BRITISH STANDARD

BS 5871-2:2005
Incorporating Amendment No. 1

Specification for the installation and maintenance of gas fires, convector heaters, fire/back boilers and decorative fuel effect gas appliances —

Part 2: Inset live fuel effect gas fires of heat input not exceeding 15 kW, and fire/back boilers (2nd and 3rd family gases)

ICS 97.100.20

BSI British Standards

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee GSE/30, Gas installations (1st, 2nd and 3rd family gases), upon which the following bodies were represented:

Boiler and Radiator Manufacturers Association Ltd.

British Flue and Chimney Manufacturers Association

BSI Consumer Policy Committee

Catering Equipment Suppliers' Association

Centrica plc

Council for Registered Gas Installers

Department of Trade and Industry

Health and Safety Executive

Heating and Ventilating Contractors' Association

ICOM Energy Association

Institute of Domestic Heating and Environmental Engineers

Institution of Gas Engineers and Managers

L P Gas Association

Society of British Gas Industries

Co-opted members

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Amendments issued since publication

Amd. No.	Date	Comments
Amendment No. 1	30 November 2007	See foreword

The following BSI references relate to the work on this British Standard:
Committee reference GSE/30
Draft for Development 03/320605 DC

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Contents

Foreword

This part of BS 5871 has been prepared under the direction of the Gas Standards Policy Committee and is a revision of BS 5871-2:2001, which is withdrawn.

This new edition of BS 5871-2 comes into effect on 11 July 2005.

This revision provides an update of the previous standard and has been extended to cover both the new development of inset live fuel effect gas fires combined with back boilers, fires with a direct flue connection, and includes requirements for fires installed in raised builders' openings (hole-in-the-wall fireplaces). In order to improve the layout of the standard, additional requirements for the installation of fire/back boilers and fire/back circulators are now specified in Clauses **15**, **16**, **17** and **18**. BS 5871 continues to cover the different types of fuel effect appliances in a single series of British Standards, as follows:

— BS 5871-1: *Gas fires, convector heaters, fire/back boilers and heating stoves (2nd and 3rd family gases).*

— BS 5871-2: *Inset live fuel effect gas fires of heat input not exceeding 15 kW and fire/back boilers (2nd and 3rd family gases).*

— BS 5871-3: *Decorative fuel effect gas appliances of heat input not exceeding 20 kW (2nd and 3rd family gases).*

— BS 5871-4: *Independent gas-fired flueless space heaters for nominal heat input not exceeding 6 kW (2nd and 3rd family gases)* (in the course of preparation).

Amendment No. 1 provides advice on the installation of the types of direct flue connection fires known in the trade as "cassette fires", which may be available with an optional flue kit that allows them to be installed to an unlined chimney under special conditions.

The start and finish of text introduced or altered by Amendment No. 1 is indicated in the text by tags 〉A1〈 〉A1〈. Minor editorial changes are not tagged.

To identify which part of BS 5871 to use when fitting an appliance which simulates a solid fuel fire, reference should be made to Figure 1 which serves to illustrate appliance types and link them to the appropriate part of BS 5871. It should be noted that the only fuel effect appliances covered by this part of BS 5871 are gas fires detailed in d) of the commentary and recommendations on Clause **5** of this standard.

The manufacturer's instructions supplied with fanned draught appliances in which the fan is either integral with the appliance or with the flue system will make reference to the appropriate part of BS 5871.

It should be noted that the only appliances covered by this part of BS 5871 are those that are "CE" marked. However, BS 5871-2 may also be referred to for the installation of used appliances, where appropriate, providing the manufacturer's instructions are available. In such circumstances, the installer should satisfy himself that the appliance is safe in construction and condition, and can be used without constituting a danger. Attention is drawn to Clause **5** concerning this particular aspect.

Arising from European standards harmonization, some British Standards appliance specifications are now being replaced by European Standards. One consequence of this process is that the reference clearance flue flow test, currently included in some of the British Standards covering the safety of appliances dealt with by BS 5871, will not be given in European appliance standards. This test has hitherto been used to determine the flue flow, under laboratory conditions, that an appliance will just clear its combustion products. The test has been used as a key factor in determining whether or not certain appliances of 7 kW[1)] heat input or less require purpose provided ventilation for their installation.

[1)] Due to tolerances, this applies to a heat input of 7 kW on both net and gross calorific value. See Clause **1**, Scope, Note 3.

Although BS 5871 is an appliance installation standard, the drafting committee has decided to include the clearance flue test as an informative annex. It is hoped that this arrangement will provide Notified Test Houses under the Gas Appliance Directive with a continuing means to evaluate appliances for installation within the UK which claim that no purpose provided ventilation is necessary for their installation.

This standard allows manufacturer's instructions to specify a method of installation, testing, commissioning or maintenance which differs in points of detail from this standard. This reference to manufacturer's instructions is allowed only where it will result in at least an equivalent level of safety. In such circumstances, it is important that the manufacturer's instructions are followed.

NOTE 1 In the preparation of this standard, the opportunity has been taken to present it in the format of a practice specification as defined in PD 6501-1. This format allows the requirements of the specification to be supported by recommendations. To comply with this specification, the user has to comply with all its requirements. He may depart from recommendations but this would be his own responsibility and he would be expected to have good reasons for doing so.

This publication does not purport to include all necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

In particular, attention is drawn to the following statutory regulations.

The Gas Safety (Installation and Use) Regulations 1998 [1]

The Gas Safety (Installation and Use) (Northern Ireland) Regulations 2004 [2]

The Gas Appliances (Safety) Regulations 1995 [3]

The Building Regulations 2000, as amended [4]

The Building (Scotland) Regulations 2004 [5]

The Building Regulations (Northern Ireland) Statutory Rules 2000, as amended [6]

The Gas Safety (Application) Order (Isle of Man) 1996 [7]

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 48, an inside back cover and a back cover

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1 Scope

This part of BS 5871 specifies installation and maintenance requirements for inset live fuel effect gas fires of heat input not exceeding 15 kW (16.6 kW based on gross calorific value) burning 2nd and 3rd family gases for the purpose of heating rooms or spaces in domestic (see Note 5) or commercial premises. Combined appliances of the type where a fire is used in conjunction with a boiler or circulator are also covered in so far as the installation of the combined appliance is concerned.

The standard is applicable to appliances intended for installation either:

a) within a builder's opening and/or fireplace recess and which may, additionally, be suitable for installation in a purpose designed metal flue box conforming to BS 715 and flue conforming to the constructional and temperature requirements of BS EN 1856-1 and BS EN 1856-2; or

b) using a direct flue connection, if specified in the manufacturer's instructions; or

c) in the case of a room sealed appliance, using a flue terminal/air duct assembly supplied by the appliance manufacturer.

This standard covers the selection of a suitable appliance, the ventilation and flueing requirements, and other measures necessary to ensure a safe installation.

The central heating and/or hot water system connected to a combined appliance is not within the scope of this standard and reference should be made to BS 5449 (see Note 6) and BS 5546 for this part of such an installation.

This standard is not applicable to mobile and portable appliances conforming to BS EN 449 or to appliances in touring caravans.

Additional requirements for the installation of fire/back boilers and fire/back circulators are specified in Clauses **15**, **16**, **17** and **18**.

NOTE 1 Inset live fuel effect gas fires differ from decorative fuel effect gas appliances, which burn gas so as to simulate a solid fuel fire or produce other decorative effects, in that they incorporate a heat exchanger and restrict the passage of the products of combustion between the appliance firebed and the chimney or flue. The only decorative fuel effect gas appliances covered by this part of BS 5871 are those shown in Figure 1b) and detailed in 1d) of the commentary and recommendations on Clause **5** of this standard.

NOTE 2 Unless the context requires otherwise, inset live fuel effect gas fires are hereinafter referred to as fires.

NOTE 3 Heat inputs in this document are based on net calorific value. Figures based on gross calorific value are given in parenthesis where deemed necessary. See also Clause **5**, commentary and recommendations g).

NOTE 4 Attention is drawn to the foreword concerning the installation of used appliances.

NOTE 5 As well as normally constructed dwellings, domestic premises include any permanently sited caravan holiday homes, residential park homes and permanently moored boats. See IGE/UP/8 [8].

NOTE 6 BS 5449 has been partly replaced by BS EN 12828 and BS EN 12831, and is to be withdrawn once BS EN 14336 and BS EN 14337 are published.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 715 to *Specification for metal flue* A1 *boxes for gas-fired appliances not exceeding 20 kW.* A1

BS 1289-1, *Flue blocks and masonry terminals for gas appliances — Part 1: Specification for precast concrete flue blocks and terminals.*

BS 4543-2, *Factory-made insulated chimneys — Part 2: Specification for chimneys with stainless steel flue linings for use with solid fuel fixed appliances.*

BS 4543-3, *Factory-made insulated chimneys — Part 3: Specification for chimneys with stainless steel fluelining for use with oil fired appliances.*

BS 5440-1, *Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70 kW (1st, 2nd and 3rd family gases) — Part 1: Specification for installation of flues.*

BS 5440-2, *Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70 kW (1st, 2nd and 3rd family gases — Part 2: Specification for installation and maintenance of ventilation for gas appliances.*

BS 5449, *Specification for forced circulation hot water central heating systems for domestic premises.*

BS 5482-1, *Domestic butane- and propane-gas-burning installations — Part 1: Specification for installations at permanent dwellings.*

BS 5482-2, *Domestic butane- and propane-gas-burning installations — Part 2: Installations in caravans and non-permanent dwellings.*

BS 5546, *Specification for installation of gas hot water supplies for domestic purposes (1st, 2nd and 3rd family gases).*

BS 6700, *Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.*

BS 6891, *Specification for installation of low pressure gas pipework of up to 28 mm (R1) in domestic premises (2nd family gas).*

BS 7435-1, *Fibre cement flue pipes, fittings and terminals — Part 1: Specification for light quality fibre cement flue pipes, fittings and terminals.*

BS 7435-2, *Fibre cement flue pipes, fittings and terminals — Part 2: Specification for heavy quality fibre cement flue pipes, fittings and terminals.*

BS 7671, *Requirements for electrical installations — IEE Wiring Regulations.*

BS 7977-1, *Specification for safety and rational use of energy of domestic gas appliances — Part 1: Radiant convectors.*

BS 7977-2, *Specification for safety and rational use of energy of domestic gas appliances — Part 2: Combined appliances: Gas fire/back boiler.*

BS EN 1856-1, *Chimneys — Requirements for metal chimneys — Part 1: System chimney products.*

BS EN 1856-2, *Chimneys — Requirements for metal chimneys — Part 2: Metal liners and connecting flue pipes.*

BS EN 13502, *Chimneys — Requirements and test methods for clay/ceramic flue terminals.*

3 Terms and definitions

For the purposes of this part of BS 5871, the following terms and definitions apply.

3.1
air vent
non-adjustable purpose provided unit/assembly designed to allow permanent ventilation

3.2
back boiler
water heating appliance designed to fit into a fireplace recess or builder's opening to provide domestic hot water and/or central heating (space heating)

3.3
back circulator
appliance with a rated input less than 6 kW designed to fit into a fireplace recess or a builder's opening and which uses gravity circulation in the production and storage of domestic hot water

3.4
balanced-flued appliance
room-sealed appliance which draws its combustion air from a point adjacent to the point at which the combustion products are discharged, the inlet and outlet being so disposed that wind effects are substantially balanced

3.5
builder's opening
enclosure constructed by the builder to accommodate fireplace components ⟩A1⟩ and/or an appliance ⟨A1⟩

3.6
direct flue connection
connection when an appliance is connected directly, or via an adaptor, to an open flue system, i.e. the products of combustion pass directly from the appliance into the flue

NOTE See Figure 6.

3.7
fanned flue system
flue system in which the removal of flue products is dependent on a fan

3.8
fireplace opening
aperture formed in the face of the builder's opening, the fireplace recess, flue box or fire surround

3.9
fireplace recess
recess formed by the inclusion of fireplace components in the builder's opening

3.10
fire surround
purpose-designed setting for a gas fire, fitted against a wall at the base of a flue and usually incorporating a hearth

3.11
flue box
a non-combustible enclosure that provides a substitute builder's opening or fireplace recess

3.12
flue spigot restrictor
plate designed to be fitted to a flue spigot of a gas fire to reduce the effect of flue pull on the appliance

3.13
flue pipe
pipe enclosing a flue; for a double walled flue system or factory made insulated system it is the inner pipe

NOTE European chimney standards refer to a flue pipe as a "chimney". This is defined in BS EN 1443 as "a structure consisting of a wall or walls enclosing a flue or flues".

A1 **3.13a**
flue kit
assembly comprising parts designed for fitting to the direct flue connection of a fire to prevent the ingress of debris into the appliance when installed in an existing chimney and supplied or specified by the fire manufacturer for use with the appliance A1

3.14
infill panel
panel of fire-resisting material having an opening to accommodate a standard closure plate, used in a fireplace opening which is too large for the closure plate alone

3.15
hearth
slab of fire-resisting material to prevent overheating of the surface beneath the appliance

3.16
inset live fuel effect gas fire
appliance designed to simulate a solid fuel appliance and intended to be installed so that the passage of the products of combustion from the firebed to the chimney or flue is restricted and so that the air enters the fireplace only through purpose designed openings

A1 *NOTE Some types of inset live fuel effect gas fire are also known as "cassette fires". See Commentary and Recommendations on Clause* ***5****, item h).* A1

3.17
installation instructions
instructions prepared by the appliance manufacturer giving detailed information and requirements on how the appliance should be installed, and checked for their validity as part of the original appliance certification

NOTE Such instructions should not be confused with other documents supplied by the appliance manufacturer, e.g. sales literature.

3.18
internal space
interior space such as a hall, passageway, stairway or landing, which is not a room

3.19
open flue system (type B)
flue system that evacuates the products of combustion to the outside air

NOTE The combustion air is drawn directly from the room or space containing the appliance.

3.20
open-flued appliance (type B)
appliance designed to be connected to an open flue system, its combustion air being drawn from the room or space in which it is installed

3.21
room-sealed appliance (type C)
appliance whose combustion system is sealed from the room in which the appliance is located and which obtains air for combustion from a ventilated uninhabited space within the premises or directly from the open air outside the premises and which vents the products of combustion directly to open air outside the premises

3.22
space heating
heating of one or more rooms or other spaces to produce a desired temperature therein

3.23
ventilation
process of supplying fresh air to, and/or removing air from a room, internal space, compartment or garage.

NOTE The air may be used or intended to be used for purposes of combustion, cooling and/or the operation of the flue.

4 Exchange of information and planning

4.1 General

Persons carrying out the work shall be competent.

The installation work shall be carried out by a business or self employed person, who is a "member of a class of persons approved for the time being by the Health and Safety Executive" (HSE) as required by the Gas Safety (Installation & Use) Regulations [1].

Persons who design the system or installation shall have a knowledge and understanding of the standards and regulations that apply to ensure that the completed plans will produce a safe and satisfactory installation.

COMMENTARY AND RECOMMENDATIONS ON **4.1**

At the time of publication, the body with HSE approval to operate and maintain a register of businesses who are "members of a class of persons" is the Council for Registered Gas Installers (CORGI).

*Persons deemed competent to carry out gas work are those who hold a certificate of gas safety competence acceptable to CORGI, which includes (without limitation) the Accredited Certification Scheme (ACS) and the Gas Services S/NVQ that has been aligned with ACS (for electrical work, see C&R to **14.1**).*

4.2 Design considerations

Particular matters that shall be considered are:

a) availability of gas supplies;

b) type of building, form of construction and level of thermal insulation;

c) location, orientation and exposure of building, and size, layout and purpose of rooms;

d) assessment of heat requirements (see Clause **8** and Annex A);

e) size, height, type and route of flue and flue termination together with materials of construction;

f) provision of adequate ventilation;

g) dimensions of fireplace openings and hearths together with materials of construction;

h) position of heating appliances in relation to probable position of fixtures, furniture and curtains;

i) electrical and water supplies (where applicable);

j) the possibility that the user may wish to use the flue system with a solid fuel open fire in the future.

COMMENTARY AND RECOMMENDATIONS ON **4.2**

Collaboration is essential between those concerned with the design and installation, both at the planning stage and during the execution of the work. Some appliances require preliminary structural work to be completed at the building carcass stage. Suitable apertures or openings should be made for connection to a built-in flue or for terminating a balanced-flued fire. Hearths for appliances should be provided where necessary.

5 Appliances

The appliance, if new, shall carry a "CE" mark, and be suitable for the gas with which it is to be supplied.

COMMENTARY AND RECOMMENDATIONS ON CLAUSE **5**

This standard may be used for the installation of used appliances which do not carry "CE" mark; see foreword.

Consideration should be given to the following.

a) *In the case of a new appliance, the installer should ensure that the packaging and the appliance itself are marked with at least the following information.*

— *The letters "GB".*

— *The type of gas and appliance inlet pressure as follows.*

i) *G20 and/or natural gas 20 mbar for an appliance adjusted for natural gas.*

ii) *G30 and/or butane 29 mbar for an appliance adjusted for butane.*

iii) *G31 and/or propane 37 mbar for an appliance adjusted for propane.*

iv) *G30/G31 and/or butane/propane 29/37 mbar for an appliance which will burn either gas at the correct pressure.*

The data plate of an appliance will carry the designation Cat. I_{2H}, I_{3B}, I_{3P}, or I_{3+} respectively for cases i), ii), iii) and iv), together with the "CE" mark.

Where an appliance data plate carries the letters Cat. II followed by gas type designations, (i.e. $_{2H}$, $_{2P}$, $_{2B}$), then the appliance can be used for different types of gases when adjusted to do so.

The installer should ensure that the appliance is correctly adjusted. Conversion to another gas, if necessary, should be carried out strictly in accordance with the manufacturer's instructions using the manufacturer's supplied kit of parts.

If there is any doubt as to the suitability of an appliance for a particular gas, then the appliance manufacturer should be consulted.

