS EN 1856	Chimneys. Requirements for metal chimneys.
Part 1: 2003	System chimney products.
Part 2: 2004	Metal liners and connecting fluepipes.
BS EN 1857: 2003	Chimneys-Components-Concrete Flue Liners.
BS EN 1858: 2003	Chimneys. Components. Concrete flue blocks.
BS EN 1859: 2000	Chimneys. Metal Chimneys. Test Methods.

BS 2869: 2006	Specification for fuel oils for agricultural and industrial engines and boilers.
BS 5410:	Code of Practice for Oil Firing.
Part 1: 1997	Installations up to 44 kW Output Capacity for Space Heating and Hot Water Supply Purposes, AMD 11022 and Corrigendum AMD 13155.
Part 2: 1978	Installations of 44 kW or Above Output Capacity for Space Heating, Hot Water and Steam Supply Purposes, AMD 3638 and AMD 13229.
BS 5440:	Installation and Maintenance of Flues and Ventilation for Gas Appliances of Rated Input not exceeding 70 Kw net (1st, 2nd and 3rd Family Gases).
Part 1: 2000	Specification for Installation and maintenance of Flues, AMD 13983.
Part 2: 2000	Specification for Installation and Maintenance of Ventilation for Gas Appliances, AMD 13368.
BS 5854: 1980	Code of Practice for Flues and Flue Structures in Buildings.
BS 5871:	Specification for Installation and maintenance of Gas Fires, Convector Heaters, Fire/Back Boilers and Decorative Fuel Effect Gas Appliances.
Part 1: 2005	Gas Fires, Convector Heaters and Fire/Back Boilers and heating stoves (1st, 2nd and 3rd Family Gases).
Part 2: 2005	Inset Live Fuel Effect Gas Fires of Heat Input Not Exceeding 15kW, and fire/back boilers. (2nd and 3rd Family Gases).
Part 3: 2005	Decorative Fuel Effect Gas Appliances of Heat Input Not Exceeding 20 kW (2nd and 3rd Family Gases).
BS 6461	Installation of chimneys and flues for domestic appliances burning solid fuel (including wood and peat).
Part 1: 1984	Code of practice for masonry chimneys and flue pipes. AMD 5649.
BS 6999: 1989	Specification for Vitreous-Enamelled Low-Carbon-Steel Fluepipes, Other Components and Accessories for Solid-Fuel-Burning Appliances with a Maximum Rated Output of 45kW, AMD 8949.

BS 7566:	Installation of Factory-Made Chimneys to BS 4543 for Domestic Appliances.
Part 1: 1992	Method of Specifying Installation Design Information.
Part 2: 1992	Specification for Installation Design.
Part 3: 1992	Specification for Site Installation.
Part 4: 1992	Recommendations for Installation Design and Installation, AMD Corrigendum 14210.
BS 8303	Installation of domestic heating and cooking appliances burning solid mineral fuels.
Part 1: 1994	Design of installations.
BS EN 10088	Stainless Steels
Part 1: 2005	List of Stainless Steels.
BS EN 13501	Fire classification of construction products and building elements.
Part 1: 2002	Classification using test data from reaction to fire tests.
OFTEC Technical Information Sheets	
T1/112: Jan. 2005	Technical advice on oil fired appliances and extract fans.
OFTEC Oil-fired appliance standards.	
OFS A100: Nov. 2004	Heating boilers with atomising burners, output up to 70 kW and maximum operating pressure of 3 BAR.
OFS A101: Oct. 2004	Oil fired cookers with atomising or vaporising burners, with or without boilers, heat outputs up to 25kW.
OFS A102: Oct. 2004	Roomheaters with atomising or vaporising burners, with or without boilers, heat outputs up to 25kW.
LPG Gas Association	
Code of practice 1	Bulk LPG storage at fixed installations.
Part 1: 2004	Design, installation and operation of vessels located above ground.

