BRITISH STANDARD

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

Part 4: Independent gas-fired flueless fires, convector heaters and heating stoves of nominal heat input not exceeding 6 kW (2nd and 3rd family gases)

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 30, an inside back cover and a back cover.

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Foreword

Publishing information

This part of BS 5871 was published by BSI and comes into effect on publication of BS EN 14829;[1)] the intervening time constitutes the implementation period of BS 5871-4. It was prepared by GSE/30/-/4, under the authority of GSE/30, *Gas Installations (1st, 2nd and 3rd family gases)*. A list of organizations represented on this committee can be obtained on request to its secretary.

This part of BS 5871 covers the installation of independent gas-fired flueless fires, convector heaters and heating stoves of nominal heat input not exceeding 6 kW (2nd and 3rd family gases).

Installation of convector heaters in greenhouses as greenhouse heaters is only covered in respect of single appliance installations.

BS 5871, *Specification for the installation and maintenance of gas fires, convector heaters, fire/back boilers and decorative fuel effect gas appliances*, consists of the following parts:

– 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 fires, convector heaters and heating stoves of nominal heat input not exceeding 6 kW (2nd and 3rd family gases)*.

It should be noted that the only appliances covered by this part of BS 5871 are those that are "CE" marked. However, BS 5871-4 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.

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.

Although BS 5871-4 is an appliance installation standard, the drafting panel has decided to include an informative Annex A providing guidance for notified bodies and manufacturers on assessing ventilation requirements for flueless gas fires.

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1) Users will be informed by BSI of the publication of BS EN 14829.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in notes in smaller italic type.

To comply with this standard, the user has to comply with all its requirements. The user may depart from recommendations, but this would be the user's own responsibility and they would be expected to have a good reason for doing so.

Contractual and legal considerations

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

Compliance with a British Standard cannot 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) Regulations (Northern Ireland) 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]

The Health and Safety (Gas) (Guernsey) Ordinance 2006 [8]

1 Scope

This part of BS 5871 specifies installation and maintenance requirements for independent gas-fired flueless fires, convector heaters and heating stoves of nominal heat input not exceeding 6 kW burning 2nd and 3rd family gases for the purpose of heating rooms or internal spaces in domestic (see note 3) or commercial premises. Specifically, it covers:

a) fixed appliances that satisfy all the requirements of BS EN 14829;

b) fixed appliances that satisfy the combustion requirements of BS EN 14829;

c) convector heaters of nominal heat input not exceeding 4.2 kW in the form of greenhouse heaters in respect of single appliance installations.

*NOTE 1 Appliances a) and b) are only intended as a secondary heat source (see Commentary and Recommendations on **4.2**).*

The heat input and ventilation, fixing and gas supply for convector heaters in the form of greenhouse heaters are specified in **8.4**, **9.4** and Clause **11**, respectively.

This part of BS 5871 covers the selection of a suitable appliance, room sizing and ventilation requirements and other measures necessary to ensure a safe installation.

*NOTE 2 Heat inputs in this document are based on net calorific value. [See also Commentary and Recommendations on Clause **5**, item b).]*

NOTE 3 As well as normally constructed dwellings, domestic premises include any permanently sited caravans, holiday homes and residential park homes. (See IGE/UP/8 [9].)

NOTE 4 Convector heaters in the form of greenhouse heaters are available in two forms, those which are freestanding and those which are intended to be fixed to a wall or floor.

This standard is not applicable to:

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

b) appliances in motor caravans and touring caravans;

c) appliances in boats;

d) installations in agricultural premises; or

e) installations in transportable accommodation units.

NOTE 5 For the maintenance of existing installations of 3rd family flueless appliances in boats, see PD 5482-3.

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 669-1, *Flexible hoses, end fittings and sockets for gas burning appliances – Part 1: Specification for strip-wound metallic flexible hoses, covers, end fittings and sockets for domestic appliances burning 1st and 2nd family gases*

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: Installations at permanent dwellings, residential park homes and commercial premises, with installation pipework sizes not exceeding DN 25 for steel and DN 28 for corrugated stainless steel or copper*

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

BS 6891, *Installation of low pressure gas pipework of up to 35 mm (R1¼) in domestic premises (2nd family gas) – Specification*

BS 7671, *Requirements for electrical installations – IEE wiring regulations*

BS 7967-2:2005, *Carbon monoxide in dwellings and the combustion performance of gas-fired appliances – Part 2: Guide for using electronic portable combustion gas analysers in the measurement of carbon monoxide and the determination of combustion performance*

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

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

BS EN 50292, *Electrical apparatus for the detection of carbon monoxide in domestic premises – Guide on the selection, installation, use and maintenance*

IGE/UP/2, *Gas installation pipework, boosters and compressors in industrial and commercial premises*

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

3.3 conservatory
single storey structure with at least half of the area of the walls and at least three-quarters of the area of the roof formed of glazing, polycarbonate sheets or similar translucent material, intended as a habitable space attached to a dwelling

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

3.5 fireguard
guard conforming to BS 8423

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

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

3.8 fire surround
purpose-designed setting for a gas fire, fitted against a wall and usually incorporating a hearth

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

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

3.10 flueless appliance (type A)
appliance which is designed to be used without a flue and in which the products of combustion mix with the surrounding air

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

3.12 greenhouse
building with walls and roof made of glazing, polycarbonate sheets or similar translucent material for the cultivation and exhibition of plants under controlled conditions

3.13 greenhouse heater
flueless convector heater of not more than 4.2 kW specially designed for installation in a greenhouse

3.14 habitable space
space intended for living, sleeping, eating or cooking

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

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

3.17 installation instructions
instructions 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.

