



BSI Standards Publication

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

Part 1: Design, installation, commissioning and maintenance of
chimneys – Specification

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Contents

	Page
Foreword	IV
1 Scope	1
2 Normative references	2
3 Terms and definitions	3
4 Competence	8
5 General	9
5.1 Compatibility of appliances and chimneys	9
5.2 Chimney outlets	11
5.3 Chimneys for use with condensing appliances (open-flued and room-sealed)	12
5.4 Location of appliances	14
5.5 Passive stack ventilation	14
5.6 Exchange of information and planning	14
5.7 Maintenance	15
6 Room-sealed natural draught chimney configurations (balanced flue) for Type C ₁₁ appliances	15
6.1 General	15
6.2 Installation	15
6.3 Post-installation checks	16
6.4 Maintenance	17
7 Room-sealed: fanned draught chimney configurations for balanced flue (Type C ₁₂ , C ₁₃ , C ₃₂ and C ₃₃) and non-balanced flue (Type C ₅₂ , C ₅₃ , C ₆₂ and C ₆₃) appliances	17
7.1 Design options	17
7.2 Installation	18
7.3 Post-installation checks	21
7.4 Maintenance	21
8 Balanced compartment	21
8.1 General	21
<i>Figure 1 — Balanced compartment installations</i>	22
8.2 Design	22
8.3 Balanced compartment construction	23
8.4 Temperature effects	23
8.5 Terminals	23
8.6 Commissioning	23
8.7 Maintenance	24
9 Room-sealed Type C ₂ for SE-ducts and U-ducts	24
9.1 Selection and installation of a suitable chimney	24
<i>Table 1 — Normal SE-duct block sizes in existing buildings</i>	24
<i>Figure 2 — Shared room-sealed systems</i>	25
<i>Figure 3 — Base of communal flue system – naturally vented</i>	28
<i>Figure 4 — Base of positive pressure communal flue system</i>	28
9.2 Terminal design and location	29
9.3 Inspection	29
9.4 Selection and installation of compatible appliances	29
9.5 Maintenance	31
10 Individual open-flued natural draught Types B ₁₁ , B ₁₂ , B ₁₃ appliances	31
10.1 Design	31
<i>Figure 5 — Typical methods of using a flue liner in a masonry chimney installation serving a gas appliance, other than a back boiler</i>	33

<i>Figure 6 — Installation of a gas fire and combined back boiler using a back boiler enclosure and prefabricated chimney: enclosure arrangement using a false chimney breast and closure panel</i>	34
<i>Figure 7 — Installation of a gas fire and combined back boiler using a back boiler enclosure and prefabricated chimney: enclosure arrangement using a proprietary back boiler box</i>	35
<i>Table 2 — Condensate-free lengths of individual open flue used with a gas fire</i>	38
<i>Figure 8 — Maximum lengths for condensate-free chimneys for appliances other than gas fires</i>	39
<i>Table 3 — Minimum void dimensions required below appliance connections</i>	41
<i>Table 4 — Appliance/chimney combinations which require the chimney to be lined</i>	43
<i>Figure 9 — Open-flued boiler connections to existing brick chimney</i>	43
10.2 Installation	44
10.3 Commissioning of the chimney	47
10.4 Radon gas systems present	50
10.5 Maintenance	51
11 Individual open-flued fanned draught Types B ₁₄ , B ₂₂ , B ₂₃ appliances and fanned draught chimneys	51
11.1 Design	51
11.2 Installation	52
11.3 Commissioning	53
<i>Table 5 — Minimum flow rates for fanned flues</i>	53
11.4 Maintenance	53
12 Special categories of chimney	53
12.1 Chimneys for Type C ₇ ("Vertex") appliances	53
12.2 Other open-flued fanned draught chimneys	54
13 Maintenance/routine checks on the chimney/flue system	54
13.1 General	54
13.2 Room-sealed fan-assisted positive pressure gas appliances	55
13.3 Balanced compartment	56
13.4 Individual open-flued natural draught Types B ₁₁ , B ₁₂ , B ₁₃ , B ₁₄ , B ₂₂ , B ₂₃ appliances	56
Annex A (informative) Classifications	57
<i>Table A.1 — Classification of gas appliances used in the UK according to the method of evacuation of products of combustion (types)</i>	57
<i>Table A.2 — Default values</i>	60
Annex B (informative) Calculation method for flue sizing	61
<i>Table B.1 — Resistance factors for use in calculating equivalent heights (Use specific factors from flue or chimney manufacturer's instructions where possible)</i>	61
<i>Table B.2 — Inlet and outlet resistances</i>	62
<i>Table B.3 — Minimum equivalent heights needed</i>	62
<i>Figure B.1 — Worked example 1</i>	65
<i>Figure B.2 — Worked example 2</i>	66
Annex C (normative) Chimney outlet positions	66
<i>Figure C.1 — Open-flued, natural draught chimney outlet locations for pitched roofs</i>	68
<i>Figure C.2 — Open-flued, natural draught chimney outlet locations adjacent to structures</i>	69
<i>Figure C.3 — Open-flued or room-sealed, natural or fanned draught chimney outlet locations adjacent to openings into a building on pitched roofs</i>	69
<i>Figure C.4 — Open-flued, natural draught chimney outlet locations on flat roofs</i>	70
<i>Figure C.5 — Open-flued, natural draught chimney outlet</i>	71
<i>Figure C.6 — Room-sealed configuration outlet location on pitched roofs</i>	72
<i>Figure C.7 — Open-flued, fanned draught chimney and room-sealed configuration outlet locations adjacent to structures on pitched roofs</i>	72

	<i>Figure C.8 — Chimney outlet positions (see Table C.1 for key to open-flued chimney outlets and for room-sealed chimney configuration outlets)</i>	73
	<i>Table C.1 — Minimum dimensions of chimney outlet positions (refer to Figure C.8)</i>	74
	<i>Figure C.9 — Example of how a natural draught, room-sealed chimney configuration outlet position is measured</i>	77
	<i>Figure C.10 — Example of how a fanned draught room-sealed chimney configuration outlet and a fanned draught open-flued chimney outlet position is measured</i>	78
	<i>Figure C.11 — Proximity of flue duct outlet to a boundary</i>	79
Annex D	(informative) Guidance checklist for positioning of chimney/flue terminations	79
	<i>Table D.1 — Guidance checklist</i>	80
Annex E	(informative) Checking of case seals and the general integrity of room-sealed fan-assisted positive pressure gas appliances	80
	<i>Figure E.1 — Checklist for checking case seals and the general integrity of room-sealed fan-assisted positive pressure gas appliances</i>	81
Annex F	(normative) Design criteria for terminals for shared system chimneys	82
	<i>Figure F.1 — Permitted recirculation of combustion products</i>	82
Annex G	(informative) Guidance on the design and installation of flue block systems in the UK	83
	<i>Figure G.1 — Gas flue blocks</i>	84
	<i>Figure G.2 — Typical flue block systems (general arrangement)</i>	85
	<i>Figure G.3 — Bonded gas flue block system for timber frame construction</i>	86
	<i>Figure G.4 — Typical construction details for gas flue block systems in internal walls</i>	87
	<i>Figure G.5 — Typical construction details for gas flue block systems in external walls</i>	87
	Bibliography	92

Summary of pages

This document comprises a front cover, an inside front cover, pages I to VI, pages 1 to 94, an inside back cover and a back cover.

Foreword

Publishing information

This part of [BS 5440](#) is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 December 2023. 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 the committee manager.

Supersession

This part of [BS 5440](#) supersedes [BS 5440-1:2008](#), which is withdrawn.

Relationship with other publications

[BS 5440](#) is published in the following parts:

- *Part 1: Design, installation, commissioning and maintenance of chimneys – Specification;*
- *Part 2: Design, installation, commissioning and maintenance of chimneys – Specification.*

Information about this document

This is a full revision of the document, and introduces the following principal changes:

- redefined chimney concepts and adopted common terminology consistent with the range of products used across the whole European Community;
- aligned with European Standards, (the general requirements for which are given in [BS EN 1443](#)) where a chimney is treated as a structure containing a flue (the passageway) and might include a liner (inner wall), insulation and an outer wall. The common terminology in UK industry, which has regarded a chimney as a masonry structure generally associated with solid fuel appliances, has been superseded. Attention is drawn to the definitions for chimney ([3.9](#)), connecting flue pipe ([3.16](#)), flue ([3.27](#)) and flue liner ([3.30](#)), air supply duct ([3.1](#)) and room-sealed chimney configuration ([3.48](#));
- updated in line with recent changes in building legislation, in particular, Approved Document B [\[1\]](#), Approved Document F [\[2\]](#) and Approved Document J [\[3\]](#);
- updated appliance design, flue material and practical experience in the disposal of products of combustion by means of flues;
- updated flueing and ventilation installation practices to reduce occurrences of CO related incidents attributable to flueing and ventilation for gas appliances; and
- incorporated, where necessary, additional requirements and guidance previously covered within Technical Bulletins.

