BRITISH STANDARD

BS 5871-3:2005

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

Part 3: Decorative fuel effect gas appliances of heat input not exceeding 20 kW (2nd and 3rd family gases)

ICS 97.100.20

BSI British Standards

Committees responsible for this British Standard

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

Boiler and Radiator Manufacturers Association Ltd.

British Flue and Chimney Manufacturers Association

BSI Consumer Policy Committee

Catering Equipment Suppliers' Association

Centrica plc

Council for Registered Gas Installers

Department of Trade and Industry

Health and Safety Executive

Heating and Ventilating Contractors' Association

ICOM Energy Association

Institute of Domestic Heating and Environmental Engineers

Institution of Gas Engineers and Managers

L P Gas Association

Society of British Gas Industries

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Contents

Committees responsible Inside front cover
Foreword ii

1 Scope 1
2 Normative references 1
3 Terms and definitions 2
4 Exchange of information and planning 4
5 Appliances 4
6 Materials and components 6
7 Location 6
8 Ventilation 8
9 Flueing 10
10 Appliance fixing 18
11 Fire and related safety precautions 20
12 Gas supply 24
13 Electricity supplies and wiring 25
14 Commissioning 25
15 Instructions and use of fireguards 26
16 Advice to be given to the user 26

Annex A (informative) Calculation of clearance flue flow 28

Bibliography 38

Figure 1 — Type of fuel effect gas appliances covered by BS 5871 7
Figure 2 — Flue/fireplace sizing chart for decorative fuel effect gas appliances 13
Figure 3 — Appliance installation in typical flue box 15
Figure 4 — Unsuitable terminations 16
Figure 5 — Typical fireplaces in which appliance may be installed 21
Figure 6 — Constraints required to determine chimney size using method 2 for cases 4, 5 and 6 22
Figure A.1 — Bubble leak indicator 33
Figure A.2 — Basic test box 34
Figure A.3 — Test box and flue for appliances that can be installed in a metal flue box 35
Figure A.4 — Collecting hood 36
Figure A.5 — Collecting hood positioning 37

Table 1 — Designation system for metal chimneys for use with gas fires 12
Table A.1 — Test internal air pressure 28
Table A.2 — Wobbe number for test gases 29
Table A.3 — Inlet pressure for tolerances 29
Table A.4 — *K* values for reference gases 32

Foreword

This part of BS 5871 has been prepared under the direction of the Engineering Sector Board and is a revision of BS 5871-3:2001, which is withdrawn.

This new edition of BS 5871-3 comes into effect on 11 July 2005.

This revision reflects experience gained in the use of the 2001 edition for the installation of decorative fuel effect gas appliances[1)] and also provides additional guidance on the use of fanned draught flueing and flue sizing, and includes requirements for fires installed in raised builders' openings (hole-in-the-wall fireplaces).

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

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

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

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

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

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

It should be noted that the only appliances covered by this part of BS 5871 are those that are 'CE' marked. However, BS 5871-3 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[2)] 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.

[1)] Sometimes referred to as a decorative gas fire or DGF.

[2)] 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.

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

This publication does not purport to include all necessary provisions of a contract. Users of 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:

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

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

The Gas Appliances (Safety) Regulations 1995 [3]

The Building Regulations 2000, as amended [4]

The Building (Scotland) Regulations 2004 [5]

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

The Gas Safety (Application) (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 39 and a back cover.

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1 Scope

This part of BS 5871 specifies installation and maintenance requirements for open flued decorative fuel effect gas appliances of heat input not exceeding 20 kW (see Note 2) burning 2nd and 3rd family gases in rooms or internal spaces in domestic (see Note 4) or commercial premises, including public houses and restaurants.

The provisions contained within this standard cover the selection of a suitable appliance, the ventilation and flueing requirements, and other measures necessary to ensure a safe installation.

This standard applies to the installation of decorative fuel effect gas appliances in builder's openings, fireplace recesses, flue boxes or under associated independent canopies. (See Figure 5.) It does not cover the installation of flueless or room-sealed appliances.

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

NOTE 1 Attention is drawn to the foreword concerning fuel effect appliances which burn gas for a decorative effect. The only types of such appliance covered by this part of BS 5871 are those detailed in b) 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 parenthesis where deemed necessary. [See also Clause **5**, commentary and recommendations b).]

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 caravan holiday homes, residential park homes and permanently moored boats. See IGE/UP/8 [8].

NOTE 5 Appliances of over 20 kW: although many of the requirements within this standard will equally apply to appliances with a rated heat input in excess of 20 kW, additional or alternative requirements may also be applicable in order to achieve a safe installation. Reference should be made to the Building Regulations and supporting guidance or requirements thereto.

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

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 (Sixteenth edition).*

BS 7977-1:2002, *Specification for safety and rational use of energy of domestic gas appliances — Part 1: Radiant/convectors.*

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
air vent free area
unobstructed cross-sectional area of an air vent, i.e. the sum of the areas of the individual apertures

3.3
associated independent canopy
non-combustible canopy situated at the base of the flue system and which is permanently fixed above the appliance to facilitate the passage of the products of combustion into the flue

3.4
builder's opening
enclosure constructed by the builder to accommodate fireplace components

3.5
chimney breast
projection beyond the thickness of a wall that contains the fireplace and flue

3.6
chimney pot
prefabricated unit fitted at the flue outlet of a chimney

3.7
decorative fuel effect gas appliance
appliance designed to burn gas for a decorative effect

3.8
factory made insulated chimney
complete assembly of all the essential factory made insulated sections, fittings and accessories necessary to convey the products of combustion to the outside air

3.9
fanned flue system
flue system in which the removal of flue products is dependent on a fan

3.10
firebed
part of a decorative fuel effect gas appliance on which the gas burns

3.11
fireplace opening
aperture formed in the face of the builder's opening, fireplace recess, flue box or fire surround, if fitted

3.12
fireplace recess
recess formed by the inclusion of fireplace components in the builder's opening

3.13
flue box
non-combustible enclosure that provides a substitute builder's opening or fireplace recess

3.14
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".

3.15
flue system
continuous flue, or a complete assembly of flue components, from a builder's opening, fireplace recess, flue box or associated independent canopy to a chimney pot, terminal or flue outlet

3.16
gather
smooth transitional reduction in area from above the builder's opening or fireplace recess into the flue

3.17
hearth
slab of fire-resisting material to prevent overheating of the surface beneath the appliance

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

3.19
lintel
loadbearing beam above the builder's opening or fireplace recess

3.20
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.

3.21
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

3.22
throat
contraction located in the flue, immediately above the fireplace recess, that is designed to accelerate the flue gases

3.23
through-room
room formed by the removal of an interconnecting wall between two rooms or any large room formed by two open plan smaller rooms

NOTE The opening/archway present between two smaller rooms may have sliding or intercommunicating doors.

3.24
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

NOTE Collaboration is essential between those concerned with the design and installation, both at the planning stage and during the execution of the work.

Particular matters that shall be considered are:

a) availability of gas supplies;

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

c) provision of adequate ventilation;

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

e) position of appliance in relation to probable position of fixtures, furniture and curtains;

f) electrical supplies (where applicable);

g) 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**

Some appliance installations can 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. In addition a hearth for the appliance will need to be provided (see Clause **11***).*

5 Appliances

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

COMMENTARY AND RECOMMENDATIONS ON CLAUSE **5**

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

Consideration should be given to the following.

a) *In the case of a new appliance, the installer should ensure that the packaging and the appliance itself is 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) *Decorative fuel effect gas appliances are available with rated heat inputs up to 20 kW. The input is quoted on the basis of net calorific value. The traditional UK system of using gross calorific value would give an equivalent rating of 22 kW input 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:

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

c) *Decorative fuel effect gas appliances covered by this standard are open-flued and may be available with either natural draught or fanned draught flueing.*

d) *Any appliance described in this standard will be used primarily to provide a decorative solid fuel open fire effect in 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 or internal space will be put and the period of usage.*

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

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 further 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 The appliance shall not be installed in a room or internal space containing a bath or shower.

7.2 Appliances of greater than 12.7 kW heat input (14 kW gross) shall not be installed in a room used or intended to be used as sleeping accommodation.

7.3 A gas appliance of not greater than 12.7 kW (14 kW gross) heat input installed in a room used or intended to be used as a sleeping accommodation 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 appliance state that it is unsuitable for use in such a location. An appliance 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].

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

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

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

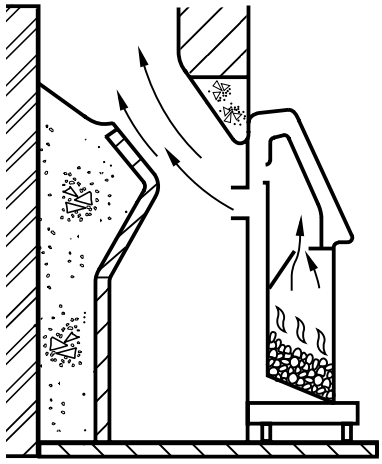
c) *New appliances will be fitted with an acceptable device. The user instructions should be checked to ensure they contain advice on the action necessary should the device operate.*

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

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

COMMENTARY AND RECOMMENDATIONS ON **7.4**

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



a) Gas fire

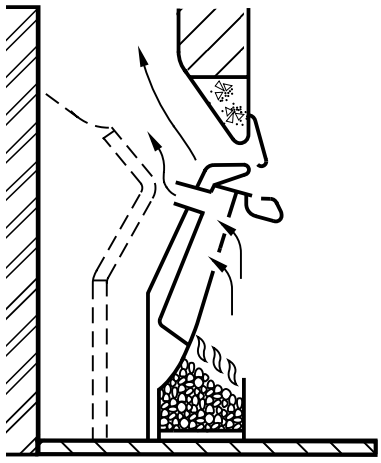
BS 5871-1

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.



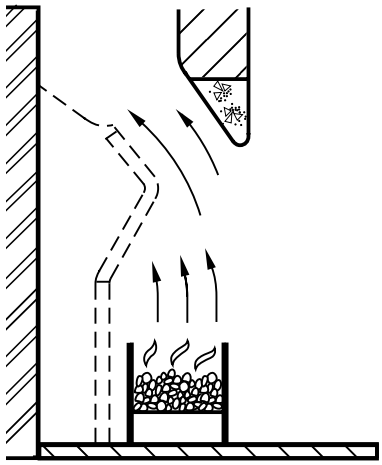
b) Inset live fuel effect gas fire

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 recess, the chairback 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 — Type of fuel effect gas appliances covered by BS 5871

8 Ventilation

8.1 General

The appliance shall have a supply of air for combustion and the safe operation of the flue.