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

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

3.20 superimposed hearth
slab of fire-resisting material which is either located on top of a constructional hearth or on a combustible floor, and which is designed to prevent overheating of the floor beneath the slab

3.21 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 and maintaining air quality.

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 by the Health and Safety Executive (HSE) as required by the Gas Safety (Installation and 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 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 Commentary and Recommendations on **12.1**).*

4.2 Design considerations for installations other than in a greenhouse

For installations other than in a greenhouse, particular matters that shall be considered are:

a) potential for problems of condensation;

b) whether the appliance input is such that the appliance may be installed in its intended location in conformity with the input and ventilation requirements of Clause **8**;

c) presence of any flues which might have an adverse effect on the appliance performance unless closed off (see **9.1**);

d) presence of other heating appliances in the room space;

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

f) availability of gas supplies;

g) availability of electrical supply (where applicable);

h) positioning of air vent(s) (see **8.1**); and

i) installation of an independent electrical carbon monoxide alarm conforming to BS EN 50291 in accordance with BS EN 50292 and the appliance and/or alarm manufacturer's instructions.

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.

Flueless heaters might give rise to problems of condensation in the room. These appliances are intended as a secondary heat source and it is recommended that a primary heat source, such as a radiator or night store heater, is present in the room and that the room volume and ventilation are adequate for the output of the appliance selected.

Appliances fitted in conservatories might give rise to extra condensation due to low insulation values and rapid cooling below the Dew Point. The installer will have to make an independent assessment of the suitability of a flueless appliance for such an application and advise the customer if they envisage problems with condensation; the following is a list of circumstances to be considered when making this assessment:

- *overall insulation value of conservatory;*
- *likely cold surfaces, such as single glazed panels and roofing materials, on which condensation might readily form;*
- *construction of floor and amount of insulation built in;*
- *location and type of primary heating source;*
- *aspect of building: a north facing conservatory will be much more likely to suffer condensation than one on a south facing aspect;*
- *proposed usage pattern: the customer may only wish to use the heating on occasional days and condensation could be acceptable in these instances; other customers may wish to use the conservatory as a living room and expect the same level of comfort as the rest of the house;*
- *method of sealing from main house: a conservatory that has an external type door between it and the main house will experience much quicker cooling than one with a lightweight door, leading to increased condensation risk; and*
- *location of conservatory with respect to altitude, latitude, aspect, and prevailing weather conditions.*

Where an independent electrical carbon monoxide alarm is not fitted in the room or internal space where the appliance is to be installed, 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 ventilation.

Only an independent electrical carbon monoxide alarm conforming to BS EN 50291 should be installed. The installer is strongly advised to consider the desirability of using an alarm for which the manufacturer can demonstrate that they have obtained third party certification/inspection/testing of product conformity with BS EN 50291.

4.3 Design considerations for installations in a greenhouse

For greenhouse heaters, particular matters that shall be considered are:

a) the potential for problems of condensation;

b) that the appliance input is such that the appliance may be installed in its intended location in conformity with the input and ventilation requirements of **8.4**;

c) availability of gas supply; and

d) availability of electrical supply (where applicable).

COMMENTARY AND RECOMMENDATIONS ON **4.3**

*Attention is drawn to **8.4** concerning the heat input and ventilation requirements for greenhouse installations which should be taken into account during appliance selection.*

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) The installer should ensure that the packaging and the appliance itself are marked with at least the following information:

— the letters "GB";

— the type of gas and appliance inlet pressure as follows:

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

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

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

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

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

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

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

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

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

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

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

b) The rated heat output of the appliance should be borne in mind during selection.

NOTE The rated heat input is generally quoted on the basis of net calorific value. Sometimes the 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 6 kW input natural gas (gross C.V.) to the equivalent net C.V. heat input: 6/1.11 = 5.4 kW heat input.]

c) Any appliance, other than a greenhouse heater, described in this standard can be used to provide supplementary heat to 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.

d) 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 – in which case combined room sizing and ventilation is required.

*NOTE Attention is drawn to the Commentary and Recommendations on **8.3** in relation to multi-appliance installations.*

e) For information purposes, Figure 1 gives examples of flueless gas appliances.

