

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

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

ICS 91.140.10; 97.100.20

Committees responsible for this British Standard

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Boiler and Radiator Manufacturers' Association Ltd.
British Flue and Chimney Manufacturers' Association
BSI Consumer Policy Committee
Catering Equipment Suppliers' Association
Centrica plc
Council for Registered Gas Installers
Department of Trade and Industry
Health and Safety Executive
Heating and Ventilating Contractors' Association
ICOM Energy Association
Institute of Domestic Heating and Environmental Engineers
Institution of Gas Engineers and Managers
LP Gas Association
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Foreword

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direction of the Gas Standards Policy Committee and is a revision of BS 5871-1:2001, which is obsolescent and will be withdrawn in due course.

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

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

This revision provides an update of the previous standard and has also been extended to cover the installation of heating stoves and appliances where the flue is connected directly to the appliance outlet spigot. In order to improve the layout of the standard, additional requirements for the installation of fire/back boilers and fire/back circulators are now specified in Clauses **15**, **16**, **17** and **18**. BS 5871 continues to cover the different types of fuel effect appliances in a single series of British Standards, as follows:

- BS 5871-1: *Gas fires, convector heaters, fire/back boilers and heating stoves (2nd and 3rd family gases);*
- BS 5871-2: *Inset live fuel effect gas fires of heat input not exceeding 15 kW and fire/back boilers (2nd and 3rd family gases);*
- BS 5871-3: *Decorative fuel effect gas appliances of heat input not exceeding 20 kW (2nd and 3rd family gases);*
- BS 5871-4: *Independent gas-fired flueless space heaters of nominal heat input not exceeding 6 kW (2nd and 3rd family gases) (in the course of preparation).*

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

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

It should be noted that the only appliances covered by this part of BS 5871 are those that are "CE" marked. However, BS 5871-1 may also be referred to for the installation of used appliances, where appropriate, providing the manufacturer's instructions are available. In such circumstances, the installer should satisfy himself that the appliance is safe in construction and condition, and can be used without constituting a danger. Attention is drawn to Clause **5** concerning this particular aspect.

Arising from European Standards harmonization, some British Standards appliance specifications are now being replaced by European Standards. One consequence of this process is that the reference clearance flue flow test, currently included in some of the British Standards covering the safety of appliances dealt with by BS 5871, will not be given in European appliance standards. This test has hitherto been used to determine the flue flow, under laboratory conditions, that an appliance will just clear its combustion products. The test has been used as a key factor in determining whether or not certain appliances of 7 kW¹⁾ heat input or less require purpose provided ventilation for their installation.

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

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

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

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

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

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

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

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

The Gas Appliances (Safety) Regulations 1995 [3].

The Building Regulations 2000, as amended [4].

The Building (Scotland) Regulations 2004 [5].

The Building Regulations (Northern Ireland) Statutory Rules 2000 [6].

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

Summary of pages

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

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¹⁾ Due to tolerances, this applies to a heat input of 7 kW on both net and gross calorific value – see Clause 1, Scope, Note 2.

1 Scope

This part of BS 5871 specifies installation and maintenance requirements for flued fixed space heating appliances burning 2nd and 3rd family gases for the purpose of heating rooms or spaces in domestic (see Note 4) or commercial premises. It applies to appliances known as radiant gas fires, radiant convector gas fires, convector heaters, and heating stoves. Combined appliances of the type where a gas fire is used in conjunction with a boiler or circulator are also covered in so far as the installation of the combined appliance is concerned.

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

The central heating and/or hot water system connected to a combined appliance is not within the scope of this standard and reference should be made to BS 5449 (see Note 5) and BS 5546 for this part of such an installation.

This standard is not applicable to:

- a) mobile and portable appliances conforming to BS EN 449; or
- b) appliances in touring caravans; or
- c) open-fronted radiant-convector heaters without a dress guard.

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

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

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

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

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

NOTE 5 BS 5449 has been partly replaced by BS EN 12828 and BS EN 12831, and is to be withdrawn once BS EN 14336 and BS EN 14337 are published.