COMMENTARY AND RECOMMENDATIONS ON **8.1**

*Subclauses **8.2**, **8.3**, **8.4** and **8.5** specify the ventilation requirements for appliances. It should be noted that whilst BS 5440-2 excludes decorative fuel effect gas appliances from its scope, the references given in **8.3** and **8.5** to BS 5440-2:2000 are applicable in the context in which they are specified.*

8.2 Sizing

Unless the manufacturer's instructions specifically state that purpose provided ventilation is not required, such ventilation shall be provided in the room or internal space containing the appliance. Where purpose provided ventilation is required, the air vent free area shall be a minimum of 100 cm^2, or, where greater, as stated in the manufacturer's instructions.

COMMENTARY AND RECOMMENDATIONS ON **8.2**

Normally, appliances covered by this standard will require a minimum of 100 cm^2 of purpose provided ventilation. However, in the case of an appliance of not greater than 7 kW input which generates a clearance flue flow not greater than 70 m^3/h when tested in accordance with Annex A, an air vent may not be necessary. The manufacturer's instructions will provide details in such circumstances. It should be noted that Annex A describes a laboratory test which is not for use by gas installers seeking conformity with this standard.

8.3 Location

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 **8.3**

Attention is drawn to the following.

a) *Wherever practicable a direct method of ventilation is preferred. BS 5440-2 specifies installation requirements for the ventilation of appliances.*

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

c) *Where a builder's opening, fireplace recess, or inglenook installation is served by an existing underfloor air supply, the air vent/grille should be sealed to avoid draughts etc., interfering with the correct operation of the flue and the appliance burner. Outside of the hearth area, the use of a floor vent communicating with a ventilated underfloor void is permitted.*

8.4 Multi-appliance installations

8.4.1 *Single room or internal space installations*

Where the room or internal space contains two or more gas appliances, the air vent free area requirement shall be the total decorative fuel effect gas appliance requirement[3)] (see **8.2**), plus, where appropriate, the greatest of the following:

a) the total flueless space heating appliance requirement; or

b) the total open-flued space heating appliance requirement (i.e. 5 cm^2 per kilowatt total rating); or

c) the greatest individual requirement of any other type of appliance. For an open-flued non-space heating appliance, the requirement shall be 5 cm^2 per kW.

[3)] The air vent free area requirement determined according to **8.2** takes into account the 35 cm^2 of adventitious ventilation deemed to be available in the room or internal space. Accordingly, when a second decorative fuel effect gas appliance is installed in the same single room or internal space, the adventitious allowance cannot again be taken into account as part of that appliance's overall ventilation requirement. As such, 35 cm^2 needs to be added to the total air vent free area requirement determined according to **8.4.1** when a second decorative fuel effect gas appliance is installed.

COMMENTARY AND RECOMMENDATIONS ON **8.4.1**

The term space heating appliance is taken to mean central heating appliance, air heater, gas fire or convector heater.

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

Example 1

In addition to one decorative fuel effect gas appliance, a room contains a gas cooker, and one open-flued instantaneous water heater of 25 kW heat input. The room volume is 30 m^3 and the manufacturer's instructions for the decorative fuel effect gas appliance specify that 100 cm^2 of purpose provided ventilation is required for this appliance.

As there are no space heating appliances to consider, the overall ventilation requirement for the room is the sum of the following:

a) *decorative fuel effect gas appliance requirement (100 cm^2); plus whichever is the greater of*

b) *gas cooker requirement (nil cm^2 plus openable window or equivalent opening); or*

c) *open-flued water heater requirement (25 × 5 = 125 cm^2)*

Therefore, the total ventilation requirement is 100 + 125 = 225 cm^2.

Example 2

*In addition to one decorative fuel effect gas appliance, a room contains a gas cooker, and one open-flued instantaneous water heater of 27 kW heat input. The room volume is 320 m^3 and the manufacturer's instructions for the decorative fuel effect gas appliance specify that purpose provided ventilation is not required for this appliance (see commentary and recommendations on **8.2**).*

As there are no space heating appliances to consider, the overall ventilation requirement for the room is the sum of the following:

a) *decorative fuel effect gas appliance requirement (0 cm^2) plus whichever is the greater of:*

b) *gas cooker requirement (nil cm^2 plus openable window or equivalent opening); or*

c) *open-flued water heater requirement (27 × 5 = 135 cm^2).*

Therefore, the total ventilation requirement is 0 + 135 = 135 cm^2.

8.4.2 ***Through-room installations where the through-room contains two similar flues that are both open***

Where the room contains two or more gas appliances, the air vent free air requirement shall be the total decorative fuel effect gas appliance requirement (see **8.2**) plus, where appropriate, the greatest of the following:

a) the total flueless space heating appliance requirement; or

b) in the case of an installation that includes one decorative fuel effect gas appliance the total open-flued space heating appliance requirement (i.e. 5 cm^2 per kilowatt total rating in excess of 7 kW); or

c) in the case of an installation that includes two decorative fuel effect gas appliances the total open-flued space heating appliance requirement (i.e. 5 cm^2 per kilowatt total rating); or

d) the greatest individual requirement of any other type of appliance. For an open-flued non-space heating appliance, the requirement shall be either:

1) in the case of an installation that includes one decorative fuel effect gas appliance, 5 cm^2 per kilowatt in excess of 7 kW; or

2) in the case of an installation that includes two decorative fuel effect gas appliances, 5 cm^2 per kilowatt.

COMMENTARY AND RECOMMENDATIONS ON **8.4.2**

The term space heating appliance is taken to mean central heating appliance, air heater, gas fire or convector heater.

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

Example

In addition to one decorative fuel effect gas appliance, a through-room contains the following gas appliances:

a) *space heating appliances:*

one open-flued boiler (21 kW heat input);

one open-flued gas fire (5 kW heat input);

b) *other appliances:*

one gas cooker;

one open-flued water heater (15.5 kW heat input).

The room volume is 100 m^3 and the manufacturer's instructions specify that 100 cm^2 of purpose provided ventilation is required for the decorative fuel effect gas appliance.

The overall ventilation requirement for the through-room is the sum of the following:

1) *decorative fuel effect gas appliance (100 cm^2); and*

2) *the ventilation requirement of a) or b), whichever is the greater.*

For (a), the ventilation requirement is $5 \times (21 + 5 - 7) = 95$ cm^2;

For (b), the ventilation requirement is nil cm^2 plus openable window or equivalent opening (cooker) and $5 \times (15.5 - 7) = 42.5$ cm^2 (water heater).

Therefore the total ventilation requirement is $100 + 95 = 195$ cm^2.

8.4.3 ***Oil or solid fuel fired appliances***

Where the room or internal space also contains oil or solid fuel fired appliances, they shall be treated as if they were gas appliances of similar type and rated input.

COMMENTARY AND RECOMMENDATIONS ON **8.4.3**

If the rated output rather than the rated input is shown on an oil or solid fuel fired appliance, the rated input (in kW) should be calculated using the following equation:

$$\text{Input} = \frac{\text{Output} \times 10}{6}$$

For a solid fuel open fire or small closed stove of unknown heat input the air vent free area requirement should be taken as 100 cm^2.

8.5 Effect of fans

Where there is an extract fan or ceiling fan in any room or internal space, the installation shall conform to BS 5440-2:2000, Clause **6**.

9 Flueing

9.1 General

Any appliance covered by this standard shall be flued in accordance with **9.2** and **9.3** or **9.4**, as appropriate.

9.2 Flue system (general)

9.2.1 The flue system shall be constructed of non-combustible materials of such nature, quality and thickness as not to be adversely affected by heat, condensation and the products of combustion. It shall be so placed, shielded or constructed as to:

a) prevent ignition of any part of the building (see also Clause **11**);

b) prevent any products of combustion from entering the building;

c) ensure that there is neither undue risk of accidental damage to the flue nor undue hazard to persons in or about the building.

9.2.2 A visual check of the flue system shall be carried out to confirm that:

a) there is a tapered transition from the head of the fireplace into the flue;

b) there is no apparent structural damage to the flue system;

c) the flue system is continuous from its inlet to the point of termination.

COMMENTARY AND RECOMMENDATIONS ON **9.2.2**

Guidance on throat design is given in BS 8303.

9.2.3 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.

To assist the correct operation of the fire, a fireplace recess or builder's opening shall have only an entrance through the fireplace opening, 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 **9.2.3**

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

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

9.2.4 Where the appliance is installed under an associated independent canopy, the canopy flue outlet shall be positioned at the top of the canopy. The canopy outlet shall have the same dimensions as the flue system and be securely fixed and sealed into the flue. The canopy shall have no openings other than at its base and top.

9.2.5 Any flue that cannot be seen to be clean and unobstructed throughout its length shall be thoroughly swept before installing an appliance.

COMMENTARY AND RECOMMENDATIONS ON **9.2**

Suitable flue systems may include the following:

a) *an existing masonry chimney;*

b) *single or double wall metal flue pipe meeting the requirements of **9.2.1** and approved by the appliance manufacturer;*

c) *an existing masonry chimney lined with a stainless steel double wall flue liner or single skin stainless steel liner satisfying the requirements of BS 715 or BS EN 1856-2;*

d) *existing masonry chimney lined with a system which has been approved by an accredited test house as being suitable for use with a solid fuel fired appliance;*

e) *lined masonry chimney (e.g. to BS 6461-1);*

f) *precast flue block chimney for use with a solid fuel fired appliance (see BS 6461-1);*

g) *other precast flue block chimneys which have been approved by an accredited test house as being suitable for use with solid fuel fired appliances;*

h) *other factory-made insulated chimney complying with BS 4543-2 or BS 4543-3;*

i) *other factory made systems which have been approved by an accredited test house as being suitable for use with appliances covered by this standard.*

Where uninsulated metal single wall flue pipe is used, there should be a minimum clearance of 25 mm between the flue pipe and combustible material. In the case of double wall flue pipe, a clearance of 25 mm, measured from the inner wall, should be provided.