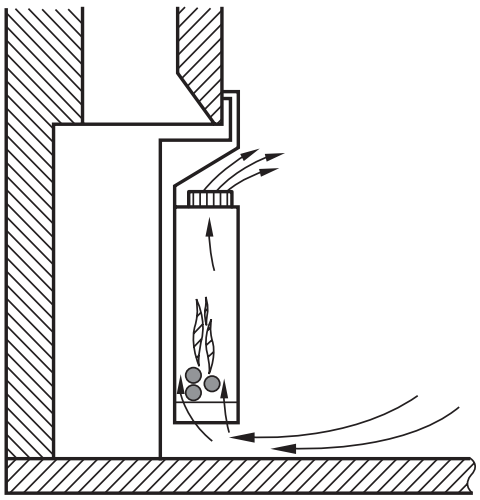
6 Materials and components

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 [10] place restrictions on the use of asbestos materials, including a total ban of asbestos cement and its products.

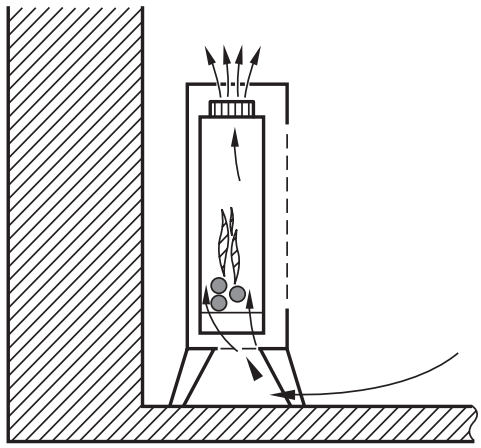
Figure 1 **Examples of flueless appliances**



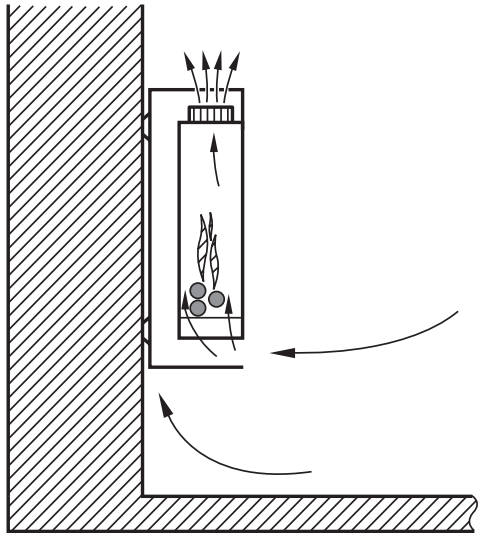
a) "Inset" type flueless appliance

Normally installed into recess or disused flue.

*NOTE Disused flues should be suitably de-commissioned (see **9.1**).*



b) Freestanding flueless appliance



c) Wall-mounted flueless appliance

7 Location

7.1 The appliance shall not be installed in a room or internal space containing or intended to contain a bath or shower.

7.2 A flueless space-heating appliance shall not be installed in a room used or intended to be used as sleeping accommodation, unless:

a) it incorporates 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; and

b) the manufacturer's instructions specifically allow installation in such locations.

COMMENTARY AND RECOMMENDATIONS ON **7.2**

A bedroom is a non-preferred location for the installation of a flueless space-heating appliance, due to the extended time the appliance is likely to be in use and the possibility that any openable window might be closed during the period any occupant(s) is asleep. An appliance covered by BS EN 14829 will 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** AND **7.2**

Great care is required in the location of an appliance in any premises where flammable vapour could accumulate, e.g. garages and workshops. Any type of appliance 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 [11].

7.3 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 **7.3**

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 and ventilation

8.1 General

The appliance shall be installed in a room or internal space that has an openable window or equivalent.

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

Purpose-provided floor ventilation shall be ducted to outside air.

The appliance shall be sited at least 1 000 mm from any air vent for combustion and any other ventilator, e.g. one serving a redundant chimney (see **9.1**), unless the appliance manufacturer specifies otherwise.

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 might already be in place to prevent radon from entering the habitable part of the dwelling.

COMMENTARY AND RECOMMENDATIONS ON **8.1**

A flueless appliance should only be used for secondary heating due to condensation which may occur with rapid warming and cooling of rooms.

The heat input will be limited by room (space) volume and this might govern the choice of heater.

Attention is drawn to the following.

a) Floor vents, unless ducted to outside air, can draw moisture from under the house floor. Combined with moisture from the appliance combustion products, this might lead to condensation in the room.

b) Air vents sited too close to an appliance can cause draught disturbance leading to poor combustion, sooting and carbon monoxide.

c) Existing ventilators in redundant chimneys may need to be sealed and the ventilator re-sited.

d) 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.

e) Equivalence to an openable window is given in BS 5440-2:2000, Table 4.

8.2 Heat input, room sizing and ventilation

Heat input, room sizing and ventilation shall be:

a) in accordance with the manufacturer's instructions; or

b) in the absence of specific ventilation and room sizing requirements in the manufacturer's instructions, in accordance with BS 5440-2.

COMMENTARY AND RECOMMENDATIONS ON **8.2**

As part of CE marking, manufacturers' installation instructions are assessed by a Notified Body to verify that, when installed in accordance with those instructions, the appliance will operate safely.