2 Normative references

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

BS 715, *Specification for metal flue pipes, fittings, terminals and accessories for gas-fired appliances with a rated input not exceeding 60 kW.*

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

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

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

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

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

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

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

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

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

BS 5546, *Specification for installation of hot water supplies for domestic purposes, using gas-fired appliances of rated input not exceeding 70 kW.*

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

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

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

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

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

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

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

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

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

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

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

3 Terms and definitions

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

3.1

air vent

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

3.2

back boiler

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

3.3

back circulator

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

3.4

balanced-flued appliance

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

3.5

builder's opening

enclosure constructed by the builder to accommodate fireplace components

3.6**closure plate**

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

NOTE This can be separate or part of the appliance.

3.7**condensing appliance**

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

3.8**convector heater**

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

3.9**direct flue connection**

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

NOTE See Figure 10.

3.10**dress guard**

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

3.11**fanned flue system**

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

3.12**fireguard**

guard conforming to BS 8423

3.13**fireplace opening**

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

3.14**fireplace recess**

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

3.15**fire surround**

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

3.16**flue box**

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

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

3.17**flue gas collector**

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

3.18

flue pipe

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

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

3.19

flue spigot restrictor

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

3.20

gas fire

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

3.21

hearth

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

3.22

heating stove

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

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

3.23

imitation fuel

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

3.24

infill panel

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

3.25

installation instructions

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

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

3.26

internal space

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

3.27

open flue system (type B)

flue system that evacuates the products of combustion to the outside air

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

3.28

open-flued appliance (type B)

appliance designed to be connected to an open flue system, its combustion air being drawn from the room or space in which it is installed

3.29

radiant

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

3.30**radiant convector gas fire**

gas fire designed to emit heat by both radiation and convection

3.31**radiant gas fire**

gas fire designed to emit heat mainly by radiation

3.32**room-sealed appliance (type C)**

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

3.33**ventilation**

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

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

4 Exchange of information and planning**4.1 General**

Persons carrying out the work shall be competent.

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

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

COMMENTARY AND RECOMMENDATIONS ON 4.1

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

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

4.2 Design considerations

Particular matters that shall be considered are:

- a) availability of gas supplies;
- b) type of building, form of construction and level of thermal insulation;
- c) location, orientation and exposure of building, size, layout and purpose of rooms;
- d) assessment of heat requirements (see Clause 8 and Annex A);
- e) size, height, type and route of flue and flue termination together with materials of construction;
- f) provision of adequate ventilation;
- g) dimensions of fireplace openings and hearths together with materials of construction;
- h) position of heating appliances in relation to probable position of fixtures, furniture and curtains;
- i) electrical and water supplies (where applicable);
- j) the possibility that the user may wish to use the flue system with a solid fuel open fire in the future.

COMMENTARY AND RECOMMENDATIONS ON 4.2

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

5 Appliances

The appliance, if new, shall carry “CE” marking and be suitable for the gas with which it is to be supplied.

COMMENTARY AND RECOMMENDATIONS ON CLAUSE 5

This standard may be used for the installation of used appliances which do not carry “CE” marking; see foreword.

Consideration should be given to the following.

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

— *The letters “GB”;*

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

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

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

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

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

The data plate of an appliance will carry the designation Cat. I_{2H}, I_{3B}, I_{3P}, or I₃₊ 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. 2_H, 2_P, 2_B), then the appliance can be used for different types of gases when adjusted to do so.

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

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

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

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

b) *The output of the appliance should be borne in mind during selection. In general, the appliances described in this standard heat the room in which they are installed. A fire/back boiler normally provides central heating to the rest of the dwelling and also domestic hot water. A fire/back circulator provides domestic hot water. However, a high-rated convector heater can be used in a hall, for example, to provide background central heating.*

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

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

Whenever practicable a room-sealed appliance should be installed.

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

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

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

NOTE Attention is drawn to the commentary and recommendations on 9.2 in relation to multi-appliance installations.

h) Gas fires, convector heaters, fire/back boilers, fire/back circulators and heating stoves are available with rated heat inputs in the approximate ranges shown below. The inputs are quoted on the basis of net calorific value. Traditional UK data on the basis of gross calorific value is given in brackets for natural gas.

