

Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases) —

Part 1: Specification for installation and maintenance of flues

ICS 91.060.40

Committees responsible for this British Standard

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- British Flue and Chimney Manufacturer’s Association
- Centrica
- Combustion Engineers’ Association
- Consumer Policy Committee of BSI
- Council for Registered Gas Installers
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- Gas Consumers Council
- Health and Safety Executive
- Institute of Domestic Heating and Environmental Engineers
- Institution of Gas Engineers
- Liquified Petroleum Gas Industry Technical Association
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Foreword

This British Standard has been prepared under the direction of the Engineering Sector Board. It is a revision of the Specification BS 5440-1:1990 which is superseded and withdrawn.

This revision has been undertaken for the following reasons:

- a) to cover recent developments in appliance design, flue material and practical experience in the disposal of products of combustion by means of flues;
- b) to recognize and refer to recent changes in gas safety and building legislation;
- c) to cover recent developments in European Standards and anticipate future applications;
- d) to improve advice on flue and ventilation installation practices and reduce occurrences of CO induced incidents attributable to flues and ventilation for gas appliances.

NOTE This standard is written as a practice specification (see clause 6 of PD 6501-1:1982) supported by recommendations. To comply with this specification, the user has to comply with all of its requirements. The user may depart from recommendations, but this would be at the user's own responsibility and the user would be expected to have good reasons for doing so.

It is essential that the appropriate specifications/codes of practice are consulted on all aspects of appliance and flue installation.

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

In particular, attention is drawn to the following regulations. The regulations may be amended from time to time and whichever regulations are currently in force at the time an installation is carried out should be complied with. The advice in this British Standard reflects the present state of the regulations in 2000.

- a) **The Gas Safety (Installation and Use) Regulations** [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 may undertake gas work.
- b) **The building regulations** [2] for the appropriate legislative region. These control work carried out in the construction of new or extension of existing buildings. Detailed advice for combustion appliances in England and Wales is given in approved documents [3], and for Northern Ireland in technical documents [4]. The Building Standards (Scotland) [5] are accompanied by methods that are deemed to conform to standards.
- c) **The Gas Appliance (Safety) Regulations** [6] control the supply of new gas appliances and specifies the conditions required for CE marking.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**. Tags indicating changes to text carry the number of the amendment. For example, text altered by amendment no. 1 is indicated by **A1** **A1**.

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 does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 87 and a back cover.

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1 Scope

1.1 Equipment

This Part of BS 5440 specifies the selection, design, installation and maintenance requirements for flue systems which form part of a new or replacement appliance installation for domestic or commercial purposes. It also specifies requirements for connecting gas appliances to existing flues. It specifies natural and fanned draught flues for appliances which carry the CE mark, utilize 1st, 2nd or 3rd family gases and have rated heat inputs based on net (lower) Calorific Value (CV) not exceeding 70 kW. It may also be used for installations of appliances which do not carry the CE mark, e.g. used appliances, where appropriate, providing the appliance manufacturer's instructions are available. In such circumstances, the installer should ensure that the appliance is safe in construction and condition, and can be used without constituting a danger.

The rating of 70 kW applies to an individual appliance connected to a flue system and, in the case of more than one appliance in the same room connected to a flue system, to the sum of the ratings. For shared flues, e.g. Se-ducts or U-ducts, the rating applies to the individual appliance rating per dwelling.

This standard deals with the complete flue equipment from the appliance connection, to the discharge point into outside air. It also covers flues that were intended originally for appliances burning other fuels but which are subsequently used for gas appliances.

This standard does not specify flue systems for decorative fuel effect fires which are specified in BS 5871-3.

This standard specifies residential park homes but not leisure accommodation vehicles. The latter are covered by BS EN 1949 or IGE document UP/8 [7].

NOTE 1 The range of appliances has been amended from 60 kW based on gross CV in the previous version of this standard to 70 kW based on net CV in order to achieve compatibility with the gas appliance product standards. For information on flues for appliances having rated inputs exceeding 70 kW, reference should be made to BS 6644. Although the present scope of BS 6644 includes the range 60 kW gross to 70 kW net, this part of BS 5440 should be used for flues in that range since it comprises the most up-to-date specification.

NOTE 2 This standard does not cover gas-fired incinerators. Such appliances require special considerations because of the high flue gas temperatures they generate. For specific information on incinerators see BS 3813-1.

NOTE 3 The installer should check the data given with an appliance to establish the basis on which the heat input is given. The data in this 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:net heat input is approximately 1.11:1 for natural gas, 1.09:1 for propane and 1.08:1 for butane. For example, convert 9 kW input based on gross CV for natural gas to the equivalent net CV input as follows:

$$\text{Net input} = 9.0/1.11 = 8.1 \text{ kW}$$

1.2 Competency

It is essential that persons carrying out the installation of any gas appliance and its flue be competent to do so, and, in the case of any work that is subject to the current Gas Safety (Installation and Use) Regulations [1], it is essential to comply with these regulations.

It is essential that persons who design the flue system should have the knowledge and understanding of the standards and regulations that apply to ensure that the completed plans will produce a safe and satisfactory installation.

COMMENTARY AND RECOMMENDATIONS ON 1.2.

At the time of publication, the body with HSE approval to operate and maintain a register of businesses who are "members of a class of persons" is the Council for Registered Gas Installers (CORGI). Thus it is essential that all business or self employed gas fitters should be registered with CORGI.

Guidance on the individual competency required for gas work is given in the Health and Safety Commission's Approved Code Of Practice (ACOP) — Standards of training in safe gas installation [8].

Persons deemed competent to carry out gas work are those who hold a current certificate of competence in the type of activity to be conducted issued under the ACOP arrangements, or by a certification body accredited by the United Kingdom Accreditation Service (UKAS).

Whilst it is essential to be competent to satisfy the Health and Safety at Work etc. Act [9] when installing a chimney or flue system, there is no requirement to be CORGI registered for such work providing it does not involve any associated work on a gas appliance/fitting.

2 Normative references

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

BS 65, *Specification for vitrified clay pipes, fittings and ducts, also flexible mechanical joints for use solely with surface water pipes and fittings.*

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

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

BS 1289-2, *Flue blocks and masonry terminals for gas appliances — Part 2: Specification for clay flue blocks and terminals.*

BS EN 1457, *Chimneys — Clay/ceramic flue liners — Requirements and test methods.*

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

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

BS 5440-2:2000, *Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases) — Part 2: Specification for installation and maintenance of ventilation for gas appliances.*

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

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

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

BS 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 60079-10, *Electrical apparatus for explosive gas atmospheres — Part 10: Classification of hazardous areas.*

3 Definitions

For the purposes of this standard the following definitions apply.

3.1

appliance compartment

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

3.2

balanced compartment

a 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 (See clause 10)

3.3

balanced-flue appliance

a 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 PD 6579 (CR 1749).