Annex A has been provided to give advice to the Notified Body undertaking this assessment and for use by appliance manufacturers.

8.3 Multi-appliance installations

8.3.1 Gas appliances

Where the room or internal space contains two or more gas appliances, the air vent free area requirement shall be the total flueless gas space heating appliance requirement (see **8.2**), plus, where appropriate, the greater of the following.

a) The total open-flued space heating appliance requirement (i.e. 5 cm^2/kW total rating).

b) 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/kW rating.

Two or more flueless space heating appliances shall not be installed in one room, unless the minimum room size is the total of the requirements for each individual flueless appliance.

COMMENTARY AND RECOMMENDATIONS ON **8.3.1**

The ventilation requirements for other appliances are specified by BS 5440-2.

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.

8.3.2 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 gas appliances of similar type and rated heat input.

COMMENTARY AND RECOMMENDATIONS ON **8.3.2**

If the rated heat output rather than the rated heat 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 rated heat input the air vent free area requirement should be taken as 100 cm^2.

8.4 Greenhouse heater installations

8.4.1 Integral greenhouses

An integral greenhouse containing a greenhouse heater shall be fitted with an air vent and an openable window (or equivalent) directly to outside air. The air vent area requirements shall be as specified in BS 5440-2 for fixed flueless space heaters in an internal space.

COMMENTARY AND RECOMMENDATIONS ON **8.4.1**

*The term "integral greenhouse" covers those types of greenhouse which form part of a dwelling and are connected to it by means of a door or window. The rated heat input for a greenhouse heater is limited by BS 5440-2 to 90 W/m^3 of heated space. Attention is drawn to the definitions of a greenhouse and a conservatory in **3.12** and **3.3** respectively, identifying that, for the purpose of this standard, for safety reasons a conservatory is classed as a habitable space.*

8.4.2 Independent greenhouses

Where the rated heat input to a greenhouse heater exceeds 2.7 kW, two air vents, one at low level and one at high level, shall be fitted. The minimum effective area of each air vent shall be 39 cm^2 for every 1 kW of the total rated heat input in excess of 2.7 kW.

COMMENTARY AND RECOMMENDATIONS ON **8.4.2**

The term "independent greenhouse" covers those types of greenhouse which are completely independent of a dwelling. Air vents are not required where the heat input to the greenhouse heater does not exceed 2.7 kW.

9 Appliance fixing

9.1 General

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

Flueless appliances shall not be connected to a flue.

Greenhouse heaters shall be fixed in accordance with **9.4**.

Where fitting into an existing fireplace opening or canopy under the base of the existing flue, the flue shall be sealed off from the appliance, unless otherwise specified in the manufacturer's instructions.

COMMENTARY AND RECOMMENDATIONS ON **9.1**

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

A flueless heater fitted:

a) into an opening under an existing flue,

b) in front of a fireplace opening,

c) close to an existing flue, or

*d) in close proximity to an air vent and any other ventilator, e.g. one serving a redundant chimney (see **8.1**),*

can experience one or more of the following due to excessive air movement: flame disturbance/reversal, overheating, incomplete combustion and sooting.

Unless the appliance manufacturer's instructions advise otherwise, it is recommended that the base of the flue is sealed with a fire-resistant material to prevent these adverse effects.

Consideration should also be given to the closure of the flue outlet using a proprietary ventilator flue cap in order to prevent entry of rain, moisture, etc., and the fitting of a ventilator to ensure that the redundant chimney is sufficiently ventilated.

9.2 Siting

The appliance shall be stood on a hearth or floor, or secured to a wall, or installed into a raised builder's opening (hole-in-the-wall application) in accordance with the manufacturer's instructions, such that the appliance is securely fixed and stable.

Where a flueless gas fire is to be fixed in front of a redundant solid fuel back boiler which has been left *in situ*, the back boiler shall be left in a condition where pressure cannot build up and the unit thereby become unsafe. In addition, the chimney flue shall be sealed so as to prevent any adverse effect on the operation of the flueless gas fire.

COMMENTARY AND RECOMMENDATIONS ON **9.2**

Wherever possible, the open vent should be left complete from the back boiler to its termination over the cold feed tank or connection to the cylinder.

If the open vent is disconnected or cut, any waterway access cover in the back boiler should be removed or the system drained of water as far as practicable and a hole of minimum diameter 6 mm drilled in the boiler.

A typical way of closing the flue would be to use a sealing plate at the base of the chimney.

*Consideration should be given to the closure of the flue outlet (see Commentary and Recommendations on **9.1**).*

9.3 Where a fire surround is to be fitted, the materials of the surround shall be compatible with the intended appliance.

Sealing of the surround to the wall shall be in accordance with the fire surround manufacturer's instructions.

COMMENTARY AND RECOMMENDATIONS ON **9.3**

Consideration should be given to the following points:

a) the compatibility between the surround and the fire should be confirmed at the planning stage;

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

c) any methods of securing and sealing a surround and hearth to a floor and wall given in the fire surround manufacturer's instructions;

d) whether the appliance manufacturer provides any special instructions for the sealing of the surround to the wall to limit temperature effects.

