



BFCMA

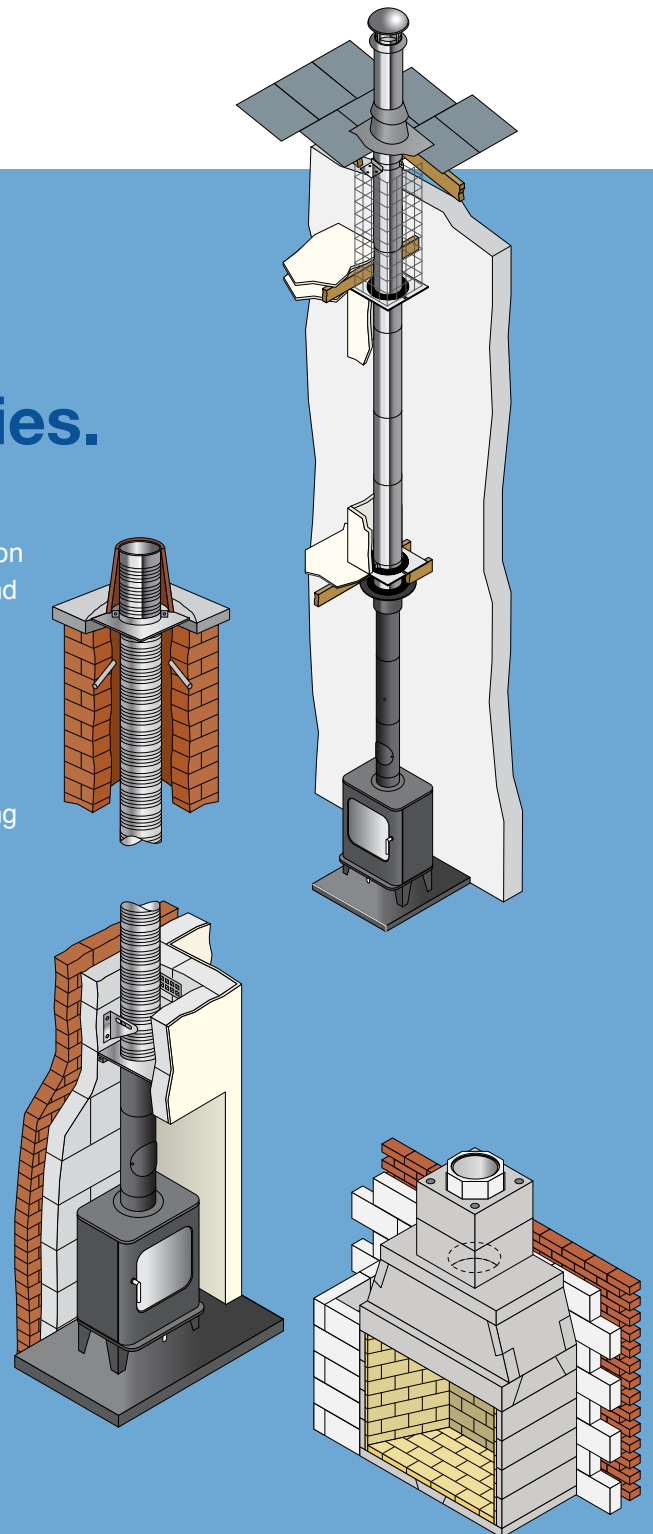
BRITISH FLUE & CHIMNEY
MANUFACTURERS
ASSOCIATION

Wood Burning & Multi Fuel Appliances in Residential Properties.

This guide has been produced by the BFCMA to provide advice and general guidance on the selection and installation of chimneys and flues for maximum performance, safety and durability. It is important to ensure that the chosen chimney and the heating system, as a whole, are suitable for the purpose intended and conform to the relevant regulations and standards.

The BFCMA is the UK's only Trade Association representing manufacturers and sole UK distributors of factory made chimney and flue products. It was established to promote the advantages of chimneys and encourage continued improvements in standards, efficiency and service.

Contact details of BFCMA members are shown on the back page of this guide.



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Introduction

Regulations

The construction and application of chimneys and flues is covered by UK Building Regulations in conjunction with the relevant European and British Standards. Whilst these differ in emphasis, they all mandate the safe application of the chimney no matter where and how used. These Regulations and Standards dictate the minimum criteria which it is necessary to apply if the chimney or flue is to function safely and correctly. Building control approval is necessary for building new chimneys and in some cases for relining old chimneys particularly if some alteration or change of the heating appliance occurs. The appropriate Regulations and Standards are listed later in this document.



Document J was published before the National Annex to BS EN 15287-1 was updated. As a result it does not have the alternative installation methods outlined in the revised annex. Document J of the updated standard (BSEN 15287-1) has been posted in the Frequently Asked Questions and Answers section of Document J. This removes any grey issues in working to the updated European standard. The updated advice from the annex has been included in this document and will be highlighted in a blue shaded box.



January 2021 saw the introduction of the UK CA mark (UK Conformity Assessed) which replaces the CE mark in Great Britain. (The CE mark will still be required in Northern Ireland and for products being sold into the European Union). The CE mark will no longer be valid in Great Britain from 1st January 2023. BS EN standards will become BS standards.

Chimney Principles

The terms flue and chimney are often used interchangeably. The flue is the working part of the chimney, conveying the products of combustion safely to the atmosphere. The chimney includes the shaft within which the flue is housed. A flue works under negative pressure drawing the product of combustion from the appliance.

A successful “chimney draw” is dependent on the following principles:

- The difference in air pressure between the appliance and the top of the chimney. (created by the height of the chimney)
- The difference in temperature between the appliance’s exhaust gas and the outside temperature.
- The quality of insulation along the length of the chimney.
- The route of chimney. (The straighter and more vertical the chimney the better).

It is essential to choose a flue diameter that matches the output from the appliance. An adequate air supply is also required for the appliance to operate safely and efficiently.

Types of Chimney and Flue Systems

The European Standard BS EN 1443: 2003 Chimneys – General Requirements, categorises chimneys and flues into three basic designations:

Custom Built Chimneys - Constructed on site using factory made flue liners.

System Chimneys - Prefabricated chimney systems. Manufactured in a factory and assembled on site. The key benefits of chimney systems lie in their off-site production and preformed insulation.

Connecting Flue Pipes - Pipe specifically designed to connect an appliance to the flue or chimney.

Chimneys and flues are also available in a number of different materials – stainless steel, concrete, pumice, clay or ceramic and plastic. Concrete, pumice and clay or ceramic are collectively referred to as masonry chimneys. Plastic flues are only allowed to be used with low temperature condensing applications.

Care must be taken to check the designation of stainless steel chimney systems and flexible liners as a limited number are specifically designed for use with gas fired appliances. These must not be used with wood burning or multi fuel appliances. Clay and pumice chimney systems and liners are suitable for wood, multi fuel, oil and gas. Concrete gas flue blocks as the name suggests are only to be used with gas effect fires and must not be used with wood or solid fuel fires.

Factory produced pumice and ceramic chimney systems are also available. Although they can be retrofitted, pumice and ceramic chimney systems tend to be used in new houses, because they require a foundation and their construction method is best suited to the skill set of a bricklayer.

Stainless Steel Flexible Liners

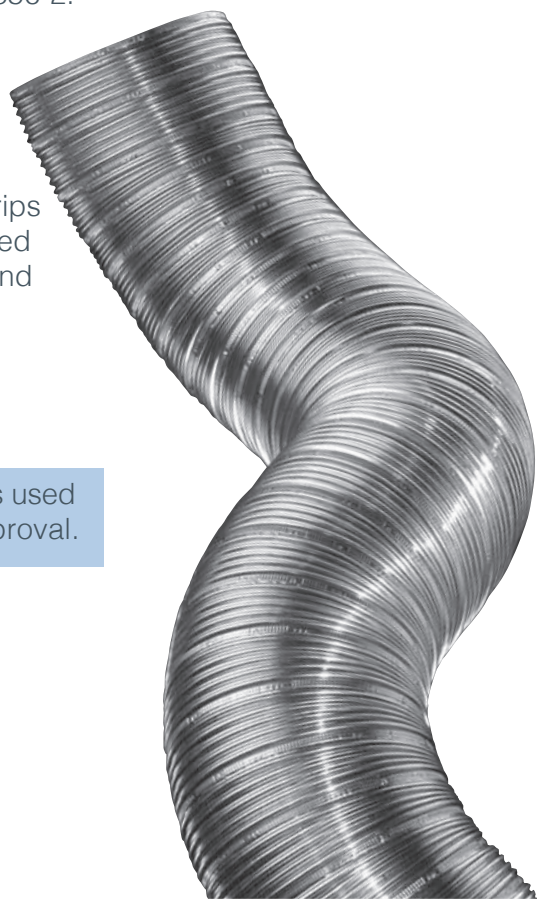
Stainless steel flexible liners are certified to BS EN 1856-2. Flexible liners are used to reline an existing chimney. Care must be taken when selecting a flexible liner.

There are two types of flexible liners:

- Single skin liners for use with gas appliances and
- Twin skin liners, manufactured from overlapping strips of high grade stainless steel to give a smooth sealed flue-way. These liners should be used with wood and multi-fuel appliances.

Single skin liners must never be used with wood or multi-fuel applications.

To be certified as a system chimney the components used with the flexible liner must also have UKCA/CE Approval.



Clay, Pumice and Concrete Liners.

Clay/ceramic flue liners are manufactured from a specially selected blend of fire clays in a range of sizes in both round and square to suit the range of wood and solid fuel appliances and open fires. BS EN 1457:2012 part 1 specifies the technical requirements for clay/ceramic liners to be used in dry, non-condensing conditions.

Pumice and concrete liners are certified to BS EN 1857:2010. The difference between concrete and pumice chimney products lies in the degree of pumice used in their manufacture. The Schiedel pumice liners, for example, are manufactured with 100% pumice aggregate. Cement is used to bind the aggregate with the result that the percentage of pumice in the finished product is still over 90%. Pumice is made from volcanic rock and its importance in chimney construction comes from the fact that it is a natural insulator.

To form a chimney, the liners have to be surrounded with at least 100mm thick brick, block or stonework with the gap in between filled with a suitable insulating concrete mix. Clay, pumice and concrete liners can be used to reline an existing chimney. Concrete and pumice liners should not be used with condensing applications.



Stainless Steel System Chimneys

Stainless steel system chimneys consist of two concentric stainless steel metal walls with insulation filling the annular space between them. Some systems have a ceramic liner, which can offer a longer life. Factory made system chimneys are easy to handle and available with a wide range of fittings such as elbows, terminals and tees, all of which simple lock or push together. They are easily assembled and supported with purpose designed support brackets. These products, which can be used internally and externally, must be certified to BS EN 1856-1:2009.

Stainless steel systems tend to be used in existing buildings that do not have a chimney and extensions, because they do not require a dedicated foundation and can be easily retrofitted.



Under the new BS EN 15287-1 twin wall system chimneys can now be used as a connecting flue pipe and also to reline an existing chimney shaft.

Pumice Chimney Systems

Pumice chimney systems are certified to BS EN1858:2008. Double wall pumice chimney systems, known as Double Module, are able to exploit the natural insulating properties of pumice and do not require any further insulation. Pumice systems are lightweight and come with a range of accessories designed to facilitate use with stoves. Pumice chimney systems should not be used with condensing applications.



Ceramic Chimney Systems

Ceramic chimney systems are certified to BS EN13063-1:2005. Ceramic chimney systems and liners are suitable for wood, multi fuel, oil and gas and condensing applications. The inner ceramic liner is insulated with rock wool and contained in a preformed concrete block.



Gas Flue Block Systems

Gas Flue Blocks have been specifically designed for use with gas effect fires. They must not be used on a wood burning or multi fuel appliance under any circumstance. The concrete blocks have an integral narrow rectangular flue way. They are of the same modular size as a masonry building block and are usually designed so that they bond into adjacent brick or block work. Gas Flue Blocks certified to BS EN 1858:2008



Connecting Flue Pipes

Connecting Flue Pipes are designed to connect the appliance to the flue. The pipe is usually decorative because it is visible in the living area. The options are vitreous enamel or single wall stainless steel. Vitreous enamel is the most commonly used option. Single wall stainless steel is certified to EN1856-2. The vitreous enamel coating should comply with the recommended requirements for high resistance to heat in BS 1344 part1:1994 part 7:1984 and acid resistance BS EN 14483-1:2004. The European Standard for vitreous enamel low carbon steel flue pipes is BS60009-1989.



Under the new BS EN 15287-1 twin wall stainless steel system chimneys certified to BS EN 1856-1:2009 can also be used as connecting flue pipe

Stainless Steel Terminals, Birdguards & Anti-Downdraught Terminals

Stainless steel terminals are usually fitted for one of two reasons:

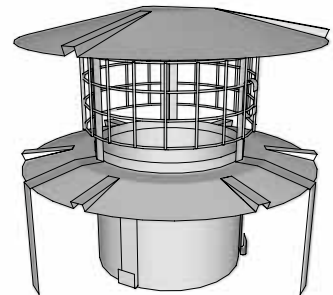
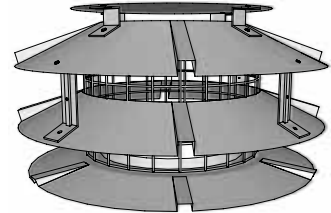
- **Weather, bird and debris protection.**

The terminal is designed so that it will not restrict the draw of the chimney.

- **Resolution of downdraught problems**

If downdraught is being experienced and other factors have been ruled out, a stainless steel anti-downdraught terminal can enhance the airflow and the performance of the chimney. Stainless steel anti-downdraught terminals are also designed to provide weather, bird and debris protection to the chimney.