Uninsulated single wall flue pipe should not be used externally, in loft and roof spaces, and in other exposed locations, e.g. unheated rooms or spaces.

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 fires covered by this standard is given in Table 1.

Table 1 — 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
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 in 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].

9.3 Flue system (natural draught)

9.3.1 *Flue and fireplace size*

a) The flue serving the appliance shall have no cross-sectional dimension less than 175 mm, other than in the case of an appliance which has been certificated for use on a flue of a smaller size.

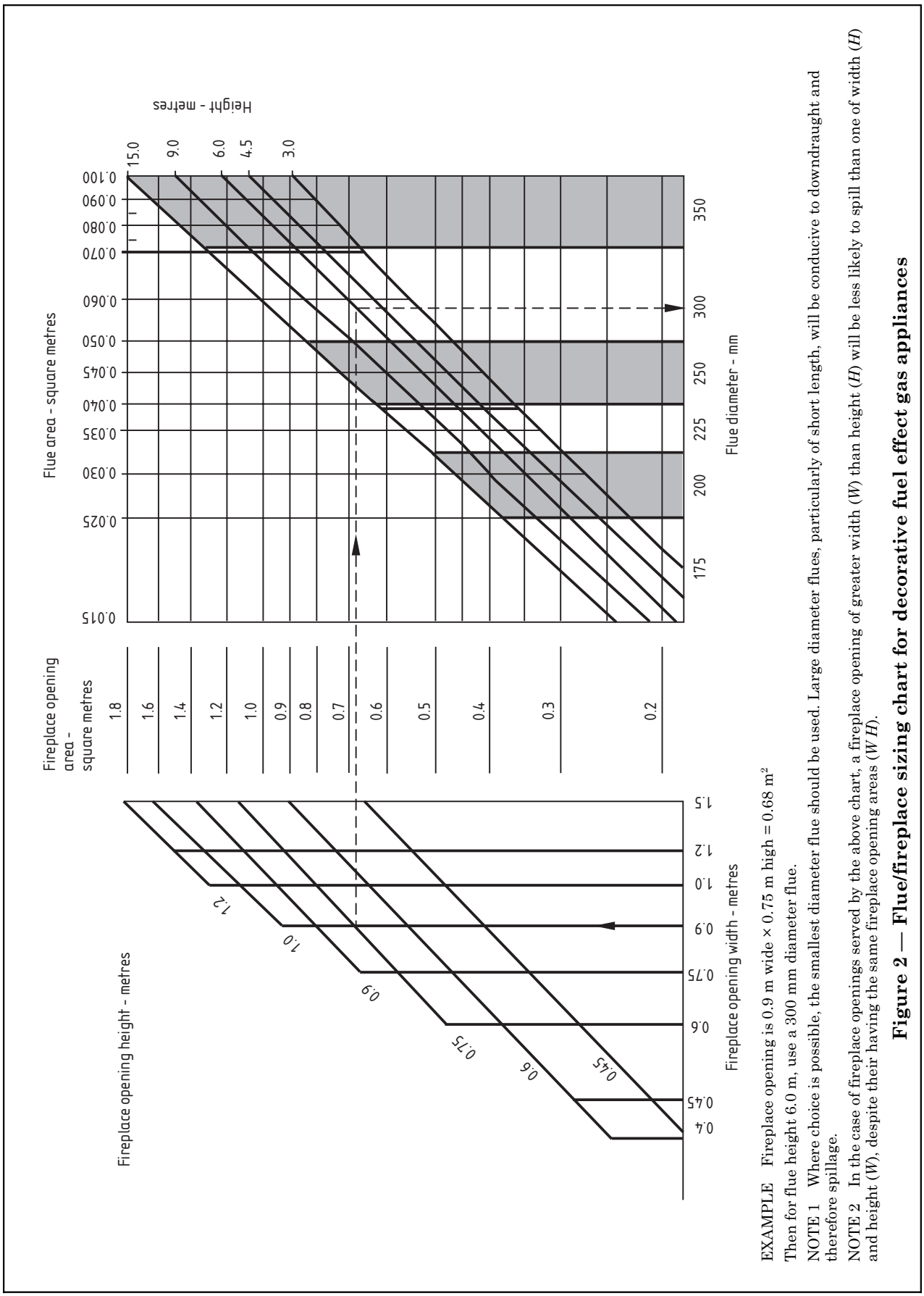
b) The fireplace size shall be such that there is no spillage from the appliance.

COMMENTARY AND RECOMMENDATIONS ON **9.3.1**a) AND b)

Where an appliance has been certificated for use on a flue of less than 175 mm across its axis, this will be stated in the manufacturer's installation instructions.

For a flue and fireplace to operate without spillage, there is a necessary relationship between the flue size, the flue height and the fireplace opening area. The chart shown in Figure 2 gives practical guidance on this relationship.

Typical fireplaces into which appliances may be installed are shown in Figure 5.



EXAMPLE Fireplace opening is 0.9 m wide × 0.75 m high = 0.68 m^2

Then for flue height 6.0 m, use a 300 mm diameter flue.

NOTE 1 Where choice is possible, the smallest diameter flue should be used. Large diameter flues, particularly of short length, will be conducive to downdraught and therefore spillage.

NOTE 2 In the case of fireplace openings served by the above chart, a fireplace opening of greater width (*W*) than height (*H*) will be less likely to spill than one of width (*H*) and height (*W*), despite their having the same fireplace opening areas (*W H*).

Figure 2 — Flue/fireplace sizing chart for decorative fuel effect gas appliances

Case 1 *shows a builder's opening. The fireplace opening area is taken as the multiple of the width and the height of the vertical face of the opening into the fireplace from the room.*

Case 2 *shows a fireplace recess. The fireplace opening area is taken as in Case 1 above.*

Case 3 *shows a raised builder's opening (sometimes referred to as a 'hole-in-the-wall' fireplace) which may or may not have fireplace components installed to form a fireplace recess. In both cases, the fireplace opening area is taken as in Case 1 above.*

Cases 4, 5 and 6 *show fireplaces incorporating a canopy. Such fireplaces, and flues, may be sized from Figure 6 by either of two methods.*

Method 1. *The fireplace opening area may be taken as the area of the horizontal entry into the base of the canopy PROVIDED THAT all the relevant constraints shown in Figure 6 are followed, or*

Method 2. *The fireplace opening area may be taken as the multiple of the unsupported perimeter of the base of the canopy and the height of the base of the canopy above the fire bed.*

When installing an appliance into an existing fireplace arrangement it is not normally necessary to alter the flue size if the flue system has been proven to work safely with a solid fuel open fire.

Use of the flue sizing chart given in Figure 2 will generally ensure satisfactory clearance of products of combustion.

Examples for Cases 4, 5 and 6 using Methods 1 and 2

1. Case 4 or 5

a) *If W = 0.8 m, H = 0.5 m and D = 0.5 m, then Method 1 cannot be used (as H is greater than 0.4 m). Therefore, by Method 2; fireplace opening area* $= H (W + 2D)$
$= 0.5 (0.8 + 1)$
$= 0.9\ m^2$

b) *If W = 0.8 m, H = 0.4 m and D = 0.5 m, and all other constraints are followed, then either Method 1 or Method 2 can be used. Therefore; by Method 2, fireplace opening area* $= H (W + 2D)$
$= 0.4 (0.8 + 1)$
$= 0.72\ m^2$

or
by Method 1, fireplace opening area $= (W \times D)$
$= (0.8 \times 0.5)$
$= 0.4\ m^2$

Method 1 gives the smaller area (and thus smaller flue size) and should be used.

2. Case 6

If $W_1 = 1.2$ *m,* $W_2 = 1.2$ *m, H = 0.4 m, then Method 1 can be used (as H is not greater than 0.4 m) provided all other constraints are followed.*

Therefore, by Method 1, fireplace opening area $= 1.2 \times 1.2$
$= 1.44\ m^2$

[By Method 2, fireplace opening area $= 2(0.4) (1.2 + 1.2) = 1.92\ m^2$*]*

Method 1 gives the smaller area (and thus smaller flue size) and should be used.

9.3.2 ***Flue boxes***

A flue box shall only be used to house a decorative fuel effect gas appliance where it has been identified as being suitable for such use by the appliance manufacturer and/or flue box manufacturer (see Figure 3).

COMMENTARY AND RECOMMENDATIONS ON **9.3.2**

Only flue boxes which have been assessed to BS 715 should be used. Technical data and installation instructions will be provided with such boxes.

Certain types of flue box are referred to as convector boxes. These are designed to provide a level of convected heat output when the appliance is in operation and are normally located within a builder's opening beneath an existing flue. 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 (also see commentary and recommendations on ***16.1****.)*