A₂

3.4**bathroom**

room or space containing a functional bath **A₂**

3.5**branched flue system**

a shared open flue system serving appliances situated on two or more floors

3.6**builder's opening**

an enclosure constructed by the builders to accommodate fireplace components

3.7**chimney**

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

3.8**chimney liner**

a rigid or flexible pipe inserted in a chimney to form a flue, (also see flue lining)

3.9**chimney plate**

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

3.10**closed flue system**

a flue system 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**

a shared open flue system serving two or more appliances installed in the same room or space

3.12**condensate drain**

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

3.13**condensate-free length**

the length of individual open flue 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 will not form on the wall of the flue under the normal operating cycle of the appliance

3.14**condensate pipe**

a pipe, which may also be part of the flue pipe (resistant to corrosion from condensate formed from the products of combustion), which is leak free, and along which condensate may flow

3.15**condensing appliance**

an 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**

a component used for connecting an appliance outlet to the flue within the chimney or flue system

3.17

decorative fuel effect gas appliance

an open-flued appliance designed to simulate a solid fuel open fire for decorative purposes and intended to be installed so that the products of combustion pass unrestricted from the firebed to the chimney or flue

3.18

draught break

an opening into any part of an open flue system, including that part integral with the appliance

3.19

draught diverter

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

3.20

equivalent height

the height of the straight vertical circular flue pipe, measured from the flue spigot to the outlet of the flue pipe, of the same cross-sectional size as the flue under consideration, which will produce the same flue flow rate as the flue under consideration

3.21

effective height – only for gas fires and combined gas fire/back boiler units

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

3.22

fan-diluted flue system

a fanned draught open flue system in which the products of combustion are diluted with air

3.23

fanned draught flue system

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

3.24

fireplace recess

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

3.25

flat roof

a section of a roof which is horizontal or close enough to horizontal such that any airflow over it will not affect the operation of flue terminating above the roof, i.e. within 20° of the horizontal. This would include a bow string truss roof as may be encountered in a residential park home

3.26

flue

a passage for conveying combustion products to the outside air

3.27

flue break

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

3.28

flue lining

a wall of a chimney consisting of components the surface of which is in contact with the products of combustion. This includes a rigid or flexible chimney or flue liner inserted into a chimney to form the flue and the inner lining of a metal or masonry chimney construction. (See also chimney liner)

3.29**flue pipes**

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

3.30**flue system**

a complete assembly of flue components that form a flue from one or more appliances to the flue outlet, for example as follows

a) *double wall flue system*

a factory made metal flue system as specified in BS 715 consisting of an inner metal lining and an outer metal casing. The gap between the lining and the casing is usually an air space or may incorporate insulation. This type of system may also be called a twin wall flue

b) *factory made insulated flue system*

a factory made metal flue system, as specified in BS 4543-2, for use with solid fuel burning appliances or, as specified in BS 4543-3, for use with oil fired appliances consisting of an inner lining and an outer metal casing

c) *gas flue blocks*

a factory made pre-cast concrete or clay flue blocks as specified in BS 1289 that are designed to be used solely for use with gas fired appliances and are installed together to form a flue, that can be built into or against a wall. There are also factory made blocks as specified in BS 6461-1 for solid fuel appliances which may also be used for gas appliances

3.31**individual flue system**

a flue system serving one appliance only

3.32**Installation instructions****3.32.1****appliance manufacturer's instructions**

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

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

3.32.2**flue and chimney manufacturer's instructions**

the printed instructions provided with the flue product or flue system by the manufacturer giving detailed information how the product or system is to be installed and checked

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

3.33**leisure accommodation vehicle**

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

3.34**main flue**

that part of a shared open flue system carrying products of combustion from two or more appliances

3.35**natural draught flue system**

a flue system in which the draught is provided by the thermal force arising from the heat of the products of combustion

3.36

open flue system

a flue system that evacuates the products of combustion to the outside air. The combustion air is drawn directly from the room or space containing the appliance

3.37

open-flued appliance

an appliance designed to be connected to an open flue system.

NOTE This is referred to as type B in PD 6579 (CR 1479).

3.38

pluming

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

3.39

room-sealed appliance

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

NOTE This is referred to as type C in PD 1749 (CR 1479).

3.40

residential park home

a mobile home designed for permanent residential accommodation that does not meet the requirement for construction and use of road vehicles

3.41

secondary flue

that part of an open flue system connecting a draught diverter or draught break to the terminal

3.42

secondary flue height

the vertical distance between two horizontal planes passing respectively throughout the top of the draught diverter, or in the case of a gas fire the spigot, and the base of the terminal

3.43

secondary flue length

the distance along the central line of the flue between two horizontal planes passing respectively through the top of the draught diverter, or in the case of a gas fire the spigot, and the base of the terminal

3.44

Se-duct

a 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, room-sealed appliances (Type C₂)

3.45

shared flue or duct system

a flue or duct system serving two or more appliances



3.46

shower room

room or space containing a functional shower 

3.47

subsidiary flue

that part of a shared open flue system which connects the appliance outlet to the main flue

3.48**terminal**

a device fitted at the flue outlet to allow or assist products of combustion to escape, minimize downdraught and prevent entry of material which might block the flue

3.49**terminal guard**

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

3.50**termination**

the outlet of the flue system from which products of combustion discharge into external air

3.51**U-duct**

a 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 inlet air ducts and flue outlets) are fitted to the other limb

NOTE A continental European arrangement fits the air inlet duct of the appliance (Type C₄) to one limb and the flue outlets to the other. This practice is not specified in this standard.

4 Preliminary design considerations

4.1 Types of flue system

The appliance shall be connected to a suitable flue system in accordance with the appliance manufacturer's installation instructions. New or used appliances shall not be connected unless the manufacturer's instructions are available to the installer.

NOTE Detailed arrangements for timber framed dwellings on termination, weather sealing, temperature effects etc., are to be found in the Institution of Gas Engineers publication IGE/UP/7 [10].

COMMENTARY AND RECOMMENDATIONS ON 4.1

The effectiveness of a flue system in discharging products of combustion to the outside air is dependent on its internal flue size (cross-section), length, route, exposure and the materials used in its construction. The factors will be additionally influenced by the thermal efficiency of the appliance, its usage pattern as well as an adequate supply of combustion air. Reference should be made to the appropriate appliance and installation specifications, codes of practice and manufacturer's instructions for specific requirements.

Reference also should be made to Annex A which provides a procedure for estimating whether a flue is likely to ensure full clearance of combustion products. Alternatively, other sizing calculation methods which lead to an installation which clears the products of combustion may be used, e.g., manufacturer's recommendations and the method in prEN 13384-1.

Gas appliances may be classified according to the flue systems specified in PD 6579 (CEN CR 1749). A summary is given in Table 1 and the common types encountered in the UK are illustrated diagrammatically in Figure 1, Figure 2 and Figure 3.

There are three major categories of appliances, defined by the way in which they discharge their products of combustion, room sealed, open flued and flueless. The room-sealed form neither contributes to, nor places any requirement for combustion purposes on the ventilation of the room containing the appliance. Open flued systems operate with appliances receiving air for combustion from the installation space, which thus requires a source of air supply, and discharging the combustion products to outside atmosphere. Open flue systems participate in the ventilation of the room or space by inducing a flow of air through the room and appliance. Flueless appliances take air from, and discharge combustion products into, the room in which they are installed and have special ventilation requirements for safe operation, see BS 5440-2 for specific ventilation requirements.

Flues and chimneys may also be classified according to a proposed European format prescribed in BS EN 1443 — Chimneys — General requirements, Annex B. The classification is based on the following performance characteristics:

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

Table 1 — Classification of gas appliances according to flue types — from CEN CR 1749 (Common types in the UK are shown with an asterisk *) († denotes fan downstream of draught diverter)

Letter	1st digit	2nd digit		
		Natural draught	Fan downstream of heat exchanger	Fan upstream of heat exchanger
A – Flueless		A ₁ *	A ₂	A ₂
B – Open flued	B ₁ – with draught diverter	B ₁₁ *	B ₁₂ * B ₁₄ †	B ₁₃ *
	B ₂ – without draught diverter, previously referred as “closed flues”	B ₂₁	B ₂₂ *	B ₂₃
C – Room sealed	C ₁ – Horizontal balanced flue/inlet air ducts to outside air	C ₁₁ *	C ₁₂ *	C ₁₃ *
	C ₂ – Inlet and outlet ducts connect to common duct system for multi-appliance connections A₂ (SE-duct or U-duct) A₂	C ₂₁ *	C ₂₂	C ₂₃
	C ₃ – Vertical balanced flue/inlet air ducts to outside air	C ₃₁	C ₃₂ *	C ₃₃ *
	C ₄ – A₁ Inlet and outlet appliance connection ducts connected to a U shaped duct for multi-appliance system A₁	A₁ C ₄₁ A₁	C ₄₂	C ₄₃
	C ₅ – Non-balanced flue/inlet air ducted system	C ₅₁	C ₅₂	C ₅₃
	C ₆ – Appliance sold without flue/air inlet ducts	C ₆₁	C ₆₂	C ₆₃
	C ₇ – Vertical flue to outside air with air supply ducts in loft. Draught diverter in loft above air inlet	C ₇₁	C ₇₂ * (“Vertex”)	C ₇₃ * (“Vertex”)
	C ₈ – Non-balanced system with air supply from outside and flue into a common duct system	C ₈₁	C ₈₂	C ₈₃

Certain appliances are designed to extract latent heat from the water vapour in the products of combustion and require provision for the draining of the condensate. The temperature of the products at the appliance outlet may be low enough to permit the application of materials and constructions of novel form.