Stainless steel terminals can be fitted to all types of flue and chimney installation in stainless steel, clay/ceramic, concrete and pumice chimney systems. They can be supplied either as part of the chimney system or can be obtained separately from reputable chimney terminal manufacturers



Chimney Fans

Chimney fans are mechanical draft systems designed to resolve chimney draft problems. Systems are available for use with a wide range of appliances including wood burning and multi fuel stoves and open fires. Specialist advice should always be sought when selecting the appropriate draught solution. Chimney fans must operate in accordance with the requirements of BS EN 15287-1.



Chimney and Flue Design

Flue Sizing

It is important to match the internal diameter of the flue with the outlet on the appliance. It should never be less than the outlet diameter of the appliance. The appliance manufacturer's chimney sizing recommendations should always be followed.

In accordance with the current version of Document J free-standing stoves, boilers and cookers up to a maximum of 20KW, that are not in a fireplace recess, the minimum flue size is 125mm round or square if the appliance has passed the DEFRA requirements for smokeless zones and 150mm if this is not the case.

For open fires with a standard fire opening up to 500mm wide by 550mm high the minimum required flue diameter is 200mm round or 175mm square. For larger open fires, such as inglenooks, dog grate installations or special appliances and stoves designed to operate with a fire opening greater than 500mm x 550mm, the flue size should be at least 15% of the free unobstructed area of the fire opening (including sides if open). Many Decorative Fuel Effect gas fires (DFE's) that imitate a coal or log burning open fire require the same chimney arrangement as for solid fuel open fires and must be installed in accordance with British Standard BS5871:Part 3:2005

Under the new BS EN 15287-1 the guidance has been amended as follows:

Chimneys serving an appliance recess

For a chimney built with a fireplace recess in which an open fire, a room heater or stove may be fitted, a flue size of 200 mm diameter or rectangular/square flues having the same cross-sectional area and a minimum dimension not less than 175 mm diameter. These flue sizes are suitable for virtually all closed appliances and for open fires with an opening up to 500 mm by 550 mm. For larger sizes of open fire, or closed appliance that can be used as an open fire, the cross-sectional area of flue should be 15 % of the free, unobstructed area of the fire opening.

In cases where a closed appliance, such as a room heater, boiler or cooker, is installed with a chimney intended for an open fire and built as recommended by BS EN 15287-1, it should not normally be necessary to make any alterations to the chimney or flue. If, however, the type and rating of the appliance to be installed is known before the chimney is built and it is unlikely that the chimney will be used for some form of open fire inset or free-standing, then the optimum size of the chimney can be determined for the particular installation.

Chimneys not serving an appliance recess (recommended sizes of flue according to the table below)

Installation (1)	Minimum flue size
Fireplace with an opening of up to 500mm x 550mm	200mm diameter or rectangular/square flues having the same cross-sectional area and a maximum dimension not less than 175mm
Fireplace with an opening in excess of 500mm x 550mm or a fireplace exposed on two or more sides	If rectangular/square flues are used the minimum dimension should not be less than 200mm
Closed appliance of up to 20 kW rated output which: a) burns smokeless or low-volatiles fuel (2) or b) is an appliance which meets the requirements of the Clean Air Act when burning an appropriate bituminous coal (3) or c) is an appliance which meets the requirements of the Clean Air Act when burning wood (3)	125 mm diameter or rectangular/square flues having the same cross-sectional area and a minimum dimension not less than 100mm for straight flues or 125mm for flues with bends or offsets
Pellet burner or pellet boiler which meets the requirements of the Clean Air Act (3)	125 mm diameter This may be reduced to no less than 100 mm when permitted by the appliance manufacturer and supported by calculation according to BS EN 13384-1:2002. This calculation can be applied to an individual installation or manufacturers can provide precalculated designs.
Other closed appliance of up to 30 kW rated output burning any fuel	150 mm diameter or rectangular/square flues having the same cross-sectional area and a minimum dimension not less than 125mm
Closed appliance of above 30 kW and up to 50 kW rated output burning any fuel	175 mm diameter or rectangular/square flues having the same cross-sectional area and a minimum dimension not less than 150mm.

NOTE 1: Closed appliances include cookers, stoves, room heaters and boilers.

NOTE 2: Fuels such as bituminous coal, untreated wood or compressed paper are not smokeless or low-volatiles fuels.

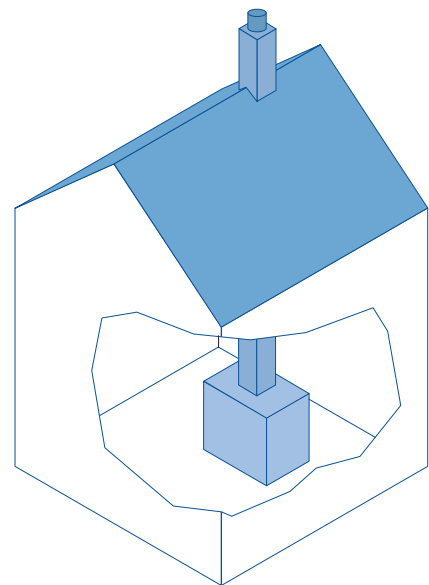
NOTE 3: These appliances are known as 'exempted fireplaces'.

Insulation is Key

One of the keys to a well performing chimney is consistent insulation along the complete length of the flue. Clay/ceramic, concrete and pumice liners require insulation to be prepared and added on site. Stainless steel and ceramic system chimneys are supplied with effective insulation. Double wall pumice chimney systems have an air gap between the walls of the inner and outer block. The air gap combined with the natural insulating properties of pumice provide effective insulation along the length of the chimney.

Chimney Position

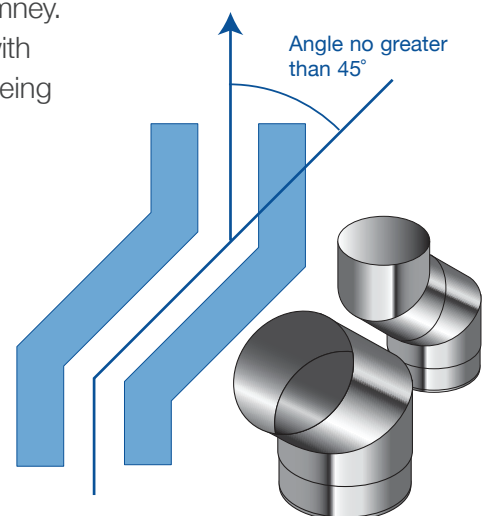
The ideal location for a chimney is on the inside of the building. That way it can benefit from being kept warm. Chimneys situated outside the building can be affected by cold weather causing poor up draught and condensation, particularly if they are un-insulated. It is therefore important that a cavity wall is continued around a lined masonry chimney or a factory made insulated chimney system is used for external applications.



Bends in the Chimney

Both the Regulations and the Standards recommend that bends in the chimney be avoided, as a straight vertical chimney performs better. If bends are necessary there must be no more than four in the length of the chimney. The angle of the bend should be no greater than 45° from the vertical, with the exception that 90° factory made bends or tees may be treated as being equal to two 45° bends. Where System Chimneys are used, always use the standard offset components which are available from the chimney manufacturer. For stainless steel chimneys, certified to BS EN 1856, the distance between bends must be no greater than 20% of the total chimney length. It is recommended that a vertical rise of 600mm should be allowed immediately above the appliance before any change of direction. An inspection hatch is required between each offset.

It is important that there is easy access for cleaning, particularly at any change of direction in the flue. This can be achieved with the use of swept elbows that incorporate both debris collection and an inspection point.



Connection to the Chimney

Stoves, cookers and boilers should be connected to the chimney using correctly sized metal steel flue pipe which conforms to BS EN 1856-2:2009, or with alternative materials identified by Building Regulations such as Vitreous Enamelled flue pipe certified to BS 6999:1989.

Under the new BS EN 15287-1 twin wall stainless steel system chimney certified to BS EN 1856-1:2009 can be connected directly to the appliance.

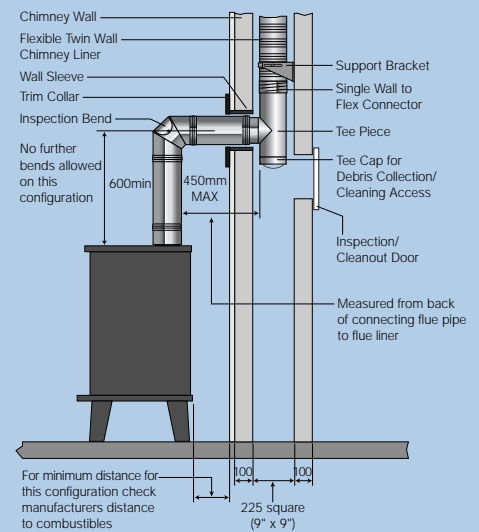
When a single wall connecting flue pipe is used to connect an appliance to a twin wall chimney, the new version of BS EN 15287-1 requires that the lower end of the twin wall chimney section must extend a minimum of 425mm below the ceiling. The flue pipe connection to the twin wall chimney must be made in the same room as the appliance.

The connecting flue pipe must be suitably sealed with spigot end facing down (into the socket of the pipe below). As excessive bends and horizontal runs can accumulate soot with the risk of blockage, the flue pipe should be kept as vertical as possible. In the current Document J the maximum horizontal length of flue pipe allowed from the back of an appliance into any chimney is 150mm.

Alternative method of installation

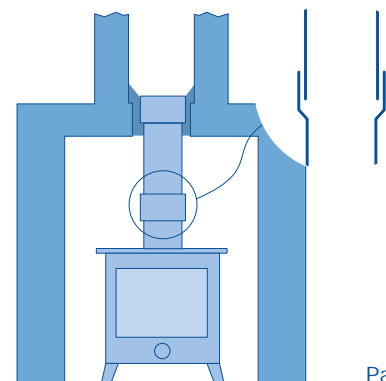
In the new version of BS EN 15287-1 the maximum horizontal distance has been increased to 450mm so long as.

- A Defra exempt appliance or an appliance, which is limited to burning authorised smokeless fuel only, is installed.
- A calculation according to BS EN 13384-1 has indicated safe operation of the proposed configuration, and the results of the calculation are left with the householder along with the appliance installation instructions.
- The chimney manufacturer and appliance manufacturers agree in writing to the proposed configuration.
- The total length of single wall connecting flue pipe is not more than 1.5m.
- The appropriate distances to combustible materials from both the appliance and the connecting flue pipe are maintained.



It is important that there is easy access for cleaning, particularly at any change of direction in the flue. This can be achieved with the use of swept elbows that incorporate both debris collection and an inspection point.

For open fires a suitable throated front lintel and gather must be installed above the fire opening, so that the front, back and sides slope up smoothly into the flue opening in the chimney at an angle no greater than 45° from the vertical. Flat surfaces or shelves must be avoided as these can cause turbulence and smoky fires. Most flue and chimney manufacturers provide standard gather and fireplace components. Precast fire chambers or Firechests are also available for standard and larger fire openings.



Access for Chimney Inspection and cleaning

Some appliances, such as free-standing stoves and inset fires, have built in gathers or removable baffle plates to allow sweeping through the appliance. Building Regulations require that the connecting flue pipe is easily accessible for regular inspection and sweeping to prevent blockage. If this is not possible through the appliance, a purpose made access/soot door must be provided in the chimney. Most chimney manufacturers can provide components to suit. Where the connecting flue pipe goes into the side of the chimney a space must be provided with soot door access below this point to collect debris, such as soot, that may fall down the chimney.

Chimney Pots and Terminals

There are many types of chimney pots and terminals, in different styles and shapes to suit almost any taste and application. However, it is important to ensure the chosen pot or terminal does not restrict the exit of the products of combustion. The area of the outlet must be at least the same as the flue area. If the terminal has a hood the area of the outlet should be twice the flue area. Beware of terminals which are primarily designed for ventilating a chimney where the fireplace has been closed off.

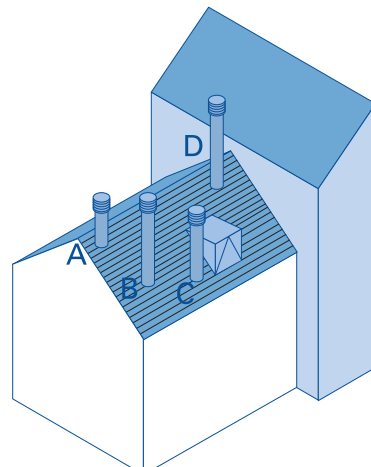
An open termination is normally recommended for wood burning and multi-fuel appliances. However rain caps or anti-downdraught terminals may be used. Rain caps and anti-downdraught terminals are available in two versions, with anti-bird mesh and without mesh. Where a terminal with mesh is used, there is a risk of soot build up, and therefore regular cleaning is required to avoid blockage.

If there is a “down draught” from the chimney (i.e. smoke blown back into the room) it is best to check that there is nothing wrong with the chimney arrangement, before fitting a special terminal. The problem is often caused by factors such as lack of ventilation in the room, poor throating above the open fire or insufficient chimney height.

Chimney Heights and Termination

The minimum chimney height recommended for minimum performance of wood burning and multi fuel appliances is 4.5 m from the top of the appliance to the top of the chimney. It is best to position the chimney, so that it goes straight up as near to the roof ridge as possible. The diagram below, taken from Document J, shows the minimum flue discharge heights and positions for all wood burning and multi fuel applications. In some cases, particularly when chimneys are towards the bottom of a sloping roof or at the eaves, it may be necessary to increase the chimney height above these minimum mandatory requirements. The reason for this is to clear pressure zones created by wind hitting the roof and nearby structures, like trees, which may interfere with the up draught required by the appliance or fire. The maximum freestanding stack height above the roof for a traditional masonry chimney is 4.5 times the narrowest horizontal part of the chimney. In the case of stainless steel system chimneys, the manufacturer’s installation instructions should be consulted; however in most cases it will be around 1.5 metres. This measurement is taken from the last point where the chimney stack passes the through or past the edge of the roof up to the chimney capping or termination. Tall chimneys may need bracing, always consult the manufacturer for advice.

