

J

Heat Producing Appliances

Building Regulations 2014

Technical Guidance Document



Comhshaol, Pobal agus Rialtas Áitiúil
Environment, Community and Local Government



Building Regulations 2014

Technical Guidance Document J

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Building Regulations 2014

Technical Guidance Document J

Heat Producing Appliances

Introduction

This document has been published by the Minister for the Environment, Community and Local Government under Article 7 of the Building Regulations 1997. It provides guidance in relation to Part J of the Second Schedule to the Regulations. The document should be read in conjunction with the Building Regulations 1997-2014, and other documents published under these Regulations.

In general, Building Regulations apply to the construction of new buildings and to extensions and material alterations to buildings. In addition, certain parts of the Regulations apply to existing buildings where a material change of use takes place. Otherwise, Building Regulations do not apply to buildings constructed prior to 1 June 1992.

Transitional arrangements

In general, this document applies to works, or buildings in which a material change of use takes place, where the works or the change of use commence or takes place, as the case may be on or after 1 September 2014. Technical Guidance Document J - Heat Producing Appliances, dated 1997, also ceases to have effect from that date. However, the latter document may continue to be used in the case of works, or buildings in which a material change of use takes place, where the works, material alteration or the change of use commence or takes place, as the case may be, before 1 September 2014.

The guidance

The materials, methods of construction, standards and other specifications (including technical specifications) which are referred to in this document are those which are likely to be suitable for the purposes of the Regulations. Where works are carried out in accordance with the guidance in this document, this will, *prima facie*, indicate

compliance with Part J of the Second Schedule to the Building Regulations. However, the adoption of an approach other than that outlined in the guidance is not precluded provided that the relevant requirements of the Regulations are complied with. Those involved in the design and construction of a building may be required by the relevant building control authority to provide such evidence as is necessary to establish that the requirements of the Building Regulations are being complied with.

Existing buildings

In the case of material alterations or changes of use of existing buildings, the adoption without modification of the guidance in this document may not, in all circumstances, be appropriate. In particular, the adherence to guidance, including codes, standards or technical specifications, intended for application to new work may be unduly restrictive or impracticable. Buildings of architectural or historical interest are especially likely to give rise to such circumstances. In these situations, alternative approaches based on the principles contained in the document may be more relevant and should be considered.

Technical specifications

Building Regulations are made for specific purposes, i.e. to secure the health, safety and welfare of persons, energy conservation and access for people with disabilities. Technical specifications (including harmonised European Standards, European Technical Assessments, National Standards and Agrément Certificates) are relevant to the extent that they relate to these considerations. Any reference to a technical specification is a reference to so much of the specification as is relevant in the context in which it arises. Technical specifications may also address other aspects not covered by the Regulations.

A reference to a technical specification is to the latest edition (including any amendments, supplements or addenda) current at the date of publication of this Technical Guidance Document. However, if this version of the technical specification is subsequently revised or updated by the issuing body, the new version may be used as a source of guidance provided that it continues to address the relevant requirements of the Regulations.

Materials and workmanship

Under Part D of the Second Schedule to the Building Regulations, building work to which the Regulations apply must be carried out with proper materials and in a workmanlike manner. Guidance in relation to compliance with Part D is contained in Technical Guidance Document D.

Interpretation

In this document, a reference to a section, sub-section, part, paragraph or diagram is, unless otherwise stated, a reference to a section, sub-section, part, paragraph or diagram, as the case may be, of this document. A reference to another Technical Guidance Document is a reference to the latest edition of a document published by the Minister for the Environment Community and Local Government under Article 7 of the Building Regulations 1997. Diagrams are used in this document to illustrate particular aspects of construction - they may not show all the details of construction.

Heat Producing Appliances

Part J - the requirement

Part J of the Second Schedule to the Building Regulations 2014, provides as follows: -

Air supply.	J1	A heat producing appliance shall be so installed that there is an adequate supply of air to it for combustion, to prevent overheating and for the efficient working of any flue pipe or chimney serving the appliance.
Discharge of products of combustion.	J2(a)	A heat producing appliance shall have adequate provision for the discharge of the products of combustion to the outside air.
Warning of release of Carbon Monoxide.	J2(b)	Reasonable provision shall be made to avoid danger to the health and safety of the occupants of a dwelling caused by the release of carbon monoxide from heat producing appliances.
Protection of building.	J3	A heat producing appliance and any flue pipe shall be so designed and installed, and any fireplace and any chimney shall be so designed and constructed, as to reduce to a reasonable level the risk of the building catching fire in consequence of its use.
Provision of information.	J4(a)	Where a hearth, fireplace, flue or chimney is provided or extended, a durable notice containing information on the type of heat producing appliance which can be safely served by the hearth, fireplace, flue or chimney shall be affixed in a suitable place in the building.
	J4(b)	Information on the system installed and any continuing maintenance required, to ensure its safe and effective operation and avoid risk to health, shall be provided to the owner.
Fuel storage system – protection against spread of fire to the system.	J5	A fixed fuel storage system, which serves a heat producing appliance, and any associated pipework carrying fuel to that appliance, shall be so located as to reduce to a reasonable level the risk of fuel ignition due to fire spreading from the building being served or an adjacent building or premises.
Liquid fuel storage system – protection against pollution by the system.	J6	A fixed liquid fuel storage tank, which serves a heat producing appliance, and the pipes connecting it to that appliance shall be so located, constructed and protected as to reduce to a reasonable level the risk of the fuel escaping and causing pollution.
Definitions.	J7	In this Part, "heat producing appliance" means a fixed appliance (including a cooker and an open fire) which is designed to burn solid fuel, oil, bio-fuel or gas and includes an incinerator.

Section 0

General guidance

0.1 Application of the Regulations

0.1.1 The aim of Part J of the Second Schedule to the Building Regulations is to allow for the installation of heat producing appliances while giving adequate protection to the occupants from incomplete combustion or products of combustion and limiting the risk of fire to the building or fuel storage.

0.1.2 Part J of the Second Schedule to the Building Regulations 2014 applies to all installations (both by way of new work or replacement) but this Technical Guidance Document (TGD) gives guidance on Heat Producing Appliances having power ratings and fuel storage capacities up to the limits specified in Sections 2, 3 and 4.

0.1.3 Part J of the Second Schedule to the Building Regulations 2014 applies to the storage of fuels for all combustion appliances but Section 5 gives guidance for storage with limited capacity applicable to domestic scenarios.

0.2 Explanation of terms

In this Document, the following definitions apply:

1. **Appliance:** refers to a Heat Producing Appliance as defined in Regulation J7;
2. **Compartment:** an appliance compartment is an enclosure specifically constructed or adapted to accommodate one or more combustion appliances;
3. **Chimney:** structure consisting of a wall or walls (e.g. masonry or stainless steel) enclosing a flue or flues. They consist of different components which can be assembled, e.g. either
 - as a system 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 (e.g. stainless steel chimneys), or
 - as custom-built chimney, that is installed or built on-site in accordance with an execution standard or local building regulations, using a combination of compatible chimney components that can be from one or more sources;
4. **Flue:** passage for conveying the products of combustion to the outside atmosphere;
5. **Flue liner:** wall of a chimney consisting of components the surface of which is in contact with products of combustion;
6. **Connecting flue-pipe:** component or components connecting the heating appliance outlet and the chimney;
7. **Flue block:** factory-made single - or multi-wall chimney component with one or more flues;
8. **Gas fire:** appliance constructed in a single cabinet incorporating a definite air path, a flue spigot for the controlled discharge of combustion products either directly into an existing flue or by passing through a purpose made closure plate. The radiant elements may be made to simulate burning solid fuel and/or may be partially enclosed by a heat resistant glass front plate;
9. **Decorative Fuel-Effect fire (DFE):** appliance whose function is primarily aesthetic, being designed to simulate an open solid fuel fire and which is intended to be installed within an open fireplace, so that the products of combustion pass

unrestricted to the chimney or flue. It therefore does not incorporate a flue connection;

10. Inset Live Fuel-Effect fire (ILFE):

appliance consisting of a purpose designed unit in a combination, which incorporates a flue box, fire bed and fire fret constructed in a manner, which controls both the combustion air and the products of combustion. The appliance is intended for installation within or partially in front of a builders opening. The unit may incorporate a method of recovering some heat from the combustion products to provide a convected heat output;

11. Open flued appliance: appliance designed to be connected to an open-flue system, its combustion air being drawn from the room or space in which it is installed;

12. Room sealed appliance: 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 air outside the premises and which vents the products of combustion directly to open air outside the premises;

13. Balanced flue: 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;

14. Fanned flue systems: flue system in which the removal of flue products depend on a fan;

15. Open- flued fan assisted appliance: appliance incorporating a fan upstream

or downstream of the burner taking combustion air from a room;

16. Flueless appliance: appliance designed for use without connection to a flue system, the products of combustion being allowed to mix with the air in a room or space in which the appliance is situated;

17. Fireplace recess: is a structural opening formed in a wall or chimney breast, from which a chimney leads and which has a hearth at its base;

18. Hearth: is a base intended to safely isolate a combustion appliance from people, combustible parts of the building fabric and soft furnishings;

19. Non-combustible material: see Technical Guidance Document B for guidance on non-combustible materials;

20. Permanent Ventilation opening: any means of permanent ventilation which –

- opens directly to the external air, and
- except in the case of a screen, fascia, baffle, etc., has a smallest dimension of at least 8 mm, but does not include a flue to a chimney;

21. Air vent: non-adjustable purpose provided arrangement designed to allow permanent ventilation;

22. Condensate: liquid products formed when the flue gas is at or below the water dew point;

23. Solid biofuel: a solid fuel derived from plants and trees and includes logs, wood chip, wood pellet and other processed plant materials.

Section 1

Provisions which apply to all fuel types

1.1 Guidance

Guidance given in this Section applies to all fuel types and should be read in conjunction with the guidance given in Sections 2, 3 or 4 - Solid fuel, Gas or Oil respectively.

1.2 Air supply to appliances

1.2.1 Each appliance should be:

- (a) room sealed, or
- (b) contained in a room space or compartment which has a permanent ventilation opening. If this opening is to an adjoining room or space, then the adjoining room or space should have a permanent opening of the same size direct to external air. However, in the case of fixed appliances designed to discharge the products of combustion to the room or space in which they are located, i.e. fixed flueless appliances, the room or space containing the appliance should have permanent ventilation openings directly to the outside air.

1.2.2 Where an appliance that requires cooling air to prevent overheating is located in an enclosed compartment, the compartment should be large enough to enable air to circulate and high and low level vents should be provided.

1.2.3 Ventilation openings should not be provided in internal construction which is required to have fire resistance under the requirements of Part B of the Second Schedule to the Building Regulations. The requirements of Part B may also be relevant to the nature and position of ventilation openings provided in some external walls particularly if the external wall is giving shielding for fuel storage.

1.2.4 Any appliance in a bath or shower room or a private garage should be of the room sealed type. All electric components should be

sealed in accordance with the relevant standard where necessary.

1.2.5 Each permanent ventilation opening should be of the recommended size appropriate to the appliance being served and be non-adjustable. Guidance on the size of free area opening recommended for different fuels and appliances is given in Sections 2, 3 and 4, as appropriate.

1.2.6 A permanently open air vent shall be sized so that the free area, or the equivalent free area of a more complex design, is sufficient for the appliance to be installed, taking account where necessary of obstructions such as grilles and anti-vermin mesh.

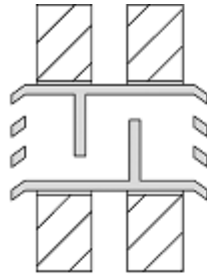
1.2.6.1 Where two or more components are to be used to provide a non-proprietary ventilation assembly, the assembly should be kept as simple and smooth as possible. The assembly should be taken to have a free area equal to that of the component with the smallest free area in the assembly.

The free area of each component should be its manufacturer's figure or where that is not available, its free area measured in accordance with paragraph 1.2.6.2 (see Diagram 1 (b)).

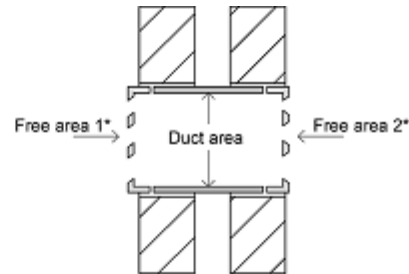
1.2.6.2 The measured free area of a ventilator component is its total unobstructed cross sectional area, measured in the plane where this area is at a minimum and at right angles to the direction of airflow. For an airbrick, grille or louver, it will be the aggregate free area of the individual apertures (see Diagram 1(c)).

1.2.6.3 Where ventilation is provided via a proprietary ventilator the equivalent area, as declared by the manufacturer when tested to I.S. EN 13141-1:2004, should be equal to not less than 80% of the required permanent free area.

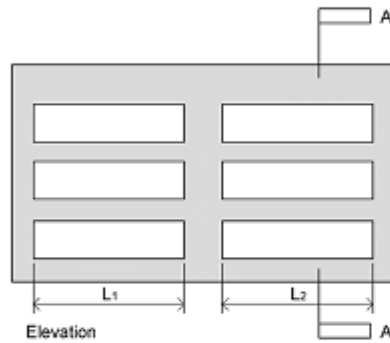
Diagram 1 Ventilation free area
(Par. 1.2.6)



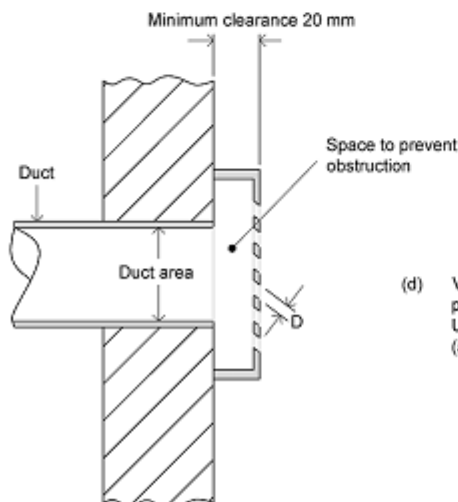
- (a) Proprietary unit incorporating baffles, grilles etc: use the manufacturer's stated equivalent areas to I.S. EN 13141



- (b) Ventilator assembled on site from components (*free area as marked on components or as measured on site - see (c) below). Use whichever is the smallest Free area 1, Free area 2 or the Duct area. For grilles or louvres which do not precisely match the duct profile see (d)



- (c) Measuring the free area of components on site -
net free area = $(L_1 + L_2) \times D \times N$
(where N = the number of slots)



- (d) Ventilator using grilles or louvres which do not precisely match the duct profile. Free area of grilles or louvres determined as per (c) above. Use whichever is the smallest Free area 1, Free area 2 or the Duct area (as per (b))

1.2.7 A permanent opening should be positioned where it is unlikely to become blocked or cause discomfort from cold draughts. Cold draughts can be avoided by placing vents close to appliances, (for example by using dedicated ducted floor vents from opposite sides of the building), or by ensuring good mixing of incoming cold air by placing air vents close to ceilings. Openings should not be located within a fireplace recess except on the basis of specialist advice.

1.2.8 Buildings may have gas-tight membranes installed in ground floors to prevent ingress of radon gas or other contaminants. Ventilation ducts or vents installed in floors should not penetrate these membranes in a way that will render them ineffective. Reference should be made to guidance in Technical Guidance Document C in this regard.

1.2.9 Permanent ventilation openings installed to comply with the requirements of this Part of the Building Regulations may serve, in whole or in part, to satisfy the ventilation requirements of Technical Guidance Document F of the Building Regulations. However, controllable background ventilation installed to comply with Technical Guidance Document F requirements should not be taken as contributing to the ventilation requirements specified in this Technical Guidance Document.

1.3 Air extract fans

1.3.1 If an air extract fan is fitted in a building containing a heat producing appliance (other than a room-sealed appliance), the appliance and flue should be able to operate effectively whether or not the fan is running. The presence of some fans may be obvious, such as those on view in kitchens, but others may be less obvious, fans installed in domestic appliances such as tumble dryers and fans fitted to other open flued combustion appliances can also contribute to depressurisation.

1.3.2 Mechanical Ventilation with Heat Recovery (MVHR) systems are not designed to provide combustion air. Where open-flued appliances are installed permanent dedicated combustion air supply is required.

Note: The pressure differences within MVHR systems can easily exceed those within an open-flued appliance. This extends to fan-flued biomass and other solid fuel appliances; although the fan will probably be sufficient to overcome any pressure discrepancies when operational, upon switching off the fan the smouldering fire bed may be reignited and/or spill into the room because of the pressure difference caused by the MVHR.

1.3.3 Some general installation guidance on air extract fans is given below. However, in order to show that open-flued heat producing appliances operate safely whether or not fans are running, appropriate in-situ tests are required.

The following guidance applies to the installation of different appliances:

- (a) For gas appliances: where a kitchen contains an open-flued appliance, the extract rate of the kitchen extract fan should not exceed 20 litres/second (72 m³/hour);
- (b) For oil appliances: guidance in relation to fan capacities is given in OFTEC Technical Books 2 and 5;
- (c) For solid fuel appliances: extract ventilation should not be installed in the same room as an open-flued solid fuel appliance. If mechanical extraction is unavoidable then specialist advice to ensure safe operation of the appliance should be sought;
- (d) For commercial and industrial installations, specialist advice may be necessary regarding the interlocking of gas heaters and any mechanical ventilation systems;

-
- (e) When fans are used to extract radon from below a building care should be taken to ensure that air from the building itself is not extracted causing spillage of combustion gases. A fan power in the order of 75 watts is normally adequate. Further guidance is given in BRE Good Building Guide GBG 25.

1.3.4 Tests to check for spillage should be carried out in conditions when appliances are subjected to the greatest possible depressurisation. A prerequisite for this condition is that all external doors, windows and other adjustable ventilators to outside are closed and any fans operating are on their maximum useable setting. The depressurisation at the appliance will depend on the particular combination of fans in operation (fans in the room containing the appliance and fans elsewhere in the building) and the pattern of open internal doors, hatches etc. Several tests (which should include a test with the door leading into the room of installation closed and all fans in that room switched on) may be necessary to establish the specific combination causing the greatest depressurisation at the appliance and demonstrate the safe operation of the appliance with reasonable certainty. The effect of ceiling fans should be checked during the tests.

Consideration should also be given to spillage due to the stack effect of openable roof lights located at high level in a building.

Guidance on appropriate spillage test procedure for gas-fired appliances is contained in BS 5440 – 1: 2008 and BS 5440 – 2: 2009 and for oil-fired appliances in OFTEC technical books 2, 4 & 5. Reference should be made to BRE Information Paper IP 7/94 Spillage of flue gases from solid-fuel combustion appliances and BRE Information Paper IP 21/92, Spillage of flue gases from open-flued combustion appliances.

See also Technical Guidance Document F - Ventilation.

1.4 Chimneys and connecting flue pipes

1.4.1 All heat producing appliances should have a balanced or low level flue or be connected to a flue pipe or chimney which discharges to the external air. However where an appliance is designed to operate without the direct discharge of the products of combustion to the outside air the manufacturer's installation requirements and the specific ventilation requirements applicable to the product must be complied with (see Section 3).

1.4.2 The development of heating appliances has resulted in new additional requirements for chimneys, e.g. operation with positive pressure, operation with the formation of condensate. A chimney or connecting flue-pipe serving any appliance should be suitable for use with that appliance. Flexible metal flue liners should not be used as a primary liner of a new chimney.

1.4.3 Condensates in chimneys: Chimneys and flue liners should provide satisfactory control of water condensation such as:

- (a) for chimneys connected to non condensing appliances the flue liner should be insulated so that flue gases do not condense in normal operation;
- (b) for chimneys connected to condensing appliances -
 - (i) lining components should be used that are impervious to condensate, have suitable resistance to corrosion (I.S. EN 1443 "W" designation) and have appropriate provision for draining, avoiding ledges, crevices, etc. and
 - (ii) provisions should be made for the disposal of condensate from condensing appliances.