The choice of flue system for a specific situation will be dependent on the types of appliance available to provide the service required and the proposed location of the appliance.

As the motive power generated by a fan is considerably greater than that generated thermally, fanned systems may prove advantageous in view of their greater flexibility in flue run, reduced flue size and less critical termination and siting for single or multiple appliance installations. The choice of flue system for a specific situation will be dependent on the types of appliance available to provide the service required and the proposed location of the appliance. In making this choice, the following factors should be considered.

a) Restraints imposed on potential terminal locations by virtue of:

- openings into buildings such as windows, air bricks and other ventilation openings;*
- existing terminals;*
- neighbouring properties;*
- boundaries;*
- combustible materials on the external face of the property;*
- structural and/or topographical features which might prevent a free flow of air over the terminal and/or lead to adverse pressure zones;*
- the need to site low level terminals so as to avoid physical damage e.g., from opening doors etc.;*
- the need to guard low level terminals to protect passers by;*
- the effects of any plumbing on surfaces and 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 bathroom and bedroom/bed-sitting rooms where special rules apply.

d) The 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 this might have on open flues.

f) The potential role of an open flue to also satisfy the extract ventilation requirement of Approved Document F to the England & Wales Building Regulations [3].

g) Whenever fans are used, additional safeguards are required to ensure that on flue flow failure the appliance is made inoperable. (See BS 5871-1:2000, 9.5 for further information.)

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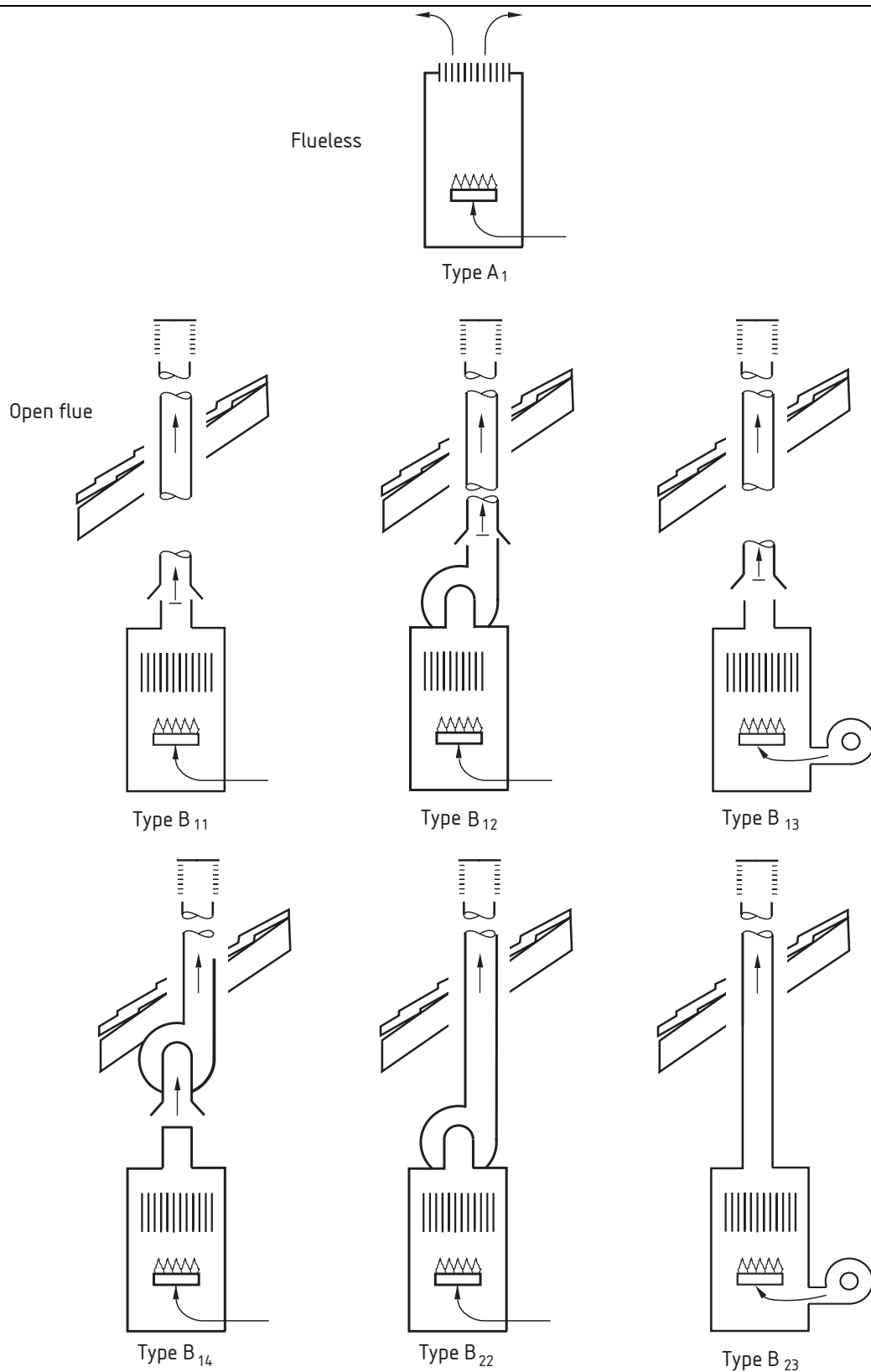
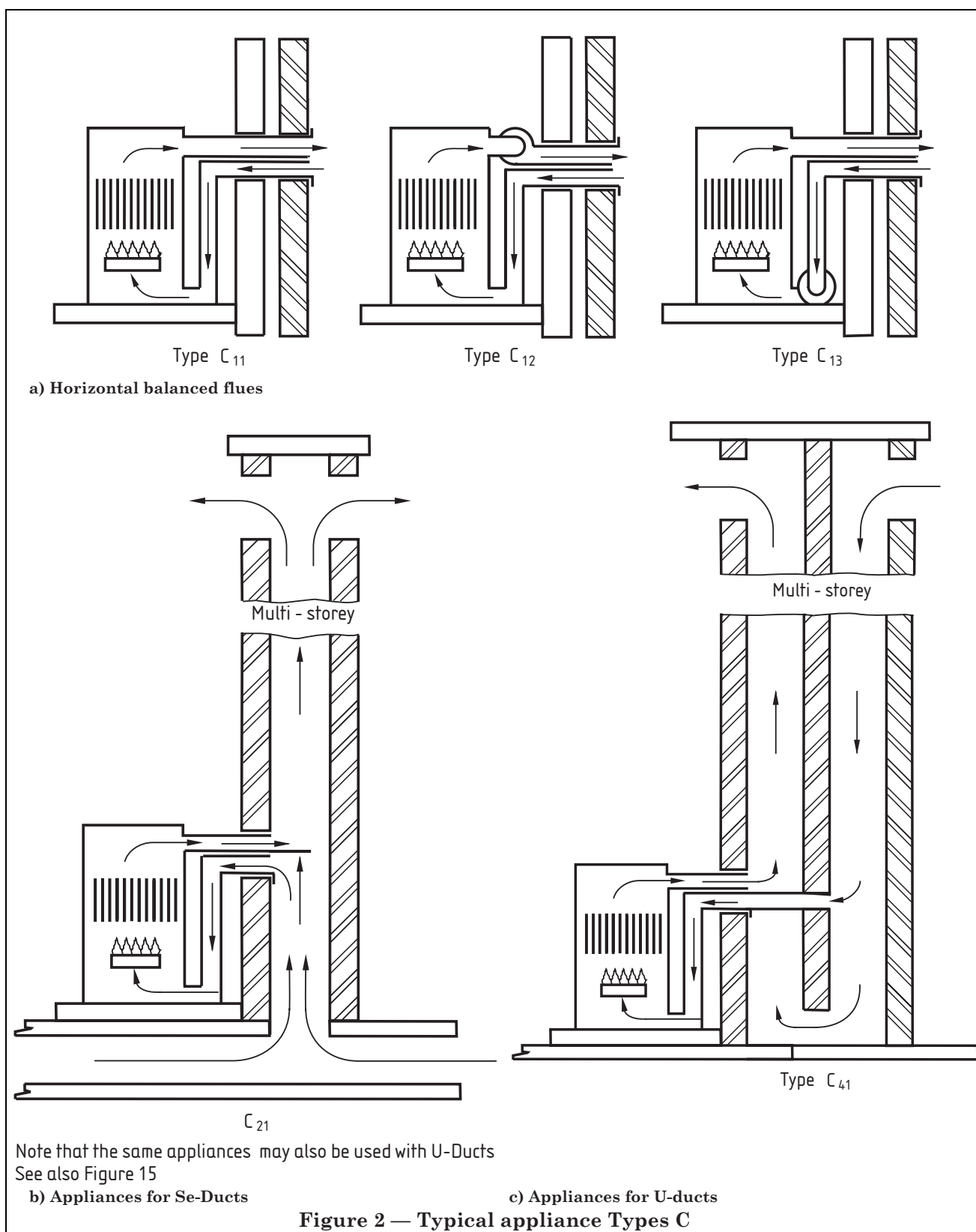