This publication can be withdrawn, revised, partially superseded or superseded. Information regarding the status of this publication can be found in the Standards Catalogue on the BSI website at [bsigroup.com/standards](#), or by contacting the Customer Services team.

Where websites and webpages have been cited, they are provided for ease of reference and are correct at the time of publication. The location of a webpage or website, or its contents, cannot be guaranteed.

Use of this document

It has been assumed in the preparation of this part of [BS 5440](#) 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 document 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.

Requirements in this document are drafted in accordance with the *Rules for the structure and drafting of UK standards:2022*, subclause **G.1.1**, which states, “Requirements should be expressed using wording such as: ‘When tested as described in Annex A, the product shall ...’”. This means that only those products that are capable of passing the specified test will be deemed to conform to this document.

Where words have alternative spellings, the preferred spelling of the *Shorter Oxford English Dictionary* is used (e.g. “organization” rather than “organisation”).

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Compliance with a British Standard cannot confer immunity from legal obligations.

In particular, attention is drawn to the following specific regulations:

The gas safety regulations for the appropriate legislative region:

- Gas Safety (Installation and Use) Regulations 1998 [\[4\]](#);
- Gas Safety (Installation and Use) Regulations (Northern Ireland) 2004 [\[5\]](#); and
- Gas Safety (Installation and Use) Regulations 1994, as amended and applied by the Isle of Man Gas Safety (Application) Order 1996 [\[6\]](#).

NOTE 1 These control all aspects of the ways gas-fired systems are installed, maintained and used, mainly in domestic and commercial premises (e.g. offices, shops, hospitals, educational and other public buildings), and the classes of persons who might undertake gas work.

The building regulations for the appropriate legislative region:

- Building Regulations for England and Wales 2000 [\[7\]](#);
- Building Regulations (Northern Ireland) 2000 [\[8\]](#);
- Building Regulations (Scotland) 2004 [\[9\]](#);
- Building Regulations (Isle of Man) Order 2003 [\[10\]](#); and

- Gas Appliance (Safety) Regulations 1995 [\[11\]](#).

NOTE 2 These control the supply of new gas appliances and specify the conditions required for CE/UKCA/UKNI marking.

1 Scope

This part of [BS 5440](#) specifies requirements for the installation of gas appliances to chimneys, chimney installation work likely to be undertaken by gas engineers and operatives working under UK gas industry conditions, and requirements for the maintenance of chimneys. It is applicable to open-flued chimneys for Type B gas appliances and room-sealed chimney configurations for Type C gas appliances, each of rated input not exceeding 70 kW net (see Note 2 and Note 3), burning 1st, 2nd or 3rd family gases. It applies to chimneys of the natural draught or fanned draught type and is applicable to room-sealed chimneys and open-flued chimneys supplied with the appliance as well as to those supplied separately.

NOTE 1 Type B and Type C appliances are explained in [Annex A, Table A.1](#).

This part of [BS 5440](#) complements the requirements for the design, installation and commissioning of chimneys as required in [BS EN 15287-1](#) and [BS EN 15287-2](#), and provides extra requirements that are specific to the UK gas industry.

This part of [BS 5440](#) specifies the following:

- a) requirements for the selection of the correct chimney configuration option for gas appliances in the UK;
- b) requirements for the installation of gas appliances to new chimneys, or chimney configurations;
- c) requirements for the installation of gas appliances to existing chimneys or chimney configurations;
- d) requirements for the installation of appliances which carry a CE, UKCA or UKNI mark and for which the manufacturer's instructions are available to the installer; and
- e) requirements for the installation of appliances which do not carry a CE, UKCA or UKNI mark and used/second-hand appliances for which the manufacturer's instructions are available to the installer.

This part of [BS 5440](#) is applicable to:

- 1) complete chimneys and all chimney components from the appliance connection to the discharge point into outside air;
- 2) the installation of gas appliances to existing chimneys that were intended originally for appliances burning other fuels;
- 3) chimneys for residential park homes; and
- 4) chimneys for hybrid systems incorporating gas appliances.

This part of [BS 5440](#) is not applicable to:

- i) gas-fired incinerators (see [BS 5871-3](#) for the installation of decorative fuel effect appliances);
- ii) leisure accommodation vehicles; or
- iii) appliances designed for use on 100% hydrogen.

This part of [BS 5440](#) includes compatibility of appliances installed in the UK with new chimneys designated under [BS EN 1443](#) and with existing chimneys, including non-designated chimneys.

NOTE 2 In the case of an individual appliance connected to a chimney, the 70 kW maximum rated input relates to that appliance. In the case of more than one appliance in the same room connected to a single chimney, the 70 kW maximum rated input relates to the sum of the rated inputs of all the appliances. In the case of appliances in separate dwellings connected to a shared flue in a chimney, e.g. an SE-duct or a U-duct, the 70 kW maximum rated input relates to the rated input of each individual appliance.

NOTE 3 Installation of gas-fired hot water boilers having rated inputs exceeding 70 kW is specified in [BS 6644](#) and the Institution of Gas Engineers and Managers Standard IGEM/UP/10.

NOTE 4 The data in this British Standard refers to heat input expressed in terms of net calorific values (CV) with conversion given for natural gas gross CV quoted in brackets where appropriate. The ratio of gross heat input to net heat input is approximately 1.1:1 for natural gas propane and butane. For example, conversion of 11 kW input based on gross CV for natural gas to the equivalent net CV input is as follows:

$$\text{net input} = 11/1.11 = 10 \text{ kW}.$$

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions, or limits the application, of this document¹⁾. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[BS 715](#), *Specification for metal flue boxes for gas-fired appliances not exceeding 20 kW*

[BS 5440-2:2023](#), *Chimneys, flue pipes and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases) – Part 2: Installation and maintenance of ventilation provision for gas appliances – Specification*

[BS 5546](#), *Specification for installation and maintenance of gas-fired water-heating appliances of rated input not exceeding 70 kW net*

[BS 5864](#), *Installation and maintenance of gas-fired ducted air heaters of rated input not exceeding 70 kW net (2nd and 3rd family gases) – Specification*

[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 (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, and fire/back boilers (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 6230](#), *Specification for installation of gas-fired forced convection air heaters for commercial and industrial space heating (2nd and 3rd family gases)*

[BS 6798](#), *Specification for selection, installation, inspection, commissioning, servicing and maintenance of gas-fired boilers of rated input not exceeding 70 kW net*

[BS 6896](#), *Specification for installation and maintenance of gas-fired overhead radiant heaters for industrial and commercial heating (2nd and 3rd family gases)*

[BS 7461](#), *Specification for electrically operated automatic gas shut-off valves fitted with throughput adjusters, proof of closure switches, closed position indicator switches or gas flow control*

[BS EN 161](#), *Automatic shut-off valves for gas burners and gas appliances*

[BS EN 1443](#), *Chimneys – General requirements*

[BS EN 1457](#) (all parts), *Chimneys – Clay/ceramic flue liners – Requirements and test methods*

¹⁾ Documents that are referred to solely in an informative manner are listed in the Bibliography.

[BS EN 1806](#), *Chimneys – Clay/ceramic flue blocks for single wall chimneys – Requirements and test methods*

[BS EN 1856-1](#), *Chimneys – Requirements for metal chimneys – Part 1: System chimney products*

[BS EN 1856-2](#), *Chimneys – Requirements for metal chimneys – Part 2: Metal flue liners and connecting flue pipes*

[BS EN 1857](#), *Chimneys – Components – Concrete flue liners*

[BS EN 1858](#), *Chimneys – Components – Concrete flue blocks*

[BS EN 14241-1](#), *Chimneys – Elastomeric seals and elastomeric sealants – Material requirements and test methods – Part 1: Seals in flue liners*

[BS EN 14471](#), *Chimneys – System chimneys with plastic flue liners – Requirements and test methods*

[BS EN 15287-1](#), *Chimneys – Design, installation and commissioning of chimneys – Part 1: Chimneys for non-roomsealed heating appliances*

[BS EN 15287-2](#), *Chimneys – Design, installation and commissioning – Part 2: Chimneys and connecting flue pipes for room sealed combustion appliances*

BS EN IEC 60079-10-1, *Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres*

IGEM/G/5, *Gas installations in multi-occupancy buildings*²⁾

IGEM/G/11, *Gas industry unsafe situations procedure*²⁾

IGEM/UP/7, *Gas installations in timber framed and light steel framed buildings*²⁾

IGEM/UP/17, *Shared chimney and flue systems for domestic gas appliances*²⁾

3 Terms and definitions

For the purposes of this part of [BS 5440](#), the following terms and definitions apply.