Further information on the labelling of gas appliances is given in BSI draft for Development DD 221:1997 (CR 1472:1997).

b) *The original packaging will generally not be available with used appliances. In this case, the installer should, by referring to the data plate and/or other means, ensure that the appliance is suitable for the pressure and type of gas to be burnt. If there is any doubt, the appliance should not be installed.*

c) *The output of the appliance should be borne in mind during selection. In general, the appliances described in this standard heat the room in which they are installed. A fire/back boiler normally provides central heating to the rest of the dwelling and also domestic hot water. A fire/back circulator provides domestic hot water.*

d) *The fires covered by this standard are open-flued and room sealed and may be available with either natural draught or fanned draught flueing.*

e) *Any appliance described in this standard can be used to heat a room or internal space, but the type chosen will depend on the user's personal preference; it should be based on a knowledge of the range of the appliances available, the use to which the room will be put and the period of usage.*

f) *In some situations, it may be desirable to provide two appliances in the same room or internal space rather than one, in order to obtain an even temperature distribution, e.g. in a long room. A fire/back boiler unit, together with a radiator supplied by the associated central heating circuit, provides an alternative arrangement for heating such a room or space. Some appliances incorporate fans to improve the circulation of convected air.*

*NOTE Attention is drawn to the commentary and recommendations on **9.4** in relation to multi-appliance installations.*

g) *Fires and fire/back boilers are available with rated heat inputs in the approximate ranges shown below.*

The inputs are quoted on the basis of net calorific value. Traditional UK data on the basis of gross calorific value is given in brackets for natural gas.

The installer should check the data given with an appliance to establish the basis on which the heat input is quoted.

The ratio of gross:net heat input is approximately 1.11:1, 1.09:1, and 1.08:1 for appliances burning natural gas, propane and butane respectively. [For example, to convert 9 kW input natural gas (gross c.v.) to the equivalent net c.v. heat input:

$$\frac{9}{1.11} = 8.1 \text{ kW heat input}]$$

(gross calorific value)	*net calorific value*
Fires:	
(4.0 kW to 16.6 kW)	*3.6 kW to 15.0 kW*
Fire/back boilers/back circulators:	
Fire (4.0 kW to 16.6 kW)	*3.6 kW to 15.0 kW*
Boiler (up to 22.0 kW)	*20.0 kW*
Circulator (up to 6.6 kW)	*6.0 kW*

In addition to carrying a "CE" mark, appliances may be marked to show conformance to a British Standard, a European Norm, or other International Standard.

h) *Inset live fuel effect gas fires covered by this part of BS 5871 are available:*

i) *for installation to a chimney or flue box (see Figure 2, Figure 3 and Figure 4 and **10.3**, **10.4**, **10.5** and **10.6**);*

ii) *for installation using a fanned draught flue system (see Figure 5 and **10.7**);*

iii) *for installation with a direct flue connection (see Figure 6);*

iv) *for installation using a flue terminal/air duct assembly supplied by the appliance manufacturer (e.g. as in the case of room sealed appliances).*

The appliances covered in ii) do not require a chimney or flue box for the evacuation of their combustion products.

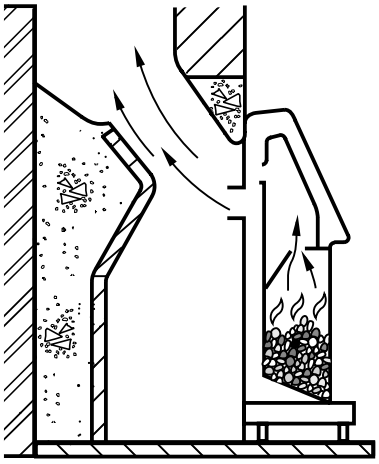
〈A1〉 *Some of the fires referred to in item iii) are known as "cassette" fires. This term is generally applied to fires of the type that are characterized by the following features:*

— *an outer case (firebox) for building into a purpose made opening and into which the appliance is fitted;*

—- *a top outlet flue spigot.*

*Cassette fires are normally fitted to a lined chimney, but some fires may be available with an optional flue kit that has been supplied or specified for use with these appliances [see **3.13**a)]. The use of such kits may allow the fire to be installed to an unlined chimney under specified conditions (see **10.1** and **10.8.2**).* 〈A1〉

i) *For information purposes, Figure 1 illustrates the types of fuel effect gas appliances covered by BS 5871 with respect to the flue size, location, ventilation and the passage of appliance combustion products to the flue serving the appliance.*



a) Gas fire

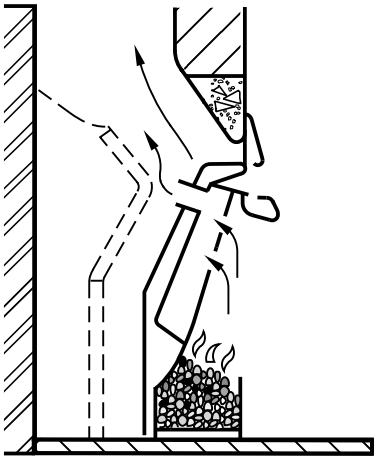
BS 5871-1

Flue size: Minimum of 125 mm across axis of flue normally required.

Location: Normally in front of closure plate which is fitted to fireplace opening.

Ventilation: Purpose provided ventilation not normally required up to 7 kW input.

NOTE For this type of appliance, the radiating surface can be in the form of either a radiant(s) or imitation fuel, the latter giving a live fuel effect.



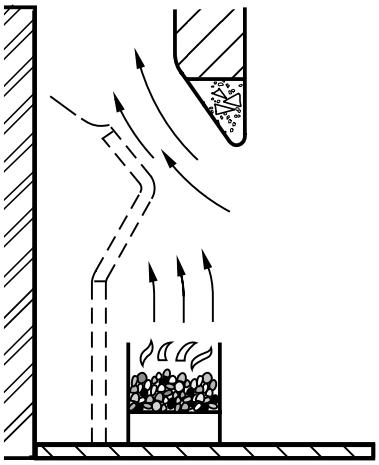
b) Inset live fuel effect gas fire

BS 5871-2

Flue size: Minimum of 125 mm across axis of flue normally required.

Location: Either fully or partially inset into builder's opening or fireplace recess. (For a recess, the chairbrick might have to be removed depending upon appliance design.)

Ventilation: Purpose provided ventilation not normally required up to 7 kW input.



c) Decorative fuel effect gas appliance

BS 5871-3

Flue size: Minimum of 175 mm across axis of flue normally required.

Location: Within builder's opening or fireplace recess or flue box, or under an associated independent canopy. (For a recess, the chairbrick may have to be removed depending upon appliance design.)

Ventilation: Purpose provided ventilation of at least 100 cm^2 normally required up to 20 kW input.

Figure 1 — Types of fuel effect appliances covered by BS 5871

6 Materials and components

All materials and components used in the installation shall conform to the requirements of applicable British Standards. Materials containing asbestos shall not be used. Where no British Standard exists, materials and equipment shall be of suitable quality and workmanship to fulfil their intended purpose.

COMMENTARY AND RECOMMENDATIONS ON CLAUSE **6**

The Asbestos (Prohibition) Regulations (As Amended) 1999 [9] place restrictions on the use of asbestos material, including a total ban of asbestos cement and its product. New (or alterations to existing) flue systems should not be constructed from materials containing asbestos. Existing flue systems may be reused in situ as flue systems provided that they are mechanically sound and conform to the requirements of this British Standard.

7 Location

7.1 Appliances installed in a room or internal space containing or intended to contain a bath or shower shall be room sealed.

7.2 A gas appliance of greater than 12.7 kW heat input (14 kW gross) installed in a room used or intended to be used as sleeping accommodation shall be room sealed.

7.3 A gas appliance of not greater than 12.7 kW input (14 kW gross) installed in a room used or intended to be used as a sleeping accommodation shall be room sealed or shall incorporate a safety control designed to shut down the appliance before there is a build up of a dangerous quantity of the products of combustion in the room concerned.

COMMENTARY AND RECOMMENDATIONS ON **7.1**, **7.2** AND **7.3**

Any type of heater may be installed in a private garage unless the manufacturer's instructions for a particular heater state that it is unsuitable for use in such a location. A heater should not be installed in any premises where concentrations of flammable vapour could accumulate, e.g. commercial garages and workshops. Reference should be made to the British Gas publication, IM/28: Appliances in commercial garages [10].

Room-sealed appliances may be installed in any room or space provided that the installation conforms to the requirements of BS 5440-1 and BS 5440-2.

Care should be taken in the selection of non-room sealed appliances for use in sleeping accommodation bearing in mind the following.

a) *An appliance not bearing a "CE" mark, purchased second hand, will not be fitted with an acceptable safety device.*

b) *Some appliances carrying a "CE" mark, purchased second hand, will not be fitted with an acceptable safety device.*

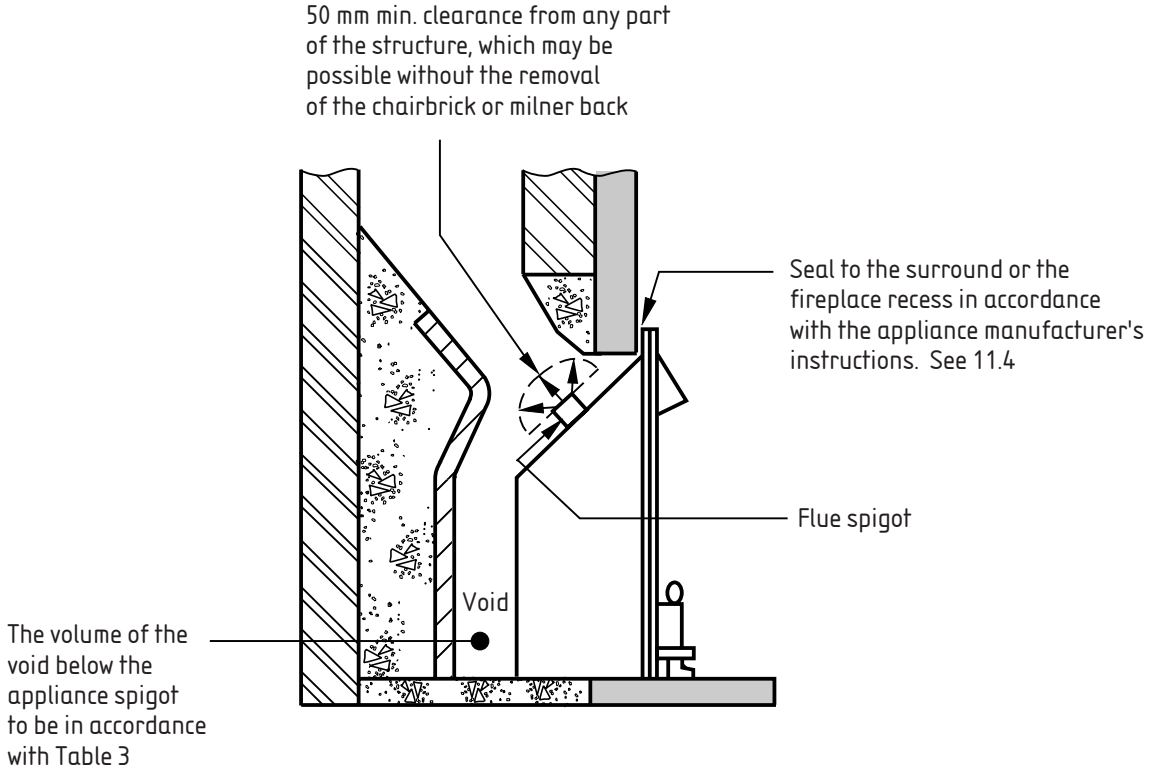
c) *New appliances will be fitted with an acceptable safety device. The user instructions should be checked to ensure they contain advice on the action necessary should the device operate.*

Where there is any doubt as to whether the appliance is fitted with an acceptable safety device, it should not be installed in sleeping accommodation.

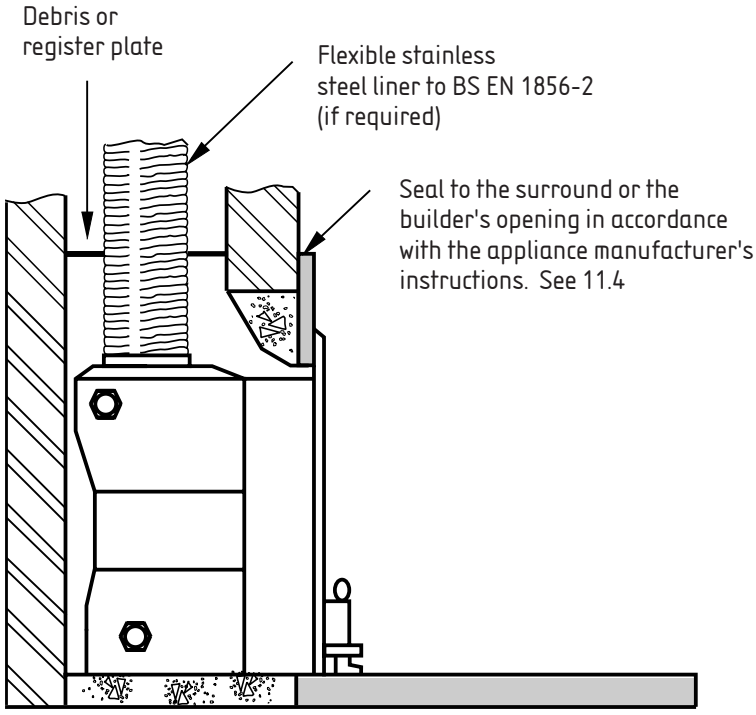
7.4 An appliance for use with 3rd family gases shall not be installed in a room or internal space below ground level, e.g. in a basement or a cellar.

COMMENTARY AND RECOMMENDATIONS ON **7.4**

This does not preclude the installation of such appliances into rooms which are basements with respect to one side of the building but open to ground level on the opposite side.

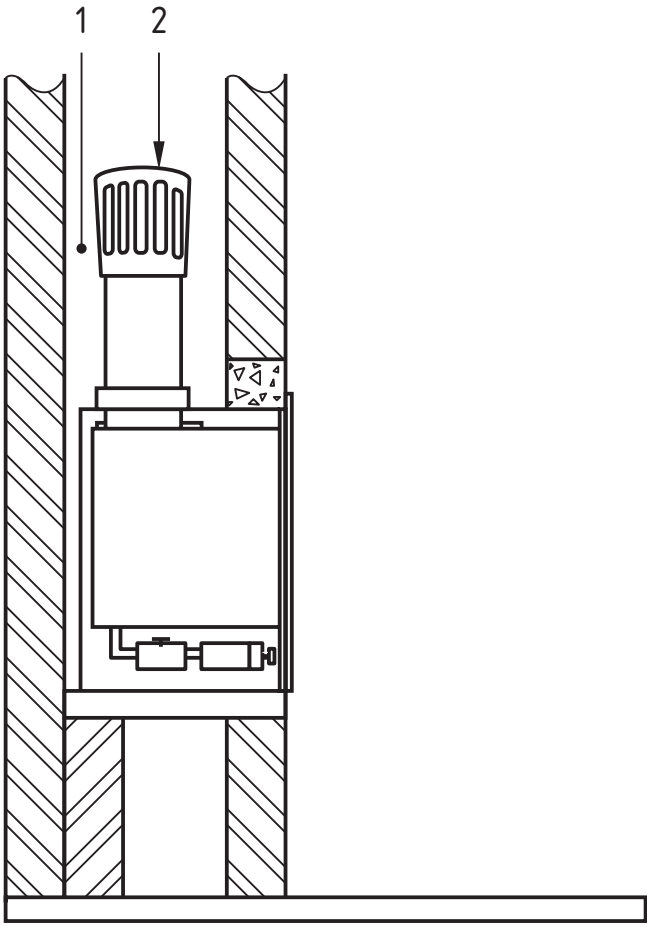


a) Inset live fuel effect gas fire



b) Inset live fuel effect gas fire combined with back boiler unit

Figure 2 — General layout — Live fuel effect gas fire, with or without a back boiler