Figure 1 — Typical appliances Types A and B, classification to CR 1749

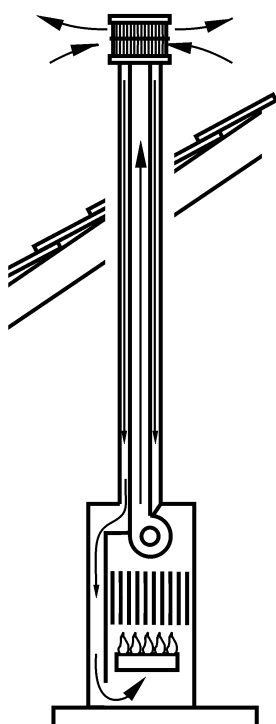
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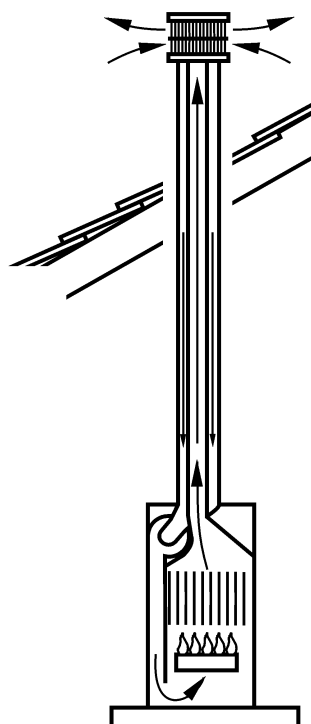


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Vertical
Balanced
Flues

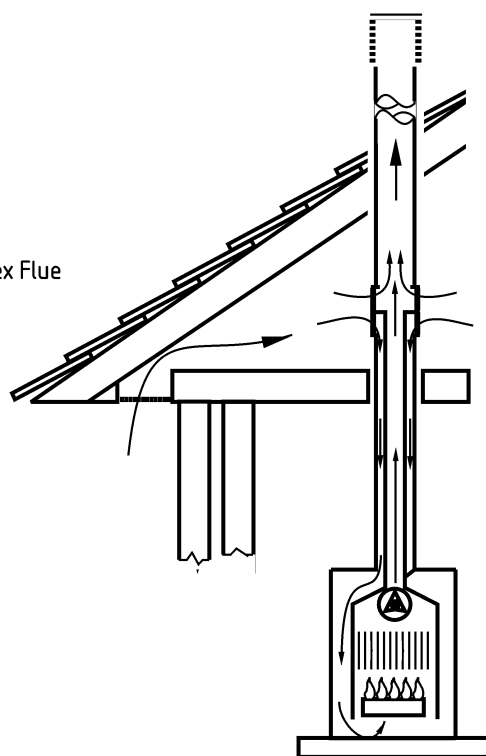


Type C₃₂



Type C₃₃

Vertex Flue



Type C₇₃

NOTE Whilst both of these illustrations depict concentric flue arrangements, the flue and combustion air supply tube can also be constructed so that they are side by side.

Figure 3 — Typical appliance Types C₃ and C₇ classification to PD 6579 (CR 1749)

4.2 Flue termination

4.2.1 General

The various forms of termination and their acceptable locations (Figure 4, Figure 5, Figure 6 and Figure 7) are dependent on the type of flue system and shall conform to the requirements given in the relevant subclauses, (5.1.6, 6.1.3, 7.1.4, 8.2.1, 9.2.1, 10.4, 11.3). The termination shall not be obstructed.

COMMENTARY AND RECOMMENDATIONS ON 4.2.

The main function of the termination of a flue system is to effectively discharge the products of combustion to the outside air under all weather conditions. This is achieved by the design of the terminal and its siting. Openings in the terminal are sized to prevent the ingress of foreign matter which would seriously impair the performance of the flue system. Under certain conditions, plumbing can occur at the termination and, where possible, terminal positions where this could cause a nuisance should be avoided.

4.2.2 Basement areas, light wells and retaining walls

No flue termination or terminal shall be sited to discharge within the curtilage or confines of any enclosed basement area, light well or external space formed by any retaining wall or passage unless reasonable provision can be made to ensure the safe disposal of flue gases.

COMMENTARY AND RECOMMENDATIONS ON 4.2.2

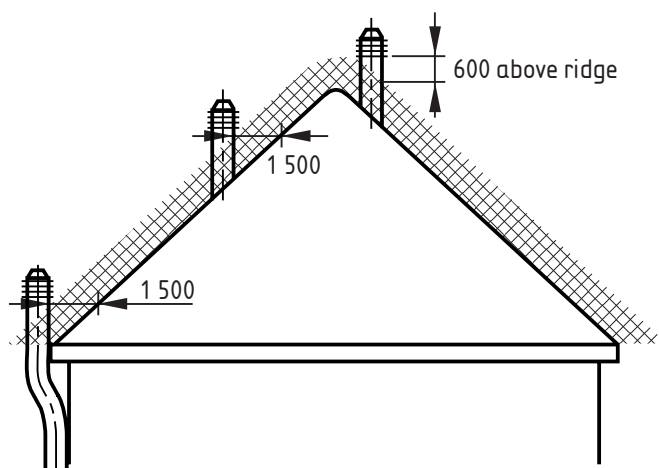
Terminals for balanced flued appliances and fanned draught open flued appliances may, be acceptable provided they are sited at a height of not more than 1 m below the top level of the basement area, light well or retaining wall. The combustion products should only discharge in free open air.

Where a basement area or light well is formed by a single retaining wall to create an uncovered passage way at least 1.5 m wide it may be possible, to site a fanned draught open flued appliance terminal or a fanned or natural draught balanced flued appliance terminal.

The passage should allow free air circulation beyond and around the ends of the structure and retaining wall. It is also essential that unobstructed air movement takes place at the open ends of any such formed passage way which should terminate at or above ground level. Subject to such provisions, a fanned-draught open-flued appliance terminal or a fanned or natural-draught balanced-flued appliance terminal may be installed in strict accordance with the appliance manufacturer's instructions.

