BS 5440-2:2009

BSI Standards Publication

# Flueing and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases) –

## Part 2: Specification for the installation and maintenance of ventilation provision for gas appliances

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# Contents



**Summary of pages**
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# Foreword

## Publishing information

This part of BS 5440 is published by BSI and came into effect on 31 December 2009. It was prepared by Technical Committee 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.

## Supersession

This part of BS 5440 supersedes BS 5440-2:2000, which is withdrawn.

## Relationship with other publications

BS 5440, *Flueing and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases)*, is published in two parts:

- *Part 1: Specification for installation of gas appliances to chimneys and for maintenance of chimneys;*
- *Part 2: Specification for installation and maintenance of ventilation provision for gas appliances.*

## Information about this document

This is a full revision of BS 5440-2:2000.

BS 5440-2 allows manufacturers' instructions to specify a method of installation, testing, commissioning or maintenance which differs in points of detail from this standard. This reference to manufacturers' instructions is allowed only where it results in at least an equivalent level of safety. In such circumstances, it is important that the manufacturer's instructions are followed.

## Use of this document

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

## 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 smaller italic type, and does not constitute a normative element.*

## 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 Appliances (Safety) Regulations 1995 [1]

The Gas Safety (Installation and Use) Regulations 1998 [4]

The Gas Safety (Installation and Use) Regulations 1994, as amended and applied by the Gas Safety (Application) Order 1996 [5]

The Gas Safety (Installation and Use) (Northern Ireland) Regulations 2004 [6]

The Health and Safety (Gas) (Guernsey) Ordinance 2006 [7]

The Asbestos (Prohibitions) Regulations 2006 [9]

The Building (Amendment) Regulations 2000 [11]

The Building Regulations (Scotland) 2004 [12]

The Building Regulations (Northern Ireland) 2000 [13]

# 1 Scope

This part of BS 5440 specifies the requirements for the installation and maintenance of ventilation provision relating to gas appliances utilizing 1st, 2nd or 3rd family gases, with a rated heat input not exceeding 70 kW based on net CV (net calorific value), used for domestic or non-domestic purposes.

This standard does not cover:

a) liquefied petroleum gas (LPG) installations covered by BS 5482-2 and installations with gases covered by PD 5482-3;

b) gas installations in caravans, holiday homes or residential park homes conforming to BS EN 721 or BS 3632 as appropriate, which were installed at the time of construction;

c) decorative fuel effect gas appliances, covered by BS 5871-3; or

d) multiple cooking appliance installations in catering establishments and schools.

*NOTE 1 Although this part of BS 5440 has been developed mainly for use with gas appliances that carry the CE mark, it may also be used for installations of gas appliances which are not required under the Gas Appliances (Safety) Regulations [1] to carry the CE mark, such as used appliances.*

*NOTE 2 Maintenance requirements relating to existing vents are specified in Clause* ***8****.*

*NOTE 3 It is essential that the installer checks the data given with an appliance to establish the basis on which the heat input is given. The data in this standard refer to heat input expressed in terms of net CV with conversion given for natural gas gross CV quoted in brackets, where appropriate.*

*NOTE 4 The ratio of gross:net heat input is approximately 1.11:1 for natural gas, 1.09:1 for propane and 1.08:1 for butane. For example, 9 kW input based on gross CV for natural gas is converted to the equivalent net CV input as follows:*

*Net input = 9.0/1.11 = 8.1 kW.*

*NOTE 5 For requirements for the installation and maintenance of gas-fired catering appliances for use in all types of catering establishments (2nd and 3rd family gases), see BS 6173. Further information regarding volume air flow rates in the catering environment can be found in DW 172,* Specification for kitchen ventilation systems *[2], and CAIS 23,* Gas safety in catering and hospitality *[3].*

# 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 1179-6, *Glossary of terms used in the gas industry – Combustion and utilization including installation at consumer's premises*

BS 5250:2002, *Code of practice for control of condensation in buildings*

BS 5871-1, *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 (1st, 2nd and 3rd family gases)*

BS 5871-2, *Specification for the installation and maintenance of gas fires, convector heaters, fire/back boilers and decorative fuel effect gas appliances – Part 2: Inset live fuel effect gas fires of heat input not exceeding 15 kW (2nd and 3rd family gases)*

BS 5871-3, *Specification for the installation and maintenance of gas fires, convector heaters, fire/back boilers and decorative fuel effect gas appliances – Part 3: Decorative fuel effect gas appliances of heat input not exceeding 20 kW (2nd and 3rd family gases)*

BS 5871-4, *Specification for the installation and maintenance of gas fires, convector heaters, fire/back boilers and decorative fuel effect gas 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)*

BS EN 449:2002+A1:2007, *Specification for dedicated liquefied petroleum gas appliances – Domestic flueless space heaters (including catalytic combustion heaters)*

# 3 Terms and definitions

For the purpose of this British Standard the terms and definitions in BS 1179-6 and the following apply.

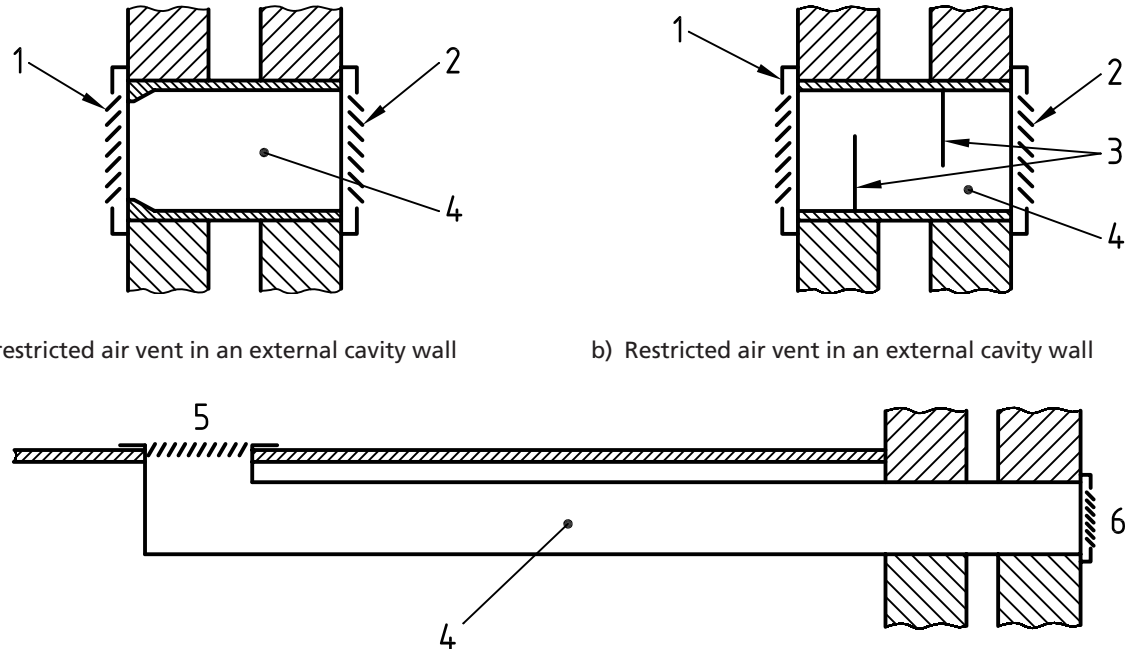
**3.1 adapter**
device to facilitate smooth and unrestricted air flow through transitional changes in section, where the cross-sectional shape of an air duct differs from that of the associated air vent

**3.2 air vent**
non-adjustable purpose provided arrangement designed to allow permanent ventilation

*NOTE 1 Examples of air vent arrangements are given in Figure 1.*

*NOTE 2 Examples of air vents can include louvre doors.*

Figure 1 **Typical air vent arrangements**




a) Unrestricted air vent in an external cavity wall

b) Restricted air vent in an external cavity wall

c) Extended under floor ducted air vent

d) Simple air vent in an internal wall or door

e) Window air vent

**Key**

1 External louvre or grille
2 Internal louvre
3 Baffle (various arrangements)
4 Duct
5 Floor grille
6 External louvre or grille

### 3.3 appliance compartment

enclosure specifically designed or adapted to house one or more gas appliances

*NOTE An appliance compartment is only used to house gas appliances and is not a habitable space.*

### 3.4 equivalent area

air vent free area which is aerodynamically equivalent to a single sharp-edged circular hole

*NOTE For a simple air vent (e.g. a grille/louvre on both ends of a smooth, uninterrupted duct), the equivalent area may be regarded as the "free area".*

**3.5 free area**
unobstructed cross-sectional area of a grille, louvre or duct, calculated as the sum of the cross-sectional areas of all unobstructed apertures measured through the plane of minimum area and at right angles to the air flow within the apertures

*NOTE See Figure 2.*

**3.6 grille**
simple fixed mesh or lattice arrangement designed and constructed to preclude vermin but to allow the passage of air at all times

*NOTE A grille can be installed independently as an air vent, set in a dedicated housing, or used with an adapter or duct (see Commentary to **5.1.5** for further details).*

**3.7 internal space**
interior space, which is not a room

*NOTE Examples include halls, passageways, stairways and landings.*

**3.8 intumescent air vent**
assembly for preventing the spread of fire, consisting of a metal louvre/grille with an intumescent block secured behind it incorporating a latticework of holes to provide continuous ventilation that expands and closes in the event of extreme heat build-up such as in a fire

*NOTE When fitted to doors, an intumescent air vent usually has a louvre/grille on both sides.*

**3.9 louvre**
assembly of fixed sloping blades or vanes contained within a framework designed and constructed to resist light and rain penetration, but to allow the unrestricted passage of air at all times

*NOTE A louvre can be employed independently as an air vent, set in a dedicated housing, or used with an adapter or duct.*

**3.10 protected area**
area other than an appliance compartment, which is enclosed with fire-resisting materials

*NOTE Examples of a protected area include a hall, landing, lobby, corridor, internal garage, stairway or shaft. Decommissioned SE ducts or U ducts are also to be considered as protected areas.*

**3.11 ventilation**
process of supplying air to, and removing air from, a room, internal space, appliance compartment or garage

*NOTE The air can be used, or intended for, purposes of combustion, cooling and/or the operation of a chimney.*

**3.12 maintenance**
work carried out on an appliance to repair any defect

**3.13 servicing**
regular and planned activity carried out on an appliance to check that it is working safely and correctly

*NOTE This is typically carried out annually.*

# 4 Competence

**4.1** Persons carrying out general design, installation and maintenance work associated with and impacting upon the ventilation provision for gas appliances, including electrical, water supply and drainage, shall be competent.