1.4.4 Chimney designation: The characteristics under which chimneys are designated are specified in I.S. EN 1443:2003. These include operating temperature, pressure, condensate resistance, corrosion resistance, sootfire resistance and distance to combustibles, e.g. T600 N2 D 3 G80 (see Annex A).

shown in Diagram 2 irrespective of the fuel type.

Guidance on flue pipes and chimneys suitable for use with solid fuel appliances is given in Section 2. These are generally suitable for use with gas or oil-fired appliances which are not condensing. Guidance on alternative provisions, suitable for gas fired appliances or oil-fired appliances (both non-condensing and condensing), is given in Sections 3 and 4 respectively.

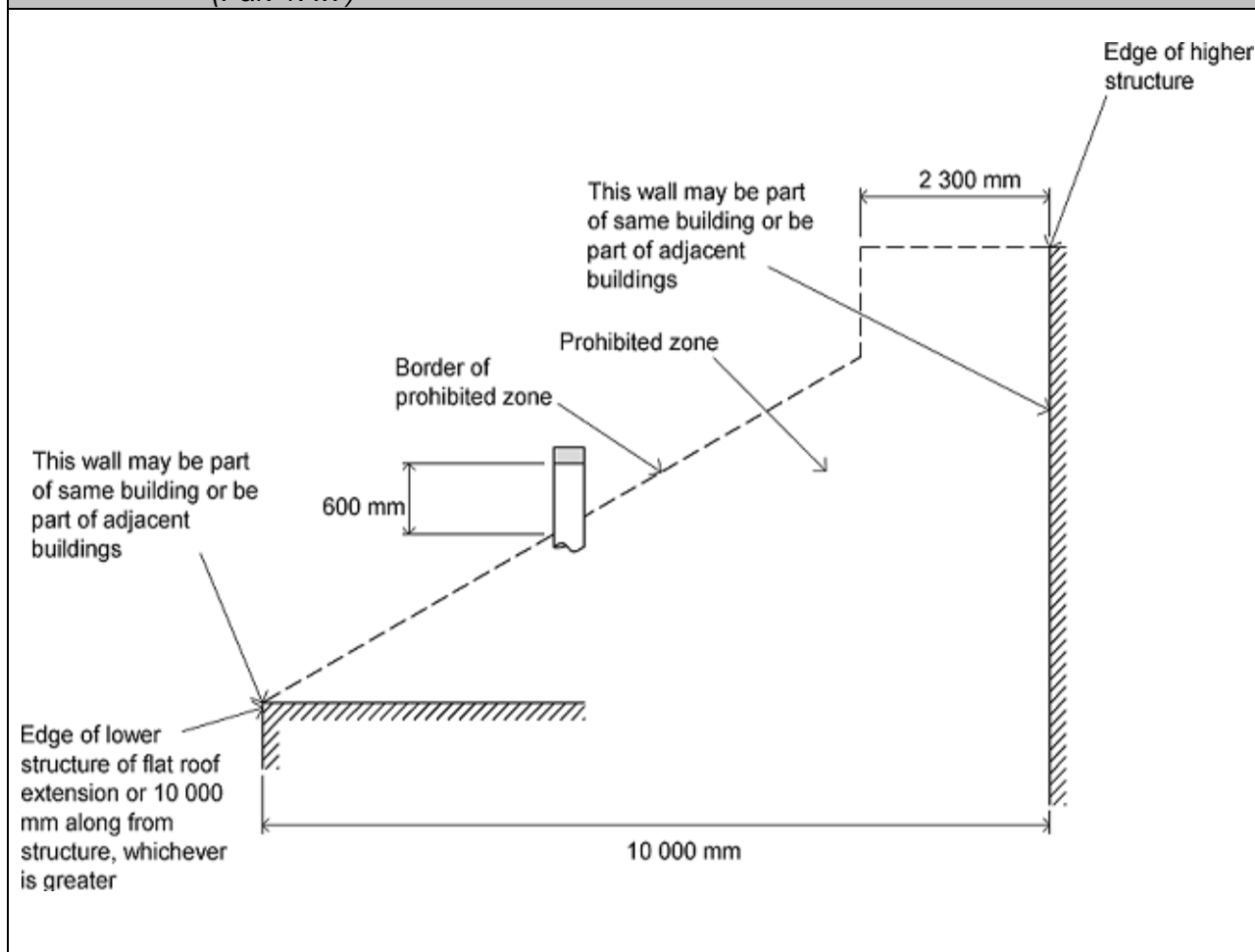
1.4.5 Provision should be made to enable a flue to be inspected and cleaned. An opening should only be made into a flue for the purpose of:

- (a) inspection or cleaning. The opening for this purpose should have a rigid, non-combustible and gastight cover, or a removable section in condensing type appliances; or
- (b) fitting an explosion door, draught stabilizer or draught diverter.

1.4.6 A flue should not open into more than one room or space except for the purpose of inspection or cleaning, but may serve more than one appliance in the same room. However, each solid fuel appliance should have its own flue.

1.4.7 Location of flue outlets: The location of flue terminals specific to the fuel type being used is given in Sections 2, 3 and 4 as appropriate. The outlet from an open-flued, natural draught appliance, for residential heating, (or comparable applications), located on a roof adjacent or adjoining a higher building should terminate above the prohibited zone as

Diagram 2 Open flue, natural draught chimney/flue outlet locations near adjacent or adjoining structures or buildings
(Par. 1.4.7)



1.4.8 Repair or reuse of existing flues or chimneys

1.4.8.1 Where it is proposed to bring a flue in an existing chimney back into use or to re-use a flue with a different type or rating of appliance, the flue and chimney should be checked and if necessary altered to ensure that they satisfy the requirements for the proposed use.

1.4.8.2 Defective flues may be relined using materials and components described in Sections 2, 3 or 4 depending on the type of

appliance proposed. Chimneys should be swept before relining to remove deposits. A flue may also need to be relined to reduce the flue area to suit the intended appliance as oversize flues can be unsafe.

1.4.8.3 Where a metal liner exists and the appliance is being replaced the condition of the metal liner should be checked and replaced where necessary.

1.4.8.4 Rigid stainless steel flue liners and flexible flue liners, appropriately designated in

accordance with I.S. EN 1856-2:2009 to suit the appliance and fuel type, may be used to reline a chimney. They may also be used to connect gas back boilers to chimneys where the appliance is located in a fireplace recess.

1.4.8.5 Existing custom-built masonry chimneys may be lined or relined using rigid or flexible flue liners with the appropriate designation and performance level specific to the type of fuel and appliance to be used (see Sections 2, 3 and 4 for performance levels).

Flexible flue liners may not be appropriate for large non-lined chimneys without specialist advice.

1.4.8.6 Masonry flue liners for use in existing chimneys should be installed in accordance with their manufacturer's instructions.

Appropriate components should be selected to form the flue without cutting and to keep joints to a minimum. Bends and offsets should only be formed with factory made components. Liners should be placed with the sockets or rebates ends uppermost to contain moisture and other condensates in the flue.

The space between the lining and the surrounding masonry may be filled with a weak insulating mix (see sub-section 2.5.3) unless the manufacturer's instructions specify the contrary.

1.5 Warning of the release of carbon monoxide in dwellings

1.5.1 Carbon monoxide: To ensure proper combustion and removal of the products of combustion a heat producing appliance should be correctly installed and regularly serviced. The provision of an alarm in accordance with the guidance below should not be regarded as a substitute for this.

1.5.2 Carbon monoxide alarms: Where a new or replacement open-flued or flueless

combustion appliance, not designed solely for cooking purposes, is installed in a dwelling, a carbon monoxide (CO) alarm should be provided:

- (a) in the room where the appliance is located, and
- (b) either inside each bedroom or, within 5 m (16 ft.) of the bedroom door, measured along the path of the corridor.

1.5.2.1 Where a system chimney is being used, with any heat producing appliance and the flue passes within or over a habitable room, (whether encased or not), then a CO alarm should be fitted in the room.

1.5.2.2 Alarm type: A carbon monoxide alarm depends on a sensing element the output of which changes in the presence of carbon monoxide. It has a limited life span and may become obsolete even though the electric circuitry remains functioning which is why an end of life alarm is required.

Carbon monoxide alarms should:

- (a) comply with I.S. EN 50291-1:2010/A1:2012; and
- (b) incorporate a visual and audible indicator to alert users when the working life of the alarm is due to pass; and
- (c) the manufacturer should have third party certification confirming compliance with the standard.

The carbon monoxide alarm may give an end-of-life indication in accordance with the following criteria:

- 1. powered by a non-replaceable (sealed) battery unit where the battery life does not exceed the life of the sensor;

-
2. powered by mains electricity(not plug in type) where a timer is included to indicate the end-of-life of the unit;
 3. powered by a replaceable battery where a timer is included to indicate the end-of-life of the unit.

1.5.3 Location:

1.5.3.1 The carbon monoxide alarm in a room containing an open-flued or flueless combustion appliance should be located –

- (a) either on the ceiling at least 300 mm from any wall or, if it is located on a wall, as high up as possible (above any doors and windows) but not within 150 mm of the ceiling; and
- (b) between 1000 mm and 3000 mm horizontally from the appliance; or
- (c) in accordance with the manufacturer's instruction.

1.5.3.2 Alarms located in bedrooms should be located relatively close to the breathing zone of the occupants.

1.5.3.3 Where a single room serves as living accommodation then the alarm should be positioned as far from the cooking appliances as possible but near to where the person sleeps.

1.5.3.4 Further guidance on the installation of carbon monoxide alarms is available in I.S. EN 50292:2002 and from manufacturers' instructions.

1.6 Sealing around fireplace openings

1.6.1 Where a decorative treatment, such as a fireplace surround, masonry cladding or dry lining is provided around a fireplace opening, any gaps that could allow flue gases to escape from the fireplace opening into the void behind the decorative treatment, should be sealed to

prevent such leakage. The method of sealing and the sealing material used should be capable of maintaining the seal despite any relative movement between the decorative treatment and the fireplace recess. Fireplaces should be securely fixed before sealing is carried out (for further guidance see BS 1251:1987 Specification for open-fireplace components and Fireplace Surrounds-Stone Federation Data Sheet March 2013).

1.7 Location of appliances

1.7.1 A permanent means of safe access to appliances should be provided for maintenance. For appliances installed in roof spaces, walkways may be necessary for this purpose. Where a heat producing appliance is installed in a domestic or other garage, precautions should be taken to avoid impact damage to the appliance by a vehicle. Such precautions may consist of: –

- (a) the provision of an adequate barrier around the appliance (see Technical Guidance Document K for guidance on barriers) or
- (b) locating the appliance at a level or in a part of the garage where it cannot be struck by a vehicle.

Whatever precautions are taken, adequate space should be provided to allow the appliance to be properly maintained.

1.8 Notice plates for hearths and flues

1.8.1 Where a hearth, fireplace (including a flue box), flue or chimney is provided (including cases where a flue is provided as part of the refurbishment work), a notice plate containing key information essential to the correct application and use of these facilities should be permanently posted in the building. The information should include the following:

-
- (a) the location of the hearth, fireplace (or flue box) or the location of the beginning of the flue;
 - (b) the category of the flue and generic types of appliances that can be safely accommodated;
 - (c) the type and size of the flue (or its liner if it has been relined) and the manufacturer's name (where applicable);
 - (d) the installation date and the installers name and registration number (where applicable).

1.8.2 Notice plates should be robust, indelibly marked and securely fixed in an unobtrusive but obvious position within the building such as:

- (a) next to the electricity consumer unit; or
- (b) next to the gas consumer unit; or
- (c) next to the chimney or hearth described.

1.9 Commissioning

1.9.1 Heat producing appliances serving the total dwelling should be commissioned and tested at completion so that the systems and their controls are left in the intended working order and can operate effectively and efficiently.

1.10 User information

1.10.1 The owner of the building should be provided with sufficient clear and comprehensive information on any continuing maintenance required to facilitate the effective operation of the heating system or systems in order to protect the health and safety of the building occupants.

Section 2

Additional provisions for solid fuel burning appliances (including solid biofuel) with a rated output up to 50kW

2.1 Guidance

Guidance given in this Section should be read in conjunction with guidance given in Section 1.

2.1.1 Guidance on the installation of solid fuel burning appliances is contained in the following standards:

I.S. 258: Domestic Solid Fuel Cookers with Integral Boilers, Part 1:1984 Safety Requirements, Part 2: 1984 General Requirements;

BS 8303 Installation of domestic heating and cooking appliances burning solid mineral fuels: Part 1: 1994 Specification for design of installations, Part 2: 1994 Specification for installing and commissioning on site and Part 3: 1994 Recommendations for design and on site installation;

I.S.EN 15287-1:2007+A1:2010 Chimneys — Design, installation and commissioning of

Chimneys Part 1: Chimneys for non-room sealed heating appliances;

I.S.EN 15287-2:2008 Chimneys — Design, installation and commissioning of Chimneys Part 2: Chimneys for room sealed heating appliances.

2.2 Air supply to appliances

Any room or space containing an appliance should have a ventilation opening (or openings) of at least the size shown in Table 1. For appliances designed to burn a range of different solid fuels the air supply should be designed to accommodate burning the fuel that produces the highest heating output.

Table 1: Air supply to non-room sealed solid fuel appliances

Appliance Type	Minimum air opening to outside
Solid fuel burning open flue appliance with or without a throat e.g. open fire.	A permanent ventilation opening (or openings) with a total free area of at least 50% of the appliance throat opening area, <i>or of the area of flue serving the appliance, where no throat involved</i> , should be provided. At least 6,500 mm ² of the openings should be permanent ventilation. For description and dimensions of “throat”, see BS 8303: Part 1:1994).
Other open flue solid fuel appliance.	Any room or space containing an appliance (other than a room sealed appliance) should have a permanent ventilation opening of free area of at least: 6,500 mm ² where air permeability is greater than 5.0 m ³ /(hr.m ²), or 6,500 mm ² + 550 mm ² per kW of rated output above 5 kW where air permeability is less than 5.0 m ³ /(hr.m ²).
Other solid fuel appliance with a flue draught stabilizer.	Where a flue draught stabilizer is used the total free area should be increased by 300 mm ² for each kW of rated output.
Note: It is unlikely that dwellings built prior to 2008 would have an air permeability of less than 5m ³ /(hr.m ²), at 50 Pa unless extensive airtightness measures have been carried out (see Appendix B for further guidance on airtightness of dwellings).	

2.3 Flues

2.3.1 Flue size: Flue sizes should be at least:

- (a) for connecting flue pipes, equal to that of the flue outlet on the appliance;
- (b) for chimneys, at least the size shown in Table 2, but never less than the size of the flue outlet on the appliance or that recommended by the appliance manufacturer.

Specialist advice should be sought when proposing to construct flues having an area of:

- more than 15% of the total face area of the fireplace openings; or
- more than 120,000 mm² (0.12m²).

2.3.2 Height of flues: Flues should be high enough to ensure sufficient draught to clear the products of combustion. The height necessary will depend upon the type of appliance, the height of the building, the type of flue and the number of bends in the flue (see Diagram 2, 3 or 4 as appropriate).

2.3.3 Location of flue outlets: The outlet from a flue should be positioned above the roof of a building as shown in Diagram 3. Where flues discharge on or near roofs with surfaces which are readily ignitable, such as thatch or shingle roofs, the clearance between flue and roof should be increased (see Diagram 4).

2.3.4 Direction of flues: Flues should be vertical wherever possible and where a bend is necessary, it should not make an angle of more than 45° with the vertical. Horizontal flue runs should be avoided except in the case of a back outlet appliance, when the length of the horizontal section should not exceed 150 mm unless otherwise specified.

Bends above the flue mouth may help to reduce splashes of rain and soot that may fall on the hearth but the angle of the bend should be no greater than 45° and preferably less than 30°.

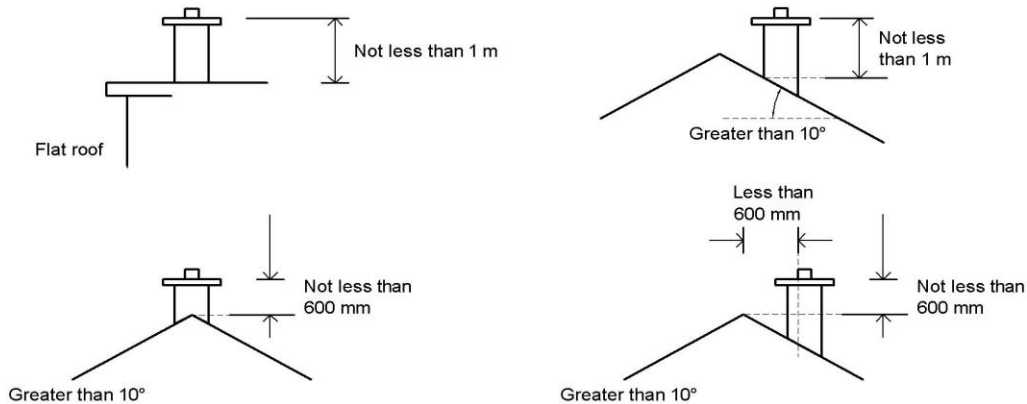
The inside surface of the bend should be smooth and there should be no reduction in the area of the flue at the bend.

Table 2: Sizes of flues

Installation	Minimum flue size
Fireplace recess for an open fire or other open appliance with an opening up to 500 mm x 550 mm.	200 mm diameter or square section of equivalent area.
Fireplace recess with an opening in excess of 500 mm x 550 mm, or fireplace open on 2 or more sides, e.g. fireplace with canopy.	A free area of 15% of the area of the recess or fireplace openings.
Closed appliance up to 20 kW rated output burning bituminous coal, peat or seasoned timber.	150 mm diameter or square section of equivalent area.
Other closed appliance up to 20 kW rated output burning smokeless, low volatile fuel or wood pellets.	125 mm diameter or square section of equivalent area.
Closed appliance above 20 kW and up to 30 kW rated output.	150 mm diameter or square section of equivalent area.
Closed appliance above 30 kW and up to 50 kW rated output.	175 mm diameter or square section of equivalent area.
Note: All dimensions refer to internal measurement.	

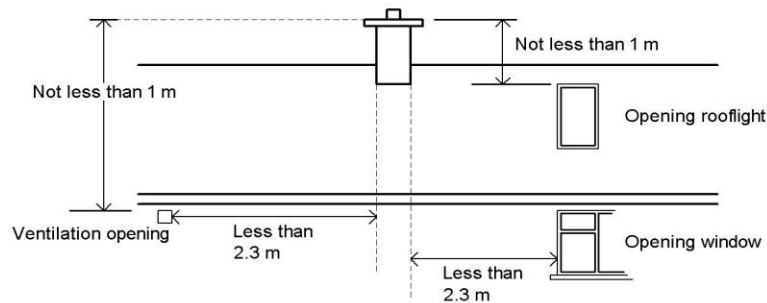
Diagram 3 Outlets from flues for solid fuel burning appliances (Par. 2.3.3)

Outlet of a chimney or a flue to be not less than 1m above the highest point of contact of chimney and roof. Where the roof has a pitch of more than 10° on both sides and the outlet is at the ridge or within 600 mm of it, the height of the chimney or flue pipe may be reduced to 600 mm.



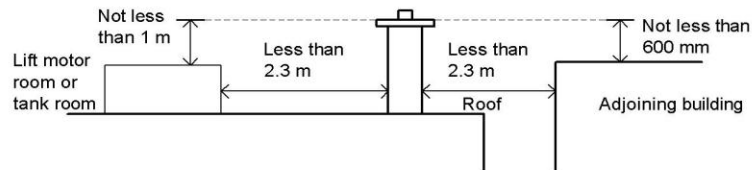
(a) HEIGHT OF FLUE OVER ROOF

The outlet of a chimney or flue pipe should also be not less than 1m above the top of any opening skylight, opening window or wall ventilator within 2.3 m.



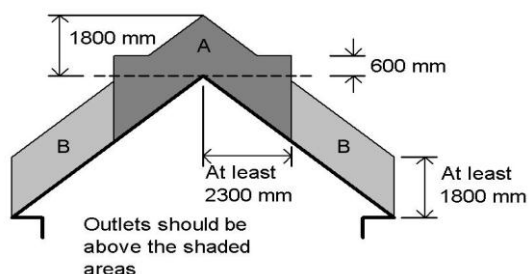
(b) HEIGHT OF FLUE OVER OPENINGS

The outlet of a chimney or flue pipe in relation to adjacent or adjoining buildings should be as shown below.