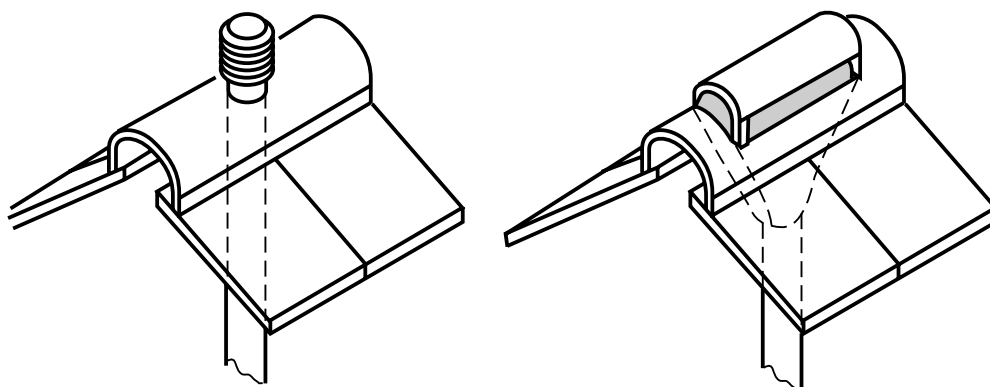


All dimensions in millimetres



No part of the flue outlet shall be less than 1.5 m measured horizontally to the roof surface, or 600 mm above the ridge.

a) Terminal locations with respect to pitch



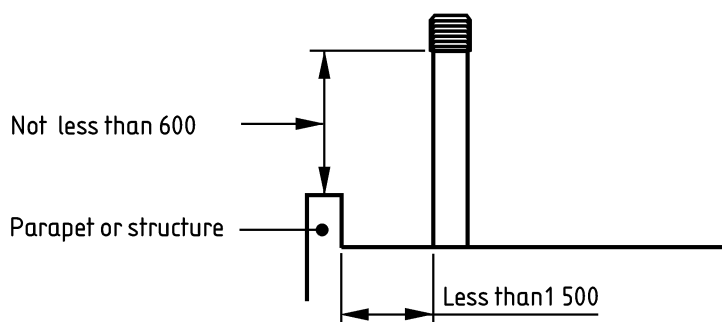
The terminal shall be positioned so that it is at least 1500 mm from any adjacent and higher structure i.e., a gable end wall.

b) Terminal location at a ridge tile

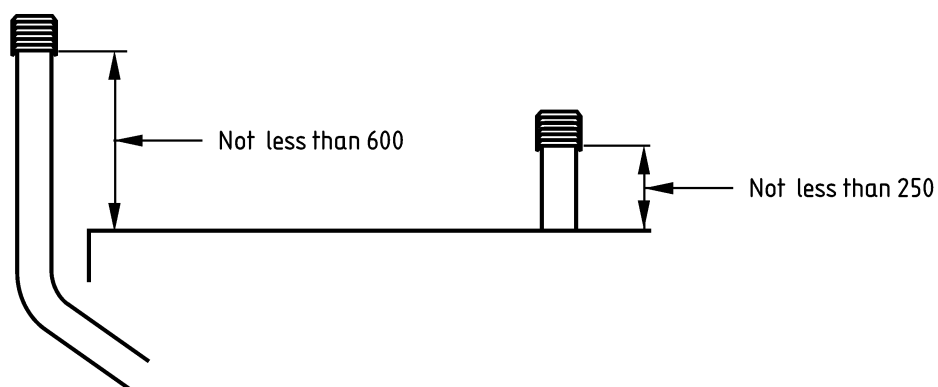
Figure 4 — Open flue terminal locations for pitched roofs



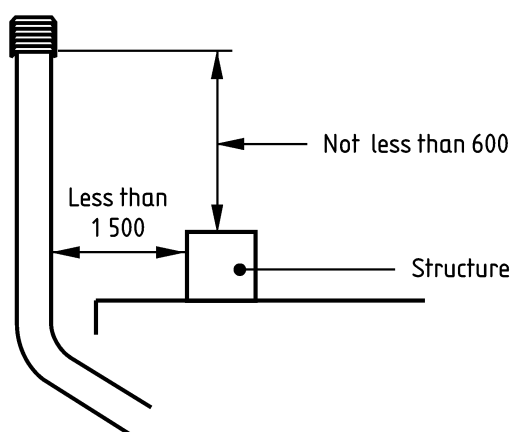
All dimensions in millimetres



a) Flat roof, with flue close to parapet



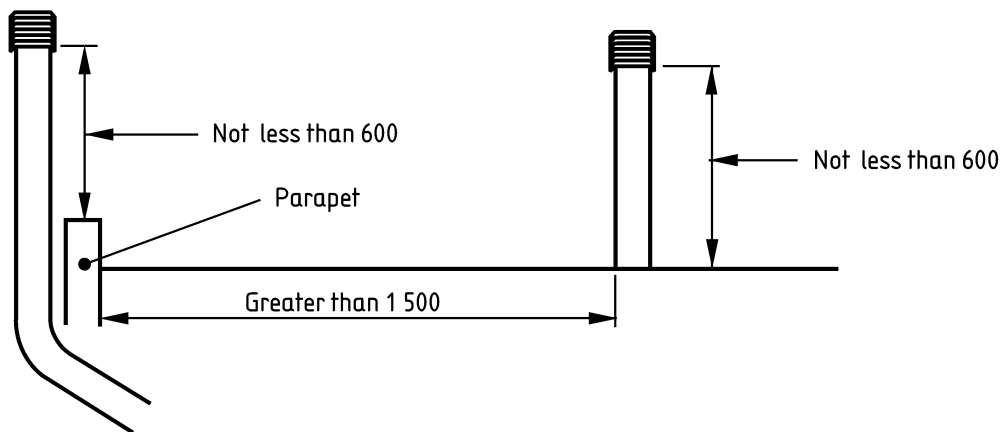
b) Flat roof with no parapet



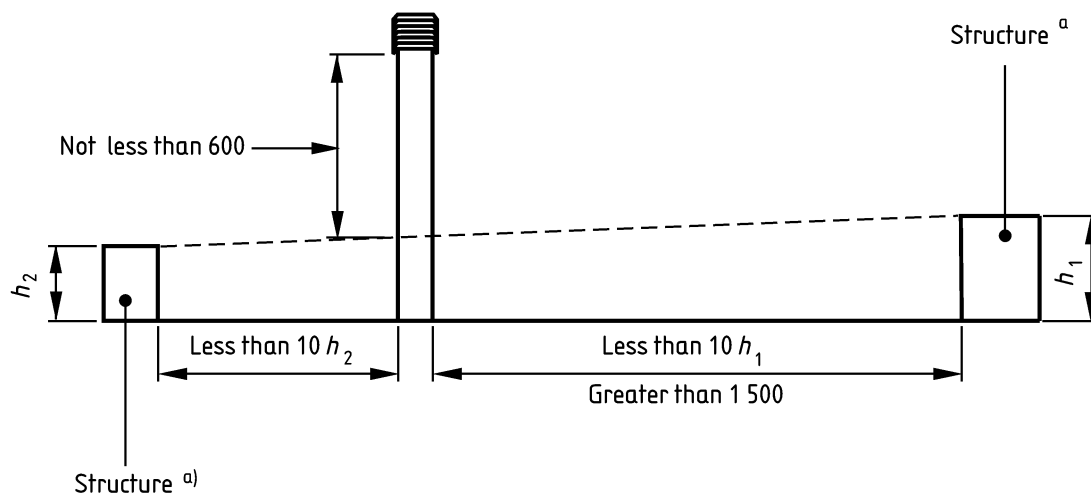
c) Flat roof with structure close to flue outlet