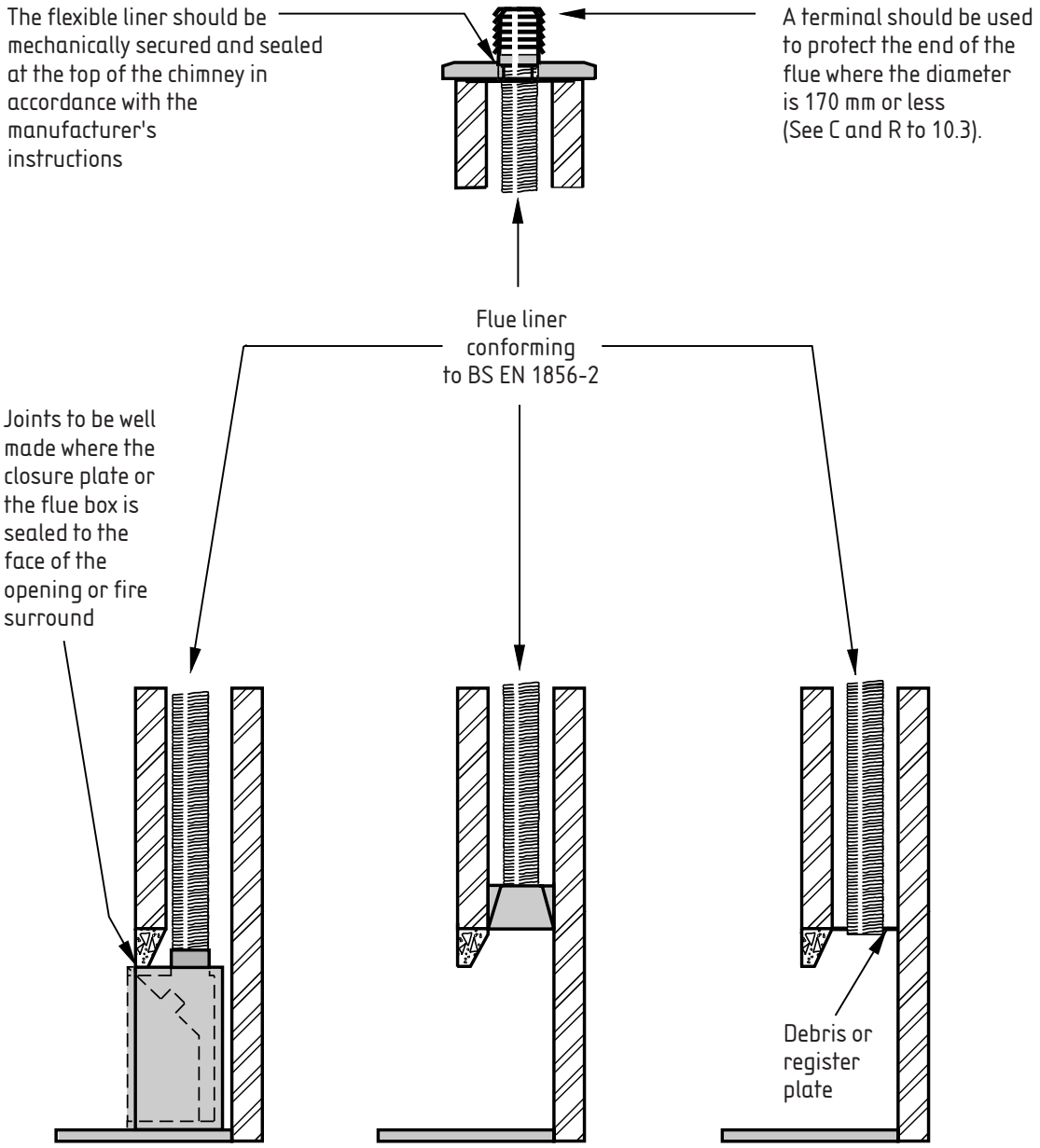
Key

1 The volume of the void below the lowest point of the debris collector outlet slots to be in accordance with Table 3.

2 Example of debris collector with outlet slots equi-spaced around the circumference of the device.

c) Example of inset live fuel effect gas fire installed in a raised builder's opening (hole-in-the-wall fireplace) using a flue kit (see **10.8.2**)

Figure 2 — General layout — Live fuel effect gas fire, with or without a back boiler (*continued*)



A. Flue liner to BS EN 1856-2 connected to a gas flue box conforming to BS 715

B. Flue liner mechanically secured and sealed into a proprietary gather above the builder's opening

C. Flue liner mechanically secured and sealed with a clamp plate to a debris or register plate above a builder's opening. NB. The liner should not project below the plate more than a nominal 25mm. The annular space between the liner and the chimney can be sealed using mineral wool (See 11.10)

NOTE 1 If the gas supply to the appliance is to be made through the wall of the gas flue box, see **13.6**.

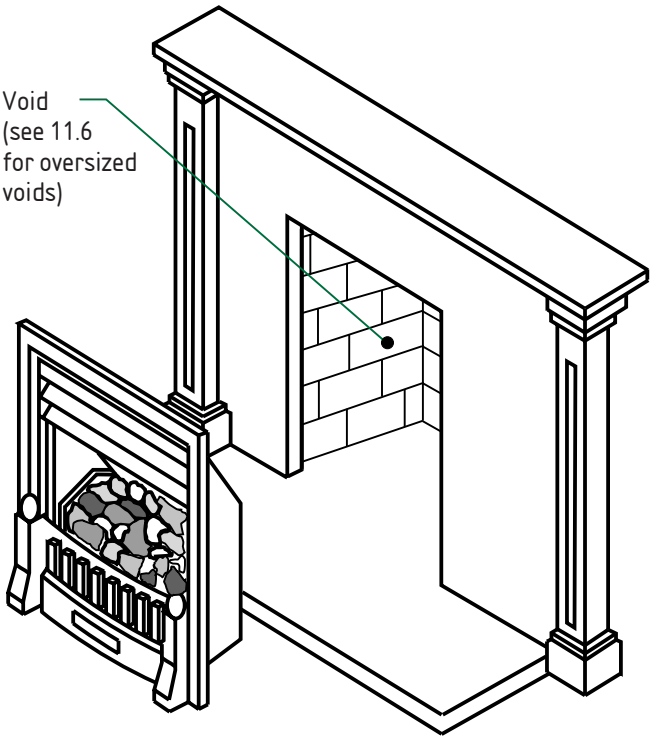
NOTE 2 The flexible liner should rise in one continuous length as near vertically as possible from the top of the appliance, gas flue box or fireplace recess, and with no part of the flue liner forming an angle greater than 45° from the vertical.

NOTE 3 The flexible liner should be sized and installed in accordance with the manufacturer's instructions.

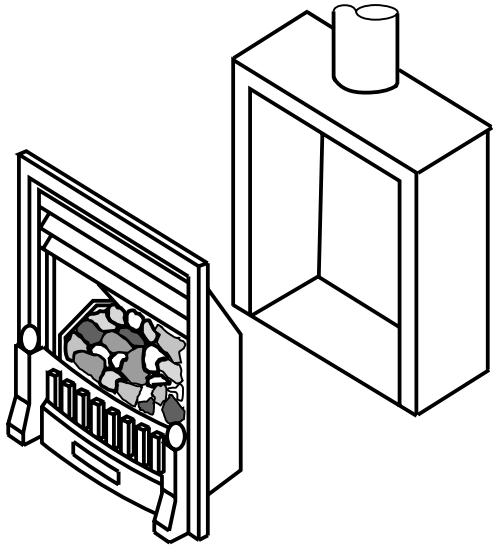
NOTE 4 In each of the illustrations above, the requirements are the same if a fire surround is applied to the front of the opening.

NOTE 5 For flue boxes and collectors, reference should be made to the manufacturer's instructions for compatibility.

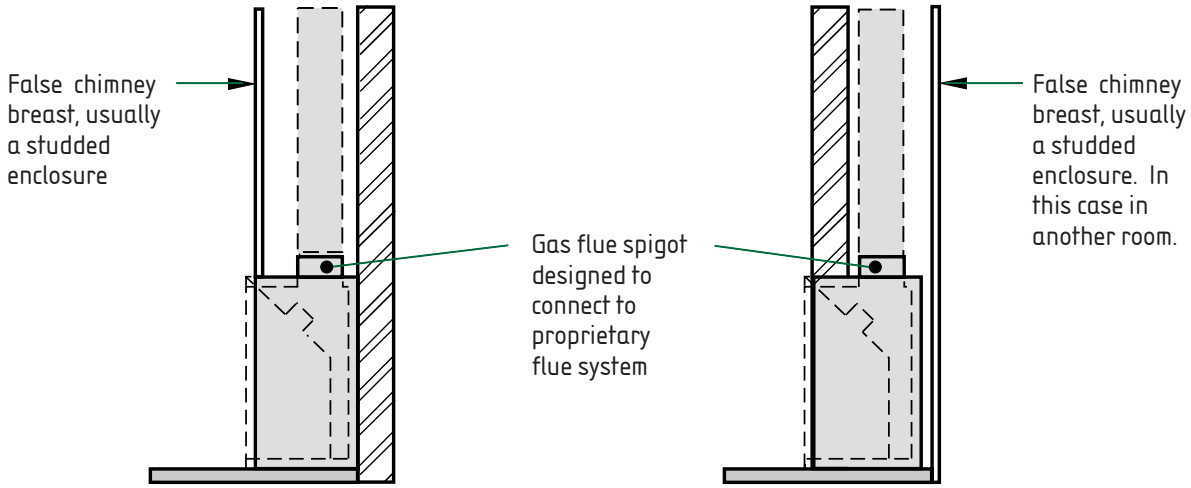
Figure 3 — Methods of using a flue liner in a masonry chimney installation serving a gas appliance, other than a back boiler



A. Installation of live fuel effect gas fire into a conventional masonry builder's opening



B. Installation of live fuel effect gas fire using a gas flue box conforming to BS 715. See also the illustrations below



C. A gas flue box positioned against an internal or external wall

D. A gas flue box located through an internal wall

NOTE 1 The gas flue box manufacturer's installation requirements may require an air gap clearance from the outside of the box to any combustible material. That would include a wall of timber stud and plasterboard construction.

NOTE 2 The gas appliance manufacturer's installation instructions may, as a condition of approval, require additional insulation material to be placed around the outer surface of the flue box.

NOTE 3 If the gas supply to the appliance is to be made through the wall of the gas flue box, see **13.6**.

Figure 4 — General installation

8 Appliance sizing

The heat output of the fire shall be at least equal to the heating requirements agreed between the supplier and the purchaser [see **4.2**d) and Annex A].

COMMENTARY AND RECOMMENDATIONS ON CLAUSE **8**

Temperature requirements, ventilation rates and appropriate U values are given in detail in BS 5449.

Recommended temperature requirements and typical ventilation rates and typical air change rates for rooms with open fires are given in Table 1A and Table 1B, respectively.

The steady-state heat losses from a room or internal space will depend upon the values of the following four basic factors:

a) *the size of the room or internal space;*

b) *the insulation value of the building fabric;*

c) *the inside/outside temperature difference;*

d) *the ventilation rate.*

External design air temperatures should be adjusted for the degree of exposure as well as altitude and latitude, and therefore outside air temperatures lower than –1 °C should be considered for design purposes. Consideration should also be given to air change rates where small changes from the design rates may affect the actual operational heat losses significantly. This is particularly relevant in the case of highly insulated dwellings.

Accordingly, it should be appreciated that the heater will be sized to cope, under steady-state conditions, with an external temperature of –1 °C or less and will, therefore, be oversized under average external temperature conditions.

Where the heater is the only source of heating or its normal usage is likely to be for short periods only, experience has shown that to avoid customer complaint, the steady state requirement figure should be increased to make allowance for opening doors, rapid initial heat up, etc.

Examples of how to calculate the required heat output of a fire are given in Annex A.

Table 1A — Temperatures and ventilation rates

Room	Room temperature[a] °C	Ventilation rate air changes/h
Living room	21	1.5
Dining room	21	1.5
Bedsitting room	21	1.5
Bedroom[b]	18	1.0
Hall and landing	16	1.5
Kitchen	18	2.0
Bathroom	22	2.0
Toilet	18	2.0

[a] These temperatures are those recommended for whole house central heating and for heated rooms with part house central heating. In rooms where open-flued appliances are installed, the rate of air change should be increased.
[b] When used part-time as bed-sitting rooms or for study purposes, a higher room temperature might be required.

Table 1B — Air change rates for rooms with open fires and flues up to 40 000 mm² (200 mm × 200 mm)

Approximate room size m^3	Throat restrictor	Ventilation rate air changes/h
40	no	5
40	yes	3
70	no	4
70	yes	2

9 Ventilation

9.1 General

The fire shall have an air supply for combustion and ventilation in accordance with BS 5440-2.

An air vent shall not communicate directly with a builder's opening or fireplace recess.

In areas in which radon has been identified as a problem, ventilation shall not be taken from below floor level (e.g. using a floor vent) or interfere in any way with remedial measures which may already be in place to prevent radon from entering the habitable part of the dwelling.

COMMENTARY AND RECOMMENDATIONS ON **9.1**

a) *A room-sealed appliance may not require an air vent in the room or internal space in which it is installed.*

b) *Areas identified as requiring action for radon gas will be known due to local publicity but, in case of doubt, further advice can be obtained from a building control officer at the local authority headquarters.*

9.2 Appliances with a heat input not exceeding 7 kW

Where appropriate, permanent ventilation shall be provided in accordance with the manufacturer's instructions.

COMMENTARY AND RECOMMENDATIONS ON **9.2**

An open-flued appliance with a rated input not exceeding 7 kW and which generates a clearance flue flow not greater than 70 m^3/h under specified conditions (see Annex B) does not normally require an air vent in the room or internal space in which it is installed. This is due to natural or adventitious ventilation through, for example, floorboards, cracks in window frames and doors, etc. However, the availability of such ventilation should never be taken for granted as the air tightness of a dwelling can be affected by double glazing, cavity insulation, draught proofing, its method of construction, the installation of extraction fans and so on. Attention is drawn to the commentary and recommendations on ***19.4*** *concerning installations deficient in ventilation.*

NOTE Attention is drawn to the Foreword and Annex B concerning appliances of 7 kW heat input or less where it is claimed that no air vent is required in the room or internal space in which the appliance is to be installed.

9.3 Appliances with a rated heat input exceeding 7 kW, but not exceeding 15 kW

For open flued fires with a rated heat input exceeding 7 kW, purpose provided ventilation of at least 5 cm^2 per kilowatt of heat input above 7 kW shall be provided up to 15 kW, unless otherwise specified in the manufacturer's instructions.

9.4 Multi-appliance installations

Where a fire is to be installed in a room or space which already contains one or more fuel burning appliances, the air supply requirements shall be as specified in BS 5440-2 for multi-appliance installations.

COMMENTARY AND RECOMMENDATIONS ON **9.4**

Where a decorative fuel effect gas appliance is already installed, reference should be made to BS 5871-3 for the ventilation requirements.

If permanent ventilation is required for a multi-appliance installation, this should, wherever practicable, be sited between the appliances.

Where an interconnecting wall has been removed between two rooms and the resultant room contains two similar chimneys, each fitted with a gas fire or inset live fuel effect gas fire (see Figure 1), an air vent is not normally required if the total rated heat input of the appliances does not exceed 14 kW.

10 Flueing

10.1 General

Unless otherwise specified in this part of the standard, the fires covered by this standard shall be flued in accordance with BS 5440-1.

Before installing any open-flued fire covered by this standard, the correct operation of the flue shall be verified by carrying out a test in accordance with BS 5440-1.

Any chimney previously used for an appliance burning a fuel other than gas shall be thoroughly swept before installing any fire.

Appliances shall be connected only to types and sizes of flue system as specified in the appliance manufacturer's instructions. (See also **10.7**). ⟨A1⟩ The fitting of any device (e.g. a flue kit) to the appliance flue spigot outlet so as to prevent the entry of debris shall only be carried out where the device is specified in the manufacturer's instructions, and only under the conditions given in those instructions. ⟨A1⟩

A fire shall only be installed within a recess formed in the cavity of a wall where this is permitted in the manufacturer's instructions.

COMMENTARY AND RECOMMENDATIONS ON **10.1**

*For fires covered by this part of BS 5871, **10.1** to **10.7**, either draw attention to the requirements given in BS 5440-1 or give additional guidance or information. An appliance should only be fitted to those flue systems as specified in the appliance manufacturer's instructions. This will also detail the size of flue system required. Many fires are now suitable for use on 125 mm diameter flue systems. However, where the fire is being fitted to a masonry chimney and unless otherwise specified in the manufacturer's instructions, the fire should be installed to a flue of such a size that it will contain a circle of not less than 175 mm in diameter, except that any purpose designed throat in a brick chimney flue system should be such that its cross-sectional area is at least 240 cm^2 with a minor dimension of at least 100 mm. Care should be taken that any purpose designed throat is not restricted when the fire is in place.*

Requirements for terminal design and location are given in BS 5440-1.

Particular attention is drawn to the existence of chimney inserts. Under no circumstances should these be used as a chimney terminal.

⟨A1⟩ *Special care is needed in the use of flue kits. Such kits normally include parts which attach to the flue spigot of a direct connection appliance so as to deflect debris [see **3.13a)** and **10.8.2**].* ⟨A1⟩

Flues and chimneys may be specified according to the European chimney standard BS EN 1443, which uses the following performance characteristics as a basis for the designation of chimneys:

- *temperature*
- *pressure*
- *soot-fire resistance*
- *resistance to condensate*
- *corrosion resistance*
- *thermal resistance*
- *distance to combustibles.*

An example of the designation system as used for metal chimneys for gas fires is as given in Table 2.

Table 2 — Designation system for metal chimneys for use with gas fires

Appliance	Temperature class	Pressure class N-negative P-positive	Sootfire resistance 0-none	Resistance to condensate class W-wet D-dry	Corrosion resistance class 1-gas
Gas fire radiant convector	T250	N2	0	D	1
ILFE	T250	N2	0	D	1
DFE	T250	N2	0	D	1

Further details on this designation system may be found in Annex B of BS 5440-1.

Attention is also drawn to Approved Document J to the Building Regulations for England and Wales [11] and to the Building (Scotland) Regulations [5] that, since 2002, specify that where a hearth, fireplace (including a flue box), flue or chimney is provided or extended (including cases where a flue is provided as part of the refurbishment work), a chimney plate should have been fixed to the building to advise appliance installers of the characteristics of the chimney. Installers should establish that the chimney and any hearth are suitable for the appliance and the chimney plate is intended to assist in this respect. The plate may show the designation of the chimney in accordance with the appropriate European Chimney standard.

It should be noted that the designations in the above Table are consistent with those appearing in the guidance and supplementary information document on Approved Document J [11].

Special considerations apply in the case of a fire installed within a recess opening formed in the inner leaf of a cavity wall. The construction of the recess may require the fitting of a lintel to support the opening. Where doubt exists regarding this work, expert building advice should be sought.

The manufacturer's instructions should be followed in respect of the insulation required at the rear of the appliance and measures necessary to avoid moisture transfer across the cavity.

Figure 5 illustrates a typical installation where an open-flued fanned draught fire has been inset into a masonry cavity wall. It should be noted that balanced-flued fires are also available for this application. Attention is drawn to Reg 19(4) of the Gas Safety (Installation and Use) Regulations [1].

10.2 Bird guards

The fitting of a bird guard to a chimney shall be considered where there is a known problem of birds nesting in chimneys in the locality.

COMMENTARY AND RECOMMENDATIONS ON **10.2**

Where there is evidence that a chimney is used by birds for nesting, or there is a known problem of birds nesting in chimneys in the neighbourhood, a guard or terminal should be fitted to the chimney.