(c) HEIGHT OF FLUE OVER ADJACENT OR ADJOINING BUILDING

Diagram 4 Outlets from flues for solid fuel burning appliances - clearances to readily ignitable roof coverings (Par. 2.3.3)



Location of Flue Terminals relative to easily ignitable roof coverings

Zone A - At least 1.8 m vertically above the weather skin; and at least 600 mm above the ridge.

Zone B - At least 1.8 m vertically above the weather skin and at least 2.3 m horizontally from the weather skin.

2.4 Connecting flue pipes

2.4.1 A connecting flue pipe should only be used to connect an appliance to a chimney.

2.4.2 Connecting flue pipes may be of any of the following materials complying with the requirements of I.S. EN 1856-2:2009:

- (a) Cast iron conforming to material type 00 (Table 2, I.S. EN 1856-2:2009);
- (b) Mild steel conforming to material type 01, (Table 2, I.S. EN 1856-2:2009), with a minimum wall thickness of 3 mm;
- (c) stainless steel conforming to materials type 40, 50 or 60 (Table 2, I.S. EN 1856-

2:2009) with a minimum wall thickness of 1 mm;

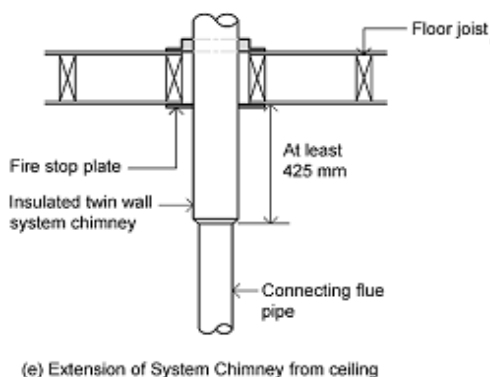
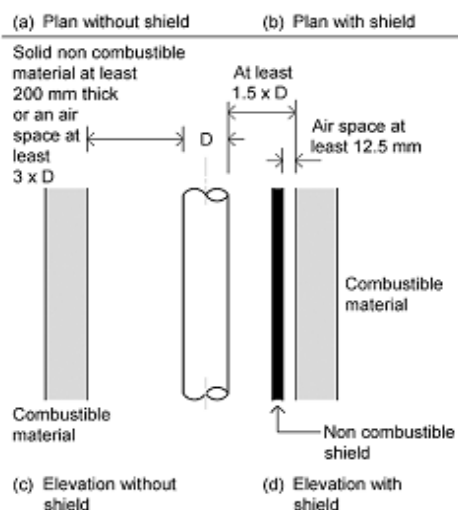
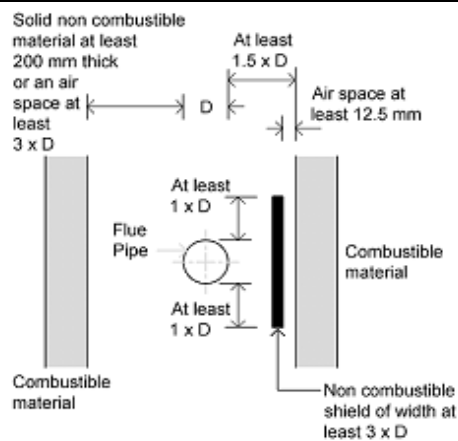
- (d) Double sided vitreous enamelled steel flue pipes conforming to material type 80 (Table 2, I.S. EN 1856-2:2009) with a minimum steel wall thickness of 1.2 mm.

2.4.3 Connecting flue pipes with spigot and socket joints should be fitted with the socket uppermost to contain moisture and other condensates in the flue.

2.4.4 Location and shielding: Connecting flue pipes should not pass through any roof space, partition, internal wall or floor, except to pass directly into a chimney through either a wall of the chimney or a floor supporting the chimney. Connecting flue pipes should also be guarded if they could be at risk of damage or if the burn hazard they present to people is not immediately apparent. Uninsulated flue pipes should be separated from combustible material by at least the distances shown in Diagram 5.

Where a connecting flue pipe is connected to a system chimney at the ceiling level a drop of 425 mm of twin wall chimney would provide sufficient shielding to give the required straight-line clearance for the single wall connecting pipe to the ceiling for domestic installations (for further information see HETAS Technical Note HTN004).

Diagram 5 Separating flue pipe from surface of adjacent combustible material
(Par. 2.4.4)



2.5 Chimneys

2.5.1 Chimneys for use with solid fuel appliances should be capable of operating at flue gas temperatures of 600°C and of withstanding a sootfire (temperature of 1000°C) without any structural change which would impair the stability or performance of the chimney.

2.5.2 Where a chimney is not directly over an appliance, provision should be made for adequate cleaning and debris removal. Where necessary, a debris collecting space should be provided which is accessible for emptying.

2.5.3 Masonry chimneys: Custom built or built in-situ masonry chimneys should be lined with:

- (a) liners meeting the performance level represented by designation T600 N2 D 3 G as defined in I.S. EN 1443:2003.

These include:

- (i) clay/ceramic flue liners with rebated or socketed joints meeting Class A1N2 or A1N1 as described in I.S. EN 1457: Part 1 2012, (see Table A5) or
 - (ii) concrete flue liners with rebated or socketed joints meeting Class Type A1 or A2 as described in I.S. EN 1857:2010 (see Table A6);
- (b) high alumina cement and kiln burnt or pumice aggregate pipes with rebated or socketed joints or steel collars around joints.

The liners should be fitted with the sockets or rebates uppermost. Liners should be jointed with fire-proof mortar, and any space between the liners and the brick/block work should be filled with a weak 1:1:12 cement/lime/sand mortar or insulating mix such as:

- (a) one part ordinary Portland cement to 6 parts Vermiculite, or

-
- (b) one part ordinary Portland cement to 10 parts Perlite, or
 - (c) one part ordinary Portland cement to 20 parts suitable lightweight expanded clay aggregate minimally wet.

2.5.4 Flueblock chimneys: These chimneys should be constructed of factory made components suitable for their intended use. They may incorporate a flue or be lined. Flueblocks suitable for use with solid fuel appliances include:

- (a) flueblocks meeting the performance level represented by designation T600 N2 D 3 G as defined in I.S. EN 1443:2003.

These include:

- (i) clay flueblocks meeting Class FB1 N2 as described in I.S. EN 1806:2006,
 - (ii) concrete flueblocks meeting Class A1 or A2 as described in I.S. EN 1858:2008 (see Table A6);
- (b) flueblocks lined as specified for masonry chimneys in sub-section 2.5.3. and meeting the classification T600 N2 D 3 G as described in I.S. EN1443:2003.

2.5.5 Wall thickness: The thickness of the walls of a brick or blockwork chimney or a flueblock chimney, excluding the thickness of any liner should be at least:

- (a) 100 mm thick between one flue and another,
- (b) 100 mm thick between a flue and the outside air or between a flue and another part of the same building (but not another part which is a dwelling or is

- constructed as a separate fire compartment),
- (c) 200 mm thick between a flue and another compartment of the same building, another building or another dwelling. This thickness should be carried up to the underside of the roof covering,
- (d) 200 mm thick between one flue and another where flues serve appliances located in separate compartments, buildings, or dwellings. This thickness should be carried up to the underside of the roof covering.

2.5.6 Combustible material: Combustible material should be separated from a masonry chimney or a flueblock chimney by at least the following distance:

- (a) 200 mm from a flue, or
- (b) 40 mm from the outer surface of a chimney or fireplace recess unless it is a floorboard, skirting, dado or picture rail, mantelshelf or architrave. Metal fixings in contact with combustible materials should be at least 50 mm from a flue (see Diagram 6).

Diagram 6 Minimum separation distances from combustible material in or near a chimney
(Par. 2.5.6)

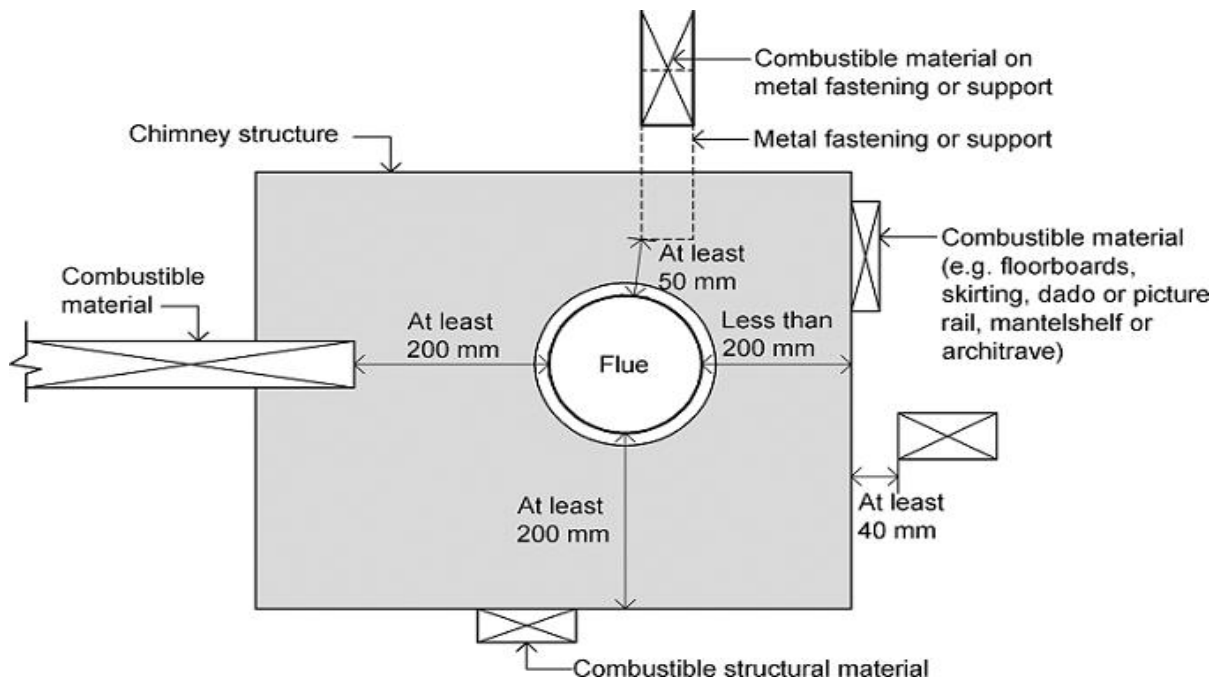
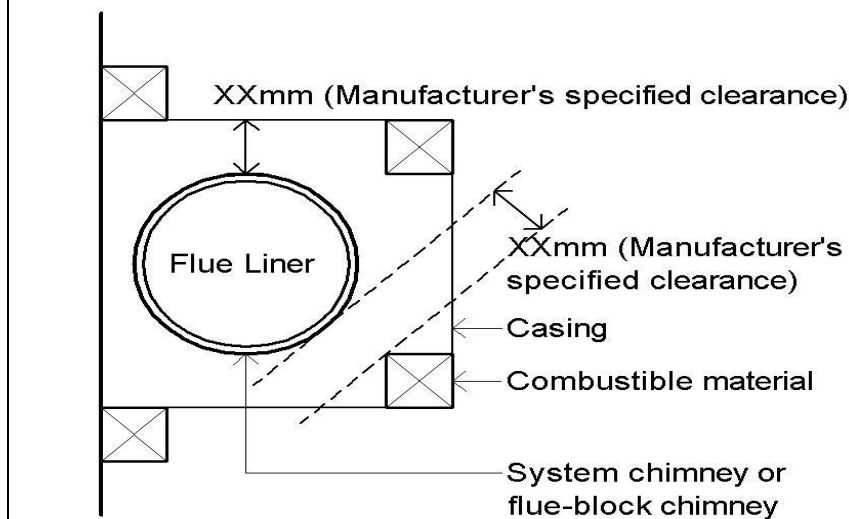


Diagram 7 Relationship of system chimneys to combustible material
(Par. 2.5.8)



2.5.7 Metal system chimneys: These chimneys should be double-walled insulated chimneys:

- (a) constructed in accordance with the recommendations of I.S. EN 1856-1 and meeting the performance levels represented by the designation T600 N1 D 3 G, or T450 N1 W 2 G for wood pellet appliances, or
- (b) where a connecting flue with a length of not less than 600 mm meeting the above designation is used the chimney designation may be reduced to T450 N1 D 3 G, and
- (c) installed in accordance with the relevant recommendations in I.S. EN 15287-1:2007.

2.5.8 A metal system chimney should not:

- (a) pass through any part of the building forming a separate compartment, unless it is cased in non-combustible material giving at least half the fire resistance of the compartment wall or floor (see Technical Guidance Document B - Fire Safety);
- (b) be placed with its outer wall nearer to combustible material than a distance xx, or
- (c) pass through a cupboard, storage space or roof space, unless it is surrounded by a non-combustible guard at a distance of at least xx from the outer wall of the chimney.

For (b) and (c) above, the distance **xx** should be specified by the manufacturer in accordance with I.S. EN 1856-1 (see Diagram 7).

2.5.9 The heating appliance should not support the weight of the chimney except

when the heating appliance manufacturer states in his instruction that the load bearing capacity is sufficient and where cleaning of the chimney can be undertaken without dismantling.

The liner manufacturer's instructions for supporting the liner should be followed. Where the liners are to be supported on a lintel or foundations at the base of the chimney they should be adequate for the liner load, including any condensate collectors, cleaning and inspection elements, and T-pieces or elbows.

The spacing of supports and unsupported height declared by the manufacturer should not be exceeded. Chimneys in accordance with I.S. EN 1858:2008 should have a maximum unsupported height of 4.5 times the least cross sectional dimension, but not higher than 3 m.

2.5.10 Rigid or flexible flue liners: Stainless steel rigid or flexible flue liners complying with the appropriate designation of I.S. EN 1856-2:2009 and meeting the performance level specified in sub-section 2.5.7 may be used in an existing chimney.

Flexible metal flue liners should be installed in one complete length without joints within the chimney. When being installed for a solid fuel appliance in a flue lined chimney it should be sealed at the top and bottom, the space between the chimney and the liner should be filled with an appropriate insulating material, (see sub-section 2.5.3), unless this is contrary to the manufacturer's instructions.

Flexible flue liners may not be appropriate for large non-lined chimneys without specialist advice.

2.6 Fireplace gathers

2.6.1 Tapered gathers should be provided to fireplaces for open fires. Gathers should be constructed of non-combustible materials. Ways of achieving these gathers include:

-
- (a) using prefabricated gather components built into a fireplace recess, or
 - (b) corbelling of masonry; or
 - (c) using a suitable canopy; or
 - (d) using a prefabricated appliance chamber incorporating a gather.

2.7 Hearths

2.7.1 A solid fuel appliance should be provided with a solid, non-combustible hearth that will prevent the heat of the appliance from igniting combustible materials. A hearth should be either:

- (a) a constructional hearth at least 125 mm thick; or
- (b) a free-standing, solid, non-combustible hearth at least 12 mm thick.

The hearth area should be not less than the area shown in Diagram 9 and the appliance itself should be located on the hearth in accordance with Diagram 12 in order to give adequate protection from the risk of ignition of the floor by direct radiation, conduction or falling embers.

2.7.1.1 Constructional hearths

A constructional hearth should be provided of solid, non-combustible material, such as concrete or masonry, at least 125 mm thick (which may include the thickness of any solid, non-combustible floor and/or decorative surface) and be at least the sizes shown in Diagram 9.

Combustible material should not be placed under a constructional hearth unless:

- it is to support the edges of the hearth, or

- there is an air space of at least 50 mm between the material and the underside of the hearth, or
- there is a distance of at least 250 mm between the material and the top of the hearth (see Diagram 8).

2.7.1.2 Free standing hearths

A free-standing, solid, non-combustible hearth should only be provided where the appliance will not cause the temperature of the top surface of the hearth on which it stands to be more than 100° C. It should be at least 12 mm thick, and should have a minimum plan area of 840 mm x 840 mm as shown in Diagram 9.

2.8 Fireplace recesses

2.8.1 Fireplace recesses should be constructed of solid non-combustible material to the appropriate size given in Diagram 10.

2.8.2 Fireplace lining components: A fireplace recess may require protection from the heat of inset open fires, to ensure durability, by the use of fireplace lining components or fire bricks.

2.8.3 Walls adjacent to hearths: Walls adjacent to hearths, which do not form part of a fireplace recess, should be constructed as indicated in Diagram 11 and Diagram 14.

2.9 Location of appliances

2.9.1 An appliance:

- (a) should not be placed closer to the edges of a constructional hearth or to any combustible material laid on it, than is shown in Diagram 12, and
- (b) should be separated from combustible materials as shown in Diagram 13.

Diagram 8 Combustible material under hearth
(Par. 2.7.1)

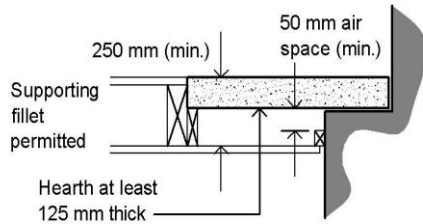


Diagram 9 Hearth sizes
(Par. 2.7.1)

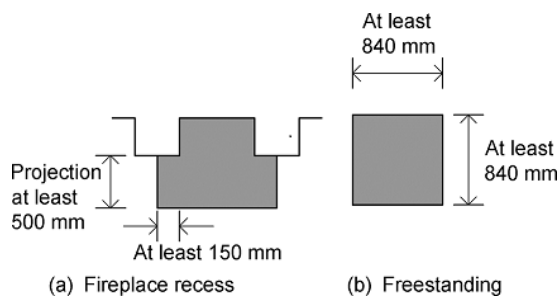


Diagram 10 Fireplace recesses
(Par. 2.8.1)

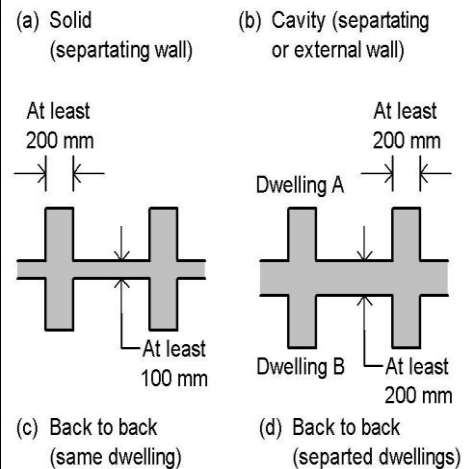
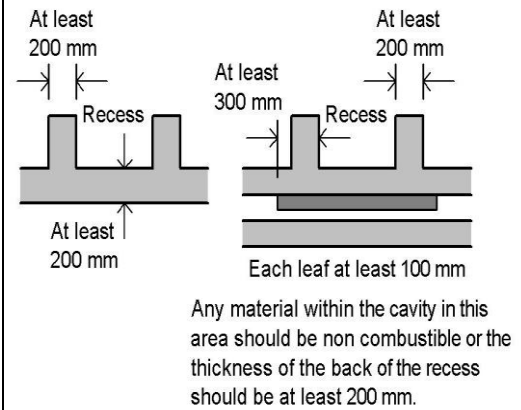


Diagram 11 Wall adjacent to hearth
(Par. 2.8.3)

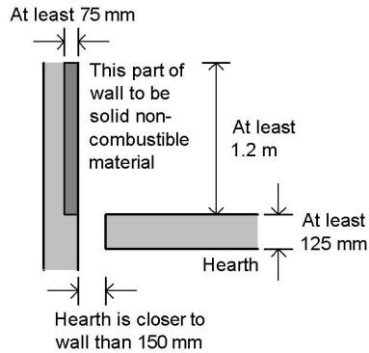


Diagram 12 Placing appliance on a hearth
(Par. 2.9.1)