**4.2** Persons carrying out any gas installation, commissioning, servicing and maintenance work shall be competent to do so.

*COMMENTARY ON **4.1** AND **4.2***
*Competency includes knowledge and understanding of the applicable standards and regulations.*

*It is a statutory requirement that all gas work be carried out by a business or self-employed person(s) that is a member of a "class of persons" registered with a registration body which has been approved by an approval body to operate and maintain such a register.*

*The statutory regulations, registration bodies and approval bodies applicable to Great Britain, the Isle of Man, Northern Ireland and Guernsey are given in Table 1.*

*The qualifications which persons need to have to be deemed competent to carry out gas work are given in Table 2.*

Table 1 **Registration and approval bodies by country/territory**

| Country/territory | Gas registration body | Approval body | Statutory regulations |
|---|---|---|---|
| Great Britain | Gas Safe Register | Health and Safety Executive (HSE) | Gas Safety (Installation and Use) Regulations 1998 [4] |
| Isle of Man | Gas Safe Register | Health and Safety at Work Inspectorate (HSWI) | Gas Safety (Installation and Use) Regulations 1994, as amended and applied by the Gas Safety (Application) Order 1996 [5] |
| Northern Ireland | CORGI [A)] Gas Registration | Health and Safety Executive Northern Ireland (HSENI) | Gas Safety (Installation and Use) (Northern Ireland) Regulations 2004 [6] |
| Guernsey | CORGI Gas Registration | Health and Safety Executive for the States of Guernsey [HSE (Guernsey)] | Health and Safety (Gas) (Guernsey) Ordinance 2006 [7] |

[A)] This is likely to change to Gas Safe Register in April 2010.

Table 2 **Competence requirements by country/territory**

| Qualifications | Great Britain and Isle of Man | Northern Ireland and Guernsey |
|---|---|---|
| Current certificate(s) of competence in the type of gas work to be conducted, issued by an awarding body accredited by the United Kingdom Accreditation Service (UKAS) (ACS certification) | ✓ | ✓ |
| National/Scottish Vocational Qualification (N/SVQ accredited by Ofqual), which is aligned in matters of gas safety | ✓ | ✓ |
| National/Scottish Vocational Qualification (N/SVQ accredited by Ofqual), which is aligned under the HSC ACoP arrangement [A)] as approved with the registration body | ✓ | ✗ |
| Any other scheme recognized by the gas registration body for registration purposes | ✓ | ✓ |

[A)] *Health and Safety Commission's Approved Code of Practice (ACoP) (COP20)* – Standards of training in safe gas installation *[8].*

# 5 Design and materials for air vents and ducts

## 5.1 Design

### 5.1.1 General

The apertures of air vents shall allow the entry of a 5 mm diameter ball. No gauze or fly screen (i.e. mesh with apertures of less than 5 mm) shall be incorporated or subsequently fitted to an air vent.

*NOTE Domestic debris can block vents of little less than 5 mm and restrict the free area.*

### 5.1.2 Free area

A proprietary air vent which is marked with the free area shall be used wherever possible.

*COMMENTARY ON **5.1.2***
*The development of materials, technology and manufacturing techniques has led to a wide diversity of ventilation products, including complex multiple assemblies dedicated for specific purposes such as minimizing draughts or sound transmission, or warming air. The free area of such products, by virtue of their internal aerodynamic characteristics, might not be calculated reliably from physical measurement. There is currently no formally agreed standard for the design or production of air vents for use with gas appliances and thus manufacturers are not obliged to mark their products with an area calculated in a uniform manner. The equivalent area stated in the vent manufacturer's literature and/or marked on the air vent, should be used wherever it is available, as this can differ considerably from the free area measured at one end of the air vent.*

*In the absence of any such marking on a grille, louvre or duct, the sum of the free cross-sectional areas of the apertures should be used (see Figure 2). For a louvre, the areas should be measured at right angles to the blades or vanes. For an air vent assembly, the free cross-sectional area of the most restrictive component in an assembly should be used to calculate the free area.*

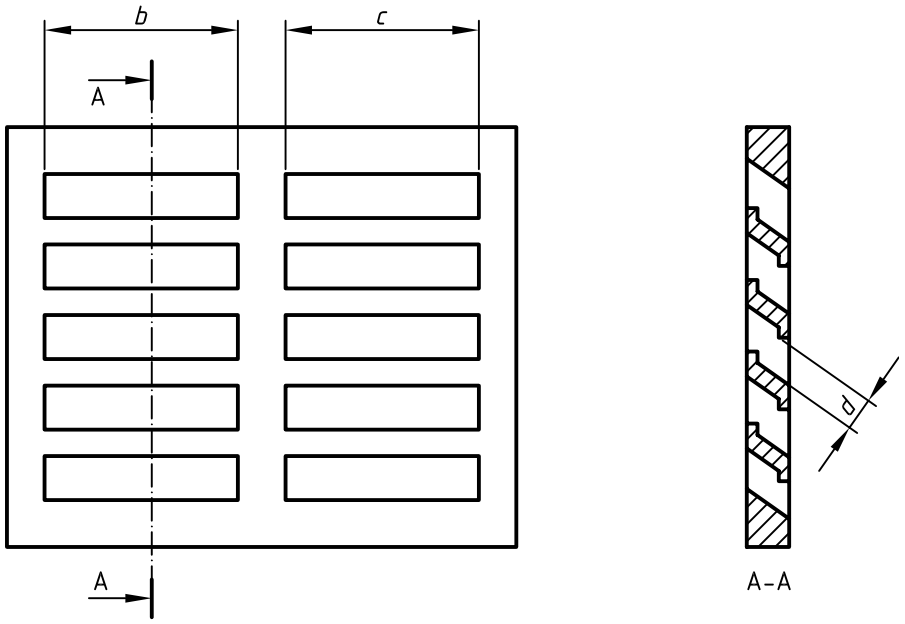
*Where two or more components are employed to construct a non-proprietary assembly, changes in section and cross-sectional area should be avoided wherever possible. Where such changes do occur, adapters should be used to facilitate a smooth and efficient transition which minimizes restriction at any of the components. The free area should be determined from the free area of the component with the least free area available.*

*In Figure 1a), for example, if the external grille or louvre has 60 holes of 9 mm × 9 mm (i.e. area = 48 $cm^2$), the duct is 150 mm in diameter (i.e. area = 176 $cm^2$), and the internal louvre has 6 slots each of which is 156 mm long and 9 mm wide (i.e. area = 84 $cm^2$), then the free area for the whole air vent should be taken as that of the component with the minimum area (i.e. 48 $cm^2$). If the areas are similar then caution should be used since components with similar aerodynamic resistances placed in series are more restrictive than the individual components by themselves. If the free area cannot be established, an alternative air vent should be used.*

*Although a non-preferred practice, where grilles/louvres and ducts of dissimilar shape or proportion are used together [see Figure 2b)], e.g. a 225 mm × 150 mm rectangular louvre and a 125 mm diameter duct, sufficient space should be allowed between the rear face of the louvre and the end of the duct to prevent an obstruction to the free area (20 mm is typically a satisfactory clearance).*

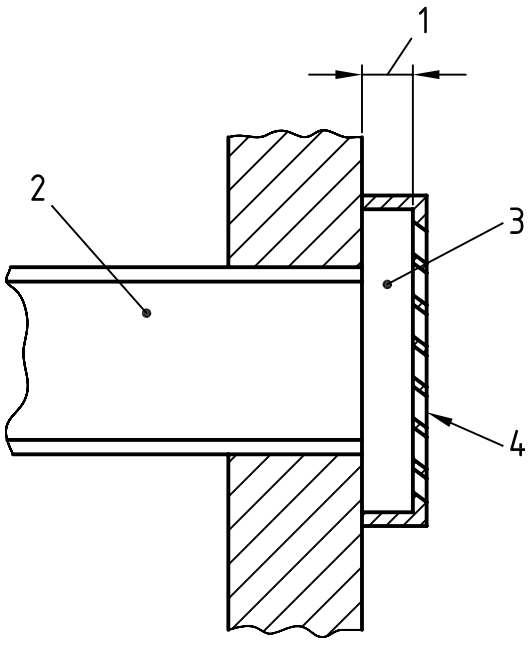
*Grilles, louvres or louvered doors used internally should be marked or labelled with, "IMPORTANT – DO NOT BLOCK THIS VENT".*

Figure 2 **Free areas**




Free area = $(b + c) \times N \times d$, where $N$ is the number of rows of slots and $d$ (distance) is the narrowest slot/louvre dimension through which air passes unobstructed

a) Calculation of free area




b) Use of grilles or louvres which do not precisely match the duct

**Key**

1 Typical clearance of 20 mm
2 Duct
3 Space to prevent obstruction
4 Free area of grilles or louvres determined as in Figure 2.a)

*NOTE All apertures should be a minimum of 5 mm diameter and apertures communicating directly with outside air should be no greater than 10 mm in diameter.*

### 5.1.3 Air vents communicating directly with outside air

A ventilation opening across an external wall directly to outside air shall be continuous, unobstructed and fitted with a terminal device such as a grille or louvre at each end. Where a ventilation opening passes through a cavity wall, it shall include a continuous duct across the cavity, conforming to **5.1.4**, and shall be fitted so that it does not impair the water resistance of the cavity.