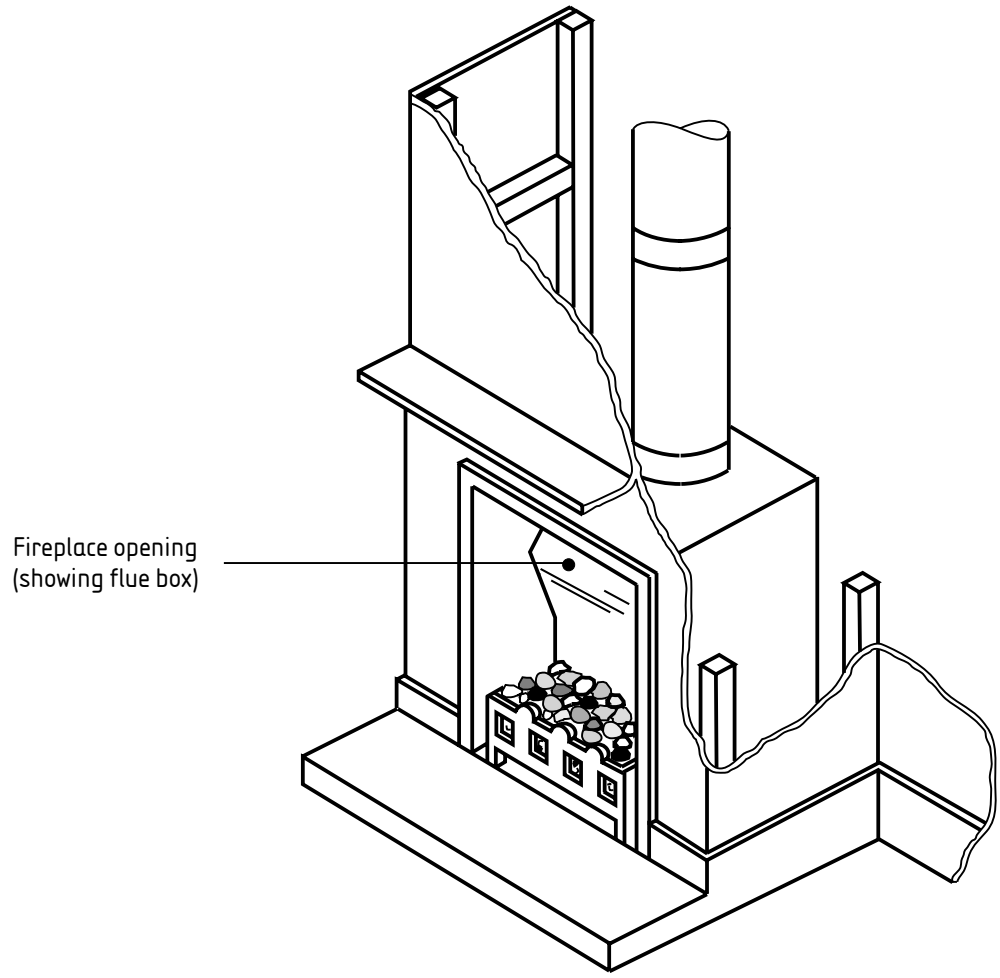


Figure 3 — Appliance installation in typical flue box (see **9.3.2**)

9.3.3 *Route*

The flue into which the appliance discharges its combustion products shall serve no other appliance and shall be routed to ensure full clearance of combustion products. The route shall be as short as practicable, consistent with effective flue operation and shall conform to any requirements regarding minimum flue height given in the manufacturer's instructions.

COMMENTARY AND RECOMMENDATIONS ON **9.3.3**

*The flue should take the most direct practicable route consistent with structural stability, appearance and termination (see **9.3.4**). Horizontal or slightly inclined runs of flue should be avoided, and if a bend is necessary in a flue it should not make an angle of more than 45° with the vertical. An essentially vertical route from the base of the flue system is especially desirable.*

*Any flue of appropriate size (see **9.3.1**) can normally be expected to give satisfactory performance provided that it does not contain excessive restrictions, multiple bends, or sections forming an angle of more than 45° with the vertical.*

Exposed flue runs should be avoided wherever possible. Where such routing is necessary, this should be in accordance with the requirements of BS 5440-1.

9.3.4 *Termination*

9.3.4.1 *General*

Where the flue serving the appliance has any cross sectional dimension of 170 mm or less across the axis of its outlet, a terminal shall be fitted in accordance with **9.3.4.2**.

Where this dimension exceeds 170 mm, a terminal or chimney pot shall be fitted, conforming to **9.3.4.2** or **9.3.4.3**, as appropriate, unless the chimney stack is of a design which was used with solid fuel appliances and not fitted with a flue terminal or pot.

COMMENTARY AND RECOMMENDATIONS ON **9.3.4.1**

In some older properties, the top of the chimney stack is finished with brickwork (e.g. feature brickwork) and the flue outlet is effectively level with the top of the stack. In such cases it is not necessary to fit a terminal or pot to the chimney.

9.3.4.2 *Terminals*

Any terminal used shall not restrict the exit and safe dispersal of the combustion products from the flue and shall conform to the following:

a) outlet openings shall be provided equally all round or on all sides of the terminal;

b) outlets shall admit a 6 mm diameter ball, but not a 16 mm diameter ball;

c) the total free area of the outlet openings shall be at least twice the nominal area of the flue, unless the terminal conforms to the aerodynamic requirements specified in BS EN 1856, BS 7435-2 or BS 1289-1.

9.3.4.3 *Chimney pots*

Any chimney pot used shall have no dimension across the axis of its outlet, or outlets, less than 175 mm.

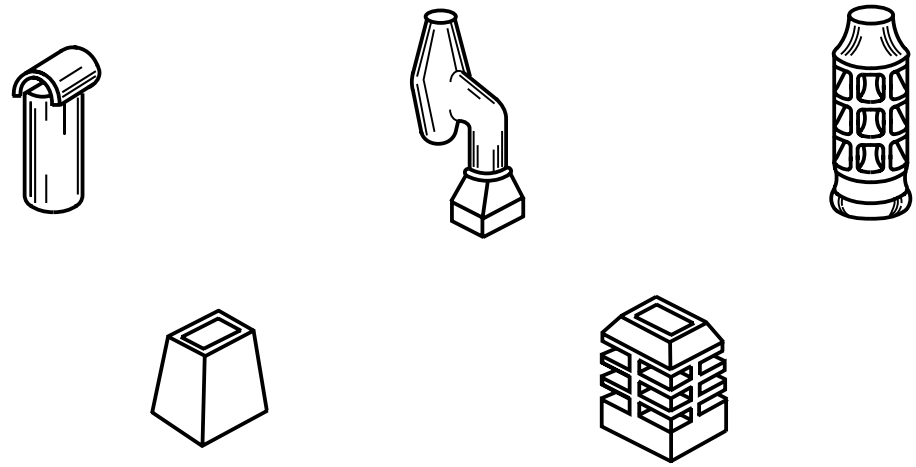
9.3.4.4 *Inserts*

A chimney pot insert shall not be used.

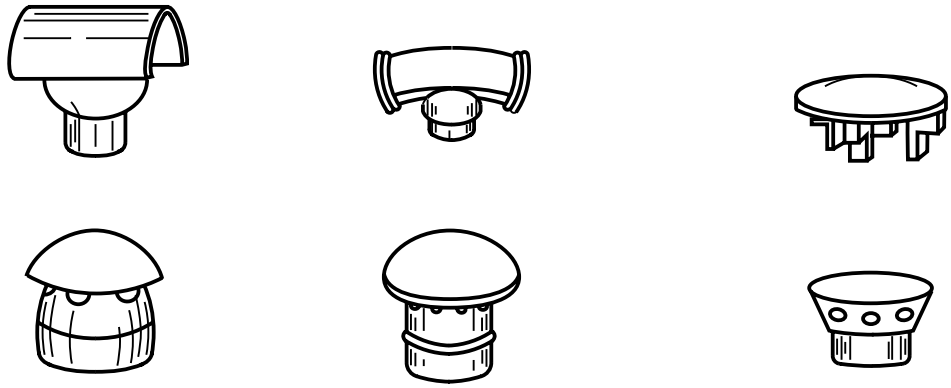
COMMENTARY AND RECOMMENDATIONS ON **9.3.4.3** and **9.3.4.4**

There are in existence many types of chimney pots and inserts (sometimes called additions).

In cases where an installation is being carried out in an existing property the installer may be unable to gain easy access to the chimney stack to check outlet opening sizes. In such cases Figure 4 will enable the installer to identify some of those terminations which are either unsuitable (i.e. inserts) or very likely to be unsuitable [i.e. chimney pots as shown in Figure 4(a)] and which should be removed or investigated further.



a) Unsuitable chimney pots, i.e. those where the flue outlet is likely to be less than 175 mm across the axis.



b) Typical chimney pot inserts designed to cap off a chimney but allow through ventilation.

NOTE All inserts are unsuitable.

Figure 4 — Unsuitable terminations (see **9.3.4.3** and **9.3.4.4**)

9.3.4.5 *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 **9.3.4.5**

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.

9.3.4.6 *Location*

The point of termination shall be in accordance with BS 5440-1, above roof edge level and so positioned as to allow air to flow freely across it at all times.

The chimney pot, terminal or flue outlet shall not be sited within 600 mm of any fresh air inlet or other opening into the building, or the open end of a ventilating pipe serving a drainage system.

9.3.5 ***Flue flow test (smoke test)***

Before installing any appliance covered by this standard, correct operation and integrity of the flue shall be verified by carrying out a flue flow test (smoke test).

COMMENTARY AND RECOMMENDATIONS ON **9.3.5**

To verify the correct operation and integrity of the flue the following procedure should be used.

Hold a lighted smoke match at the base of the flue system. If the smoke does not clear, warm the entry to the flue system with a blow lamp for approximately 2 min and then carry out another smoke match check. If the smoke still does not clear, the fault should be investigated.

If the smoke match check is satisfactory, close all doors which communicate with other rooms or internal spaces and light a smoke pellet placed at the base of the flue system. Check that smoke discharges only from the flue system termination. If the smoke does not clear, or it discharges from somewhere other than the flue system termination, do not install the appliance until the fault has been corrected.

9.4 Flue system (fanned draught)

Open-flued fanned draught systems shall be installed in accordance with BS 5440-1 as appropriate and only when permitted in the appliance manufacturer's instructions.

COMMENTARY AND RECOMMENDATIONS ON **9.4**

Appliances with integral fanned draught flue systems capable of being installed in accordance with BS 5440-1 are available. Alternatively, and subject to the appliance manufacturer's approval, flue flow assistance may be provided by a non-integral terminal, or in-line, fan.

The choice of fan, flue route and size should be so as to ensure full clearance of combustion products in the event of adverse wind pressures as detailed in BS 5440-1. In other than exceptional cases, a minimum flow rate of 36 m^3/h per kW will provide clearance at a maximum CO_2 flue concentration of 0.3 %.

The flue flow rate quoted is at 15 °C and 1 013 mbar and appropriate correction has to be made to allow for the actual temperature of the combustion products.

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 Appliance fixing

10.1 General

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

NOTE 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.

10.2 Correct operation of the flue

Before fixing any appliance covered by this standard, correct operation of the flue shall be verified in accordance with Clause **9**.

10.3 Siting

10.3.1 The appliance shall be stood on a hearth or installed into a raised builder's opening (hole-in-the-wall fireplace) and fixed in accordance with the manufacturer's instructions.

The dimensions of the hearth shall be in accordance with **11.2**.

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

The appliance shall be installed so that it is not liable to be accidentally or inadvertently moved.