9.4 Greenhouse heater fixing

A greenhouse heater shall be firmly secured to a wall or floor, except where it is the type that is self-extinguishing if knocked over and installed in an independent greenhouse, and shall be fitted to a gas connection in accordance with Clause **11**.

Flexible connections may be used for greenhouse heaters (see **11.1**).

10 Fire precautions

10.1 User protection

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

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

b) a tactile separator in the form of either:

   i) a hearth provided in accordance with **10.2.1**; or

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

COMMENTARY AND RECOMMENDATIONS ON **10.1**

*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.*

10.2 Floor protection from radiant heat

10.2.1 General

A hearth conforming to **10.2.2** to **10.2.4** shall be provided unless the appliance manufacturer's instructions allow for installation without a hearth. If the fire is intended for wall mounting, it shall be installed such that any flame or incandescent materials are at least 225 mm above the carpet or any combustible floor covering.

COMMENTARY AND RECOMMENDATIONS ON **10.2.1**

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

10.2.2 Materials

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

COMMENTARY AND RECOMMENDATIONS ON **10.2.2**

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

10.2.3 Thickness

A hearth shall have a minimum thickness of 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 **10.2.3**

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.

10.2.4 Dimensions

The hearth shall extend at least 300 mm in front of any naked flame or incandescent part of the firebed, and at least 150 mm beyond each edge of the naked flame or incandescent radiant source, and have a minimum height of 50 mm along its front and side edges.

COMMENTARY AND RECOMMENDATIONS ON **10.2.4**

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

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:

- *discourage carpets or rugs from riding or being placed on top of the hearth; and*
- *provide persons with a tactile (i.e. physical proximity) warning that he or she is approaching the fire.*

10.3 Appliances in raised builder's openings (hole-in-the-wall applications)

Where the appliance is installed in a hole-in-the-wall fireplace a hearth conforming to **10.2.1** to **10.2.4** shall be fitted on the floor in front of the hole in order to protect combustible material from radiant heat, unless:

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

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

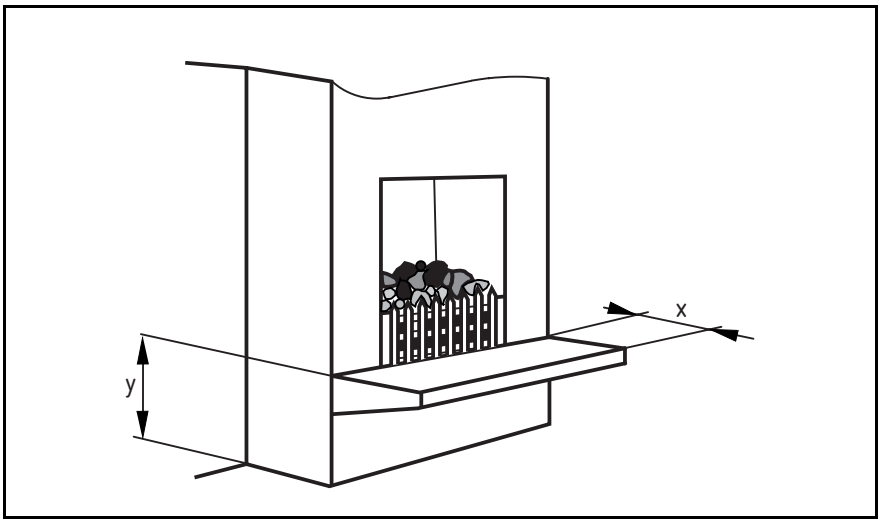
c) the hearth beneath the appliance, or into which the appliance is set, extends in front of any flame or incandescent part of the fire-bed such that the sum of the **x + y** dimensions in Figure 2 is at least 225 mm to any carpet or floor covering.

COMMENTARY AND RECOMMENDATIONS ON **10.3**

*If the constraints in **10.3**b) or 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.

Figure 2 **General layout of a raised builder's opening installation (hole-in-the-wall fireplace)**



10.4 Heating stoves

Unless otherwise specified in the appliance manufacturer's installation instructions, a hearth conforming to **10.2.2** and **10.2.3** shall be provided for the stove extending to at least the front of the stove supporting legs, and to at least each side of the stove. If the appliance has a door which is intended to be open during normal operation or has exposed flames, then the hearth shall be dimensioned in accordance with **10.2.4**.

10.5 Protection at rear of appliance

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

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

COMMENTARY AND RECOMMENDATIONS ON **10.5**

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

10.6 Side wall protection

10.6.1 Fire

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

10.6.2 Stove

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

COMMENTARY AND RECOMMENDATIONS ON **10.6**

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

10.7 Shelf protection

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

COMMENTARY AND RECOMMENDATIONS ON **10.7**

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

11 Gas supply

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

Where flexible connections are used for greenhouse heaters, these shall be to BS 669-1, or as specified in the manufacturer's instructions.