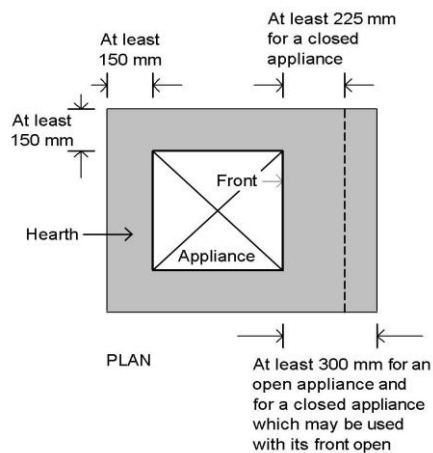


Diagram 13 Separating appliance from combustible materials in walls
(Par. 2.9.1)

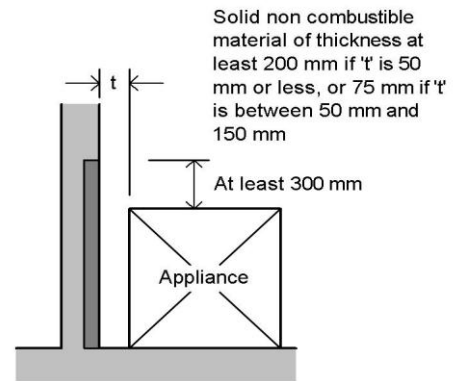
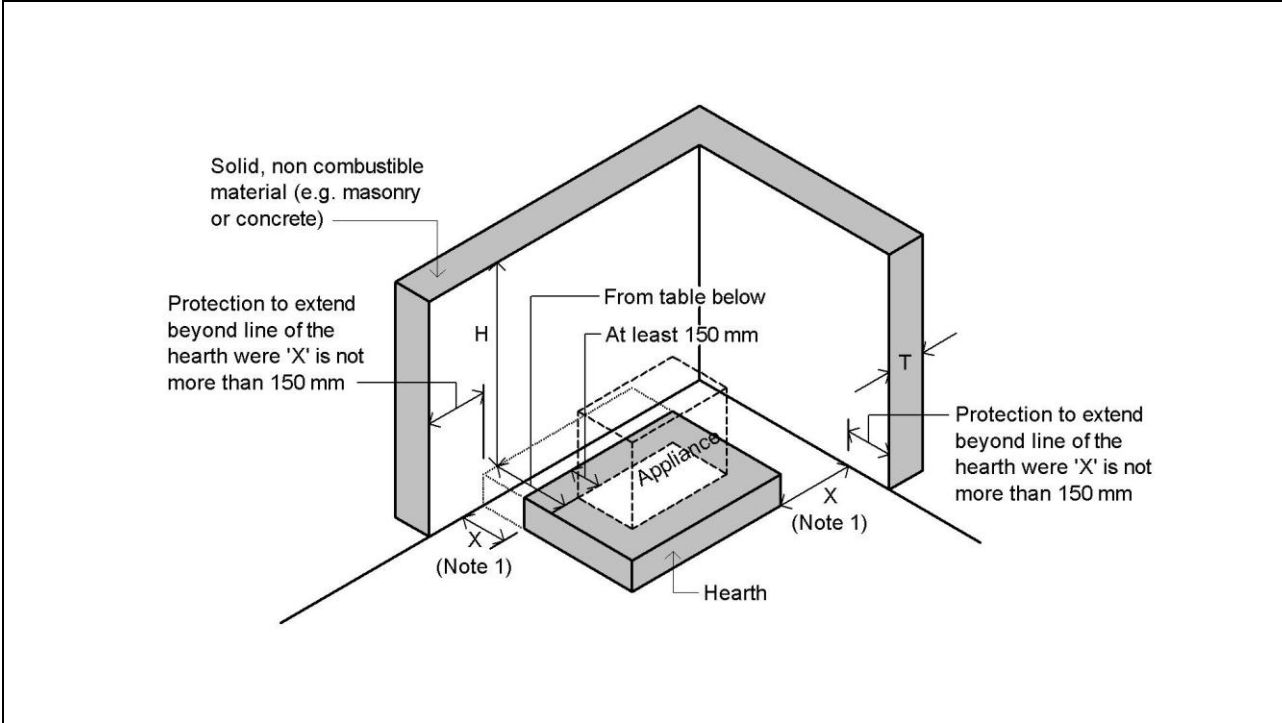


Diagram 14 Wall adjacent to hearths
(Par. 2.8.3)



Hearth and appliance adjacent to any of a building

Location of hearth or appliance	Thickness (T) of solid non-combustible material	Height (H) of solid non-combustible material
Where the hearth abuts a wall and the appliance is not more than 50 mm from the wall.	200 mm	At least 300 mm above the appliance or 1.2 m above the hearth whichever is greater.
Where the hearth abuts a wall and the appliance is more than 50 mm but not more than 150 mm from the wall.	75 mm	At least 300 mm above the appliance or 1.2 m above the hearth whichever is the greater.
Where the hearth does not abut a wall and is not more than 150 mm from the wall.	75 mm	At least 1.2 m above the hearth.

Note:

1. There is no requirement for protection of the wall where X is more than 150 mm.

1. There is no requirement for protection of the wall where X is more than 150 mm.

Section 3 - Additional provisions for fixed gas burning appliances with a rated input up to 70 kW and for gas burning cooking appliances

3.1 Guidance

3.1.1 The guidance in this Section should be read in conjunction with guidance given in Section 1.

3.1.2 Requirements for the installation of gas burning appliances (natural gas and liquefied petroleum gas (LPG)) are contained in I.S. 813:2014 Domestic Gas Installations and I.S. 820:2010 Non-domestic Gas Installations. Additional guidance for specific appliances is contained in the following standards and codes of practice:

I.S. EN 449:2002 (LPG Appliances – Domestic flueless space heaters);

I.S. EN 509:2000 (Decorative fuel-effect gas appliances);

BS 5546:2010 (gas appliances providing hot water supplies for domestic purposes);

BS 5864:2010 (ducted-air heaters);

BS 6173:2009 (catering appliances).

3.1.3 All gas appliances should be installed and commissioned by a competent person and in accordance with the requirements of the Commission for Energy Regulation (CER).

3.2 Fixed flued gas fires

3.2.1 There are three main types of such fires (see Diagram 15):

- (a) radiant convector gas fires,
- (b) inset live fuel-effect (ILFE) fires, and
- (c) decorative fuel-effect (DFE) fires - may be inset in a fireplace or fitted under a canopy.

3.2.2 Installation of appliances should be in accordance with the relevant recommendations of I.S. 813:2014. Decorative Fuel and Inset Live-Effect fires exceeding 15 kW input should not be installed in domestic dwellings.

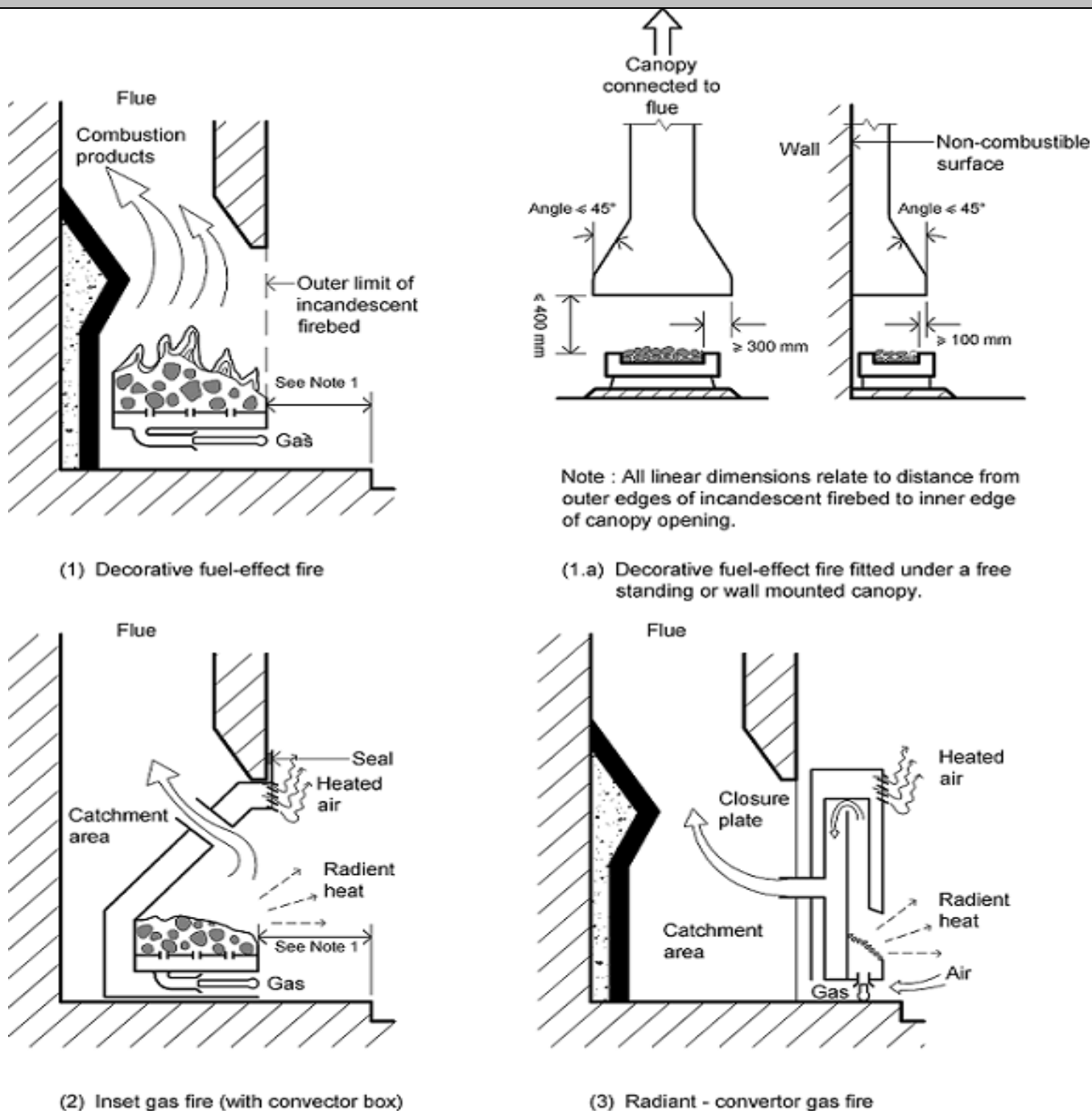
3.3 Fixed flueless gas fires

3.3.1 This type of appliance discharges the products of combustion to the room in which it is situated. This type of appliance should not be installed for use as a primary source of room heating. Installation should be in accordance with the relevant requirements of I.S. 813:2014.

3.4 Appliances in bathrooms and garages

3.4.1 Any appliance in a bath or shower room or a private garage must be of the room-sealed type.

Diagram 15 Examples of fires
(Par. 3.2.1)



Decorative & Inset Live Fuel - Effect fires

Note 1. The hearths for DFE & ILFE fires should extend 300 mm beyond the outer edge of incandescent fire bed.

Table 3: Locations and permanent ventilation requirements for flueless appliances

Appliance Type	Maximum allowable Input Rate	Locations not permitted	Minimum air opening to outside	Other requirements
Fixed Space heater (see note 1).	4.2 kW	Bedrooms. Bathrooms. Shower rooms. Private garages. Rooms without an openable window.	Permanent openings of a minimum of 12,000 mm ² . The total ventilation requirements should be equally divided between high and low level openings on the same wall separated by a minimum distance of 1,600 mm.	All space heaters should incorporate an oxygen depletion protection device (see note 2).
Cookers, hobs, ovens and grills.	20 kW	Bedrooms. Bathrooms. Shower rooms. Private garages. Rooms < 5 m ³ in volume.	<p>1) Room with a volume of 5 m³ to 11 m³ should have a door opening directly to the external air or a permanent opening of 6,500 mm².</p> <p>2) Room with a volume >11 m³ should have a door opening directly to the external air or normal air infiltration (see note 3).</p> <p>3) Bed-sitting room should have a permanent opening of 10,000 mm².</p>	<p>All rooms containing a cooker should have an openable window or extract hood or fan discharging to outside.</p> <p>For dwellings with MVHR an openable window and extract fan is required.</p>

Note:

1. This type of heater is not normally intended as a primary heat source.
2. As combustion products from this appliance are released directly into the room additional provisions may be needed to avoid condensation and ensure satisfactory air quality. Advice should be sought from the manufacturer of the specific appliance if not included in the manufacturer's instructions.
3. This assumes an air tightness of greater than 5 m³/(hr.m²) at 50 Pa. If the air tightness is assessed as being less than 5 m³/(hr.m²) a permanent opening of 6,500 mm² should be provided. It is unlikely that dwellings built prior to 2008 would have an air permeability of less than 5 m³/(hr.m²) at 50 Pa unless extensive air tightness measures have been carried out (see Appendix B for further guidance on air tightness of dwellings).

3.5 Air supply to appliances

3.5.1 Flueless appliances: When locating any flueless appliance reference should be made to Table 3 and I.S.813:2014 for locations permitted and air supply required as combustion products from these appliances are released directly into the room where they are located.

3.5.2 Open-flued appliances: Any room or space containing an open-flued appliance should comply with the requirements as set out in Table 4 for permanent ventilation openings.

3.5.3 Additional guidance regarding the size and positioning of ventilation openings, including guidance for when there is more than one open-flued or flueless appliance in a room or space and for when the appliance is situated in a compartment is contained in I.S. 813:2014 and I.S. 820:2010.

Table 4: Air supply – Open-flued heating appliances - minimum ventilation opening requirements

Appliance type and input	Room volume greater than 10 m ³	Room volume less than 10 m ³
Decorative Fuel-Effect Fire (DFE)	6,500 mm ²	10,000 mm ²
Open-flued appliance Input Rating – 7 kW or less	No Requirement ^a	3,500 mm ²
Input rating greater than 7 kW but less than 14 kW	35,00 mm ² ^b	6,500 mm ²
Input rating greater than 14 kW	3,500 mm ² minimum ^b plus 450 mm ² /kW above 14 kW	6,500 mm ² minimum plus 450 mm ² /kW above 14 kW
Note: <p>a. This assumes an air tightness of greater than 5 m³/(hr.m²), at 50 Pa. If the air tightness is assessed as being less than 5 m³/(hr.m²), a ventilation opening of 3,500 mm² should be provided.</p> <p>b. This assumes an air tightness of greater than 5 m³/(hr.m²), at 50 Pa. If the air tightness is assessed as being less than 5 m³/(hr.m²), a ventilation opening of 6,500 mm² should be provided.</p> <p>c. It is unlikely that dwellings built prior to 2008 would have an air tightness value of less than 5 m³/(hr.m²), at 50 Pa unless extensive air tightness measures have been carried out (see Appendix B for further guidance on air tightness of dwellings).</p>		

3.6 Flues

3.6.1 Open-flued appliances

3.6.1.1 Flue size: The flue size should be at least the following:

- (a) Flues for Decorative Fuel-Effect (DFE) fires should have a minimum dimension, (circular or square), not less than 175 mm, or a cross sectional area of 32,000 mm² if the flue is rectangular, and have a minimum dimension of 90 mm,
- (b) Flues for Inset Live Fuel Effect (ILFE) fires should have a minimum dimension, (circular or rectangular), not less than 125 mm,
- (c) Flues for other open-flued gas fires should have a cross-section area of at least 12,000 mm² if the flue is round, or 16,500 mm² if the flue is rectangular, and have a minimum dimension of 90 mm, and
- (d) Flues for any other appliance, should have a cross-sectional area of at least that of the outlet from the appliance.

The cross sectional area of the flue at the appliance should be maintained or increased along its length in accordance with the manufacturer's recommendations. The cross sectional area should not be reduced at any point along the length of the flue.

3.6.2 Flue direction

3.6.2.1 For natural draught flue: Horizontal flue runs should be avoided except in the case of a back outlet appliance, when the length of the horizontal section should not exceed 700 mm. If a bend is necessary in a flue, it should not make an angle of more than 45° with the vertical. Where the use of angles greater than 45° from the vertical cannot be avoided, the following should apply:

- no downward sloping sections should be permitted;
- angled sections should not exceed 700 mm in total length;
- the minimum vertical height of the flue should be 1.3 m.

3.6.2.2 For non-natural draught flue: reference should be made to the appliance or flue manufacturer's instructions.

3.6.3 Concealed flues

3.6.3.1 Where a metal or plastic chimney system is routed within a void and consists of more than 2 joints, appropriate means of access at strategic locations should be provided to allow a visual inspection to ensure the following:

- the flue is continuous throughout its length,
- all joints appear correctly assembled and appropriately sealed,
- the flue is adequately supported along its length,
- any required gradient of fallback to the boiler is provided.

3.6.4 Outlets from flues

3.6.4.1 The outlet from a balanced-flued appliance should be:

- (a) so situated externally as to allow free intake of air and dispersal of products of combustion, and
- (b) protected with a guard if persons could come into contact with the terminal or if it could be subject to damage, and
- (c) designed so as to prevent the entry of any matter which might restrict the flue.

3.6.4.2 The outlet from any other appliance should be:

- (a) so situated at roof level, that air may pass freely across it at all times, and
- (b) fitted with a flue terminal if the flue outlet is less than 175 mm measured across the axis of the flue and the appliance is not a gas fire or
- (c) fitted with a guard to prevent the entry of any matter which might restrict the flue where the outlet is greater than 175 mm.

Table 5 gives appropriate distances for terminals as shown in Diagram 16.

Note: The flue terminal positions are in accordance with the safety distances set out in I.S. 813. Consideration may be given to siting a condensing boiler flue terminal such that the plume of wet flue products does not impinge on or significantly affect the use of the dwelling and also the neighbouring buildings.

Care may need to be taken to locate flue outlets from condensing boilers away from parts of a building that may be damaged by frequent wetting. The direction of the flue may be altered by specialist diversion kits which should be appropriate for the flue, appliance and fuel being used. Further detailed guidance regarding the location of flue outlets is contained in I.S. 813:2014 and I.S. 820:2010.