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

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

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

	(gross calorific value)	net calorific value
Gas fires:		
	Radiant (5 kW to 6 kW)	4.5 kW to 5.4 kW
	Radiant/convector (4 kW to 8 kW)	3.6 kW to 7.2 kW
Convector heaters:		
	Flued (2 kW to 22 kW)	1.8 kW to 20 kW
Heating stoves:		
	(4 kW to 7 kW)	3.6 kW to 6.3 kW
Fire/back boilers/back circulators:		
	Fire (4 kW to 8 kW)	3.6 kW to 7.2 kW
	(radiant, radiant convector)	
	Boiler (up to 22 kW)	20 kW
	Circulator (up to 6.6 kW)	6.0 kW

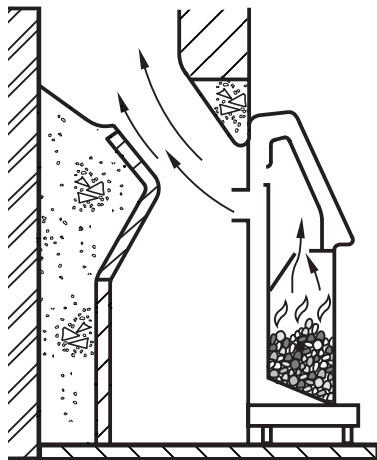
In addition to carrying a “CE” mark, appliances may be marked to show conformance to a British Standard, a European Norm, or other International Standard.

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

- 1) for installation to a chimney or flue box using a closure plate [see Figure 1a) and 10.3, 10.4 and 10.5];
- 2) for use with a proprietary fanned draught flue system (see 10.7);
- 3) supplied with a flueing system, the fan for the evacuation of combustion products being integral with the appliance;
- 4) for installation with a direct flue connection.

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

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



a) Gas fire

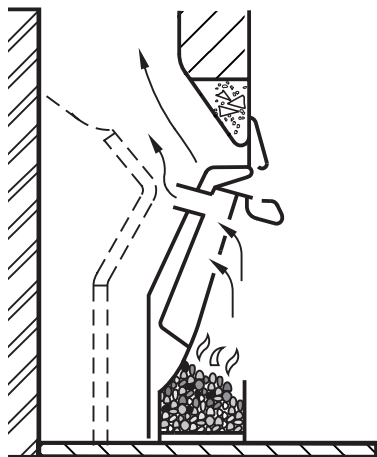
BS 5871-1

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

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

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

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



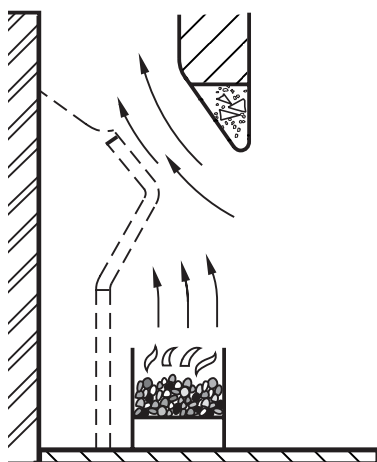
b) Inset live fuel effect gas fire

BS 5871-2

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

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

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



c) Decorative fuel effect gas appliance

BS 5871-3

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

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

Ventilation: Purpose provided ventilation of at least 100 cm² normally required up to 20 kW input.

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

6 Materials and components

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

COMMENTARY AND RECOMMENDATIONS ON CLAUSE 6

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

7 Location

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

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

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

COMMENTARY AND RECOMMENDATIONS ON 7.1, 7.2 AND 7.3

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

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

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

- a) An appliance without a "CE" mark purchased second hand is unlikely to be fitted with an acceptable safety device.*
- b) Some appliances carrying a "CE" mark purchased second hand will not be fitted with an acceptable safety device.*
- c) New appliances will be fitted with an acceptable safety device. The user instructions should be checked to ensure they contain advice on the action necessary should the device operate.*

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

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

COMMENTARY AND RECOMMENDATIONS ON 7.4

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

8 Appliance sizing

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

COMMENTARY AND RECOMMENDATIONS ON CLAUSE 8

Temperature requirements, ventilation rates and appropriate U values are given in detail in the National Annex to BS EN 12828, which repeats the values given in BS 5449.

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

Table 1A — Temperatures and ventilation rates

Room	Room temperature ^a °C	Ventilation rate air changes/h
Living room	21	1.5
Dining room	21	1.5
Bedsitting room	21	1.5
Bedroom ^b	18	1.0
Hall and landing	18	1.5
Kitchen	18	2.0
Bathroom	22	2.0
Toilet	18	2.0
^a These temperatures are those recommended for whole house central heating and for heated rooms with part house central heating. In rooms where open-flued appliances are installed, the rate of air change should be increased. ^b When used part-time as bed-sitting rooms or for study purposes, a higher room temperature might be required.		