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

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

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

COMMENTARY AND RECOMMENDATIONS ON **11.3**

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.

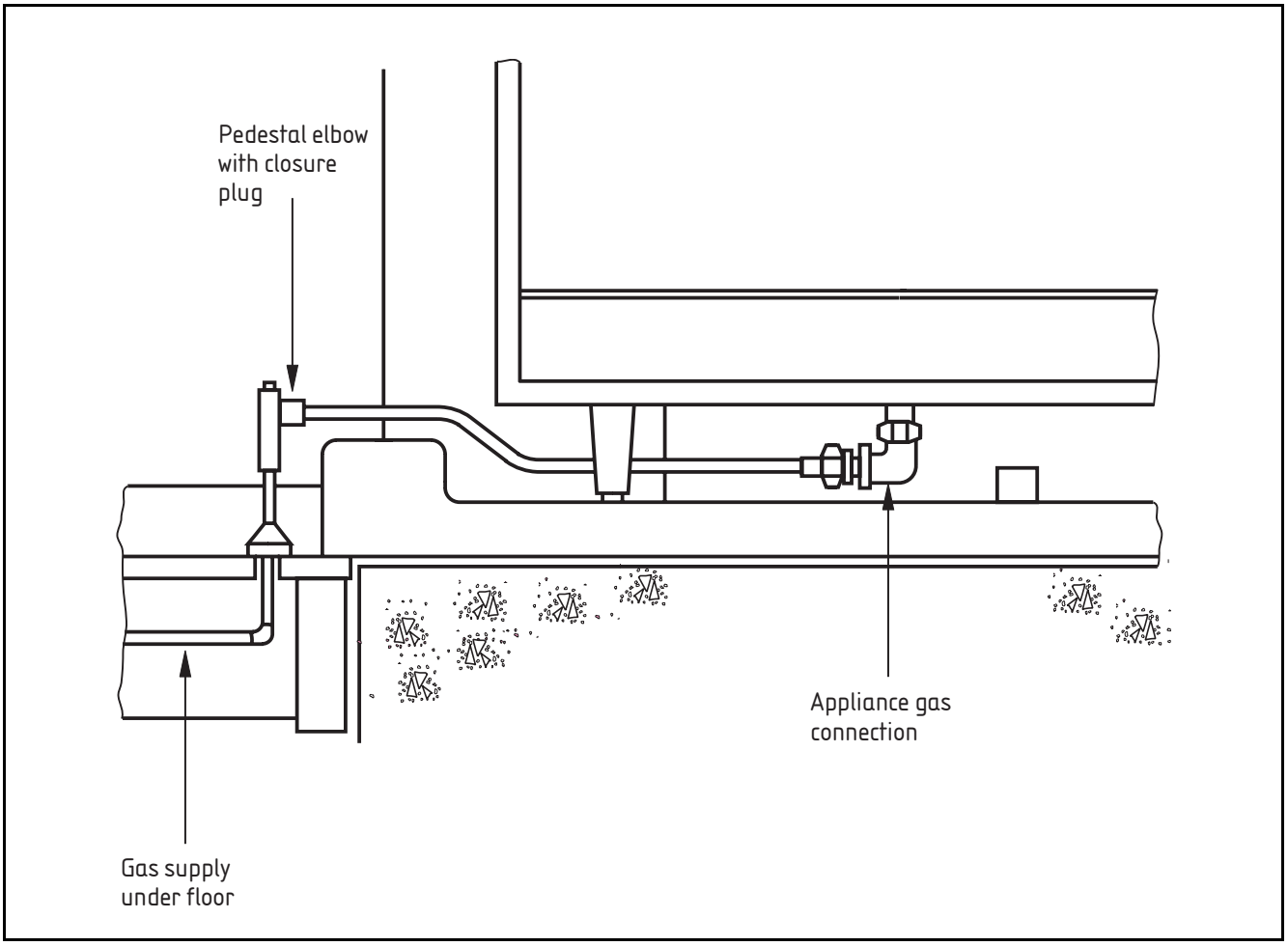
11.4 All connections, whether concealed or not, shall allow the appliance to be removed for periodic inspection.

Proprietary hand-bendable connection pipe may be used where this is permitted in the fire manufacturer's instructions and it has been independently certified as fit for purpose.

COMMENTARY AND RECOMMENDATIONS ON **11.4**

Regulation 5(1) of the Gas Safety (Installation and Use) Regulations [1] requires gas fittings to be "of good construction and sound material, adequate strength and size to secure safety, and of a type appropriate for the gas with which it is to be used."

Figure 3 **Typical unconcealed gas supply system to a gas fire**



11.5 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 CLAUSE **11**

A typical rigid gas supply system to an appliance is shown in Figure 3. 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 Electricity supplies and wiring

12.1 The electrical wiring installation to the appliance shall conform to BS 7671.

COMMENTARY AND RECOMMENDATIONS ON **12.1**

Attention is also drawn to the requirements of Approved Document P of the Building Regulations [13] covering electrical work and the need for conformity with competency schemes for carrying out such work.

