BRITISH STANDARD

BS 5871-1:2005

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

Part 1: Gas fires, convector heaters, fire/back boilers and heating stoves (2nd and 3rd family gases)

ICS 91.140.10; 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
LP Gas Association
Society of British Gas Industries
Co-opted Members

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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direction of the Gas Standards Policy Committee and is a revision of BS 5871-1:2001, which is obsolescent and will be withdrawn in due course.

This new edition of BS 5871-1 comes into effect on 11 July 2005.

Requirements for flueless appliances specified in BS 5871-1:2001 no longer appear in this new edition of the standard. These are to be included BS 5871-4, which is currently in the course of preparation. The requirements for flueless appliances specified in BS 5871-1:2001 will remain current until such time as BS 5871-4 is published.

This revision provides an update of the previous standard and has also been extended to cover the installation of heating stoves and appliances where the flue is connected directly to the appliance outlet spigot. 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 of nominal heat input not exceeding 6 kW (2nd and 3rd family gases)* (in the course of preparation).

To identify which part of BS 5871 to use when fitting an appliance which simulates a solid fuel fire or produces other decorative effects, e.g. a pebble 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 i) of the commentary and recommendations in 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 5871-1 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.

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 In the preparation of this standard, the opportunity has been taken to present it in the format of a practice specification. 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 [6].

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 59 and a back cover.

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[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 2.

1 Scope

This part of BS 5871 specifies installation and maintenance requirements for flued fixed space heating appliances burning 2nd and 3rd family gases for the purpose of heating rooms or spaces in domestic (see Note 4) or commercial premises. It applies to appliances known as radiant gas fires, radiant convector gas fires, convector heaters, and heating stoves. Combined appliances of the type where a gas 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.

This standard covers the selection of a suitable appliance, the flueing and/or ventilation 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 5) and BS 5546 for this part of such an installation.

This standard is not applicable to:

a) mobile and portable appliances conforming to BS EN 449; or

b) appliances in touring caravans; or

c) open-fronted radiant-convector heaters without a dress guard.

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

NOTE 1 Attention is drawn to the foreword concerning fuel effect appliances which burn gas so as to simulate a solid fuel fire or produce other decorative effects. The only types of such appliances covered by this part of BS 5871 are those detailed in i) of the commentary and recommendations on Clause **5** of this standard. Further guidance in this respect is given in Figure 1.

NOTE 2 Heat inputs in this document are based on net calorific value. Figures based on gross calorific value are given in parentheses where deemed necessary. (See also Clause **5**, commentary and recommendations, h).

NOTE 3 Attention is drawn to the foreword concerning the installation of used appliances.

NOTE 4 As well as normally constructed dwellings, domestic premises include any permanently sited caravans, holiday homes, residential park homes and permanently moored boats. See IGE/UP/8 [8].

NOTE 5 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*, Specification for metal flue pipes, fittings, terminals and accessories for gas-fired appliances with a rated input not exceeding 60 kW.*

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

BS 1945*, Specification for fireguards for heating appliances (gas, electric and oil-burning).*

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 flue lining 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 hot water supplies for domestic purposes, using gas-fired appliances of rated input not exceeding 70 kW.*

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 applicances — 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 8423, *Fireguards for fires and heating appliances for domestic use — Specification.*

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

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.*

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

3.6
closure plate
non-combustible plate for closing off substantially a fireplace opening when installing a gas fire, where required, supplied with the appliance

NOTE This can be separate or part of the appliance.

3.7
condensing appliance
appliance designed to make use of the latent heat in the combustion products water vapour by condensing the water vapour within the appliance

3.8
convector heater
appliance that is designed to heat a room mainly by the emission of air heated by convection

3.9
direct flue connection
connection of an appliance 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 10.

3.10
dress guard
guard conforming to BS 1945 and an integral fitting to the front of and forming part of a gas fire

3.11
fanned flue system
flue system in which the removal of flue products is dependent on a fan

3.12
fireguard
guard conforming to BS 8423

3.13
fireplace opening
aperture formed in the face of the builder's opening, the fireplace recess, flue box or fire surround, if fitted

3.14
fireplace recess
recess formed by the inclusion of fireplace components in the builder's opening

3.15
fire surround
purpose-designed setting for a gas fire, fitted against a wall at the base of a flue and usually incorporating a hearth

3.16
flue box
non-combustible enclosure that provides a substitute builder's opening or fireplace recess

NOTE It may be used either within an existing masonry builder's opening or form part of a false chimney breast construction.

3.17
flue gas collector
proprietary form of flue box with a flue outlet which is located and sealed against the front of a fire surround or builder's opening, and to which a connection is made with a flexible flue liner inside the builder's opening

3.18
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".

3.19
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

3.20
gas fire
flued appliance for heating one room and incorporating a radiating surface, either in the form of a radiant or an imitation fuel

3.21
hearth
slab of fire-resisting material to prevent overheating of the surface beneath the appliance

3.22
heating stove
free-standing appliance designed to simulate a solid fuel burning stove

NOTE Some heating stoves are connected to a flue by means of a closure plate, others may have a direct connection to a metal flue system.

3.23
imitation fuel
non-combustible component supplied with the appliance and designed to be in contact with gas flames

3.24
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

3.25
installation instructions
instructions printed and provided 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.

3.26
internal space
interior space such as a hall, passageway, stairway or landing, which is not a room

3.27
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.

3.28
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

3.29
radiant
component forming part of a gas appliance and designed to become incandescent when heated by a gas flame

3.30
radiant convector gas fire
gas fire designed to emit heat by both radiation and convection

3.31
radiant gas fire
gas fire designed to emit heat mainly by radiation

3.32
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

3.33
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 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, 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 heater. Hearths for appliances should be provided where necessary.

5 Appliances

The appliance, if new, shall carry "CE" marking 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" marking; 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).

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.

b) *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. However, a high-rated convector heater can be used in a hall, for example, to provide background central heating.*

c) *Gas fires are available in two types, radiant fires and radiant/convector fires. They may be open-flued or room-sealed and may be available with either natural draught or fanned draught flueing. The installation of flueless gas fires is to be covered by BS 5871-4, which is currently in preparation. The requirements for flueless gas fires specified in BS 5871-1:2001 remain current until BS 5871-4 is published (see foreword).*

d) *Convector heaters may be room-sealed or open-flued. The flued types may be available with natural draught or fanned draught flueing.*

Whenever practicable a room-sealed appliance should be installed.

e) *Heating stoves may be open-flued or room-sealed. Open-flued versions are available in two basic types, freestanding and those which have a rear flue spigot which passes through a closure plate (see Figure 11, Figure 12, and Figure 13). Room-sealed heating stoves are available with horizontal or vertically run balanced flues.*

f) *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.*

g) *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 ***9.2*** *in relation to multi-appliance installations.*

h) *Gas fires, convector heaters, fire/back boilers, fire/back circulators and heating stoves 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*
Gas fires:		
	Radiant (5 kW to 6 kW)	*4.5 kW to 5.4 kW*
	Radiant/convector (4 kW to 8 kW)	*3.6 kW to 7.2 kW*
Convector heaters:		
	Flued (2 kW to 22 kW)	*1.8 kW to 20 kW*
Heating stoves:		
	(4 kW to 7 kW)	*3.6 kW to 6.3 kW*
Fire/back boilers/back circulators:		
	Fire (4 kW to 8 kW)	*3.6 kW to 7.2 kW*
	(radiant, radiant convector)	
	Boiler (up to 22 kW)	*20 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.

i) *Gas fires of the fuel effect type covered by this part of BS 5871 are available as follows:*

1) *for installation to a chimney or flue box using a closure plate [see Figure 1a) and* ***10.3****,* ***10.4*** *and* ***10.5****]*;

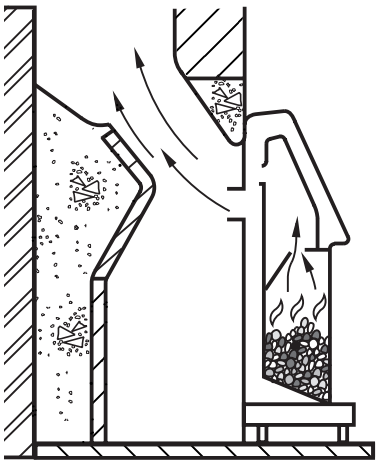
2) *for use with a proprietary fanned draught flue system (see* ***10.7****);*

3) *supplied with a flueing system, the fan for the evacuation of combustion products being integral with the appliance;*

4) *for installation with a direct flue connection.*

j) *The appliances covered in (2) and (3) of i) do not require a chimney or flue box for the evacuation of their combustion products. Appliances of the type detailed in (3) may be of the condensing type. (See* ***10.8****).*

k) *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 combustion products to the flue serving the appliance.*



a) Gas fire

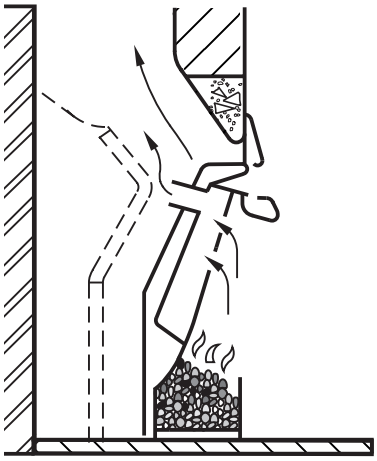
BS 5871-1

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.



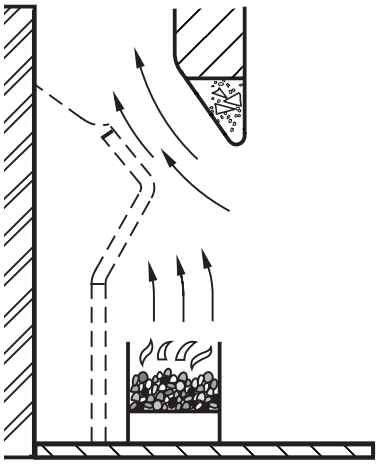
b) Inset live fuel effect gas fire

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 materials, including a total ban of asbestos cement and its products. 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 heat 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 without a "CE" mark purchased second hand is unlikely to 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 below ground level with respect to one side of the building but open to ground level on the opposite side.

8 Appliance sizing

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

COMMENTARY AND RECOMMENDATIONS ON CLAUSE **8**

Temperature requirements, ventilation rates and appropriate U values are given in detail in the National Annex to BS EN 12828, which repeats the values given 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.

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	18	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 mm^2 (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

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 an appliance are given in Annex A.

9 Ventilation

9.1 General

The appliance 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 gas 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**

Attention is drawn to the following.

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

b) *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 recommendation on Clause **19.4** concerning installations deficient in ventilation.*

NOTE 1 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.

NOTE 2 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 should be provided unless otherwise specified in the manufacturer's instructions.

c) *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.*

d) *For the purposes of this standard and safety reasons, a conservatory should be treated as a habitable room.*

9.2 Multi-appliance installations

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

COMMENTARY AND RECOMMENDATIONS ON **9.2**

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, appliances covered by this standard shall be flued in accordance with BS 5440-1.

Before installing any open-flued appliance covered by this standard, the correct operation of the flue shall be verified by testing in accordance with BS 5440-1.

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

Appliances shall be connected only to the types and sizes of flue system as specified in the appliance manufacturer's instructions. (See also **11.3.4**.)

A chimney with a flue of 170 mm diameter or less shall be fitted with a terminal.

COMMENTARY AND RECOMMENDATIONS ON **10.1**

*For appliances covered by this part of BS 5871, **10.1** to **10.8** either draw particular attention to the requirements 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. 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.*

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 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].

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, 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 an appliance 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.

Before installing an appliance, it shall be ensured that the base of the flue is clear of debris.

Where a metal flue system is used to line a masonry chimney, this shall conform to **10.6**.

COMMENTARY AND RECOMMENDATIONS ON **10.3**

A masonry chimney may be oversized for some of the appliances 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 appliance manufacturer's instructions (for example, the use of a flue spigot restrictor).

When a gas fire or gas fire/back circulator is connected to a chimney designed for use with solid fuel, it is not 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.

For open-flued convector heaters, a correctly sized connecting opening 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, BS EN 1858 or BS 6461-1. The appliance manufacturer's instructions should be consulted regarding the suitability of an appliance for use with a precast flue block chimney. Where this is permitted, openings in which appliances are to be fitted may be made from purpose designed precast recess panel blocks or formed of brickwork or masonry. It should be noted that the manufacturer's instructions may include special requirements for the installation of gas 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 appliance 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, BS 715 or BS EN 1856-1 and BS EN 1856-2. A flue box shall only be used to house a gas 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**

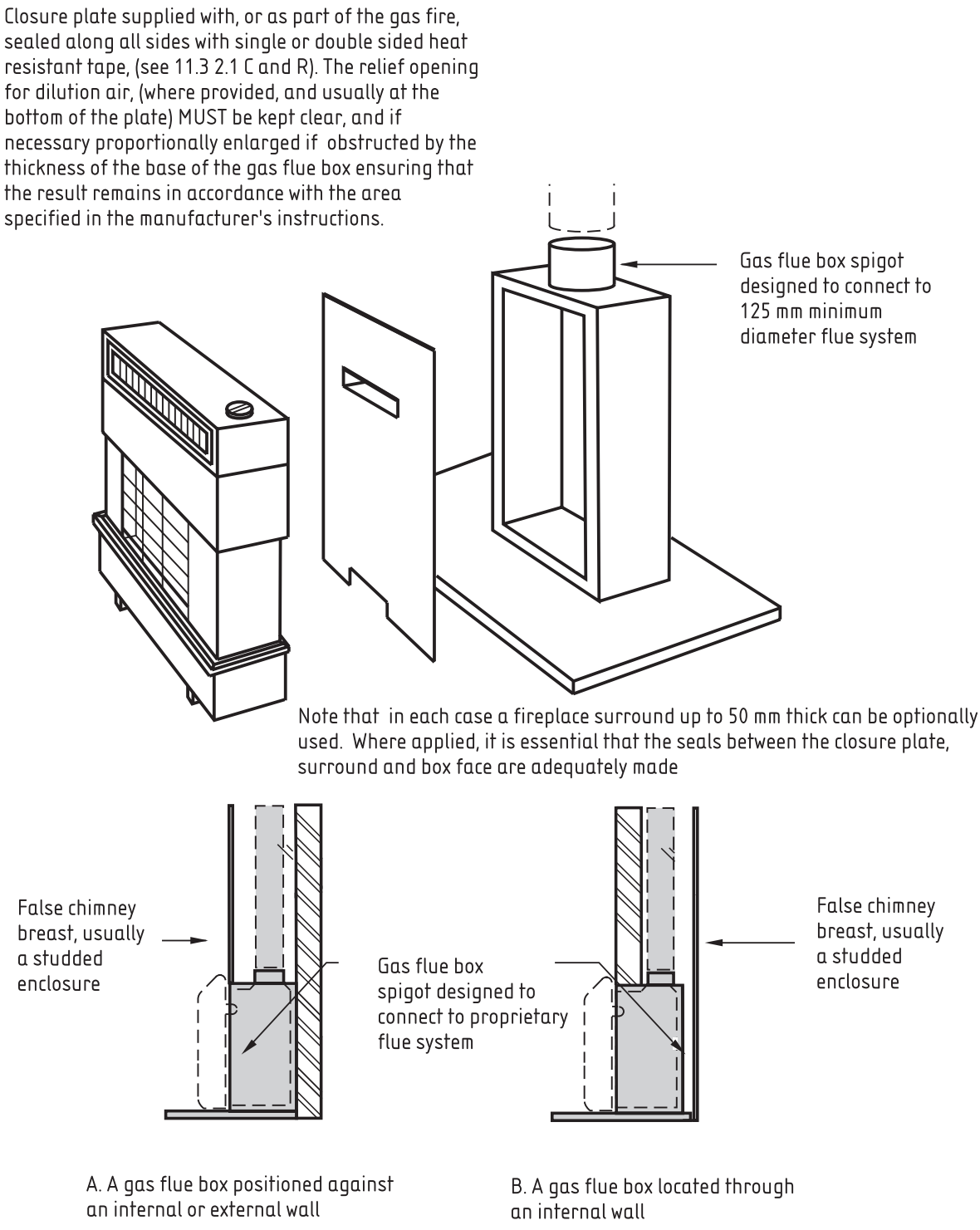
Methods of installation using a flue box, flue pipe and flexible flue liner are shown in Figure 2 and Figure 3.