The apertures of an air vent communicating directly with outside air (which includes a ventilated roof space or ventilated underfloor area) shall prevent the entry of a 10 mm diameter ball, but still allow the entry of a 5 mm diameter ball.

*NOTE 1 While vermin can thrive in ducts fitted with louvres or grilles with apertures of over 10 mm, domestic debris (e.g. lint and dust) can block louvres or grilles of little less than 5 mm.*

*NOTE 2 There are various devices available, such as a graduated probe, to help determine the size of the apertures of an air vent.*

*NOTE 3 Where an air vent incorporates a draught-reducing device or other restriction, experience has shown that this imposes a 25% to 50% reduction in equivalent area over that of an unrestricted air duct. The equivalent area should be obtained from the manufacturer.*

*NOTE 4 Consideration should be given to the location of air vents to allow access for maintenance. For example, the siting of air vents behind radiators can cause problems of accessability for inspection and therefore might not be considered to be good practice.*

### 5.1.4 Air vents not communicating directly with outside air

An opening made through any internal wall, door, partition or panel for the purpose of providing ventilation shall be completely cleared of debris prior to the air vent being fitted. Where the wall, door, partition or panel contains any material that can slip and cause an obstruction (such as insulation), a duct shall be used between each end of the air vent.

*NOTE Where air is taken from a roof space or underfloor space, refer to the commentary on **6.2.2**.*

### 5.1.5 Ducts

The cross-sectional free area of a duct used for ventilation shall be not less than that of any grilles or louvres fitted at either end of the duct. The design and construction of a duct shall not contain any gaps that permit the ingress of water, vermin or cavity insulation material, for example. It shall facilitate inspection of the entire air passage for integrity and blockage at any time, such as on initial installation or after cavity foam insulation has been installed.

*COMMENTARY ON **5.1.5***
*Where the cross-sectional shape of a duct differs from that of the associated grille/louvre, the cross-section of the duct should be modified, or adapters used to create a smooth transition and prevent restriction of the air duct or grilles/louvres. Where an adapter is employed, the air vent free area may be reduced, or even determined by the adapter. Every effort should be made to keep the ducts proportional and of similar cross-sectional shape to that of the associated grilles/louvres.*

*It might be necessary to inspect a duct on installation of the air vent and/or the gas appliance, or after the cavity has been filled with insulation, e.g. foam or granules.*

*Long horizontal ducts and ducts intended to convey air downwards should be avoided wherever possible. Where horizontal ducts are necessary (e.g. for internal rooms or basements), they should be as short as practicable, not longer than 3 m and incorporate not more than two right-angled bends, unless a special allowance is made for the restriction that they impose. This can be achieved by increasing the cross-sectional area by 50% for each successive 3 m or part thereof in excess of the initial 3 m run.*

*Attention is drawn to BS 5440-1 for advice on balanced compartments.*

*The use of flexible ducting should be avoided wherever possible. Where there is no practicable alternative, the flexible ducting should be firmly fixed in order to prevent any restriction in the cross-sectional area.*

### 5.2 Materials

Grilles, louvres, air vents and ducts shall be corrosion-resistant and such that the intended free area is maintained.

*NOTE 1 When selecting a grille, louvre, air vent or duct, due consideration should be given to its free area, siting and environment.*

*NOTE 2 Attention is drawn to the Asbestos (Prohibitions) Regulations 2006 [9].*

### 5.3 Intumescent air vents in fire-rated compartments

*NOTE Intumescent air vents may be used if the manufacturer of the air vent, in calculating the free area, has accounted for a space between the intumescent block and metal louvre/grille, as explained in the commentary on **5.1.2**.*

The air vent shall have no means of being closed, other than by an intumescent device.

When an intumescent air vent is installed or maintenance work carried out by an operative, advice shall be given to the end user that it is essential that an intumescent air vent that has been triggered by a high temperature, such as a fire, is replaced before any gas appliance is operated.

## 6 Free area and positioning of air vents

### 6.1 Air vents communicating directly with outside air

To minimize the risk of re-entry of the products of combustion, an air vent shall be sited in accordance with Table 3.

*NOTE This should ensure that a minimum separation between the air vent and any part of an appliance terminal serving any combustion appliance is attained.*

*COMMENTARY ON **6.1***
*Where ventilation is provided via a roof space, see **6.2.2**.*

*Table 3 gives the minimum requirements for the separation distances necessary between an air vent and an appliance terminal for the following:*

*a) the heat input of the appliance; and*

*b) the type of chimney to which the terminal is connected.*

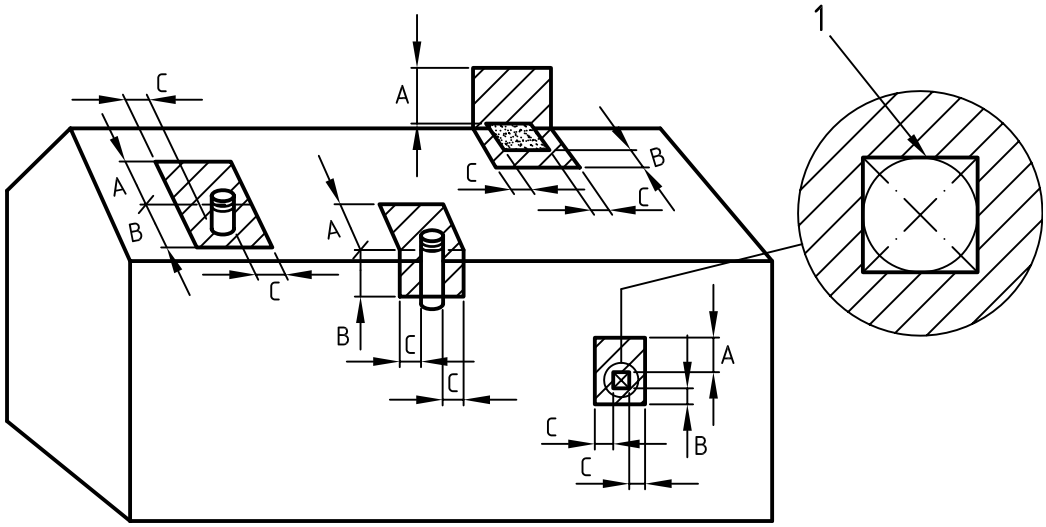
*The specified separation distances should be achieved upon installation of an appliance and/or air vent. In some cases, this can necessitate re-siting an existing air vent.*

*These separation distances also apply to general room-extract fan outlets with, or without, a non-return flap, mechanical ventilation openings, or any opening into a roof space. They do not apply to extract duct terminals fitted with non-return flaps that are connected via ducts to an appliance, such as a cooker hood or tumble dryer.*

*In addition, the air vent should not be located in a position where it is likely to be easily blocked (e.g. by leaves or snow or other debris), become flooded, or where contaminated air can be present at any time (e.g. in car ports). Location should prevent the air currents produced from passing through normally occupied areas of a room. This may be achieved by one or more of the following:*

1) *siting the appliance in an appliance compartment with air vents communicating directly with outside air;*
2) *siting the air vent at a point adjacent to the appliance; and/or*
3) *siting the air vent at or near ceiling height and orientating the internal louvres to direct incoming air away from the living or general accommodation area.*

Table 3 **Minimum separation distances between air vents and appliance terminals** (mm)




**Key**

1 Terminal

| **Air vent position** | **Appliance input** (kW) | **Room-sealed or non room-sealed** Separation (mm) | |
|---|---|---|---|
| | | Natural draught | Fanned draught |
| A | 0 to 7 | 300 | 300 |
| Above a | >7 to 14 | 600 | 300 |
| terminal | >14 to 32 | 1 500 | 300 |
| | >32 | 2 000 | 300 |
| B | 0 to 7 | 300 | 300 |
| Below a | >7 to 14 | 300 | 300 |
| terminal | >14 to 32 | 300 | 300 |
| | >32 | 600 | 300 |
| C | 0 to 7 | 300 | 300 |
| Horizontally to | >7 to 14 | 400 | 300 |
| a terminal | >14 to 32 | 600 | 300 |
| | >32 | 600 | 300 |

## 6.2 Air vents not communicating directly with outside air

**6.2.1** An air vent set in an internal wall, other than an appliance compartment wall, shall be located not more than 450 mm above floor level in order to reduce the spread of smoke in the event of fire.

*NOTE For air vents set in an appliance compartment wall, see **6.3.2.1**.*

**6.2.2** An air vent shall not communicate with a ventilated roof space or underfloor space if that space communicates with other premises. Where an air vent draws air from a ventilated roof space or ventilated underfloor space, the total effective free area of the grilles or louvres into that space shall be at least equal to the total effective free area of any air vents drawing air from that space. The ventilated roof space shall be visually inspected to confirm that it conforms to the minimum unrestricted ventilation requirements in BS 5250.