COMMENTARY AND RECOMMENDATIONS ON **10.3.2**

The manufacturer's instructions will state how the appliance is to be fixed but any one or more of the following methods will ensure that the appliance is not liable to be accidentally or inadvertently moved:

a) *by self-weight if the mass is greater than 15 kg;*

b) *by the side and rear restraint of fireplace components conforming to BS 1251.*

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

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

10.3.3 The location for the appliance installation shall be chosen with due regard to the use of the building and its proximity to sources of air movement.

COMMENTARY AND RECOMMENDATIONS ON **10.3.3**

Particular care should be taken in siting appliances in areas subject to excessive air movement, e.g. public houses, close to door openings etc., due to the potential problem of spillage.

10.4 Removal for servicing

When the appliance is installed in a builder's opening, fireplace recess, flue box or under an associated independent canopy it shall be installed in such a way that it can be removed, if necessary, for servicing.

10.5 Appliance projection and canopy size

10.5.1 *Appliance projection*

Unless otherwise specified in the manufacturer's instructions, when the appliance is installed in a builder's opening or a fireplace recess (see Figure 5) or a flue box (see Figure 3) no part of the naked flame or incandescent part of the firebed shall project beyond the vertical plane of the fireplace opening.

10.5.2 *Appliance canopy size*

When the appliance is installed under an associated independent canopy (see Figure 5) the size of the canopy base and the height of the canopy base above the appliance shall be as detailed in the appliance manufacturer's instructions. In the absence of any specific information the dimensions shall be determined in accordance with Figure 6.

COMMENTARY AND RECOMMENDATIONS ON **10.5.2**

The front and sides of the canopy should slope up to the inlet of the flue at an angle of not more than 45° with the vertical.

10.6 Replacement components or accessories

Replacement components or accessories that could adversely affect the safe operation of the appliance shall not be fitted to, or in association with, the appliance.

COMMENTARY AND RECOMMENDATIONS ON **10.6**

Replacement coals or logs etc. of a type or quantity other than those provided or specified by the appliance manufacturer should never be used on the appliance firebed.

Decorative attachments such as kettle stands, trivets etc., should not be fitted to the appliance front unless these are as supplied or specified by the appliance manufacturer.

11 Fire and related safety precautions

11.1 General

11.1.1 Combustible material adjacent to the appliance shall be protected against the effects of heat transmission. Where the manufacturer's instructions state that the appliance is suitable for mounting on or against combustible material then any special instructions in this respect shall be followed.

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

COMMENTARY AND RECOMMENDATIONS ON **11.1.1**

The above requirement will generally be satisfied by any unprotected combustible wall or fixed combustible furniture being not nearer than 300 mm, measured horizontally, to the naked flame or incandescent part of the firebed.

11.1.2 Any part of a canopy or an uninsulated flue pipe which is within 1 m of the naked flame or incandescent part of the firebed shall be separated from any combustible materials by a distance not less than 300 mm. Thereafter, the canopy or uninsulated flue pipe arrangement shall be constructed such that the flue gases are separated from any combustible materials by a distance not less than 50 mm.

COMMENTARY AND RECOMMENDATIONS ON **11.1.2**

Attention is drawn to the need to limit the surface temperature of those parts of the canopy which might inadvertently be touched, and the installer should satisfy himself that these would be acceptable to a user.

In order to reduce surface temperatures it is recommended that a canopy of double skin or insulated construction is used.

11.2 User protection

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

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

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

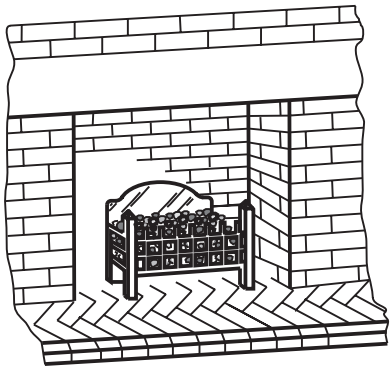
1) a hearth provided in accordance with **11.3.2**, or

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

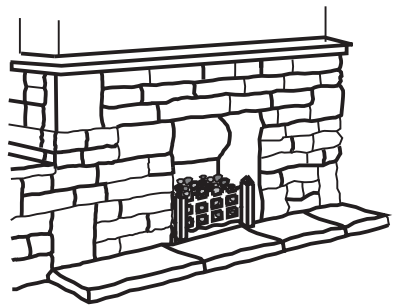
COMMENTARY AND RECOMMENDATIONS ON **11.2** a) and b)

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

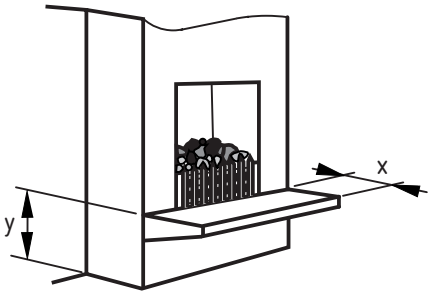
The tactile separator is intended to give abrupt warning by touch to a person moving inadvertently towards the fire.



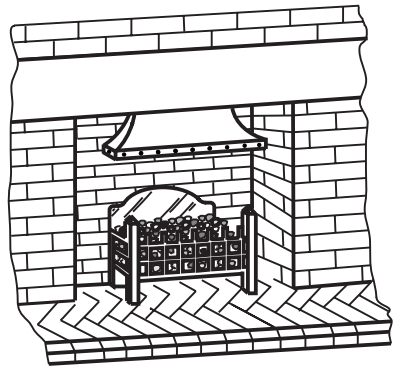
Case 1. Builder's opening



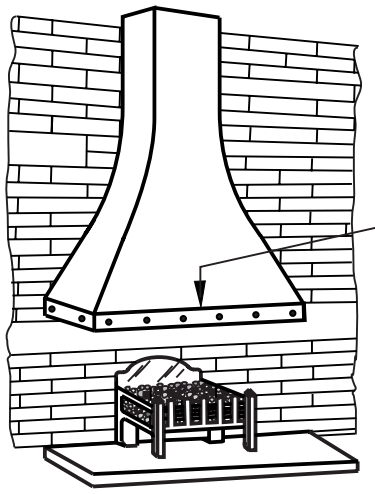
Case 2. Fireplace recess



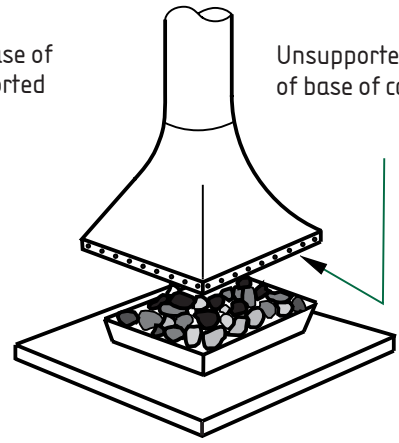
Case 3. Raised builder's opening



Case 4. Builder's opening with associated independent canopy



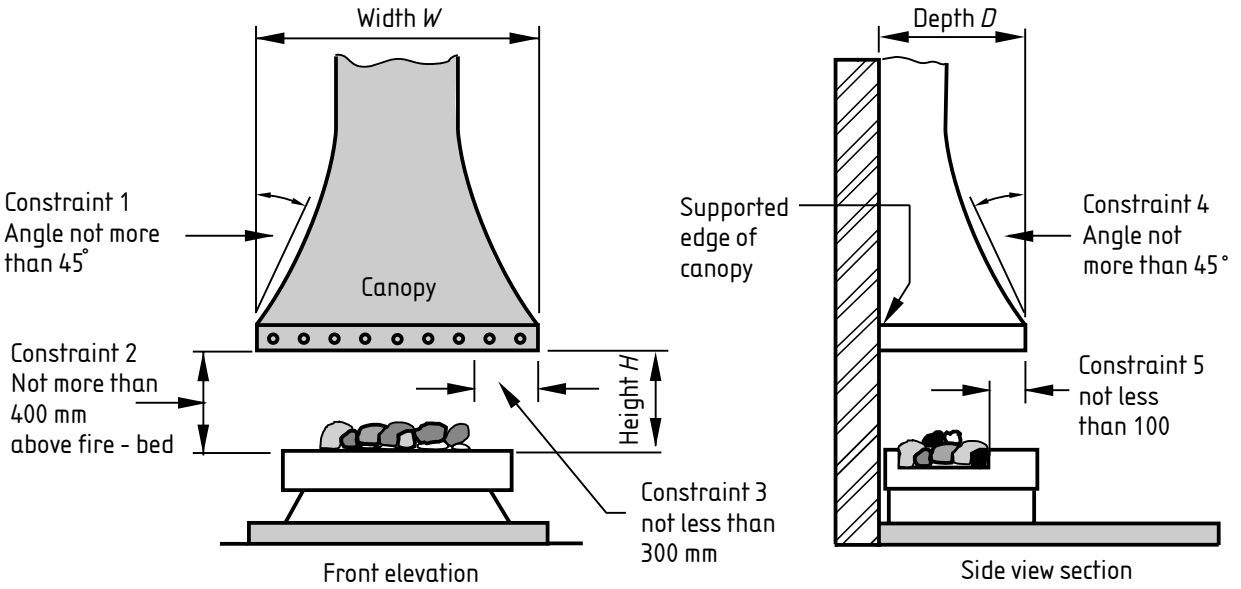
Case 5. Associated independent canopy with supported edge



Case 6. Associated independent canopy which may be rectangular, circular or irregular

Figure 5 — Typical fireplaces in which appliance may be installed [see **11.3.2** and **11.3.3** for hearth dimensions and also commentary and recommendations for **9.3.1**a) and b)]