Figure 5 — Open flue terminal locations on flat roofs

All dimensions in millimetres

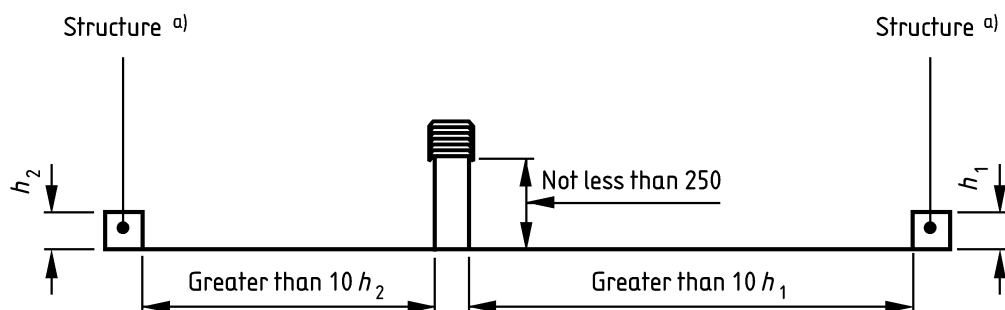


d) Flat roof with parapet



^{a)} Typical structures are e.g. plant rooms, lift motor rooms, storage water tanks.

e) Flat roof, envelope method



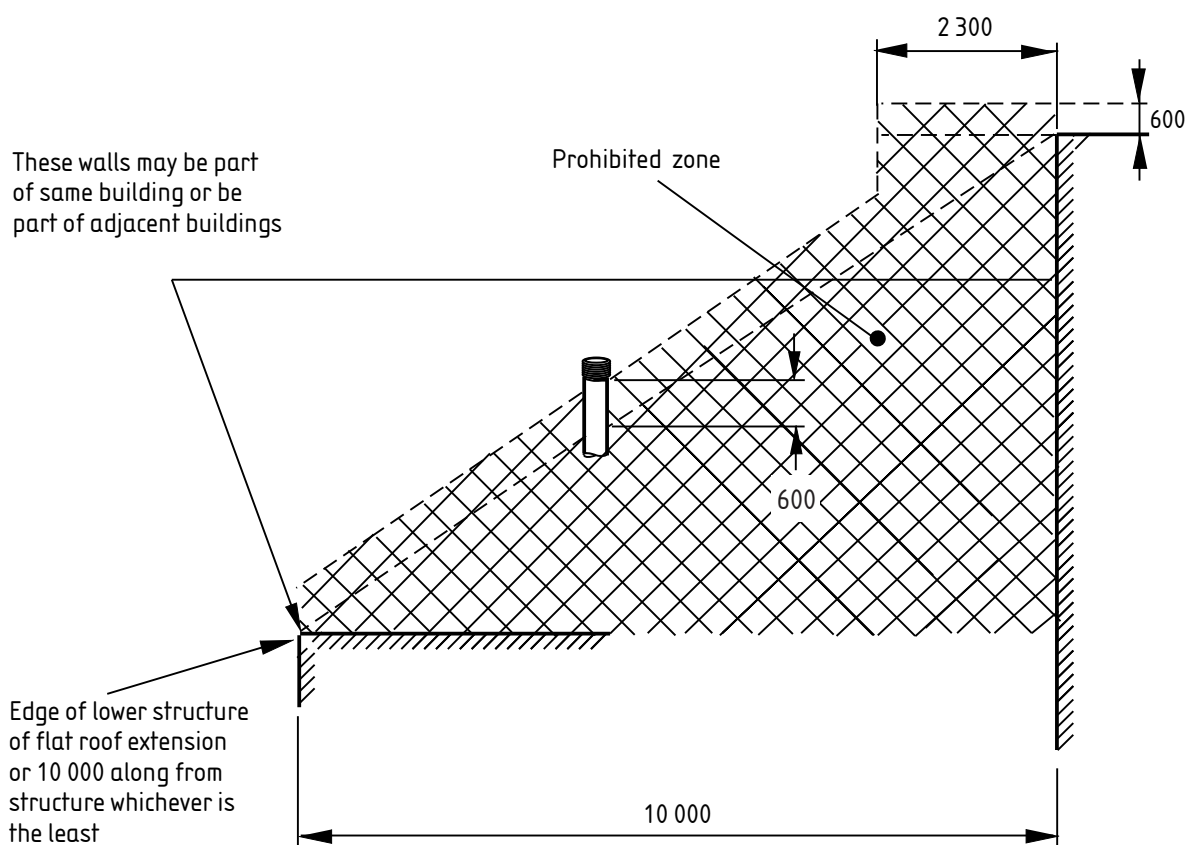
^{a)} Typical structures are, e.g. plant rooms, lift motor rooms, storage water tanks.

f) Flat roof, where the flue outlet is more than 10 heights (h) away from all structures

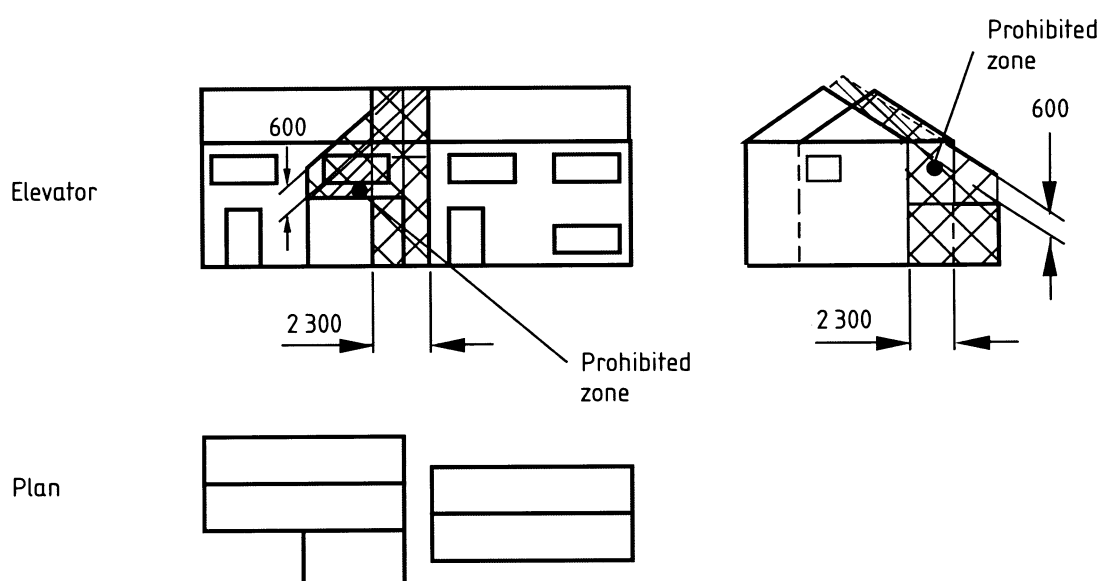
Figure 5 — Open flue terminal locations on flat roofs (continued)

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All dimensions in millimetres