Point where flue passes through weather surface (Notes 1,2)	Clearances to flue outlet
A At or within 600mm of the ridge	At least 600mm above the ridge
B Elsewhere on the roof (whether pitched or flat)	At least 2300mm horizontally from the nearest point on the weather surface and: a) at least 1000mm above the highest point of intersection of the chimney and the weather surface; or b) at least as high as the ridge
C Below (on a pitched roof) or within 2300mm horizontally to an openable rooflight, dormer window or other opening (Note 3)	At least 1000mm above the top of the opening
D Within 2300mm of an adjoining or adjacent building, whether or not beyond the boundary (Note 3)	At least 600mm above any part of the adjacent building within 2300mm



Dwellings with a Thatch and Combustive Roof

These require special attention and should only be worked on by experienced installers. Attention is drawn to the HETAS guide on thatched properties. The home owner's insurance company must be advised of proposed works.

Fan Assisted Flue Arrangements

The use of electrically powered fans to assist natural chimney draught is a subject that must be discussed with both the fan supplier and heating appliance manufacturers who will normally provide technical advice to ensure safe operation. Even in the event of fan failure, the products of combustion must still be able to safely evacuate the chimney, in accordance with BS EN 15287-1. The products of combustion will continue to be produced until the appliance is extinguished.

Combustion Air Requirements

All heating appliances need air to work efficiently and safely. It is essential that the appropriate permanent air supply, as required by the appliance manufacturer and Building Regulations is provided into the room where the appliance or open fire is situated. Always refer to the appliance manufacturer's recommendations and Building Regulations before installation. An inadequate supply of combustion air can create problems. Situations assumed to be "down draught" and spillage of smoke and fumes back into the room, which can be unpleasant and dangerous, are more frequently caused by insufficient provision of combustion air. Either the openings have not been provided, are not large enough or have been simply blocked off. If the appliance does not get all the air it needs to burn the fuel efficiently, incomplete combustion will occur resulting in the production of carbon monoxide and, if badly deprived of air, copious volumes of soot.

Carbon Monoxide Alarms

All wood burning and multi-fuel appliances should have a carbon monoxide alarm fitted within the same room as the appliance. The carbon monoxide alarm should comply with BS EN 50291-1:2010, and must be installed to the manufacturers' installation instructions, and current Buildings Regulations.

An alarm is required because carbon monoxide is a dangerous odourless and invisible gas.

UKCA/CE Designations

Making Sense of UKCA/CE Designations for Stainless Steel Flues

One of the key features of the European Standard for metal chimneys (EN 1856) is a user-readable classification system that designates the features of the product. A label showing the classification must go with each flue component. Understanding the classification can make the job of selecting the right flue much easier and will allow you to compare different flues. It's easy to use so long as you know the keys. The diagram below unlocks the coded information.

Metal chimney system	EN 1856:	T400	N1	W	V2	L50	050	G	75
Product Description									
Standard Number									
Temperature Rating									
Pressure Rating (N = Negative, P = Pressure, H = High Pressure)									
Condensate Resistance (W = Wet, D = Dry)									
Corrosion Resistance									
Liner Material									
Material Thickness									
Soot Fire Resistance (G = Yes, O = No)									
Distance to combustibles									

Picking out a few of the main points:

Temperature Rating Maximum temperature (°C) for continuous use of the flue. T400 is suitable for multi-fuel. T200 is suitable for gas and oil.

Corrosion Resistance This is fuel dependent as follows;

V1 Resistant to attack from products of combustion from gas.

V2 Resistant to attack from products of combustion from light oil (sulphur content up to 0.2%) and natural wood. If the flue passes the V2 wet test then it is also deemed to comply with D3 & V3 under dry conditions.

D3 Resistant to the products of combustion from burning wood under dry conditions.

V3 Resistant to attack from products of combustion from heavy oil (sulphur content > 0.2%), solid fuels and peat.

VM Not tested but rating declared by the manufacturer.

Liner Material and Thickness 316L, is the highest quality grade and is expected to withstand the corrosion effect of multi-fuel, wood or heavy oil. The code for 316L is L50. Light oil is less corrosive and normally 304 (L20) has proved adequate in dry conditions, but in the increasingly common wet conditions created by high efficiency condensing boilers, the higher grade is required (316L). The thickness is the steel thickness in mm.

Soot Fire Resistance and Distance to Combustibles Expressed as either G, for soot fire resistance or O for not, followed by the declared minimum distance to combustibles expressed in mm. To obtain the G classification means that the product has been tested at 1000°C for 30 minutes and remains intact. The temperature of combustible material at the designated distance must not exceed 100°C at an ambient temperature of 20°C.

Distance to Combustibles for Connecting Flue Pipe Connecting flue pipes to BS EN 1856-2 also have an additional classification M (Measured) or NM (Not Measured). If not measured the minimum distance to combustibles should be 3 times the internal diameter of connecting flue pipe. Connecting flue pipes to BS EN 1856-1 should be used in accordance with the manufacture's declared distance to combustibles.

Making Sense of UKCA/CE Designations for Clay/Ceramic Liners

The main change in the new standard for clay/ceramic flue liners, published in January, 2012, is the fact that the standard was split into two sections. BS EN 1457 part 1 is the standard for clay/ceramic flue liners operating under dry or non-condensing conditions. BS EN 1457 part 2 covers liners operating under wet/condensing conditions. Under wet conditions condensation will be on the inside of the flue liners typically arising from the operation of modern and more efficient lower exhaust gas temperature appliances. The structure of the label is the same in both parts.

Clay/Ceramic liners	EN 1457-1:	300	A1N2
Product Description			
Standard Number (either EN1457-1 or EN1457-2)			
Nominal diameter			
<p>The type of liner specifies the conditions under which the liner can be used. For wood burning and solid fuel appliances and open fires, operating under negative pressure in the chimney, the requirement is for soot fire resistant liners which are in the class A1N1 and A1N2. A1N2 will be the type of liner generally available. These liners are suitable for use at a working temperature of 600 °C. They can also withstand a soot fire of 1000 °C.</p>			
Condensate Resistance			
<p>If Certified for wet conditions under EN1457-2 there will be a W here.</p>			

The CE Designation for Concrete Liners

The standard for concrete liners is BS EN 1857:2010 The types of liner are classified in a similar way to clay liners, with the result that the same classes are required for wood burning and solid fuel appliances and open fires. A1N1 and A1N2 concrete liners can only be used under dry conditions.

Checking and Relining Existing Chimneys

It is important to check the condition of an old chimney, especially when re-opening one, after many years of not being used. A chimney should contain a sealed flue from the appliance to the chimney pot to transport the products of combustion safely to the atmosphere. Over time the condition of the flue can deteriorate. It was only from 1965 that Building Regulations required all new chimneys to be built with suitable flue liners of the correct flue size to protect the chimney.

The check should be carried out by a chimney specialist and would entail the following procedures:

- The chimney should be swept to ensure that it is clear of obstructions such as dislodged masonry or bird's nests
- A smoke test should then be carried out to establish whether there is any major fault that can cause products of combustion to leak through the chimney walls. A smoke test procedure is given later on in this guide.
- The structural stability should also be checked, as well as making sure the chimney is wind and water tight.

This should identify the repair work that is needed. Often the safest and most economical way to make the flue secure is to reline the chimney shaft with new liners. This can be done with clay, concrete or pumice liners, single wall stainless steel or flexible stainless steel liners.

To reline the chimney with clay, concrete or pumice liners, the liners are lowered down the chimney on guide ropes with locating bands at the joints. The gap between the liners and chimney is then backfilled with a lightweight insulating compound. The existing flue opening has to be made large enough for the liners to be installed. This benefit of this type of re-lining is its durability. However the cost can be prohibitive.

The alternative is to use stainless steel liners, either single wall rigid liners or flexible liners. Stainless steel flexible liners are designed to take on the shape of the chimney. The liners are installed by either lowering them down or pulling them up the chimney. They can go around most bends. Whilst their slim profile enables quick installation into chimneys where other systems might not fit, their life can be reduced if abnormally high corrosive soot or condensate deposits are created and allowed to accumulate in the flue or have not been thoroughly removed from the walls of the existing chimney flue.

Fuel Burning

A chimney operates on the principle of having a natural up draught. One factor in creating the up draught is maintaining a warm flue gas temperature.

The recommended temperature range in Document J is between 150°C and 450°C. The upper temperature in the new BS EN 15287-1 has been reduced to 400°C.

Burning wood or multi fuel slowly with insufficient air supply, particularly on stoves or closed appliances must be avoided. Low flue gas temperatures will cause condensation and greatly increases the risk of producing excessive tar and corrosive soot deposits. This is a common problem, particularly when burning wet wood or coal and should be avoided. If soot and condensate deposits are allowed to accumulate in a flue, the deposits can ignite causing a chimney fire. These deposits can also be very corrosive and if they are not regularly removed can cause corrosion of the metal parts of both the chimney and the appliance.

When burning wood it is important to ensure that it is dry and well-seasoned. The HETAS Wood Fuel Guide provides useful information on the use of wood as a fuel. Always use suitable solid fuels. Some processed fuels can produce abnormally high temperatures together with very corrosive deposits. The HETAS Guide also contains a list of suitable fuels. An Approved Solid Fuel Merchant should also be able to give advice. Never burn household waste, plastics or chemicals, which can produce harmful fumes and corrosive vapours. These vapours can be dangerous to health and cause premature corrosion of metals. Where the appliance is slumbered overnight or for long periods it is advisable to run the appliance at high fire in a controlled manner for a period of at least 30 minutes. Slumbering is a contributing factor to premature liner failure through corrosion. It is important to ensure a sufficiently high flue gas temperature to minimise the products of combustion condensing out of the flue gases.

Regular Inspection

The chimney should be swept regularly to remove soot and tar. At the very least the chimney should be swept at the start of the heating season. It is not recommended that the appliance is over fired, (allowed to burn fiercely and out of control), or chimney fires be started in an attempt to clean the chimney. Deposits of soot and tar will be greatly increased if unseasoned wood is burnt. Should a chimney fire occur, the chimney and appliance should be checked for damage before using them again.

It is also good practise to check at least every year or two the exposed parts of a chimney, flashings and terminals for signs of damage. Just like the outside of a house chimneys can suffer from the wear and tear of extreme weathering.

If at any time smoke or fumes are apparent or suspected from the appliance, chimney or flue, seek advice immediately from the installer or chimney expert in case there is a blockage or failure. Do not use the appliance or chimney until they have been thoroughly checked for safety and soundness. The escape of fumes can be dangerous.

Visual inspection of metal system chimney within enclosures

Document J calls for the inspection of concealed flues in voids. The new BS EN 15287-1 provides guidance on how this can be done.

Where practical, the length of the chimney may be inspected after installation, from below by removal or looking through the firestop plate or register plate, or by inspection looking down from above in the roof space, possibly by the use of a camera.

Where this is impractical a 100mm square access door should be created to allow for inspection by other means e.g. with a torch and mirror.

When the installation of connecting flue pipe is completed, an inspection should be carried out to ensure that all joints have been properly made and that all supports and clips are properly located and secured in accordance with the manufacturer's installation instructions.

Chimney Cleaning

As a guide all flues should be swept before and during the heating season, and ideally at the end of the heating season to prevent tar and soot deposits having a corrosive effect on the chimney and appliance during the dormant period.

Mechanical sweeping with brush and rods is the only method of cleaning recommended because materials other than soot can block the flue e.g. mortar, brickwork, birds' nests. For this reason cleaning a flue using just chemical chimney cleaners or vacuum cleaning cannot be recommended as an alternative for correct chimney cleaning. (Some chemical cleaners can invalidate manufactures warranties).

Sweeping brushes should be made from suitable bristle and be of the same diameter or area as the flue being swept, and be fitted with a ball or free running wheel boss on the end to prevent scraping the flue walls, particularly at bends. Chimney manufacturers give instruction to which brush type to use on their systems. Use a qualified chimney sweep or member of NACS (National Association of Chimney Sweeps) who provide an inspection and sweeping certificate.

BS EN 15287-1 has introduced a new flow test for metal chimneys.

Smoke Test Masonry Chimneys

The appliance, if fitted, should not be alight at the time of test. Before commencing, the chimney flue should be warmed by a gas blow lamp or similar heating device for about 10 minutes. The ashpit door of the appliance and thermostat (if fitted) should be in the closed position. Any soot doors or flue pipe access doors should be closed.

Two smoke pellets should be placed in the appliance firebox or the bottom of the chimney or the appliance recess and ignited. When smoke starts to form, the heating appliance or appliance recess or the bottom of the chimney should be closed and the smoke should be allowed to drift upwards. When smoke is observed rising from the chimney, the terminal should be sealed. An inflatable rugby ball bladder is ideal for this as it will accommodate any variations in dimensions. Alternatively, a polyethylene bag can be placed over the terminal and sealed around the edges.

The chimney breast and surrounding walls should then be observed at ground level, first floor level, roof space level and terminal level to check for major smoke leakage. As this may occur some distance from the original fault, particular attention should be taken at barge overhangs to end of terrace dwellings and at eaves for leakage from cavities. The smoke test should be allowed to continue for at least 5 minutes.

If there is no sealed heating appliance but an open-type fire or appliance recess, a piece of board should be placed over the fire opening and sealed around the edges after igniting the smoke pellets.

Some smoke leakage may be seen during the smoke test and it is a matter of expert judgement to whether leakage indicates failure.

NOTE 1: If the chimney being tested forms part of a multi-flued construction as in a back-to-back situation, the fire(s) connected to the other flues should not be alight.

NOTE 2: The smoke test should be carried out using suitable smoke pellets. The minimum performance of a pellet should be one, which the pellet manufacturer claims generates 5m³ of smoke in 30 seconds burn time.