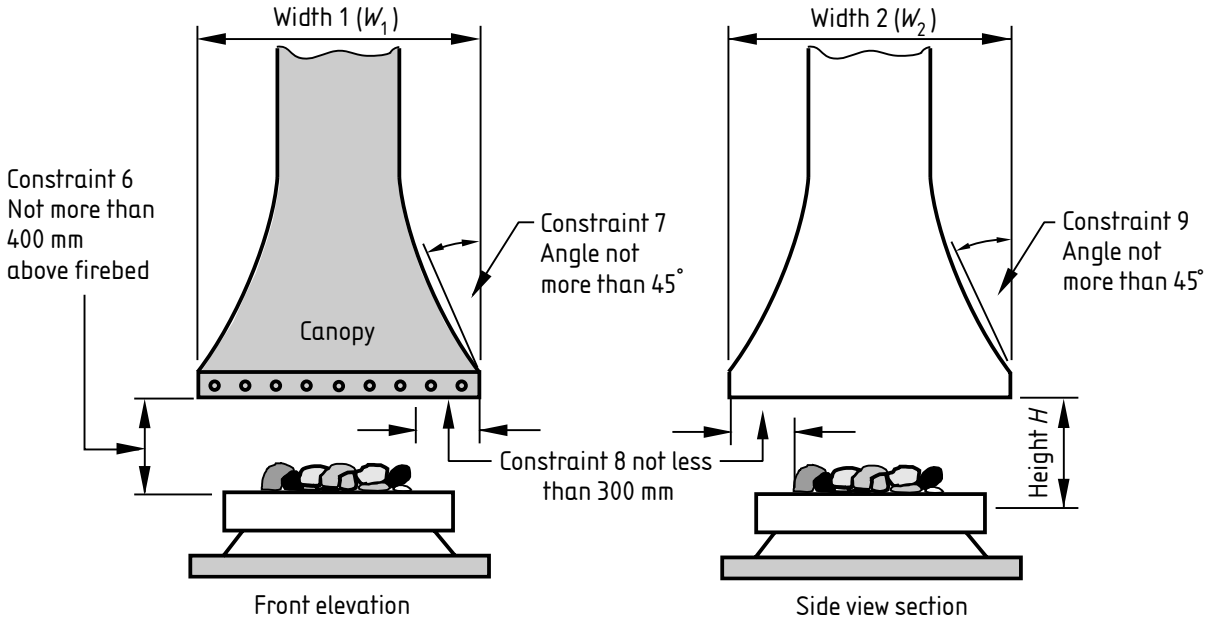
Cases 4 and 5



Method 1 (following all of constraints 1 to 5 above) Fireplace opening area = $W \times D$

Method 2 (not following all of constraints 1 to 5 above) Fireplace opening area = $H(W + 2D)$

Case 6



Method 1 (following all of constraints 6 to 9 above) Fireplace opening area = $W_1\ W_2$ [Rectangular canopy]

Fireplace opening area = $\frac{\pi(W_1)^2}{4}$ [Circular canopy]

Method 2 (not following all of the constraints 6 to 9 above) Fireplace opening area = $2H(W_1 + W_2)$ [Rectangular canopy]

Fireplace opening area = $\pi(W_1 H)$ [Circular canopy]

NOTE These two methods apply to rectangular, circular and also irregular canopies.

Figure 6 — Constraints required to determine chimney size using method 2 for cases 4, 5 and 6 [see Figure 5 and commentary and recommendations to **9.3.1**a) and b)]

11.3 Floor protection from radiant heat

11.3.1 *General*

A hearth of solid material shall be provided beneath the appliance.

11.3.2 *Appliances in floor level fireplaces*

11.3.2.1 *Fitted appliances*

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

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

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

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

11.3.2.2 *Free-standing appliances*

Where the appliance is free-standing, the hearth shall:

a) extend completely beneath any naked flame or incandescent part of the fire-bed; and

b) project outwards at least 300 mm from all sides of any naked flame or incandescent part of the fire-bed or, if there is a non-combustible wall within 300 mm of any naked flame or incandescent part of the fire-bed, up to that wall (see cases 6 and 5, respectively, of Figure 5).

11.3.2.3 *Fitted and free-standing appliances*

In both cases the hearth shall:

a) have a thickness not less than 12 mm and be such that the heat transmitted through it does not give rise to a temperature greater than 80 °C on its underside;

COMMENTARY AND RECOMMENDATIONS ON **11.3.2.3**a)

In order to meet the hearth underside temperature requirement, a hearth thickness of greater than 12 mm might be needed and this will be detailed in the manufacturer's instructions.

Purpose-made proprietary hearths are available whose suitability for a particular application should be established from the hearth manufacturer. Hearths which would be suitable for this application are those made from non-combustible materials conforming to BS 476-4, or materials classified as Class 0 in accordance with Approved Document B to the Building Regulations 2000, as amended [12].

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

COMMENTARY AND RECOMMENDATIONS ON **11.3.2.3**b)

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

The 50 mm requirement is to:

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

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

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

Where the appliance is installed in a hole-in-the-wall fireplace, a hearth conforming to **11.3.2.1** and **11.3.2.3** shall be fitted on the floor beneath the hole so as to protect combustible material from radiant heat, unless:

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

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

c) the hearth beneath the appliance, or into which the appliance is set, extends in front of any flame or incandescent part of the fire-bed such that the sum of the **x** + **y** dimensions in Figure 5, Case 3, is at least 225 mm to any carpet or floor covering.

COMMENTARY AND RECOMMENDATIONS ON **11.3.3**b) and c)

*If the constraints in **11.3.3**b) and c) are followed then the nearest point of exposure of the carpet or floor covering to radiant heat will be more than 225 mm away from any flame or incandescent material.*

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

12 Gas supply

12.1 Gas installation pipework to the appliance shall be in accordance with BS 6891 or IGE/UP/2 [13] (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 **12.1**

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

12.2 Connections to the appliance shall not be subject to strain.

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

COMMENTARY AND RECOMMENDATIONS ON **12.1**, **12.2** AND **12.3**

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

12.4 Flexible gas connections shall not be used.

12.5 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 **12.5**

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.

12.6 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 **12.6**

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

13 Electricity supplies and wiring

13.1 Any electrical wiring installation to the appliance or fan shall conform to BS 7671.

COMMENTARY AND RECOMMENDATIONS ON **13.1**

Attention is also drawn to the requirements of Approved Document P of the Building Regulations [14] covering electrical work and the need for conformity with competency schemes for carrying out such work.

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

13.3 Any point of connection to the mains electricity shall be readily accessible and the method of connection shall provide electrical isolation of the appliance and of 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 **13.3**

Where a three pin plug is used, this should be removed from the socket when servicing the appliance.

13.4 All fuses shall be rated in accordance with the appliance manufacturer's instructions.

COMMENTARY AND RECOMMENDATIONS ON **13.4**

*Where the flue system serving the appliance incorporates a fan, i.e. it is a fanned draught flue system, the requirements of Clause **13** will be applicable. The requirements of Clause **13** will also apply to any other ancillary electrical controls, e.g. safety controls, or to any appliance incorporating electrical components in its design.*

14 Commissioning

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

NOTE Further information on testing is given IGE/UP/1 [15], IGE/UP/1A [16] or IGE/UP/1B [17] (2nd family gases) and TM/62 [18] (3rd family gases).

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

14.3 The ventilation provision shall be checked for conformity with Clause **8**.

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

Where any room or internal space 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.

In the case of a multi-appliance installation, the decorative fuel effect gas appliance shall not adversely affect the operation of the flue of any other gas, oil or solid fuel fired appliance in the room or internal space of the installation, and shall itself be checked for spillage with the other appliance(s) fully operating.

If, under any of the situations given, the installation fails the spillage test and the installation cannot be immediately corrected, the appliance shall be disconnected and the customer notified.

COMMENTARY AND RECOMMENDATIONS ON **14.4**

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 appliance 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 appliance now clears its products of combustion then additional ventilation should be provided. Where spillage continues, the appliance should be removed and both the appliance and the flue examined.

It should be noted that this type of appliance will have a higher flue flow rate than a radiant or radiant/convector gas fire, or inset live fuel effect gas fire [see Figure 1a) and 1b) respectively].

Where there is already one or more gas, oil or solid fuel fired appliance in the room or internal space, the following procedure should be followed.

a) *Check each appliance, individually to ensure that it is clearing its products of combustion (for gas appliances see **14.4**).*

b) *Operate all appliances at full on rate for 5 min to 10 min.*

c) *With all appliances operating simultaneously, check each appliance in turn to ensure that each appliance is clearing its products of combustion.*

d) *Where spillage problems persist after all flues and appliances have individually proved to be satisfactory, consideration should then be given to introducing ventilation or increasing the existing ventilation. The need for providing or increasing the ventilation can normally be checked by slightly opening a window in the room or internal space and rechecking for spillage.*

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

15 Instructions and use of fireguards

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

COMMENTARY AND RECOMMENDATIONS ON CLAUSE **15**

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 6539 or BS 6778, should be fitted when the appliance is used in the presence of young children, the elderly or infirm.

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

16 Advice to be given to the user

16.1 Operating instructions

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

16.1.2 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 **16.1**

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

16.2 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 **16.2**

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 [19].

Annex A (informative)
Calculation of clearance flue flow

A.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.

A.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 **A.6**). The clearance flue flow rate is calculated at the point of just clearing (see **A.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.

A.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.

A.4 Gas tightness

A.4.1 *General*

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

Table A.1 — Test internal air pressure

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 shall be 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 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.

A.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.

A.5 Heat input

A.5.1 *General*

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

Table A.2 — Wobbe number for test gases

Family	Test gas	Wobbe number[a] MJ/m³
2nd	G20	50.8
3rd	G30	87.5
	G31	77.0
[a] The reference conditions are 1 013.25 mbar, 15 ºC, dry.		

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

For category I appliances the heat input shall be measured with G30 only.

A.5.2 *Tolerance*

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

Table A.3 — Inlet pressure for tolerances

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

A.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:

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

where:

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

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

F_m is the meter calibration factor;

t_g is the meter temperature (in °C);

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

p_a is the atmospheric pressure (in mbar);

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

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

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

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

$$Q_{\mathrm{r}} = Q\frac{W_{\mathrm{r}}}{W_{\mathrm{t}}}$$

where:

Q_{r} is the heat input using the reference gas (in kW);

W_{r} is the Wobbe index of dry reference gas;

W_{t} is the Wobbe index of the test gas.

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

$$W_{\mathrm{t}} = \frac{H_{\mathrm{w}}}{\sqrt{d_{\mathrm{w}}}}$$

i.e. if using a wet meter

$$W_{\mathrm{t}} = \frac{H_{\mathrm{d}}}{\sqrt{d}}$$

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:

$$H_{\mathrm{d}} = 1.01774H_{\mathrm{w}}$$

and the wet and dry relative densities by:

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

A.6 General conditions of test

A.6.1 *Test room*

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

The appliance should be installed on a test box and flue in accordance with Figure A.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 A.3). The flue box and test flue are supplied by the manufacturer to the test authority. The flue box should have the minimum dimensions specified in the manufacturer's installation instructions and should conform to the constructional requirements of BS 715. The test flue should have the minimum nominal diameter specified in the manufacturer's instructions and be of such a height that the distance between the base of the flue box and the top of the flue is 3 m.