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 mount a closure plate or seal the appliance housing against (e.g. as necessary in the case of an inset live fuel effect gas fire).*

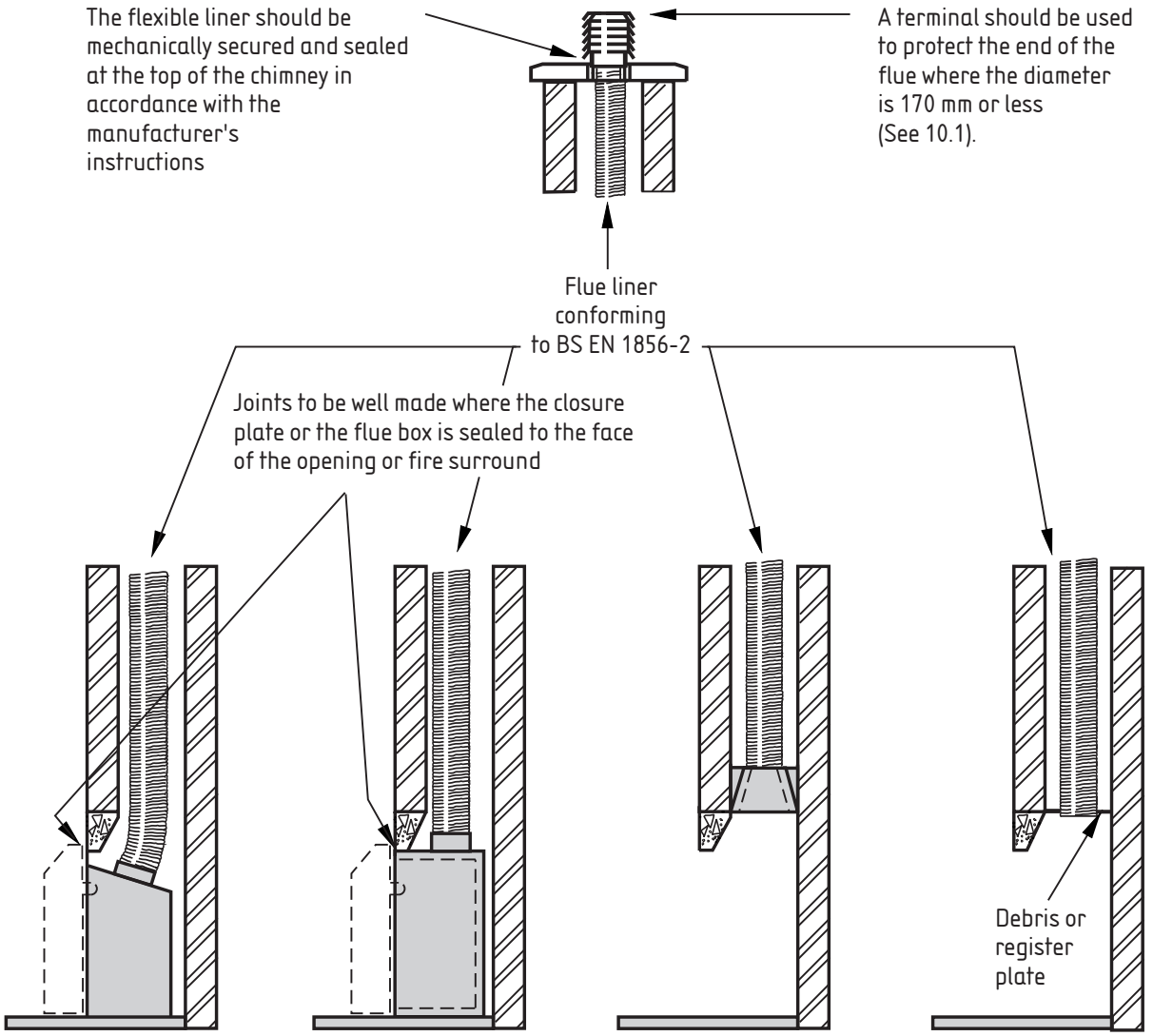


NOTE 1 The gas flue box manufacturer's installation requirements may require an air gap clearance from the outside of the box to any combustible material. That would include a wall of timber stud and plasterboard construction.

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 2 — Method of installing a gas fire in conjunction with a flue box and flue pipe



a) Flue liner connected to a proprietary flue gas collector. For use with an appliance with a closure plate

b) Flue liner to BS EN 1856-2 connected to a gas flue box conforming to BS 715. Used with an appliance with or without a closure plate.

c) Flue liner mechanically secured and sealed into a proprietary gather above the builder's opening (see 16.1)

d) Flue liner mechanically secured and sealed with a clamp plate to a debris or register plate above a builder's opening. N.B. 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 11.3.2.8 and 16.1).

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 fire/back boiler or circulator

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.

10.7 Proprietary fanned draught flue systems

Before an appliance is installed for use with a proprietary fanned draught flue system, the gas appliance manufacturer's instructions shall be checked to confirm that it is an acceptable combination.

The installation shall be in accordance with the instructions supplied by the manufacturer(s) of both the appliance and of the flue system. Where a replacement fire is to be fitted to an existing fanned draught flue system, the gas fire manufacturer's fixing kit shall be used and all requirements of this standard satisfied.

COMMENTARY AND RECOMMENDATIONS ON **10.7**

Consideration should be given to the following.

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

b) *This clause is not intended to cover appliances which have an integral fan to evacuate their products of combustion.*

c) *Proprietary fanned draught flue systems for fires are available in both side and rear exit forms. Figure 4 illustrates a side exit type.*

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

e) *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.*

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

10.8 Condensing appliances

An appliance designed to operate in a condensing mode shall be installed in accordance with the manufacturer's installation instructions which will detail provisions for condensate disposal and any requirements on the size and length of flue.

COMMENTARY AND RECOMMENDATIONS ON **10.8**

Appliances of this type normally incorporate a fanned draught flue system, thus enabling small-bore flue piping, which may be non-metallic, to be used both for evacuating the products of combustion and for the drainage of any condensate.

With such flue systems, special jointing techniques may apply and any instructions should be followed. The maximum length of flue pipe, including bends, etc., together with permitted flue materials, will be specified in the manufacturer's instructions.

If the appliance installation instructions state that it is permissible, the flue may be designed to conduct condensate from the flue back to the heater for disposal through the heater's condensate drain. Alternatively or additionally, provision may be made to drain the flue at any convenient point. Some heaters may combine the flue and condensate drain as a single pipe.

In most circumstances a flue drain pipe requires a trap to prevent flue products escaping, air from entering the flue, or smells from entering the premises.

Where the heater input does not exceed 4 KW it might be acceptable to discharge the condensate other than to a drain provided this is in accordance with the appliance manufacturer's instructions; any combined flue and condensate discharge pipe should project a minimum of 75 mm from the point of exit on an external wall and be sited such that condensate cannot drain onto a pathway where freezing of the condensate might cause a hazard.

Further details on the installation of condensing appliances is given in BS 5440-1.

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.

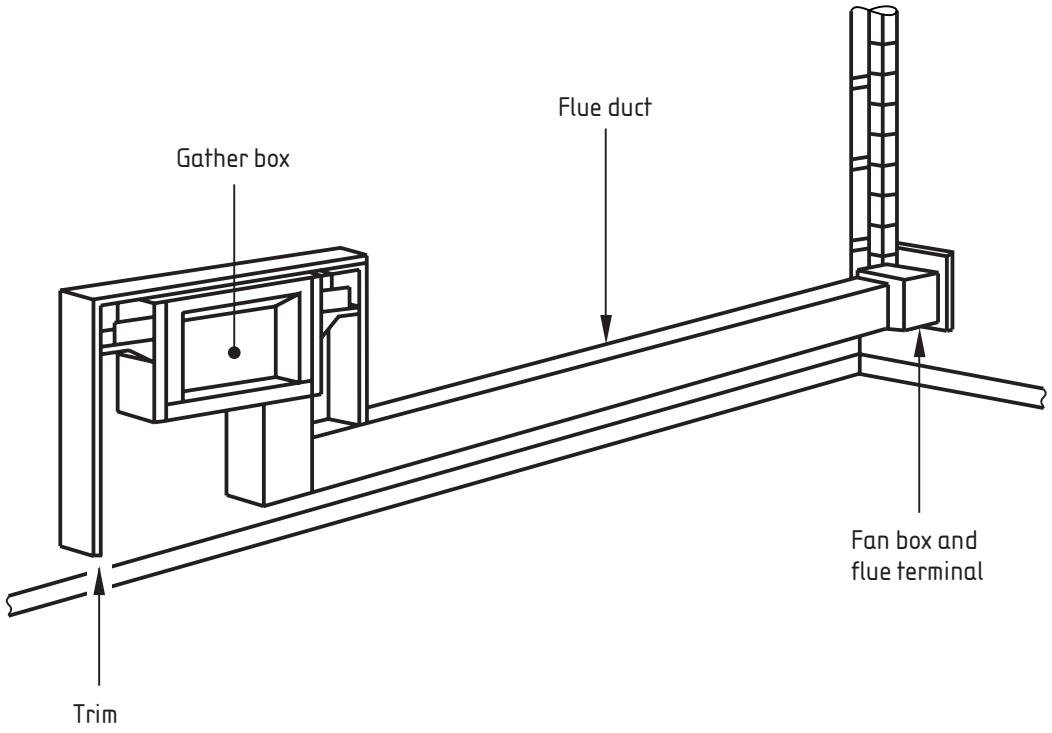


Figure 4 — Installation of a side exit fanned draught flue system

11 Appliance fixing

11.1 General

Appliances 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 appliance shall be stood on a hearth or floor, or secured to a wall in accordance with the manufacturer's instructions.

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

Where a redundant solid fuel back-boiler is to be left in situ, it shall be left in a condition where pressure cannot build up and the unit thereby become unsafe.

Any action taken shall avoid creating a path from the builder's opening for combustion products to escape.

COMMENTARY AND RECOMMENDATIONS ON **11.2**

Guidance on installations using 3rd family gases is given in BS 5482-1, BS 5482-2 and BS 5482-3.

Particular care should be taken to ensure that any extra fixing does not impair the ease of servicing of the appliance.

Wherever possible, the open vent should be left complete from the back boiler to its termination over the cold feed tank or connection to the cylinder. If the open vent is disconnected, or cut, any waterway access cover in the back boiler should be removed or the system drained of water as far as practicable and a hole of minimum diameter 6 mm drilled in the boiler.

11.3 Open-flued appliances

11.3.1 *General*

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

11.3.2 *Gas fires*

11.3.2.1 Unless otherwise specified in the manufacturer's instructions, a gas fire shall always be fitted using a closure plate regardless of the type of flue system to which it is connected. Direct flue connection shall conform to **11.3.4**. To eliminate the entry of excess air into the flue, the closure plate shall be sealed to the fireplace wall or fire surround using an adhesive tape or other sealing material which is suitable for the type of surface to which it is to be affixed (see Figure 2, Figure 5, Figure 6, Figure 7, Figure 8 and Figure 9) and shall be capable of maintaining its seal throughout the range of temperature to which it will be subjected. The aspect and dimensions of any ventilation or air relief opening shall be maintained and the opening not obstructed. Any modification to a closure plate shall be in accordance with the manufacturer's instructions.

COMMENTARY AND RECOMMENDATIONS ON **11.3.2.1**

A gas fire is normally supplied with a closure plate of dimensions 660 mm × 440 mm incorporating an opening for the insertion of the flue spigot and, where necessary, a ventilation or air relief opening. (The closure plate can be separate or part of the appliance.) Any ventilation or air relief opening in a closure plate will be located and sized by the manufacturer to allow the correct flue flow rate when the appliance is in operation.

Only tape or other sealing material capable of maintaining its seal (e.g. adhesive strength) at least to a temperature of 100 °C should be used. In this regard, it should be noted that proprietary tapes are available which have been developed for this application. When necessary, tapes or sealants should have sufficient flexibility to seal along uneven surfaces such as rough stone fireplaces.

When a closure plate is removed for inspection or servicing, the tape or other sealing material should be renewed.

*In the case of those fires which use a direct flue connection, see **11.3.4**.*

11.3.2.2 Where a gas fire is brought forward from the fireplace opening, e.g. due to the low forward projection of a mantleshelf above a fireplace, a flue spigot extension shall be used.

NOTE The length of a spigot may be increased by use of a spigot extension, supplied by the manufacturer, up to either 150 mm from the back of the appliance or such other length as may be specified in the manufacturer's instructions.

The flue spigot or spigot extension shall pass through the closure plate and extend through it for at least 15 mm (see Figure 5, Figure 6, Figure 8 and Figure 9). There shall be a minimum clearance of 50 mm (see Figure 5, Figure 6, Figure 8 and Figure 9) between the end of the flue spigot or flue products outlet and any surface.