3.1 air supply duct

duct in a chimney configuration only for conveying combustion air to a room-sealed appliance

3.2 appliance compartment

enclosure, not being a habitable space, specifically designed or adapted to house one or more gas appliances only

3.3 balanced compartment

sealed enclosure, not being a habitable space, specifically designed or adapted to house one or more open-flued gas appliances only, but which takes its air supply from a place outside the enclosure which is adjacent to the flue discharge point

NOTE See [Clause 8](#) for more information on balanced compartments.

3.4 balanced flue appliance

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

NOTE This is referred to as Type C in [BS EN 1749](#).

²⁾ Available from the Institution of Gas Engineers and Managers, Charnwood Wing, Holywell Park, Ashby Road, Loughborough, Leicestershire, LE11 3GH. <http://www.igem.org.uk/>.

3.5 bathroom

room or space containing a functioning bath

3.6 boundary

curtilage of the land or buildings belonging to and under the control of the building owner

3.7 branched chimney

shared chimney serving open-flued appliances situated on two or more floors

3.8 builder's opening

enclosure constructed by builders to accommodate fireplace components

NOTE Plasterboard and aerated concrete blocks are not suitable materials for use within a builder's opening.

3.9 chimney

structure consisting of a wall or walls enclosing a flue or flues

NOTE This includes chimneys of all materials (e.g. metal, masonry, plastic). It may be either an open-flued chimney for use with an open-flued appliance or a room-sealed chimney configuration for use with a room-sealed appliance.

3.10 closed flue

flue that is closed to a room or internal space due to the absence of a draught diverter, flue break and any draught break within the chimney; combustion air is drawn directly from the room or space containing the appliance

NOTE This is now an obsolete term for an open flue without a draught diverter.

3.11 common flue system

shared open-flued system serving two or more appliances installed in the same room or space

3.12 communal flue system

fabricated chimney which removes combustion products and usually supplies air to gas-fired appliances fitted to the system

3.13 condensate drain

fixture in a chimney or appliance, resistant to corrosion from condensate formed from the products of combustion, where condensate can be drained

3.14 condensate-free length

length of individual chimney which can be calculated to maintain the temperature of the flue gases above the dew point and thereby ensure that condensate from the products of combustion does not form on the inner wall of the chimney under the normal operating cycle of the appliance

3.15 condensing appliance

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

3.16 connecting flue pipe

component used for connecting an appliance outlet and the chimney

3.17 custom-built chimney

chimney that is installed or built on-site using a combination of compatible chimney components that may be from one or different sources, and which is not a system chimney

3.18 decorative fuel effect gas appliance

appliance designed to burn gas for a decorative effect

3.19 draught break

opening into any part of a chimney, including that part integral to the appliance

3.20 draught diverter

device for preventing conditions in a secondary flue from interfering with the combustion performance of an appliance

3.21 effective height

height of straight vertical circular chimney, measured from the base of the fire to the outlet of the chimney, of the same cross-sectional size as the chimney under consideration, which produces the same flue flow rate as the chimney under consideration equal to the equivalent height plus 0.65 m

NOTE This definition applies only to gas fires and combined gas fire/back boiler units.

3.22 equivalent height

theoretical vertical design height of a circular chimney, measured from the appliance flue spigot to the chimney outlet and which contains bends etc., compared to the same chimney without bends

3.23 fan diluted chimney/flue system

fanned draught chimney connected to an open-flued appliance in which the products of combustion are diluted with air

3.24 fanned draught chimney

chimney in which the removal of the products of combustion is dependent on a fan

3.25 fireplace recess

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

3.26 flat roof

section of a roof which is horizontal or close enough to horizontal such that any airflow over it does not affect the operation of a chimney terminating above the roof, i.e. within 20° of the horizontal

NOTE This includes a bow string truss roof such as might be encountered in a residential park home.

3.27 flue

passage for conveying combustion products to the outside air

3.28 flue break

opening into a secondary flue in the same room as, and in addition to, the opening at the draught diverter

3.29 flue duct

duct containing the flue of a chimney

3.30 flue liner

component of a chimney, the surface of which is in contact with the products of combustion

NOTE This includes a rigid or flexible liner inserted into a chimney to form the flue and the inner wall of a metal or masonry chimney construction.

3.31 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

3.32 inner courtyard

external space that is enclosed by a building or other structure that restricts the dispersal of combustion products due to a lack of air movement

NOTE An example of an inner courtyard is an external communal space created by the walls or facades of four buildings, with each adjacent building joined to create an enclosed courtyard.

3.33 Installation instructions

3.33.1 appliance manufacturer's instructions

instructions prepared by the appliance manufacturer giving detailed information and requirements on how the appliance is to be installed

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

3.33.2 chimney manufacturer's instructions

instructions provided with the product by the manufacturer giving detailed information on how the chimney or chimney component is to be installed and checked

NOTE Such instructions should not be confused with other sales or marketing-related literature supplied by the manufacturer.

3.34 leisure accommodation vehicle

unit of living accommodation designed for temporary or seasonal occupation that might meet the requirement for the construction and use of road vehicles

3.35 light well

provision of a single window/light opening below ground to a basement (particularly Victorian or Edwardian) property or an open space contained within the volume of a larger building that has been designed to provide light and/or ventilation to interior spaces

NOTE See [5.2.2](#) for more guidance on light wells.

3.36 main flue

part of a shared open-flued system carrying products of combustion from two or more appliances

3.37 natural draught chimney

chimney in which the draught is provided by the thermal force arising from the heat of the products of combustion

3.38 notice plate

permanent plate or label fixed in a secure and accessible position in a building giving details of the chimney or flue installation

3.39 open-flued appliance

appliance designed to be connected to an open-flued chimney

NOTE 1 These appliances are referred to in [BS EN 15287-1](#) as “non-room-sealed” appliances.

NOTE 2 This is equivalent to a Type B appliance in [BS EN 1749](#).

3.40 open-flued chimney

chimney that evacuates the products of combustion to the outside air, the combustion air being drawn directly from the room or space containing the appliance

3.41 opening into a building

opening into a building, including windows, doors, air bricks and other ventilation openings

NOTE Weep vents are not considered openings into a building.

3.42 passive stack ventilation

form of natural ventilation created by pressure differences due to wind and/or temperature differences induced by an essentially vertical duct to remove odours and moisture-laden atmosphere at roof level

NOTE Used typically in “wet” rooms, e.g. kitchens, bathrooms/shower rooms.

3.43 plume management kit

chimney component designed to extend the appliance’s flue duct so that products of combustion, e.g. plume, do not cause a nuisance

NOTE Plume management kits should not be used to circumvent the appliance manufacturer’s requirement to correctly locate any flue/chimney termination or air inlet position.

3.44 pluming

visible cloud formed when products of combustion exit from a chimney and are cooled below the dew point by mixing with external air

3.45 product characteristic

prescribed requirement of a chimney system

NOTE See [Annex A, Table A.2](#) for information on the product characteristics of appliance categories.

3.46 residential park home

mobile home designed for permanent residential accommodation that does not meet the requirements for construction and use for a road vehicle

3.47 room-sealed appliance

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

NOTE This is equivalent to a Type C appliance in [BS EN 1749](#).

3.48 room-sealed chimney configuration

unit consisting of a flue duct and air supply duct which can be concentric or separate for a room-sealed appliance

NOTE In this context “concentric” refers to where a flue duct is located inside the air supply duct; the ducts do not necessarily share a common axis. This includes assemblies previously called “balanced flues”.

3.49 SE-duct

duct rising vertically through a building, open at its extremities, and serving to bring combustion air to, and to take products to the outside air from, Type C₂ room-sealed appliances

3.50 secondary flue

flue in a chimney for an open-flued appliance connecting a draught diverter or draught break to an outlet

3.51 shared chimney

chimney serving two or more appliances

3.52 shower room

room or space containing a functioning shower

3.53 system chimney

chimney that is installed using a combination of compatible chimney components, obtained or specified from one manufacturing source with product responsibility for the whole chimney

3.54 terminal

fitting installed at the outlet of a chimney

NOTE These are fitted to assist products of combustion to escape, minimize downdraught and prevent entry of material which might block the flue.

3.55 terminal guard

device fitted over a terminal and/or air inlet in order to protect persons from contact with, prevent interference with, and prevent damage to the terminal, and also to prevent flue blockage

3.56 U-duct

duct in the form of a vertical “U”, the ends being open and adjacent, one limb of which provides combustion air to the bottom of the “U”, whilst room-sealed appliances, (Type C₂), both air supply duct and flue duct, are fitted to the other limb

NOTE 1 A continental European arrangement fits the air supply duct of the appliance (Type C₂) to one limb and the flue duct to the other (see [Clause 9](#)).

NOTE 2 See [BS EN 1749](#) for reference to classification of gas appliances according to the method of supplying combustion air and of evacuation of the combustion products.

4 Competence

Persons carrying out any design, installation and maintenance work shall be competent to do so.

NOTE 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 Gas Safe Register. Therefore, it is essential that all businesses or self-employed gas installers are registered with Gas Safe Register.