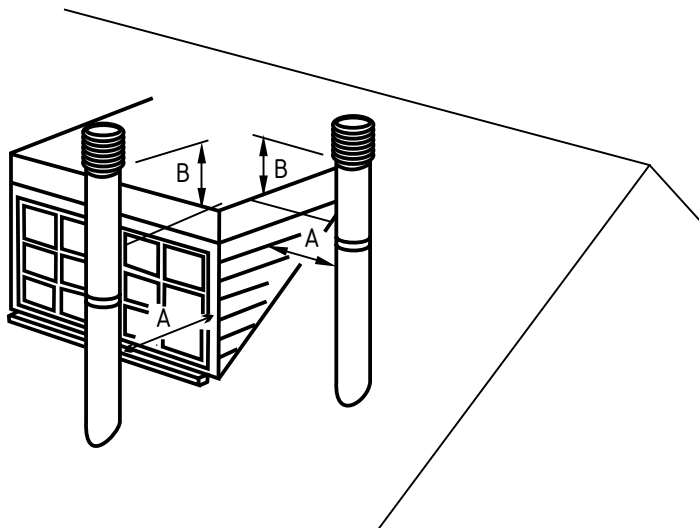
a) Prohibited zone — General principle



b) Example of prohibited zone near adjacent housing

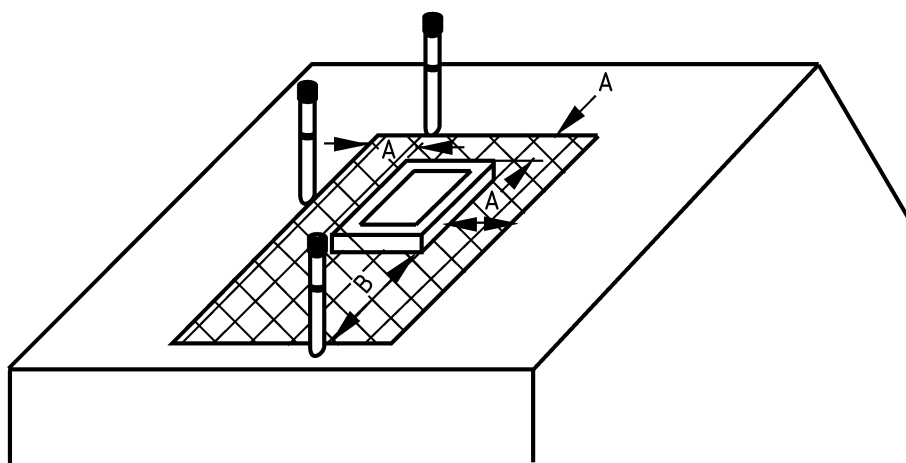
Figure 6 — Open flue terminal locations near adjacent structures or buildings

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If A is less than 1 500 mm, B shall be not less than 600 mm

a) Terminal locations for pitched roofs with structures



A = 600 mm

B = 2 000 mm

The flue shall not penetrate the shaded area of the roof and shall otherwise conform to Figure 4.

b) Terminals adjacent to window or openings on pitched roofs irrespective of pitch

Figure 7 — Open flue terminal locations near structure, windows and openings on pitched roofs

A1

4.3 Terminal guards

Terminal guards shall be used where necessary to prevent blockage and/or injury to people, as required by the relevant building regulations.

COMMENTARY AND RECOMMENDATIONS ON 4.3.

See 5.1.6, 5.2.6, 8.2.1 and 9.2.1 for advice.

4.4 Fire precautions

All the systems shall be installed to reduce the risk of ignition of any part of the building structure.

COMMENTARY AND RECOMMENDATIONS ON 4.4.

Specific precautions to be taken are detailed in 5.2.4, 8.2.3, 9.2.3 and 10.3.

For buildings of timber framed construction, adequate safeguards are achieved by, for example, the introduction of suitable sleeves or ducts where the flue system passes adjacent to combustible material, or 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 are to be found in the Institution of Gas Engineers Publications UP/7 [10].

4.5 Installations in bedrooms

Open-flued appliances with rated input of 12.7 kW net (14 kW gross) or less may only be installed in bedrooms, bed-sitting rooms and other rooms intended to be used as sleeping accommodation if they incorporate a safety control device which will shut down the appliance before there is a build up of dangerous quantity of combustion products in the room concerned.

Any appliance with a rated input above 12.7 kW net (14 kW gross) installed in a bedroom, bed-sitting room or other room intended to be used as sleeping accommodation shall be room-sealed.

COMMENTARY AND RECOMMENDATIONS ON 4.5.

Advice on permissible flueless appliances is given in BS 5540-2.

Care should be taken in the selection of non-room-sealed appliances for use in sleeping accommodation taking into account the following:

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

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

4.6 Installations in bathrooms or shower rooms

Any gas appliance installed in a bathroom or shower room shall be room-sealed.

4.7 Instantaneous water heaters

No instantaneous water heater shall be installed in any room unless it is room-sealed or fitted with a safety control which will shut off the appliance before a dangerous quantity of combustion products can build up in the room concerned.

4.8 Cupboards and compartments in bathrooms, shower rooms or bedrooms

 Cupboards and compartments which have doors opening into bedrooms or bathrooms or shower rooms shall be treated as part of the bedroom or bathroom or shower room concerned.

Cupboards and compartments which have doors opening into other rooms or spaces, but are ventilated through adjoining walls, floors or ceilings into bathrooms or shower rooms or bedrooms, shall be treated as part of the bedroom or bathroom or shower room concerned.  

4.9 Garages and other hazardous areas

Gas appliances and their flues in motor vehicle repair workshops shall be installed in accordance with the Institution of Gas Engineers IGE publication IM/28 [11].

Gas appliances shall not be installed in spaces classified as hazardous as defined in BS EN 60079-10:1996.

COMMENTARY AND RECOMMENDATIONS ON 4.9.

The requirement for commercial applications is intended to apply where petroleum and other heavier than air flammable vapours are present. Wherever reasonably practicable the appliance should not be installed in such places.

There is no restriction on the type of flue or location of appliances that can be installed in a private garage.

 Text deleted. 

4.10 Radon gas protection

Where radon gas extraction systems are installed, the spillage performance of every open flued appliance in the dwelling shall be rechecked with the radon gas extractive system in operation to ensure satisfactory clearance of combustion products. If spillage occurs, expert advice shall be sought to ensure that both the performance of the flue and the radon reduction are satisfactory. The appliance shall not be left connected to the gas supply unless it has successfully passed the spillage test specified in 5.3.2.3.

COMMENTARY AND RECOMMENDATIONS ON 4.10.

Where extract ventilation below ground floor level is provided to reduce radon gas levels, the spillage performance of open flued appliances may be affected.

Room sealed appliances are insensitive to extractive radon gas protective measures.

Further advice is available in BRE paper IP21/92 [12].



4.11 Passive stack ventilation

Where a house contains both passive stack ventilation (psv) systems and open flue natural draught appliances, the respective terminals shall be sited to avoid the possibility of setting up a pressure gradient across the two systems that could lead to appliance flue reversal.

COMMENTARY AND RECOMMENDATIONS ON 4.11

In order to avoid the outlets for a passive stack ventilation system and an open flue being positioned in different pressure zones they should be located on the same face of the building, and the flue termination should be at the same or higher level than the passive stack ventilation outlet. A2

4.12 Exchange of information and planning

The designer or builder of the flue system, or the provider or installer of the gas appliance shall agree and document the pertinent details with the customer as appropriate. Where the flue system is provided as part of the appliance, e.g. a balanced flued appliance, the installer shall agree and document, with the customer, that the flue system is suitable for the application.

COMMENTARY AND RECOMMENDATIONS ON 4.12.

When erecting a new flue system or modifying an existing one, the pertinent details will include the type, size and route of the flue 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 flue system and fitting the gas appliance.

When a gas appliance is to be fitted to an existing flue system, it is essential that the installer confirms that the flue system is suitable for the appliance.

Where appropriate, the end user (customer), should be consulted and involved in the decision making process. It is recommended that the customer should be advised of the reasons for the choice of appliance and the flueing system. Some factors that may 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 open flued or room-sealed may be influenced by attitudes to safety issues.

All appliances converting energy into useful heat (electrical and fossil fuels) may invoke some element of risk. Burning any fossil fuel (oil, solid fuel and gas) creates products of combustion which may lead to the creation of harmful elements if the combustion process and subsequent provisions for flueing are inadequate. Incidents involving gas utilization generally involve inadequate installation, subsequent lack of servicing or maintenance or misuse by the user. Flued systems will not operate correctly under conditions of inadequate or blocked flues, or inadequate or blocked air supply and under such conditions they spill products of combustion. Some examples of types of flueing systems are as follows, but these do not represent an exhaustive treatise.