11.3.2.3 Where a closure plate is inadequate to fill the fireplace opening completely, or where required for aesthetic reasons, an infill panel or surround shall be used with an opening to which a closure plate may be secured.

COMMENTARY AND RECOMMENDATIONS ON **11.3.2.3**

The infill panel or surround should be made from a suitable fire resisting material e.g. calcium silicate, vermiculite, or glass reinforced plaster. Boards made from fibre board (e.g. hard board and medium density fibre board MDF), particle board (e.g. chipboard), strand board (similar to chipboard using larger pieces of wood), or composite veneered boards such as ply wood or block board are not considered suitable. Attention is also drawn to ***12.2*** *concerning protection at the rear of appliances.*

11.3.2.4 The gas fire shall be fitted so that there is a void below the base of the spigot for the collection of debris. The minimum volume of the void and its depth below the fire spigot shall be as given in Table 3.

The finished opening into the void shall be large enough to permit the clearance of any debris when the gas fire and the closure plate are removed.

The void, including that which may be created by any ledge, shall not be so large as to adversely affect performance of the flue by creating abnormal flow.

COMMENTARY AND RECOMMENDATIONS ON **11.3.2.4**

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 3a) and Figure 3b).] The nominal dimensions of the void should not exceed 650 mm wide × 475 mm deep × 800 mm high. (See Figure 5 and Figure 6.)

Table 3 — Minimum void volumes and depths below gas fire flue spigots

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	✓		✓		✓
Depth mm					
75		✓		✓	
250	✓		✓		✓

NOTE A ✓ in the table indicates a requirement.

[a] For example, to BS EN 1806 or BS EN 1858.
[b] For example, to 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.

11.3.2.5 Where a flue system is used, for example in the case where no chimney is available, the gas fire shall be fitted to a flue box which is capable of accepting a closure plate (see Figure 2).

The fire shall be fitted so 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 **11.3.2.5**

Proprietary sheet metal flue boxes conforming to BS 715 are available. Under no circumstances should a flue box penetrate an external wall (even into a garage or other attached structure) as the flue gases passing through the box will be excessively chilled leading to incorrect operation of the main flue.

11.3.2.6 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. (See Figure 5b) and Figure 9b).)

COMMENTARY AND RECOMMENDATIONS ON **11.3.2.6**

Consideration should be given to the following points.

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 gas fires.*

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.*

11.3.2.7 To assist the correct operation of the gas fire, the fireplace recess or builder's opening shall have only two openings, an entrance or entrances through the closure plate and an exit via the flue.

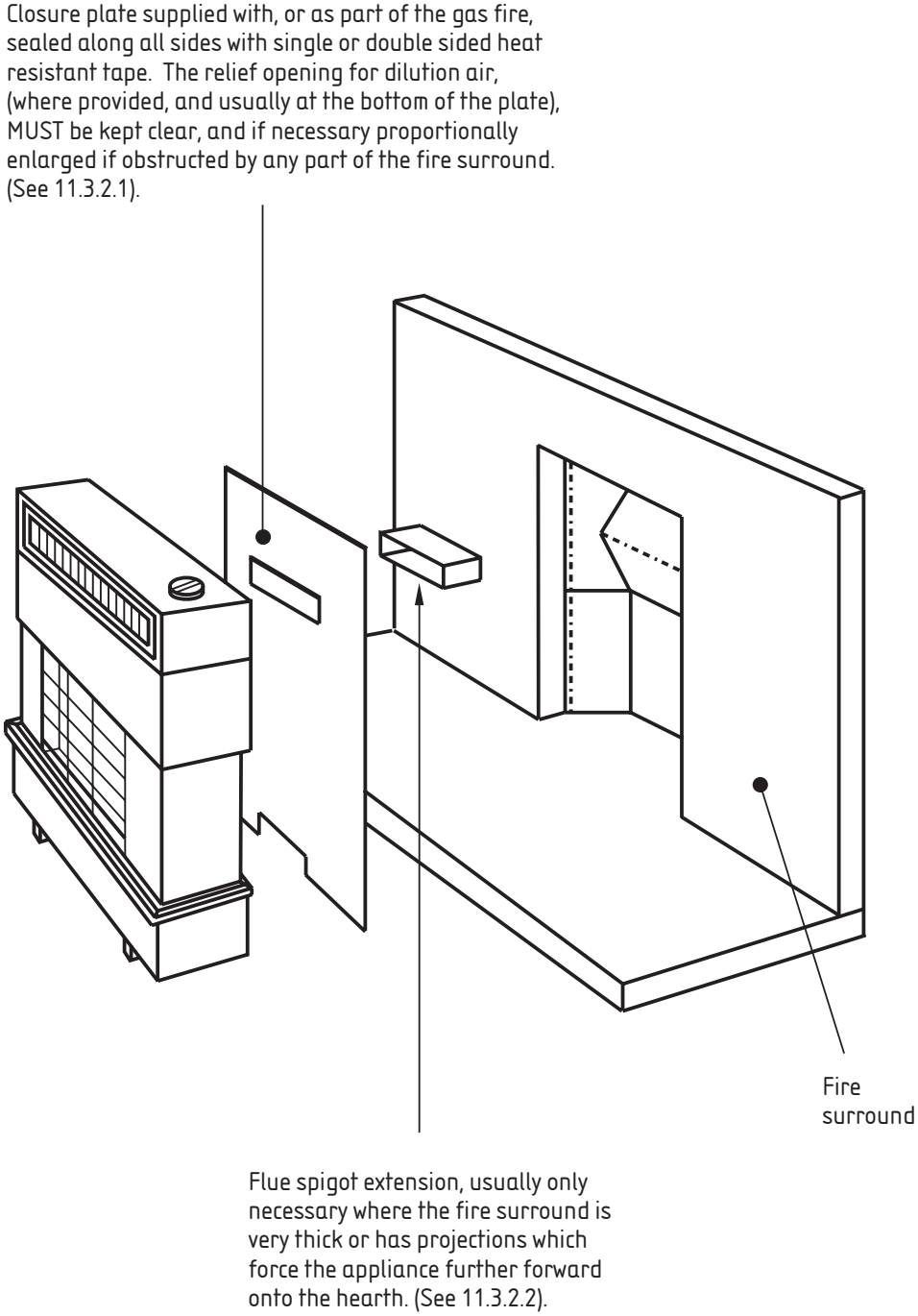
All other openings, in particular, gaps/cracks inside the builder's opening (including in or around any chairbrick), those between any surround and the builder's opening, those which may exist in respect of an existing underfloor air supply, and those made for the passage of gas and flue pipes and electric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

COMMENTARY AND RECOMMENDATIONS ON **11.3.2.7**

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 mortar 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.

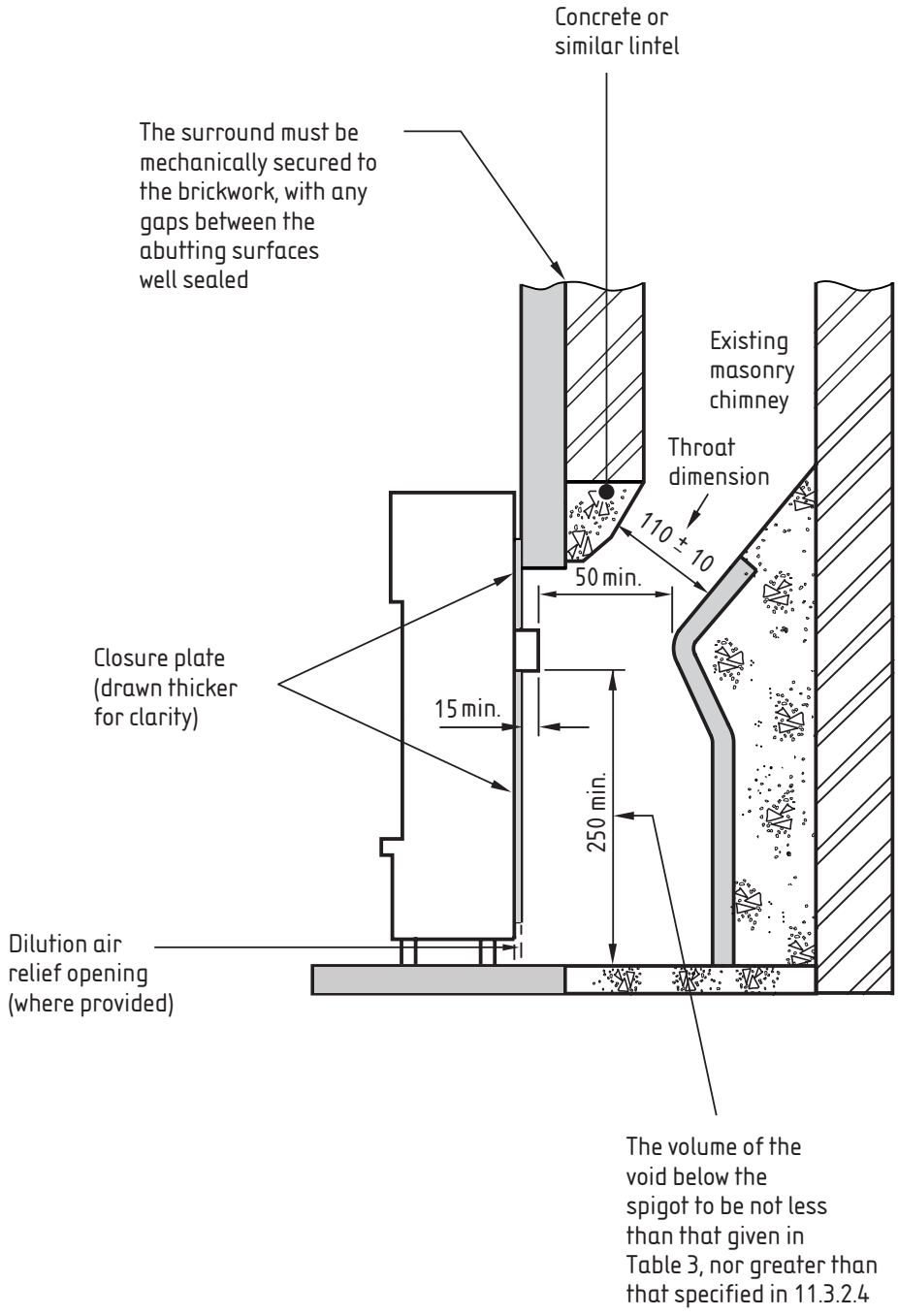
11.3.2.8 Where a masonry chimney is fitted with a flue liner (see Figure 3), the annular space between the liner and the chimney shall be sealed at the base with a suitable sealant, e.g. mineral wool. Any annular space between the flue liner and the chimney shall be sealed at the base and at the top of the chimney. At the base this shall be done in such a way that the sealant will not fall out into the enclosure at the rear of the fire. The flue liner shall be supported at the top and bottom of the chimney.



a) General installation

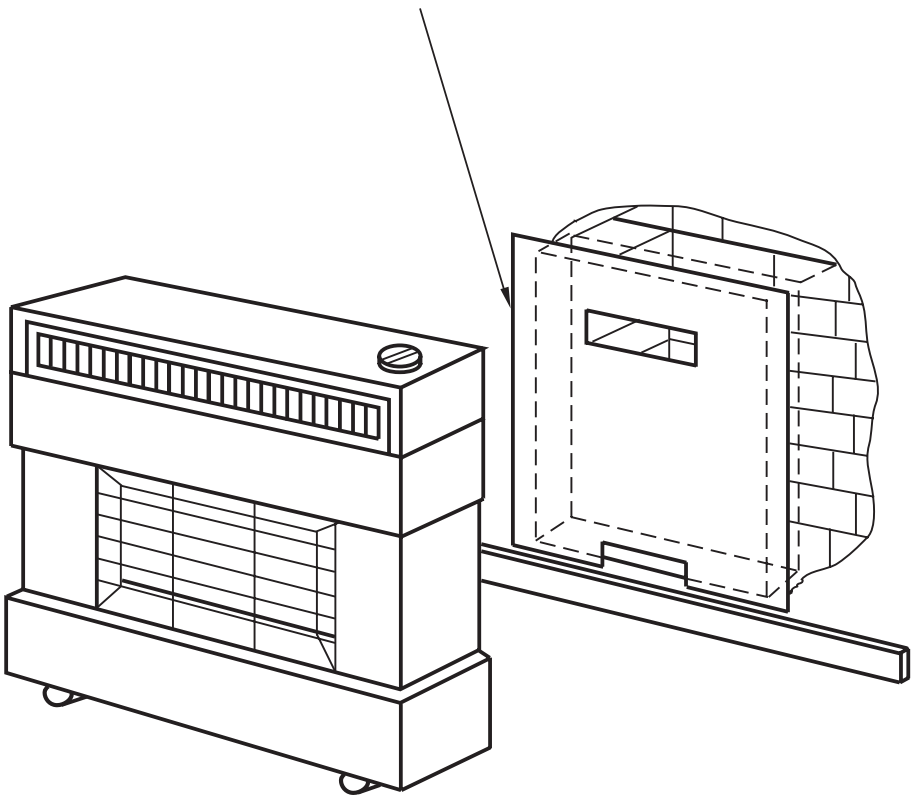
Figure 5 — Method of installing a gas fire or convector heater on an existing or new solid fuel hearth