Flue Flow Test Metal Chimneys (draw test)

The appliance, if fitted, should not be alight at the time of the test. Before commencing, the chimney flue should be warmed by a gas blow lamp or similar heating device for about 10 minutes. The ashpit door of the appliance and thermostat (if fitted) should be in the closed position. Any soot doors or flue pipe access doors should be closed.

Two smoke pellets should be placed in the appliance firebox or the bottom of the chimney or the appliance recess and ignited. Open the combustion air controls. When smoke starts to form, the smoke should be allowed to drift upwards. The test is satisfactory if, while the smoke pellet is burning, there is no spillage of smoke at the heating appliance, no seepage of smoke over the length of the flue and there is discharge of smoke from the terminal.

However, if there is smoke spillage at the heating appliance position, or seepage from the chimney then the test has failed. Some smoke leakage may be seen during the draw test and it is a matter of expert judgement as to whether any leakage indicates failure.

Chimney, Flue and Appliance On-Site Identification

When a chimney or flue or a combustion appliance, (irrespective of fuel used), is installed or renovated, it is a mandatory requirement that a Notice Plate be completed and fixed in a relevant position. The BFCMA also recommends that a Check List is left with the house occupant. The purpose of the Check List is to ensure that the installation has been carried out correctly. The Notice Plate is a record of the installation, the appliance and fuels that can be used with the chimney. It must be located in a convenient and accessible location, for example, near a services meter. Completion of the data required on the Notice Plate can be by the heating appliance installer, builder, chimney supplier/installer or other competent person. This is an example of the Notice Plate as defined in Building Regulation Approved Document J.

Checklist

Hearths, fireplaces, flues and chimneys

This checklist can help you to ensure hearths, fireplaces, flues and chimneys are satisfactory. If you have been directly engaged, copies should also be offered to the client and to the Building Control Body to show what you have done to comply with the requirements of Part J (Part F in N. Ireland). If you are a sub-contractor, a copy should be offered to the main contractor.

- Property address, where work has been carried out: _____
- Location of hearth, fireplace, chimney or flue: _____
- Fuel: Solid fuel Wood Gas Oil All
- Intended type of appliance: State type or make. If open fire give finished fireplace opening dimensions _____
- Chimney or flue construction:
 - State the type or make and whether new or existing _____
 - Internal flue size: Circular Size Square Size Rectangular 228 x 90mm Twin Wall Flue 125mm dia. (mm) _____
 - The flue liners/blocks have been laid with rebate uppermost. Yes
Jointing material used _____
 - Details of fire outlet terminal and diagram reference: _____
Outlet terminal _____ Complies with outlet detail _____
 - Number and angle of bends: _____
 - Provision for cleaning and recommended frequency: _____
- Ventilation provisions for the appliance: State type and areas of permanently open air vents Existing New
- Hearth form of construction _____
- Inspection and testing after completion carried out by: _____ Tick if OK. Comment (if needed): _____

Tests (Appendix E in AD J 2002 Part F (NI)) and result:	
Visual inspection	<input type="checkbox"/>
Sweeping check	<input type="checkbox"/>
Smoke test	<input type="checkbox"/>
Appliance (where included) spillage	<input type="checkbox"/>
- Location of notice plate: Electricity consumer unit Water supply
 Other (please specify) _____

I/We the undersigned confirm that the above details are correct. In my/our opinion, these works comply with the requirements of Part J and Part F (NI) of Schedule 1 to the Building Regulations.

Name (Block Capitals) _____ Profession _____
Capacity _____ Telephone _____
Address _____ Date _____
Signature _____
Registered membership of (e.g. CORGI, OFTEC, HETAS, NACSI) _____

Important Safety Information

This plate must not be removed or covered

- Property address _____
- The hearth and chimney located in the _____
- Fuel suitable for Solid fuel Wood Gas
 Oil All
- Type of appliance _____
- (a) Type of chimney liner
 Clay liners to BS EN 1457: 1999 1000 A3 N1 S D 3
 Schedule 1 for all fuels
 Schedule 2 with clay liners as above
 Gas flue block to BS EN 1059: 2002 1250 120 D 1
 Twin wall stainless steel flue BS EN 1058-1 1250
 Clear
- (b) Internal flue size
 Circular Size
 Square Size
 Rectangular 228 x 90mm
 Twin Wall Flue 125mm dia.

Suitable for condensing appliance Yes No

Installation date _____
Installed by _____

Other information _____

Schedel Chimney Systems provide this plate but it is the installer's responsibility to ensure the details entered are correct, the correct type and size of flue has been used and the installation described fully complies with the Building Regulations in force at the time of installation.

UK Building Regulations

England & Wales: The Building Regulations Approved Document J

Scotland: Building Regulations Technical Standards

Northern Ireland: Technical Booklet L Section 3 Building Regulations Northern Ireland

European and British Standards which relate to Flues and Chimneys

All of the standards referenced below are either directly applicable to chimneys and flues, or contain relevant content and are correct at the time of publication of this document. Many of the standards cover the use for all fuels. Any Standards which are NOT pertinent to wood burning and multi fuel appliances have been italicised.

Copies of European and British Standards can be obtained from:

British Standards Institution, 389 Chiswick High Road, Chiswick, London. W4 4AL. Tel: 0208 9969000

- BS EN 483:2000 Gas-fired central heating boilers. Type C boilers of nominal heat input not exceeding 70 kW. Replaced BS 5258: Pt 1; 1986
- BS EN 509:2000 Decorative fuel-effect gas appliances. Replaced BS 5258: Pt 12; 1990.
- BS 715: 2005 Specification for metal flue boxes for gas-fired appliances not exceeding 20kW.
- BS 1251: 1987 Specification for open fireplace components.
- BS EN 1443: 2003 Chimneys – general requirements
- BS EN 1457: 2012 Chimneys, Clay/Ceramic flue liners. Requirements and test methods. Replaced BS 1457: 1999
- BS EN 15287+A1: 2010 Chimneys - Design, installation and commissioning of chimneys. Pt 1: Chimneys for non-roomsealed heating appliances. Replaces BS 15287-1
- BS EN 1806: 2006 Chimneys Clay/ceramic flue blocks for single wall chimneys. Requirements and test methods
- BS EN 1856 - 1: 2009 Chimneys. Requirements for metal chimneys. System chimney products. Replaced BS 4543: Pts 2 and 3 & BS 715: 1993
- BS EN 1856 - 2: 2009 Chimneys. Requirements for metal chimneys. Metal liners and connecting metal flue pipes Replaced BS 715: 1993
- BS EN 1857: 2010 Chimneys - Components. Concrete flue liners. Replaced BS 7435: Pts 1-2
- BS EN 1858 2008: Chimneys, Components, Concrete flue blocks. Replaced BS1289: Pt 1
- BS EN 1859 2009 Chimneys. Metal chimneys. Test methods. Replaced BS 4543: Pt 1:1990
- BS 5871: 2005 Specification for installation of gas fires, convector heaters, fire/back boilers and decorative fuel effect gas appliances
- Pt1: Gas fires, convector heaters and fire/back boilers.
- Pt2: Inset live fuel effect gas fires of heat input not exceeding 15kW.
- Pt3: Decorative fuel effect gas appliances of heat input not exceeding 15kW.
- BS 5440: 2008 Installation of flues and ventilation for gas appliances of rated input not exceeding 70 kW.
- Pt1: 2008 Specification for installation of flues.
- Pt2: 2008 Specification for installation of ventilation for gas appliances.
- BS15287-2 Room-Sealed Appliances. Installation of chimneys and flues for room sealed domestic appliances burning solid fuel (including wood and peat).
- BS 6999:1989 Specification for vitreous-enamelled low carbon steel flue pipes
- BS 7977-1:2009 Specification for safety and rational use of energy of domestic gas appliances. Radiant/convectors Replaced BS 5258: Pts 5 and 16
- BS 7977-2:2009 Specification for safety and rational use of energy of domestic gas appliances. Combined appliances. Gas fire/back boiler. Replaced BS 5258: Part 8
- BS EN 15287-1: 2007 Chimneys. Design, installation and commissioning of chimneys. Chimneys for non-room-sealed appliances.
- BS EN 12446 : 2011 Chimneys. Components. Concrete outer wall elements
- BS EN 13063-1: 2005 Chimneys. System chimneys with clay/ceramic flue liners. Requirements and test methods for sootfire resistance
- BS EN 13063-2: 2005 Chimneys. System chimneys with clay/ceramic flue liners. Requirements and test methods under wet conditions
- BS EN 13069: 2005 Chimneys. Clay/ceramic outer walls for system chimneys. Requirements and test methods
- BS EN 13216 : 2004 Chimneys. Test methods for system chimneys. Replaced BS 4543
- BS EN 13502 : 2002 Chimneys. Requirements and test methods for clay/ceramic flue terminals. Replaced BS 1181:1999.
- BS EN 50291-1: 2010. Electrical apparatus for the detection of carbon monoxide in domestic premises. Test methods and performance requirements.

Useful Contacts



HETAS

Severn House
Unit 5, Newtown Trading Estate
Green Lane, Tewkesbury GL20 8HD
Tel: 01684 278170
www.hetas.co.uk



Ready to Burn

Tel: 01684 278188
Email: info@woodsure.co.uk



Guild of Master Chimney Sweeps

Email: info@guildofmasterchimneysweeps.co.uk
www.guildofmasterchimneysweeps.co.uk



NACS

National Association of Chimney Sweeps
Tel: 01785 811732
Email: nacs@chimneyworks.co.uk
www.nacs.org.uk



NACE

National Association of Chimney Engineers
PO Box 849, Metheringham, Lincoln, LN4 3WU
Tel: 01526 322555
Email: info@nace.co.uk
www.nace.org.uk



SIA

Stove Industry Alliance
Haseley Manor, Birmingham Road, Warwick, Warwickshire, CV35 7LS
Tel: 01789 415640
Email: info@stoveindustryalliance.com
www.stoveindustryalliance.com



SFA

Solid Fuel Association
7 Swanwick Court, Alferton, Derbyshire, DE55 7AS
Tel: 01789 415640
Email: sfa@solidfuel.co.uk
www.solidfuel.co.uk

Some Do's and Dont's

Do ensure that when an appliance is fitted to an existing chimney system it is inspected and tested for soundness and any defects are rectified.

Do ensure that chimney or flue system is always installed and supported and that all joints are properly, securely and efficiently made strictly in accordance with the manufacturer's instructions.

Do ensure that the flue pipe connection from the appliance rises vertically for at least 600 mm before any change of direction is contemplated. The reason for this is that the flue draught is crucial nearer the appliance because of the higher flue gas temperature. Any horizontal or angled runs at the bottom of the flue will create severe restriction to flue gas movement and affect appliance operation.

Do try to construct the chimney vertically all the way to the terminal. Where bends are necessary, do not use more than 4 bends. Generally the maximum bend is 45° from the vertical with the exception of 90° factory made bends or tees which may be treated as being equal to two 45° bends.

Do ensure that the flue diameter is not less than the diameter of the appliance outlet.

Do ensure that the effective height of any chimney with bends (vertical distance between appliance and terminal) is at least twice the horizontal distance between the appliance and terminal.

Do try to position the chimney inside the building to avoid excessive cooling and risk of condensation.

Do ensure that the chimney is installed and located in accordance with Building Regulations and British Standards, particularly where distinct distances from combustible materials are required.

Do ensure that the chimney is thoroughly inspected, and that smoke tests are carried out before the appliance is used.

Do remember a permanent supply of combustion air must be provided and kept clear from obstruction.

Do remember that a heating appliance needs to be checked regularly and the flues expertly swept.

Do ensure that the installation is carried out by a HETAS registered installer.

Do ensure an approved Carbon Monoxide Alarm is installed on every installation.

Do ensure the Notice / Data Plate is correctly completed and positioned.

Don't use any single wall flue system as a chimney.

Don't allow clothes, furnishings or any combustible materials to come into contact with the surface of any flue pipe or prefabricated metal chimney.

Don't use bends if they can be avoided.

Don't run horizontal flue anywhere in the system other than a maximum 150mm horizontal length into the chimney from a back outlet appliance, if you are working to the current Document J. If you are following the new BS EN 15287-1 the maximum distance is 450mm.

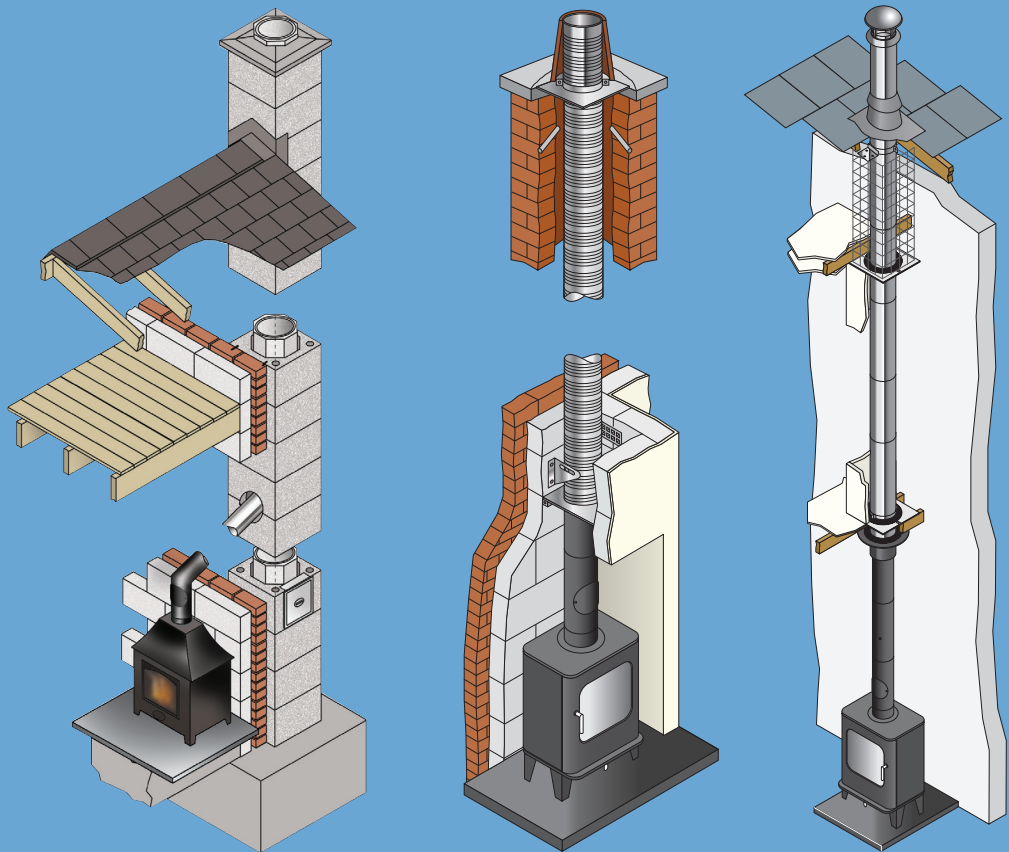
Don't position the chimney externally if it can be avoided.