Open flued appliances (Type B) draw air for combustion from the room in which the appliance is situated. In Type B, appliances, a draught diverter is included to minimize the effects of draught down the flue and also to assist the operation of the flue. A permanent air supply to the room is required. It is essential that a spillage test is carried out at the time of installation and when other work is carried out on the appliance. New appliances installed in domestic applications are required by the Gas Appliances (Safety) Regulations 1995 [6], to be marked with the CE mark and have devices fitted that are designed to shut down the appliance before there is a dangerous build up of the products of combustion in the room.

Some used appliances may not be fitted with such devices if they were manufactured before this became a requirement.

Some commercial appliances may not require such devices if they are installed in commercial situations.

Room sealed appliances (Type C) are designed such that the air supply and the products of combustion are sealed within the appliance and separated from the room in which the appliance is situated. The common Type C1 balanced flue, is fitted with the air supply duct and flue at the factory. The siting of the terminal is important to ensure that no hazard is caused by products of combustion re-entering the building, albeit in a diluted form. There are also restrictions on siting terminals in restricted spaces such as some light-wells and passages (see 5.1.6.2).

Attention is drawn to a chimney plate which may be affixed to new chimneys to assist in matching an appliance to the flue, (see also 5.1.1).

5 Individual open flue: natural draught (for Types B₁₁, B₁₂, B₁₃ appliances)

5.1 Design

5.1.1 General

Any new flue system shall be constructed from the materials specified in 5.1.2, 5.1.3, routed and sized as specified in 5.1.4 and terminated as specified in 5.1.5 and 5.1.6.

Any existing flue systems shall conform to 5.1.8. Each flue shall only communicate with the room or space in which the appliance is installed.

COMMENTARY AND RECOMMENDATIONS ON 5.1.1.

Attention is drawn to Approved Document J to the Building Regulations for England and Wales [3] and to the Building Standard (Scotland) [5] that specify a chimney plate which is to be fixed to the building to advise appliance installers of the characteristics of the chimney. Installers should establish that the chimney and any hearth are suitable for the appliance and the chimney plate is intended to assist in this respect.

5.1.2 Flue pipes

Metallic flue pipes shall conform to BS 715. Single walled flue pipe, defined by BS 715 as being for internal use only, shall not be used externally except as specified in 5.1.7. Double walled metal flue systems to BS 715 or BS 4543-2 or -3 shall be used externally in accordance with the flue manufacturer's instructions. Flue pipes connecting an appliance to the flue system shall conform to BS 715 or shall only be connected together if permitted by the manufacturer's instructions and using connections or adapters provided by the manufacturer.

Fibre cement flue pipes shall be in accordance with BS 7435 -1 and -2.

Asbestos materials shall not be used for new flue pipes.

Sheet metal flue boxes shall conform to BS 715. A flue box shall only be used to accommodate a fire where it has been identified as being suitable for such use by the appliance manufacturer and/or the flue box manufacturer.

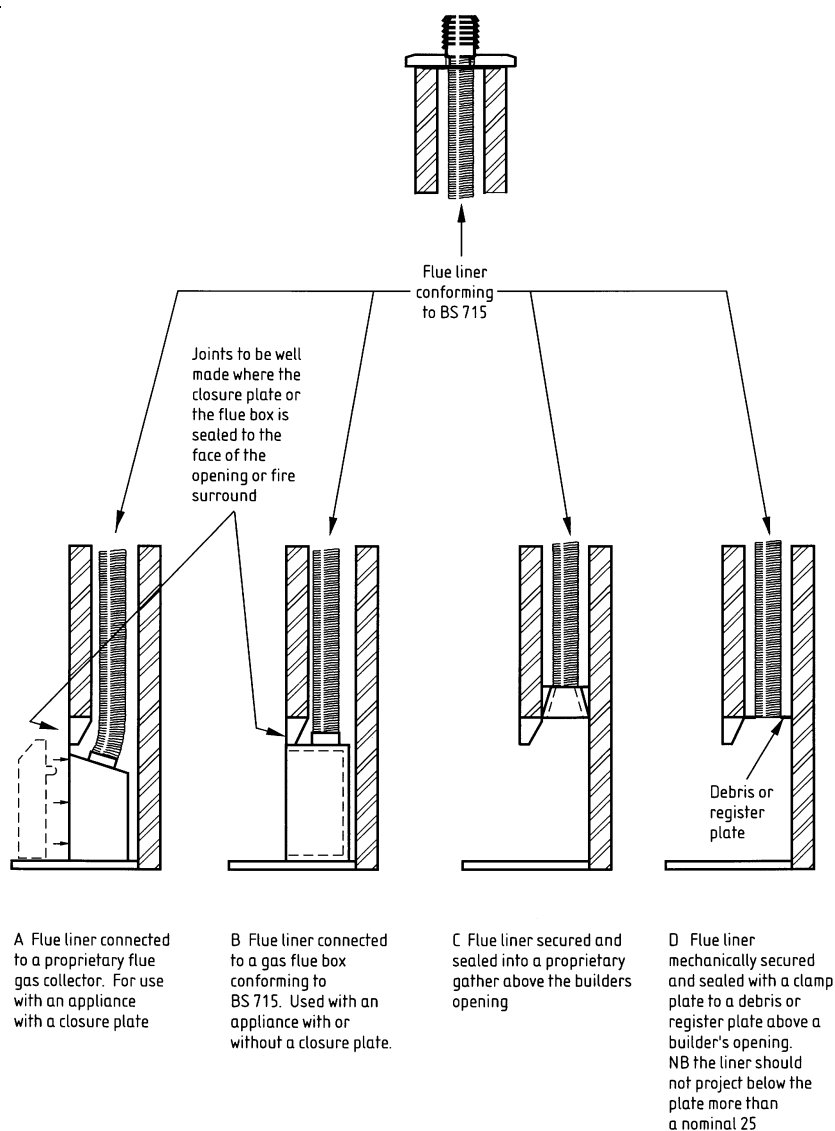
COMMENTARY AND RECOMMENDATIONS ON 5.1.2.

BS 567 and BS 835 cover asbestos¹⁾ materials, and existing flue systems constructed of these materials may be re-used (see 5.1.8).

Proprietary prefabricated flue boxes conforming to BS 715 may be used in conjunction with flue pipe also conforming to BS 715. Technical data and installation instructions will be provided with such boxes. Methods of installation using a flue box, flue pipe and flexible liner within the chimney are shown in Figure 8 and Figure 9. It should be noted that flue boxes are not suitable for solid fuel appliances, and this should be stated (via a permanent badge/label) on the flue box.

¹⁾ The Asbestos (Prohibition) Regulations (As Amended) 1999 [13] places further restrictions on the use of asbestos materials, including a total ban of asbestos cement and its products.

New (or alterations to existing) flue systems should not be constructed from materials containing asbestos. Existing flue systems may be re-used in situ as flue systems provided that they are mechanically sound and conform to the requirements of this British Standard.



NOTE 1 If the gas supply to the appliance is to be made through the wall of the gas flue box, it should be routed as close as practicable to the bottom of the box and sealed into the box with a non-setting sealant.

NOTE 2 The flexible liner should rise in one continuous length as near vertically as possible from the top of the appliance, gas flue box or fireplace recess and no part of the flue liner should form an angle greater than 45° from the vertical.

NOTE 3 The flexible liner should be installed in accordance with the manufacturer's instructions and be mechanically secured and sealed at the top of the chimney. Care should be taken to ensure that any materials used to seal and close off and seal the liner at the top of the chimney, do not drop down the void around the outside of the liner.

NOTE 4 An approved terminal should be used to protect the end of the flue where its diameter is less than 170 mm.

NOTE 5 In each of the illustrations above, the requirements are the same if a fire surround is applied to the front of the opening.

Figure 8 — Typical methods of using a flue liner in a masonry chimney installation serving a gas appliance, other than a back boiler