Birds nesting in chimneys are particularly prevalent in areas where jackdaws are known to roost. Before fitting a terminal or guard, the chimney should be inspected and, if necessary, reinforced to ensure it will support such a terminal or guard.

Birdguards should be fabricated from a corrosion and weather resistant material, and should be securely fixed. Any opening in the birdguard accessible to birds should have a minor dimension of not more than 20 mm.

10.3 Masonry chimneys

Where a fire is to be fitted to an existing chimney, any damper or restrictor plate in the chimney shall be removed except that, where it is not reasonably practicable to remove a sliding damper, it shall be permanently fixed in the fully open position.

NOTE Installations of this type are covered in BS 5440-1.

Before installing the fire it shall be ensured that the base of the flue is clear of debris.

COMMENTARY AND RECOMMENDATIONS ON **10.3**

A masonry chimney may be oversized for some of the fires covered by this specification and, therefore, some means may be advisable to control the total rate of flow through it. If a method of control is advisable, it will be detailed in the fire manufacturer's instructions (for example, the use of a flue spigot restrictor).

When any fire or fire/back boiler is connected to a chimney designed for use with solid fuel, it is not normally necessary to fit a flue terminal to the existing chimney outlet where the flue diameter is greater than 170 mm diameter.

A metal lining system may be used with a masonry chimney in order to:

- *— restore a masonry chimney with a flueway in poor condition fit for use;*
- *— reduce the size of a chimney which is oversized for the application;*
- *— reduce the likelihood of condensation in the flue.*

Further details in this respect and on the general use of metal flue lining systems are given in BS 5440-1.

10.4 Precast flue block chimneys

For any appliance suitable for connection to a precast flue system, an opening which conforms to the appliance manufacturer's instructions shall be provided at the base of the flue.

An appliance shall only be fitted to a precast flue block system where this is permitted in the appliance manufacturer's installation instructions. Any special instructions for such usage shall be complied with.

COMMENTARY AND RECOMMENDATIONS ON **10.4**

Various types of precast flue block chimney are available, e.g. to BS 1289-1, BS EN 1806 or BS 6461-1. The fire manufacturer's instructions should be consulted regarding the suitability of a fire for use with a precast flue block chimney.

Where this is permitted, openings in which fires are to be fitted may be purpose designed precast recess panel blocks or formed of brickwork or masonry. It should be noted that the fire manufacturer's instructions may include special requirements for the installation of fires fitted to precast flue block chimneys.

Where a cooler device is required for use with a precast flue block chimney, it should be specified, or supplied by, the fire manufacturer.

10.5 Concrete cast in situ flue liners

Poured lightweight insulated concrete cast in situ lining systems to form a continuous flueway to line and refurbish an existing brick built constructional chimney shall be used only where such lining system methods have been independently certified by the British Board of Agrément (BBA).

COMMENTARY AND RECOMMENDATIONS ON **10.5**

This form of lining is specialist in nature and it is essential the requirements of BS 5440-1 are fully met in respect of such systems.

The names of certified cast in situ chimney lining systems may be obtained by reference to the BBA.

The process may be used to insulate, refurbish and/or reduce chimney free areas to match appliance chimney design requirements.

*Appliances should only be installed to existing cast in situ lining systems where the lining meets the above criteria and conforms to **10.1**.*

10.6 Prefabricated metal flue systems

Sheet metal flue systems shall conform, as appropriate, to BS 4543 or BS EN 1856-1 and BS EN 1856-2. A flue box conforming to BS 715 shall only be used to house a fire where it has been identified as being suitable for such use by the appliance manufacturer and/or flue box manufacturer.

COMMENTARY AND RECOMMENDATIONS ON **10.6**

Methods of installation using a flue box, flue pipe and flexible flue liner are shown in Figure 3.

In general, flue boxes provide a means to accommodate an appliance where:

a) *no fireplace recess or builder's opening exists; or*

b) *an existing fireplace recess or builder's opening is oversized; or*

c) *the existing fireplace opening plane represents an unsuitable surface upon which to seal the appliance housing* A1 *Text deleted* A1.

Only flue boxes which have been assessed to BS 715 and are also suitable for use with the fire should be used. Technical data and installation instructions will be provided with such boxes.

*It should be noted that flue boxes are not suitable for solid fuel fired appliances and this should be stated (via a permanent badge/label) on the flue box (see also Clause **21**).*

*If the manufacturer's instructions specify a direct flue connection, see **10.8**.*

10.7 Flue system (fanned draught)

10.7.1 *General*

Fires using fanned draught systems shall be installed in accordance with **10.7.2** or **10.7.3**, as appropriate.

COMMENTARY AND RECOMMENDATIONS ON **10.7.1**

a) *Prior to installation, it will be necessary to ensure that the system is suitable for its proposed location, and that the distance between the fire and the outer face of the wall on which the flue is to be terminated is as recommended by the fire manufacturer.*

b) *The flue terminal should be positioned to allow the free passage of air across its external face as well as conforming to the flue system manufacturer's specifications concerning the minimum acceptable distance from the terminal to ground level, obstructions and ventilation openings.*

c) *It should be noted that all fanned draught flue systems are required by the Gas Safety (Installation & Use) Regulations [1] to shut down the appliance in the event of failure of the draught.*

d) *Special considerations apply in the case of a fire installed in the inner leaf of a cavity wall (see **10.1**).*

10.7.2 *Fire with integral fanned draught flue system*

The fire shall be installed in accordance with the manufacturer's instructions.

10.7.3 *Fire fitted to proprietary fanned draught flue system*

Where a proprietary fanned draught flue system is to be fitted to a fire, the gas fire manufacturer's instructions shall be checked to confirm that this is an acceptable combination. The installation shall be in accordance with the instructions supplied by both the manufacturer of the fire and of the flue system.

COMMENTARY AND RECOMMENDATIONS ON **10.7.3**

Proprietary fanned draught flue systems capable of being installed in accordance with BS 5440-1 are available.

10.8 Appliances with a direct flue connection

[A1] 10.8.1 General [A1]

Direct flue connection shall only be made where the appliance has been designed for such use and this method is permitted in the manufacturer's installation instructions.

Unless otherwise specified in the manufacturer's installation instructions, appliances designed for direct flue connection shall be installed using one of the following:

— a metal twin wall flue system conforming to BS EN 1856-1;
— a metallic flexible flue liner conforming to BS EN 1856-2;
— a masonry chimney which has been lined e.g. with a clay lining;
— a factory made insulated chimney conforming to BS 4543.

The joints between the appliance and the flue shall be sound. The flue system itself shall be sound and continuous between the appliance outlet spigot and the flue termination. In all cases, a flue terminal shall be fitted, irrespective of the diameter of the flue.

COMMENTARY AND RECOMMENDATIONS ON [A1] **10.8.1** [A1]

Unless otherwise specified in the manufacturer's installation instructions, the connection of the flue to the appliance should be mechanically held in position (e.g. with a clamp or self-tapping screw) and the annulus sealed with a suitable sealant (see Figure 6). For this type of appliance there is no requirement for a void below the spigot. Other than these provisions, and unless otherwise stated in the manufacturer's instructions, direct connection appliances should conform to the relevant requirements of BS 5440-1 and BS 5440-2.

[A1] 10.8.2 Direct flue connection appliance flue kits

A flue kit shall only be used where the condition of the chimney is such that it would not otherwise require lining.

A flue kit shall only be fitted to an appliance where the chimney serving the appliance:

a) has passed a flue flow test to ensure that the flue is sound and without leaks (to BS 5440-1); and

b) has been swept if previously used for solid fuel.

A flue kit shall not be fitted to a chimney that is likely to have problems with condensation, i.e. a length in excess of 12 m internal or 10 m external to the building. (See BS 5440-1, Table 4). [A1]

〈A1〉 The finished installation shall conform to **11.6**. Where any part of a flue kit comprises a short length of flexible flue liner the liner shall conform to BS EN 1856-2.

The use of a flue kit shall not be regarded as an alternative to lining a chimney which would otherwise need to be lined due to its size, poor condition, length, etc., as required by this standard and BS 5440-1.

COMMENTARY AND RECOMMENDATIONS ON **10.8.2**

*Direct connection appliances are normally installed in accordance with **10.8.1**. However, some direct connection fire types (e.g. cassette fires) are available with an optional flue kit or device that enables the fire to be fitted to an unlined chimney. Such kits normally include a debris deflector device that fits directly or indirectly to the flue spigot of the fire thus enabling the fire to be installed to an unlined chimney instead of using a continuous length of flue liner from the appliance to the chimney termination. Such a device should only be used with the appliance for which it was intended and where the appliance/kit combination has been certified for such use. The appliance manufacturer's instructions will detail the method of assembly and attachment to the appliance and the conditions under which the flue kit may be used.*

Attention is drawn to the requirements of Regulation 27(1) of GSIUR [1]. 〈A1〉

10.9 Multi-appliance installations

Where more than one appliance is installed in a room or internal space, the flueing requirements of BS 5440-1 shall be met.

COMMENTARY AND RECOMMENDATIONS ON **10.9**

Where, for whatever reason, two or more chimneys/flue systems serve a common space, the draught of the stronger chimney/flue system can influence the pull of the weaker and cause spillage. This will happen with gas fired appliances of different types and even more so, if one of the chimneys/flue systems serves a solid fuel appliance.

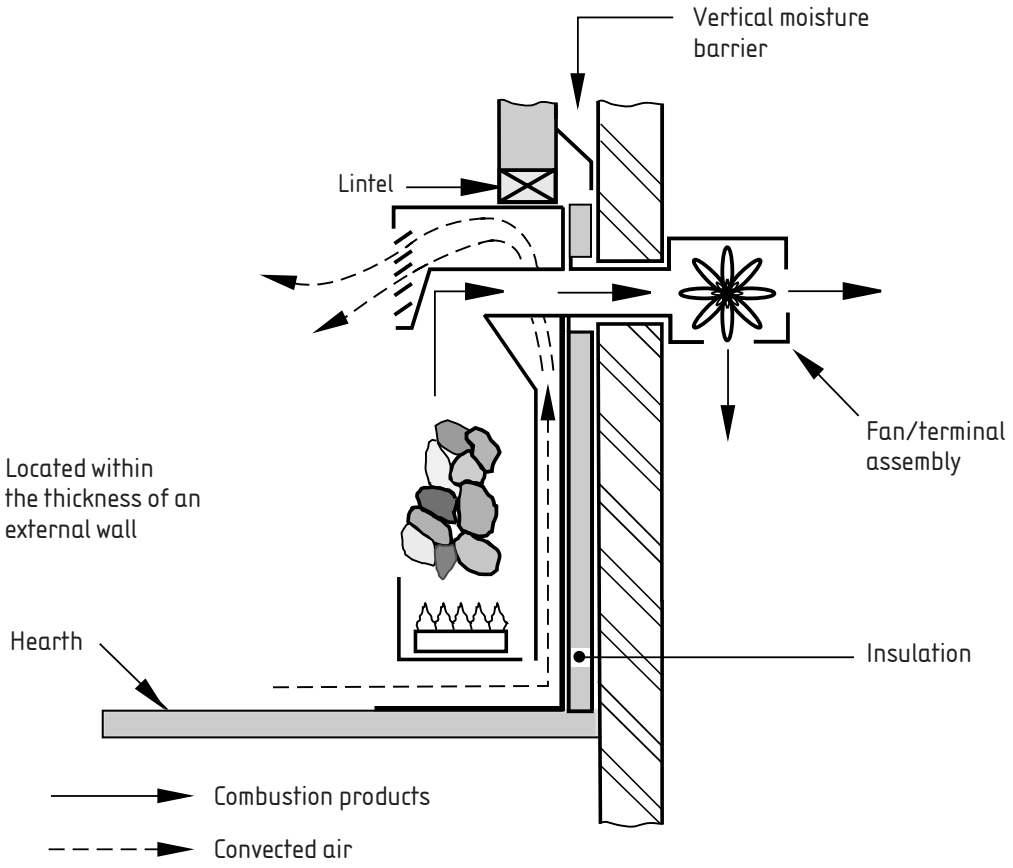
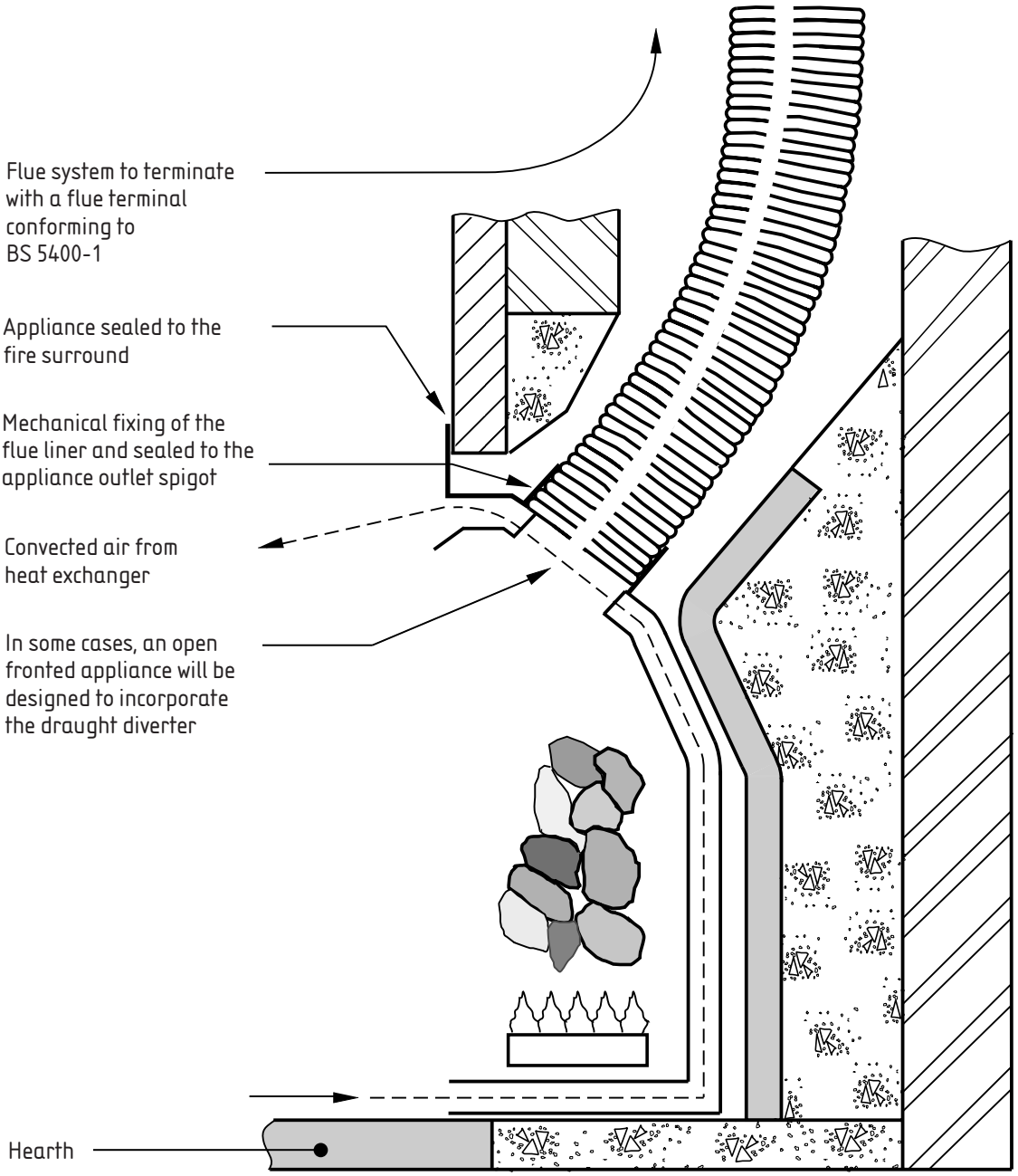


Figure 5 — Installation of a fire within the inner leaf of a cavity wall using a fanned draught flue system



NOTE This illustration relates to appliances purpose designed for direct connection to the flue. Do not confuse with conventional gas fires which should not be connected in this manner.

Figure 6 — Inset live fuel effect gas fire with direct flue connection

11 Appliance fixing

11.1 General

The fire shall be installed in accordance with the manufacturer's instructions.

COMMENTARY AND RECOMMENDATIONS ON **11.1**

Attention is drawn to the Gas Safety (Installation and Use) Regulations [1] which control all aspects of the ways in which gas-fired appliances are installed, maintained and used in premises where they apply and the classes of persons who may undertake gas work.

11.2 Siting

The fire shall be stood on a hearth or floor, secured to a wall, or installed into a raised builders opening (hole-in-the-wall fireplace) in accordance with the manufacturer's instructions.

Where it is evident that the fire is not sufficiently stable when installed and connected to the gas supply, additional fixing shall be used to secure it.

COMMENTARY AND RECOMMENDATIONS ON **11.2**

Guidance on installations using 3rd family gases is given in BS 5482-1 and BS 5482-2. Particular care should be taken to ensure that any extra fixing does not impair the ease of servicing of the fire.

11.3 Before fixing any open-flued fire covered by this standard, correct operation of the flue shall be verified in accordance with Clause **10**.

11.4 To eliminate the entry of excess air into the flue, the fire shall be sealed into position in accordance with the fire manufacturer's instructions [see Figure 2, Figure 3, Figure 4 and Figure 7a)].

COMMENTARY AND RECOMMENDATIONS ON **11.4**

To enable the fire to be sealed into position, the fire manufacturer will either supply a suitable seal or specify a sealant in the installation instructions.

A non-combustible infill material may be used when a fireplace has a low forward projection, or in instances to obviate the necessity to remove a chairbrick.

11.5 Where the fireplace opening dimensions are in excess of those specified in the fire manufacturer's instructions, an infill panel shall be used with an opening in accordance with the fire manufacturer's instructions.

COMMENTARY AND RECOMMENDATIONS ON **11.5**

Where an infill panel is used, this should also be sealed into position in accordance with the fire manufacturer's instructions.