Diagram 16 Location of flue outlets for gas appliances
(Par. 3.6.4)

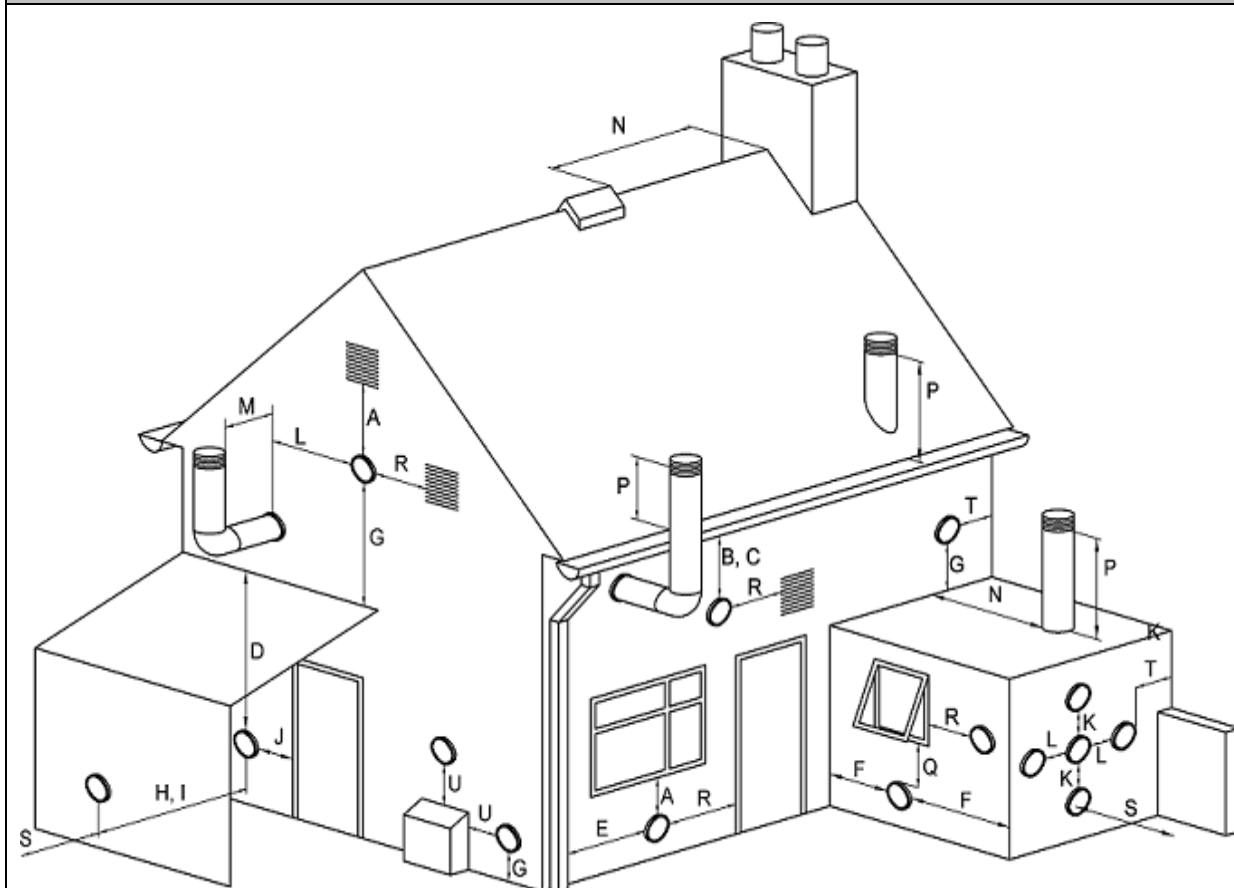


Table 5: Flue terminal locations (see Diagram 16)

Terminal position All dimensions in mm	REF. Dimension	Room sealed		Open Flues	
		Natural Draught	Fanned Draught	Natural Draught	Fanned Draught
Directly below opening vent, window, air brick, etc.	A*	300	300	N/P	300
Below gutters, soil pipes.	B	300	75	N/P	75
Below eaves.	C	300	200	N/P	200
Below balconies, car port roof.	D	600	200	N/P	75
From a vertical drain/soil pipe.	E	75	75	N/P	300
From an internal/external corner.	F	600	300	N/P	300
Above ground roof or balcony level.	G*	300	300	N/P	300
From a surface or Boundary facing a terminal.	H*	600	600	N/A	600
From a terminal facing a terminal.	I*	600	1,200	N/A	1,200
From an opening in a car port into a dwelling.	J*	1,200	1,200	N/A	1,200
Vertical from a terminal on the same wall.	K*	1,500	1,500	N/A	1,500
Horizontal from a terminal on the same wall.	L*	300	300	N/A	300
From the wall on which the terminal is mounted.	M	N/A	N/A	N/A	50
From a vertical structure on the roof.	N	N/A	N/A	See Diagram 17 (a) & (b)	N/A
Above intersection with the roof.	P	N/A	N/A		N/A
Below horizontal hinged window.	Q*	1,000	3,000 Where the exhaust is directly upwards, Otherwise 1,000	N/P	3000 Where the exhaust is directly upwards, Otherwise 1000
Horizontal from door, window, vent or air brick.	R*	300	300	N/P	300
From an opening of a building directly opposite.	S	600	2,000	N/A	N/A
Terminal running parallel to the boundary.	T	300	300	N/A	N/A
From a gas meter or gas meter cabinet.	U	300	300	N/A	N/A
Note: <ol style="list-style-type: none"> 1. N/P means "Not Permitted". N/A means "Not Applicable". 2. M relates to fanned draught flue only, terminating below level of roof. 3. The distance marked with a * are minimum safety distances and override any lesser dimensions given by the appliance manufacturer. Other distances not marked with a * are to be applied in the absence of any advice from the appliance manufacturer. 					

Diagram 17(a) Open-flued gas terminals exiting through or adjacent to roof
(Par. 3.6.4)

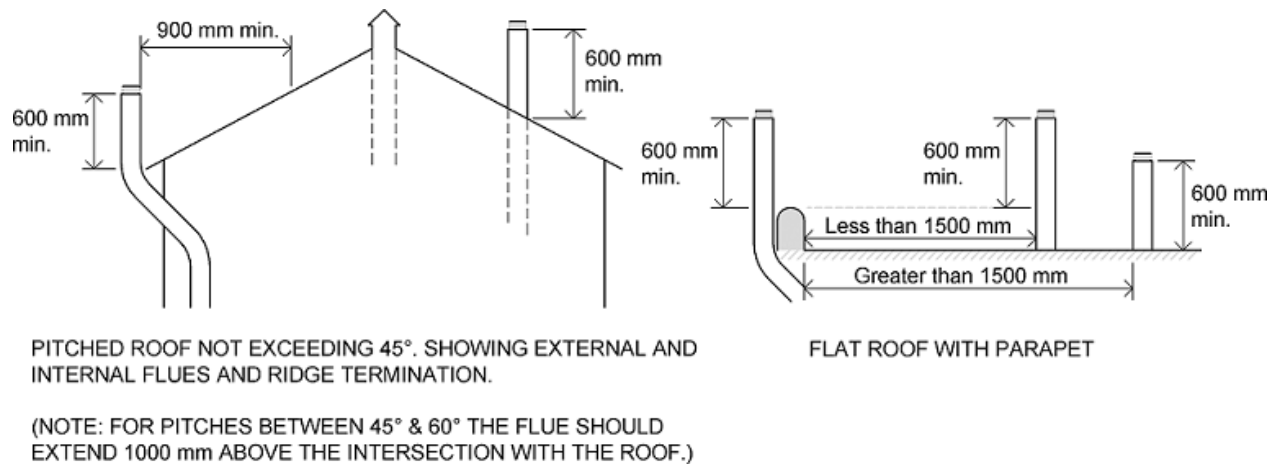
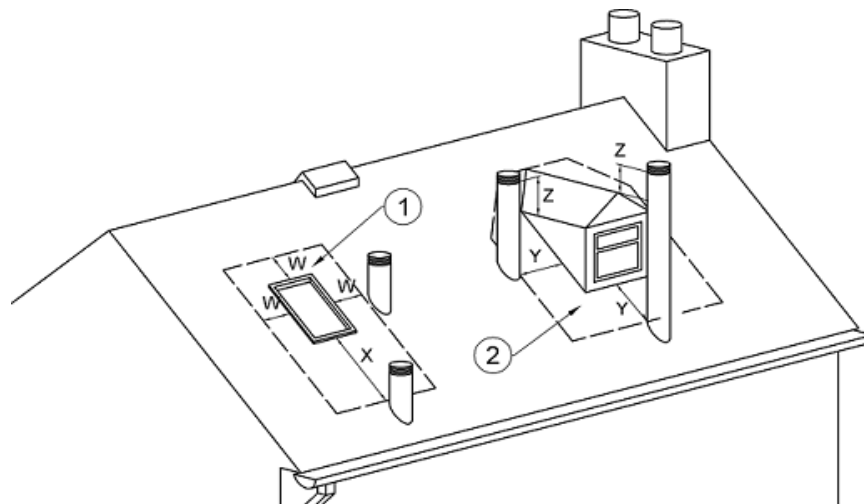


Diagram 17(b) Gas flue terminal adjacent to a window or roof light on pitched roof
(Par.3.6.4)



Key:

1. Area surrounding roof lights or windows where flue terminals should not be located.
2. Area surrounding dormer or structure where dimensions Y and Z shall be applied.

W = 600 mm above or adjacent to roof lights or windows.

X = 2,000 mm below roof lights or windows.

Y = Distance from the dormer or roof structure to the flue.

Z = Clearance distance from the top of the dormer or roof structure to the flue terminal. If Y is less than 1,500 mm then Z shall be at least 600 mm.

3.7 Chimneys and connecting flue pipes

3.7.1 The minimum I.S. EN 1443:2003 designations (see sub-section 1.4.4) for chimneys and connecting flue pipes are shown in Table 6.

Table 6

Appliance	Type	Minimum Designation
Boiler - Open flued.	Natural Draught.	T250 N2 D 1 Oxx
	Fanned Draught.	T250 P2 D 1 Oxx (1)
	Condensing	T160 P2 W 1 Oxx
Boiler – Room sealed.	Natural Draught.	T250 N2 D 1 Oxx
	Fanned Draught.	T250 P2 D 1 Oxx (1)
	Condensing	T160 P2 W 1 Oxx
Gas Fire.	Radiant/ convector ILFE or DFE	T450 N2 D 1 Oxx
Air Heater.	Natural Draught.	T250 N2 D 1 Oxx
	Fanned Draught.	T250 P2 D 1 Oxx
Note: 1. The pressure designation P2 is considered the default specification and should be used unless the appliance manufacturer specifies that pressure designation N2 may be used.		

3.8 Connecting flue pipes

3.8.1 Materials: Connecting flue pipes may be of any of the following materials:

- (a) any material described in Section 2 for a solid fuel appliance, or
- (b) sheet metal flue pipes as described in I.S. EN 1856-2:2009.

Flue pipes with spigot and socket joints should be fitted with the sockets uppermost.

3.8.2 Shielding: Flue pipes should:

- (a) be at least 25 mm from any combustible material, or
- (b) where passing through a wall, floor or roof, be separated from any combustible material by a non-combustible sleeve enclosing an air space of at least 25 mm around the flue pipe, or
- (c) where passing through a compartment wall or a compartment floor, be cased with non-combustible material with at least half the fire resistance needed for the wall or floor (see Technical Guidance Document B - Fire Safety).

For a double-walled flue pipe, the 25 mm distance may be measured from the outside of the inner pipe.

3.9 Chimneys

3.9.1 Masonry chimneys: Masonry chimneys should be lined with any material described in Section 2 for a solid fuel appliance. For condensing appliances, clay/ceramic flue liners with rebated or socketed joints meeting Class B2N1 or B2N2 as described in I.S. EN 1457-2:2012 may also be used. Specific care should be taken where the liners have a water vapour diffusion class of WB, WC or WD (see manufacturer's instructions).

The liners should be fitted with the sockets or rebates uppermost. Liners should be jointed with fire-proof mortar, and any space between the liners and the brickwork should be filled with weak 1:1:12 cement/lime/sand mortar or insulating mix as specified in sub-section 2.5.3.

3.9.2 Flue block chimneys: Flue block chimneys should be constructed of factory made components suitable for their intended use. They may incorporate a flue or be lined. Flue blocks suitable for use with gas-fired appliances include:

-
- (a) any flue block described in Section 2 as suitable for solid-fuel appliances;
 - (b) flue blocks meeting the performance level specified in sub-section 3.7.1 for gas-fired appliances. These include:
 - (i) clay/ceramic flue blocks as described in I.S. EN 1806:2006. The appropriate Classes for use with natural draught appliances, fanned draught appliances and condensing boilers are Class FB4 N1, FB4 P1 and FB5 P1 respectively, unless otherwise specified by the manufacturer (see Table A5),
 - (ii) concrete flue blocks as described in I.S. EN 1858:2008. The appropriate Classes for use with natural draught appliances, fanned draught appliances and condensing boilers are Class E1, E3 and G1 respectively, unless otherwise specified by the manufacturer (see Table A6).

3.9.3 Wall thickness: The wall thickness of a brick or blockwork chimney or flue block chimney should be at least 25 mm. Any chimney wall which:

- (a) is part of the wall of a compartment of the same building, another building or another dwelling, should give at least the fire resistance needed for the compartment or separating wall (see Technical Guidance Document B - Fire Safety), or
- (b) passes through a compartment wall or a compartment floor, should have at least half the fire resistance needed for the compartment wall or floor (see Technical Guidance Document B - Fire Safety).

If the compartment wall or floor is masonry material, it may also form the chimney wall.

3.9.4 Metal system chimneys

3.9.4.1 Metal system chimneys should be double-walled insulated chimneys as described in Sections 2 for solid-fuel appliances. Alternatively metal system chimneys complying with I.S. EN 1856-1:2009 or system chimneys with plastic flue liners complying with I.S. EN 14471:2005 and meeting the performance level specified in sub-section 3.7.1 and Table 6 may be used.

3.9.4.2 The heating appliance should not support the weight of the chimney except when the heating appliance manufacturer states in his instructions that the load bearing capacity is sufficient and where cleaning of the chimney can be undertaken without dismantling. The liner manufacturer's instructions for supporting the liner should be followed. The spacing of supports and unsupported height declared by the manufacturer should not be exceeded.

3.9.4.3 Where the liners are to be supported on a lintel or foundations at the base of the chimney they should be adequate for the liner load, including any condensate collectors, cleaning and inspection elements, and T-pieces or elbows. Chimneys in accordance with EN 1858 should have a maximum unsupported height of 4.5 times the least cross sectional dimension, but not higher than 3 m.

3.9.5 Rigid or flexible flue liners: Stainless steel rigid or flexible flue liners complying with the appropriate designation of IS EN 1856-2:2009 and meeting the performance level specified in sub-section 3.7.1 and Table 6 may be used in an existing chimney. Flexible metal flue liners should be installed in one complete length without joints within the chimney. When being installed for a gas appliance in a flue lined chimney it should be sealed at the top and bottom, the space between the chimney and the liner should be left empty unless this is contrary to the manufacturer's instructions.

Flexible flue liners may not be appropriate for large non-lined chimneys without specialist advice.

3.9.6 Debris collection space: Where the chimney is not lined or not constructed of flue blocks as provided for in the guidance in this document, then a debris collection space should be provided at the bottom of the chimney with a volume of at least 0.012 m³ and a depth of at least 250 mm below the point of connection of the appliance with the chimney. The space should be readily accessible for clearance of debris, for example by removal of the appliance.

3.10 Hearths

3.10.1 A hearth should always be provided for an appliance unless:

- (a) every part of any flame or incandescent material in the appliance will be at least 225 mm above the floor, or
- (b) the product standard provides for a hearth not being necessary and the appliance complies with the appropriate parts of the standard. The following is a list of some such standards.

I.S. EN 26:1998	instantaneous water heaters
I.S. EN 30 (all parts)	cookers
I.S. EN 89: 2000	DHW heaters
I.S. EN 297:1994	central heating boilers
I.S. EN 449:2002	LPG Flueless appliances
I.S. EN 483:2000	Type C boiler
I.S. EN 778:2009	Forced convection air-heater
I.S. EN 1266:2002	convector heaters
I.S. EN 1319:2009	air heaters
BS 7977-1:2009	Radiant convector

3.10.2 In the case of a back boiler, the hearth should be constructed:

- (a) of solid, non-combustible material at least:

- (i) 125 mm thick, or
- (ii) 25 mm thick placed on non-combustible supports at least 25 mm high, and

- (b) to the size given in Diagram 18.

3.10.3 In the case of any other appliances, the thickness of the solid non-combustible material may be reduced to 12 mm. The hearth size should be as shown in Diagram 18.

3.10.4 For ILFE and DFE gas fires the hearth thickness may be reduced as above and extend at least 300 mm forward from the face of the builders opening or outer edge of the incandescent fire bed and at least 150 mm beyond each edge of the naked flame or incandescent radiant source (see Diagram 15).

3.11 Shielding of appliances

3.11.1 Unless the appliance complies with the appropriate parts of the standards listed in subsection 3.10.1(b), which provide that a shielding of the appliance is not necessary, the backs, tops and sides of appliances and any draught-diverters should be separated from any combustible material by either:

- (a) a shield of non-combustible material at least 25 mm thick, or
- (b) an air space of at least 75 mm (see Diagram 19).

Diagram 18 **Hearth sizes**
(Par. 3.10.2 & 3.10.3)

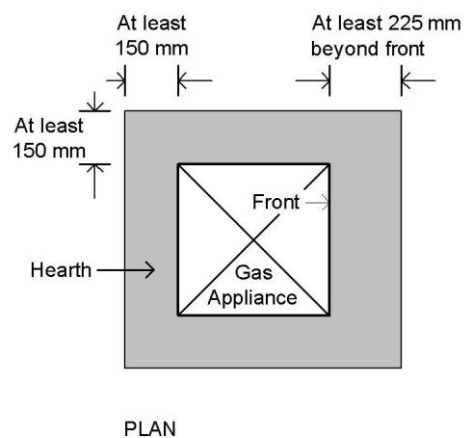
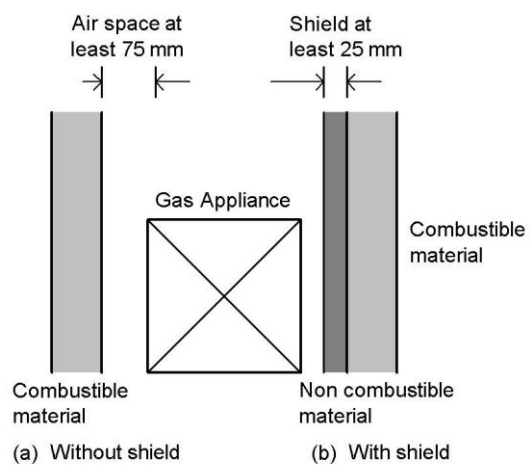


Diagram 19 **Separating appliance from combustible material**
(Par. 3.11.1)



Section 4 - Additional provisions for oil burning appliances with a rated output up to 45 kW

4.1 Guidance

4.1.1 The guidance in this Section should be read in conjunction with guidance given in Section 1. The guidance is relevant to combustion installations designed to burn oils meeting the specifications for Class C2 (Kerosene) and Class D (Gas oil) given in BS 2869:2010 or equivalent, liquid biofuel conforming to I.S. EN 14214:2012 and blends of mineral oil and liquid biofuel to OPS 24.

4.1.2 Guidance on the installation of oil burning appliances is contained in: BS 5410: Part 1:1997. Open flued oil-fired appliances should not be installed in such rooms as bathrooms or bedrooms. Room-sealed appliances only should be used if required in these areas.

4.1.3 Oil-firing appliances should be installed, commissioned and serviced to ensure that the entire installation operates safely. Oil firing equipment should be suitable for its purpose and the class of oil used in the installation.

4.2 Air supply to appliances

4.2.1 Any room or space containing an appliance (other than a room-sealed appliance) should have a permanent ventilation opening of free area of at least:

- 6,500 mm² where the air permeability is greater than 5.0 m³/(hr.m²), or
- 6,500 mm² + 550 mm² per kW of rated output above 5 kW where the air permeability is less than 5.0 m³/(hr.m²).

Where room-sealed appliances are contained in compartments, the compartment may require ventilation for cooling purposes (see sub-section 1.2.2).

Note: It is unlikely that dwellings built prior to 2008 would have an air permeability of less than 5 m³/h/m² at 50 Pa unless extensive air tightness measures have been carried out (see Appendix B for further guidance on airtightness of dwellings).

4.3 Flues

4.3.1 Size: The flue size for open-flued appliances should be at least:

- (a) for a connecting flue pipe, the same as for the flue outlet from the appliance,
- (b) for a chimney see Table 7.

Table 7: Flue sizes for chimneys

Rated Output of Appliance	Diameter of the Flue
Up to 20 kW	100 mm
20 kW to 32 kW	125 mm
32 kW to 45 kW	150 mm
If the flue is of square section, then it should have a cross-sectional area equivalent to the corresponding circular chimney.	

4.3.2 Direction: For natural draught appliances, horizontal flue runs should be avoided, and if a bend is required in a flue, it should not make an angle of more than 45° with the vertical.

For non-natural draught flues: reference should be made to the appliance or flue manufacturer's instructions.

4.3.3 Location of flue outlets: The outlet from a balanced flue or low level discharge appliance should be:

- (a) so situated externally as to allow the dispersal of the products of combustion and, with a balanced flue, the free intake of air, and

- (b) protected with a terminal guard if persons could come into contact with it or if it could be subject to damage, and
- (c) designed so as to prevent the entry of any matter which might restrict the flue.