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

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

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

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

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

A.6.2 *Test method*

A.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 A.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 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 %.

A.6.2.2 *Preliminary adjustment*

It is an advantage in this test method to minimize 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 A.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 analyzer or alternatively simultaneous sampling into bags is recommended.

A.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 A.1);

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

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

Table A.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 are within ± 0.004 m^3/h per kilowatt of heat input.

The point of just clearing is 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.

A.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

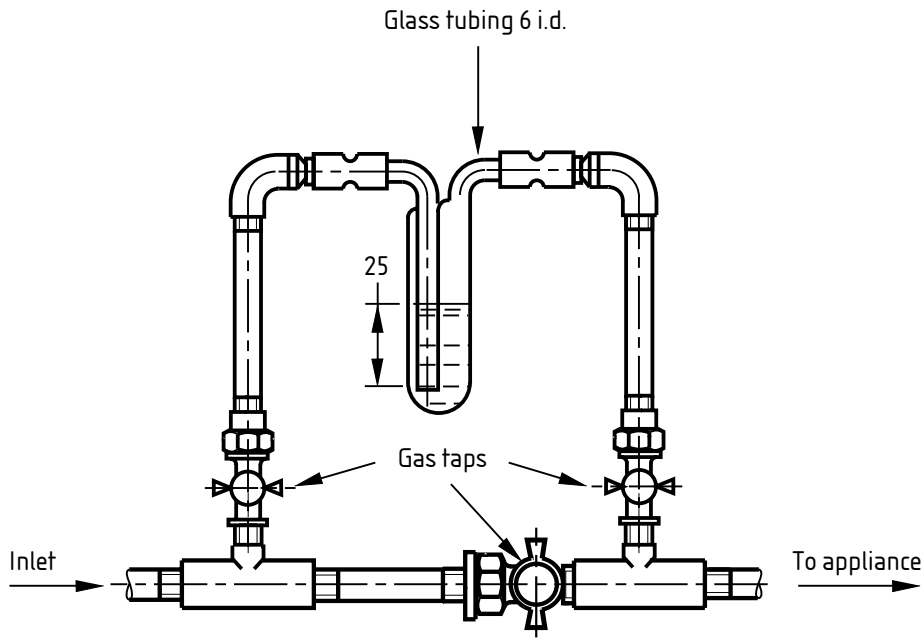
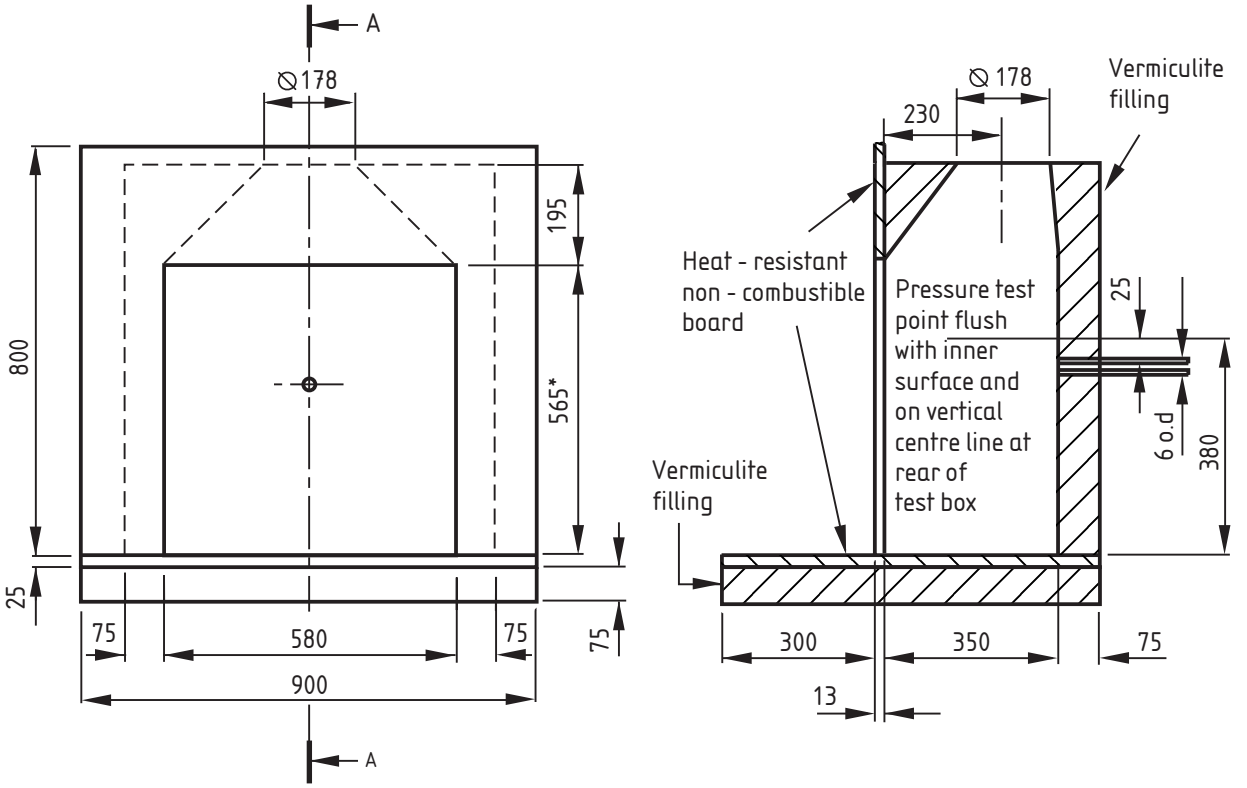


Figure A.1 — Bubble leak indicator

Dimensions in millimetres



Front elevation **Side elevation**

Material:

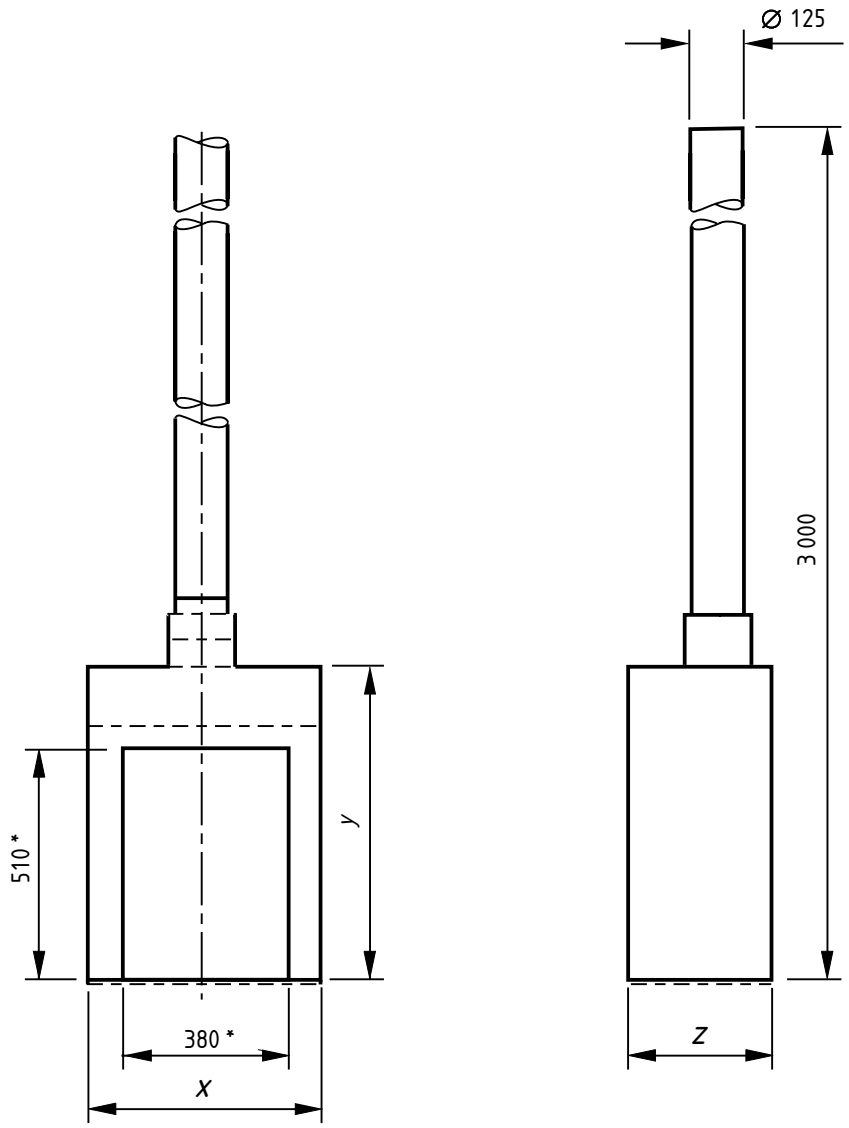
external surfaces: polished aluminium

internal surfaces: steel (preferably stainless)