Dimensions in millimetres



b) Sectional view

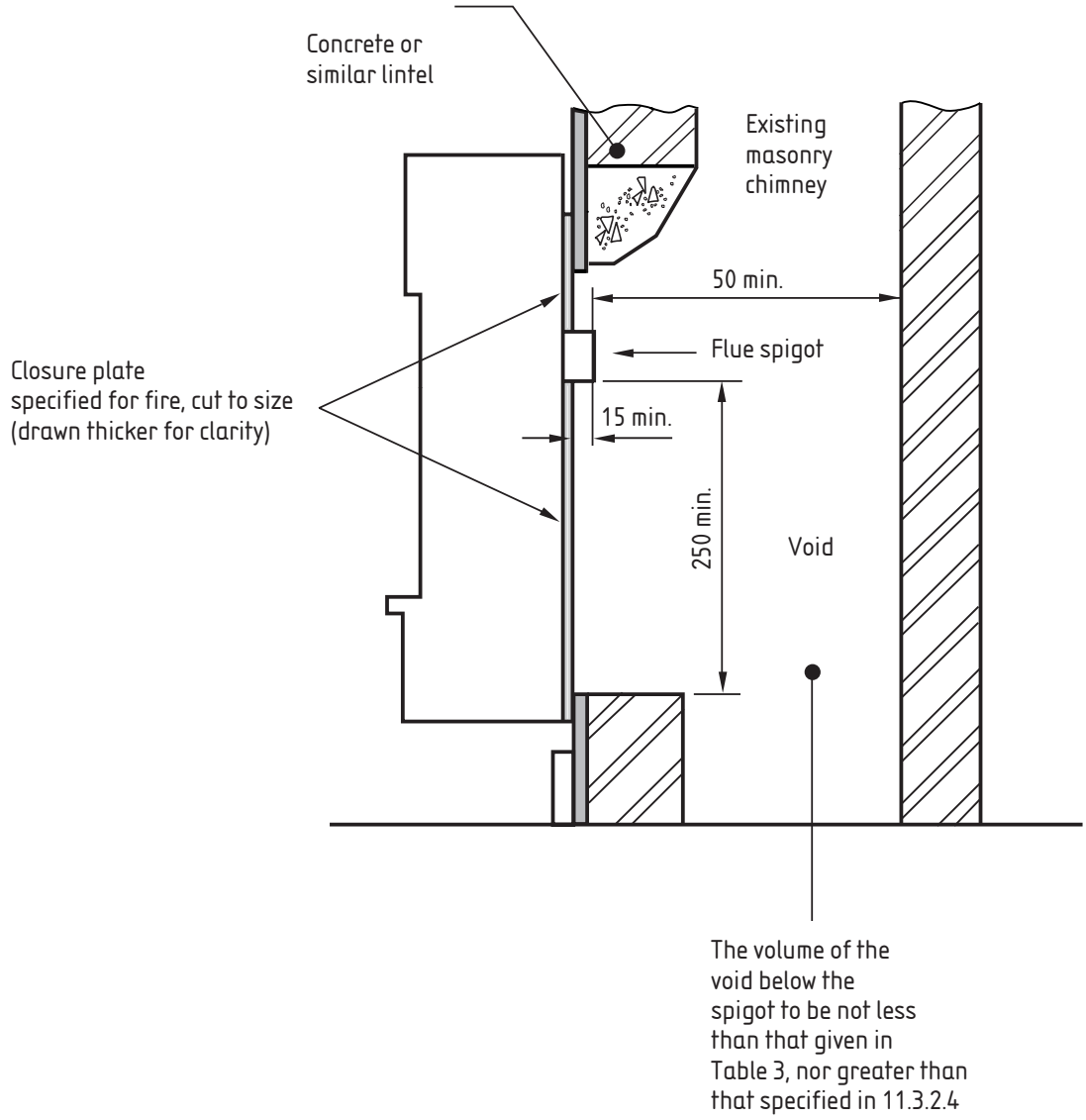
Figure 5 — Method of installing a gas fire or convector heater on an existing or new solid fuel hearth (*continued*)



a) General installation

Figure 6 — Method of wall mounting a gas fire on an existing chimney breast

Dimensions in millimetres



b) Sectional view

Figure 6 — Method of wall mounting a gas fire on an existing chimney breast (*continued*)

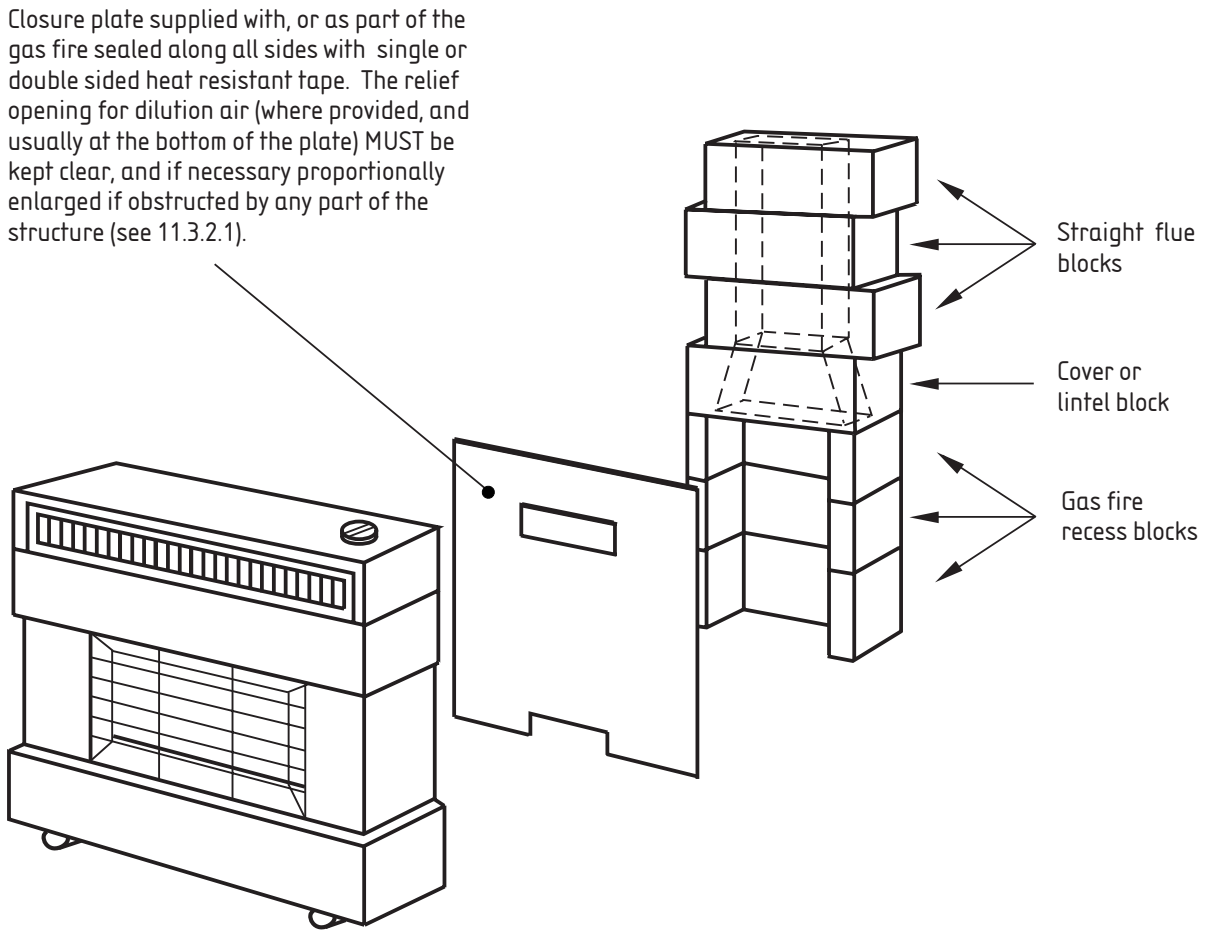


Figure 7 — Method of installing a gas fire on the hearth of a precast block chimney

11.3.3 *Convector heaters*

An open-flued convector heater incorporating a closure plate and its own draught diverter shall be connected to a lined or unlined brick chimney, a precast flue block chimney, or to a proprietary flue system. (For convector heaters with a direct flue connection, see **11.3.4**.)

The minimum volume of the void and its depth below the flue spigot shall be as given in Table 3. The finished opening into the void shall be large enough to permit the clearance of any debris when the convector heater and closure plate (if fitted) is removed. Where a convector heater is fitted to a chimney or a precast flue block chimney, the void requirements specified in **11.3.2.4** shall be met.

Where a closure plate is fitted, this shall be sealed to the fireplace wall or fireplace opening in accordance with **11.3.2.1**, as appropriate.

COMMENTARY AND RECOMMENDATIONS ON **11.3.3**

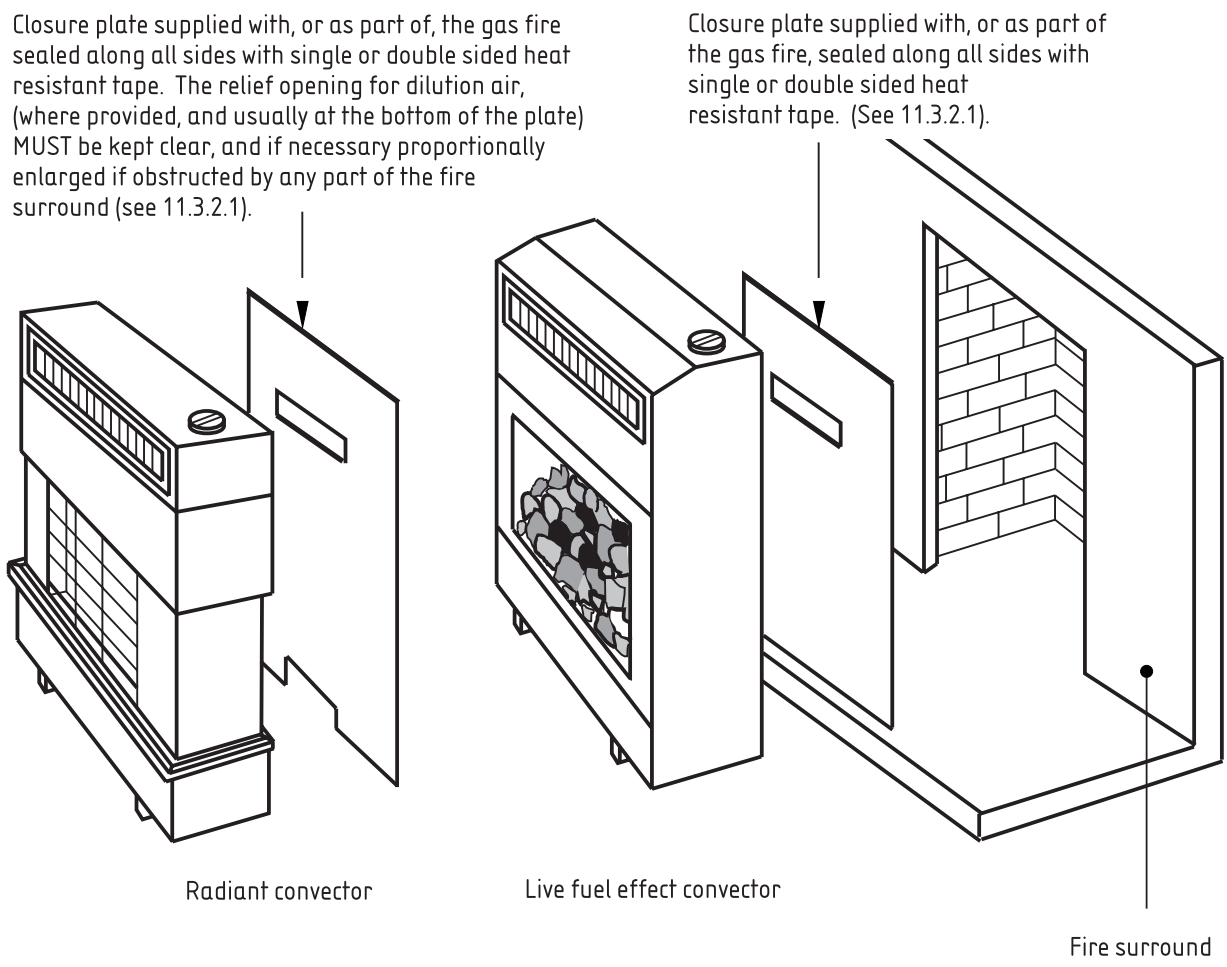
*Where a convector heater is fitted to a 225 mm × 225 mm brick chimney (see Figure 5), a void below the spigot not less than 12 dm^3 should be available. It should be noted that not all convector heaters are suitable for a precast block chimney; see the appliance manufacturer's instructions. In the case of an oversized void, the commentary and recommendations on **11.3.2.4** should be followed.*

11.3.4 *Gas fires and convector heaters designed for use with a direct flue connection*

A direct flue connection to a gas fire or convector heater 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 only be connected to a lined flue and installed using one of the following:

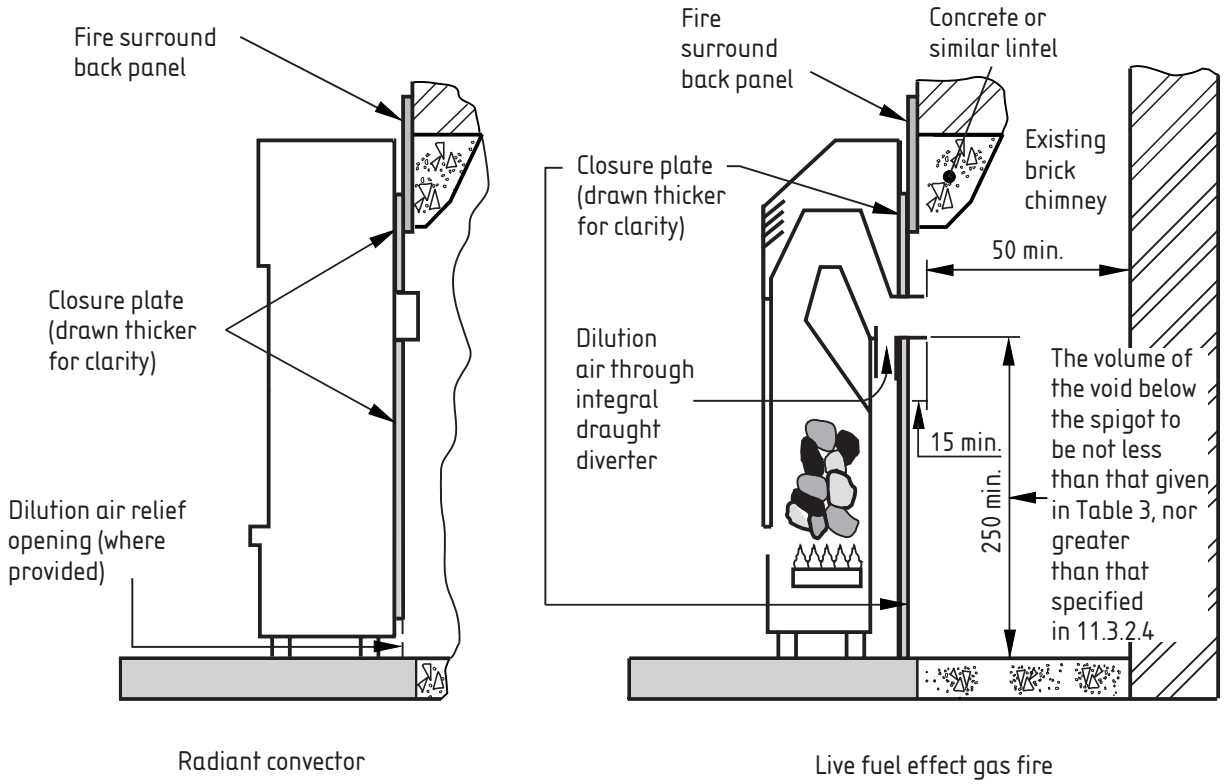
— a metal twin wall flue system conforming to BS EN 1856-1;
— a metallic flexible flue liner conforming to BS EN 1856-2;
— a masonry chimney which has been lined, e.g. with a clay lining;
— a factory made insulated chimney conforming to BS 4543.