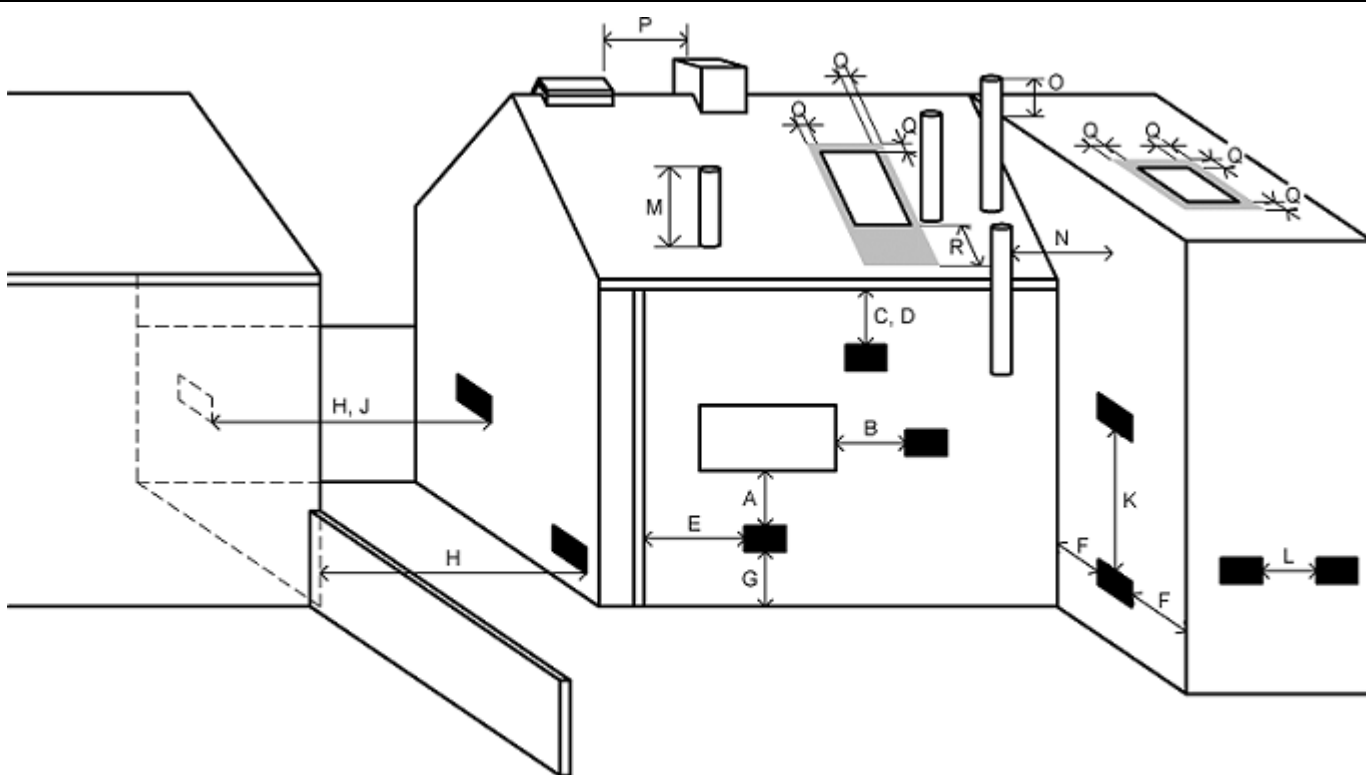
The flue terminal from an oil burning appliance should be positioned in accordance with Diagram 20 and Table 8.

4.3.4 The flue terminals positioned in accordance with the safety distances set out above may not be ideal for condensing boilers which emit plumes of wet flue products.

It is necessary to site a condensing boiler flue terminal such that the plume of wet flue products does not impinge on or significantly affect the use of the dwelling and also the neighbouring buildings. Care may need to be taken to locate flue outlets from condensing boilers away from parts of a building that may be damaged by frequent wetting.

An appliance designed to burn class D fuel should discharge its flue gases at a height of 2 m or greater from the outside ground level. No such limitation is required for an appliance designed to burn class C2 fuel.

Diagram 20 Flue terminating positions for oil fired appliances
(Par. 4.3.3)



FLUE TERMINATING POSITIONS FOR OIL FIRED APPLIANCES

Table 8: Flue terminating for oil fired appliances

	Appliance burner type	Pressure Jet ^a	Vaporizing ^a
	Location		
A	Directly below an opening, air brick opening, opening window, etc.	600	Not Allowed
B	Horizontally to an opening, air brick opening, opening window etc.	600	Not Allowed
C	Below a gutter, eaves or balcony with protection	75	Not Allowed
D	Below a gutter or a balcony without protection	600	Not Allowed
E	From a vertical sanitary pipework	300	Not Allowed
F	From an internal or external corner	300	Not Allowed
G	Above ground or balcony level	300	Not Allowed
H	From a surface or boundary facing the terminal	600	Not Allowed
J	From a terminal facing the terminal	1,200	Not Allowed
K	Vertically from a terminal on the same wall	1,500	Not Allowed
L	Horizontally from a terminal on the same wall	750	Not Allowed
M	Above the highest point of an intersection with the roof	600	1,000
N	From a vertical structure to the side of the terminal	750	2,300
O	Above a vertical structure less than 750mm from the side of the terminal	600	1,000
P	From a ridge terminal to a vertical structure on the roof	1,500	Not Allowed
Q	Above or to the side of any opening on a flat or sloping roof	300	300
R	Below any opening on a sloping roof	1,000	1,000
NOTE: <ol style="list-style-type: none"> Terminals should be positioned so as to avoid products of combustion accumulating in stagnant pockets around the building or entering into buildings. Appliances burning class D oil have additional restrictions, (An appliance designed to burn class D fuel should discharge its flue gases at a height of 2 m or greater from the outside ground level). Vertical structures in N, O and P includes tank or lift rooms, parapets, dormers etc. Terminating positions A to L are only permitted for appliances that have been approved for low level flue discharge when tested in accordance with I.S. EN 303-1, OFS A100(11) or OFS A101(11). Terminating positions should be at least 1.8 m from an oil storage tank unless a wall with at least 30 min fire resistance and extending 300 mm higher and wider than the tank is provided between the tank and the terminating position. Where a flue is terminated less than 600 mm away from a projection consists of plastics or has a combustible or painted surface, then a heat shield of at least 750 mm wide should be fitted to protect these surfaces. For terminals used with vaporizing burners, a horizontal distance of at least 2,300 mm is recommended between the terminal and the roof line. If the lower part of the terminal is less than 2 m above the ground, balcony, flat roof or other place to which any person has access, the terminal should be protected by a guard. Notwithstanding the dimensions given above, a terminal should not be sited closer than 300 mm to combustible material. In the case of a thatched roof, double this separation distance should be provided. It is also advisable to treat the thatch with a fire retardant material and close wire in the immediate vicinity of the flue. It is essential that a flue or chimney does not pass through the roof within the shaded area delineated by dimensions Q and R. Where protection is provided for plastic components, such as guttering, it is essential that this is to the standard specified by the manufacturer of the plastic components. <p>a = Minimum distances to terminals in millimeters as measured from top of the chimney or the rim of a low level discharge opening.</p>			

4.4 Chimneys and connecting flue pipes

4.4.1 The minimum I.S EN 1443 designation (see sub-section 1.4.4) for chimneys and connecting flue-pipes for use with oil-fired boilers are shown in Table 9.

Table 9

Type of Appliance	Fuel Oil	Minimum Designation
Pressure Jet Appliance	Class C2	T250 N2 D1 O
Pressure Jet Appliance	Class D	T250 N2 D2 O
Vapourising Burner	Class C2	T160 N2 D1 O
Vapourising Burner	Class D	T250 N2 D2 O
Condensing Pressure Jet Appliance	Class C2	T160 N2 W1 O
Condensing Pressure Jet Appliance	Class D	T160 N2 W2 O
Condensing Vapourising burner Appliance	Class D	T160 N2 W2 O

4.4.2 Connecting flue pipes

4.4.2.1 Connecting flue pipes as specified in sub-sections 2.4 should generally be acceptable. Where it is known that flue temperatures will not exceed 250° C, connecting flue pipes as specified in sub-sections 3.8 can be used.

4.4.3 Masonry chimneys: Masonry chimneys should be lined with any material described in Section 2 for a solid fuel appliance. For condensing appliances, clay/ceramic flue liners with rebated or socketed joints meeting Class B2N1 or B2N2 as described in I.S. EN 1457-2:2012 may also be used. Specific care should be taken where the liners have a water vapour diffusion class of WB, WC or WD. (see manufacturer's instructions).

The liners should be fitted with the sockets or rebates uppermost. Liners should be jointed with fire-proof mortar, and any space between the liners and the brickwork should be filled with weak 1:1:12 cement/lime/sand mortar or insulating mix (see Section 2.5.3).

4.4.4 Flue block chimneys: Flue block chimneys should be constructed of factory made components suitable for their intended use. They may incorporate a flue or be lined. Flue blocks suitable for use with oil-fired appliances include:

- (a) any flue block described in Section 2 as suitable for solid-fuel appliances;
- (b) flue blocks meeting the performance level specified in sub-section 4.4.1 for oil-fired appliances. These include:
 - i) clay/ceramic flue blocks meeting Class FB4 N1 as described in I.S. EN 1806:2006, or FB5 P1 for condensing boilers (see Table A5),
 - ii) concrete flue blocks meeting Class D1 as described in I.S. EN 1858:2008, or Class G2 for condensing boilers (see Table A6).

4.4.5 Metal system chimneys

4.4.5.1 Metal system chimneys should be double-walled insulated chimneys as described in Section 2 for solid-fuel

appliances. Alternatively metal system chimneys meeting the performance level specified in sub-section 4.4.1 and satisfying the guidance regarding installation set out in sub-section 4.4.5.2 may be used.

3.4.1.2 A metal system chimney should not:

- (a) pass through any part of the building forming a separate compartment, unless it is cased in non-combustible material giving at least half the fire resistance of the compartment wall or floor (see Technical Guidance Document B - Fire Safety),
- (b) be placed with its outer wall nearer to combustible material than a distance xx, or
- (c) pass through a cupboard, storage space or roof space, unless it is surrounded by a non-combustible guard at a distance of at least xx from the outer wall of the chimney.

For (b) and (c) above, the distance xx should be specified by the manufacturer in accordance with I.S. EN 1856-1:2009 (see Diagram 7).

4.4.6 Rigid or flexible flue liners: Stainless steel rigid or flexible flue liners complying with the appropriate designation of I.S. EN 1856-2:2009 and meeting the performance level specified in sub-section 4.4.1 may be used in an existing chimney.

Flexible metal flue liners should be installed in one complete length without joints within the chimney. When being installed for an oil appliance in a flue lined chimney it should be sealed at the top and bottom, the space between the chimney and the liner should be left empty unless this is contrary to the manufacturer's instructions.

Flexible flue liners may not be appropriate for large non-lined chimneys without specialist advice.

4.5 Hearths

4.5.1 If the surface temperature of the floor below the appliance is:

- (a) likely to exceed 100° C, then a constructional hearth should be provided as described in paragraph 2.7.1.1, or
- (b) unlikely to exceed 100° C, the appliance may stand on a rigid, imperforate sheet of non-combustible material without a constructional hearth (see sub-section 2.7.1.2).

4.6 Shielding of appliances

4.6.1 If the surface temperature of the sides and back of an appliance is likely to exceed 100° C, the appliance should be shielded as described in paragraph 3.11.

4.7 Fire valves

4.7.1 Remote acting fire valves should be fitted so as to cut off the supply of oil from the combustion appliance in the event of a fire starting in or around the appliance. They should be temperature rated to suit the installation requirements specified by the appliance manufacturer and should be tested before fitment to prove operation.

4.7.2 For appliances installed inside buildings, the oil supply should be shut off externally to the building. For externally located heating appliances, the oil supply should be cut off at least 1 m away from the appliance.

The valve should be fitted in accordance with the recommendations in Section 8.3 of BS

4.8 Biofuels

4.8.1 Vaporising burners and appliance installations should not have bio-liquid fuels introduced to them. Bio-liquids in kerosene can immediately adversely affect vaporising burner combustion and manifest in the rapid onset of premature carboning in vaporising sleeve burner bases. Vaporising appliances, such as range cookers, should be converted with appliance manufacturer's (or appliance manufacturer's approved) bio-liquid conversion burners.

4.8.2 Pressure jet burners should be adjusted in accordance with the manufacturer's instructions by a competent person. All equipment designed/converted for biofuels, especially oil storage tanks and oil fired appliances, should be easily and readily identifiable by non-intrusive means with clear and permanent labelling at point of manufacture (or for existing equipment at point of conversion) as only being suitable for bio-liquid fuel blends to I.S. EN 14214:2012 and blends of mineral oil and liquid biofuel to OPS 24.

Section 5

Fuel Storage

5.1 Introduction

5.1.1 This section deals with the location and protection of a fuel storage container serving a heat producing appliance in a building and the fuel feed system from the container to the appliance where this applies.

5.2 Oil storage installations

5.2.1 An oil storage tank serving a heat producing appliance in a building and the fuel feed system from the tank to the appliance should be reasonably protected from the effect of fires that may occur in the building being served, or in an adjacent building or premises. This can be achieved by:

- (a) isolating the tank by sufficient distance;
- (b) protecting the tank by a physical barrier;
- (c) enclosing the tank with non-combustible fire resisting construction;
- (d) burying the tank.

5.2.2 The tank should comply with OFTEC's technical specification for tanks. OFS T100 specifies requirements for static thermoplastic tanks and integrally bunded tanks and all rotationally moulded polyethylene tanks should be tested and approved in accordance with I.S. EN 13341. OFS T200 specifies requirements for static steel tanks, with or without bunding.

5.2.3 The risk of water pollution due to oil escape from an oil storage tank serving a heat producing appliance, or from the fuel feed system from the tank to the appliance should be reduced to a reasonable level. This can be achieved by providing:

- (a) a storage tank and associated pipework which have adequate resistance to

physical damage and corrosion and are designed and installed so as to minimise the risk of oil escaping during the filling or maintenance of the tank;

- (b) providing secondary containment when there is a significant risk of pollution (see sub-section 5.2.5); and
- (c) providing information on how to respond to a leak, e.g. by fixing an appropriate label to the tank.

5.2.4 Oil storage tank with a capacity not exceeding 3,500 litres

5.2.4.1 An oil storage tank with a capacity not exceeding 3,500 litres should be located in accordance with Table 10. For the purpose of Table 10, the following terms apply:

Bund: a catchpit beneath the tank, without a drain, constructed with non-permeable materials and capable of containing the contents of the tank, plus an additional 10% (see CIRIA Report 163 for the construction of masonry and concrete bunds).

Chamber: a fully enclosed ventilated space, bounded by non-combustible 60 minutes fire resisting construction (see Technical Guidance Document B), including a self closing fire door wholly above the bund level.

Barrier: means a wall or screen having not less than 30 minutes fire resistance (see Technical Guidance Document B) and extending at least 300 mm above and beyond the ends of the tank.

Table 10: Oil storage tanks (capacity not exceeding 3,500 litres)

Location of tank	Secondary containment	Protection from fire in a building	Protection from fire required in relation to a boundary
Within a building.	Required.	Within a chamber.	Not applicable.
External, above ground.	Required (see note 1 below).	In accordance with sub-section 5.2.6 and Table 11.	In accordance with sub-section 5.2.6 and Table 11.
External, wholly below ground.	Required.	No requirement.	No requirement.
Note: 1. An oil storage tank not exceeding 2,500 litres capacity, which serves a dwelling house, does not generally require a bund. However, where an oil leak would present a significant risk of water pollution, a bund should be provided (see sub-section 5.2.5). An oil storage tank which is not provided with a bund or has an integrated bund should be installed on or above a non-combustible base which extends out at least 300 mm from all sides of the tank.			

5.2.5 Secondary containment, e.g. a non-permeable bund or integrally banded prefabricated tank, should be provided where the tank capacity is in excess of 2,500 litres or where there is a significant risk of water pollution should a spillage occur. A significant risk of water pollution is likely to exist where the storage tank is located:

- within 10 m of inland freshwaters or coastal waters; or
- where spillage could run into an open drain or to a loose fitting manhole cover; or
- within 50 m of sources of potable water, such as wells, bore-holes or springs; or
- where oil spilled from the installation could reach the waters listed above by running across hard ground; or
- where tank vent pipe outlets cannot be seen from the intended filling point.

5.2.6 Protection of an external above ground tank from fire risk

5.2.6.1 An oil storage tank should be located so as to minimise the possible exposure of the

tank from a fire in the building or from an externally sited appliance. Protection of the tank is generally achieved by locating the tank so as to achieve a minimum separation distance from the building/appliance or by the provision of non-combustible fire resisting barriers (see Technical Guidance Document B) or screen walls between the tank and the building/appliance.

An external wall of a building may be considered as a barrier or screen wall where it meets the non-combustibility and fire resistance requirements. In these situations, particular care should be taken in relation to unprotected openings such as doors and windows and the proximity of combustible building elements, such as overhead roof eaves.

Guidance on minimum separation distances from buildings/appliances and boundaries for oil storage tanks is given in Table 11 and BS 5410: Part 1:1997, together with guidance on protection measures, including the provision of screen walls, where such distances are reduced. Where a tank is used which is not covered by the guidance in BS 5410: Part 1-1997, the protective measures should be appropriate to the level of risk of fire spread to the tank.

5.2.6.4 The oil feed installation from the oil storage tank to the appliance should conform with the recommendations contained in BS

5410: Part 1-1997, including the fitting of an automatic fuel cut-off valve.

Table 11: Protection of an oil storage tank of not more than 3,500 litres capacity located externally to a building

Location of Tank	Protection Required	
	Buildings without openings	Building with openings
Not more than 1.8 m from any part of any building.	Non-combustible base, and any eaves not more than 1.8 m from the tank to have 30 min fire resistance for integrity and insulation and to extend 300 mm beyond each side of the tank: and either a) any part of the building not more than 1.8 m from the tank to have 30 min fire resistance for loadbearing capacity, integrity and insulation to internal fire; or b) a barrier.	Non-combustible base, and any eaves not more than 1.8 m from the tank to have 30 min fire resistance for integrity and insulation and extending 300 mm beyond each side of the tank, and a barrier between the tank and any part of a building not more than 1.8 m from the tank that does not have 30 min fire resistance for loadbearing capacity, integrity and insulation to internal fire.
More than 1.8 m from any building.	Non-combustible base.	
Not more than 1.8 m from any oil burning appliance.	Non-combustible base, and a barrier.	
More than 1.8 m from any oil burning appliance or flue terminal.	Non-combustible base.	
Not more than 760 mm from a boundary.	Non-combustible base, and a barrier, or boundary wall extending at least 300 mm above and beyond the ends of the tank.	
More than 760 mm from a boundary.	Non-combustible base.	
Externally and wholly below ground.	No protection required.	
Note: 1. Underground tanks must have secondary containment and may not be acceptable in certain environmentally sensitive areas. 2. Non-combustible bases may be constructed of: concrete at least 100 mm thick, stonework or closely positioned paving stones at least 42 mm thick or a purpose built stand.		

5.2.7 Oil storage tank with a capacity which exceeds 3,500 litres

5.2.7.1 The location of an oil storage tank with a capacity which exceeds 3,500 litres should be in accordance with the requirements of BS 5410: Part 2:2013, as appropriate.

5.3 Liquid biofuels

5.3.1 Where liquid biofuel conforming to I.S. EN 14214:2012, or blends of mineral oil and liquid biofuel conforming to OPS 24, is being used the guidance given above for oil installations and in BS 5410-1:1997 is appropriate.

Boilers using bio-liquid blends should be fitted with bio-liquid compatible filters and fire valves, no other modifications are required to the ancillary equipment to facilitate the safe storage and supply of bio-liquid blends. However, it is recommended that all components in contact with oil are proven to be compatible with bio-liquids.

5.4 LPG storage installations

5.4.1 This section gives guidance in relation to non complex domestic installations. Further guidance is contained in the following standards:

I.S. 813:2014 Domestic gas installations;

I.S. 820:2010 Non-domestic gas installations (edition 2);

I.S. 3216:2010 Code of Practice-Bulk storage of liquefied petroleum gas (edition 2).

5.4.2 Tank location

5.4.2.1 LPG vessels up to 2,500 litres capacity (1.1 tonne) sited above ground should be located in the open air in a well ventilated position in accordance with the separation distances given in Table 12.