11.6 Where the fire is fitted to a masonry or block chimney, it shall be fitted so that there is a void below the base of the spigot for the collection of debris. The volume of the void and its depth below the fire flue spigot shall be as given in Table [A1]3[A1].

The finished opening into the void shall be large enough to permit the clearance of any debris, [A1] e.g. [A1] when the fire is removed [A1], or when any inspection panel built into the appliance is removed.[A1]

[A1] Except where a flue kit is used [e.g. see Figure 2c)] [A1] there shall be a minimum clearance of 50 mm [see Figure 2 and Figure 7a)] between the end of the flue spigot or flue products outlet and any surface. The void shall not be so large as to adversely affect performance of the flue by creating abnormal flow.

〈A1〉 Where a flue kit is used with a direct flue connection [e.g see Figure 2c)] the minimum dimension of the flue or masonry chimney shall be a minimum of 50 mm greater than the maximum cross-sectional dimensions of the debris deflector in a horizontal plane.

NOTE The flue kit termination does not have to be central within the flue or masonry chimney as it can be allowed to take its own position. 〈A1〉

COMMENTARY AND RECOMMENDATIONS ON **11.6**

〈A1〉 *Where the appliance is such that:*

— it has a top outlet flue spigot; and

— its flue spigot is fitted with a debris deflector device; and

—it is to be fitted to an unlined chimney,

a label should be supplied with the flue kit to be fitted to the fire in a conspicuous position so as to be readily visible by an installer.

A suitable form of words will be specified in the next edition of the appliance standard, BS 7977-1, and for ease of reference is reproduced below.

"WARNING — THIS APPLIANCE IS INSTALLED TO AN UNLINED CHIMNEY. FOR EXAMINATION OF THE DEBRIS VOID AND CONDITION OF CHIMNEY REFER TO THE APPLIANCE MANUFACTURER'S INSTRUCTIONS OR REMOVE THE WHOLE FIREBOX."

The manufacturer's instructions will detail the depth of the opening for the appliance outer case (firebox) which may provide a debris catchment void conforming to Table 3 when the appliance is installed.

Certain fires may incorporate integral spacer bars or distance pieces at the rear and/or sides of the appliance firebox. If the fire is capable of being fully inset into a builder's opening/fireplace recess which conforms to BS 1251 without these projections touching the rear of the builder's opening or fireback this may indicate that a minimum debris catchment volume of 12 dm^3 is available.

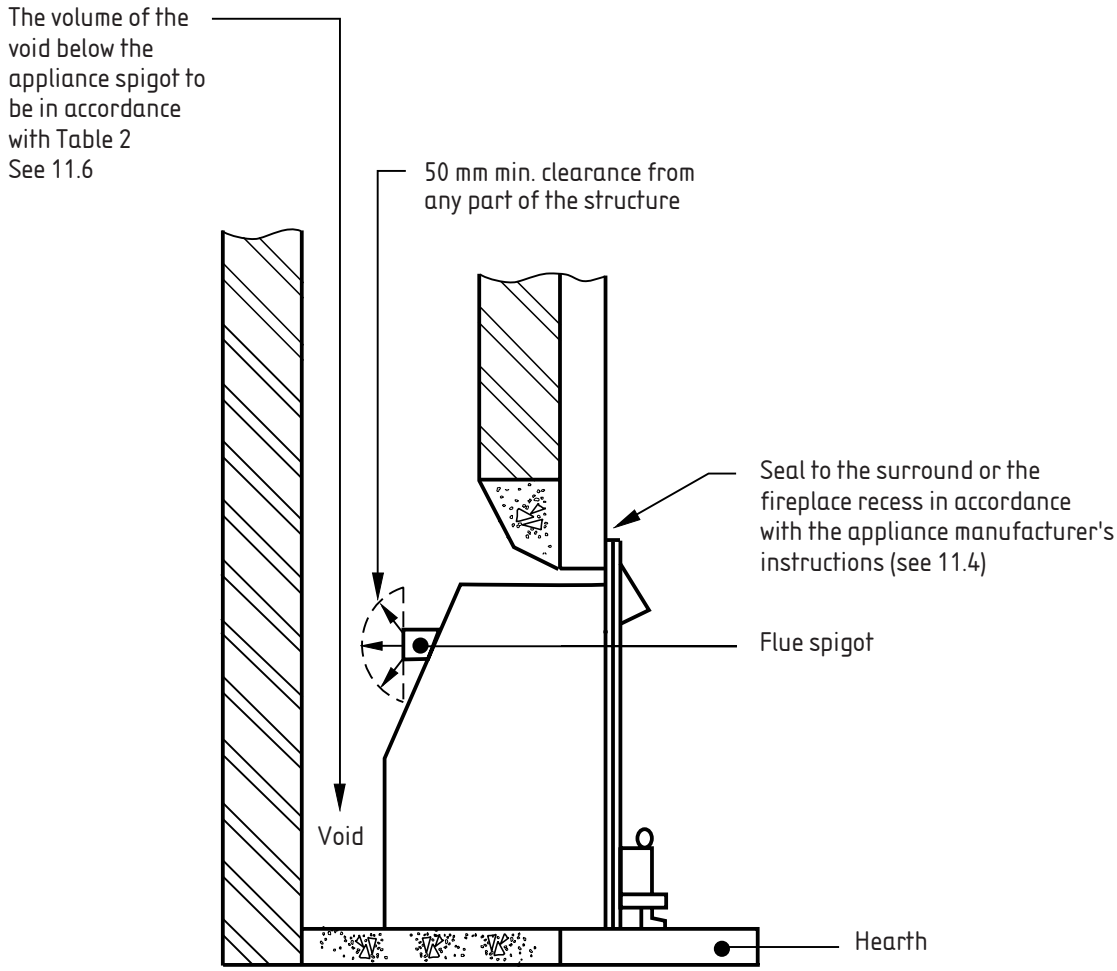
In all cases, the manufacturer's instructions should be strictly followed and any special instructions on the preparation of the builder's opening/fireplace recess observed.

Where a debris deflector device is fitted to a direct connection appliance, the installer should ensure that the debris catchment void specified in Table 3 is available.

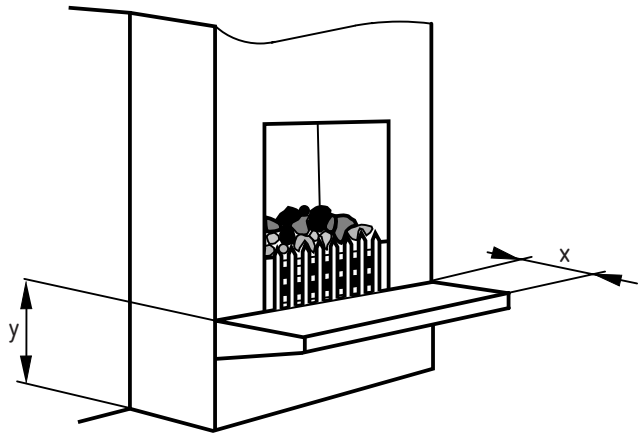
Where an oversized void is encountered, it may be reduced in size by lining with bricks or blocks or alternatively by inserting a metallic flue box. [See Figure 3 (A) and Figure 4 (B)]. The nominal dimensions of the void should not exceed 650 mm wide × 475 mm deep × 800 mm high. [See Figure 2 (A) and Figure 4 (A).]

Light weight aerated concrete blocks should not be used as an alternative to dense concrete blocks, as prolonged exposure to products of combustion might cause light weight aerated concrete blocks to deteriorate over time.

The finished installation should be such that the debris collection space is readily accessible by removal of the appliance, or by virtue of the design of the fire, e.g. by the inclusion of a built-in inspection panel on the appliance. 〈A1〉



a) Installation where chairbrick or milner removal might be necessary using an existing solid fuel hearth



b) General layout of a raised builder's opening installation (hole-in-the-wall fireplace)

Figure 7 — Examples of an inset live fuel effect gas fire installed to a masonry chimney

〈A1〉 Table 3 — Minimum void volumes and depths below gas fire flue spigots or the lowest point of the outlets of a debris deflector in a flue kit

Debris catchment	Masonry chimneys			Block chimneys[a]/Flue systems[b]	
Minimum void volume dm³	Unlined	Lined (clay or cement or metal)		New or unused[c]	Previously used[d]
		New or unused[c]	Previously used[d]		
2		✓		✓	
12	✓		✓		✓
Minimum void depth mm					
75		✓		✓	
250	✓		✓		✓

[a] For example, to BS EN 1806 or BS EN 1858.
[b] For example, BS 715 (using a flue box and flue pipe), BS EN 1856-1 or BS EN 1856-2.
[c] A new or unused chimney, or one previously used only with a gas appliance.
[d] Previously used with a solid fuel or oil burning appliance.

NOTE 1 A ✓ in the table indicates a requirement.

*NOTE 2 In the case of appliances with a direct flue connection in accordance with **10.8.1** there is no requirement for a void below the spigot.*

〈A1〉

11.7 Where a flue pipe is used, e.g. in the case where no purpose made chimney is available, the fire shall be fitted to a flue box and flue conforming to the dimensions specified in the fire manufacturer's instructions.

The fire shall be fitted such that there is a minimum depth of 75 mm below the flue spigot.

A flue box shall not be fitted so as to pass through an external wall.

COMMENTARY AND RECOMMENDATIONS ON **11.7**

*The fire manufacturer's instructions should be consulted regarding the suitability of a fire for use with a metal flue box and flue (see **10.6**).*

The flue box should be suitable for connection to a flue pipe of a minimum diameter as specified in the fire manufacturer's instructions.

Proprietary sheet metal flue boxes conforming to BS 715 may be suitable.

〈A1〉 *Text deleted* 〈A1〉

11.8 Where a fire surround is to be fitted, it shall be compatible with the intended appliance. Any superimposed surround and hearth shall be effectively sealed to the wall and floor to prevent air entrainment which could adversely affect the performance of the flue.

COMMENTARY AND RECOMMENDATIONS ON **11.8**

Consideration should be given to the following.

a) *The compatibility between the surround and the fire should be confirmed at the planning stage.*

b) *Fire surrounds are available which have been tested and found satisfactory for use with fires e.g. in terms of temperature rating compatibility.*

c) *The methods of securing and sealing a surround and hearth to a floor and wall will be given in the fire surround manufacturer's instructions.*

11.9 To assist the correct operation of the fire, the fireplace recess or builder's opening shall have only an entrance or entrances through the fire, and an exit via the flue.

All other openings, in particular gaps/cracks inside the builder's opening (including in or around any chairbrick), those between any surround and the builder's opening, those which may exist in respect of an existing underfloor air supply, and those made for the passage of gas and flue pipes and electric cables, shall be sealed.

COMMENTARY AND RECOMMENDATIONS ON **11.9**

The reason for sealing these other openings is that they reduce the flue suction on the fire and can allow combustion products into the room. An acceptable way of sealing these openings would be by use of, for example, cement or fireclay.

In the case of a dry lined wall construction, attention is drawn to the need to seal any gaps between the plasterboard and the wall.

11.10 Where a masonry chimney is fitted with a flue liner and flue box assembly (see Figure 3), the annular space between the liner and the chimney shall be sealed at the base with a suitable sealant, e.g. mineral wool.

11.11 Room-sealed appliances

Room-sealed appliances shall be installed in accordance with the manufacturer's instructions. The appliance shall be sited such that the terminal is at least 1 m (measured horizontally) from any LPG gas supply cylinder(s).

NOTE More information about LPG appliance installations in permanent dwellings with gas supplies is given in BS 5482-1.

Where required by Building Regulations, the terminal shall be fitted with a protective guard such that no part of the guard is less than 50 mm from any part of the terminal, not including the wall plate. The guard shall not have any sharp edges likely to cause injury nor shall any opening permit the entry of a ball of 16 mm diameter when applied with a force of 5 N.

COMMENTARY AND RECOMMENDATIONS ON **11.11**

The manufacturer's instructions will detail the types and thicknesses of wall upon which the appliance may be installed, together with any special instructions regarding the flue termination. It is essential that the flue assembly is fitted such that it is sealed (e.g. using mastic) where it enters and exits the wall through which it passes. In the case of timber frame dwellings, special considerations apply. Further information on the installation of room-sealed flue systems is given in BS 5440-1, and in IGE/UP/7 "Guide for gas installations in timber framed housing". [12]

*Proprietary terminal guards meeting the requirements of **11.11** are available; the appliance manufacturer will provide details.*

12 Fire precautions

12.1 User protection

The user, or other persons in the room in which the appliance is fitted, shall be protected as far as is reasonably possible, from the risk of burns or ignition of their clothing from the heat from the flames and incandescent parts of the appliance by either:

a) installing an appliance that is fitted with an integral guard which conforms to BS 7977-1:2002, **6.4.8**; or

b) a tactile separator, in the form of either:

i) a hearth provided in accordance with **12.2.2**, or

ii) a fender, kerb, horizontal bar, or other barrier, being fixed not less than 50 mm above floor level and not more than 1 000 mm above floor level, and positioned at least 300 mm in front of and 150 mm beyond the edge of any naked flame or incandescent part of the fire-bed.

COMMENTARY AND RECOMMENDATIONS ON **12.1**a) AND **12.1**b)

If the manufacturer's instructions do not positively confirm that the appliance is fitted with a guard conforming to BS 7977-1:2002, **6.4.8***, then a "tactile separator" is required to protect persons from inadvertently backing or walking into the fire.*

The tactile separator is intended to give abrupt warning by touch to a person moving inadvertently towards the fire.

12.2 Floor protection from radiant heat

12.2.1 *General*

A hearth conforming to **12.2.2** shall be provided for a fire unless the fire conforms to the requirements of BS 7977-1 for installation without a hearth.

COMMENTARY AND RECOMMENDATIONS ON **12.2.1**

Certain fires in accordance with BS 7977-1 may be installed without a hearth; in such cases the fire manufacturer's instructions will provide details. Where the floor is of the type that is likely to be covered, any flame or incandescent materials should be at least 300 mm above the floor in order to make allowance for floor coverings beneath the appliance.

12.2.2 *Appliances in floor level fireplaces*

Where the appliance is fitted in a floor level builder's opening, floor level fireplace recess or floor level flue box, the hearth shall:

a) extend through the whole base of the builder's opening, fireplace recess or beneath the flue box;

b) project at least 300 mm in front of any naked flame or incandescent part of the fire-bed;

c) project at least 150 mm beyond each side of any naked flame or incandescent part of the firebed or, if there is a non-combustible wall within 150 mm of any naked flame or incandescent part of the firebed, up to that wall;

d) have a thickness not less than 12 mm; and

COMMENTARY AND RECOMMENDATIONS ON **12.2.2**d)

Purpose-made proprietary hearths are available whose suitability for a particular application should be established from the hearth manufacturer. Hearths which would be suitable for this application are those made from non-combustible materials conforming to BS 476-4, or materials classified as Class 0 in accordance with Approved Document B to the Building Regulations 2000, as amended [13].

e) have a minimum height of 50 mm along its front and side edges.

COMMENTARY AND RECOMMENDATIONS ON **12.2.2**e)

An upstanding edge of 50 mm minimum height along the front and the sides of the hearth or the installation of a fender of 50 mm minimum height would satisfy the hearth height requirement.

The 50 mm requirement is to:

1) *discourage carpets or rugs from riding or being placed on top of the hearth, and*

2) *provide persons with a tactile (i.e. a physical proximity) warning that he or she is approaching the fire.*

12.2.3 *Appliances in raised builder's openings (hole-in-the-wall fireplaces)*

Where the appliance is installed in a hole-in-the-wall fireplace, a hearth conforming to **12.2.2** shall be fitted on the floor beneath the hole so as to protect combustible material from radiant heat, unless:

a) the appliance is installed in accordance with the manufacturer's instructions and the instructions state that no hearth is required to protect the floor covering from radiant heat under these circumstances; or

b) the appliance is installed so that every part of any flame or incandescent part of the fire-bed is at least 225 mm vertically above any carpet or floor covering; or

c) the hearth beneath the appliance, or into which the appliance is set, extends in front of any flame or incandescent part of the fire-bed such that the sum of the **x + y** dimensions in Figure 7b) is at least 225 mm to any carpet or floor covering.

COMMENTARY AND RECOMMENDATIONS ON **12.2.3**b) AND **12.2.3**c)

*If the constraints in **12.2.3**b) and **12.2.3** c) are followed then the nearest point of exposure of the carpet or floor covering to radiant heat will be more than 225 mm away from any flame or incandescent material.*

Where there is no carpet or floor covering in place and the floor is of the type that is likely to be covered in such a way; it is recommended that the 225 mm distance be increased to 300 mm in order to make allowance for any future floor covering beneath the appliance.

12.3 Protection at rear of appliance

Combustible material at the rear of the fire shall be protected against the effects of heat transmission. Where the fire instructions state that it is suitable for mounting on or against combustible material then any special instructions in this respect shall be followed.

When fitting the fire to a fireplace opening, combustible material shall not be fitted inside this opening.

COMMENTARY AND RECOMMENDATIONS ON **12.3**

*The instructions for the fire will detail suitable surfaces upon which the fire may be mounted together with any special requirements such as the fitting of plates or plinths, etc. (see also **11.8**).*

12.4 Side-wall protection

A fire shall be installed such that no part of a combustible side-wall, when measured laterally from the flame or incandescent radiant source, is less than 500 mm, or such figure as specified in the fire manufacturer's instructions, from that radiant source.

12.5 Shelf protection

A fire shall only be fitted below a shelf or similar projection of combustible material where this is permitted by the fire manufacturer's instructions.

COMMENTARY AND RECOMMENDATIONS ON **12.5**

Where appropriate, the fire manufacturer's instructions will detail any limitation on the height and depth of the shelf above the fire or any protection necessary to prevent the shelf from reaching an excessive temperature.

12.6 Protection of adjacent combustible material

The protection of combustible material adjacent to flue pipes shall be in accordance with BS 5440-1.