*COMMENTARY ON **6.2.2***
*To avoid condensation and associated problems that can result from low ambient seasonal temperatures in the roof space, adequate ventilation should be provided. Existing air vents, grilles or louvres that have previously been installed to meet the requirements for roof space ventilation and that communicate directly to the outside air may have apertures of less than 5 mm, and are deemed to be acceptable if the total free area is satisfactory and openings are checked to ensure that they are free from obstruction. In order to prevent condensation occurring within a roof space that can result from low ambient seasonal temperatures, ventilation is normally required and further guidance can be found in BS 5250:2002, **8.4.2.1.2** and **8.4.2.2.3**.*

*A roof space constructed in accordance with the ventilation recommendations in BS 5250:2002, **8.4.2.1.2** and **8.4.2.2.3**, may be considered to be outside air.*

*It is important that any ventilation provision is not blocked at the eaves and at the point where the ventilation passes through the ceiling insulation into the dwelling. This can be caused by poorly installed roof/cavity wall insulation, for example. Some modern construction methods employ the use of a "breathable" roofing felt designed to allow similar ventilation of the roof space. Where this method has been used, the roof space should not be considered to be outside air for the purpose of gas appliance air supply, due to its propensity for reduced performance of the membrane over time.*

*It is also important that the requirements of Approved Document B regarding fire safety [10] are taken into consideration and that any ventilation provision for a gas appliance provided through the roof space or loft does not compromise fire safety. Further guidance on ventilation and fire safety can be found in BS 5250.*

*A roof space not constructed to conform to BS 5250 can only be regarded as another internal space and therefore should be treated as such when calculating air vent free-areas.*

*In all circumstances air vents leading into roof spaces should be designed or located to avoid blockages from, for example, insulation material.*

*Air vents supplying air to the appliance from the roof space should be sited not less than 300 mm above joists or 150 mm above the level of insulation, whichever is the greater (measured up to the bottom openings of the air vent), in order to avoid blockage by insulation material. It is also preferable that terminal guards or bird guards are fitted to air vents to prevent blockages in general.*

*For requirements for radon gas and underfloor spaces, see **7.3**.*

*Attention is drawn to the requirements of the relevant building regulations [11], [12], [13], with regard to communication of air vents with attached garages.*

**6.2.3** No air vent shall penetrate a protected area.

*NOTE A decommissioned SE duct or U duct should be considered to be a protected area.*

### 6.2.4 Air vents in series (see Figure 3)

Where outside air is conveyed to an open-flued appliance through an external air vent (Vent 1) into a room and thereafter through one internal wall/partition air vent (Vent 2) in series, both air vents shall be sized in accordance with **6.3.1**.

Where there is more than one internal air vent, the free area of each internal air vent (Vent 2, Vent 3, and so forth) shall be increased by at least 50% of that required for Vent 1.

Where an appliance is sited in an appliance compartment, the free area of the high and low appliance compartment vents is as specified in Table 4.

*COMMENTARY ON **6.2.4***
*Where only two air vents are in series, experience has shown that the additional flow resistance is acceptable without increasing the area of either, as long as they meet the requirements for an air vent communicating directly with the outside air (see **6.1**).*

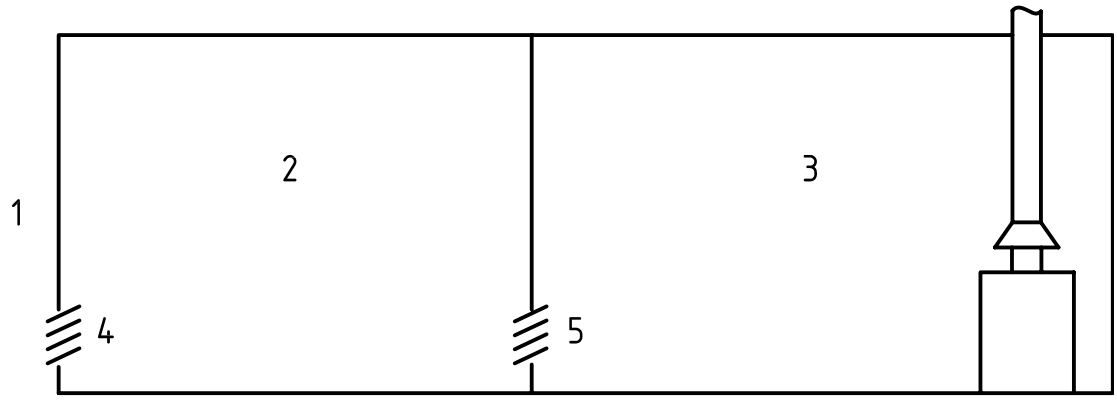
*As positioning air vents in series theoretically increases the resistance of air flow to an appliance, a 50% increase in area of all internal wall/partition vents (excluding appliance compartment vents) is a readily achievable simplification. In the situation shown in Figure 3, the size of Vent 1 does not need to be increased, partly due to the additional air flow that occurs with each extra room linked via an air vent.*

Table 4 **Minimum air vent free area for appliance compartments: open-flued appliances**

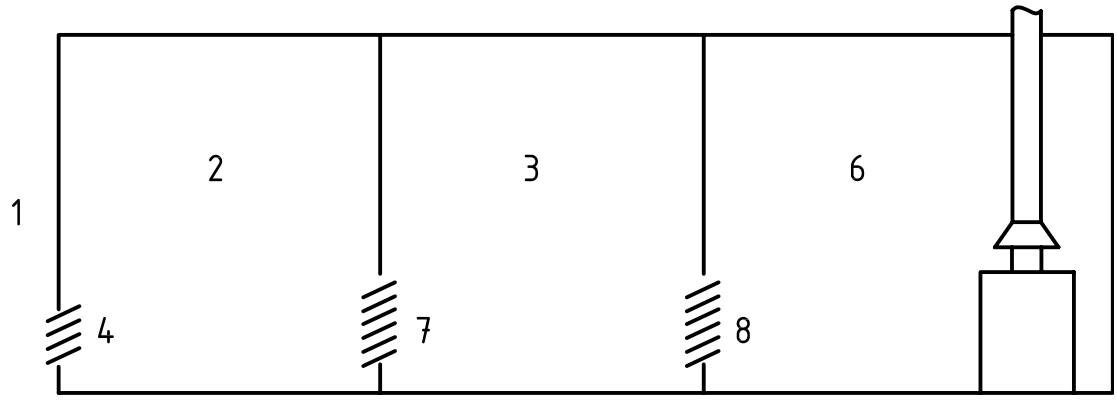
| **Air vent position** | **Appliance compartment ventilated:** ($cm^2$ per kW (net) of appliance maximum rated input) | |
|---|---|---|
| | **to room or internal space** [A)] | **directly to outside air** |
| High level | 10 | 5 |
| Low level | 20 | 10 |

[A)] A room containing an appliance compartment for an open-flued appliance also requires ventilation, calculated in accordance with **6.3.1**.

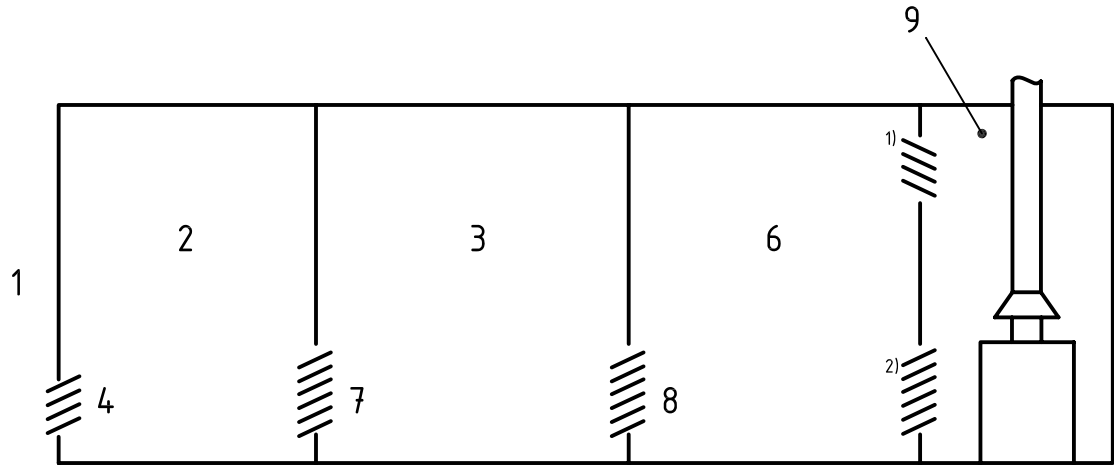
Figure 3 **Air vents in series**




a) Two air vents in series




b) Three or more air vents in series




c) Three or more air vents in series feeding an appliance compartment

**Key**

| | | | |
|---|---|---|---|
| 1 | Outside air | 6 | Room 3 |
| 2 | Room 1 | 7 | Vent 2 – 50% bigger than Vent 1 |
| 3 | Room 2 | 8 | Vent 3 – 50% bigger than Vent 1 |
| 4 | Vent 1 | 9 | Appliance compartment |
| 5 | Vent 2 | | |

*NOTE Appliance compartment air vents 1) and 2) sized and positioned as specified in **6.3.2**.*

## 6.3 Open-flued appliances

### 6.3.1 Open-flued appliance installed in a room or internal space

Where an open-flued appliance with a rated input exceeding 7 kW is installed in a room or internal space or garage, that room or internal space shall be provided with a permanent opening and an air vent with a minimum free area of 5 $cm^2$ for every kW of appliance maximum rated input in excess of 7 kW. Ventilated underfloor space shall be considered outside air, providing the air vents supplying air to the underfloor space remain adequate (i.e. air vents have not been removed, blocked or sealed). Underfloor air vents to gas space heaters shall not be positioned directly under the appliance and shall be in accordance with BS 5871-1, BS 5871-2, BS 5871-3 or BS 5871-4, as appropriate.