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

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

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

- a) *the size of the room or internal space;*
- b) *the insulation value of the building fabric;*
- c) *the inside/outside temperature difference;*
- d) *the ventilation rate.*

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

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

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

Examples of how to calculate the required heat output of an appliance are given in Annex A.

9 Ventilation

9.1 General

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

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

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

COMMENTARY AND RECOMMENDATIONS ON 9.1

Attention is drawn to the following.

- a) *A room-sealed appliance may not require an air vent in the room or internal space in which it is installed.*
 - b) *An open-flued appliance with a rated input not exceeding 7 kW and which generates a clearance flue flow not greater than 70 m³/h under specified conditions (see Annex B) does not normally require an air vent in the room or internal space in which it is installed. This is due to natural or adventitious ventilation through, for example, floorboards, cracks in window frames and doors etc. However, the availability of such ventilation should never be taken for granted as the air tightness of a dwelling can be affected by double glazing, cavity insulation, draught proofing, its method of construction, the installation of extraction fans and so on. Attention is drawn to the commentary and recommendation on Clause 19.4 concerning installations deficient in ventilation.*
- NOTE 1 Attention is drawn to the foreword and Annex B concerning appliances of 7 kW heat input or less where it is claimed that no air vent is required in the room or internal space in which the appliance is to be installed.*
- NOTE 2 For open-flued fires with a rated heat input exceeding 7 kW, purpose provided ventilation of at least 5 cm² per kilowatt of heat input should be provided unless otherwise specified in the manufacturer's instructions.*
- c) *Areas identified as requiring action for radon gas will be known due to local publicity but in case of doubt further advice can be obtained from a building control officer at the local authority headquarters.*
 - d) *For the purposes of this standard and safety reasons, a conservatory should be treated as a habitable room.*

9.2 Multi-appliance installations

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

COMMENTARY AND RECOMMENDATIONS ON 9.2

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

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

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

10 Flueing

10.1 General

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

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

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

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

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

COMMENTARY AND RECOMMENDATIONS ON 10.1

For appliances covered by this part of BS 5871, 10.1 to 10.8 either draw particular attention to the requirements in BS 5440-1 or give additional guidance or information. An appliance should only be fitted to those flue systems as specified in the appliance manufacturer's instructions. Requirements for terminal design and location are given in BS 5440-1. Particular attention is drawn to the existence of chimney inserts. Under no circumstances should these be used as a chimney terminal.

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

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

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

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

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

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

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

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

10.2 Bird guards

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

COMMENTARY AND RECOMMENDATIONS ON 10.2

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

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

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

10.3 Masonry chimneys

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

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

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

COMMENTARY AND RECOMMENDATIONS ON 10.3

A masonry chimney may be oversized for some of the appliances covered by this specification and therefore some means may be advisable to control the total rate of flow through it.

If a method of control is advisable it will be detailed in the appliance manufacturer's instructions (for example, the use of a flue spigot restrictor).

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

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

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

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

10.4 Precast flue block chimneys

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

For open-flued convective heaters, a correctly sized connecting opening shall be provided at the base of the flue.

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

COMMENTARY AND RECOMMENDATIONS ON 10.4

Various types of precast flue block chimney are available, e.g. to BS 1289-1, BS EN 1806, BS EN 1858 or BS 6461-1. The appliance manufacturer's instructions should be consulted regarding the suitability of an appliance for use with a precast flue block chimney. Where this is permitted, openings in which appliances are to be fitted may be made from purpose designed precast recess panel blocks or formed of brickwork or masonry. It should be noted that the manufacturer's instructions may include special requirements for the installation of gas fires fitted to precast flue block chimneys.

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

10.5 Concrete cast in situ flue liners

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

COMMENTARY AND RECOMMENDATIONS ON 10.5

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

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

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

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

10.6 Prefabricated metal flue systems

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

COMMENTARY AND RECOMMENDATIONS ON 10.6

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

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

- a) no fireplace recess or builder's opening exists; or*
- b) an existing fireplace recess or builder's opening is oversized; or*
- c) the existing fireplace opening plane represents an unsuitable surface upon which to mount a closure plate or seal the appliance housing against (e.g. as necessary in the case of an inset live fuel effect gas fire).*