COMMENTARY AND RECOMMENDATIONS ON **12.6**

Particular attention is drawn to the manufacturer's instructions concerning the proximity of curtains and other combustible materials in relation to the fire or its flue pipe.

13 Gas supply

13.1 Gas installation pipework to the fire shall be in accordance with BS 6891 or IGE/UP/2 (2nd family gases) [14] or BS 5482-1 and BS 5482-2 (3rd family gases), as appropriate.

The pipe to the fire shall be of malleable iron, mild steel, copper or stainless steel. Other fittings shall be of these materials or of brass.

COMMENTARY AND RECOMMENDATIONS ON **13.1**

For some existing installations, installation in accordance with BS 5482-3 is acceptable.

13.2 Connections to the fire shall not be subject to strain.

13.3 Where the final connection to the fire is to be concealed, any part of the gas supply pipe buried in the structure or running within a chimney recess shall be suitably protected (for example, coated or wrapped with PVC tape).

COMMENTARY AND RECOMMENDATIONS ON **13.1**, **13.2** AND **13.3**

Pipework which passes through a wall/floor or other structure should take the shortest practicable route and should be enclosed in a gastight sleeve which is ventilated to a safe position, preferably to open air and with one end sealed.

It should be noted that the Gas Safety (Installation & Use) Regulations [1] contain special provisions for inset fanned draught fires installed within the inner leaf of a cavity wall and permit the running of the gas installation pipe within the cavity itself provided the pipework is as short as is reasonably practicable, enclosed in a gastight sleeve and sealed at the joint where the pipework enters the fire.

*See also the Commentary and recommendations on **10.1**.*

13.4 All connections, whether concealed or not, shall allow the fire to be removed for periodic inspection of the debris collection space. Flexible connections shall not be used.

13.5 A gas cock or other means of isolation shall be fitted on the inlet supply as close as is practicable to the appliance and in a position that is readily accessible. A means of disconnection shall be fitted, if not integral with the appliance, between the isolation device and the appliance.

COMMENTARY AND RECOMMENDATIONS ON **13.5**

The gas tap of an appliance is usually protected, either by design or position, against accidental operation. If additional safety is desired, for example where appliances are fitted in nurseries, old people's homes, public houses, restaurants, etc., a second isolation device may be fitted with a removable key.

13.6 Where an appliance is located in a flue box, the gas supply shall only pass through the wall of the box if it is adequately sealed at the point of entry using a suitable non-setting sealant.

COMMENTARY AND RECOMMENDATIONS ON **13.6**

The gas supply should be routed as close as practicable to the bottom of the flue box.

14 Electricity supplies and wiring

14.1 The electrical wiring installation to the fire shall conform to BS 7671.

COMMENTARY AND RECOMMENDATIONS ON **14.1**

For room-sealed installations in bathrooms and shower rooms, or rooms in which a bath or shower is positioned, attention is drawn to the special requirements of BS 7671 concerning the positioning of electrical switches associated with the appliance.

Attention is also drawn to the requirements of Approved Document P of the Building Regulations [15] covering electrical work and the need for conformity with competency schemes for carrying out such work.

14.2 Electricity supplies to the fire and any ancillary electrical controls shall be installed in accordance with the fire manufacturer's instructions. All electrical components shall be designed for the electrical supply voltage and of at least a rating to carry the electrical current required by the operation of the equipment.

14.3 Any point of connection to the mains electricity shall be readily accessible and the method of connection shall provide electrical isolation of the appliance and all ancillary electrical controls by either:

a) a fused, double pole switch or spur box; or

b) a fused three pin plug and a shuttered socket-outlet.

COMMENTARY AND RECOMMENDATIONS ON **14.3**

Where a three pin plug is used, this should be removed from the socket when servicing the appliance. To encourage this, an unswitched socket outlet is recommended. In the case of back boiler installations, attention is drawn to the higher ambient temperatures which can exist in the boiler enclosure and care should be taken to ensure that electrical wiring is not subjected to temperatures in excess of that for which it is rated.

14.4 All fuses shall be rated in accordance with the fire manufacturer's instructions.

15 Ventilation (Fire/back boilers and fire/back circulators only)

The ventilation requirements for a fire/back boiler or fire/back circulator combination shall be calculated from the total of the maximum rated heat inputs.

NOTE See BS 5440-2 for further details.

16 Appliance fixing (Fire/back boilers and fire/back circulators only)

16.1 Existing unlined chimneys

Where a back circulator is to be fitted to an unlined chimney, the flue products outlet connection shall be such as to:

a) prevent the entry of falling debris into the appliance flue spigot or flue piece; and

b) provide a void of a minimum volume of 12 dm^3 below the lowest point of the flue products outlet.

Where a back boiler is to be fitted, the chimney shall be lined, e.g. by the use of a flexible flue liner. The lining shall be connected directly to the outlet of the draught diverter of the back boiler, in accordance with the manufacturer's instructions.

The liner shall be continuous from the appliance to the terminal.

Any annular space between the flue liner and the chimney shall be sealed at the base and at the top of the chimney. At the base this shall be done in such a way that the sealant will not fall out into the back boiler enclosure. The flue liner shall be supported at the top and bottom of the chimney.

COMMENTARY AND RECOMMENDATIONS ON **16.1**

Consideration should be given to the following points.

a) *Where a back circulator is installed, it should not be necessary to line the chimney provided the flue length does not exceed 10 m (external wall) or 12 m (internal wall).*

NOTE Further details of condensate free lengths of flues in given in BS 5440-1.

b) *If the product outlet is horizontal and conforms to **16.1**b), it automatically conforms to **16.1**a). If the product outlet is vertical, unless the installer is confident that the design satisfies **16.1**a), the appliance manufacturer should be consulted before proceeding.*

c) *If a flexible flue liner is fitted, the support at the top and bottom of the chimney can be made by means of a sealing plate or other suitable means.*

d) *A typical way of sealing the annular space between the chimney and the flexible flue liner at the base would be by use of mineral wool. For larger openings, it may be necessary to use, for example, a register plate to hold the mineral wool in place.*

e) *When a fire/back circulator is connected to a chimney designed for use with solid fuel, it is not normally necessary to fit a flue terminal to the existing chimney outlet.*

16.2 Existing lined chimneys

Where a chimney has been lined during construction, e.g. with a clay lining, a short length of either rigid or flexible flue pipe of a size appropriate for the back boiler flue outlet shall be used to connect the appliance to the chimney liner such that the flue pipe projects at least 150 mm into the liner.

The annular space between the short length of flue pipe and chimney liner shall be sealed using a suitable flue jointing material, in such a way that it does not restrict the flue pipe exit and will not fall out into the back boiler enclosure.

Where a back circulator is to be installed, any special flueing arrangements contained in the appliance manufacturer's instructions shall be met.

COMMENTARY AND RECOMMENDATIONS ON **16.2**

Consideration should be given to the following points.

a) *Generally, chimneys built later than 1965 will incorporate a liner of a minimum diameter of 175 mm. (Not to be confused with pre-cast flues.)*

b) *The builder's opening at the base of the chimney will form the back boiler enclosure.*

c) *A typical way of sealing the annular space between the chimney and the flexible flue liner at the base would be by packing the annular space with mineral wool. For larger openings, it may be necessary to use, for example, a register plate to hold the mineral wool in place.*

*Generally, back circulators are designed for fitting to both unlined and lined chimneys. As such, the flue outlet will normally conform to **16.1**a) and **16.1**b) and there will be no provision for connecting the flue outlet to any flue lining.*

16.3 Extensions to chimney breasts

If an extension to an existing chimney breast is constructed to form a duct for pipework, cables, etc., the builder's opening shall be sealed from such a duct in accordance with **16.4** and as shown in Figure 8.

16.4 Sealing of extraneous openings to back boiler/circulator enclosures

To assist the correct operation of the fire/back boiler or fire/back circulator, the enclosure shall have only two openings, an entrance through and round the back of the fire and an exit via the flue. All other openings, in particular, gap/cracks inside the builder's opening (including in or around any chairbrick), those between any surround and the builder's opening, those which exist in respect of an existing underfloor air supply, and those made for the passage of gas, water, flue pipes and electric cables, shall be sealed.

COMMENTARY AND RECOMMENDATIONS ON **16.4**

The reason for sealing these other openings is that they provide a passage for combustion products to produce a flue effect which, apart from transmitting the combustion products, can also cause excessive air movement under the fire leading to flame distortion. An acceptable way of sealing those openings would be by the use of, for example, silicon mastic or fireclay.

16.5 Flue termination

Where a chimney has been lined with a flue pipe or flexible flue liner, a terminal that conforms to the performance test requirements given in BS EN 13502, BS 1289 or BS 7435 shall be fitted. The terminal size shall be not less than the nominal size of the appliance flue connection. The flue pipe or liner shall not protrude into the terminal so as to restrict the products outlet.

COMMENTARY AND RECOMMENDATIONS ON **16.5**

The terminal will generally be fitted in place of the existing chimney pot. In cases where this would leave the terminal openings obstructed, e.g. by adjacent chimney pots, it is possible to fit the terminal on top of the existing chimney pot to enable free dispersal of flue products at all times.

*For a back circulator connected to an unlined chimney (see **16.1**), it is not normally necessary to fit a flue terminal in place of, or to, the existing chimney outlet.*

16.6 Precast flue block chimney or a flue pipe

An appliance shall only be fitted to a precast flue block system where this is permitted in the appliance manufacturer's instructions. Any special instructions for such usage shall be followed. Where there is no solid fuel appliance chimney, a purpose-made non-combustible box shall be provided to take the place of the builder's opening and provide the back boiler or back circulator enclosure. The back boiler enclosure shall stand on, or shall incorporate, a hearth which can support the weight of the enclosure and fire/back boiler (see Figure 9).

Adventitious openings to back boiler/circulator enclosures shall be sealed in accordance with **16.4**.

The associated precast flue block chimney, or flue pipe, shall be properly connected to the back boiler enclosure box and the joint sealed with, for example, fireclay. A terminal shall be installed at the top of the chimney in accordance with **16.5**.

COMMENTARY AND RECOMMENDATIONS ON **16.5**

Fire/back boilers were originally designed to be installed in houses having chimneys and fireplaces constructed for solid fuel appliances, but they are equally suitable for houses without such chimneys where a suitable back boiler enclosure, hearth, flue and terminal are provided.

The back boiler enclosure may be a proprietary item made of precast concrete, insulated metal or other non-combustible material or it may be constructed in situ of suitable material.

The appliance manufacturer's instructions should detail the minimum dimensions; the typical internal dimensions are as follows:

Height 900 mm

Width 585 m

Depth 375 mm.

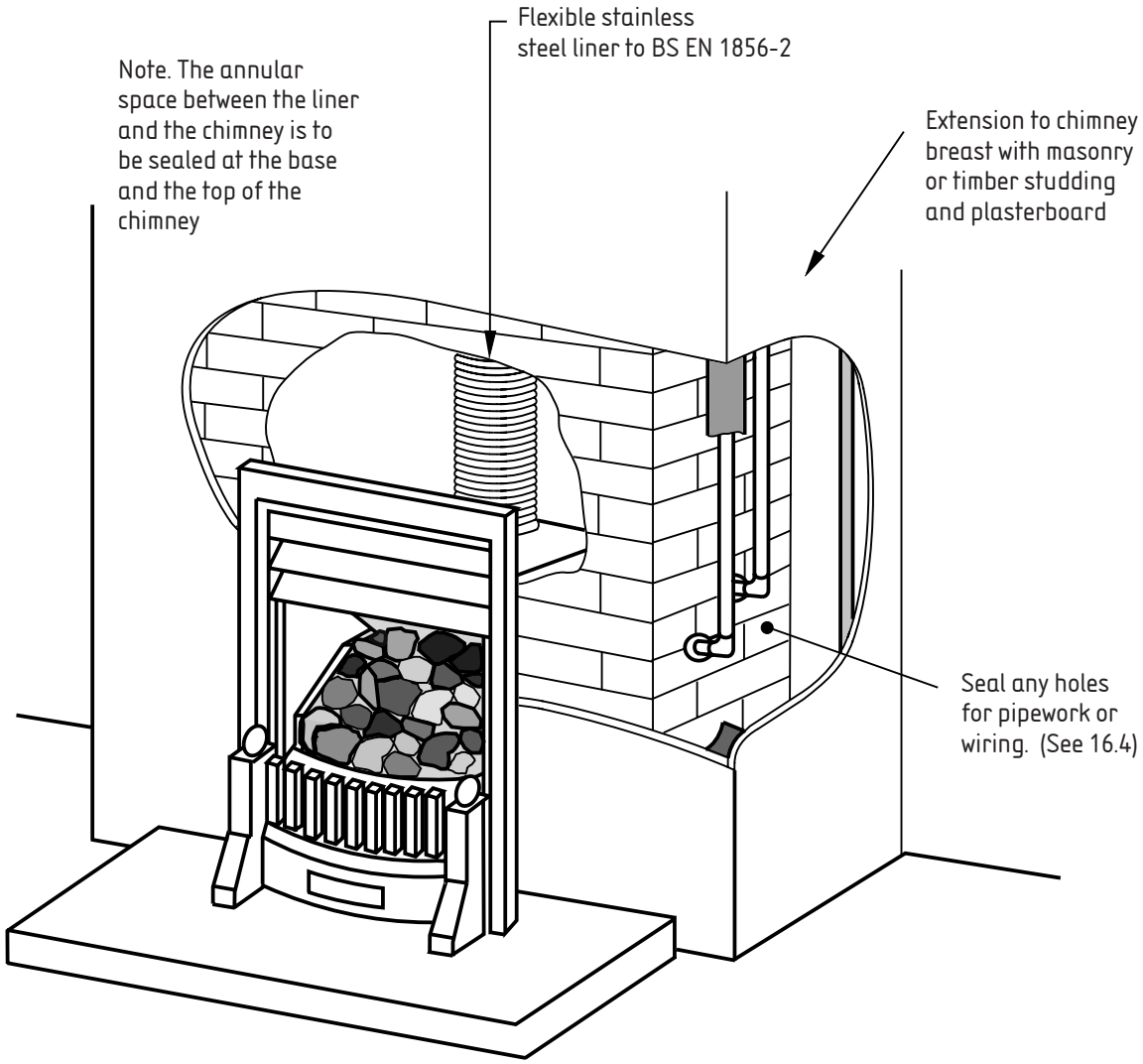
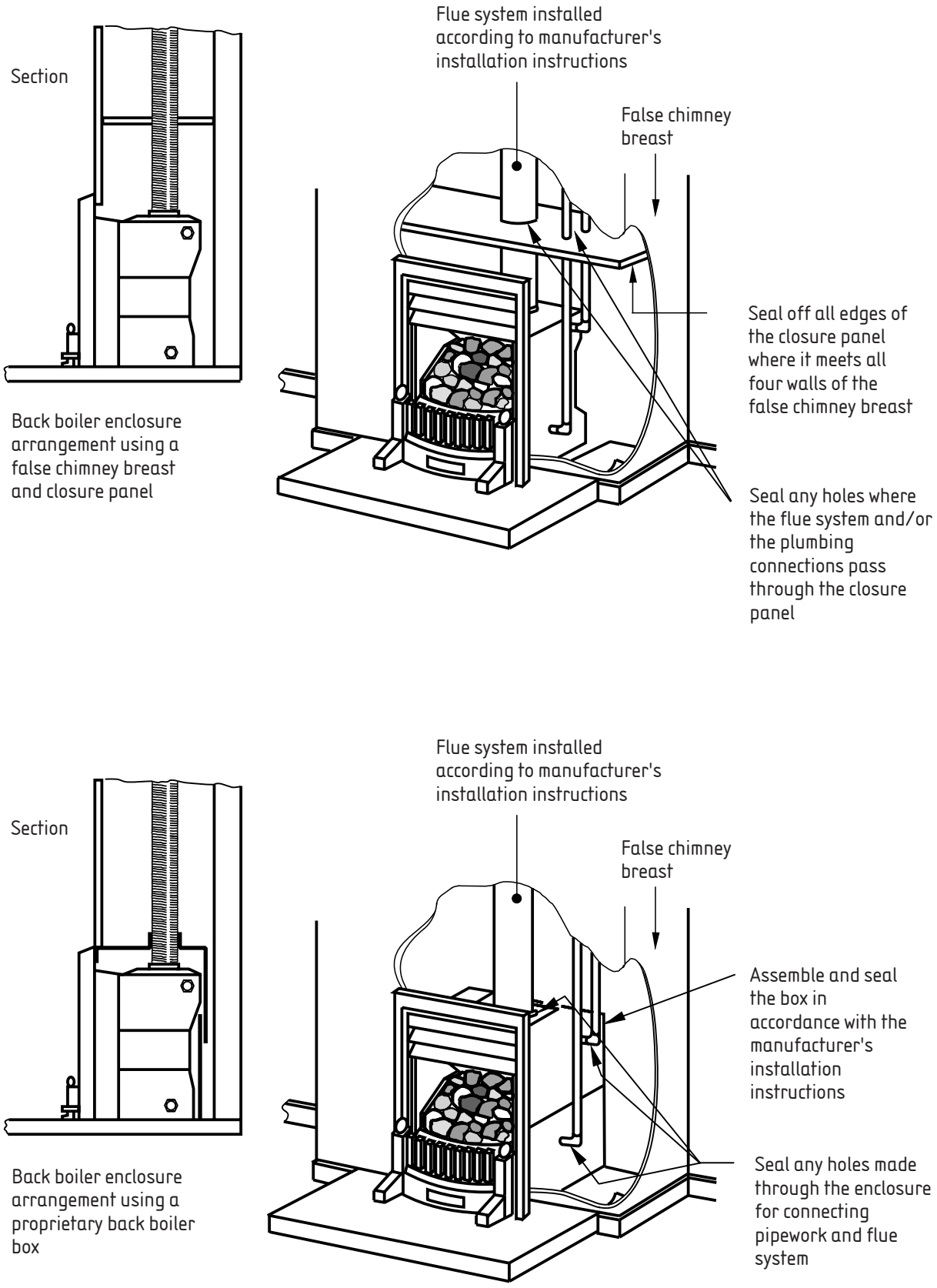


Figure 8 — Installation of a live fuel effect gas fire and combined back boiler where a chimney breast is extended to form a duct for pipework and wiring



NOTE If the gas supply to the appliance is to be made through the wall of the back boiler box, see **13.6**.