Persons deemed competent to carry out gas work at premises covered by the Gas Safety (Installation and Use) Regulations [4], [5], [6] are those who hold a certificate of gas safety competence, which includes (without limitation) the Accredited Certification Scheme (ACS) and the Gas Services S/NVQ that has been aligned to ACS.

Guidance on competence is given in Health and Safety Executive's Approved Code of Practice and Guidance L56, Safety in the installation and use of gas systems and appliances [12].

Attention is drawn to the Health and Safety at Work etc. Act [13] regarding competency when designing or installing a chimney/flue.

5 General

NOTE Design of chimneys and flue pipes for non-room-sealed (open-flued) appliances is specified in BS EN 15287-1 and for room-sealed appliances in BS EN 15287-2. BS EN 15287-1 and BS EN 15287-2 specify that chimneys and flue pipes should conform to nationally accepted rules. General UK requirements for design of chimneys for both room-sealed and non-room-sealed gas appliances are specified in 5.1 to 5.7.

5.1 Compatibility of appliances and chimneys

COMMENTARY ON 5.1

The effectiveness of a chimney/flue in discharging products of combustion to the outside air is dependent on the flue size (cross-sectional area), length, route, exposure and the materials used in its construction. The effectiveness is also influenced by the thermal efficiency of the appliance and its usage pattern as well as being critically dependent on an adequate supply of combustion air.

For room-sealed appliances in which the chimney configuration is supplied with the appliance (referred to in BS EN 15287-2 as system chimneys), the manufacturer can be expected to have taken these factors into account in the integrated appliance and chimney configuration design.

For non-room-sealed -appliances, calculations need to be carried out to determine the size of chimney required to ensure full clearance of combustion products. A calculation method for open-flued chimneys is given in Annex B; alternatively, the method given in BS EN 13384-1 may be used.

Fanned systems can be used with smaller flues than those required for corresponding non-fanned systems. This can have advantages in certain circumstances. For example, it gives greater flexibility in the routing of the chimney and in the siting of the chimney outlet.

Attention is drawn to the Building Regulations [7], [8], [9], [10] and supporting documentation [2], [3] regarding appliances and chimneys to be so constructed and installed as to reduce to a reasonable level the risk of people suffering burns or the building catching fire or contributing to the spread of smoke and fire.

Attention is drawn to the building requirements in the relevant geographical location, i.e. England, Guernsey, the Isle of Man, Jersey, Northern Ireland, Scotland, Wales, with regards to materials used for chimneys and flue pipes when passing through and on external walls of high risk buildings.

For buildings of timber framed construction, adequate safeguards can be achieved, for example, by the introduction of suitable sleeves or ducts where the chimney or chimney configuration passes adjacent to combustible material, or by other simple shielding arrangements. For such buildings, precautions are also necessary to preserve the integrity of any vapour barrier or cavity insulation and to minimize any effects on the thermal and acoustic insulation properties of the structure. Detailed arrangements can be found in the Institution of Gas Engineers and Managers Standard IGE/UP/7.

- 5.1.1** The appliance shall be connected to a chimney of a classification which is the correct configuration for the appliance type.

The chimney required for a specific situation is also dependent on the proposed location of the appliance. In selecting the correct chimney, the following factors shall be taken into account.

- a) The constraints imposed on potential chimney outlet locations by the following:
 - 1) openings into the building;
 - 2) existing chimney/flue outlets;
 - 3) neighbouring properties;
 - 4) local authority constraints, such as conservation areas, listed buildings and historical buildings;
 - 5) boundaries, to include public walkways and public areas;
 - 6) distance to combustible materials, including the external face of the building;
 - 7) structural and/or topographical features which might prevent a free flow of air over the chimney outlet and/or lead to adverse pressure zones;
 - 8) the need to site low level terminals so as to avoid physical damage, e.g. from opening doors;
 - 9) the need to guard low level terminals to protect passers-by;
 - 10) the effects of any plumbing on surfaces of the building and neighbouring properties; and
 - 11) the effects of nuisance from plumbing on neighbouring properties.
- b) The availability of existing chimneys for re-use.
- c) The function of the room in which the appliance is to be installed, particularly in the case of bathrooms, shower rooms, bedrooms and bed-sitting rooms where special rules apply under the Gas Safety (Installation and Use) Regulations 1998 [4], [5], [6].
- d) The need for provision of an adequate air supply for combustion and, where necessary, cooling.
- e) The extent to which mechanical ventilation is present in the intended location and the effect that this might have on non-room-sealed appliances.
- f) In the case of fan-assisted chimneys, if additional safeguards are required to ensure that the appliance is shut down on failure of the fan (see Clause 7 for further information).
- g) The angle/fall of the chimney and whether the flue system is concealed.
- h) Adequate support for the chimney system.
- i) The correct sizing for the chimney system, i.e. volume and pressure.
- j) The insulation of the chimney system and cooling.

NOTE To ensure the safe and effective operation of an appliance and chimney it is essential that the appliance classification is compatible with the chimney designation. For room-sealed appliances it is common that the chimney configuration is certified and supplied by the appliance manufacturer. Certain appliances (e.g. Type C₂, Type C₄ and Type C₆ and Type B₂) may be connected to a chimney supplied separately.

Gas appliances are classified in BS EN 1749 according to the method of evacuation of the products of combustion as Type A (flueless) Type B (open-flued) and Type C (room-sealed). Type A appliances do not have a chimney and are outside the scope of this part of BS 5440.

Chimneys are given a designation string in accordance with BS EN 1443 on the basis of their performance characteristics and the materials from which they are made. Details of these classification and designation systems are given in Annex A.

- 5.1.2** The appliance shall be connected to a compatible open-flued chimney or room-sealed chimney configuration which is in accordance with:

- a) the appliance manufacturer's installation instructions (see [5.1.3](#)) or, if these do not specify the chimney to be used, the default values given in [Table A.2](#) can be used; and
- b) the additional requirements for flueing specified in the following standards, as applicable:
 - 1) [BS 5546](#) for water heaters;
 - 2) [BS 5871-1](#) and [BS 5871-2](#) for gas fires;
 - 3) [BS 5871-3](#) for decorative fuel effect gas fires;
 - 4) [BS 6798](#) for boilers;
 - 5) [BS 5864](#) for ducted warm air heaters;
 - 6) [BS 6230](#) for direct and indirect fired warm air heaters; and
 - 7) [BS 6896](#) for overhead radiant tubes and radiant plaques.

NOTE Detailed arrangements for flueing of gas appliances in timber framed and steel framed dwellings are given in the Institution of Gas Engineers and Managers Standard IGEM/UP/7.

- 5.1.3** New or used appliances shall not be connected unless the appliance manufacturer's installation instructions are available to the installer and copy left with the responsible person, e.g. the home owner.

NOTE Attention is drawn to Regulation 29 of the Gas Safety (Installation and Use) Regulations 1998 [\[4\]](#), [\[5\]](#), [\[6\]](#).

5.2 Chimney outlets

NOTE 1 Chimney terminals and the location of chimney outlets for non-room-sealed appliances are specified in [BS EN 15287-1](#) and chimney terminals and the location of chimney outlets for room-sealed appliances are specified in [BS EN 15287-2](#).

NOTE 2 UK requirements for location of chimney outlets for gas appliances are specified in [5.2.1](#) to [5.2.4](#). Attention is drawn to the building requirements in the relevant geographical location, i.e. England, Guernsey, the Isle of Man, Jersey, Northern Ireland, Scotland, Wales.

5.2.1 General

COMMENTARY ON 5.2.1

The main function of a chimney for both non-room-sealed and room-sealed appliances is to effectively discharge the products of combustion to the outside air under all weather conditions. This is achieved by the selection of the correct terminal and the correct outlet location, as well as configuration.

Openings in the terminal are sized to prevent the ingress of foreign matter which would impair the performance of the flue system. Under certain conditions, pluming can occur at the outlet and, where possible, chimney outlet positions where this could cause a nuisance should be avoided.

Chimney outlets shall be located as specified in [Annex C](#).

The chimney outlet shall not be obstructed. Any obstructions, such as adjacent aerials and satellite dishes, solar panels, wind turbines mounted on the chimney stacks or nearby and above the chimney outlet and trees shall be removed or the chimney outlet sited elsewhere.

5.2.2 Location of chimney outlets in relation to basement areas, light wells and retaining walls

Chimney outlets shall be sited so as not to discharge within the curtilage or confines of any enclosed area formed by a retaining wall or passage unless provision is made to ensure the safe dispersal of flue gases as follows.

- a) Chimney outlets from room-sealed appliances and fanned draught non-room-sealed appliances may be located in such areas provided that they are sited not more than 1 m below the top level of the enclosed space.
- b) Chimney outlets from room-sealed appliances and fanned draught non-room-sealed appliances may be sited in an area that creates an uncovered passageway at least 1.5 m wide. This shall only be done if the passageway allows free air circulation beyond and around the ends of the structure and the retaining wall or passageway, if the passageway terminates at or above ground level and if unobstructed air movement can take place at the open ends of the passage.