a) General installation

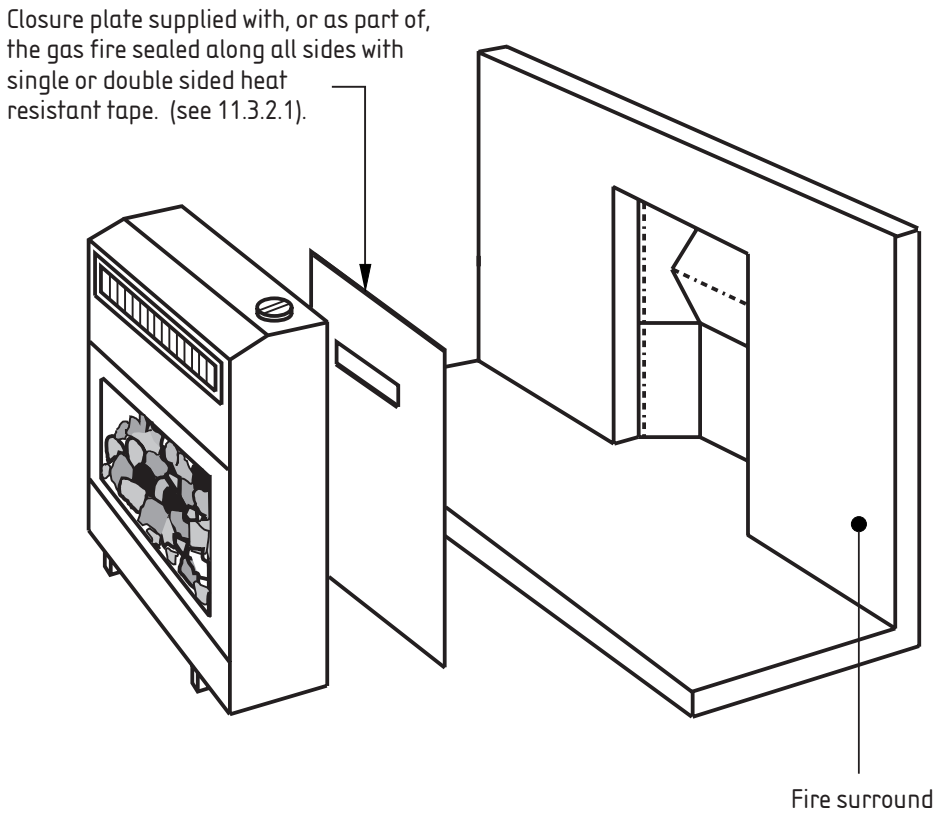
Figure 8 — Method of installing an open-flued live fuel effect gas fire with an integral draught diverter onto a proprietary fire surround

Dimensions in millimetres



b) Sectional view

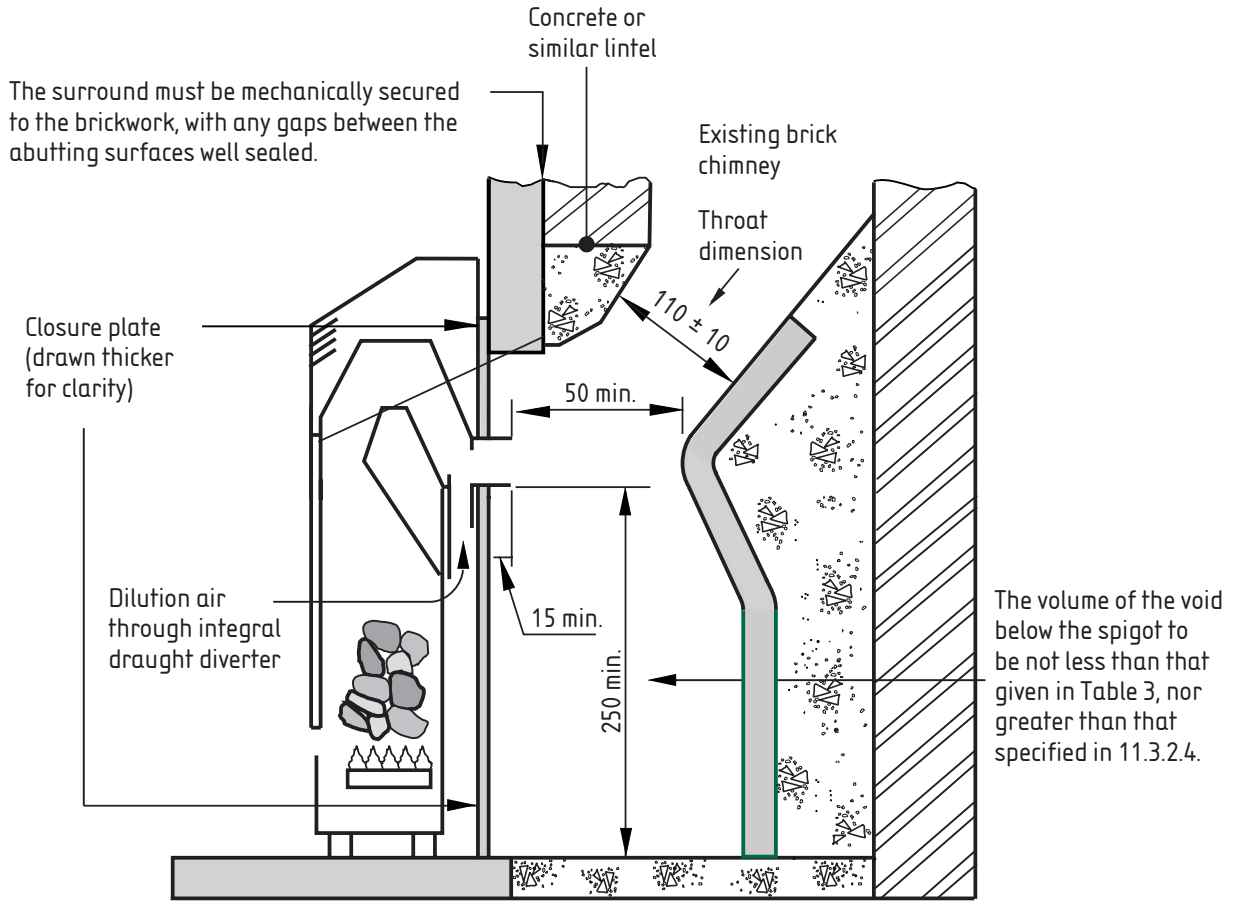
Figure 8 — Method of installing an open-flued live fuel effect gas fire with an integral draught diverter onto a proprietary fire surround (*continued*)



a) General installation

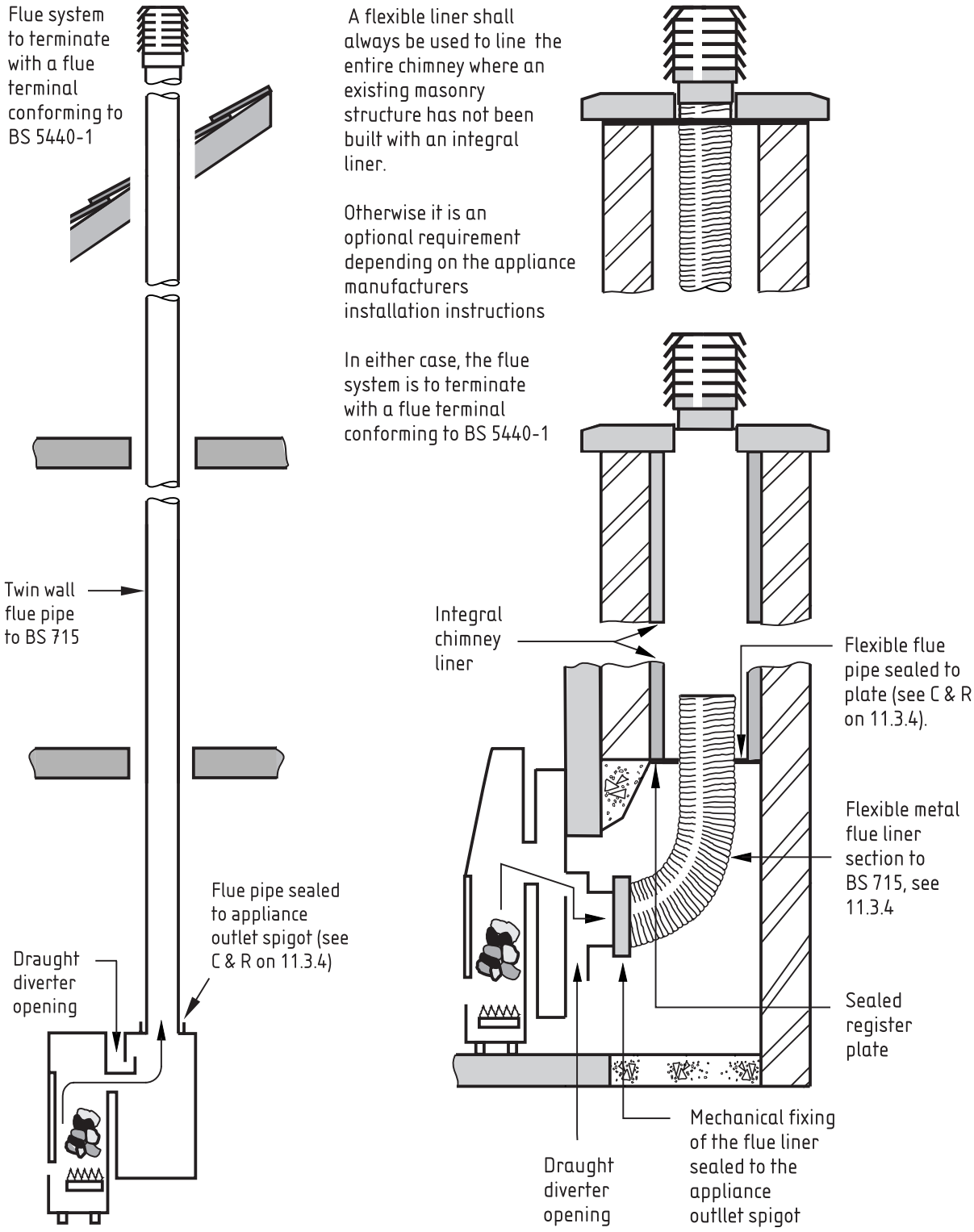
Figure 9 — Method of installing an open-flued live fuel effect gas fire with integral draught diverter onto an existing or new solid fuel hearth

Dimensions in millimetres



b) Sectional view

Figure 9 — Method of installing an open-flued live fuel effect gas fire with integral draught diverter onto an existing or new solid fuel hearth (*continued*)



a) Top outlet direct flue connection

b) Rear outlet direct flue arrangement using flexible liner connected to a clay lined masonry chimney

NOTE These illustrations relate to appliances purpose designed for direct connection to the flue. Do not confuse with conventional gas fires which MUST NOT be connected to flues in this manner.

Figure 10 — Application of direct flue connection appliances

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. Where a flexible flue liner is used, this shall be independently supported, i.e. the weight of the liner shall not be carried by the mechanical joint at the flue spigot. In all cases, a flue terminal shall be fitted, irrespective of the diameter of the flue.

COMMENTARY AND RECOMMENDATIONS ON **11.3.4**

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 10a)]. Where a flexible metal flue liner is used in conjunction with a register plate [see Figure 10b)], the liner should protrude through the plate by a minimum of 150 mm. 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.

11.4 Heating stoves

Heating stoves shall be installed in accordance with the manufacturer's instructions. Where the stove uses a closure plate, the requirements of **11.3.2.4** shall be met.

COMMENTARY AND RECOMMENDATIONS ON **11.4**

Open-flued heating stoves are available in two basic types, freestanding and those which have a rear flue spigot which passes through a closure plate in a similar manner to a gas fire installation (see Figure 11, Figure 12, and Figure 13). The installation instructions for either form of appliance will specify the permissible types of flue and any special fixing instructions which should be followed. Where a flexible metal flue liner is used in conjunction with a register plate (see Figure 12) the liner should protrude through the plate by a minimum of 150 mm. Where a closure plate is used, it is essential that any air relief opening is not obstructed. In the case of a room-sealed heating stove, the installation should conform to ***11.5****.*

11.5 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 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.