Don't be tempted to use non BS EN certificated flue and chimney systems; they may only last for a short time and will have to be replaced by the correct product. It will then be at least twice as expensive in the long run. Use of non-approved products is also illegal.



BFCMA

BRITISH FLUE & CHIMNEY
MANUFACTURERS
ASSOCIATION



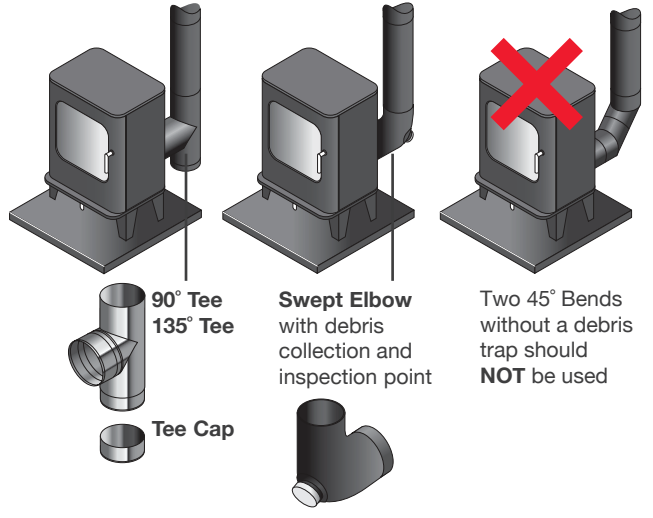
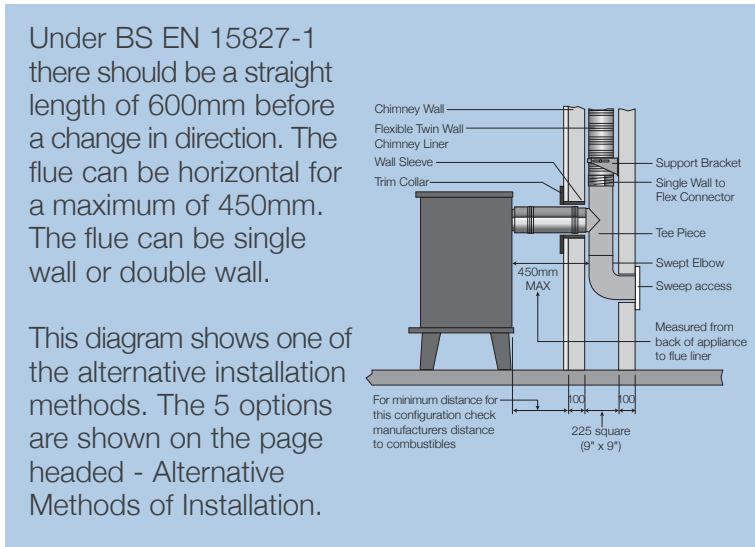
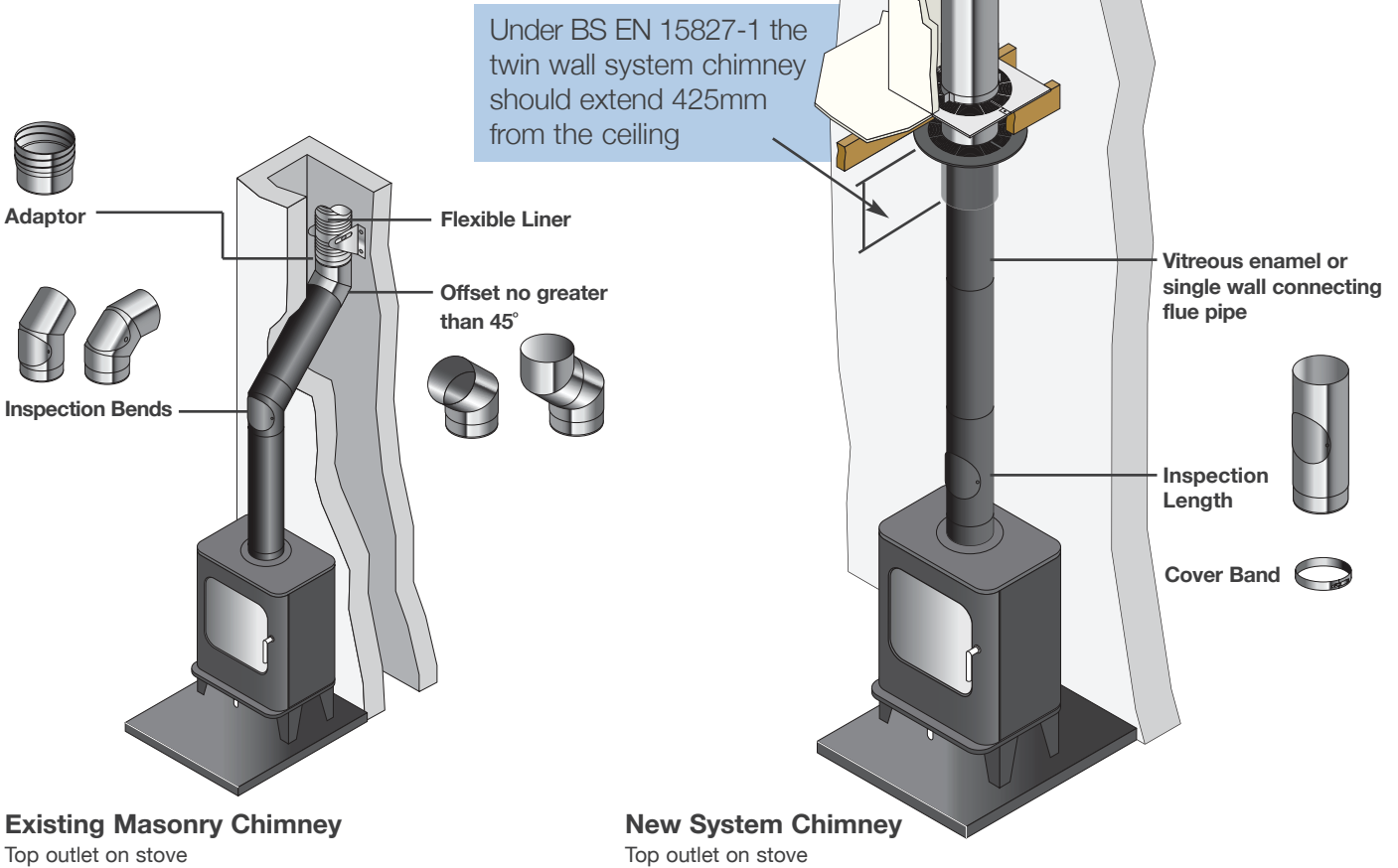
Installation Guidelines

for Wood Burning &
Multi Fuel Appliances

Wood Burning & Multi Fuel Stoves

Connecting Flue Pipe

The stove should be connected to the flue using vitreous enamel or 1mm thick single wall stainless steel pipe.



Connection methods for rear outlet stoves

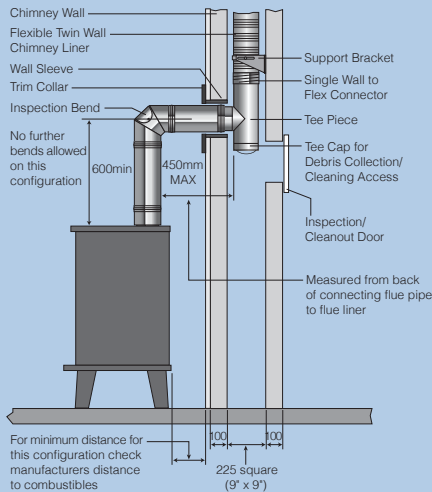
Installations shown are by way of illustration only. Manufacturer's installation instructions should always be consulted before installation.

Wood Burning & Multi Fuel Stoves

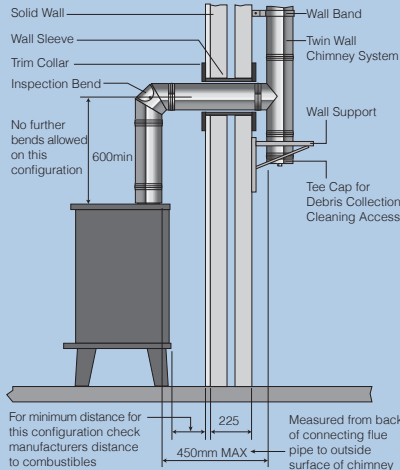
Alternative methods of installation of under BS EN 15287-1

Under the new BS EN 15287 the horizontal distance for the connecting flue can be up to a maximum of 450mm provided:

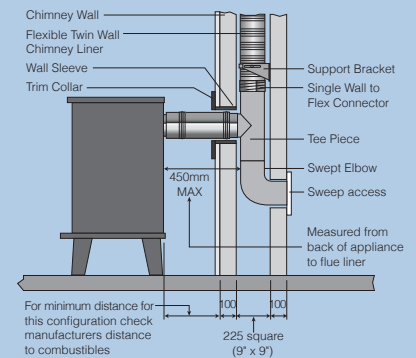
- A Defra exempt appliance or an appliance, which is limited to burning authorised smokeless fuel only, is installed.
- A calculation according to BS EN 13384-1 has indicated safe operation of the proposed configuration, and the results of the calculation are left with the householder along with the appliance installation instructions.
- The chimney manufacturer appliance manufacturers agree in writing to the proposed configuration;
- The total length of single wall connecting flue pipe is not more than 1.5m;
- The appropriate distances to combustibles from both the appliance and the connecting flue pipe are maintained.



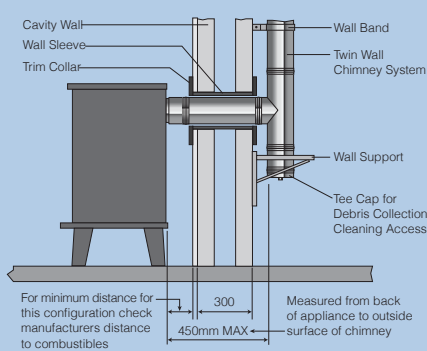
Top outlet twin wall connecting flue pipe into re-lined masonry chimney



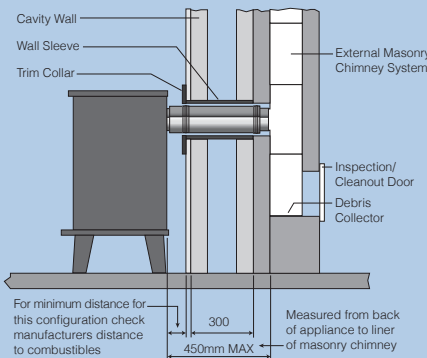
Top outlet twin wall connecting flue pipe through solid wall into twin wall system chimney



Rear outlet twin wall connecting flue pipe into re-lined masonry chimney



Rear outlet twin wall connecting flue pipe through cavity wall into twin wall system chimney