NOTE 1 Existing appliances with satisfactory combustion and which are operating safely may be left operational.

NOTE 2 Attention is drawn to the Clean Air Act [14].

5.2.3 Location of chimney outlets in relation to courtyards

For new developments or complete building refurbishments, where an appliance is being installed it shall be connected to a communal flue system that meets the requirements of [Clause 7](#).

Where an appliance is being installed in an existing building, it shall only terminate into an inner courtyard where the narrowest dimension across the inner courtyard is at least the height of the tallest structure forming the inner courtyard, i.e. where the wall meets the roof.

Where the height of an inner courtyard is greater than its narrowest dimension, the installation shall be treated as a new development or complete building refurbishment. Appliances may be installed on the upper most floor if the chimney termination complies with [5.2.2a](#)).

NOTE 1 Existing appliances with satisfactory combustion and which are operating safely may be left operational.

NOTE 2 Attention is drawn to the Clean Air Act [14].

5.2.4 Terminal guards

NOTE Attention is drawn to the Building Regulations [7], [8], [9], [10] and supporting documentation [2], [3].

Terminal guards shall be used where there is a risk of blockage of, and/or damage to, the terminal and/or where there is a risk of injury to people including exposure to excessive temperatures.

Terminal guard installation shall conform to the height requirements of [6.2.1](#) and [7.2.1](#).

5.3 Chimneys for use with condensing appliances (open-flued and room-sealed)

5.3.1 General

NOTE Condensing appliances are normally of the fanned room-sealed type, although other types are not necessarily excluded. The manufacturer might specify the flue route, siting and terminal.

When installing a condensing appliance, extra provisions (compared to a non-condensing appliance) shall be made to accommodate the condensate by selecting and constructing the chimney of materials in accordance with [5.3.2](#), incorporating arrangements for condensate disposal in accordance with [5.3.3](#) and siting the chimney outlet in accordance with [5.3.4](#). Plastic materials shall conform to the relevant requirements of [BS EN 14471](#).

5.3.2 Chimney materials

NOTE Materials such as copper, lead, mild steel and certain grades of stainless steel are not suitable for this particular application. Where doubt exists, advice should be sought from the appliance manufacturer.

Chimney systems with plastic flue liners in accordance with [BS EN 14471](#) shall be used where the appliance to be connected is CE, UKCA or UKNI marked and the manufacturer's installation instructions specifically permit and specify such flue system materials and constructions and detail the requirements for their use. In all other circumstances, advice shall be sought from the manufacturer. Sealing materials for chimney systems with plastic flue liners shall be in accordance with [BS EN 14241-1](#).

The materials selected for chimney components and any sealing devices shall be suitable for use with condensed combustion products, which are mildly acidic.

5.3.3 Condensate disposal

Measures shall be taken to avoid freezing of the condensate drain during cold weather.

NOTE Detailed advice on condensate drains for boilers is given in [BS 6798](#), advice for water heaters is given in [BS 5546](#), advice for ducted warm air heaters is given in [BS 5864](#) and advice for communal flues is given in the Institution of Gas Engineers and Managers Standard IGEM/UP/17. Further guidance can be found in HHIC guidance Installer guide: Condensate discharge pipe installation [\[15\]](#).

Where the appliance installation instructions specify that a condensate drain needs to be provided for the appliance, provision shall be made also for the collection and/or disposal of condensate formed in the flue.

5.3.4 Siting of the flue duct outlet

5.3.4.1 General

NOTE 1 Appliances (particularly condensing appliances) have a tendency to form a plume of water vapour from the flue duct outlet. The effect of wind conditions and the dispersal of the plume relative to adjacent wall surfaces, openable windows and neighbouring property should be taken into account.

The flue duct outlet shall be sited so that the wet combustion products are unlikely to cause damage or nuisance. Any plume management kit installation shall be installed in accordance with the manufacturer's instructions.

Outlets from flues ducts shall be situated externally to allow the dispersal of products of combustion. For a balanced flue appliance, the intake shall be positioned to allow free movement of air.

NOTE 2 A way of meeting this requirement is to locate flue outlets as shown in [Figure C.3](#) and [Figure C.8](#).

NOTE 3 The plume of wet flue products from condensing boilers, positioned in accordance with the safety distances set out in [Figure C.8](#), can sometimes be considered a nuisance for neighbouring properties. Whilst this nuisance is not considered to be within the scope of building regulations, such installations could be considered as a "Statutory Nuisance" as set out in the Environmental Protection Act [\[16\]](#). As such, installers might wish to adopt the guidance in Chapter 6 of the Guide to condensing boiler installation assessment procedure for dwellings [\[17\]](#). Where a claim of nuisance is upheld, it is likely the responsible person will be asked to ensure the nuisance does not continue.

Flue outlets shall be located away from parts of the building that might be damaged by frequent wetting or where products of combustion condense on a window.

5.3.4.2 Proximity to a boundary

The flue duct outlet shall be sited in accordance with [C.3](#).

NOTE As part of due diligence, the engineer should determine the boundary before commencing flue outlet positioning.

5.4 Location of appliances

5.4.1 General

NOTE Attention is drawn to Regulation 30 of the Gas Safety (Installation and Use) Regulations [4], [5], [6] with respect to installations in bedrooms, bathrooms or shower rooms and to instantaneous water heaters.

Location of appliances shall be in accordance with the appliance manufacturer's instructions.

5.4.2 Hazardous areas

Gas appliances shall not be installed in spaces classified as hazardous as defined in BS EN IEC 60079-10-1.

NOTE Attention is drawn to the Dangerous Substances and Explosive Atmospheres (DSEAR) Regulations 2002 [18] with regard to hazardous areas.

5.5 Passive stack ventilation

Where a building contains both passive stack ventilation systems and open-flued natural draught appliances, the respective outlets shall be sited so as to avoid the possibility of setting up a pressure gradient across the two systems that could lead to appliance flue reversal.

5.6 Exchange of information and planning

COMMENTARY ON 5.6

When erecting a new chimney or chimney configuration or modifying an existing one, the pertinent details include the type, size and route of the chimney, information regarding the positioning of the flue joints, and the type and size of gas appliance that is intended to be connected to it. This is particularly pertinent when different trades are involved in the erection of the chimney or chimney configuration and fitting the gas appliance.

When a gas appliance is to be fitted to an existing open-flued chimney or room-sealed chimney configuration, it is essential that the installer confirms that the chimney is suitable for the appliance.

Where appropriate, the end user (customer), should be consulted and involved in the decision making process. The customer should be advised of the reasons for the choice of appliance and the flueing option. Some factors that might be relevant, such as cost, aesthetic appearance, and positioning relative to furniture, fittings and the building structure, are beyond the scope of this standard. However, the choice of an open-flued or room-sealed appliance might be influenced by attitudes to safety issues.

All appliances converting energy into useful heat (i.e. electrical and fossil fuel-fired appliances) involve some element of risk. Incidents involving gas utilization generally involve inadequate installation, subsequent lack of servicing or maintenance or misuse by the user.

Burning any fossil fuel (oil, solid fuel and gas) creates products of combustion which could lead to the creation of harmful elements if the combustion process and subsequent provisions for flueing are inadequate.

Open-flued chimneys do not operate correctly under conditions of inadequate or blocked flues, or inadequate or blocked air supply and under such conditions might spill products of combustion. The performance of the flue can also be impacted by ambient temperature conditions, and, for example, cause chilling of the flue.

Attention is drawn to notice plates, which might be available to assist in matching the appliance to the chimney or chimney configuration. Attention is drawn to the Building Regulations [7], [8], [9], [10].

Attention is also drawn to the requirements to notify aspects of the flue installation to Building Control in relevant geographical areas.

The designer or installer of the chimney shall document the chimney compatibility details (see [5.1](#)) for any subsequent gas appliance installation.

NOTE Building regulations or standards might require this to be on a permanent chimney notice plate.

5.7 Maintenance

General maintenance and routine checks shall be done in accordance with [13.1](#).

6 Room-sealed natural draught chimney configurations (balanced flue) for Type C₁₁ appliances

6.1 General

COMMENTARY ON 6.1

Room-sealed natural draught chimney configurations were conceived in the 1960s and, other than for some gas fires and wall heaters, were superseded by fan-assisted room-sealed chimney configurations (see [Clause 7](#)).

The flue duct and air supply duct usually form an integral part of the appliance, which is typically referred to as a “balanced flue appliance”. For the UK market, the flue duct and air supply components are usually supplied by the appliance manufacturer as a pre-formed terminal.

Appliances designed for a room-sealed natural draught chimney configuration shall be installed in accordance with the appliance manufacturer’s instructions.