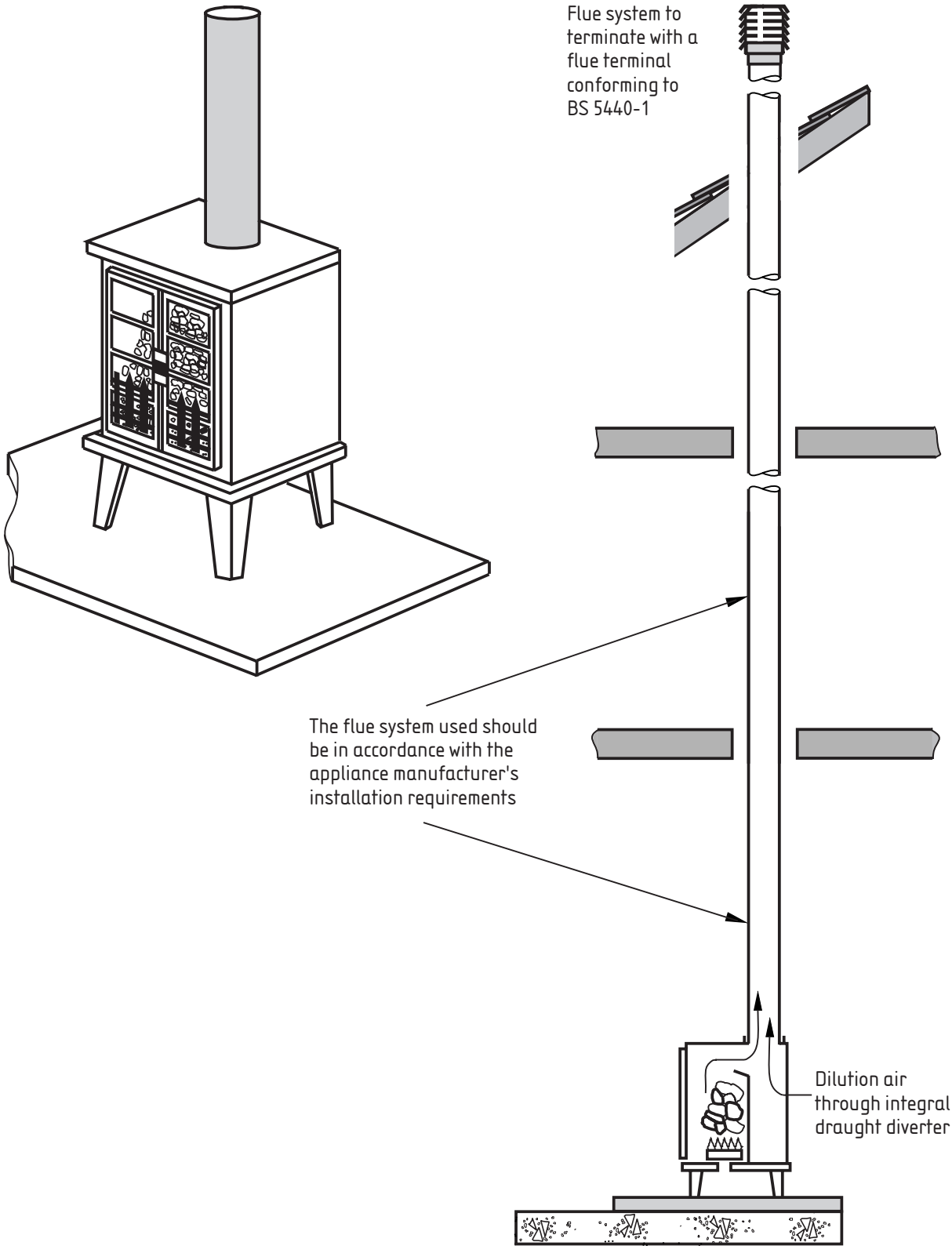


Figure 11 — Installation of a heating stove connected to a factory made chimney or flue system

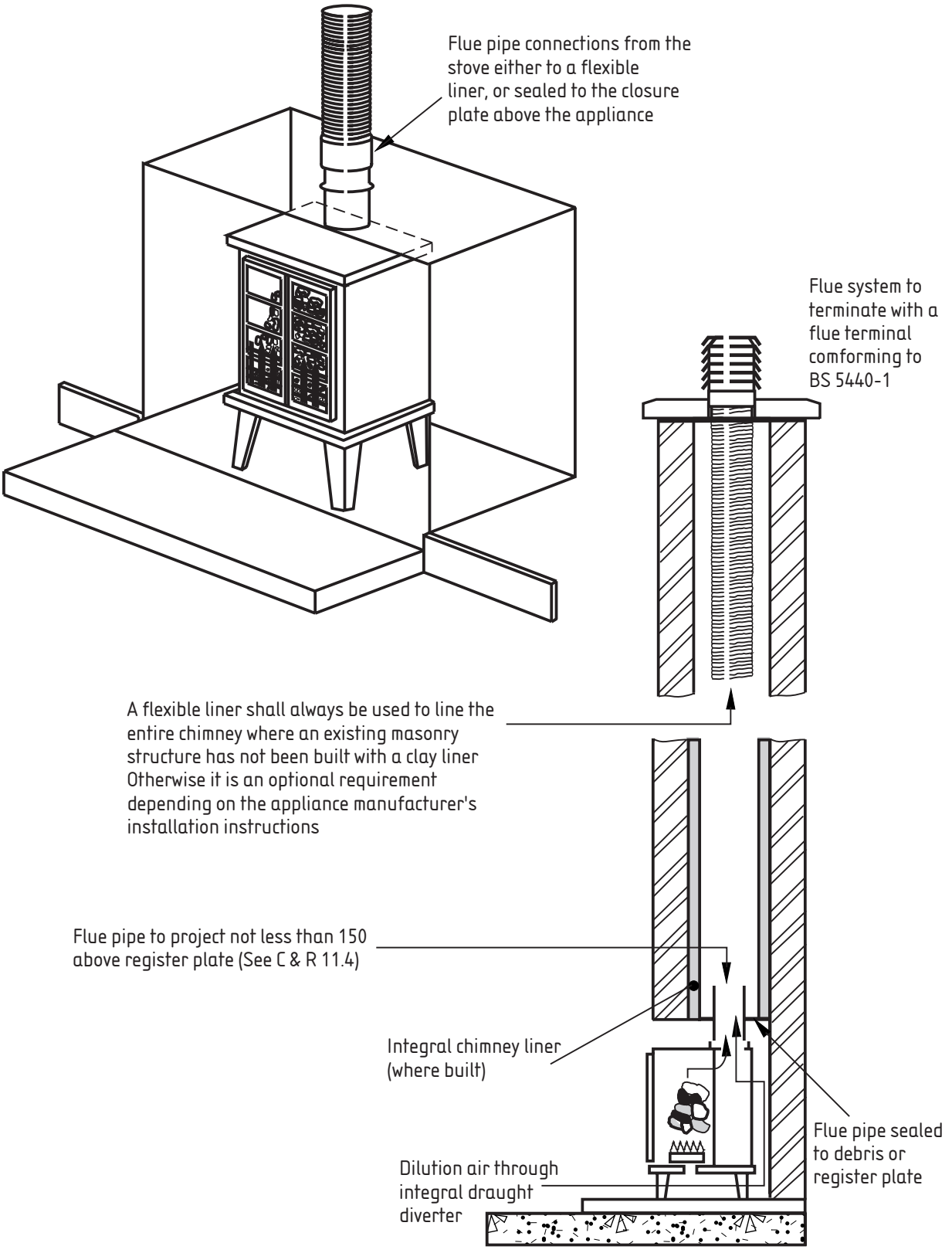


Figure 12 — Installation of a freestanding heating stove located in a builder's opening

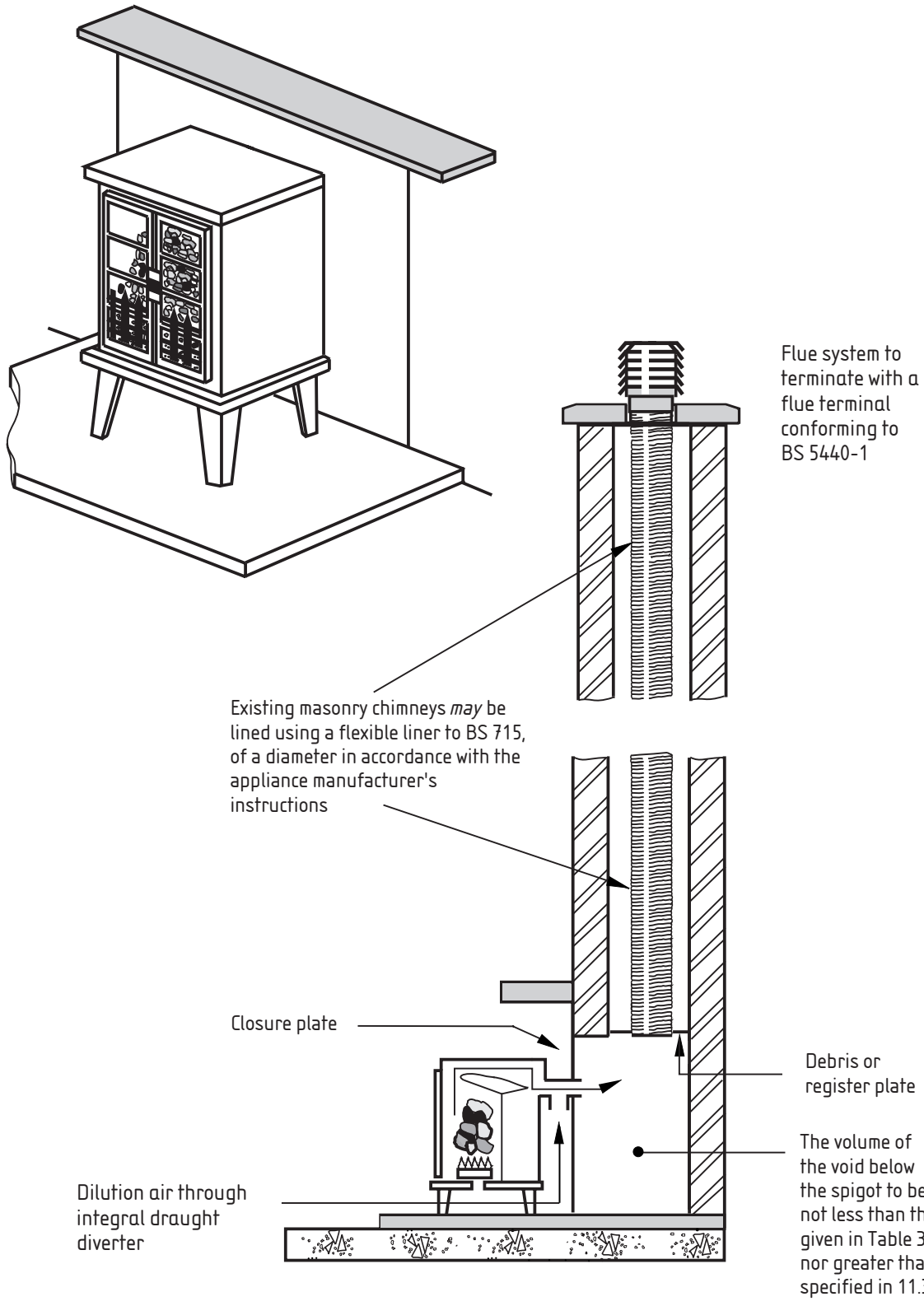


Figure 13 — Installation of a freestanding heating stove using a closure plate

COMMENTARY AND RECOMMENDATIONS ON **11.5**

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 ***11.5*** *are available; the appliance manufacturer will provide details.*

The installation of appliances to Se-duct and U-duct systems should only be carried out when this is recognised in the manufacturer's instructions. In such cases, BS 5440-1 should also be consulted.

12 Fire precautions

12.1 Floor protection/hearths and bases

12.1.1 *Gas fires*

A hearth conforming to **12.1.2**, **12.1.3** and **12.1.4** shall be provided for a fire unless the fire conforms to the requirements of BS 7977-1 for installation without a hearth. If the fire is intended for wall mounting, it shall be installed such that any flame or incandescent materials are at least 225 mm above the carpet or any combustible floor covering.

COMMENTARY AND RECOMMENDATIONS ON **12.1.1**

Certain gas fires may be installed without a hearth; in such cases the appliance 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.

12.1.2 *Materials*

Where a hearth is required, this shall be made from fire-resisting material.

COMMENTARY AND RECOMMENDATIONS ON **12.1.2**

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 to BS 476-4, or materials classified as Class 0 in accordance with Approved Document B to the Building Regulations 2000 (as amended) [13].

12.1.3 *Thickness*

A hearth shall have a minimum thickness of 12 mm.

12.1.4 *Dimensions*

The hearth shall extend at least 300 mm forward from the back plane of the gas fire, and at least 150 mm beyond each edge of the naked flame or incandescent radiant source.

COMMENTARY AND RECOMMENDATIONS ON **12.1.4**

These dimensions are the minimum required as precautions against heat. It may be necessary or desirable to increase the hearth area, for example in order to ensure that the fire is stable on the hearth.

12.1.5 *Convector heaters*

12.1.5.1 *Domestic*

A hearth conforming to **12.1.2**, **12.1.3** and **12.1.4**, shall be provided for a convector heater unless:

a) the manufacturer's instructions allow the appliance to stand on a combustible surface;

b) the convector heater is intended for wall mounting, in which case it shall be installed in accordance with the manufacturer's instructions, or such that any flame or incandescent materials are at least 225 mm above any carpet or floor covering.

12.1.5.2 *Heating stoves*

Unless otherwise specified in the installation instructions, a hearth conforming to **12.1.2** and **12.1.3** shall be provided for the stove extending to at least the front of the stove supporting legs, and to at least each side of the stove.

COMMENTARY AND RECOMMENDATIONS ON **12.1.5.2**

The above hearth dimensions assume the appliance has no exposed flames, i.e. they are situated behind a hinged door on the front of the appliance. If the appliance has a door which is intended to be open during normal operation or it has exposed flames, then the hearth should be dimensioned in accordance with ***12.1.4****.*

12.2 Protection at rear of appliance

Combustible material at the rear of an appliance shall be protected against the effects of heat transmission. Where the appliance installation 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 an appliance to a fireplace opening, combustible material shall not be fitted inside this opening.

COMMENTARY AND RECOMMENDATIONS ON **12.2**

The instructions for the appliance will detail suitable surfaces upon which the appliance may be mounted together with any special requirements such as the fitting of plates or plinths, etc. (see also ***11.3.2.6****).*

12.3 Side wall protection

12.3.1 *Gas fires*

A gas 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 appliance manufacturer's instructions, from that radiant source.

12.3.2 *Convector heaters (all types)*

A convector heater shall be installed such that no part of a combustible side wall is less than 150 mm, or other such figure as specified in the appliance manufacturer's instructions, from the warm air outlet.

12.3.3 *Heating stoves*

The appliance shall be installed such that the side wall clearance specified in the manufacturer's installation instructions is met.

12.4 Shelf protection

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

COMMENTARY AND RECOMMENDATIONS ON **12.4**

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

12.5 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 **12.5**

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

12.6 Dress guard

Where the appliance is not provided with an integral dress guard, a fireguard shall be permanently fixed as part of the installation.

COMMENTARY AND RECOMMENDATIONS ON **12.6**

*The fitting of an appliance without an integral dress guard is not recommended. Clause **20** provides further guidance on fireguards. In the case of glass fronted fires or heating stoves, the glass is deemed to be the dress guard.*

13 Gas supply

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

The pipe to the appliance 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 appliance shall not be subject to strain.

13.3 Where the final connection to the appliance 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 polyvinyl chloride (PVC) tape].

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

COMMENTARY AND RECOMMENDATIONS ON **13.1**, **13.2**, **13.3** AND **13.4**

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.

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.