Figure 9 — Installation of a gas fire and combined back boiler using a back boiler enclosure and prefabricated chimney/flue system

17 Fire precautions (Fire/back boilers and fire/back circulators only)

17.1 Floor protection/hearths and bases

17.1.1 *Hearth*

Where a hearth is required for a fire/back boiler or fire/back circulator installation, the hearth and its supports shall be able to safely carry the mass of the appliance.

The height of the fire hearth above the finished floor level shall be appropriate to the type of installation. If the fire associated with the back boiler or back circulator is to fit on a hearth, then the back boiler base shall be at the same height as the fire hearth. The dimensions of the fire hearth shall be in accordance with **12.2.2**. If the fire is to be wall mounted, the height of the back boiler base shall be sufficient to enable the fire to meet the height requirement specified in **12.2.1**.

COMMENTARY AND RECOMMENDATIONS ON **17.1.1**

When a fire/back boiler or fire/back circulator is installed at the base of a chimney, which will usually be associated with an existing hearth, no additional precautions are necessary to protect the surrounding floor.

17.1.2 *Bases*

Where a base is required for a back boiler or back circulator unit it shall be of solid, non-combustible material not less than 25 mm thick placed upon non-combustible supports of height not less than 25 mm. It shall extend not less than 150 mm from the back and sides of the back boiler. If there is a wall within 150 mm, it shall extend to that wall. It shall also extend at least to the front of the builder's opening.

18 Water connections (Fire/back boilers and fire/back circulators only)

Water connections shall be in accordance with BS 5546, BS 5449 and BS 6700, as appropriate.

NOTE Attention is drawn to the Water Supply (Water Fittings) Regulations 1999 [16], and relevant byelaws.

Where water pipes pass through a wall or run within a chimney recess, they shall be suitably protected (for example, sleeved or coated or wrapped with PVC tape). All openings for the passage of water pipes in builder's openings shall be sealed in accordance with **16.4**.

19 Commissioning

19.1 All gas fittings forming part of the installation shall be tested for gas tightness, and purged.

NOTE Further information on testing is given in IGE/UP/1 [17], IGE/UP/1A [18] or IGE/UP/1B (2nd family gases) [19] or TM 62 (3rd family gases) [20].

19.2 The gas rate or pressure shall be checked and adjusted, where necessary, to the correct setting as specified in the fire manufacturer's instructions, or as indicated on the fire data plate.

19.3 The ventilation provision shall be checked for conformity with Clause **9**.

19.4 The fire shall be checked for spillage in accordance with the appliance manufacturer's instructions.

Where any room of the premises is fitted with a fan (e.g. extract fan or a fan incorporated within an appliance), the operation of the fan(s) shall not adversely affect the performance of the flue when the flue is tested in accordance with BS 5440-1.

If the installation fails the spillage test given in the appliance manufacturer's instructions and the installation cannot be immediately corrected, the appliance shall be disconnected and made safe and the customer notified.

COMMENTARY AND RECOMMENDATIONS ON **19.4**

The fire manufacturer's recommended method for spillage testing may be given on a badge attached to the fire and is also detailed in the instructions. Attention is drawn to the foreword concerning the installation of used appliances. The fire should first be tested with all windows and doors closed in the room of the installation and with any fan in the room running. If there is a fan in an adjacent or nearby room, the test should be repeated with all interconnecting doors open and the fan in operation. If spillage is evident in any of these cases (including the situation in which no fan is present), the test should be repeated with a window slightly open. If the fire now clears its products of combustion then additional ventilation should be provided. Where spillage continues, the fire should be removed and both the appliance and the flue examined; removal of any spigot restrictor may improve the performance.

It should be noted that this type of fire may have a higher flue flow rate than a radiant or radiant/convector gas fire [see Figure 1a)].

19.5 Correct and safe appliance operation shall be checked in accordance with the fire manufacturer's commissioning instructions.

20 Instructions and use of fireguards

All instructions provided by the fire manufacturer shall be left with the owner or occupier of the premises in which the fire is installed.

COMMENTARY AND RECOMMENDATIONS ON CLAUSE **20**

It should be noted that under the Gas Safety (Installation and Use) Regulations [1], the installer is required to leave with the owner or the occupier of the premises any instructions supplied with the appliance.

The user instructions should include reference to fireguards, in particular to the effect that fireguards, in accordance with BS 6539 or BS 6778, should be fitted when the fire is used in the presence of young children, the elderly or infirm.

Further guidance and information concerned with the effective and safe guarding of fires and heating appliances is given in PD 6516.

21 Advice to be given to the user

21.1 Operating instructions

21.1.1 The installer shall ensure that the user has been provided with the manufacturer's instructions for operating the appliance.

21.1.2 Wherever possible, the installer shall demonstrate the correct and safe operation of the appliance including any special features of the appliance.

COMMENTARY AND RECOMMENDATIONS ON **21.1**

When fitting a new open flue fire, it will be noted that the fire is fitted with a spillage monitoring system. The user should be informed that the spillage monitoring system is designed so that in the unlikely event that the efficient evacuation of the combustion products up the flue is interrupted, the appliance will automatically be turned off before a dangerous situation is reached. The user should be shown how to restart the appliance after such an automatic shut down, but it should be stressed that if the spillage monitoring system repeatedly shuts down the appliance, he/she should turn off the gas supply to the appliance at the isolation tap and contact a CORGI registered installer and ask for the installation and appliance to be checked.

Where an electrical CO alarm is not fitted, the user should be made aware of the potential contribution to safety, for all fuel burning appliances, that such an alarm can make. However, it should be stressed that such alarms are to be regarded only as a "back-up precaution" and not a substitute for proper installation and maintenance of appliances and flues.

Where any part of the flueing installation (hearth, fireplace recess, associated independent canopy, flue system, etc.) used would not be suitable for use with a solid fuel fired appliance, the installer should advise the user that under no circumstances should a solid fuel fired appliance be used in place of the fuel effect gas appliance.

21.2 Maintenance

If the premises in which a gas appliance is installed are owned by the occupier, the occupier shall be advised in writing that, for continued efficient and safe operation of the appliance, it is important that adequate and regular maintenance is carried out by a competent person (i.e. a CORGI-registered gas installer) in accordance with the appliance manufacturer's recommendations.

If the premises are tenanted and the landlord owns the gas appliance, the landlord shall be advised in writing of the duty imposed by the Gas Safety (Installation and Use) Regulations [1] to ensure that the appliance installation is maintained in a safe condition and checked for safety every 12 months.

COMMENTARY AND RECOMMENDATIONS ON **21.2**

The Gas Safety (Installation and Use) Regulations 1998 [1] impose a general obligation on landlords providing gas appliances in tenanted premises to have these maintained in a safe condition and checked for safety every 12 months.

Where an independently mounted carbon monoxide (CO) detector to BS 7860 or BS EN 50291 is fitted in or recommended for a room containing a gas appliance the installer should advise the user that a detector should not be regarded as a substitute for proper installation and regular servicing by a competent person.

Where any defects that cannot be rectified are identified as part of any maintenance or safety check activity, reference should be made to the requirements of the Gas Industry Unsafe Situations Procedure [21].

Annex A (informative)
Calculation of required heat output of a fire

A.1 Sizing a fire

Heat is lost from a room to the fabric of the building, i.e. through walls and floors, and as a result of ventilation heat losses. The heat output of an appliance is usually sized to match these heat losses under design conditions, i.e. the assumed internal and external temperatures of a room and the assumed ventilation rate. Typical design values for temperature and ventilation are given in Table 1A and Table 1B.

Experience has shown that for normal use an inset live fuel effect gas fire with a heat input of approximately 5 kW to 7 kW will normally be adequate for single room heating and may, after a heat up period at full rate, be used at turn down rate to maintain comfort conditions within the room.

A.2 Fabric heat losses

To calculate the heat loss (in W) through the structure of an element (e.g. a wall) the following formula is used:

Heat loss = surface area (m^2) × *U* value ($W/m^2 \cdot °C$) × temperature difference (°C).

The heat loss is calculated for each wall, window and floor in a room. In the case of an outside wall the outside design temperature is normally taken to be –1 °C, but this will vary according to geographical location. Heat loss coefficients for typical building structures, called *U* values, are quoted in BS 5449 and the CIBSE guide, volume A, *Design data* [22].

A.3 Ventilation heat losses

To calculate the heat loss from a room due to ventilation the following formula is used:

Heat loss = air change rate/h × volume (m^3) × ventilation factor ($W/m^3 \cdot °C$) × temperature difference (°C).

The ventilation factor is normally taken to be 0.33 $W/m^3 \cdot °C$.

A.4 Calculation method and example

Calculate and add together the fabric and ventilation heat losses from the room (or space) in which the appliance is to be sited. This figure will represent the design heat loss. The required heat output of the appliance should be at least equal to the design heat loss, i.e.:

Required heat output ≥ Design heat loss (W/m^3).

A demonstration of this method is given in example A. It should be noted that the heat output calculated in the example relates solely to the construction specified and should not be used as a guide to appliance sizing.

Example A. Living room

An inset live fuel effect gas fire is installed in a living room in a house where no energy conservation measures have been taken; no cavity insulation, no double glazing and only linoleum floor covering. The room has two external walls and dimensions of 4.0 m × 4.0 m × 2.4 m with a single window of 1.5 m × 1.0 m. The temperature of the adjacent hall and kitchen, and upstairs bedroom is 18 °C and the ventilation rate is 1.5 air changes per hour.

For a temperature of 21 °C in the living room the data needed to obtain the minimum heat output required from the fire is given in Table A.1.

From the data given in Table A.1 the total or design heat loss is calculated to be 1 439 W. The heat output of the appliance should therefore be at least 1.44 kW.

Table A.1 — Fabric and ventilation heat losses for example A

Fabric heat losses				
Element	**Area** m^2	***U* value** $W/m^2 \cdot °C$	**Temperature difference** °C	**Heat loss** W
Outside wall	4 × 2.4	0.92	22	195
Outside wall	(4 × 2.4) – 1.5	0.92	22	264
Party walls	4 × 2.4 (×2)	1.9	3	110
Ground floor	4 × 4	0.59	22	208
Ceiling	4 × 4	1.62	3	78
Window	1.5 × 1	5	22	165
Ventilation heat losses				
Ventilation rate Air change rate/h	**Volume** m^3	**Ventilation factor** $W/m^3 \cdot °C$	**Temperature difference** °C	**Heat loss** W
1.5	4 × 4 × 2.4	0.33	22	419

Annex B (informative)
Calculation of clearance flue flow

B.1 Introduction

The following test procedure is given for possible use by appliance manufacturers, Notified Bodies/Test Houses and others in the assessment of the clearance flue flows of appliances intended for installation within the UK. Appliances which have a clearance flue flow rate of less than 70 m^3/h under the conditions specified below, and which do not exceed 7 kW heat input, may not require an air vent in the room or internal space in which they are installed provided all the other requirements of this standard are met. The appliance manufacturer's instructions will give advice in this respect.

This is a laboratory test and is not for use by gas installers seeking conformity with this standard.

B.2 Determination of clearance

The point of just clearing is determined in the laboratory by operating the appliance on the standards test flue at its nominal input rate. The flue is restricted and spillage is detected by the method described (see **B.6**). The clearance flue flow rate is calculated at the point of just clearing (see **B.7**).

Before any tests are made, the appliance should be operated at its full working temperature for a period sufficient to dry the insulation and remove any temporary finish that might interfere with observations.

B.3 Preparation of appliance

The appliance should be installed and adjusted in accordance with the manufacturer's instructions, using the appropriate reference test gas at the following inlet pressure.

B.4 Gas tightness

B.4.1 *General*

When tested as described below the fully assembled appliance should be sound at the internal air pressure given in Table B.1.

Where the appliance is for use on both gas families, the test pressure should be 150 mbar.

The appliance is deemed to be gas tight if the leakage rate does not exceed 100 cm^3/h over a period of 1 min.

NOTE One convenient method of measuring the leakage rate is by the bubble leak indicator illustrated in Figure B.1. A rate of seven bubbles per minute should be equivalent to 100 cm^3/h but this should be checked before the indicator is used.

Table B.1 — Test internal air pressures

Family	Air pressure mbar
2nd	50
3rd	150

B.4.2 *Method*

Connect to the appliance inlet an air supply maintained constant at the appropriate pressure and embodying a suitable meter for measuring air flow. Test the appliance under the following conditions:

a) all gas taps in the OFF position;

b) all gas taps turned to the ON position

any flame supervision device being maintained in the open position by suitable means (e.g. thermal or mechanical) compatible with its normal operation and all injectors and pilots capped off.

B.5 Heat input

B.5.1 *General*

The heat input is that which would be obtained with a reference gas of the Wobbe number shown in Table B.2.

Table B.2 — Wobbe number for test gases

Family	Test gas	Wobbe number[a] MJ/m^3
2nd	G20	50.8
3rd	G30	87.5
	G31	77.0
[a] The reference conditions are 1 013.25 mbar, 15 °C, dry.		

The heat input is measured with the appliance fitted to the test box and flue in accordance with **B.6** and 1 h after lighting.

For category I, appliances the heat input should be measured with G30 gas only.

B.5.2 *Tolerance*

The heat input should be within ±5 % of the rated heat input with the pressure indicated in Table B.3 applied to the inlet of the appliance and with the appliance adjusted to the manufacturer's recommended setting pressure.

Table B.3 — Inlet pressure for tolerances

Family	Test gas	Inlet pressure mbar
2nd	G20	20
3rd	G30	29
	G31	37
NOTE The heat input of the type test sample should be within ±2 % of the rated heat input in order to ensure that the results of other tests are not unduly affected by deviations from the stated test conditions.		

B.5.3 *Calculation of reference gas heat input*

The appliance gas rate is measured under the specified operating conditions using available test gas and either a wet or dry meter.

The heat input using the test gas is then given by:

$$Q = q_m F_m \left(\frac{288.15}{t_g + 273.15}\right)\left(\frac{p + p_a - p_w}{1\ 013.25}\right)\frac{H}{3.6} \quad \text{(B.1)}$$

where

Q is the heat input using the test gas (in kW);

q_m is the measured gas rate in (m^3/h);

F_m is the meter calibration factor;

t_g is the meter temperature (in °C);

p is the meter (gauge) pressure (in mbar);

p_a is the atmospheric pressure (in mbar);

p_w is the saturation vapour pressure of water at the dew point of the test gas (in mbar);

H is the calorific value of the test gas (in MJ/m^3) at 1 013.25 mbar and 15 °C, dry.

NOTE When using a wet meter the dew point of the test gas is equal to t_g °C.

The heat input of the reference gas is then given by:

$$Q_r = Q\frac{W_r}{W_t}$$

where

Q_r is the heat input using the reference gas (in kW);

W_r is the Wobbe index of dry reference gas;

W_t is the Wobbe index of the test gas.

NOTE The Wobbe index of the test gas has to relate to the state of the gas as used.

$$W_t = \frac{H_w}{\sqrt{d_w}}$$

i.e. if using a wet meter

$$W_t = \frac{H_d}{\sqrt{d}}$$

if using a dry meter

where

H_w is the calorific value of the wet test gas (in MJ/m^3);

H_a is the calorific value of the dry test gas (in MJ/m^3);

d_w is the relative density of the wet gas;

d is the relative density of the dry gas.

The wet and dry calorific values are related by the expression:

$H_d = 1.017\ 74 H_w$

and the wet and dry relative densities by:

$$d_w = \frac{(p + p_a - p_w)d + 0.622 p_w}{p + p_a}$$

B.6 General conditions of test

B.6.1 *Test room*

The room should be adequately ventilated, but free from draughts likely to affect the performance of the appliance. If the test results are influenced by the temperature of the ambient air, the room temperatures should be maintained at (20 ± 5) °C.

The appliance should be installed on a test box and flue in accordance with Figure B.2.

Where an appliance is also suitable for installation and use in a metal flue box the appropriate test should be carried out in a flue box and test flue assembly (see Figure B.3). The flue box and test flue are supplied by the manufacturer to the test authority. The flue box should have the minimum dimensions specified in the manufacturer's installation instructions and should conform to the constructional requirements of BS 715. The test flue should have the minimum nominal diameter specified in the manufacturer's instructions and be of such a height that the distance between the base of the flue box and the top of the flue is 3 m.

Where the appliance is to be used with a surround, specific to the appliance, this surround should be supplied by the manufacturer for the purposes of testing the appliance. This surround should be of the minimum thickness specified in the manufacturer's instructions.

The appliances should be at room temperature at the start of each test.

During testing the initial adjustment of the appliance should not be altered.

Precautions should be taken to prevent thermostat or other variable controls from acting to interfere with the gas flow, except as necessitated by the test.

Test pressures should be measured correct to 0.2 mbar and controlled so that the variation does not exceed ±0.2 mbar.

B.6.2 *Test method*

B.6.2.1 *Apparatus*

The method for measuring the amount of leakage involves collecting, in a hood placed over the appliance, the convected air output from the appliance, together with any escaping products. Figure B.4 gives details of a hood suitable for the majority of appliances. For appliances for which this hood is not suitable, a special hood should be constructed by the appliance manufacturer and supplied to the testing authority.

The positioning of the hood is illustrated by Figure B.5. The back panel may be adapted to fit around the fireplace opening and should be sealed to the face of the test box. The front lower edge of the hood is positioned above the likely source of leakage such that:

a) the hood is positioned as low as possible without affecting the performance of the appliance under test;

b) there is no loss of combustion products from the bottom of the hood. Instrumentation is required capable of measuring the CO_2 content of gas to an accuracy of 0.002 %.