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

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

Dimensions in millimetres

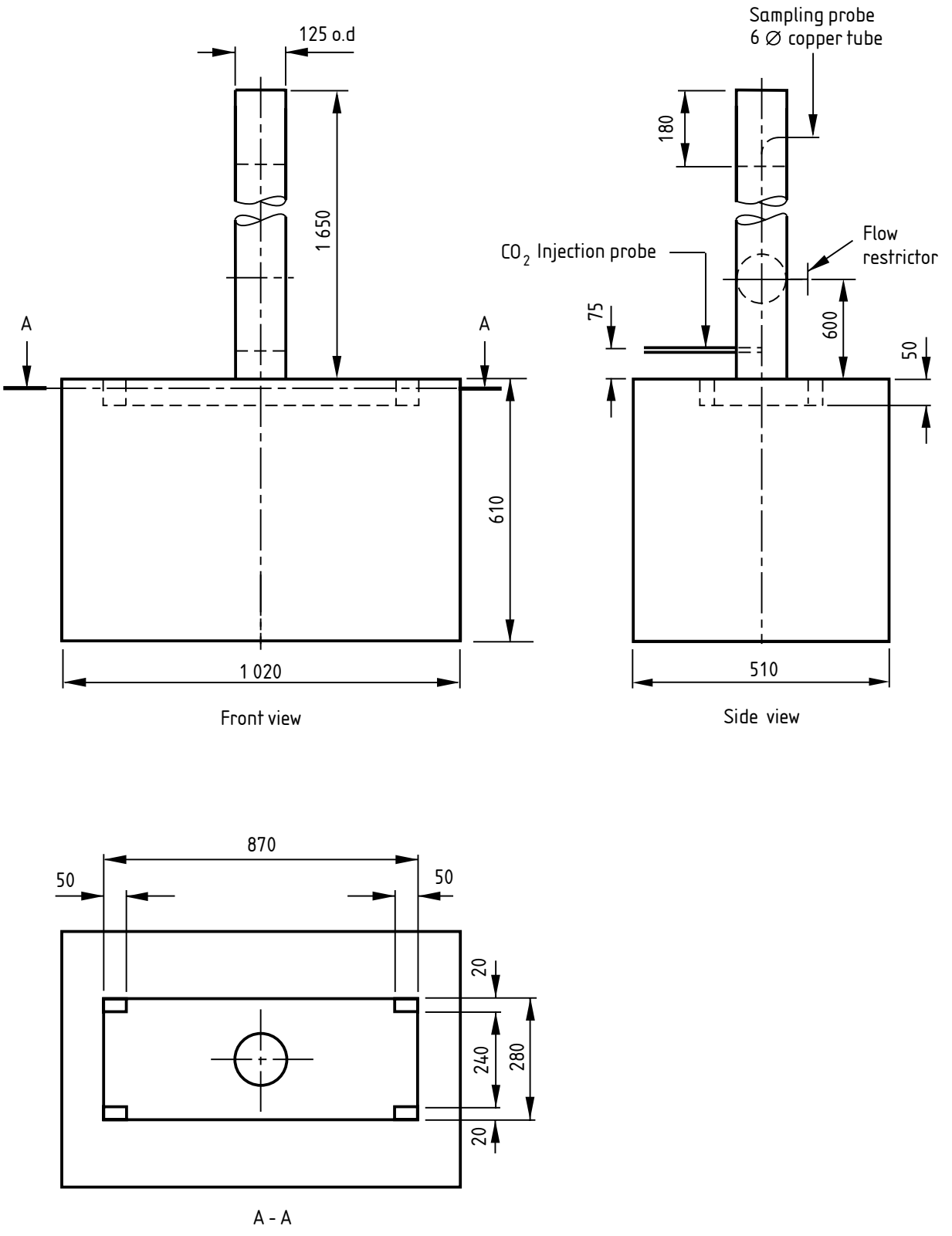


Figure A.4 — Collecting hood

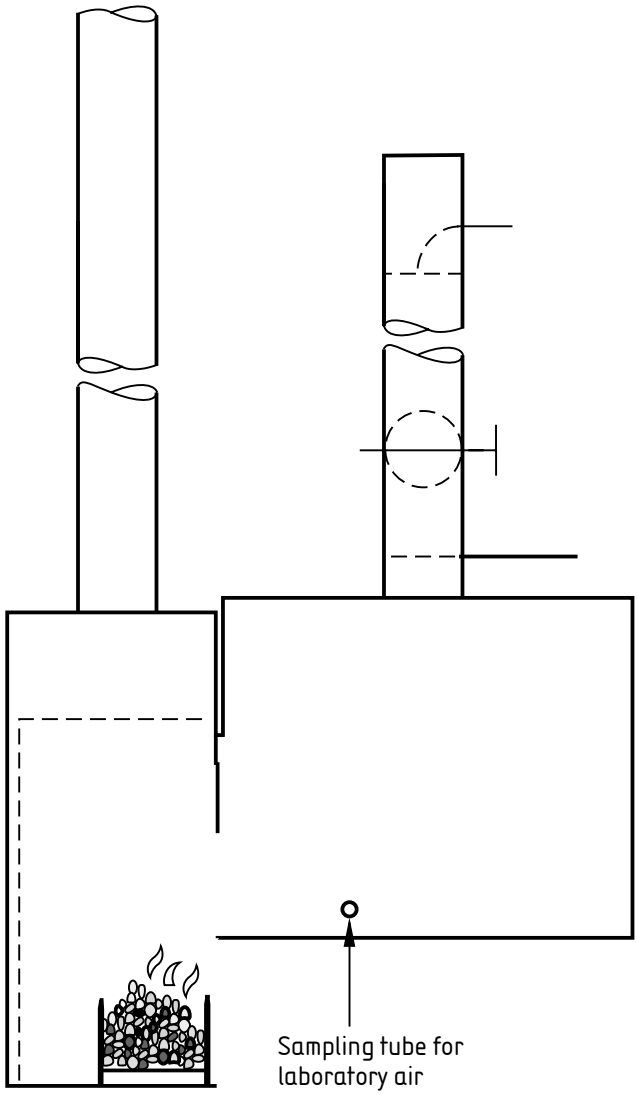


Figure A.5 — Collecting hood positioning

Bibliography

Standards publications

BS 476-4:1970, *Fire tests on building materials and structures — Part 4: Non-combustibility test for materials.*

BS 1251:1987, *Specification for open-fireplace components.*

BS 4543-2:1990, *Factory-made insulated chimneys — Part 2: Specification for chimneys with stainless steel flue linings for use with solid fuel fixed appliances.*

BS 4543-3:1990, *Factory-made insulated chimneys — Part 3: Specification for chimneys with stainless steel flue lining for use with oil fired appliances.*

BS 6461-1:1984, *Installation of chimneys and flues for domestic appliances burning solid fuel (including wood and peat) — Part 1: Code of practice for masonry chimneys and flue pipes.*

BS 6539:1984, *Specification for fireguards for use with solid fuel appliances.*

BS 6778:1986, *Specification for fireguards for use with portable, free-standing or wall-mounted heating appliances.*

BS 8303 (all parts), *Installation of domestic heating and cooking appliances burning solid mineral fuels.*

BS EN 449:2002, *Specification for dedicated liquefied petroleum gas appliances. Domestic flueless space heaters (including diffusive catalytic combustion heaters).*

BS EN 1443:2003, *Chimneys — General requirements.*

BS EN 50379-3:2004, *Specification for portable electrical apparatus designed to measure combustion flue gas parameters of heating appliances — Part 3: Performance requirements for apparatus used in non-statutory servicing of gas fired heating appliances.*

PD 6501-1:1982, *The preparation of British Standards for building and civil engineering — Part 1: Guide to the types of British Standard, their aims, relationship, content and application.*

PD 6516:1987, *Guide to guarding fires and heating appliances.*

DD 221:1997 (CR 1472:1997), *General guidance for the marking of gas appliances.*

Other documents

[1] GREAT BRITAIN. The Gas Safety (Installation and Use) Regulations (S.I.1998 No. 2451). London: The Stationery Office.

[2] GREAT BRITAIN. The Gas Safety (Installation and Use) Regulations (Northern Ireland) 2004, SR 2004, No. 63, London: The Stationery Office.

[3] GREAT BRITAIN. The Gas Appliances (Safety) Regulations 1995 (S.I. 1629). London: The Stationery Office.

[4] GREAT BRITAIN. The Building Regulations 2000 [S.I. 2000 No. 2531 (as amended)]. London: The Stationery Office.

[5] GREAT BRITAIN. The Building (Scotland) Regulations 2004 (S.I. 2000, No. 406). London: The Stationery Office.

[6] GREAT BRITAIN. The Building Regulations (Northern Ireland) (Statutory Rules of Northern Ireland 2000 No.389), as amended. London: The Stationery Office.

[7] GREAT BRITAIN. The Gas Safety (Application) (Isle of Man) Order 1996, SD 326/96. London: The Stationery Office.

[8] IGE/UP/8, *Gas in caravans, holiday homes and boats, 2000*. Institution of Gas Engineers. 21 Portland Place, London. W1N 3AF.

[9] GREAT BRITAIN. The Asbestos (Prohibition) Regulations (As Amended) 1999, London: The Stationery Office.

[10] BRITISH GAS plc: IM/28: *Appliances in commercial garages* (1st edition) (available from Institution of Gas Engineers, Loughborough), 1993.

[11] Approved Document J: 2002 Edition, *Guidance and Supplementary Information on the UK Implementation of European Standards for Chimneys and Flues* (second edition), The Stationery Office, London: 2004.

[12] Approved Document B: 2000 Edition (with amendments), *Fire safety*, The Stationery Office, London: 2004.

[13] INSTITUTION OF GAS ENGINEERS AND MANAGERS: IGE/UP/2, G*as installation pipework, boosters and compressors on industrial and commercial premises*, 1994 (amended January 1995).

[14] Approved Document P, *Electrical safety*, The Stationary Office, London: 2004.

[15] INSTITUTION OF GAS ENGINEERS AND MANAGERS: IGE/UP/1, *Soundness testing and purging of industrial and commercial gas installations*, Loughborough: 1995.

[16] INSTITUTION OF GAS ENGINEERS AND MANAGERS: IGE/UP/1A, *Soundness testing and direct purging of small low pressure industrial and commercial Natural Gas installations*, Loughborough: 1998.

[17] INSTITUTION OF GAS ENGINEERS AND MANAGERS, IGE/UP/1B, *Tightness testing and purging of domestic sized Natural Gas installations*.

[18] THE LP GAS ASSOCIATION. TM/62: *Gas Soundness Testing of LPG Service Pipework, Installation Pipework and Appliances*, London: 1999.

[19] CORGI: *The gas industry unsafe situations procedure — Dealing with unsafe situations in customers' premises*, (3rd edition), Basingstoke: 2001. (This publication can be purchased from CORGI direct by telephoning 0870 516 8111 or online by visiting www.corgi-direct.com).

[20] Approved Code of Practice, *Safety in the installation and use of gas systems and appliances* (2nd Edition L56). Sudbury: HSE Books.[4)]

[4)] Available from HSE Books, PO Box 1991, Sudbury, Suffolk, CO10 6FS.

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