5.4.2.2 For separation distances from buildings, in the case of above ground vessels up to 2,500 litres capacity, the separation distances in Table 12 column (D) may be used, provided the construction of the external

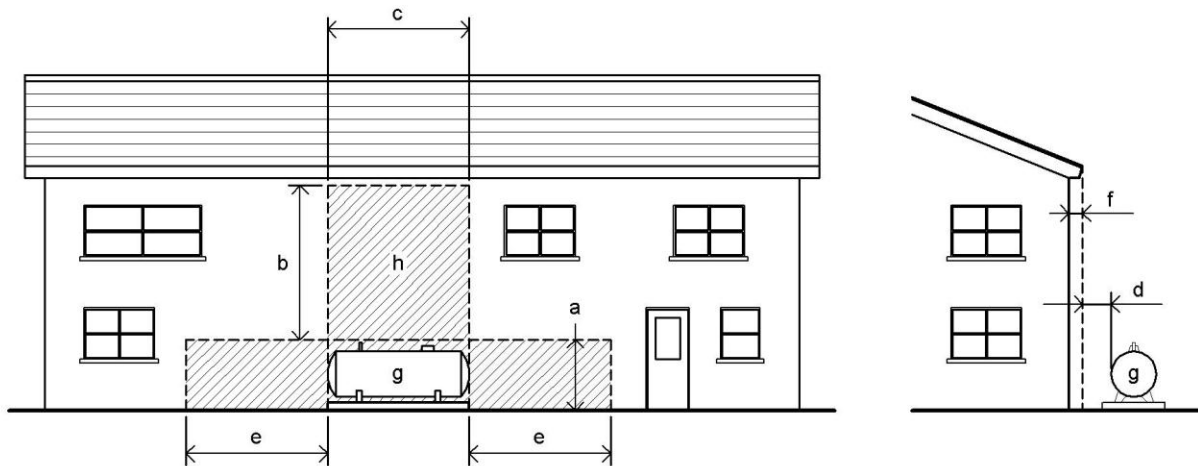
wall of the building, the area shown shaded in Diagram 21, is non-combustible and is of construction having a minimum period of fire resistance of 60 minutes.

5.4.2.3 The vessel location should be selected to give maximum protection against accidental damage and to take maximum advantage of natural ventilation. The ground beneath or adjacent to connections into vessels or ancillary equipment containing LPG should be concreted, paved or compacted and free from pits, depressions, drains and culverts.

5.4.2.4 Shrubs or trees provided to screen LPG vessels from view should not interfere with ventilation and therefore should only be located on one side of the installation. Evergreen shrubs or hedges should not be located within a minimum of 1 m from vessels up to 5,000 litres capacity for this purpose. Trees should not be located within a minimum of 3 m from vessels up to 5,000 litres capacity for this purpose.

5.4.2.5 For underground or mounded vessels reference should be made to I.S. 3216:2010 and should be located so that the manhole and pressure relief valves are in a well ventilated position in accordance with the separation distances given in Table 1 of that document.

Diagram 21 Small bulk vessel adjacent to a building
(Par. 5.4.2.2)



Key:

- a Height of top of Pressure Relief Valve (PRV)
- b 9m
- c Length of vessel
- d 0.3m for vessels up to 500 litres
1.5m for vessels > 500 litres to 2,500 litres
- e 2.5m for vessels up to 500 litres
3.0m for vessels > 500 litres to 2,500 litres
- f Roof overhang
- g LPG vessel
- h 60 minutes minimum fire resistance & imperforate

5.4.3 Fire walls

5.4.3.1 Fire walls may be free standing walls built between the tank and the building, boundary and fixed source of ignition or part of the building belonging to the property as per Diagram 21. Where necessary fire walls should be provided to reduce the effects of radiant heat from fires onto LPG vessels, while ensuring adequate ventilation.

5.4.3.2 A fire wall should be imperforate and of solid masonry, concrete or similar construction which affords a minimum of 4 hours fire resistance when tested in

accordance with the relevant part of BS 476 or a construction giving an equivalent fire resistance and durability.

5.4.3.3 Except for vessels up to 500 litres (0,25 te) a fire wall should be at least 2 m high or as high as the top of the vessel whichever is the greater and should be sited between 1.5 m and 3 m from the nearest point of the vessel. With the provision of a fire wall, the separation distances may be reduced to the values given in Table 12 Column (D).

For vessels up to 500 litres see Note 1 to Table 12. The distance between the vessel and the specified feature measured around

the ends of the fire wall should be equal to or greater than the separation distance given in Table 12 column (C).

5.4.3.4 In general a wall may be provided on only one side of a vessel. In certain circumstances a wall may be provided on two sides of a vessel provided adequate ventilation is maintained.

Table 12

Nominal capacity of tank		Above ground	
(A) Water capacity (litres)	(B) LPG Capacity (Tonnes)	From buildings, boundaries or fixed source of ignition (metres)	
		(C) Without fire wall	(D) With fire wall
150-500	0.05-0.25	2.5	0.3 (see note 1)
Up to 2,500	Up to 1.1	3	1.5 (see note 2)
Note: 1. For vessels up to 500 litres capacity, the fire wall needs to be no higher than the top of the vessel and may form part of the site boundary. 2. The fire wall for a tank up to 2,500 litres water capacity may form part of a building wall in accordance with Diagram 21. Where part of the building is used as a firewall, the wall, including any overhang, against which the LPG is stored should be 60 minutes fire-resisting construction and imperforate.			

5.4.4 Cylinders

5.4.4.1 Location: Cylinders containing commercial propane supplying permanently fixed equipment should be sited and installed outside the building in a well-ventilated area where any leakage of this gas, which is heavier than air, may readily disperse. Cylinders should not be sited where they may

be subject to temperatures in excess of 40° C. Cylinders should be sited away from any heat source likely to raise the temperature of the cylinder contents above 40° C.

Cylinders should be sited and installed at or above ground level, never below the ground or in sunken areas or adjacent to open drains or basements or near basement access areas where gas might collect. The part of the structure upon which, or against which the cylinders are located should have a minimum of 2 hour non-combustible fire resistance (see Diagram 22 and Table 13).

Any opening into chimneys or air intakes should be at least 1,0 m above the level of the top of any cylinder.

Other openings above any cylinder should be at least 0.3 m above the level of the top of the cylinders (see Diagram 22).

5.4.4.2 Support: Cylinders should be located on a firm level surface in an upright position with the valve uppermost. Precautions should be taken to prevent cylinders from falling over.

5.4.4.3 Access: Where there is or likely to be uncontrolled access to the cylinder installation, consideration should be given to protection by a lockable ventilated cage. Appropriate precautions should be taken to protect cylinders against vehicular impact. The installation, its fittings and attachments should be appropriately protected to minimize accidental damage and inadvertent or deliberate interference.

Diagram 22 Siting of LPG cylinder in use
(Par. 5.4.4.1)

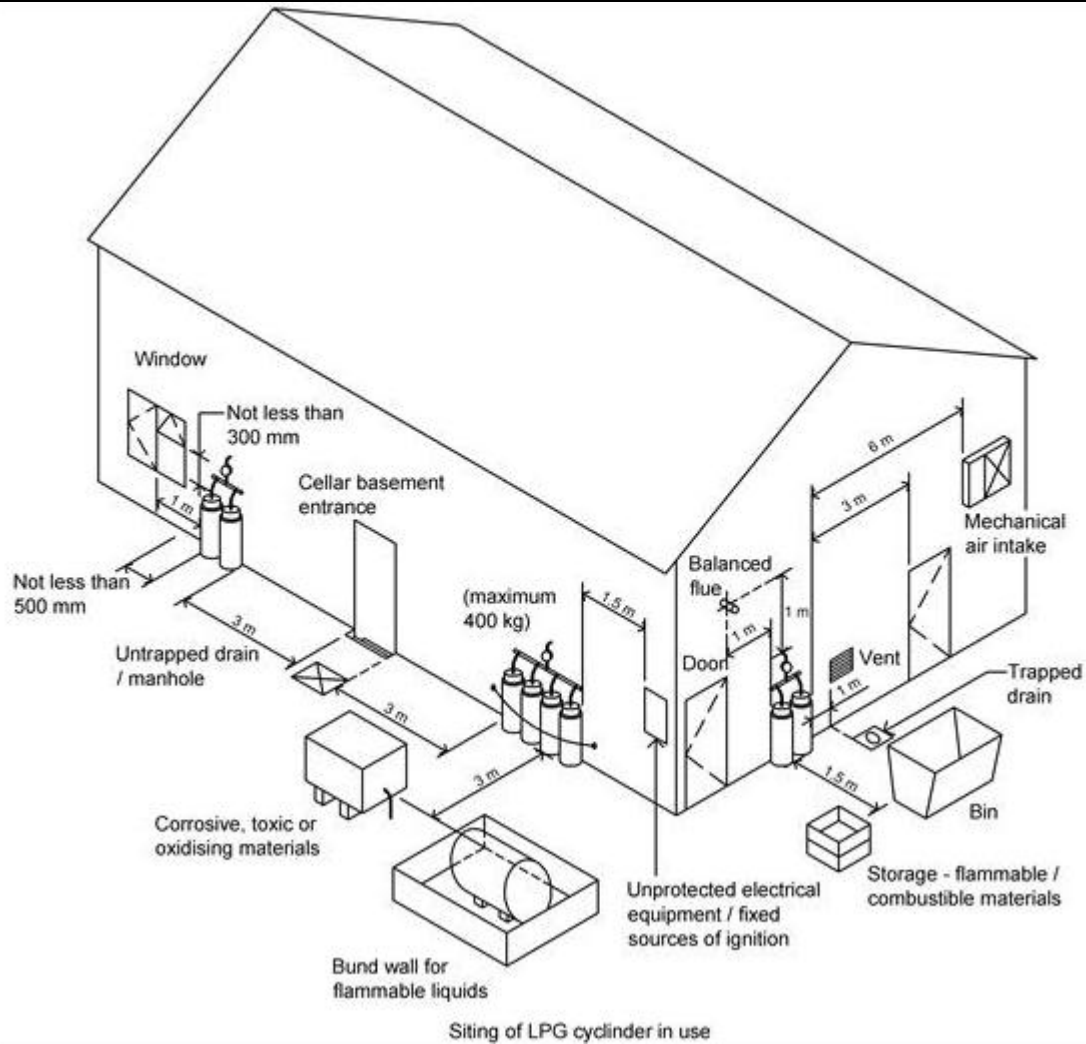


Table 13: Separation distance required between various features or hazards and a cylinder installation (see Diagram 22)

Minimum Horizontal Separation	Feature or Hazard
0,5	Window reveal.
1,0	Window Opening. Door. Air Vent. Balanced – Flue. Trapped Drain.
1,5	Parked motor vehicle. Fixed sources of ignition. Unprotected electrical equipment. Flammable / Combustible materials.
3,0	Untrapped drain or unsealed gully. Bund wall for bulk flammable liquid storage. Opening to cellar / basement. Corrosive, toxic or oxidising materials.
6,0	Mechanical air intake.

5.5 Wood storage

5.5.1 Bulk storage of woody biomass

fuel: Woody biomass fuel is highly combustible and precautions are required to reduce the risk of the stored fuel igniting. To ensure maximum energy from the fuel, storage should be designed to be damp free and improve or maintain the moisture content of the fuel at time of delivery. To inhibit the spread of fire to the contents, bulk storage for wood fuels should be in containers and located in accordance with Table 14.

5.5.2 Safety

5.5.2.1 Fire safety: With automated fuel feed systems, there is a risk of fire burning back from the boiler to the fuel store. To prevent this, there should be an interruption to the fuel-transport system (e.g. a star-feeder or chute for the fuel to fall into the boiler).

For large biomass systems, e.g. community systems, a sprinkler-system to flood the fuel-transport line in the event of back-burning should also be fitted. Any such sprinkler system should be supplied from an assured mains connection (the relevant safety standards are described in I.S. EN 303-5).

5.5.2.2 Safety-features for a pellet or woodchip store

Wood pellet Stores:

Pellet-stores should meet special safety-requirements to prevent problems such as damage to the store, dust-explosions and moisture-absorption. According to best practice, the ideal pellet-store would display the following features:

- solid walls that can withstand the pressure of the pellets, and which are fire-resistant for 90 minutes;
- completely dry, protected from water or dampness and dustproof;
- the filling nozzles through which the wood pellets reach the storage room should be of metal and should not have any right angles, in order to prevent pellet breakages due to the rapid change in direction;
- with changes of direction of more than 45 degrees, only curves with a radius of more than 200 mm should be used;

-
- the combined length of the hosepipe and internal piping should not exceed 30 m during filling of the silo;
 - the filling and exhaust connector should be earthed with a copper earth wire with a cross section area of at least 4 mm²;
 - an abrasion and tear-proof impact protection mat suspended opposite the inlet to the store such that the pellets hit the mat absorbing momentum of the pellets and reducing the damage to the pellets from hitting the wall of the store during unloading;
 - the mat used should be HDPE-film with a thickness of at least 2 mm or abrasion-proof rubber with a thickness of 1-3 mm;
 - fireproof, properly-sealing door to the store with removable wooden boards which allow access when the store is partly full;
 - no electrical installations other than those required to operate the system;
 - Sloping floor: 35° - 45°;
 - wood pellet storage rooms should always have proper ventilation. The use of special ventilation caps on the inblow and exhaust pipes is recommended. These caps allow the exchange of air between inside and outside the storage installation.

Access:

Access to hoppers and stores should be restricted for safety reasons. Access doors and lids should be capable of being secured.

A safety warning notice relating to the dangers of wood pellet storage should be provided adjacent to the access point.

Table 14: Recommendations for the protection of wood storage

Location of store	Protection recommended
External and not more than 1.8 m from any part of a building.	<p>(a) any part of the building eaves not more than 1.8 m from the container or storage space and extending 300 mm beyond each side of the container or storage space should be non-combustible; and</p> <p>(b) a barrier.</p>
External and not more than 1 m from any boundary.	The container or storage frame should be constructed to have a 30 minutes fire resistance to its boundary walls.
Within a building.	<p>(a) separated from the building with internal wall construction providing a fire resistance duration of 90 minutes; and</p> <p>(b) any door to be outward opening providing 30 minutes fire resistance duration; and</p> <p>(c) separated from the building with floor construction providing fire resistance duration of 90 minutes; and</p> <p>(d) external walls constructed that provide 90 minutes fire resistance duration as appropriate.</p>
<p>Note:</p> <p>1. Barrier means an imperforate, wall or screen at least 300 mm higher than and extending 300 mm beyond either end of the container or storage space constructed so as to prevent the passage of direct radiated heat having a fire resistance of at least 30 minutes.</p>	

Appendix A

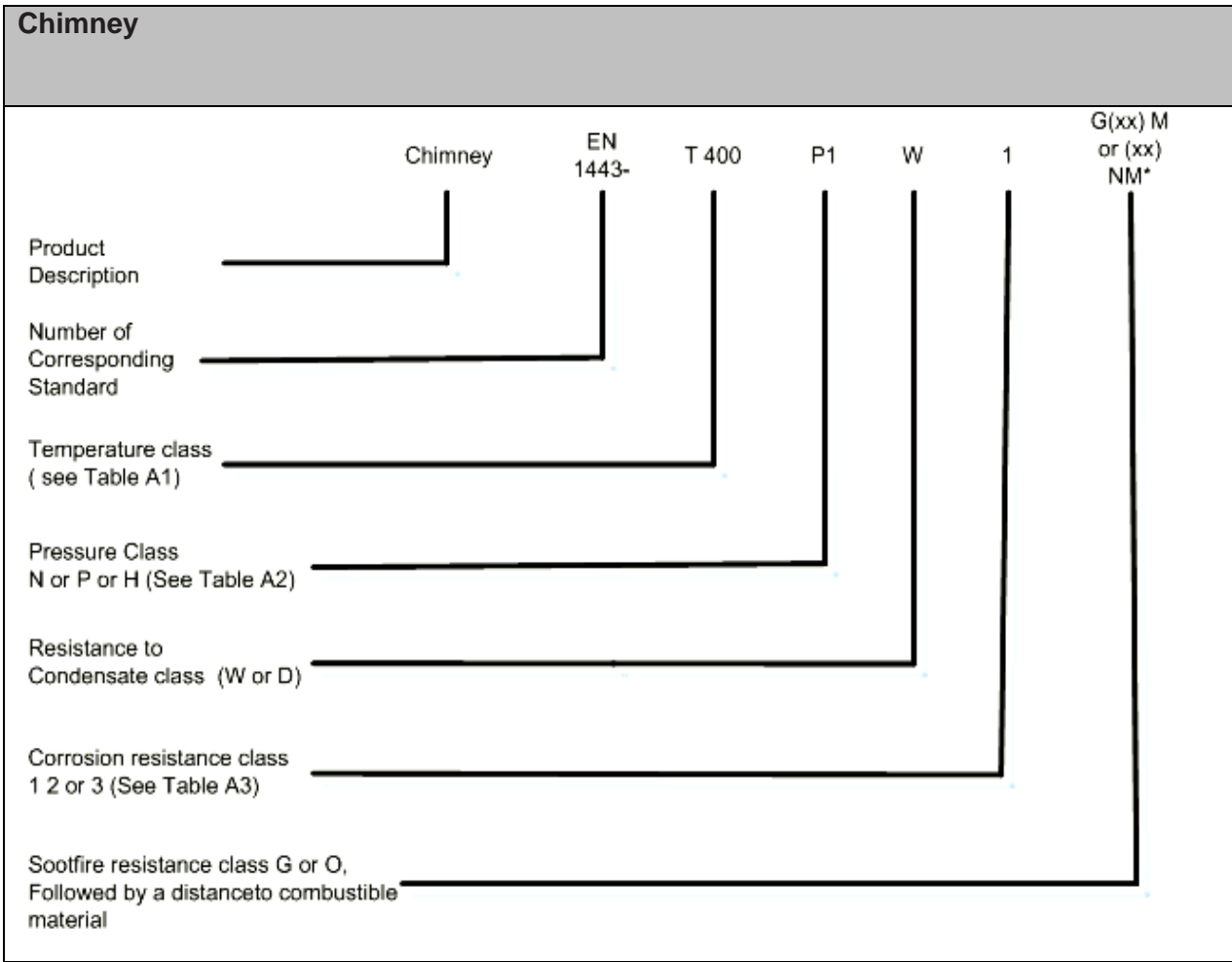
European Chimney Designations

A1 This appendix gives guidance on the European chimney designation scheme based on I.S.EN 1443:2003 which uses Code letters and numbers.

I.S. EN 1443 requires flue product manufacturers to provide a designation containing useful information to assist in the design of a flue using their products. The designation is set out as a code which relates to the performance characteristics of the product.

Designation

The designation of a chimney consists of:



A2 In selecting an appliance for a given chimney designation, the appliance, irrespective of the fuel used, is required to generate combustion products with characteristics equal or less than those designated for the chimney. When selecting a chimney suitable for a given appliance, any chimney with performance characteristics equal to or higher than those appropriate for the appliance may be used.

Temperature class

A3 Temperature classes are set out in the table A1 and expressed as “T” followed by a number which is less than or equal to the nominal working temperature, i.e. the average flue gas temperature obtained during the nominal /rated output test (usually the maximum operating level).

Pressure classes

A4 Pressure classes are set out in Table A2 and expressed as either ‘N’ , ‘P’ or ‘H’ followed by either ‘1’ or ‘2’. N relates in general to natural draught chimneys, i.e. operating under negative pressure while the number relates to the gas tightness of the product. A1 designation being more gas tight than A2. This allows for different class of products, e.g. metal chimneys to I.S. EN 1856-1 have the class N1 while N2 would be normally assigned as a minimum to masonry chimneys. P and H relate to chimneys which operate under positive, e.g. for fan assisted applications and diesel generators respectively. The pressure designation depends on the gas tightness it achieves, the lower number being more onerous, the higher allowed leakage for positive pressure application being intended to external installations.

Condensate resistance classes

A5 Condensate resistance class – expressed as either ‘W’ for wet or ‘D’ for dry operations. A product designated ‘W’, able to contain condensates within the flue, is aimed

at condensing appliances. A product designated ‘D’ would usually have flue gas temperature high enough to avoid condensate formation.