Appendix B Inspection and testing of flues, chimneys and fluepipes

This appendix is provided for additional guidance only and as such is not part of the deemed-to-satisfy provisions of this Technical Booklet

General scope

- B.1 This Appendix only describes ways of checking a natural draught flue intended for open-flued appliances. The procedures described are only used to assess whether the flue in the chimney, the connecting fluepipe (and flue gas passages in the appliance) are free of obstruction and acceptably gastight. In addition, appliance performance tests, including flue spillage tests must be carried out when a gas fired appliance is commissioned as required by the Gas Safety (Installation and Use) Regulations (Northern Ireland) 2004.
- B.2 Tests on flues should be carried out at the most appropriate time during the building work. Where possible smoke tests shall be performed when the structure of a chimney is visible and before the application of finishes such as plaster or dry lining that could obscure sight of smoke leakage during testing.

Inspection

Existing flues

- B.3 A flue in an existing chimney can be obstructed by nests, debris resulting from deterioration of the structure (e.g. brickwork, flue lining material or pieces of chimney pot) and by soot and tar. A flue in an existing chimney may also leak as a result of holes or cracks appearing in the structure and linings, particularly at joints. The top, exposed part of a chimney is particularly prone to decay.
- B.4 Prior to bringing a flue back into use, it should be checked by –
- (a) Sweeping the flue. This is intended to clean the flue to demonstrate that it is essentially free from obstructions and to enable better visual inspection and testing of the flue. Tar deposits caused by burning wood may be especially hard to dislodge and must be removed. The debris that comes down the chimney when sweeping should be examined for excessive quantities of lining or brick that are signs that further repairs are necessary.
 - (b) Carrying out a visual inspection of the accessible parts to identify –
 - (i) deterioration in the structure, connections or linings which could affect the flue's gas tightness and safe performance with the proposed combustion appliance. Examine the interior of the flue and the exterior of the chimney, including in the roof space. The presence of smoke or tar stains on the exterior of a chimney are signs of leaks that indicate damage;

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- (ii) modifications made whilst the flue was out of service, such as the fitting of a ventilator terminal, which would be incompatible with using the flue with the intended appliance; and
 - (iii) correct lining and lining sizes for the proposed new application.
- (c) Perform checks where necessary to demonstrate that the flue is free from restriction. A visual check may be sufficient where the full length of the flue can be seen. In cases of doubt, a coring ball test should be carried out.
- (d) Check the operation and gas tightness of the flue by carrying out a smoke test.

New masonry and flueblock chimneys

- B.5 Check during construction that liners are installed the right way up; with sockets facing upwards, and joints are sealed so that moisture and condensate will be contained in the chimney.
- B.6 A flue in a new masonry chimney can be obstructed, particularly at bends, by debris left during construction, or by excess mortar falling into the flue or by jointing material extruded from between liners and flueblocks. The flue must be checked to demonstrate that it has been correctly constructed and is free of restrictions and acceptably gas-tight. The condition of a new flue prior to bringing it into use must be checked by –
- (a) visually inspecting the accessible parts to check that the lining, liners or flueblocks are of the correct materials and of suitable size for the proposed application;
 - (b) performing checks where necessary to demonstrate that the flue is free from restriction. A visual check may be sufficient where the full length of the flue can be seen. In cases of doubt, a coring ball test should be carried out, or the flue swept, which may be more effective at removing flexible debris that might not be dislodged by a coring ball; and
 - (c) checking the operation and gas-tightness of the flue by carrying out a smoke test.

New factory made metal chimneys

- B.7 A checklist for the visual inspection of a newly completed factory-made metal chimney is given in BS 7566 Part 3: 1992: Section 10 and additional checks or particular variants may be included in manufacturers installation instructions. Following inspection, the chimney should be subjected to a smoke test.

Relined flues

- B.8 A flue which has been relined should be checked to show that it is free from restrictions, such as from surplus material and that it is acceptably gastight by using the same tests as would be applied in the case of a newly built flue. However, a flue that has been relined with a flexible metal liner in accordance with Section 3 of this Technical Booklet may be assumed to be unobstructed and acceptably gastight. It should be noted that the use of a coring ball or inappropriate sweeps brushes could seriously damage a flexible metal flue liner.