NOTE Detailed arrangements for gas appliances in timber framed and light steel framed dwellings on chimney outlets, weather sealing, temperature effects, etc., can be found in the Institution of Gas Engineers and Managers Standard IGEM/UP/7 and these should be read in conjunction with the manufacturer’s instructions. The manufacturer’s requirements should also be taken into account.

6.2 Installation

6.2.1 Terminal

The terminal shall be positioned so that combustion products can safely disperse at all times.

Terminals shall be installed in accordance with the appliance manufacturer’s instructions, when supplied. In the absence of any specific instructions from the appliance manufacturer for siting the terminal, the terminal position shall be sited in accordance with [C.2](#) (balanced flues: natural draught).

Terminals shall not be sited in covered passageways, e.g. a ginnel or alley, or between buildings.

Where people could come into contact with the terminal or if it could be subject to damage, a protective guard shall be fitted. The guard shall be fitted such that no part of the guard is less than 50 mm from any part of the terminal (not including any terminal wall plate). The guard shall not have any sharp edges. It shall without force, admit a 6 mm diameter ball but shall not admit a 16 mm diameter ball.

NOTE 1 The terminal should be positioned so that the combustion products do not cause a nuisance, e.g. not positioned onto a passageway or pathway, or over adjoining property.

NOTE 2 In the absence of any specific instruction from the manufacturer, a suitable guard should be provided whenever a terminal is fitted less than 2.0 m above ground, above a balcony or above a flat roof to which people have access. Such a guard has two purposes: to protect the terminal against damage or interference and to protect people from injury from sharp edges and hot surfaces.

See [Annex C](#) for more guidance on outlet positions.

6.2.2 Jointing and weather sealing

NOTE When installing appliances in properties of timber framed construction, the property's vapour barrier should not be damaged, which affects the insulation and moisture resistance of the structure. See the Institution of Gas Engineers and Managers Standard IGE/UP/7 for more information.

Where chimney configuration components are required to be joined, the jointing methods and materials specified by the appliance manufacturer shall be used.

Any gaps between the chimney and the structure shall be weather sealed.

The ingress of moisture shall be prevented from affecting the internal wall face, e.g. by using a drip ring to prevent rain bridging the cavity along the chimney assembly.

Lubricants shall not be used on weatherproof seals unless specified by the manufacturer.

6.2.3 Temperature effects

The chimney configuration shall be located or shielded to reduce the risk of ignition or damage to the building.

When installing a chimney configuration through a wall of combustible construction, or containing combustible materials, any installation requirements specified by the appliance manufacturer for that type of installation shall be followed.

In the absence of any such instructions, unless the manufacturer states that no additional precautions are required, the following method shall be adopted.

- a) Any section of the chimney configuration contained within the combustible part of the wall shall be contained in a sleeve, itself constructed of non-combustible material. The sleeve shall be sized so that there is a minimum air gap of 25 mm between it and the outermost skin of the assembly. At its entry and exit points in the combustible wall, any gaps between the sleeve and the surrounding material shall be made good.
- b) If the outside surface of the wall is of combustible material, a non-combustible plate shall be used to maintain the 25 mm gap. The joint between the plate and the wall surface shall be weatherproofed.
- c) Where the chimney components are not supplied by the appliance manufacturer, the system designation for the minimum distance to combustibles shall be checked. Where this measurement differs from the above clearances, the greater of the two measurements shall be used.

6.3 Post-installation checks

Before leaving the appliance connected to the gas supply, the installer shall examine the appliance and its chimney configuration to verify that it has been installed in accordance with the manufacturer's instructions, including but not limited to the following:

- a) the seal between the combustion circuit and the room is effective;

NOTE This includes checking that any sight glass, flame monitors, wires, gaskets or grommets are properly fitted and that the appliance backplate or combustion case has not been distorted and resulted in the seal becoming ineffective.

- b) the flue duct and air duct are either continuous through the wall or, if of the telescopic variety, that minimum engagement of flue and the method of securing and sealing required by the appliance manufacturer's instructions has been met;
- c) no debris is left contained within the flue duct or air duct assembly;
- d) the joint between the terminal and the wall is sealed and weatherproof; and

- e) the terminal is correctly located.

6.4 Maintenance

Maintenance and routine checks on room-sealed natural draught chimney configurations for Type C₁₁ appliances shall be done in accordance with [13.1](#).

7 Room-sealed: fanned draught chimney configurations for balanced flue (Type C₁₂, C₁₃, C₃₂ and C₃₃) and non-balanced flue (Type C₅₂, C₅₃, C₆₂ and C₆₃) appliances

7.1 Design options

7.1.1 General

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

Chimneys shall not adversely affect the structural integrity of the building.

Chimneys shall not pass through another dwelling or fire compartment.

Chimneys installed in multi-occupancy buildings shall be installed in accordance with the Institution of Gas Engineers and Managers Standard IGE M/G/5.

Except for Type C₆ appliances, all components of the flue duct and air supply system shall be supplied by the appliance manufacturer.

NOTE 1 A C₆ appliance is designed to be connected to an approved chimney/flue products which need not be supplied by the appliance manufacturer. For further guidance see [BS EN 1749](#).

NOTE 2 Custom-built chimneys are installed or built on site in accordance with a design document or local building regulations, using a combination of compatible chimney components that can be from one or more sources. Where components from different chimney manufacturers are used, the chimney becomes a custom-built chimney and the integrity of the whole chimney is the sole responsibility of the installer.

NOTE 3 For domestic boilers connected to non-domestic flue systems, such as fan dilution systems, guidance can be found in [BS 6644](#) or the Institution of Gas Engineers and Managers Standard IGE M/UP/10.

NOTE 4 Detailed arrangements for gas appliances in timber framed and light steel framed dwellings on chimney outlets, weather sealing, temperature effects, etc., can be found in the Institution of Gas Engineers and Managers Standard IGE M/UP/7.

NOTE 5 Attention is drawn to the building requirements in the relevant geographical location, i.e. England, Guernsey, the Isle of Man, Jersey, Northern Ireland, Scotland, Wales, with regards to combustible materials passing through the structure of the building for buildings above a certain height.

7.1.2 Room-sealed: balanced flue appliances (Type C₁₂, C₁₃, C₃₂, C₃₃)

COMMENTARY ON 7.1.2

In the UK, terminals are generally supplied with balanced flue Type C₁₂, C₁₃, C₃₂ or C₃₃ appliances. If a terminal is not supplied with the appliance, i.e. a Type C₆ appliance, the requirements in [7.1.4](#) apply.

A fanned draught, balanced flue appliance might incorporate a terminal to the chimney configuration in its design and this is intended to be located on, or adjacent to, an outside wall of a building. The chimney outlet for products of combustion is adjacent to the air inlet, an arrangement that minimizes wind effects on the appliance performance.

The air inlet and flue duct shall be in the form of a proprietary configuration (concentric or separate) and supplied with the appliance or meeting the criteria specified by the appliance manufacturer.

7.1.3 Room-sealed: non-balanced flue appliances (Type C₅₂ and C₅₃)

COMMENTARY ON 7.1.3

The air inlet and flue terminal can be located on the same or different faces of a building, i.e. in different pressure zones. A fanned draught, room-sealed appliance is normally supplied with separate air ducts and flue ducts which are assembled on site. The appliance manufacturer's instructions provide details of the maximum length of ducts and number of bends, etc., which can be used in the installation.

The air inlet and flue duct shall be in the form of proprietary ducts supplied with the appliance or meeting the criteria specified by the appliance manufacturer.

The air inlet and flue duct shall be assembled and supported in accordance with the appliance manufacturer's instructions.

The air inlet shall be sited to enable free flow of air into the appliance and be separated from any other appliance terminal in accordance with the siting requirements for air supply specified in BS 5440-2:2023, Table 1.

7.1.4 Room-sealed: terminals supplied separately from appliance (Type C₆₂ and C₆₃)

NOTE This option is not generally available in the UK.

For room-sealed appliances with terminals supplied separately from the appliance the installer shall establish the compatibility and correct installation and sealing of the room-sealed chimney configuration terminal. The appliance manufacturer's advice shall be followed.

7.2 Installation

7.2.1 Terminals

COMMENTARY ON 7.2.1

The terminal should be positioned so that the combustion products do not cause a nuisance, e.g. the terminal should not be positioned on a passageway, pathway or over adjoining property.

When locating a fanned flued room-sealed appliance, the position of the terminal should be such as to minimize the risk of re-entry of combustion products through openable windows, vents, extract vents, intake vents, etc., of opposite or adjacent properties. A plume of products of combustion might be readily observed, especially in cold weather or if a condensing appliance is involved.

The terminal shall be positioned so that combustion products can safely disperse at all times in accordance with the room-sealed dimensions in [Annex C \(Table C.1 and Figure C.8\)](#).