When determining the net input for existing appliances whose instructions or labelling do not make any specific reference to net or gross input, the input shall be assumed to be given as net.

For those appliances whose instructions or labelling quote their input rating in gross terms, the quoted input rating shall be divided by the factor 1.1.

The permanent opening shall be either direct to outside air in accordance with **5.1.3**, or to an adjacent room or internal space via air vents in accordance with **5.1.4**, or to a roof space which itself has an opening of at least the same free area direct to outside air, refer to **6.2.2**.

The permanent opening shall be an air vent.

*COMMENTARY ON **6.3.1***
*The purpose of the permanent opening is to provide air for combustion and the correct operation of the flue. Acceptable air vent positions are illustrated in Figure 4.*

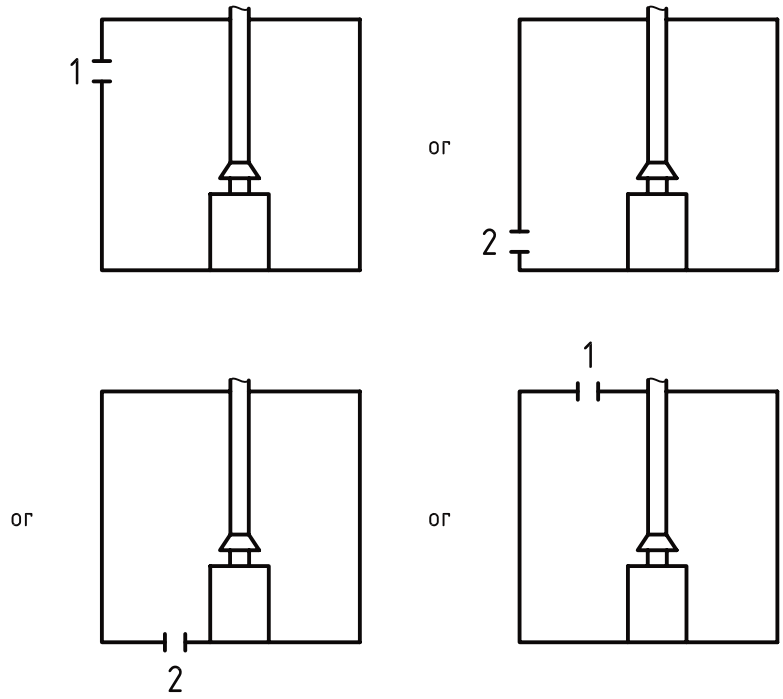
*It is assumed that it is possible for a room or internal space to provide adequate ventilation for an appliance up to 7 kW. It is practical for this to apply to heat inputs of 7 kW on both gross and net CV because of the tolerances. Appliances above this rating require purpose-designed air vents. Ventilation is normally present due to natural or adventitious ventilation, for example through floorboards, cracks in window frames and doors. However, the availability of such ventilation should never be taken for granted as it can be affected by factors such as double glazing, cavity insulation, draught proofing, the method of construction and the installation of extraction fans.*

*Whilst the conversion of rated input between gross and net values strictly depends on the CV of gas used, in practical terms a common factor 1.1 should be used. For example, an appliance with a gross heat input of 16.5 kW has a net heat input of 15 kW (i.e. 16.5 kW gross/1.1 = 15 kW net) and to be installed in a room, it requires an air vent of (15 - 7) × 5 $cm^2$ = 40 $cm^2$.*

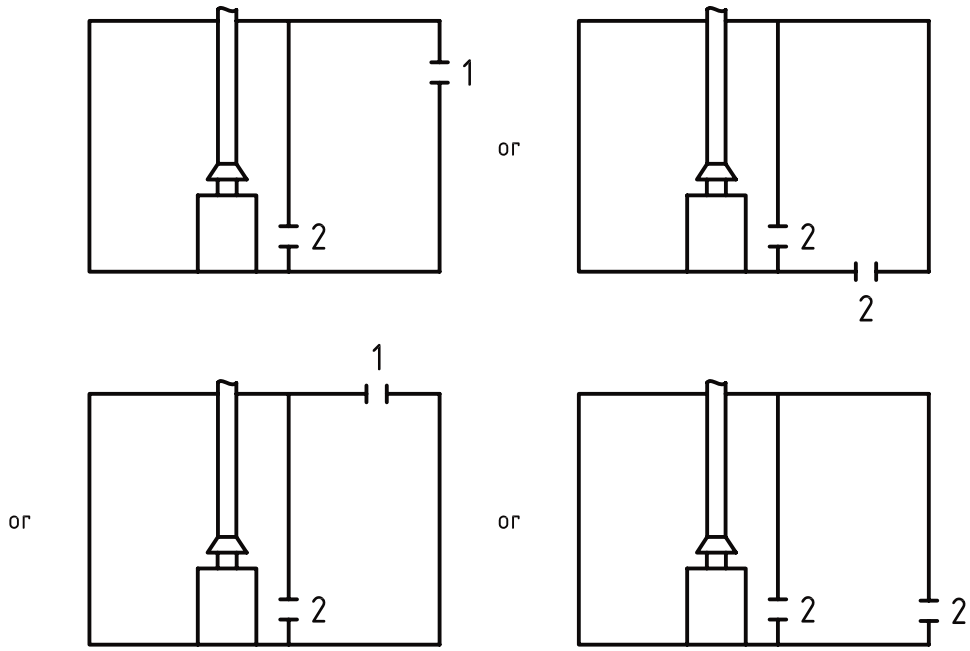
*If spillage from an appliance is detected, then the whole installation, including the chimney, and the ventilation should be checked and rectified. If spillage occurs and no chimney fault is found, the ventilation provided should be increased by progressively opening a door or window. If the chimney then clears the combustion products, the area of the opening should be measured and provision made for the equivalent amount of additional permanent ventilation.*

*Where underfloor ventilation is used, reference should also be made to **7.3**.*

Figure 4 **Air vent positions for an open-flued appliance in a room or internal space**




a) High or low air vent communicating with outside air or ventilated floor/roof space




b) Low level air vents communicating with another room or internal space and subsequently to outside air or ventilated floor/roof space

**Key**

1 High level air vent

2 Low level air vent

*NOTE Ducting runs, where unavoidable, should be kept to a minimum, not more than 3 m long. A low level air vent in an internal wall should be not more than 450 mm above floor level.*

### 6.3.2 Open-flued appliance installed in an appliance compartment

**6.3.2.1** Where an open-flued appliance is installed in an appliance compartment, air vents in the appliance compartment shall be sized in accordance with the appliance manufacturer's instructions, or, in the absence of any such instructions, in accordance with Table 4.

Air vents shall be provided at both the lowest and highest practicable levels in the appliance compartment. Both high and low level air vents shall communicate either with the same room or internal space, or with the outside air through the same wall.

*NOTE 1 Ventilation, for example from two differing external walls, can create a cross-flow of ventilation, leading to unsatisfactory burner and/or flue performance.*

Clearance around the sides, front, above and below the appliance shall be provided in accordance with the appliance manufacturer's instructions, or, in the absence of any such instructions, these clearances shall be a minimum of 75 mm to the sides, above, below and in front of the appliance.

An appliance compartment shall not be used for storage (see **6.3.2.5**).

*COMMENTARY ON **6.3.2.1***
*The purpose of the air vents in an appliance compartment is to provide air for combustion, correct operation of the flue and appliance compartment cooling. It should be noted that small appliance compartments are susceptible to vitiation caused by down-draught and so great care should be taken to ensure that the ventilation provision conforms to **6.3.2** or the manufacturer's instructions.*

*Small rooms, such as individual WCs, cloakrooms, understair spaces, are not normally considered appliance compartments. However, like small appliance compartments, they are susceptible to vitiation caused by down-draught. For this reason, and in cases where the heat loss from the appliance could lead to high ambient temperatures, appliance compartment ventilation should be considered.*

*The vertical distance between the high and low level air vents should be as great as possible to encourage convective air flow. Positioning air vents so that they communicate with the same room or internal space, or with the outside air on the same wall, should subject them to a common air source and pressure and mitigate any effects on burner and/or flue operation.*

*For new installations that are not replacements, both air vents should communicate with outside air wherever practicable. Acceptable air vent positions are illustrated in Figure 5. Examples of incorrect air vent positions for an open-flued appliance in an appliance compartment are illustrated in Figure 6.*