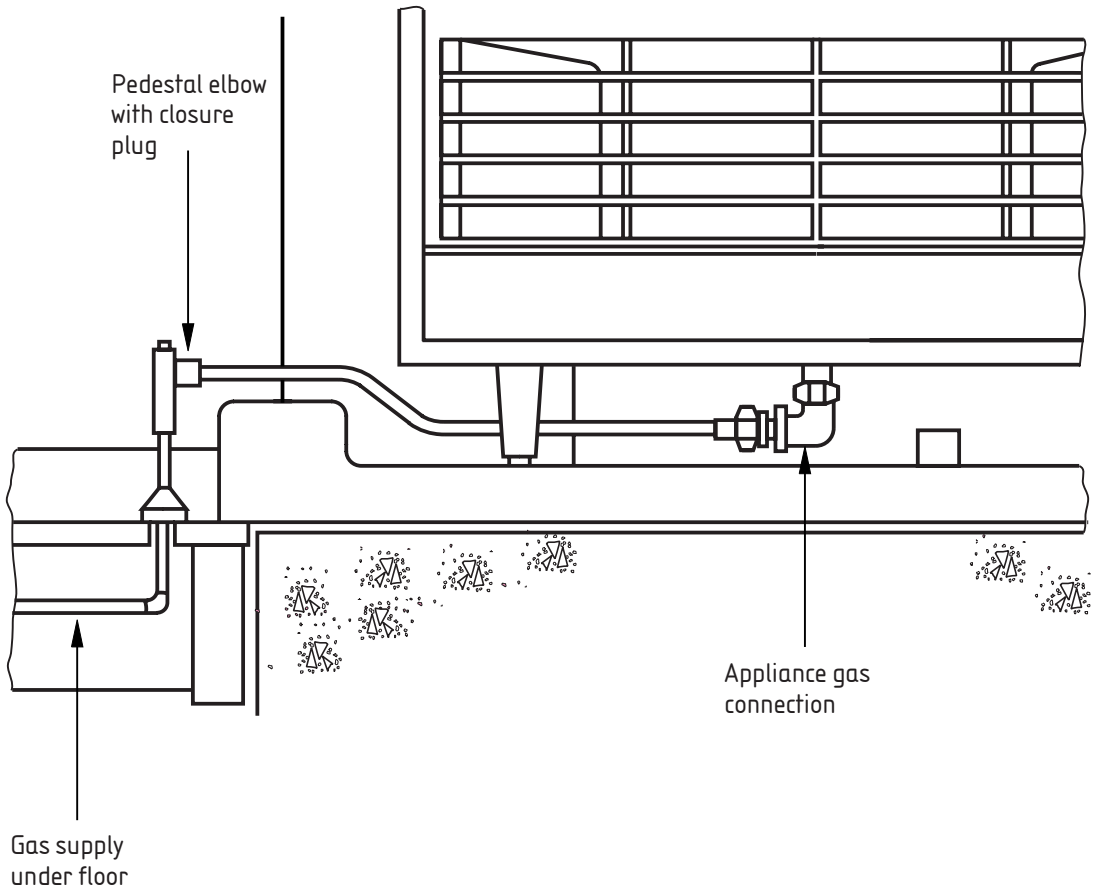


Figure 14 — Typical unconcealed gas supply system to a gas fire

14 Electricity supplies and wiring

14.1 The electrical wiring installation to the appliance 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 appliances and any ancillary controls shall be installed in accordance with the appliance 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 All fuses shall be rated in accordance with the appliance manufacturer's instructions.

14.4 Any point of connection to the mains electricity shall be readily accessible and the method of connection shall provide electrical isolation of the appliance (either single or combined) 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 **14.4**

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 may 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.

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 using a suitable flue jointing material 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 is 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, i.e. with a lining according to Building Regulations, 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 followed.

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.*

d) *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 15.

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, or where an appliance has a direct flue connection, a terminal that conforms to the performance test requirements given in BS EN 13502, BS 1289 or BS 7435 shall be fitted. The terminal 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.*

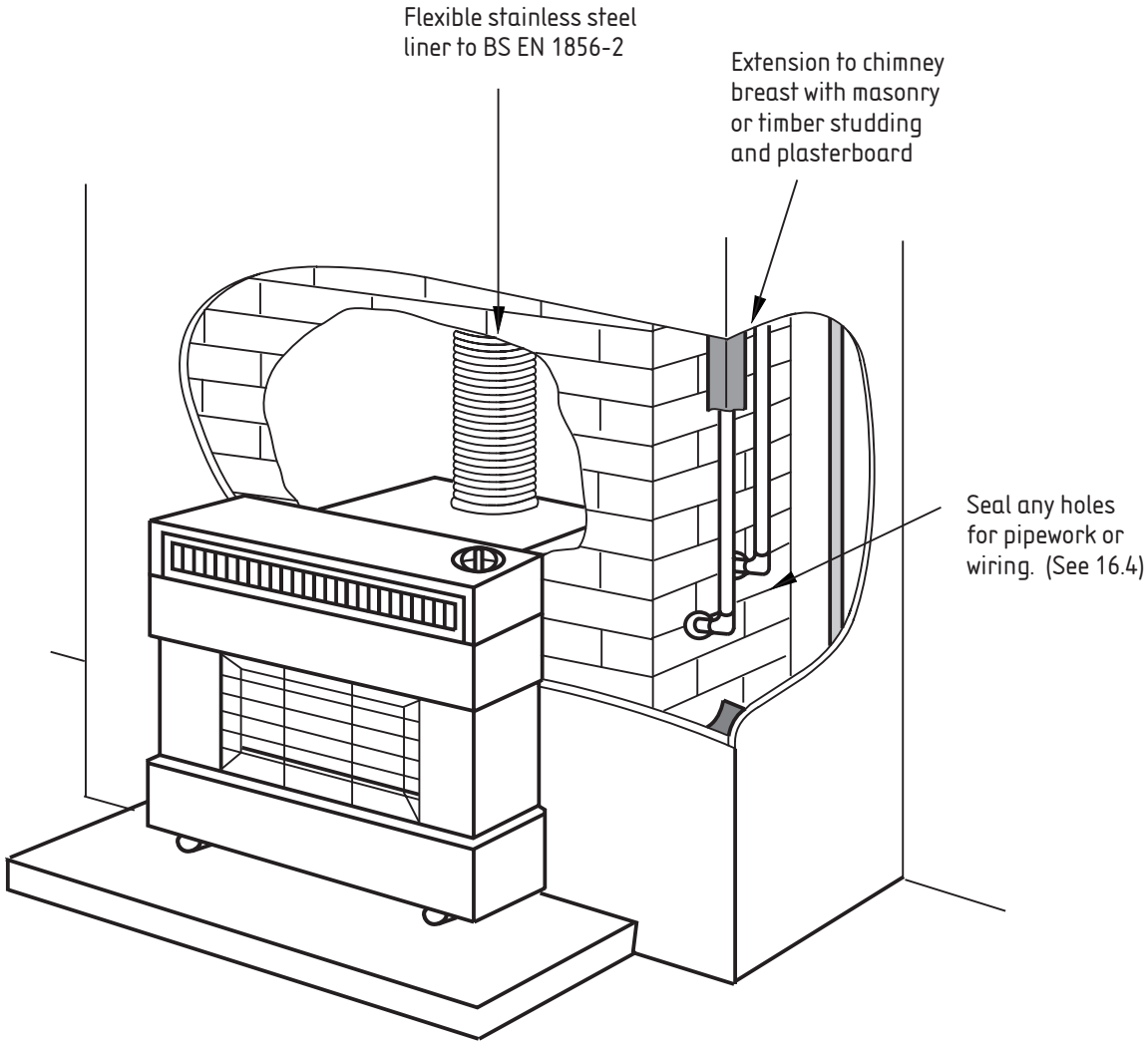


Figure 15 — Installation of a gas fire and combined back boiler where a chimney breast is extended to form a duct for pipework and wiring

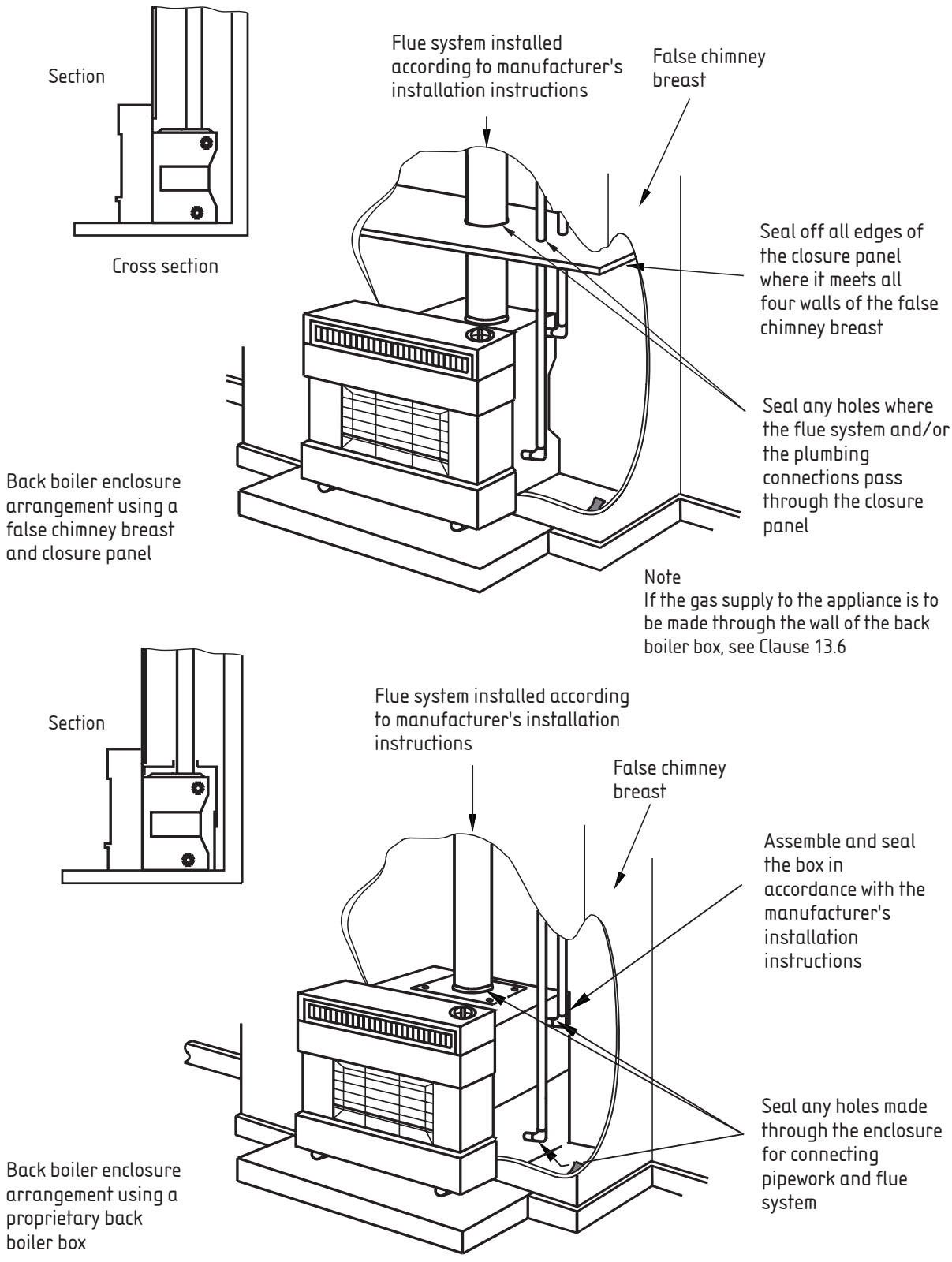


Figure 16 — Installation of a gas fire and combined back boiler using a back boiler enclosure and prefabricated chimney/flue system

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 16).

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 **16.6**

Fire/back boilers were originally designed to be installed in dwellings 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 mm

Depth 375 mm.

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 **12.1.3** and **12.1.4**. 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 **12.1.1**.

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 5449, BS 5546, and BS 6700, as appropriate.

NOTE Attention is drawn to the Water Supply (Water Fittings) Regulations 1999 [16], the Water Regulations Guide [15] 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 [19] (2nd family gases) and TM 62 [20] (3rd family gases).

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

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

19.4 The appliance 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. recirculating ceiling fan, an extract fan, or a fan incorporated within an appliance), 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**

In the case of gas fires, the manufacturer's recommended method for spillage testing may be given on a badge attached to the appliance 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.

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

COMMENTARY AND RECOMMENDATIONS ON **19.5**

It should be noted that the Gas Safety (Installation and Use) Regulations [1] require the appliance to be disconnected from the gas supply with an appropriate fitting and labelled if it cannot be fully commissioned.

20 Instructions and use of fireguards

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

These instructions should include reference to fireguards, in particular to the effect that fireguards, in accordance with BS 8423, should be fitted when the appliance is used in the presence of young children, the elderly or infirm.

In this context, attention is drawn to the high temperatures which are normally present on the external surfaces of heating stoves during operation.

Further guidance and information concerned with the effective 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.) serving a fuel effect gas appliance 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 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 an appliance

A.1 Sizing a room heater

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 1.

Experience has shown that for normal use a radiant convector gas fire with either radiants or imitation fuel and with a heat output of approximately 3.5 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.

NOTE Where a customer requires an appliance to provide background heating only, the installer should calculate the appliance size on a reduced heat service. For example, in the case of a hall, the customer might accept a temperature of 16 °C as being suitable for background heating.

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 (in W) 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 examples

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

A radiator convector 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.

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

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.

Example B. Hall

A convector heater is installed in a hall having two external cavity walls, a single window 1.5 m × 1.0 m and dimensions of 3.0 m × 1.5 m × 6.0 m.

The temperature required is 18 °C and the ventilation rate is 1.5 air changes per hour.

The data needed to obtain the minimum heat output required from the convector heater is given in Table A.2.

Table A.2 — Fabric and ventilation heat losses for example B

Fabric heat losses				
Element	**Area** m^2	***U* value** $W/m^2 \cdot °C$	**Temperature difference** °C	**Heat loss** W
Outside wall	3 × 6	0.92	19	314
	(1.5 × 6) – 1.5	0.92	19	131
	3 × 6	1.9	19	650
Party wall	1.5 × 5	1.9	19	270
Roof	3 × 1.5	0.34	19	29
Window	1.5 × 1	5	19	142
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	3 × 1.5 × 6	0.33	19	254

From the data given in Table A.2 the total or design heat loss is calculated to be 1 790 W. The heat output of the appliance should therefore be at least 1.79 kW.

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.

Table B.1 — Test internal air pressures

Family	Air pressure mbar
2nd	50
3rd	150

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.