Room-sealed chimney configuration terminals shall be installed in accordance with the appliance manufacturer's instructions, when supplied. In the absence of any specific instructions from the appliance manufacturer for siting terminals, the flue terminal position shall be in accordance with [Annex C](#).

Terminals shall not be sited in covered passageways between buildings.

A fanned flue terminal shall be positioned as follows:

- a) at least 2.0 m from an opening in a building directly opposite; and
- b) so that the products of combustion are not directed to discharge across a boundary and at least 600 mm facing or 300 mm alongside any boundary to a neighbouring property.

NOTE 1 Some appliances are designed to disperse condensate in a spray form within the combustion products discharge. With these types of appliance, the terminal should be sited such that condensate does not impinge directly onto any structure or object.

NOTE 2 Installations under car ports or similar constructions should be avoided wherever possible. The guidance in [BS 6798](#) or the relevant appliance manufacturer's instructions should be followed.

Where clear guidance from the manufacturer is not available regarding a horizontal terminal to be sited in a car port or similar construction, then the following requirements apply:

- 1) the car port or other add-on extension shall have at least two open and unobstructed sides; and
- 2) the dimension F given in [Figure C.8](#) shall be taken as the vertical distance between the lowest point of the roof immediately above the terminal and the top of the terminal.

NOTE 3 If the roof is of plastics material and needs to be altered, e.g. for the installation of a plume management kit, the installation should be treated with great care.

Plume management kits (see [3.43](#)) shall only be used to mitigate nuisance from the plume where specified by the appliance manufacturer. They shall be installed such that the resulting chimney outlet is in accordance with the room-sealed dimensions in [Table C.1](#) and [Figure C.8](#).

If the plume management kit separates the flue duct and air inlet duct, the position of the flue duct outlet shall remain in the same pressure zone as the air inlet (e.g. on the same face of a building) unless allowed by the manufacturer's instructions, and positioned to avoid the possibility of recirculation of products of combustion. Plume management kits are solely designed to resolve plumbing issues and shall not be used to overcome flue termination requirements. The air intake shall be sited to comply with manufacturers' requirements.

A plume management kit forms part of the flue; as such, the maximum flue length shall not be exceeded.

Where any terminal or air inlet is accessible from ground level or if it could be subject to damage, it shall be fitted with a protective guard. In the absence of any specific instruction from the manufacturer, a suitable guard shall be provided whenever a terminal or air inlet is fitted less than 2.0 m above ground, above a balcony or above a flat roof to which people have access. The dimensions of the guard shall be such that, when fitted in accordance with the appliance manufacturer's instructions, no part of the guard is less than 50 mm from any part of the terminal or air inlet (not including any wall plate). The guard shall not have any sharp edges. It shall, without force, admit a 6 mm diameter ball but shall not admit a 16 mm diameter ball.

NOTE 4 For condensing appliances, the type of material or coating used to prevent damage from corrosion should also be taken into account.

NOTE 5 See [Annex D](#) for a checklist on the correct location of flue terminals.

7.2.2 Jointing and weatherproofing

COMMENTARY ON 7.2.2

When installing room-sealed chimney configurations in properties of timber framed construction, (see the Institution of Gas Engineers and Managers Standard IGEN/UP/7), the effect of the installation on the insulation and moisture resistance of the structure should be minimized where possible.

Where flue duct components are required to be joined, the jointing methods and materials specified by the appliance manufacturer shall be used.

NOTE Materials such as decorator's caulk or expanding foam should not be used.

The annular space around the outer ducts and their respective surrounding structures shall be sealed such that the flue is sufficiently weatherproofed and secured.

Any ingress of moisture shall be prevented from affecting the internal wall face.

7.2.3 Temperature effects

The flue duct or combined chimney configuration shall be so placed or shielded as to prevent ignition or damage to any part of any building.

When installing a flue duct or combined chimney configuration through a wall of combustible construction, or containing combustible materials, any additional installation requirements specified by the appliance manufacturer for that type of installation shall be followed.

In the absence of any such instructions, unless the manufacturer states that no additional precautions are required, the following methods shall be adopted.

- a) That section of the flue duct or combined chimney configuration contained within the combustible part of the wall shall be contained in a sleeve, itself constructed of non-combustible material. The sleeve shall be sized so that there is a minimum air gap of 10 mm between it and the outermost skin of the flue assembly. At its entry and exit points in the combustible wall, any gaps between the sleeve and the surrounding material shall be made good.
- b) If the outside surface of the wall is of combustible material, a non-combustible plate shall be used to maintain the 10 mm gap. The joint between the plate and the wall surface shall be weatherproofed.

NOTE The chimney designation stipulates tested distance to combustible material.

7.2.4 Enclosed flues

Where a room-sealed fanned flue is enclosed, e.g. boxed in or sited in a void, at least one means of access shall be provided to allow the construction of the flue to be inspected.

No flue joint within the void shall be more than 1.5 m distance from the edge of the nearest inspection hatch to facilitate adequate inspection.

Where possible, inspection hatches shall be located at changes of flue direction. Where this is not possible, then bends should be viewable from both directions.

Some products, e.g. longer chimney sections, are constructed using a manufactured seam. Manufactured seams shall not be treated as flue joints for the purposes of inspection.

NOTE 1 To facilitate inspection, hatches should be a minimum of 300 mm × 300 mm. Attention is drawn to the requirements of Approved Document J [3] and equivalent documents in other geographic locations.

NOTE 2 Chimneys/flues may pass through communal areas where relevant systems are used and inspection access provided.

NOTE 3 Attention is drawn to the relevant fire, thermal and acoustic requirements of the Building Regulations in the relevant geographical location.

NOTE 4 The requirements in 7.2.4 are not applicable to chimney/flue systems incorporating:

- a) the air inlet pipe of a twin pipe flue/chimney system;
- b) a short continuous chimney/flue pipe, without joints, that does not exceed the maximum single chimney/flue supplied by the manufacturer, which passes:
 - 1) directly from the appliance to outside air, or
 - 2) through a roof, with no inspection access to allow inspection and there are no changes in direction, no signs of distress; or
- c) a vertical condensing flexible room-sealed fanned draught chimney/flue system installed in enclosures, such as constructional chimneys, which are constructed/sealed so that combustion products cannot pass into the room or internal space.

7.3 Post-installation checks

Before leaving the appliance connected to the gas supply, the installer shall examine the appliance and its chimney configuration to verify that it has been installed in accordance with the manufacturer's instructions, including but not limited to the following:

- a) the seal between the combustion chamber and the room is effective;

NOTE 1 This includes checking that any sight glasses, flame monitors, wires, gaskets or grommets are properly fitted and that the appliance backplate or combustion case has not been distorted and resulted in the seal becoming ineffective.

- b) the integrity test has been performed;

NOTE 2 Annex E provides a checklist for integrity testing.

- c) the flue gas analysis check has been performed and is in accordance with the manufacturer's instructions;
- d) the flue duct or combined chimney configuration does not place undue stress on the appliance spigot or outlet connection;
- e) the flue duct or combined chimney configuration is either continuous throughout the wall or, if telescopic, the method of sealing specified by the appliance manufacturer's instructions has been complied with;
- f) no debris is contained within the room-sealed chimney configuration;
- g) the joint between the terminal and the wall is weatherproof; and
- h) the terminal is correctly located.

7.4 Maintenance

Maintenance and routine checks of room-sealed fanned draught chimney configurations for balanced flue (Type C₁₂, C₁₃, C₃₂ and C₃₃) and non-balanced flue (Type C₅₂, C₅₃, C₆₂ and C₆₃) appliances shall be done in accordance with [13.1](#) and [13.2](#).