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

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

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

a) a fused double-pole switch unit with flex outlet (spur box); or

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

COMMENTARY AND RECOMMENDATIONS ON **12.4**

Where a three-pin plug is used, this should be removed from the socket when servicing the appliance. To encourage this, an un-switched socket outlet is recommended. Care should be taken to ensure that electrical wiring is not subjected to temperatures in excess of that for which it is rated.

13 Commissioning

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

NOTE Further information on testing is given in IGE/UP/1 [14], IGE/UP/1A [15] and IGE/UP/1B [16] (2nd family gases) and BS 5482-1 and LPGA TM 83 [17] (3rd family gases).

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

COMMENTARY AND RECOMMENDATIONS ON **13.2**

It is recommended that a combustion test is carried out at the time of installation. This should be in accordance with the appliance manufacturer's instructions or, in the absence of a specific instruction, in accordance with the appropriate method specified in BS 7967-2.

13.3 The ventilation provision and room volume shall be checked for conformity with Clause **8**.

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

Where any room of the premises is fitted with a fan (e.g. re-circulating ceiling fan, an extract fan, or a fan incorporated within an appliance), operation of the fan(s) shall not adversely affect the appliance's flame stability.

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

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

14 Instructions and use of fireguards

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

COMMENTARY AND RECOMMENDATIONS ON CLAUSE **14**

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 that fireguards in accordance with BS 8423 should be fitted when the appliance is used in the presence of young children, the elderly or infirm.

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

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

15 Advice to be given to the user

15.1 Operating instructions

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

15.1.2 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 **15.1.2**

As part of the above demonstration the user should be made aware of the following.

These appliances are intended as a secondary heat source; in certain situations, e.g. if used as a primary heat source, this may result in condensation.

That all CE marked flueless space heaters are assessed to verify that, when used in accordance with the manufacturer's instructions, they will not cause a concentration of carbon monoxide in the room or space concerned likely to present a danger to the health of the user.

If the appliance being installed is fitted with a safety monitoring system that can shut the appliance down under fault conditions, e.g. an atmospheric sensing device, the user should be informed that the monitoring system is designed to do this and should be shown how to restart the appliance after such an automatic shutdown, but it should be stressed that if the monitoring device 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 independent electrical carbon monoxide alarm is not fitted, the user should be made aware of the potential contribution to safety, for all fuel burning appliances, that an alarm conforming to BS EN 50291 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 ventilation. Installation of an independent electrical carbon monoxide alarm should be in accordance with BS EN 50292 and the appliance and/or alarm manufacturer's instructions. The installer is strongly advised to consider the desirability of using an alarm for which the manufacturer can demonstrate that they have obtained third party certification/inspection/testing of product conformity with BS EN 50291.

15.2 Maintenance

15.2.1 If the premises in which the 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.

15.2.2 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 **15.2.2**

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 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 [18].

15.2.3 A combustion test shall be carried out during maintenance or checks for safety. This shall be in accordance with the appliance manufacturer's instructions or, in the absence of a specific instruction, in accordance with the appropriate method specified in BS 7967-2.

Annex A (informative) Guidance on ventilation requirements for flueless gas fires

NOTE This annex is not for use by gas installers seeking to install flueless gas fires in compliance with this British Standard.

A.1 General

This annex has been prepared to provide advice to Notified Bodies and appliance manufacturers on how they can relate appliance performance with manufacturer's recommended minimum room sizing and ventilation requirements to provide assurance that the said appliance, when installed, will not produce concentrations of the pollutants carbon monoxide, nitrogen dioxide and carbon dioxide in the habitable space in excess of recommended levels.

The recommendation of the Department of Health's Committee on the Medical Effects of Air Pollutants (COMEAP) concerning upper limits for indoor air quality standards for concentrations of carbon monoxide (CO) and nitrogen dioxide (NO_2) is 10 ppm (8-hour average) and 150 ppb (1 hour average) respectively.

For carbon dioxide (CO_2), in the absence of any advice on acceptable indoor levels, the occupational level of 5 000 ppm [0.5% by volume] (8-hour average) recommended in the HSE publication EH40/2005 *"Workplace exposure limits"* has been adopted [19].

Application of one of the following methods can be used to demonstrate compliance. The manufacturer will state in the installation instructions the method of compliance that has been utilized.

A.2 Application of BS EN 14829, Annex G – mass balance model

In order to use the mass balance model to demonstrate compliance, the appliance has to conform to the combustion requirements of **6.8**, and the requirements of **G2.4** and **G2.5** of BS EN 14829. Given this conformity, the contaminant decay rate (k) and the air change per hour (a) can each be taken as 1 for use in the mass balance formula.

In addition:

a) for CO

The CO emission rate E_R is determined from the CO/CO_2 ratio (i.e. the measured CO value divided by the measured CO_2 value), recorded during the combustion test (BS EN 14829, **6.8.1/7.9.2.2.1**).

NOTE An emission rate of 65 mg/MJ is equivalent to a CO/CO_2 ratio of 0.002 and other emission rates can be calculated from the measured combustion ratio pro rata.