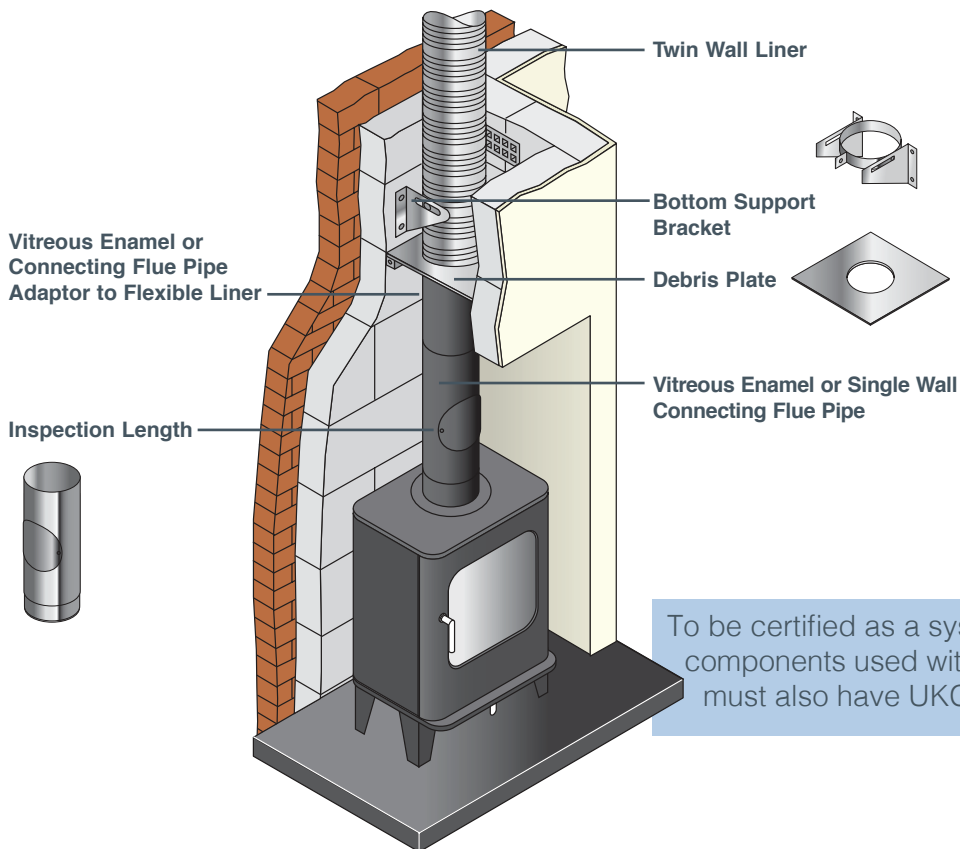
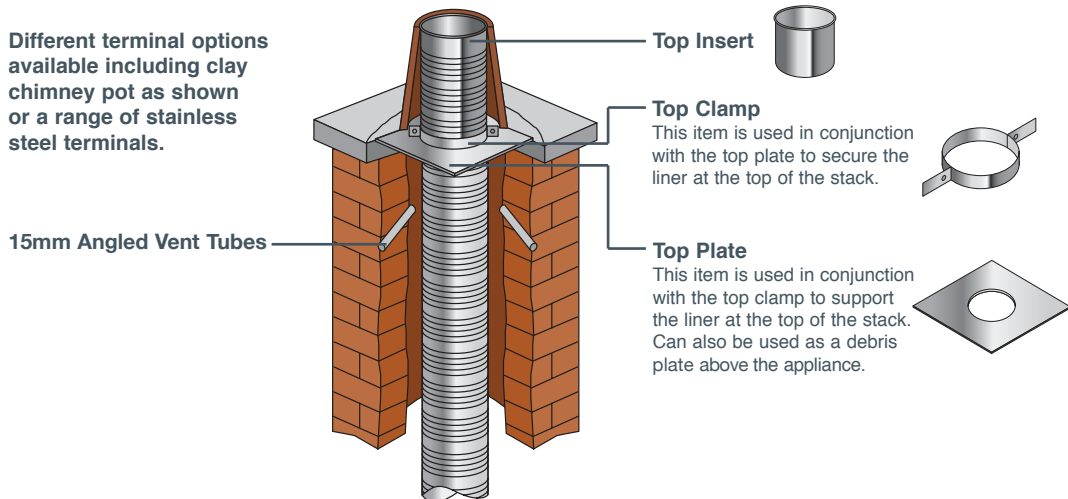
Rear outlet twin wall connecting flue pipe into external masonry chimney through a cavity wall

Installations shown are by way of illustration only. Manufacturer's installation instructions should always be consulted before installation.

Wood Burning & Multi Fuel Stoves

Existing Chimneys

Relining an existing chimney with twin wall flexible liner

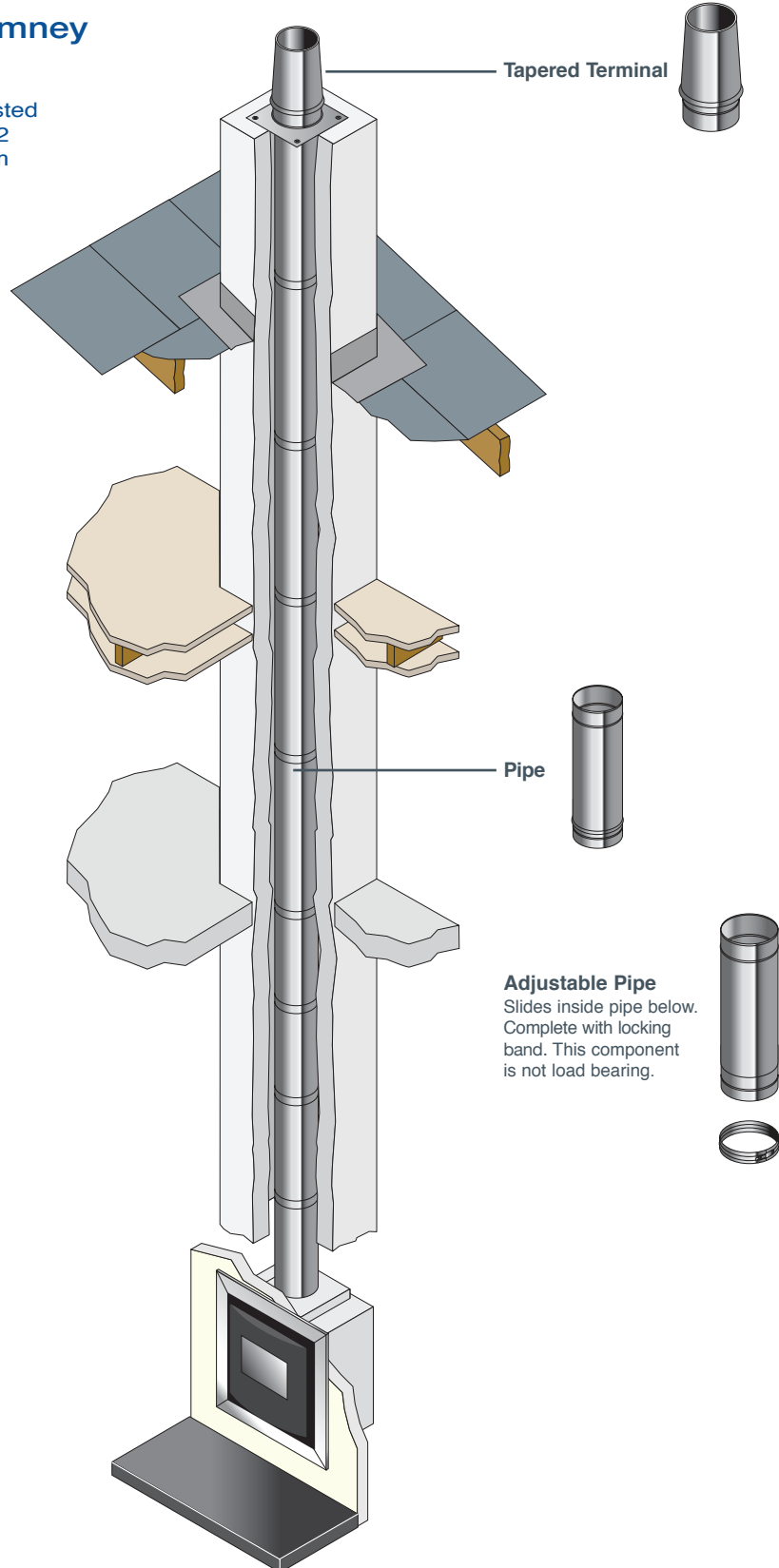


Wood Burning & Multi Fuel Stoves

Existing Chimneys

Relining an existing chimney with single wall liner.

If the 0.6mm thick liner has been tested in accordance with BSEN1856 part 2 then it may be used. If not then 1mm single wall liner must be used.

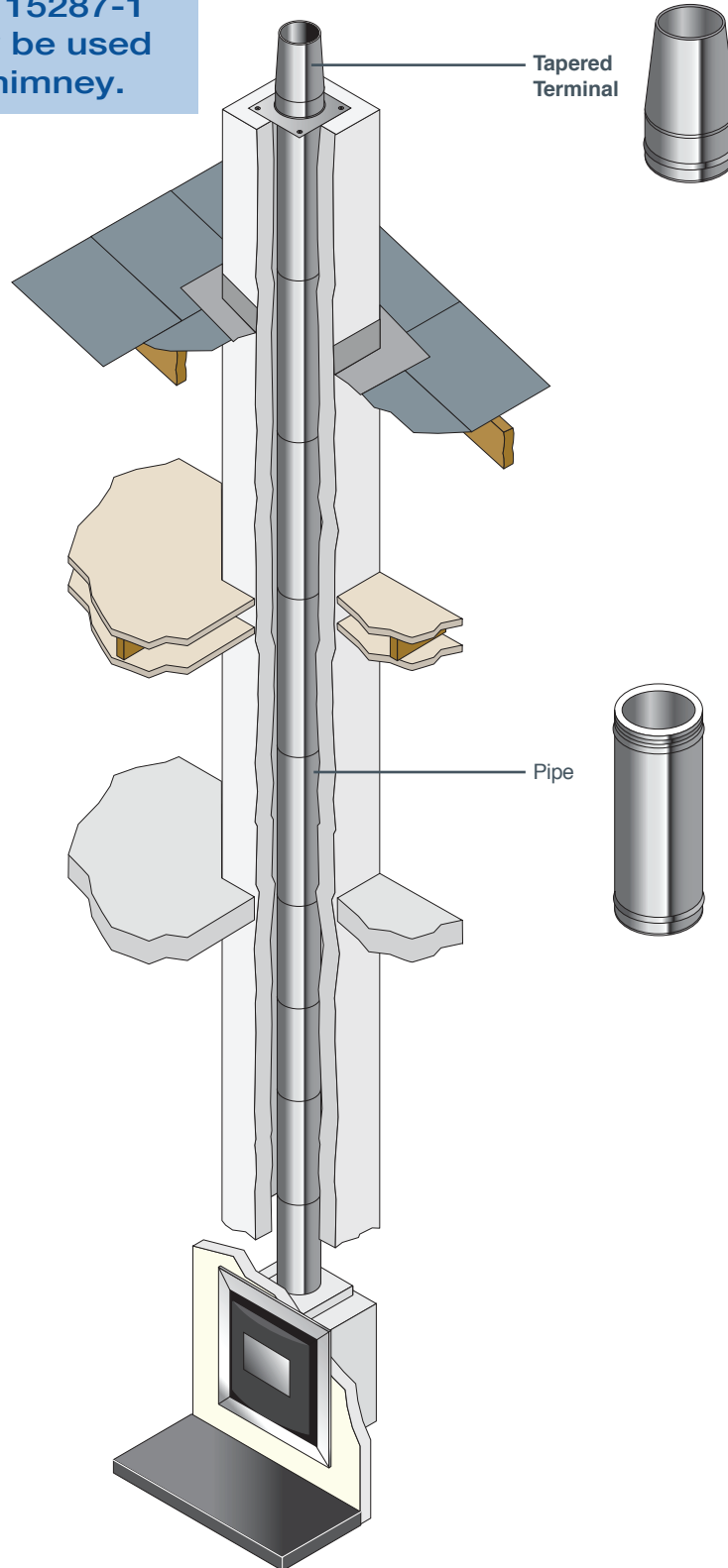


Installations shown are by way of illustration only. Manufacturer's installation instructions should always be consulted before installation.

Wood Burning & Multi Fuel Stoves

Existing Chimneys

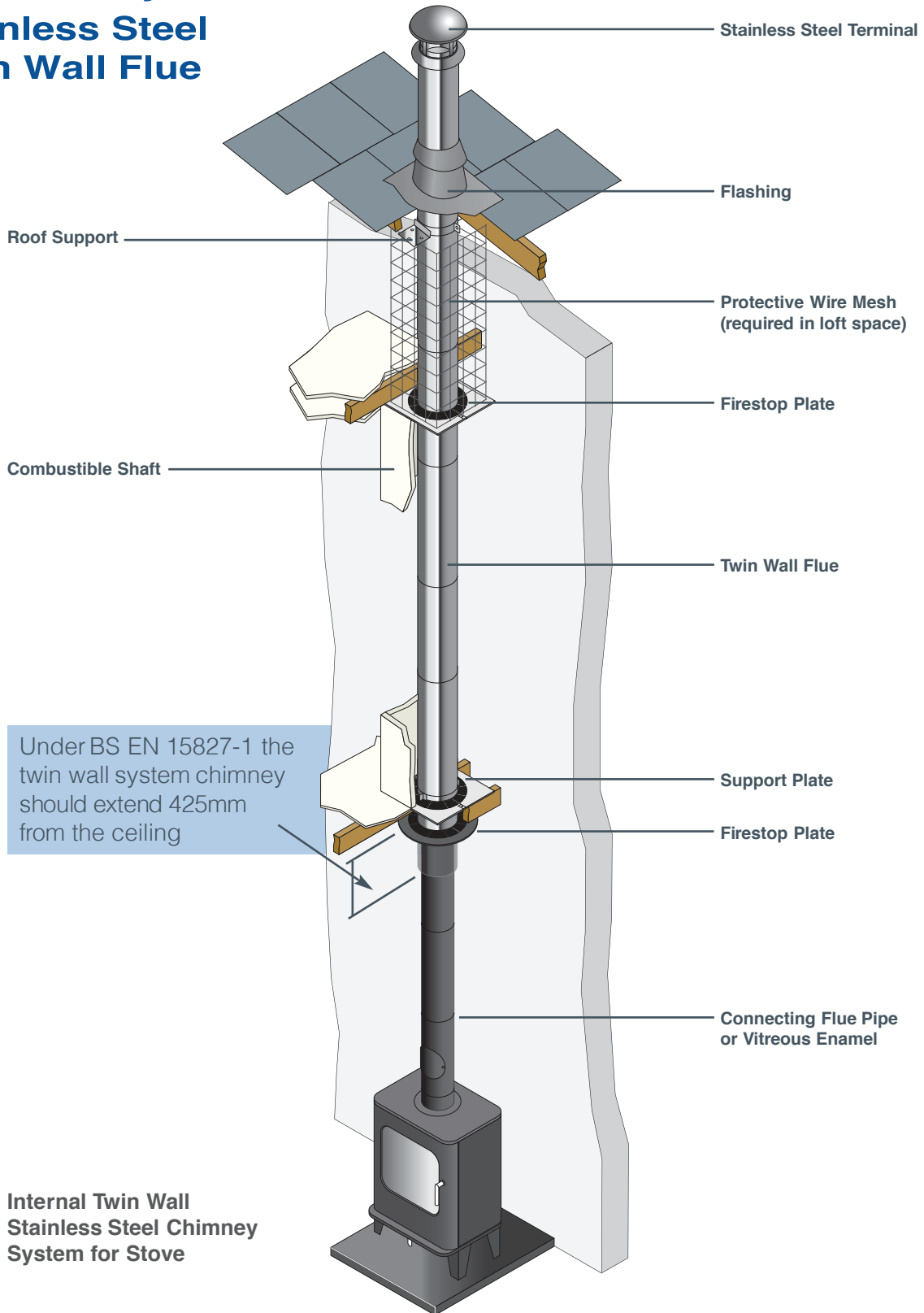
Under the new BS EN 15287-1 twin wall flue can now be used to reline an existing chimney.