8 Balanced compartment

8.1 General

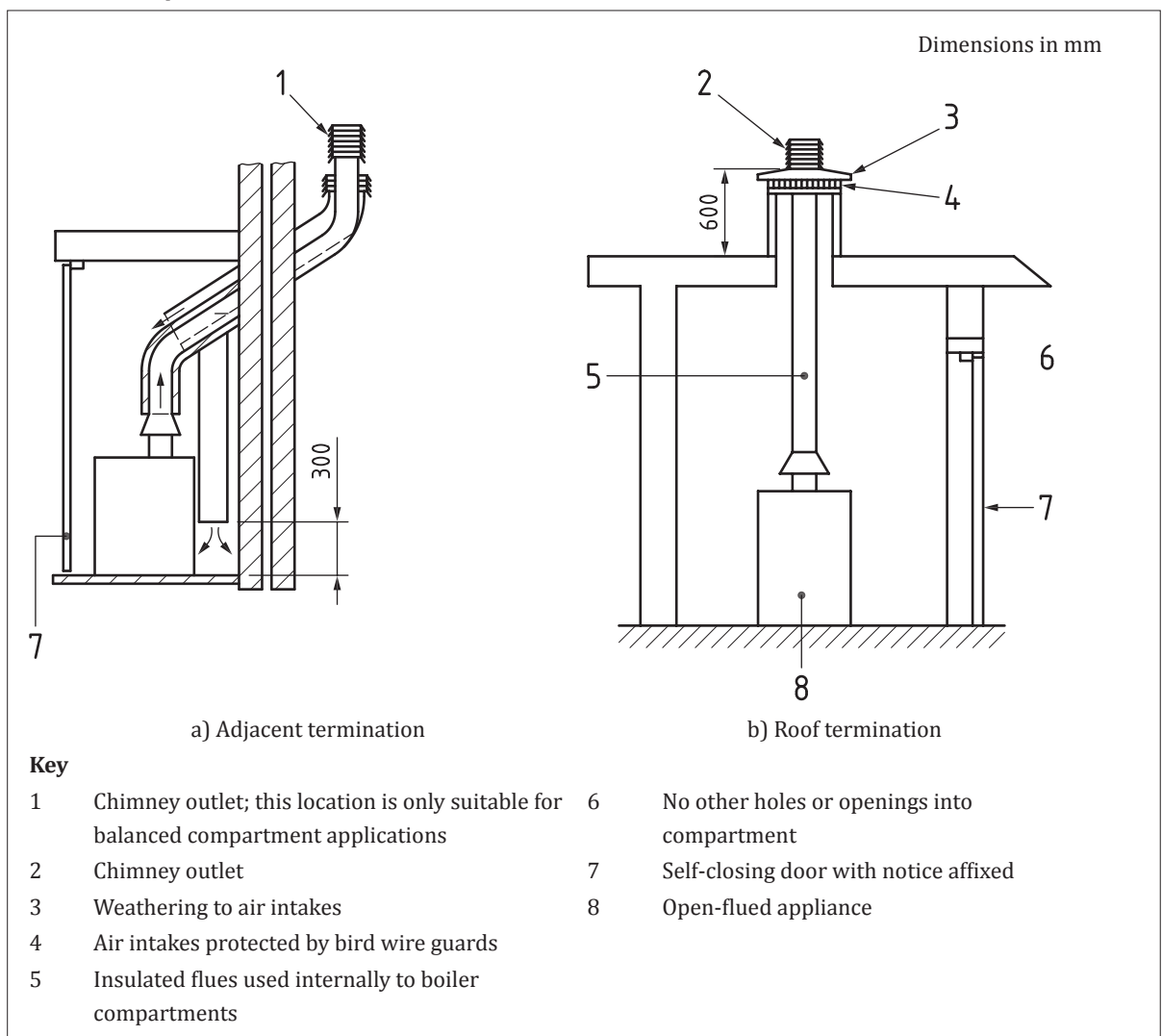
COMMENTARY ON 8.1

The balanced compartment is a method of installing an open-flued appliance in a room-sealed situation and arranging the chimney and ventilation so that a balanced flue effect is achieved (see [Figure 1](#)).

The method is particularly suitable for higher rated appliances. The method can also provide an alternative to long external flue runs or for use when the boiler house is adjacent to a taller building.

Where an appliance is to be installed in a balanced compartment, it shall conform to [8.2](#) to [8.7](#) in addition to [10.1.2](#), [10.1.3](#) and [10.2](#).

The flue shall be sized in accordance with [10.1.4](#).

Figure 1 — *Balanced compartment installations*

8.2 Design

- 8.2.1** The chimney and ventilation arrangements for balanced compartments shall be such as to ensure full clearance of combustion products.

Chimney and ventilation arrangements can be designed for individual applications, or proprietary systems can be used. The configurations shall be installed in accordance with the chimney manufacturer's instructions and the appliance manufacturer's recommendations.

- 8.2.2** The combustion air shall be ducted down from a point adjacent to the chimney terminal.

The position of the air supply duct inlet shall be not more than 150 mm below the base of the chimney outlet.

Where the air is ducted to a low level, i.e. 300 mm or less from the floor within the balanced compartment [see [Figure 1a](#)], the cross-sectional area of the air supply duct shall be not less than 7.5 cm² per kW (net) of the appliance maximum rated input.

NOTE 1 This is calculated from 1.5 times the allowance for the maximum air vent area for a high level, direct to outside air opening specified for open-flued appliances in [BS 5440-2](#).

Where the air is ducted to a high level only within the balanced compartment [see [Figure 1b](#)], the cross-sectional area of the air supply duct shall be not less than 12.5 cm² per kW (net) of the appliance maximum rated input.

NOTE 2 This is calculated from 2.5 times the allowance for the maximum air vent area for a high level, direct to outside air opening specified for open-flued appliances in [BS 5440-2](#).

NOTE 3 Where the ceiling of the balanced compartment is more than 300 mm higher than the base of the skirt of the appliance draught diverter, a high level opening should be provided in the air supply duct.

This opening should be of the same cross-sectional area as that of the duct. The opening in the duct might be provided by a T or Y piece inserted at high level.

8.3 Balanced compartment construction

NOTE A room-sealed effect is essential to the safe operation of a balanced compartment. When the appliance is in operation the balanced compartment needs to be effectively isolated from its surroundings, except for the flue and ventilation arrangements.

A balanced compartment shall have a self-closing flush door which fits tightly in its frame and incorporates a draught sealing strip. The door shall not open into a room containing a bath or shower, or if the appliance has a rated input greater than 12.7 kW, into a room intended for sleeping accommodation.

A notice shall be attached to the door or access cover stating that the door shall be kept closed and the space is not to be used for storage.

There shall be no other ventilation openings into the balanced compartment (see [Figure 1](#)).

The door shall be fitted with a switch to act as an electrical isolator which shuts the appliance down when the door is opened.

8.4 Temperature effects

The length of chimney and any exposed hot water carrying pipework or air supply ducts within the balanced compartment shall be insulated to minimize heat transfer to the balanced compartment.

NOTE Double-wall flue pipe conforming to [BS EN 1856-1](#) would meet the insulation requirements for flue pipes. Hot water carrying pipework insulation material should be not less than 19 mm thick with a thermal conductivity (k) of not greater than 0.035 W/mK or of the appropriate thickness and value of k to give no greater loss.

8.5 Terminals

The chimney outlet shall be positioned in accordance with [10.1.5](#); where this is not possible, information and requirements shall be agreed and documented.

NOTE The chimney outlet of a balanced compartment installation is not as critical as an individual open-flued installation. However, if positions other than those specified in [10.1.5](#) are advantageous, appropriate advice should be available from the compartment designer or (in the case of a proprietary chimney) the chimney manufacturer.

8.6 Commissioning

The chimney and its associated appliance shall be commissioned in accordance with [10.3](#) or [6.3](#) as appropriate to the appliance type.

Following commissioning, the door interlock switch shall be checked for correct operation.

NOTE In most applications, the balanced compartment is sufficiently large to permit the commissioning engineer to remain in the balanced compartment to undertake the test method specified in [10.3](#).

Where this is not the case, the test may be carried out with the balanced compartment door open. The switch specified in [8.6](#) has to be bypassed temporarily in order to undertake this work.

8.7 Maintenance

Maintenance and routine checks of balanced compartments shall be done in accordance with [13.1](#) and [13.3](#).

Following maintenance work, the door interlock switch shall be checked for correct operation.

9 Room-sealed Type C₂ for SE-ducts and U-ducts

9.1 Selection and installation of a suitable chimney

9.1.1 General

COMMENTARY ON 9.1.1

SE-ducts and U-ducts are no longer constructed. Like modern communal flue systems (CFS) they allow appliances on different storeys of a building to conduct the products of combustion to a single, common chimney outlet at high level. Information on SE-duct sizing is given in [Table 1](#).

Table 1 — Normal SE-duct block sizes in existing buildings

Size	Internal dimensions	External dimensions	Height
mm	mm	mm	mm
No. 1	205 × 305	255 × 355	28
No. 2	230 × 395	280 × 445	35
No. 3	330 × 480	390 × 540	55
No. 4	380 × 560	455 × 635	75

Further guidance for shared chimneys and flue systems is given in the Institution of Gas Engineers and Managers Standard IGEM/UP/17.

[BS 5440-1:2008](#) contains guidance on the design of SE-ducts and U-ducts.

Only C₂ appliances shall be connected to an SE-duct or U-duct.

9.1.2 SE-ducts

COMMENTARY ON 9.1.2

The horizontal ductwork for the air entry to the base of the vertical sections may be below ground floor level. Buildings supported on columns or having a well-ventilated sub-floor space normally satisfy the neutral pressure zone requirement.

SE-ducts shall be constructed of non-combustible material. The duct shall open to the atmosphere at its extremities, and discharge above roof level with combustion air drawn from the base of the duct via either:

- a) a horizontal duct that runs from one side of the building to another; or
- b) a single inlet in a zone of neutral pressure, e.g. an underground space (see [Figure 2](#)).

Suitable measures shall be taken to minimize flooding or blockage of the combustion air duct, e.g. from leaves or snow.