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) with all gas taps in the OFF position;

b) with 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 numbers 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_3 appliances, the heat input shall 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 pressures 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:

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

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 1 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 2 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:

$H_d = 1.017\ 74H_w$

and the wet and dry relative densities by:

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

B.6 General conditions of test

B.6.2 *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 temperature 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 appliance 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 v (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

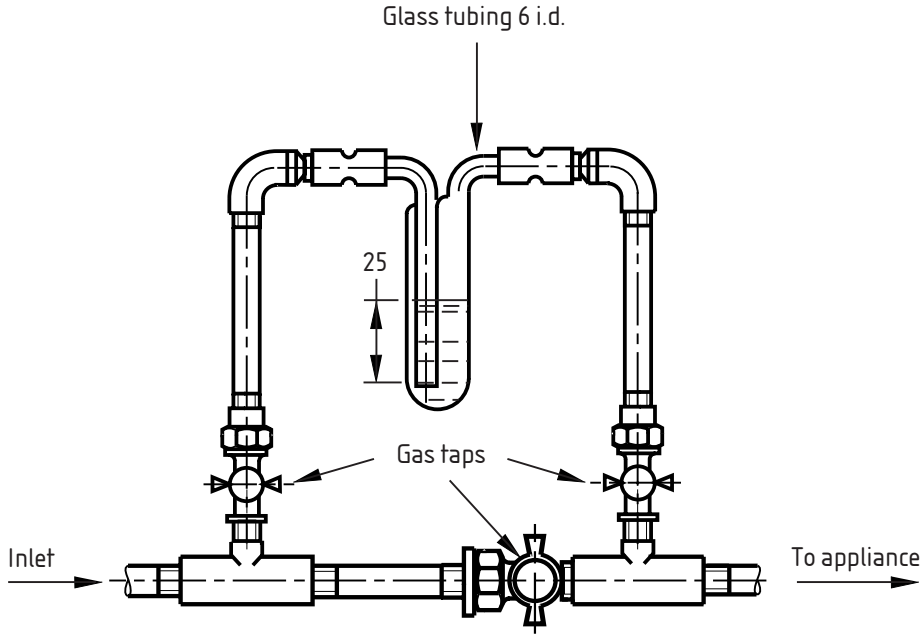
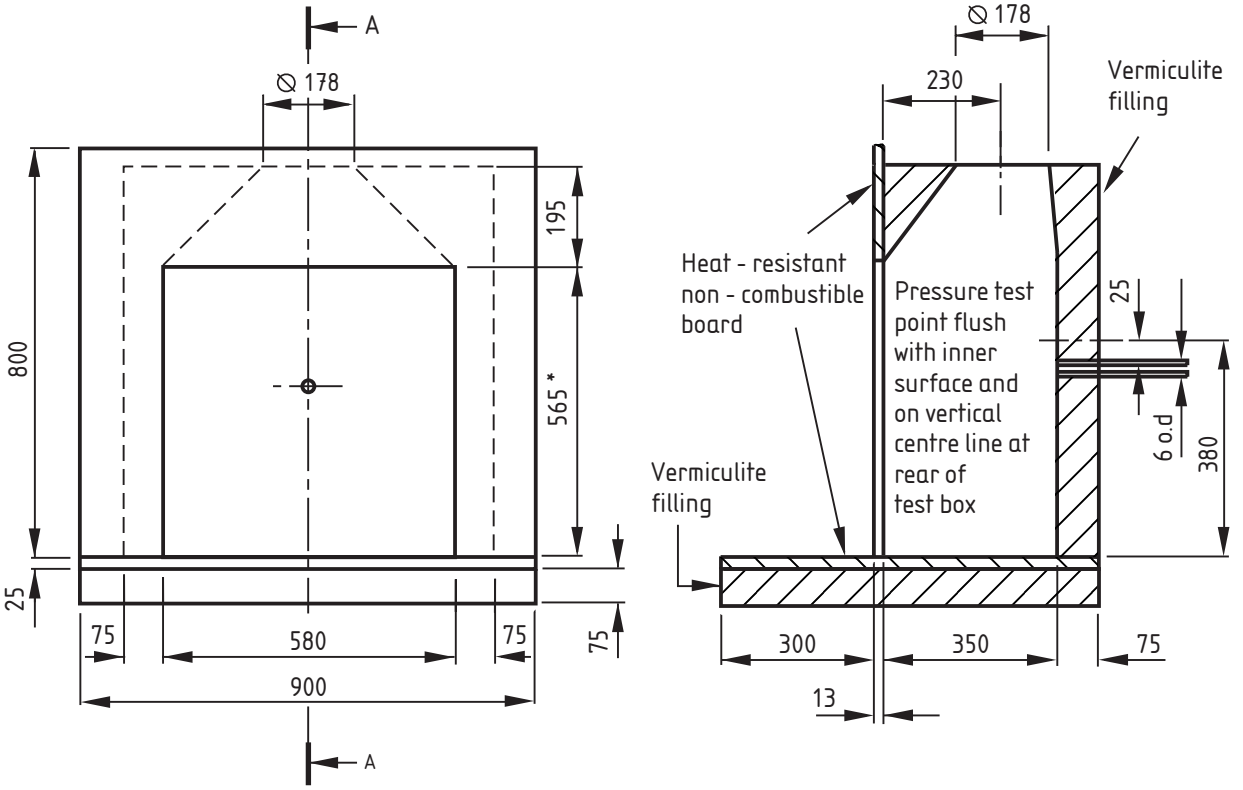


Figure B.1 — Bubble leak indicator

Dimensions in millimetres



Front elevation **Side elevation**

Material

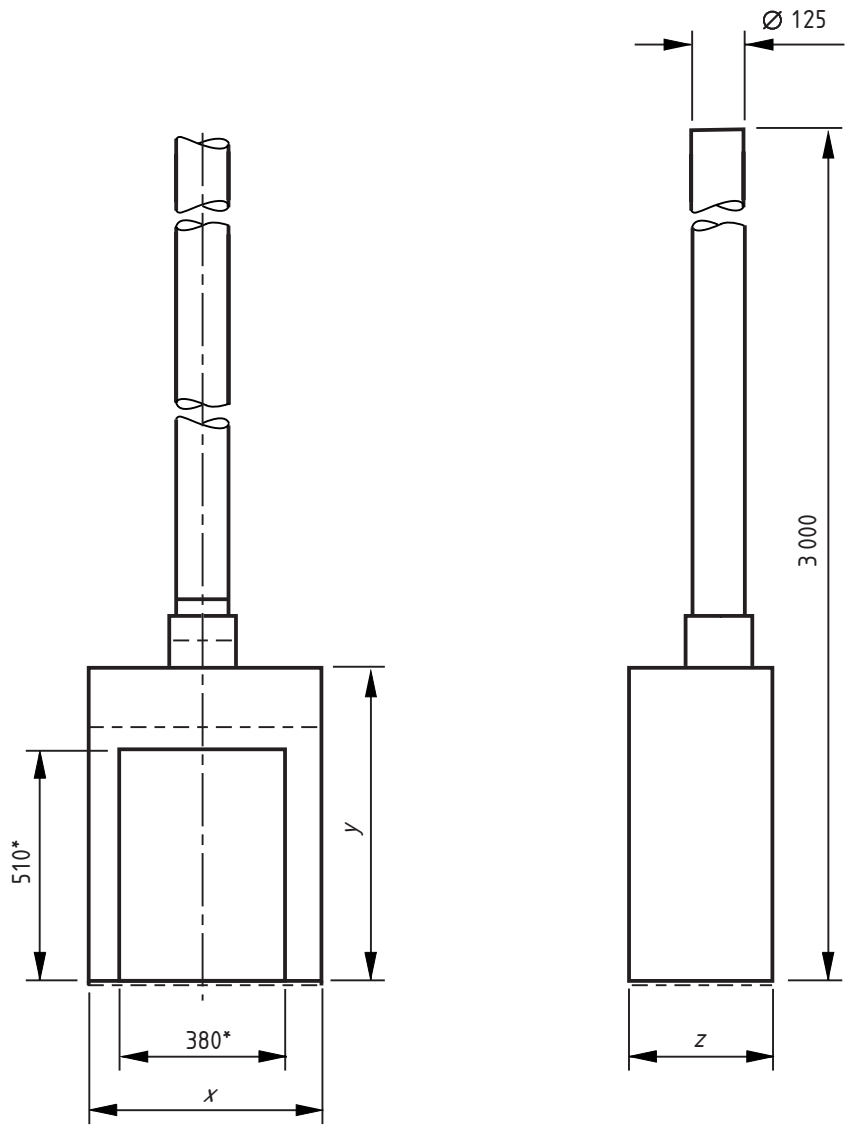
external surfaces: polished aluminium

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

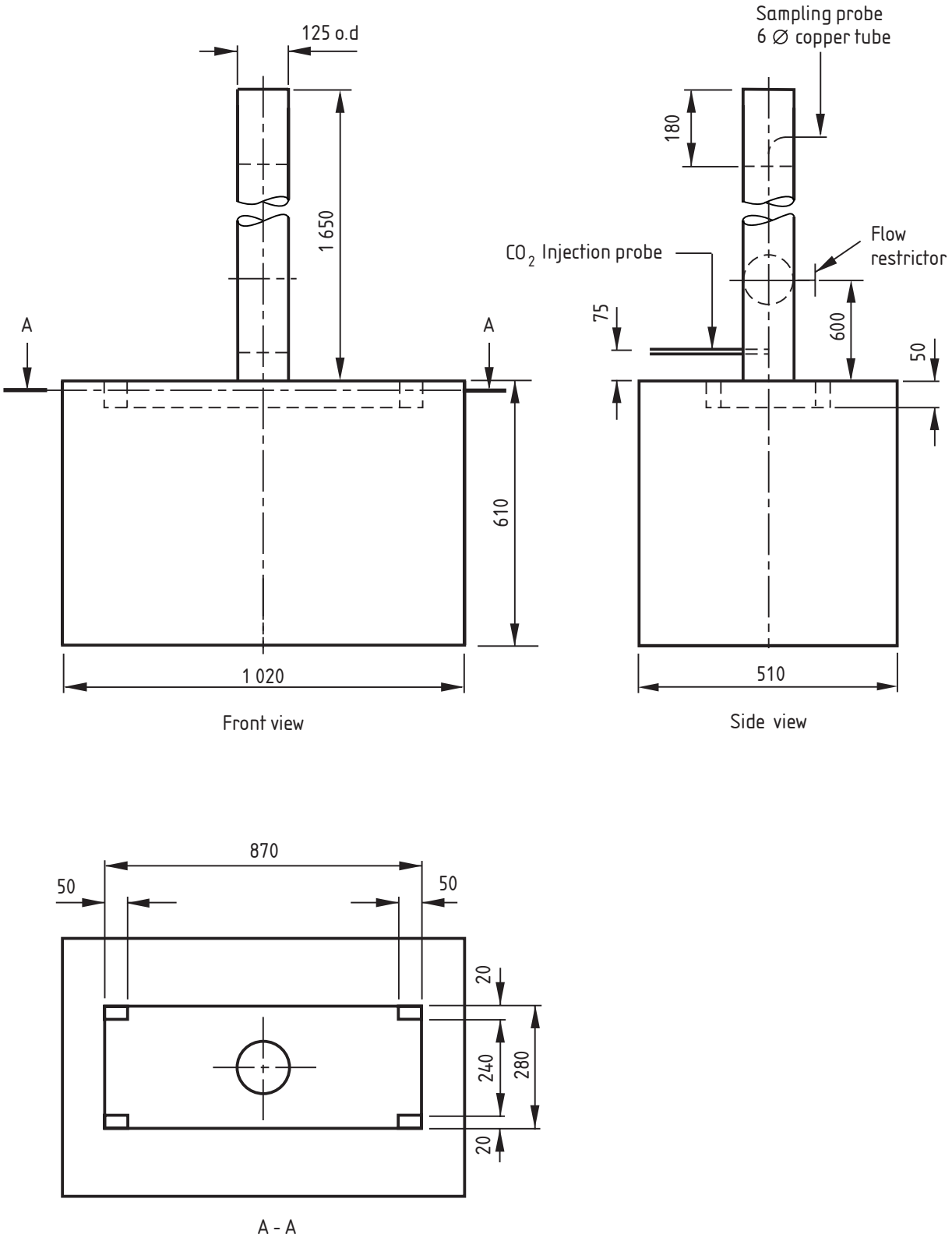


Figure B.4 — Collecting hood

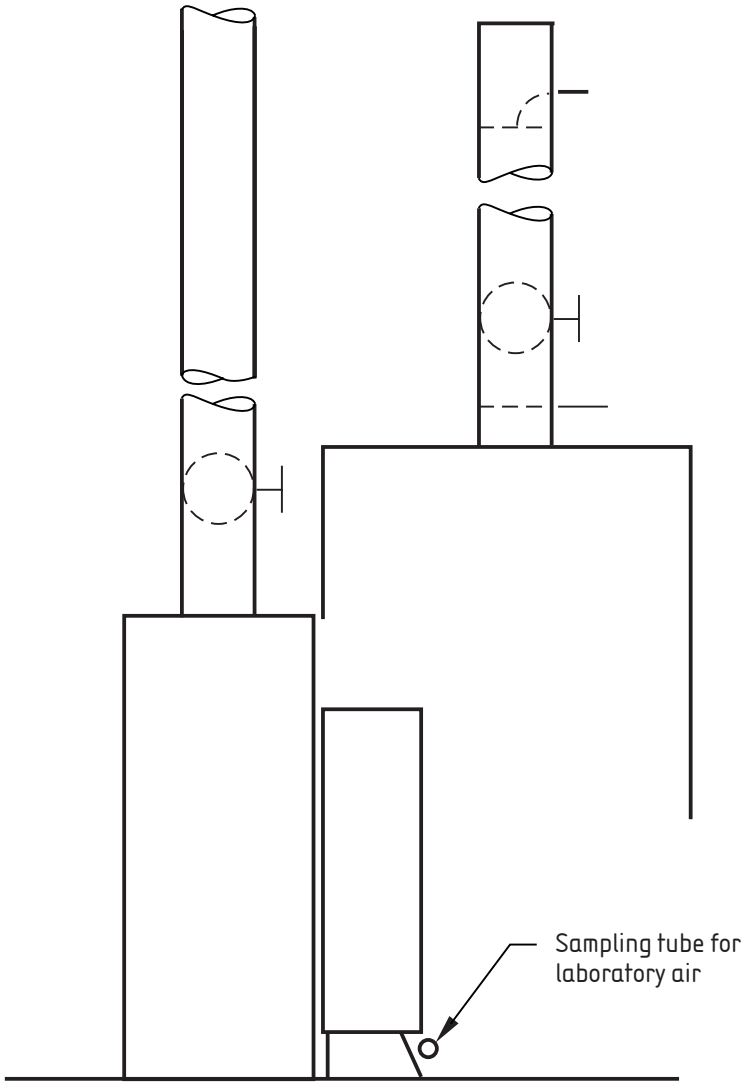


Figure B.5 — Collecting hood positioning

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