AND

b) for NO_2

The NO_2 emission rate E_R is the value calculated from the results of measurements recorded during the combustion test (BS EN 14829, **6.8.5/7.9.4**).

c) for CO and NO_2

The room concentrations of CO and NO_2 can be calculated when these emission rates, together with the minimum room size and ventilation specified in the manufacturer's instructions, are entered into the mass balance model.

A.3 Application of BS 5440-2:2000

The appliance is deemed to satisfy the guidelines when:

a) the appliance satisfies the combustion requirements of BS EN 14829, **6.8**; and

b) the appliance has an NO_2 emission rate of class 5 or better (BS EN 14829, Table 1); and

c) the manufacturer's instructions specify a minimum room size and ventilation conforming to the requirement "Space heater in a room" of BS 5440-2:2000, Table 4.

A.4 Direct measurement

A.4.1 General

The method detailed here can only be used when the manufacturer's instructions for permanent vent size conform to the requirements of "Space heater in a room" of BS 5440-2:2000, Table 4.

The following apparatus, test room and method has to be used.

A.4.2 Method

A.4.2.1 Apparatus

NOTE CR 1404:1994 has been used to inform the specification of appropriate measuring apparatus.

An appropriate NO_2 analyser is of the chemiluminescent type and capable of measuring the expected concentrations (i.e. <50 ppb). Likewise, the calibration gases need to be of a suitable standard and the probe manufactured from stainless steel.

The CO content is measured by an instrument capable of determining CO contents between 5×10^{-5} and 100×10^{-5} parts by volume. In the range used, the method selected needs to be accurate to $\pm 2 \times 10^{-5}$ parts of CO by volume. Instruments which currently correspond to these requirements are of the infra-red absorption type. The CO measuring apparatus is to be designed or installed so that it is not affected by the presence of CO_2 in the products of combustion.

The CO_2 content is measured by a method accurate to within 5%. Infra-red absorption instruments are recommended.

A.4.2.2 Test room

The test room is to be similar to the one described in BS EN 14829, Annex F.

The volume of the room and the ventilation openings will be the minimum described in the manufacturer's installation instructions. For the room volume specified in the manufacturer's instructions, the test room internal height will be 2.5 m ± 0.2 m, and the length and width in the proportion of approximately 1.75/1.

Before the addition of the ventilation openings, the air leakage rate of the room is to be such that, after a homogenous room content of 4% CO_2 ± 0.2% has been established without heating, but by releasing CO_2 from a canister, the CO_2 content will have decreased by less than 0.1% over a period of two hours.

Two openings have to be cut into the test room, one opening to be equivalent in size to the total air vent area specified by the manufacturer. Through the other opening, a measured volume of air equivalent to one air change per hour is drawn mechanically, the volume being measured by the use of an anemometer.

Care should be taken to ensure that the placement of the two openings is such as NOT to result in a short circuit air path through the test room or interfere with the normal operation of the appliance.

NOTE The test room will be designed such that:

a) the operator can, at any time, observe the appliance in operation, the appliance being sited on one of the narrower walls;

b) sampling of the room atmosphere for CO_2, CO and NO_2 concentrations can be performed at the geometric centre of the room, the samples being reintroduced into the room after analysis;

c) the air drawn mechanically through the test room is taken from an area that is uncontaminated by combustion products and/or hydrocarbons;

d) the air extracted from the test room containing the combustion products cannot contaminate the air being drawn into the test room;

e) the appliance can be supplied from a gas source outside the room, the regulator being outside the room;

f) the temperature measured at the geometric centre of the room can be maintained between 20 °C and 40 °C when measured at the geometric centre of the room using a thermocouple shielded both from draughts and radiation;

NOTE If it is necessary to use a cooling device (e.g. an air conditioning unit) during the test care has to be taken to ensure that the performance of the appliance is not affected by the means of cooling. In particular, the appliance has to be protected from draughts.

g) the atmosphere in the room is maintained as a homogenous mixture.

A.4.3 Test

The appliance is installed in the test room according to the manufacturer's instructions and operated on reference gas at normal pressure, with any controls set such that the appliance operates at its nominal input throughout the test.

Sufficient readings are taken to ensure that the concentrations of the emissions have stabilized and do not exceed the COMEAP and HSE recommended limits detailed in **A.1**.

Tests are carried out with any catalytic converter rendered inoperative, whilst retaining its resistance to the flow of products of combustion, and repeated with the catalyst functioning. The emission rates used to judge the performance will be the higher of the two values.

NOTE 1 The catalyst can be rendered inoperative by any suitable means (to be agreed between the manufacturer and the test house), e.g. installing a "dummy" catalyst, coating the catalyst with a non-reactive substance or by removing the catalyst and replacing it with a plate which gives an equivalent resistance to the products of combustion (pressure drop between the burner and the products outlet).

NOTE 2 If the "suitable means" chosen to render the catalytic converter inoperative is a dummy catalyst, care should be taken when selecting the material as some materials, e.g. stainless steel, may adversely affect the emission values/properties.

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