B.6.2.2 *Preliminary adjustment*

It is an advantage in this test method to minimise the flow through the collecting hood, thus increasing the CO_2 fraction of the sample. This is done by adjusting the hood damper. Care should be taken to ensure that the hood does not spill. This is checked by sampling along the front bottom edge of the hood and comparing the CO_2 content with that of ambient air in the same plane as the horizontal edge of the hood (see Figure B.5). When the adjustment of the hood damper is completed a period of not less than 30 min should be allowed for the hood to stabilise to its new condition before starting the test.

Take samples of the air from:

a) the hood without injection;

b) the hood with injection CO_2;

c) the room in which the appliance is installed.

During the test ensure that the CO_2 content of the air passing into the appliance does not exceed 0.1 % and does not vary by more than 0.02 % during any one test.

NOTE 1 Rates of injection of 0.02 m^3/h and 0.04 m^3/h have been found suitable for the majority of appliances.

NOTE 2 It has been found that the laboratory air can fluctuate quite rapidly and therefore a fast response analyser or alternatively simultaneous sampling into bags is recommended.

B.6.2.3 *Calculation of results*

The leakage of dry undiluted products of combustion ν (in m^3/h per kilowatt of heat input) is calculated from the following equation:

$$v = \frac{r \times (b - a_1)}{(c - a_2) - (b - a_1)} \times \frac{K}{Q}$$

where

a_1 is the CO_2 in laboratory air when CO_2 is not injected (in %);

a_2 is the CO_2 in laboratory air when CO_2 is injected (in %);

b is the CO_2 in hood when CO_2 is not injected (in %);

c is the CO_2 in hood when CO_2 is injected (in %);

r is the injection rate (in m^3/h);

Q is the appliance heat input (in kW) calculated for the test gas [see Equation B.1];

K is the ratio of the volume of dry products to the volume of CO_2 per unit volume of gas.

Table B.4 gives the K values for the reference gases.

Table B.4 — *K* values for reference gases

Family	Test gas	*K*
2nd	G20	8.57
3rd	G31	7.31
	G30	7.15

Two pairs of results are used to calculate two values for the rate of leakage. The two values should be within ±0.004 m^3/h per kilowatt of heat input.

The point of just clearing should be determined by restricting the flue outlet to the point where leakage from the appliance is 0.04 m^3/h per kilowatt of heat input.

B.7 Determination of clearance flue flow

The flue flow is determined by measuring the CO_2 in the flue attributable to the appliance and calculating from the formula:

$$q = R\left(\frac{100A}{B} + C\right)$$

where

q is the flue flow (in m^3/h);

R is the gas rate (in m^3/h);

A is the CO_2 produced by combustion (in m^3/m^3) calculated from the volumetric composition of the test gas;

B is the CO_2 in the flue attributable to the appliance (in %) at the point of just clearing;

C is the water vapour produced by combustion (in m^3/m^3) calculated from the volumetric composition of the test gas.

Dimensions in millimetres

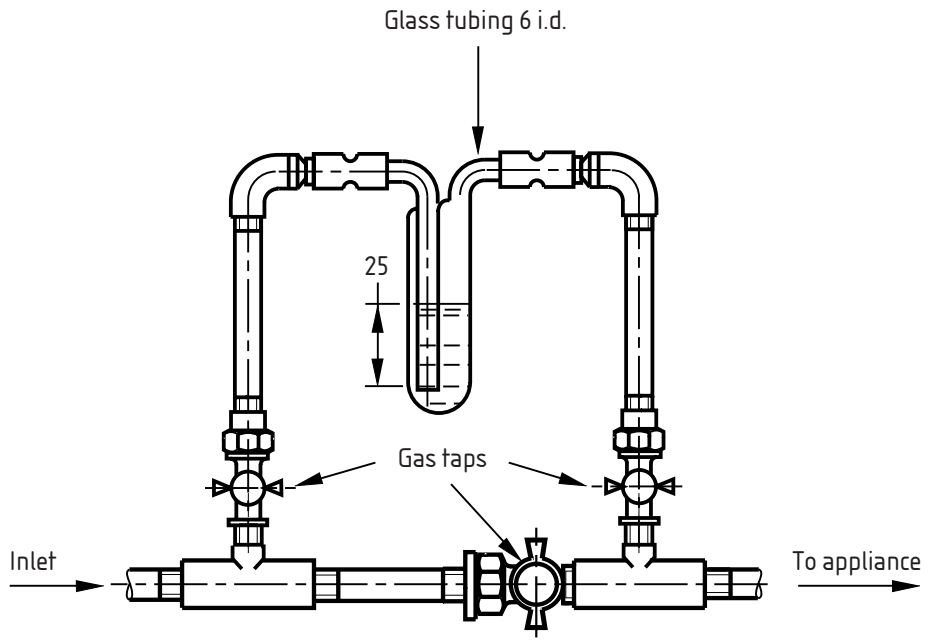
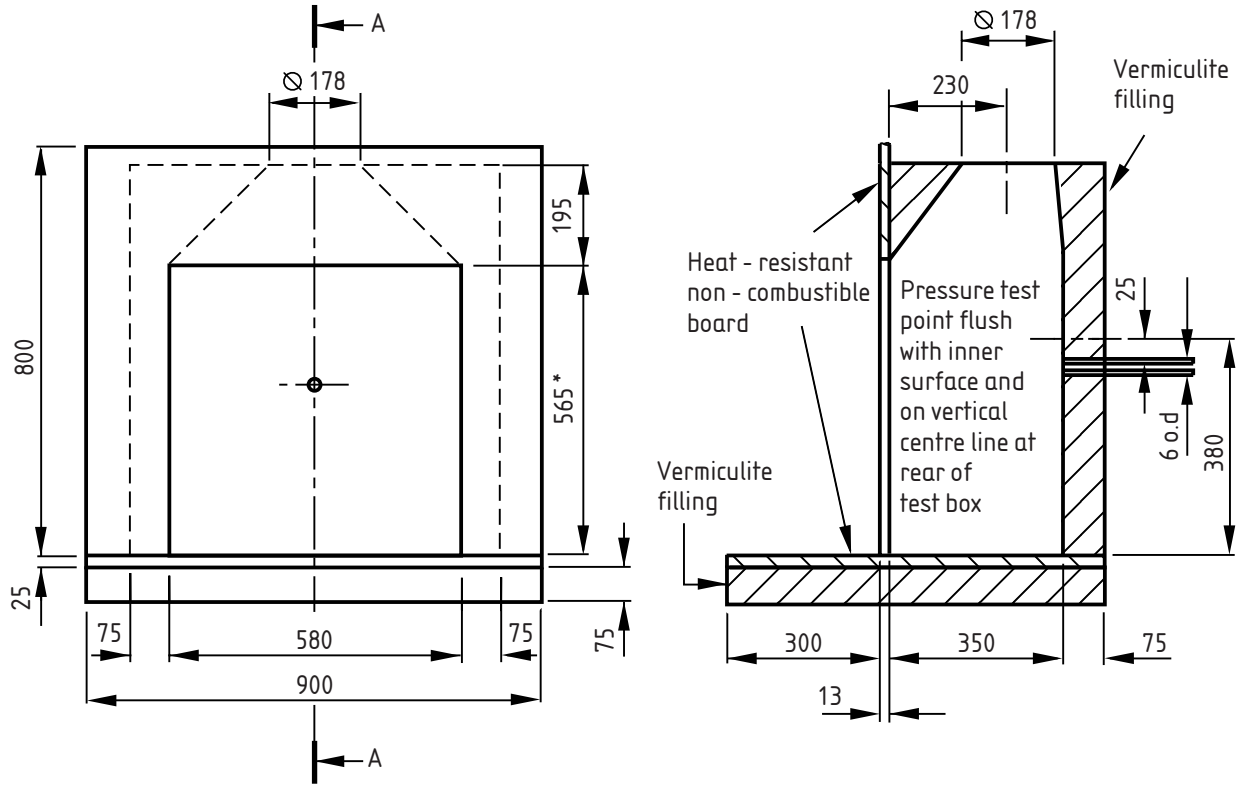


Figure B.1 — Bubble leak indicator

Dimensions in millimetres



Front elevation **Side elevation**

Material

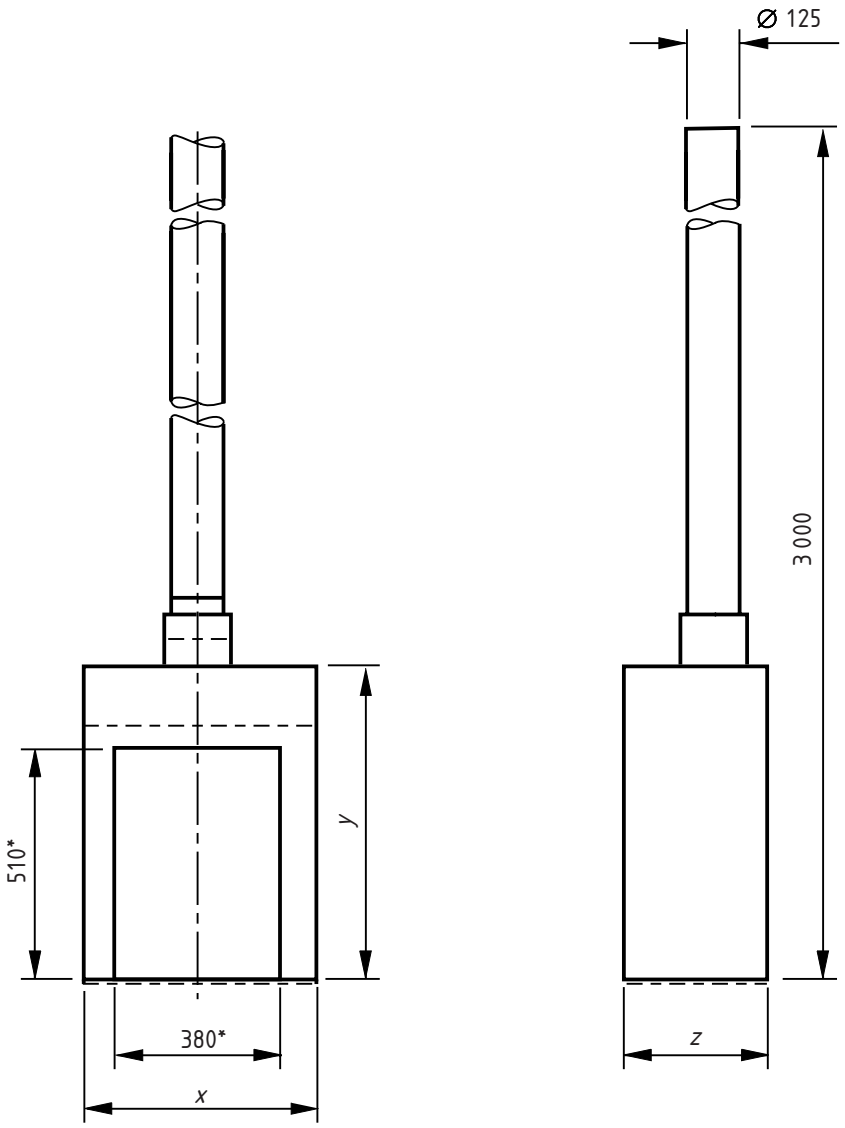
external surfaces: polished aluminium

internal surfaces: steel (preferably stainless)

* Minimum internal height figure. Will probably need to be increased to suit brick used.

Figure B.2 — Basic test box

Dimensions in millimetres



Front elevation **Side elevation**

NOTE 1 Dimensions marked with an asterisk are minimum dimensions.

NOTE 2 Dimensions *x*, *y* and *z* are subject to the limitations specified in the manufacturer's instructions.

Figure B.3 — Test box and flue for appliances that can be installed in a metal flue box

Dimensions in millimetres

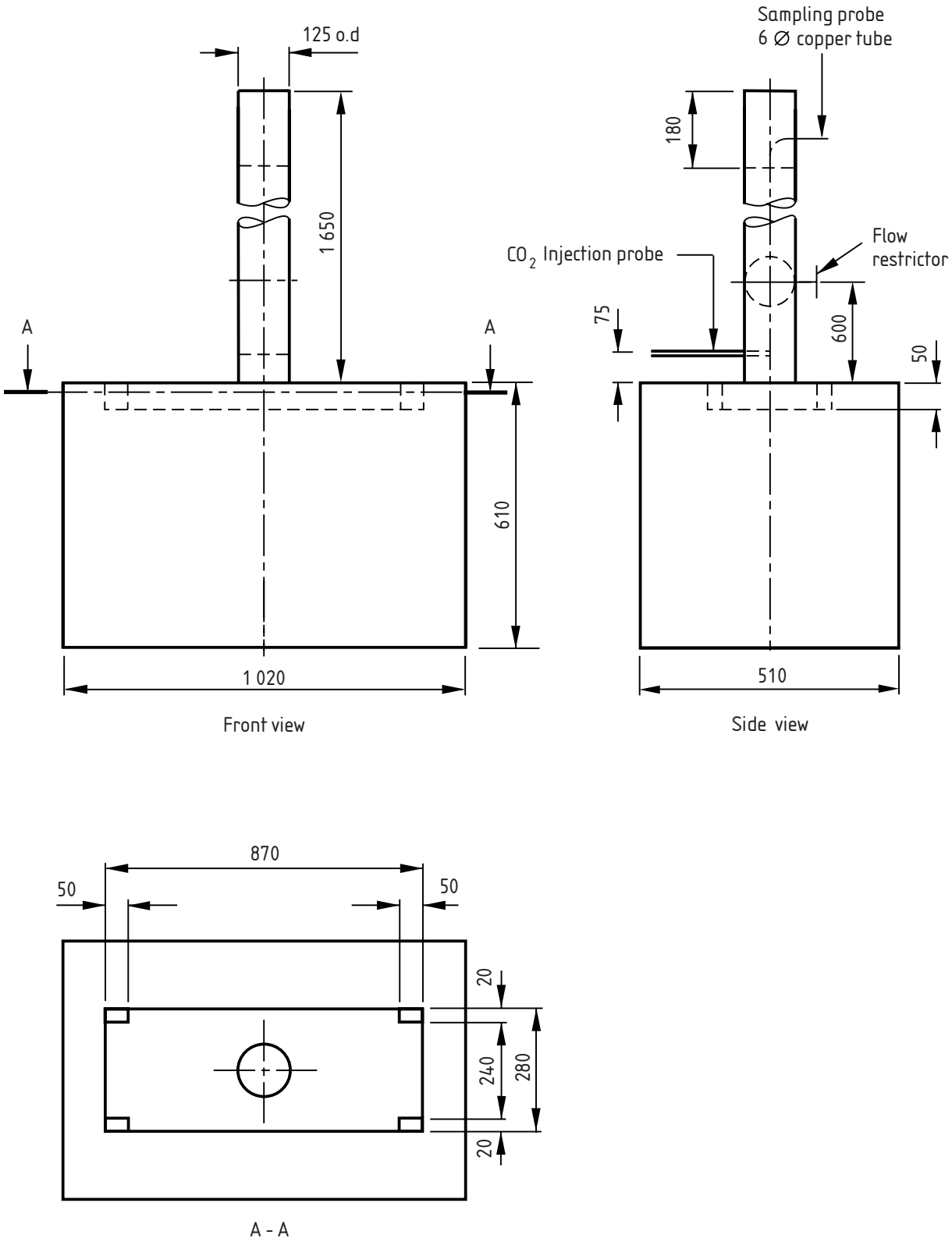


Figure B.4 — Collecting hood

Dimensions in millimetres

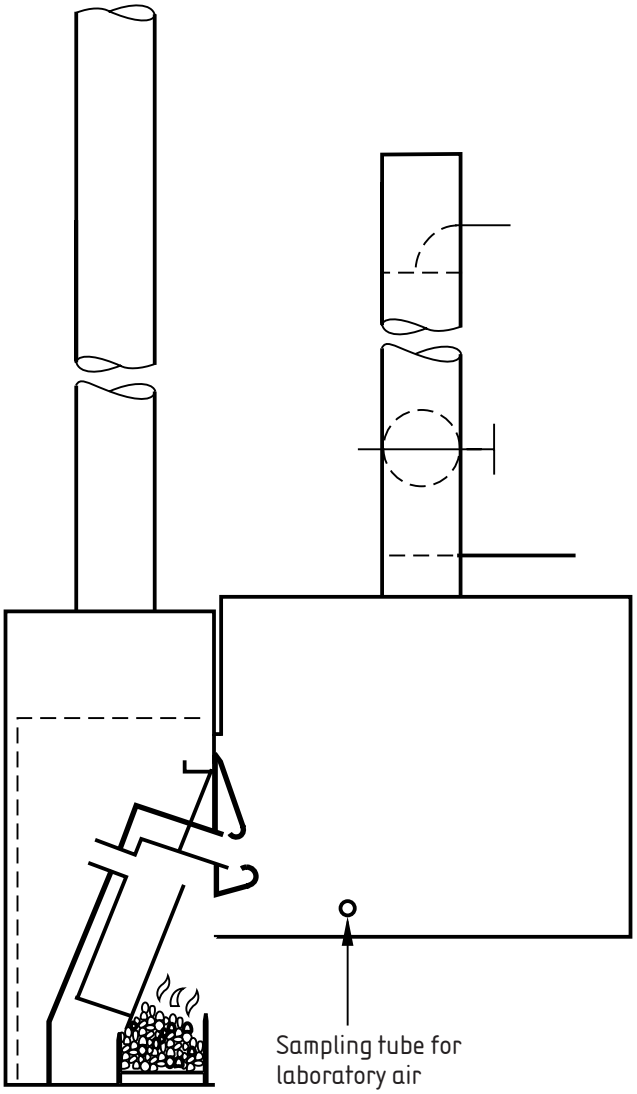


Figure B.5 — Collecting hood positioning

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