Installations shown are by way of illustration only. Manufacturer's installation instructions should always be consulted before installation.

Wood Burning & Multi Fuel Stoves

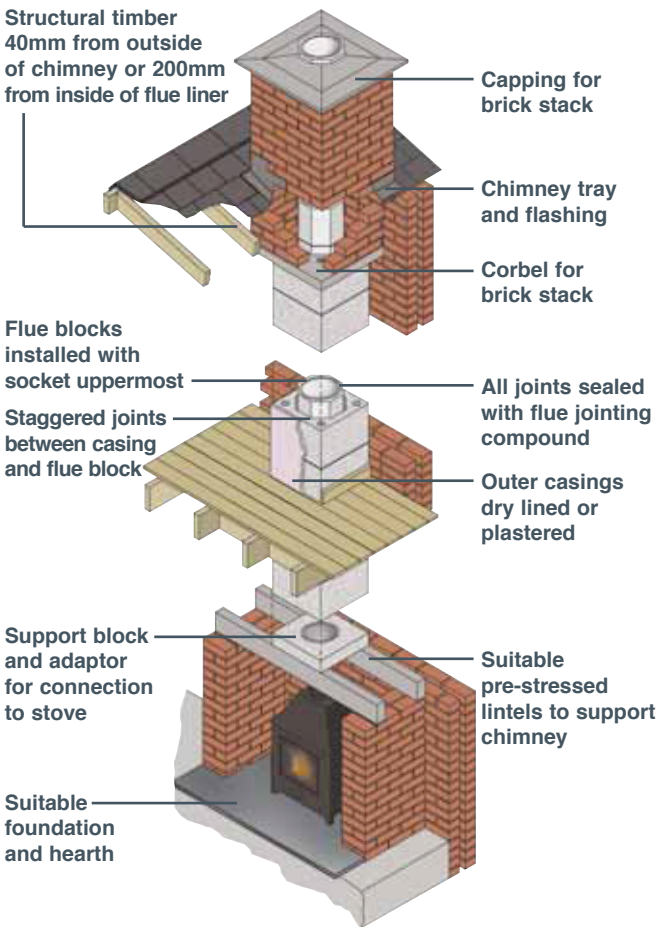
New Chimneys - Stainless Steel Twin Wall Flue



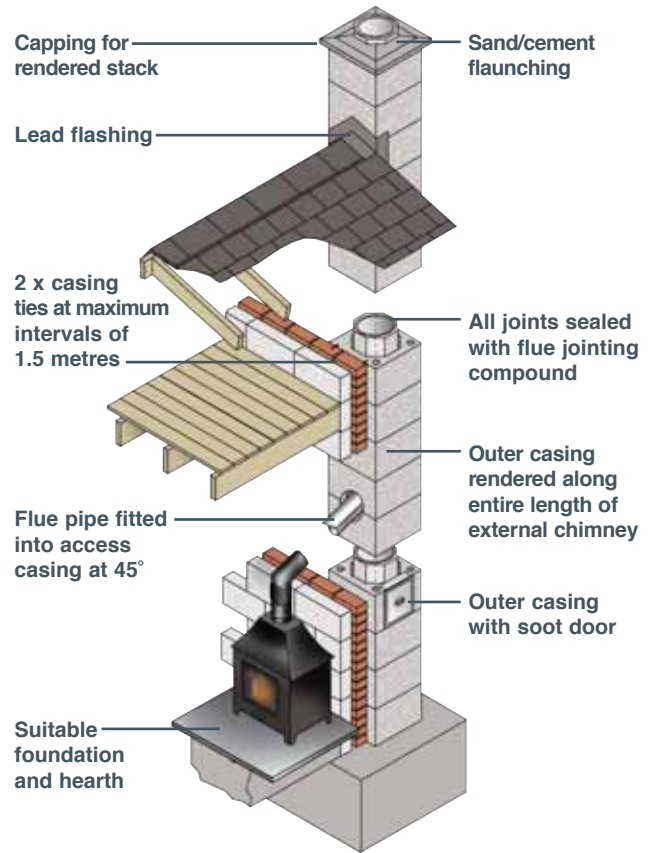
Installations shown are by way of illustration only. Manufacturer's installation instructions should always be consulted before installation.

Wood Burning & Multi Fuel Stoves

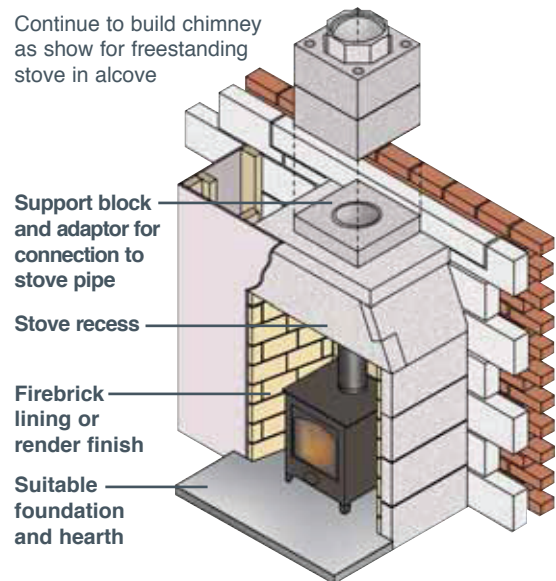
Clay Concrete & Pumice - Chimney Systems



Free Standing Stove in an Alcove



Free standing stove with external chimney with preformed stove entry kit

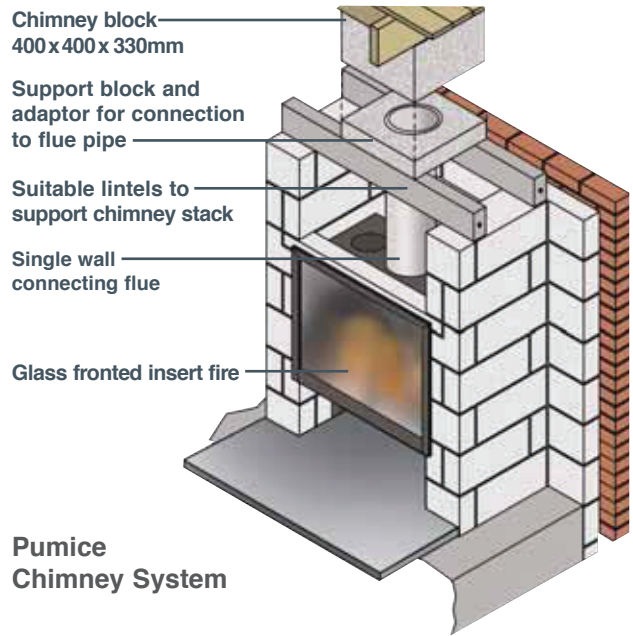
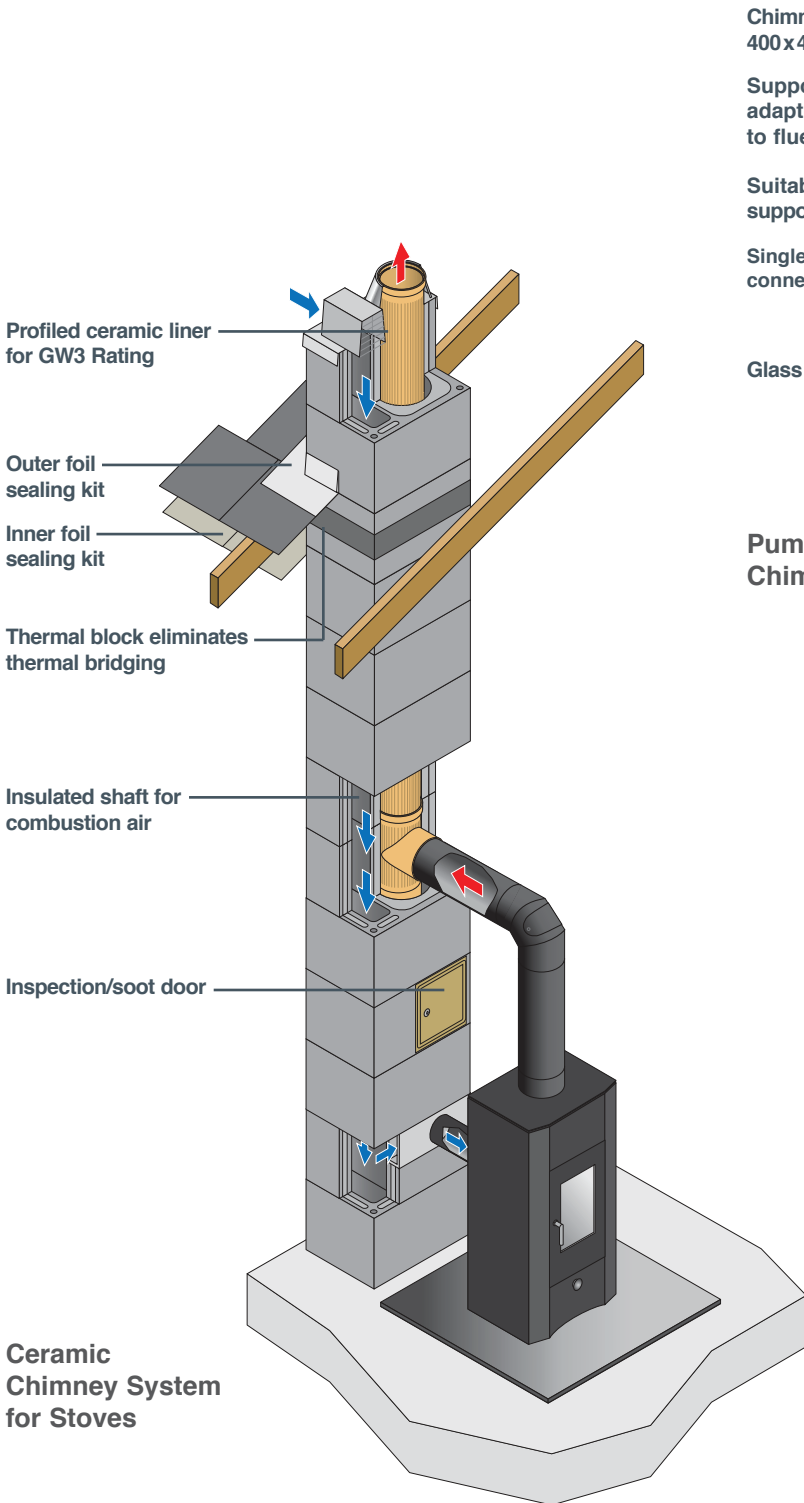


Stove Recess

Installations shown are by way of illustration only. Manufacturer's installation instructions should always be consulted before installation.