Appliances

- B.9 Where a combustion appliance is provided and connected up to the flue system as part of the work, the complete system of appliance and flue should be tested for gas tightness in addition to testing the flue separately as above. For gas fired appliances an appropriate spillage test procedure is given in BS 5440 Part 1: 2000 and for oil and solid fuel fired appliances suitable test procedures are given in BS 5410 Part 1: 1997 and BS 6461 Part 1: 1984 respectively.

Flue test procedures

Coring ball test

- B.10 This test may be appropriate for proving the minimum diameter of circular flues. It may also be used to check for obstructions in square flues but will not detect obstructions in the corners. (A purpose made coring ball or plate may need to be used if the flue is rectangular.) It is not applicable to fluepipes and shall not be used with flexible metal flue liners. It should be carried out before smoke testing.
- B.11 A heavy ball, with a diameter about 25 mm less than that of the flue, is lowered on a rope from the flue outlet to the bottom of the flue. If an obstruction is encountered, the blockage should be removed and the test repeated.

Smoke testing

- B.12 Where an existing flue is to be checked with a smoke test, it should first be swept.
- B.13 Two smoke testing procedures are described below –
- (a) Test I confirms the gastightness of the whole flue and may be used for one serving a solid fuel or oil fired appliance or if there is any doubt over the condition of a gas flue; or
 - (b) Test II may be used where the flue is to serve a gas fired appliance.

Neither test is a substitute for any spillage test required when commissioning the appliance. Other smoke testing procedures could be used where these form part of the procedure for the installation of an approved flue or relining system.

Smoke test I

- B.14 All doors and windows in the room served by the flue must be closed. The flue should first be warmed to establish a draught, e.g. with a blowlamp or electric heater. A suitable number of flue testing smoke pellets are placed at the base of the flue, such as in the fireplace recess or in the appliance if it is fitted, and ignited. When smoke starts to form, the base of the flue or fireplace opening must be sealed or the appliance closed, so that the smoke can only enter the flue. (For example, the recess opening should be closed off with a board or plate, sealed at the edges or, if the pellets are in the appliance, its doors, ashpit covers and vents should be closed).

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- B.15 Smoke should be seen to issue freely from the flue outlet or terminal. When this is established, the top of the flue should be sealed. The full length of the flue should then be checked, bearing in mind paragraph B.20, there should be no significant leakage. The test should be allowed to continue for at least 5 minutes. The closures at the top and bottom of the flue should then be removed.

Smoke test II

- B.16 All doors and windows in the room served by the flue must be closed. The flue should first be warmed to establish a draught. A suitable flue testing smoke pellet is ignited at the base of the flue or in the intended position of the appliance, so that the smoke is drawn into the flue with the rising draught. (If the pellets are placed in a recess at the base of the flue, the opening between the room and the recess should be partially closed, such as with a board, but an air entry gap of about 25 mm should be left at the bottom).
- B.17 Smoke should be seen to issue freely from the flue outlet or terminal and not to spill back into the room. There should be no significant leakage of smoke from the length of the chimney inside or outside of the building.
- B.18 Smoke tests I and II are in line with the recommendations in BS 6461 Part 1: 1984 and BS 5440 Part 1: 2000.

Notes in relation to testing

- B.19 Where warming of the flue is specified, this is intended to establish a draught, but this may take more than 10 minutes in the case of large or cold flues.
- B.20 Appliances, where fitted, should not be under fire at the time of carrying out the test. During a smoke test, smoke should not emerge from the outlet of any other flue, as this indicates leakage between flues. When checking for smoke leakage from a flue it should be borne in mind that smoke from a faulty flue can emerge some distance away from the original fault. In such cases, the smoke could emerge from such places as barge overhangs in end of terrace dwellings or from window reveals in cavity walls.
- B.21 The purpose of carrying out smoke testing is to check that flue gases will rise freely through the flue and to identify whether there are any faults, such as incorrectly sealed joints or damage that would cause the flue gases to escape into the dwelling.
- B.22 It should be noted that smoke pellets create a pressure significantly higher than the pressure required in the product standards for natural draught chimneys and for flues having a gas-tightness designation of N1. Flues to this designation are permitted to have a leakage rate of up to 2 litre/s/m² flue wall area. Some smoke leakage may therefore be seen during smoke tests and it can be a matter of expert judgment of whether leakage indicates failure.