Table A1: Temperature classes

Temperature class	Nominal working temperature °C
T 080	≤ 80
T 100	≤ 100
T 120	≤ 120
T 140	≤ 140
T 160	≤ 160
T 200	≤ 200
T 250	≤ 250
T 300	≤ 300
T 400	≤ 400
T 450	≤ 450
T 600	≤ 600

Table A2: Pressure classes

Pressure Class	Test Pressure Pa	Gas Tightness – Maximum leakage rate L/s/m ²
N1	40	2.0
N2	20	3.0
P1	200	0.006
P2	200	0.120
H1	5,000	0.006
H2	5,000	0.120

Corrosion resistance classes

A6 Corrosion resistance classes are set out in Table A3 – this is fuel dependant and expressed as 1, 2 or 3.

Table A3: Corrosion resistance classes (from I.S. EN 1443)

Corrosion resistance Class	1. Possible fuel types	2. Possible fuel types	3. Possible fuel types
Gas	Gas: sulphur – content $\leq 50\text{mg/m}^3$ Natural gas L + H	Gas Natural Gas L+H	Gas Natural L+H
Liquid	Kerosene: sulphur – content $\leq 50\text{mg/m}^3$	Oil: sulphur – content ≤ 0.2 mass % kerosene :sulphur-content $\geq 50\text{mg/m}^3$	Oil: sulphur – content > 0.2 mass % kerosene :sulphur-content $\geq 50\text{mg/m}^3$
Wood		Wood in open fire places	Wood in open fire places Wood in closed stoves
Coal			Coal
Peat			Peat

Sootfire resistance classes

A7 Sootfire resistance class – expressed as either ‘G’ with sootfire resistance, or ‘O’ without. A product assigned the designation ‘G’ has been tested at 1,000° C for 30 minutes.

Distance to combustible material

A8 The designation of the minimum distance from the outer surface of the chimney to combustible material is given as xx expressed in millimeters (e.g. the distance ‘x-x’ identified in sub-section 2.5.8 and Diagram 7).

Standards for chimneys

A9 European chimney standards have been developed based on the material of the flue liner, e.g. clay/ceramic, concrete, metal and plastic. Some material based standards have adopted a different shortened designation, e.g. for clay flue a designation Liner – I.S. EN 1457-300-A1-N2 means it is suitable for a chimney with the designation T600 N2 D 3 G, with a nominal size of 300 mm. Table A5 and A6 gives the correlation between certain standards and the EN 1443 designations.

A10 The designation of the corrosion resistance class of a metal chimney product is

dealt with in I.S. EN 1856-1:2009 and I.S. EN 1856-2:2009 by a two - fold approach. A minimum material specification and thickness is allowed and products upon which a declaration has been made in this manner are designated Vm. The alternative approach involves the choice of one of three corrosion resistance tests. Products meeting the tests carry the designation V1, V2 or V3, as appropriate allow the product to be designated with the corrosion resistance class 1, 2 or 3 respectively. The material specification still forms part of the overall designation, and appears alongside the “V” letter, e.g. Vx- L40045. The material specification for the liner (or connecting pipe) is formed by the letter “L” followed by five digits. The first two digits represent the material type and the last three digits represent the material thickness in multiples of 0.01 m.

Guidance on the minimum material specification appropriate for the various applications in terms of corrosion resistance (solid fuel, gas and oil) for use in Ireland for products complying with I.S. EN 1856-1 and 2 is given in Table A4. This should be complied with where corrosion tests to V1, V2 or V3 have not been carried out.

Example of Flue Designation using material specification

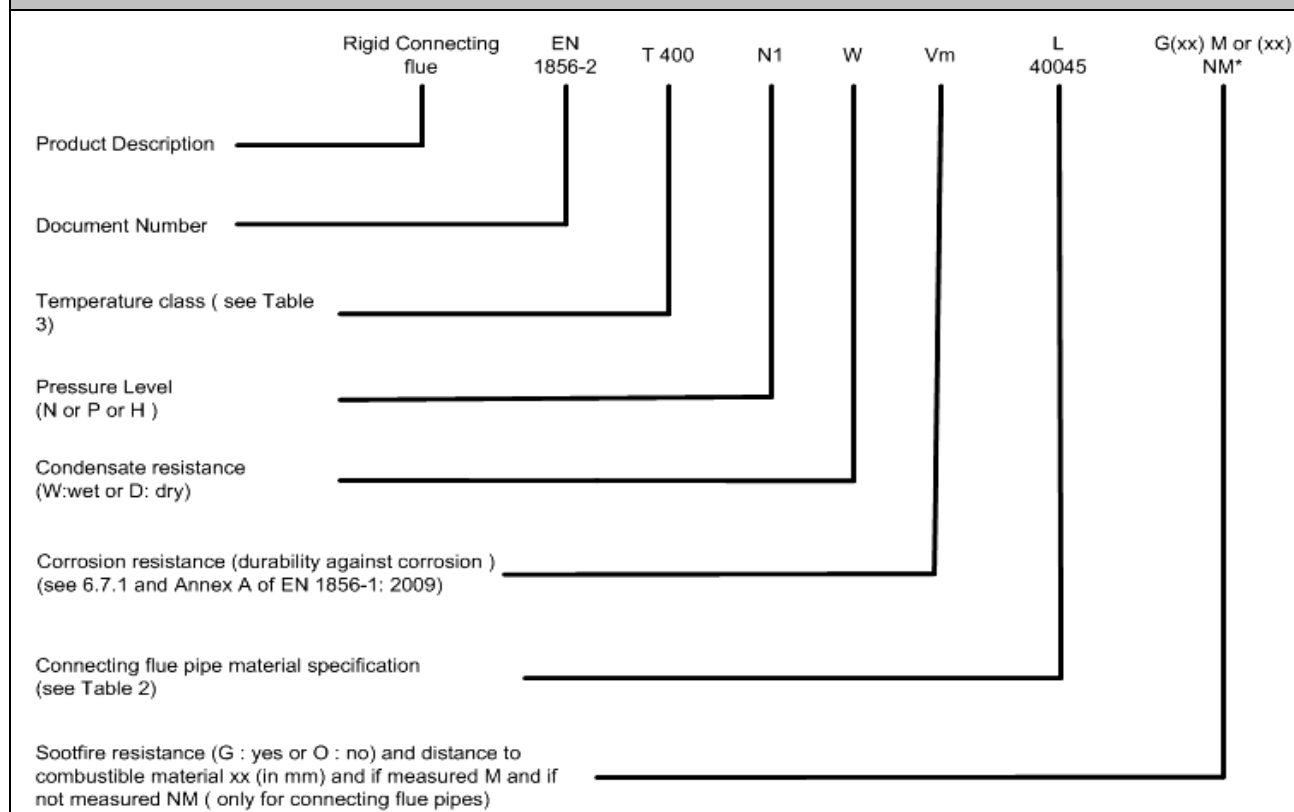


Table A4: Correlation between flue liner material and corrosion load

Product type	Metal Flue liner Material Specification (Vm)	Corrosion Load
Multiwall System Chimney	L50040	D3
	L50050	W2
Rigid Metal Liners	L40060	W1
	L50040	D3
	L50050	W2
Flexible Metal Liners	2xL50010	W2/D3
	L50010	D2/W1
Note: 1. For products with the same or higher material specification and increased thickness, the same correlations apply unless corrosion tests to the appropriate standard indicating a higher value have been carried out by an accredited independent test house.		

Table A 5: Correlation between designation parameters for clay/ceramic flue liners and flue blocks

Designation of EN 1457 clay /ceramic flue liner	Designation of EN 1806 clay /ceramic flue blocks	Designation according to EN 1443
A1 N2	FB 1N2 ^a	T 600 N2 D 3 G
A1N1	FB 1N1 ^a	T 600 N1 D 3 G
A2 N2	FB 2N2 ^a	T 600 N2 D 3 O
A2 N1	FB 2N1 ^a	T 600 N1 D 3 O
A2 P1		T 600 P1 D 3 O or T 600 P1 W 2 O
B1 N2		T 400 N2 D 3 G
B1 N1		T 400 N1 D 3 G
B2 N2	FB 3N2 ^a	T 400 N2 D 3 O or T 400 N2 W 2 O
B2 N1	FB 3N1 ^a	T 400 N1 D 3 O or T 400 N1 W 2 O
B2 P1		T 400 P1 D 3 O or T 400 P1 W 2 O
C1 N2	FB 6 ^b	T 300 N2 D 3 O
C1 N1		T 300 N1 D 3 O
C2 N2	FB 4N2 ^a	T 300 N2 D 3 O or T300 N2 W 2 O
C2 N1	FB 4N1 ^a	T 300 N1 D 3 O or T300 N1 W 2 O
C2 P1		T 300 P1 D 3 O or T 300 P1 W 2 O
D1 N2		T 200 N2 D 3 O
D1 N1		T 200 N1 D 3 O
D2 N2		T 200 N2 D 3 G or T 200 N2 W 2 O
D2 N1		T 200 N1 D 3 G or T 200 N1 W 2 O
D3 N2	FB 5N2 ^a	T 200 N2 D 3 O or T 200 N2 W 2 O
D3 N1	FB 5N1 ^a	T 200 N1 D 3 O or T 200 N1 W 2 O
D3 P1	FB 5P1	T 200 P1 D 3 O or T 200 P1 W 2 O
^a = non – bonding block type ^b = bonding block type		

Excerpt from I.S.EN 15287-1:2007

**Table A6: Correlation between designation parameters for concrete
flue liners and concrete flue blocks**

Designation of EN 1857 concrete flue liner	Designation of EN 1858 concrete flue blocks	Designation according to EN 1443
A1	A1	T 600 N1 D 3 G
A2	A2	T 600 N2 D 3 G
B1	B1	T 450 N1 D 3 G
B2	B2	T 450 N2 D 3 G
B3	B3	T 450 N1 D 3 O
C1	C1	T 400 N1 D 3 G
C2	C2	T 400 N2 D 3 G
C3	C3	T 400 N1 D 3 O
D1	D1	T 300 N1 D 3 O
D2	D2	T 300 N1 D 3 O or T 300 N1 W 2 O
D3	D3	T 300 P1 D 3 O or T 300 P1 W 2 O
E1	E1	T 250 N1 D 3 O
E2	E2	T 250 N1 D 3 O or T 250 N1 W 2 O
E3	E3	T 250 P1 D 3 O or T 250 P1 W 2 O
F1	F1	T 200 N1 D 3 O
F2	F2	T 200 N1 D 3 O or T 200 N1 W 2 O
G1	G1	T 160 N1 D 3 G or T 160 N1 W 2 O
G2	G2	T 160 P1 D 3 G or T 160 P1 W 2 O
H1	H1	T 140 N1 D 3 O or T 140 N1 W 2 O
H2	H2	T 140 P1 D 3 O or T 140 P1 W 2 O
J1	J1	T 120 N1 D 3 O or T 120 N1 W 2 O
J2	J2	T 120 P1 D 3 O or T 120 P1 W 2 O
K1	K1	T 100 N1 D 3 O or T 100 N1 W 2 O
K2	K2	T 100 P1 D 3 O or T 100 P1 W 2 O
L1	L1	T 80 N1 D 3 O or T 80 N1 W 2 O
L2	L2	T 80 P1 D 3 O or T 80 P1 W 2 O

Excerpt from I.S. EN 15287-1:2007

Appendix B – Assessing Air Permeability of older dwellings in relation to permanent ventilation requirements

General

B1 The minimum requirements for permanent ventilation for certain appliances depend on knowledge of the air tightness of the dwelling where they are to be installed. Dwellings built after 2008 are likely to have evidence of the air tightness either through an individual air permeability test certificate or through representative testing of the same design of dwelling on the same housing development.

Retrofitting measures that would reduce air permeability

B2 Older houses are unlikely to have been tested but are unlikely to achieve an air permeability of less than $5.0 \text{ m}^3 / (\text{hr.m}^2)$ at 50 Pa unless the building fabric has been upgraded. These would include all or most of the following measures:

- Full double (or triple) glazing;
- Secondary glazing fitted;
- Effective closures on trickle vents and other controllable ventilation devices;
- All external doors with integral draught seals and letter box seals;
- Internal and external sealing around doors and window frames;
- Filled cavity or solid walls;
- External insulation fitted;
- Internal insulation plastered or with air-tightness membrane fitted;
- Impermeable overlay and edge sealing of suspended ground floors;

- Careful sealing at junctions between building elements such as between walls and floors or ceilings;
- Careful sealing around loft hatch;
- Careful sealing around chimney or flue penetrations;
- Careful sealing around internal soil pipe;
- Careful sealing around domestic water and heating pipes passing into externally ventilated spaces;
- Careful sealing of all service penetrations in the building fabric (electricity, gas, water, drainage, phone, TV aerial, etc.);
- Internal warning pipe for WC;
- All cable channels for light switches and power sockets sealed;
- All cable entry for lighting and ceiling roses sealed. Recessed lighting should not penetrate ceilings below attic spaces.

B3 Failure to implement even a few of these measures will typically mean that the overall air permeability will probably exceed $5.0 \text{ m}^3 / (\text{hr.m}^2)$ at 50 Pa. However individual rooms in some older houses with solid walls and solid floors can be inherently air-tight when fitted with modern glazing.

The situation may therefore need to be assessed with respect both to the overall dwelling and to the individual room where the appliance is to be fitted. If in doubt then assume that the air permeability is lower than $5.0 \text{ m}^3 / (\text{hr.m}^2)$ at 50 Pa and fit the appropriate permanent ventilation or seek specialist advice.

Further information on sources of air leakage can be found in GPG224 Improving air-tightness in dwellings.

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Standards referred to:

I.S. 258: Parts 1 and 2:1984 Domestic Solid Fuel Cookers with Integral Boilers, Part 1: Safety Requirements; Part 2: General Requirements AMD No. 1:1986

I.S. 813:2014, Domestic Gas Installations

I.S. 820:2010, Non-Domestic Gas Installations

I.S. 3216:2010, Code of practice-Bulk storage of liquefied petroleum gas (LPG) (2nd Edition)

I.S. EN 26:1998 Gas-fired instantaneous water heaters for sanitary uses production, fitted with atmospheric burners (Including Corrigendum 1998) (Including AMD. No. 1:2000 & AMD No. 2:2004)

I.S. EN 30-1-1:1998 Domestic cooking appliances burning gas fuel Part 1-1: Safety - General (including AMD. No.1:1999 and AMD. No. 2:2003)

I.S. EN 30-1-2:1999 Domestic cooking appliances burning gas - Part 1-2: Safety - Appliances having forced-convection ovens and/or grills

I.S. EN 30-1-3:2003 Domestic cooking appliances burning gas – Part 1-3: Safety - appliances having a glass ceramic hotplate

I.S. EN 30-1-4:2002 Domestic cooking appliances burning gas - Part 1-4: Safety - Appliances having one or more burners with an automatic burner control system

I.S. EN 30-2-1:1998 Domestic cooking appliances burning gas – Part 2-1: Rational use of energy – General (Including AMD. No. 1:2003)

I.S. EN 30-2-2:1999 Domestic cooking appliances burning gas – Part 2-2: Rational use of energy – Appliances having forced-convection ovens and/or grills

I.S. EN 89:2000, Gas-fired storage water heaters for the production of domestic hot water (Including AMD. No. 1:2000 & AMD. No. 2:2000)

I.S. EN 297:1994, AMD 4:2004, Gas Fired Central Heating Boilers - Type B11 And B11bs Boilers Fitted With Atmospheric Burners Of Nominal Heat Input Not Exceeding 70 Kw

I.S. EN 303-1:1999 + AMD 1:2003 Heating Boilers - Part 1: Heating boilers with forced draught burners - terminology, general requirements, testing and marking

I.S. EN 303-5:1999 Heating Boilers – Heating boilers for solid fuels, hand and automatically stoked, nominal heat output of up to 300KW - terminology requirements, testing and marking

I.S. EN 449: 2002, Specification For Dedicated Liquefied Petroleum Gas Appliances - Domestic Flueless Space Heaters (Including Diffusive Catalytic Combustion Heaters).

I.S. EN 483:2000, Gas-fired central heating boilers – Type C boilers of nominal heat input not exceeding 70 kW (Including AMD. No. 2 2001)

I.S. EN 509:2000, AMD 2: 2005, Decorative Fuel-Effect Gas Appliances

I.S. EN 778:2009, Domestic gas-fired forced convection air heaters for space heating not exceeding a net heat input of 70 kW, without a fan to assist transportation of combustion air and/or combustion products (Including AMD. No. 1 2001)

I.S. EN 1266:2002, Independent gas-fired convection heaters incorporating a fan to assist transportation of combustion air and/or flue gases

I.S. EN 1319:2009, AMD 1:2001, Domestic Gas-Fired Forced Convection Air Heaters For Space Heating, With Fan-Assisted Burners Not Exceeding A Net Heat Input of 70 Kw

I.S. EN 1443:2003 Chimneys – General requirements

I.S. EN 1457-1:2012, Chimneys – Clay/ceramic Flue Liners operating under dry conditions - Requirements and test methods

I.S. EN 1457-2: 2012, Chimneys – Clay/ceramic Flue Liners operating under wet conditions - Requirements and test methods

I.S. EN 1806:2006, Chimneys. Clay/ceramic flue blocks for single wall chimneys. Requirements and test methods

I.S. EN 1856-1:2009, Chimneys - Requirements For Metal Chimneys - Part 1: System Chimney Products

I.S. EN 1856-2:2009, Chimneys - Requirements For Metal Chimneys - Part 2: Metal Liners And Connecting Flue Pipes

I.S. EN 1857:2010, Chimneys-Components - Concrete flue liners

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I.S. EN 13141-1:2004, Ventilation for buildings - Performance testing of components/products for residential ventilation - Part 1: Externally and internally mounted air transfer devices

I.S. EN 13341:2005 +A1:2011 Static thermoplastic tanks for above ground storage of domestic heating oils, kerosene and diesel fuels - blow moulded and rotationally moulded polyethylene tanks and rotationally moulded tanks made of anionically polymerized polyamide 6 - requirements and test methods

I.S. EN 14214:2012 Liquid petroleum products – Fatty acid methyl esters (FAME) for use in diesel engines and heating appliances - Requirements and test methods

I.S. EN 14471:2005 Chimneys - System chimneys with plastic flue liners - Requirements and test methods

I.S. EN 15287-1:2007 + A1:2010 Chimneys – Design, installation and commissioning of chimneys – Part 1: chimneys for non-room sealed heating appliances

I.S. EN 15287-2:2008 Chimneys – Design, installation and commissioning of chimneys – Part 2: chimneys for room sealed heating appliances

I.S. EN 50291-1:2010/A1:2012 Gas detectors - Electrical apparatus for the detection of carbon monoxide in domestic premises — Part 1: Test methods and performance requirements

I.S. EN 50292:2002 Electrical apparatus for the detection of carbon monoxide in domestic premises - Guide on the selection, installation, use and maintenance

BS 476 Part 4:1970 Fire tests on building materials and structures. Non-combustibility test for materials

BS 476 Part 20:1987 Fire tests on building materials and structures. Method for determination of the fire resistance of elements of construction (general principles)

BS 476 Part 23:1987 Fire tests on building materials and structures. Methods for determination of the contribution of components to the fire resistance of a structure

BS 1251:1987 Specification for open-fireplace components (under revision)

BS 2869: 2010 + A1: 2011 Fuel oils for agricultural, domestic and industrial engines and boilers. Specification

BS 5410-1:1997 Code of practice for oil firing: Part 1: 1997 Installations up to 45 kW output capacity for space heating and hot water supply purposes

BS 5410-2:2013 Code of practice for oil firing Installations over 45 kW output capacity for space heating, hot water and steam supply services

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

BS 5440-2:2009 Flueing and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases). Specification for the installation and maintenance of ventilation provision for gas appliances

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burning solid mineral fuels Specification for the design of installations

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burning solid mineral fuels Specification for installing and commissioning on site

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Building Research Establishment (UK). Information Paper IP 7/94 Spillage of flue gases from solid-fuel combustion appliances

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