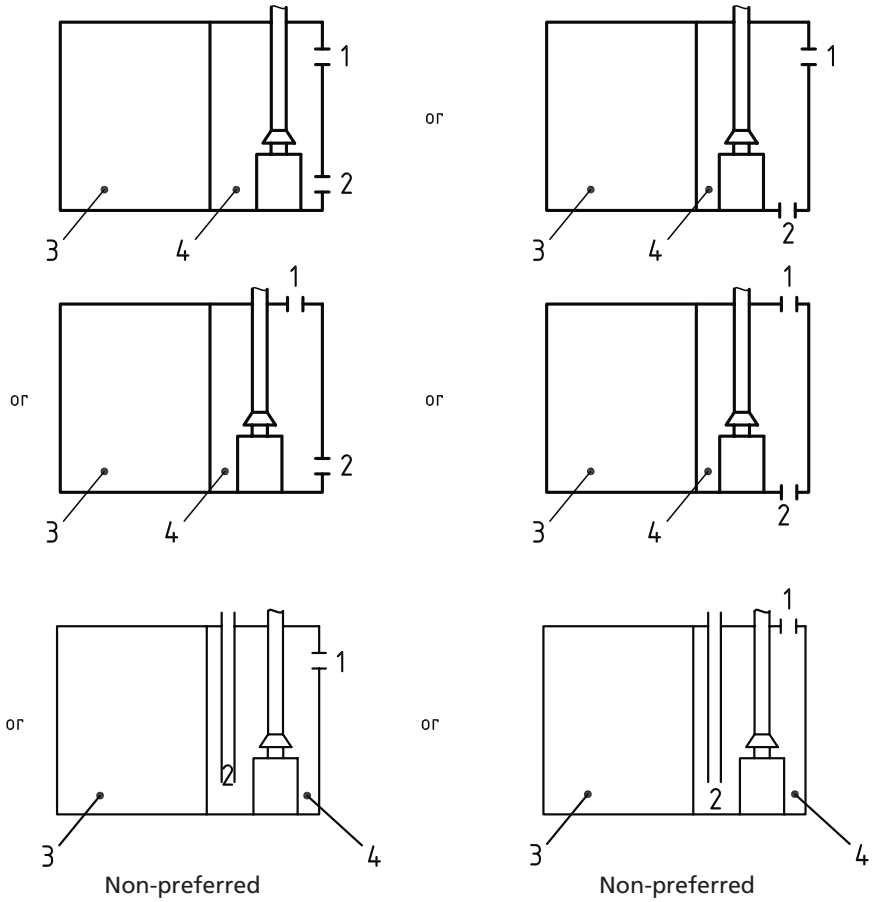
*If the recommendations stated in the appliance manufacturer's instructions differ from the general requirement of both high and low air vents in an appliance compartment communicating with the same room or internal space, then these may be complied with as an alternative.*

*A CO alarm in accordance with BS EN 50291 can be used to provide additional assurance to the end user. However, use of such an alarm should not be a substitute for maintenance checks.*

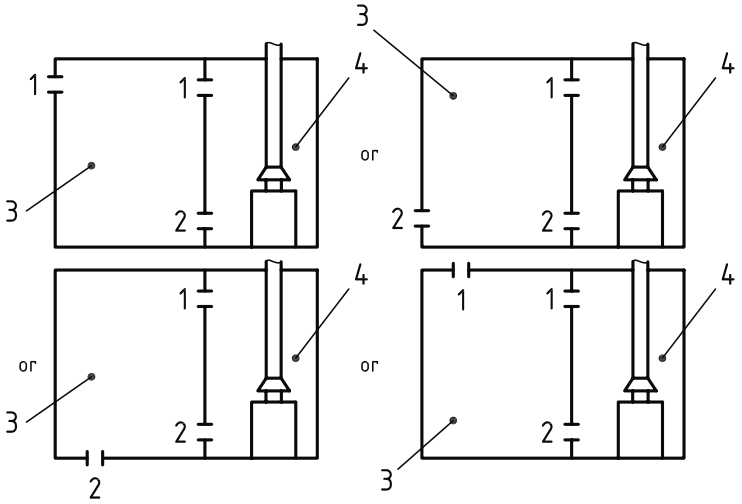
*Where an open-flued appliance is installed in a balanced appliance compartment, specific installation requirements, including those for ventilation, apply. These are specified in BS 5440-1. Specialist advice should also be obtained.*

*Where louvred doors provide ventilation to the appliance compartment, the total area, measured across the minimum dimension of the slots, should be not less than the sum of the high and the low level requirements. A louvred door should be as tall as practicable to encourage convective air flow.*

Figure 5 **Air vent positions for an open-flued appliance in an appliance compartment**




a) High and low level air vents communicating with outside air or ventilated floor/roof space (only the final two diagrams show non-preferred high and low level air vents for new and replacement installations)



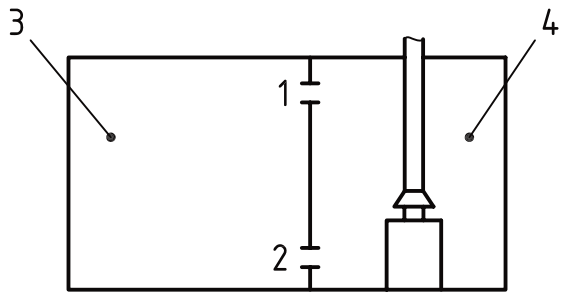

b) High and low level air vents communicating with another room or internal space and subsequently to outside air or ventilated floor/roof space

**Key**

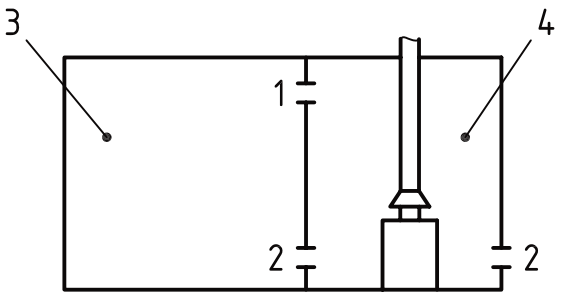
1 High level air vent
2 Low level air vent
3 Room
4 Appliance compartment

*NOTE Appliance compartment installations should have both high and low level air vents (see **6.3.2** and **6.3.3**). Manufacturer's recommendations for clearance around appliance casing should be complied with. Ducting runs, where unavoidable, should be kept to a minimum of not more than 3 m long and the vertical distance between high and low air vents should be as great as possible.*

Figure 6 **Examples of incorrect air vent positions for an open-flued appliance in an appliance compartment**




a) High and low level air vents communicating with a room without combustion ventilation from the room to the outside air




b) High and low level air vents communicating with a room with combustion ventilation at low level from the appliance compartment to the outside air

**Key**

1 High level air vent
2 Low level air vent
3 Room
4 Appliance compartment

**6.3.2.2** Where two or more appliances are installed in the same appliance compartment, whether or not they are supplied as a combined unit, the aggregate maximum rated input shall be used to determine the air vent free area from Table 4.

**6.3.2.3** Where the low level ventilation is via a duct from a higher level, the duct shall be independent from any duct used for supplying the high level ventilation. No high level ventilation shall be via a duct from a lower level. Ducts shall be sized in accordance with **5.1.5**.

*COMMENTARY ON **6.3.2.3***
*Where practicable, both high and low level air vents should communicate either with the same room or internal space, or with the outside air at the same wall. The vertical distance between the high and low level air vents should be as great as possible.*

*Where low level ventilation is provided via a duct fed from a space above the appliance compartment, the duct should be insulated to reduce the possibility of flow reversal and the lower end should be below the level of the burner in the appliance.*

**6.3.2.4** Where the appliance compartment air vent communicates with a room or internal space, that room or internal space shall itself be provided with a permanent opening in accordance with **6.3.1.**

**6.3.2.5** An appliance compartment containing an open-flued appliance shall be labelled to warn against blockage of the air vents and use for storage.

*NOTE Recommended wording for the label is as follows: "IMPORTANT – DO NOT BLOCK THIS VENT. DO NOT USE FOR STORAGE".*

### 6.3.3 Air vent communication

For new or replacement installations, an air vent supplying air to an open-flued appliance shall not communicate with a bedroom, or a room containing a bath or shower.

*NOTE Whilst the installation of certain open-flued appliances is allowed within a bedroom, or room used as sleeping accommodation, attention is drawn to the Gas Safe Register,* The Gas Industry Unsafe Situations Procedure*, sixth edition [14].*

## 6.4 Room-sealed appliances

*COMMENTARY ON **6.4***
*A room-sealed appliance installed in a room or internal space does not require purpose-provided ventilation.*

### 6.4.1 Room-sealed appliance installed in an appliance compartment

**6.4.1.1** Unless the appliance manufacturer's installation instructions state otherwise, air vents shall be provided in an appliance compartment containing a room-sealed appliance and these shall be sized in accordance with Table 5, at both high and low levels.

Table 5 **Minimum air vent free area for appliance compartments: room-sealed appliances**

| **Air vent position** | **Appliance compartment ventilated:** | |
|---|---|---|
| | $cm^2$ per kW (net) of appliance maximum rated input | |
| | **to room or internal space** | **direct to outside air** |
| High level | 10 | 5 |
| Low level | 10 | 5 |

*COMMENTARY ON **6.4.1.1.***
*The purpose of the air vents is to supply air for cooling. Both high and low level air vents in an appliance compartment should communicate either with the same room or internal space, or with the outside air at the same wall. The vertical distance between the high and low level air vents should be as great as possible to encourage a convective air flow. Suitable air vent positions are illustrated in Figure 7.*

**6.4.1.2** Where two or more appliances are installed in the same appliance compartment, whether or not they are supplied as a combined unit, the aggregate maximum rated input shall be used to determine the air vent free area from Table 5 or the appliance manufacturer's instructions.

**6.4.1.3** Where the low level ventilation is via a duct from a higher level, the duct shall be independent from any duct used for supplying the high level ventilation. No high level ventilation shall be via a duct from a lower level. Ducts shall be sized in accordance with **5.1.5**.

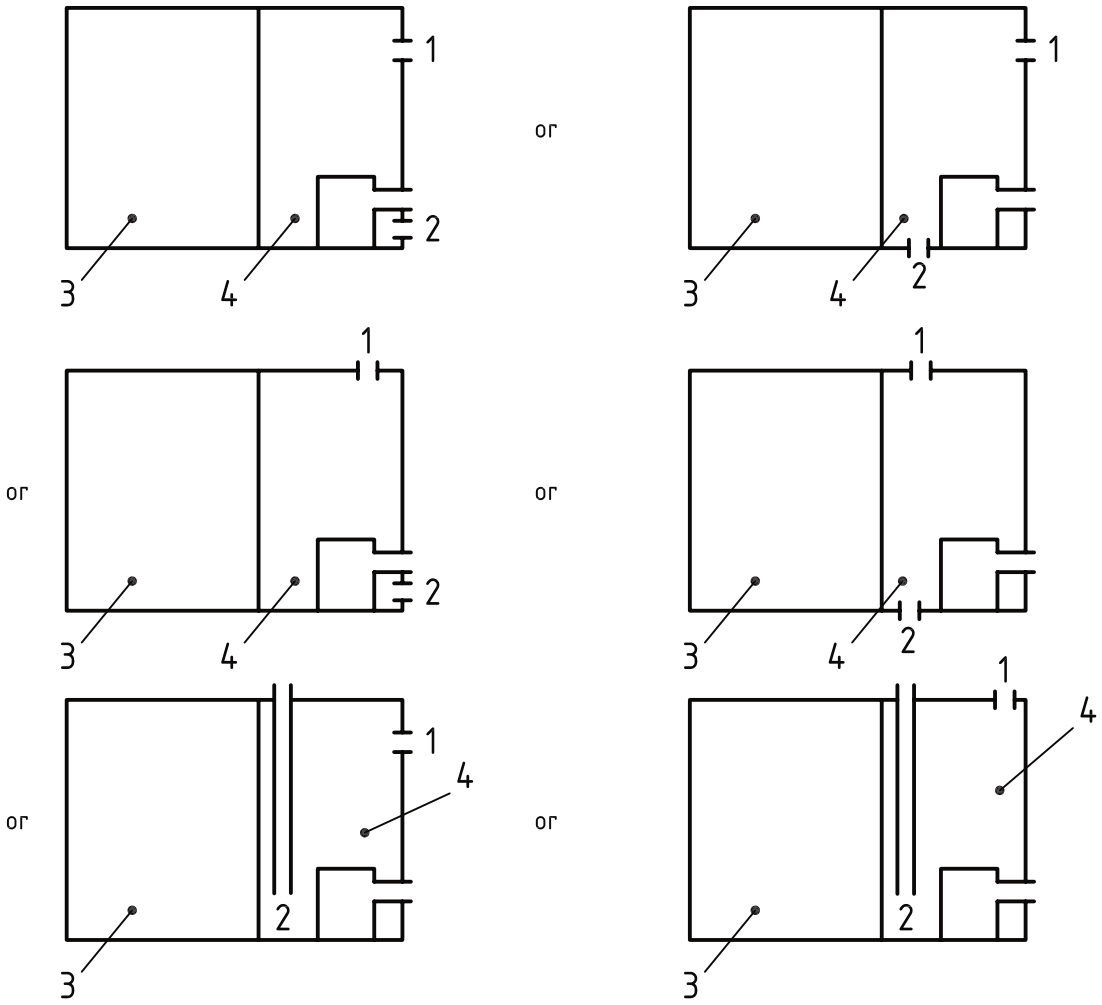
*COMMENTARY ON **6.4.1.3***
*Where practical, both high and low level air vents should communicate either with the same room or internal space, or with the outside air at the same wall. The vertical distance between the high and low level air vents should be as great as possible.*

*Where low level ventilation is provided via a duct fed from a space above the appliance compartment, the duct should be insulated and the lower end should be below the level of the burner in the appliance.*

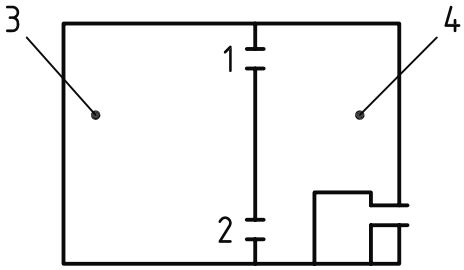
**6.4.1.4** An appliance compartment containing a room-sealed appliance shall be labelled to warn against blockage of the air vents and use for storage.

*COMMENTARY ON **6.4.1.4***
*Recommended wording for the label is as follows: "IMPORTANT – DO NOT BLOCK THIS VENT. DO NOT USE FOR STORAGE".*

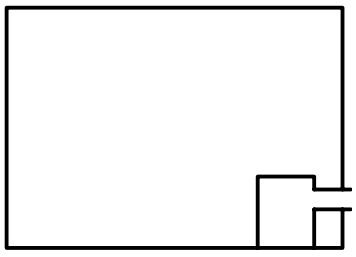
Figure 7 **Air vent positions for a room-sealed appliance in an appliance compartment, room and internal space**




a) High and low level air vents communicating with outside air or ventilated floor/roof space




b) High and low level air vents communicating with a room or internal space



c) Appliance in a room with no air vents required

**Key**

1 High level air vent
2 Low level air vent
3 Room
4 Appliance compartment

*NOTE Where air vents and terminals are located on the same wall, take note of minimum separation in Table 3. Appliance compartment installations should have both high and low level air vents (see **6.4.1**). Manufacturer's recommendations for clearance around appliance casing should be complied with. Ducting runs, where unavoidable, should be kept to a minimum of not longer than 3 m and the vertical distance between high and low air vents should be as great as possible.*

## 6.5 Flueless appliances

Where a flueless appliance is installed/operated in a room or internal space, that room or internal space shall be provided with air vents which communicate directly with outside air and are sized in accordance with Table 6.

Where no openable window is available, an alternative means of ventilation shall be provided in addition to the permanent air vent [see footnote A) in Table 6].

*COMMENTARY ON **6.5***
*Where an appliance is not rigidly fixed (i.e. it is portable), ventilation in accordance with Table 6 should be provided in every room in which the appliance can be connected to the fixed pipework via a suitable self-sealing connector (see BS 669-2). This does not include moveable cabinet heaters which carry their own gas cylinders.*

*EXAMPLE:*
*For a space heater in a typical room (4 m × 4 m × 2.4 m = 38.4 $m^3$), the maximum heat input allowed at 45 $W/m^3$ of heated space would permit a maximum heater size of 1.73 kW.*

Table 6 **Minimum permanent opening free area for flueless appliances**

| **Type of appliance** | **Maximum appliance rated input limit (net)** | **Room volume** ($m^3$) | **Permanent air vent size** ($cm^2$) | **Openable window or equivalent also required** [A) B)] |
|---|---|---|---|---|
| Domestic oven, hotplate, grill or any combination thereof [C)] | None | <5<br>5 to 10<br>>10 | 100<br>50 [D)]<br>Nil | Yes |
| Instantaneous water heater | 11 kW | <5<br>5 to 10<br>>10 to 20<br>>20 | Installation not permitted<br>100<br>50<br>Nil | Yes |
| Space heater in a room | 45 W/$m^3$ of heated space | | 100 plus 55 for every kW (net) by which the appliance rated input exceeds 2.7 kW (net) | Yes |
| Space heater in an internal space | 90 W/$m^3$ of heated space | | 100 plus 27.5 for every kW (net) by which the appliance rated input exceeds 5.4 kW (net) | Yes |
| Space heaters conforming to BS EN 449:2002+A1 in a room | 50 W/$m^3$ of heated space | >15 | 25 $cm^2$/kW with a minimum of 50 $cm^2$ at high and low level | Yes |
| Space heaters conforming to BS EN 449:2002+A1 in an internal space | 100 W/$m^3$ of heated space | >15 | 25 $cm^2$/kW with a minimum of 50 $cm^2$ at high and low level | Yes |
| Refrigerator | None | | Nil | No |
| Single burner hotplate/boiling ring (2 or more to be treated as a hotplate) | None | | Nil | No |

A) Alternative acceptable forms of opening include any adjustable grille or louvre, hinged panel or other means of ventilation that opens directly to outside air. This is in addition to the permanent air vent requirement.

B) Where no openable window direct to outside is available, other products shall be sought (see **7.4**).

C) The appliance, unless a single burner hotplate/boiling ring, shall not be installed in a bed/sitting room of less than 20 $m^3$ volume.

D) If the room or internal space containing these appliances has a door which opens directly outside, no permanent opening is required.

*NOTE Further information on ventilation for tumble dryers with input up to 6 kW can be found in BS 7624. Further information on particular space heaters of nominal heat input not exceeding 6 kW burning 2nd and 3rd family gases can be found in BS 5871-4. For ventilation requirements for moveable cabinet heaters, please see BS EN 449:2002+A1.*

## 6.6 Multi-appliance installations

**6.6.1** Where a room or internal space contains more than one gas appliance, the air vent free area shall be calculated from the greatest of the following:

a) the aggregate maximum rated input of flueless space heating appliances; or

b) the aggregate maximum rated input of open-flued space heating appliances; or

*NOTE The exception to b) is when the interconnecting wall between two rooms has been removed and the resultant room contains only two similar chimneys, each fitted with a similar gas fire with rated input each less than 7 kW. In this instance, an air vent might not be required.*

c) the greatest individual rated input of any other type of appliance.

*COMMENTARY ON **6.6.1** a) AND b)*
*The term "space heating appliance" is taken to mean central heating appliance, air heater, gas fire or convector.*

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

*Where two or more chimneys serve a common space, the draught of the stronger chimney can influence the pull of the weaker and cause spillage. This can happen with gas-fired appliances of different types, or if one of the chimneys serves a solid fuel appliance (see **6.6.2**). 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 fire, an air vent is not normally required, provided that the rated heat input of each of the appliances does not exceed 7 kW, and the installation instructions do not specify additional ventilation. For further information see BS 5871-1, BS 5871-2 and BS 5871-3.*

**6.6.2** Where a room or internal space also contains oil or solid fuel burning appliances, the air vent for the gas appliance shall be sized with consideration given to the rating of other appliances and their usage pattern.

*COMMENTARY ON **6.6.2***
*Where two or more chimneys serve a common space, the draught of the stronger chimney can influence the pull of the weaker and cause spillage. The provision for ventilation for each appliance should be made separately (e.g. if a gas appliance and a solid fuel appliance are located in the same room, one ventilation provision is required for the gas appliance and another for the solid fuel appliance).*

*Further advice is given in Appendices 1 and 2 of the HSE publication,* Safety in the installation and use of gas systems and appliances *[15].*

*The ventilation provision for oil and solid fuel appliances is given in the relevant building regulations [11], [12], [13]. If the rated output rather than the rated input is shown on an oil or solid fuel burning appliance, the rated input should be calculated using the following formula:*

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

*EXAMPLE:*
*A closed, multi-fuel stove with a declared output of 8kW would have a calculated input of 13.33kW (see below).*

$$13.33 = \frac{8 \times 10}{6}$$

# 7 Other aspects of ventilation

## 7.1 Effect of extract fans

Where there is a depressurizing extract or other fan in any room or internal space of a premises that contains any type of open-flued appliance and the operation of the fan has the effect of reducing the pressure ambient to the appliance, and thus adversely affects the operation of the flue, i.e. spillage, additional air vents shall be provided and a spillage test be confirmed as satisfactory before the appliance is used.

*COMMENTARY ON **7.1***
*The operation of the flue/chimney can be adversely affected (i.e. with regard to spillage) in situations in which the operation of an extract fan reduces the ambient pressure surrounding the appliance.*

*Examples of fans which can adversely affect the performance of the flue by reducing the pressure ambient to the appliance are:*

*a) room-extract fans;*

*b) fans in the flues of open-flued appliances;*

*c) externally ducted tumble dryers;*

*d) fans in cooker hoods;*

*e) circulating fans of warm air heating systems (whether or not gas-fired);*

*f) fans used for removing undesirable gases, e.g. radon (see **7.3**) or land-fill gases; or*

*g) ceiling (paddle) fans.*

*This is not an exhaustive list as any piece of equipment that contains a fan designed to move air can adversely affect the safe operation of an open-flued gas appliance and it is recommended that these are checked in all modes of operation.*

*As a general guide, an extra 50 $cm^2$ of air vent free area should be sufficient for most situations. However, the spillage test should be repeated after extra air vents have been fitted. Further advice on spillage testing is given in BS 5440-1:2008, **6.3.2.3.***

## 7.2 Passive stack ventilation

Passive stack ventilation (PSV) shall be considered independently from the provision of ventilation for gas appliances.

*COMMENTARY ON **7.2***
*For advice on the effects on flueing of appliances see BS 5440-1.*

*PSV is a ventilation system using ducts from the ceiling of a room to terminals on the roof, which operate by a combination of the natural stack effect, i.e. the movement of air due to difference in temperature between inside and outside, and the effect of the wind passing over the roof of the dwelling.*

## 7.3 Radon gas

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

*COMMENTARY ON **7.3***
*One option to overcome this difficulty would be to use uncontaminated air drawn from outside through ducts which can pass through the underfloor space, so that the ducted air is isolated from the underfloor space.*

*Identified areas requiring action for radon gas should be known locally, but in case of doubt, further advice can be obtained from the local authority building control office (also see BS 5440-1).*

### 7.4 Internal kitchens

Open-flued appliances in internal kitchens shall be provided with ventilation in accordance with **6.3**. Flueless appliances in internal kitchens shall be ventilated in accordance with Table 6.

*COMMENTARY ON **7.4***
*For further information on how to provide ventilation in these circumstances, for England and Wales see Approved Document F to the Building Regulations [16], for Scotland, the Building Regulations in Scotland [12] or Technical Standard – Part K,* Ventilation *[17], and Gas Safe Register Technical Bulletin 005,* Gas cookers in internal kitchens – Ventilation requirements *[18] or CORGI Technical Bulletin 184*, Gas cookers in internal kitchens *[19]*.

## 8 Servicing and maintenance

When carrying out a service or maintenance work on an appliance, the provisions for air supply shall be examined. Existing air vents shall be checked for internal and external obstructions. Gauze, fly screens and/or adjustable controls shall be removed to render the ventilation permanent and non-adjustable. The size of air vent apertures, the free area and the position of an air vent shall be inspected for conformity to Clause **5** and Clause **6**.

*NOTE Work is defined in the Gas Safety (Installation and Use) Regulations [4].*

*COMMENTARY ON CLAUSE **8***
*When checking an existing air vent, the grilles and/or louvres should be examined visually for signs of obstruction. Where practicable, a screwdriver or similar tool should be inserted into the openings to check for blockages such as clear plastic sheets or fly screens.*

*Mortar extrusions into air vents should be cleared. Where the internal parts of an air vent or ducting are inaccessible, the best practicable endeavours should be made to check for and clear any obstructions.*

*These checks are in addition to the formal inspections for correct operation of the appliance. Where any defects are identified with an existing installation or appliance in respect of any part of this standard, reference should be made to the current Gas Industry Unsafe Situations Procedure (GIUSP) [14].*

# Bibliography

## Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 669-2, *Flexible hoses, end fittings and sockets for gas burning appliances – Specification for corrugated metallic flexible hoses, covers, end fittings and sockets for catering appliances burning 1st, 2nd and 3rd family gases*

BS 3632*, Residential park homes – Specification*

BS 5440-1:2008*, Flueing and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases) – Part 1: Specification for installation of gas appliances to chimneys and for maintenance of chimneys*

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

BS 6173, *Specification for the installation and maintenance of gas-fired catering appliances for use in all types of catering establishments (2nd and 3rd family gases)*

BS 7624, *Installation and maintenance of domestic direct gas-fired tumble dryers of up to 6 kW heat input (2nd and 3rd family gases) – Specification*

BS EN 721*, Leisure accommodation vehicles – Safety ventilation requirements*

BS EN 50291, *Electrical apparatus for the detection of carbon monoxide in domestic premises – Test methods and performance requirements*

PD 5482-3*, Code of practice for domestic butane- and propane-gas-burning installations – Part 3: Installations in boats, yachts and other vessels*

## Other publications

[1] GREAT BRITAIN. The Gas Appliances (Safety) Regulations, SI 1995, No. 1629, London: The Stationery Office Limited.

[2] HEATING AND VENTILATING CONTRACTORS ASSOCIATION. DW/172, *Specification for Kitchen Ventilation Systems*, London: 2005.

[3] HEALTH AND SAFETY EXECUTIVE. Catering Information Sheet No. 23, *Gas Safety in Catering and Hospitality* (Revision 1), London: 2007. [1)]

[4] GREAT BRITAIN. The Gas Safety (Installation and Use) Regulations (GSIUR), SI 1998, No. 2451. London: The Stationery Office Limited.

[5] GREAT BRITAIN. The Gas Safety (Installation and Use) Regulations 1994, SI 1886, No. 2451, as amended and applied by the ISLE OF MAN Gas Safety (Application) Order 1996. London: The Stationery Office Limited.

[1)] Catering Information Sheets can be downloaded freely from the Health and Safety Executive website, http://www.hse.gov.uk

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

[7] GUERNSEY. The Health and Safety (Gas) (Guernsey) Ordinance 2006.

[8] HEALTH AND SAFETY COMMISSION. Approved Code of Practice (ACoP) (COP20): *Standards of training in safe gas installation*. London: 1987.

[9] GREAT BRITAIN. The Asbestos (Prohibitions) Regulations 2006. London: The Stationery Office Limited.

[10] DEPARTMENT FOR COMMUNITIES AND LOCAL GOVERNMENT. *The Building Regulations Fire Safety Approved Document B*, 2006 ed. (both volumes). London: NBS, 2007.

[11] GREAT BRITAIN. The Building Regulations 2000, as amended, SI 2000, No. 2531, London: The Stationery Office Limited.

[12] GREAT BRITAIN. The Building Standards (Scotland) Regulations 1990, as amended, SI 1990, No. 2179, London: The Stationery Office Limited.

[13] GREAT BRITAIN. The Building Regulations (Northern Ireland) 2000, as amended, SR 2000, No. 389, London: The Stationery Office Limited.

[14] GAS SAFE REGISTER. Technical Bulletin 001: *The Gas Industry Unsafe Situations Procedure (GIUSP) – Dealing with unsafe situations in customers' premises*, 6th edition. Basingstoke: Gas Safe Register 2009. [2)]

[15] HEALTH AND SAFETY EXECUTIVE. *Safety in the installation and use of gas systems and appliances – Gas Safety (Installation and Use) Regulations 1998 approved code of practice and guidance*. London 1998 (amended 2004).

[16] GREAT BRITAIN. The Building Regulations for England and Wales Approved Document F: *Ventilation*. London: The Stationery Office Limited, 1995.

[17] GREAT BRITAIN. Building Standards (Scotland) Regulations 1990: *Technical Standard – Part K, Ventilation*. London: The Stationery Office Limited, 1999. [3)]

[18] GAS SAFE REGISTER. Technical Bulletin 005: *Gas cookers in internal kitchens – Ventilation*. Basingstoke: Gas Safe Register, July 2008. [3)]

[19] CORGI. Technical Bulletin 184: *Gas cookers in internal kitchens*. Basingstoke: CORGI, October 2007. [4)]

[2)] Available on the Gas Safe Register website, http://www.gassaferegister.co.uk

[3)] This can be accessed via the Scottish government website, http://www.scotland.gov.uk

[4)] Available on the CORGI website, http://www.trustcorgi.com

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