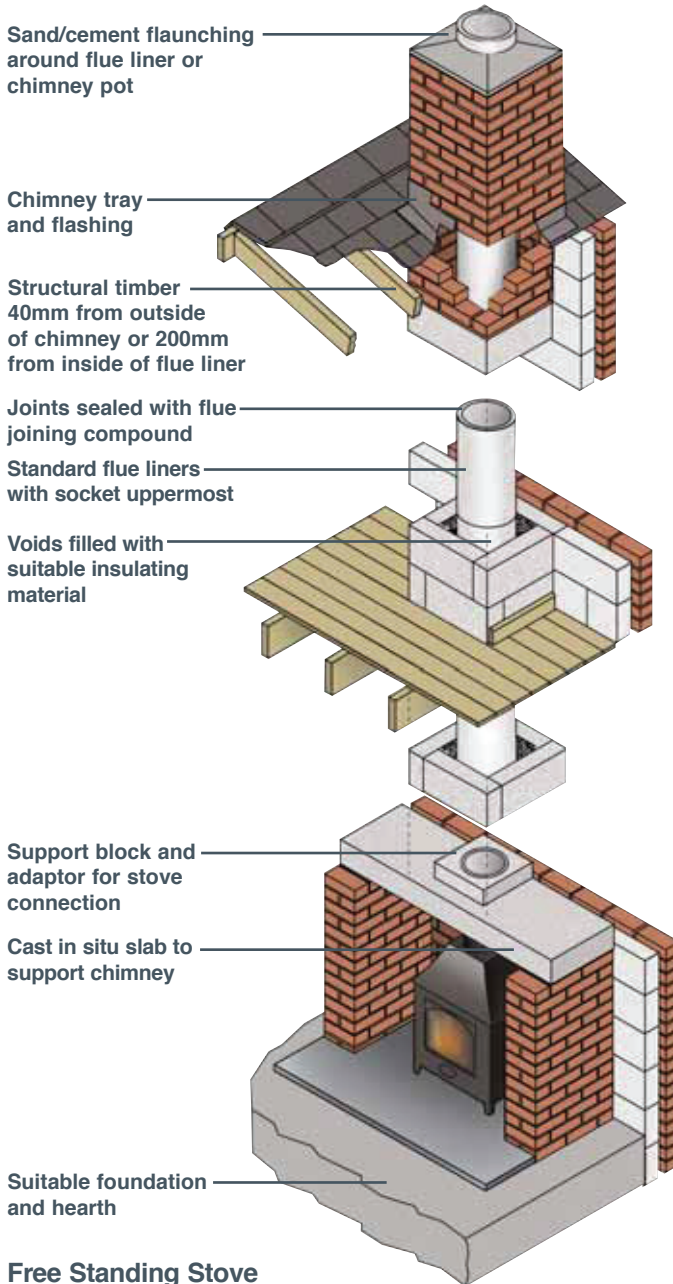
Wood Burning & Multi Fuel Stoves

Clay Concrete & Pumice - Chimney Systems

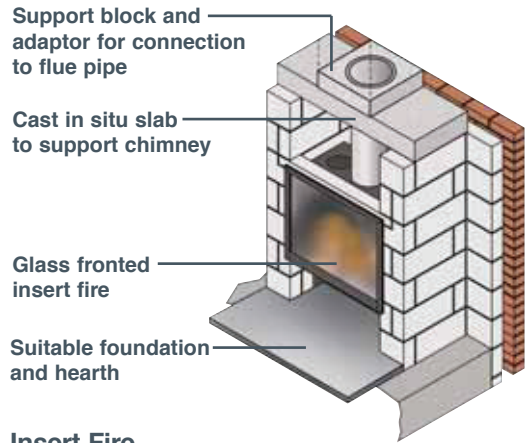


Wood Burning & Multi Fuel Stoves

Clay Concrete & Pumice - Liners



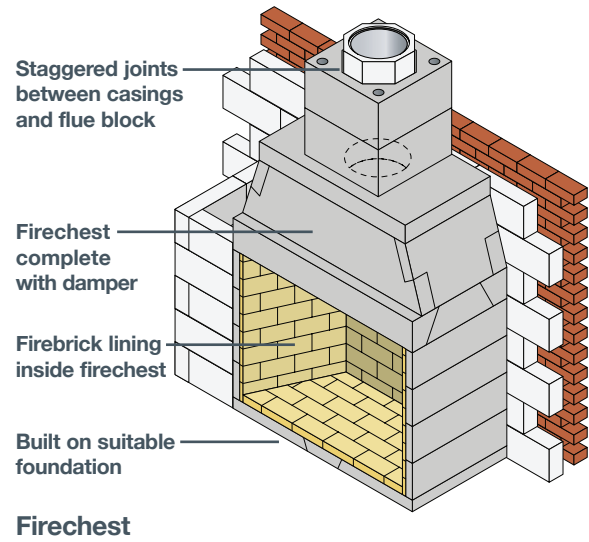
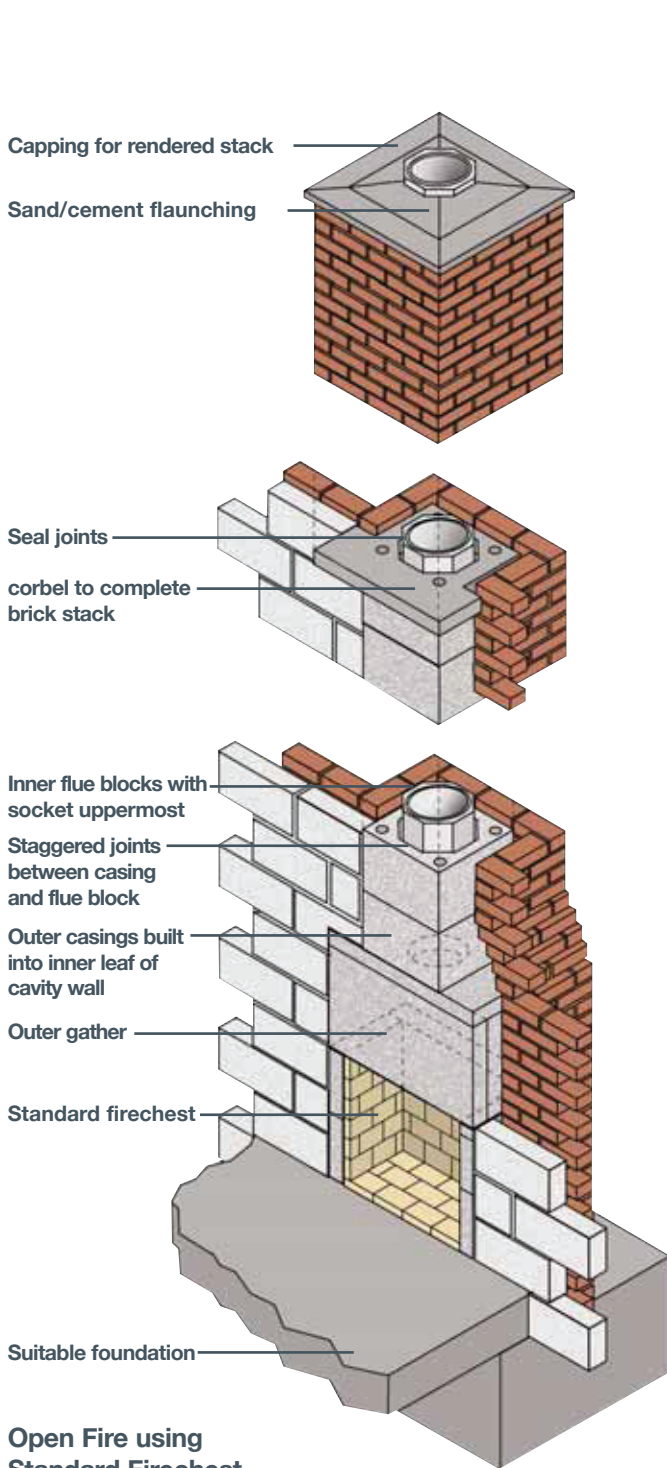
Continue to build chimney as in free standing stove



Insert Fire

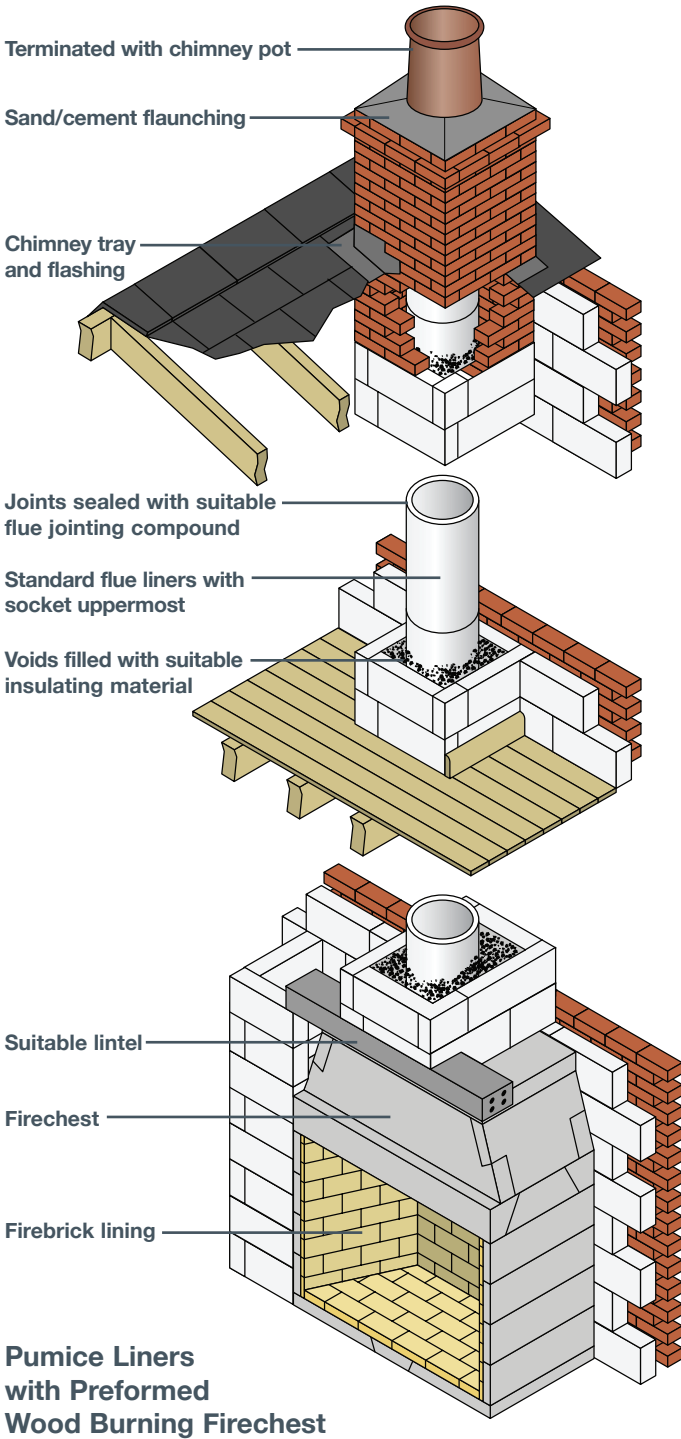
Open Fires

Clay Concrete & Pumice - Chimney Systems

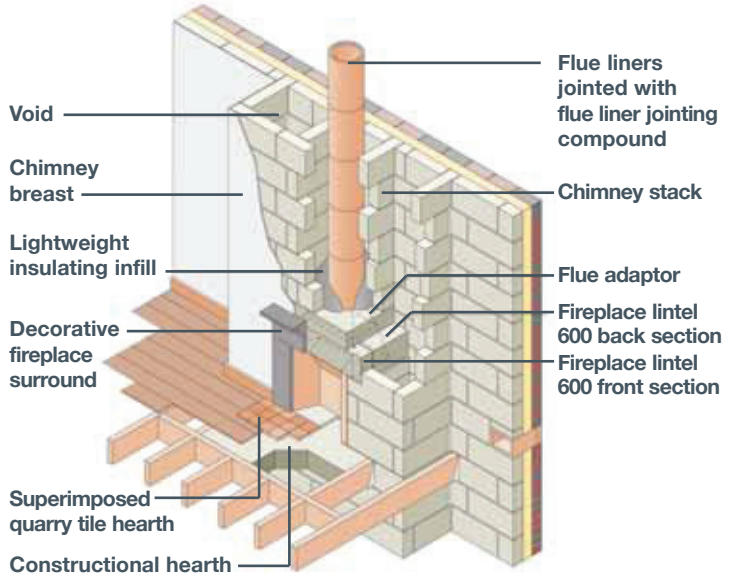


Open Fires

Clay Concrete & Pumice - Liners



Pumice Liners with Preformed Wood Burning Firechest

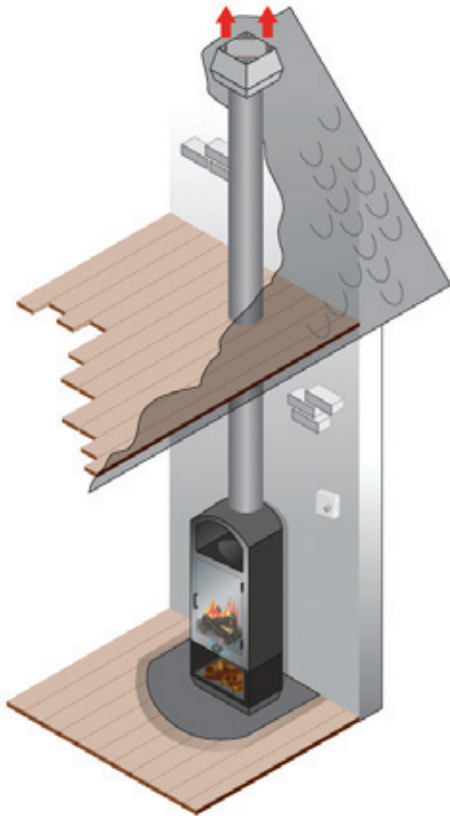


Standard Methodology for Clay, Concrete & Pumice Liners

Installations shown are by way of illustration only. Manufacturer's installation instructions should always be consulted before installation.

Wood Burning & Multi Fuel Appliances

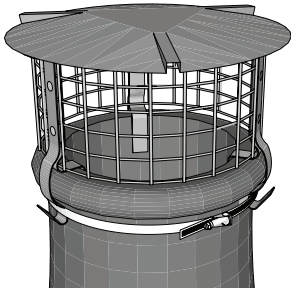
Chimney Fan System



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Examples of Terminals

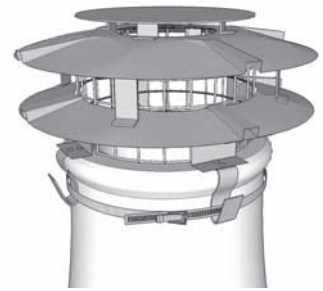
Examples of Stainless Steel Terminals, Birdguards & Anti-Downdraught Terminals



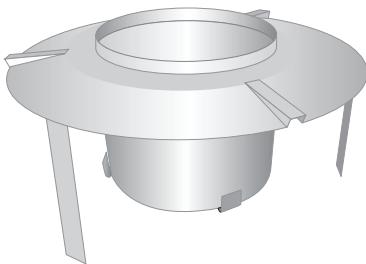
**Birdguard
fitted to Chimney Pot**



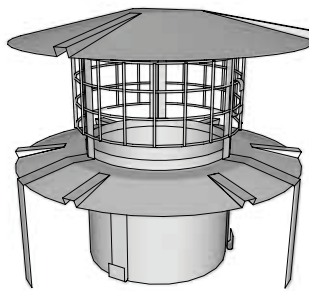
**Raincap
fitted to Chimney Pot**



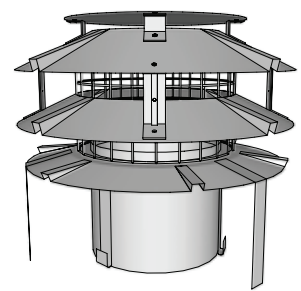
**Solid Fuel Anti-Downdraught
fitted to Chimney Pot
(with or without mesh)**



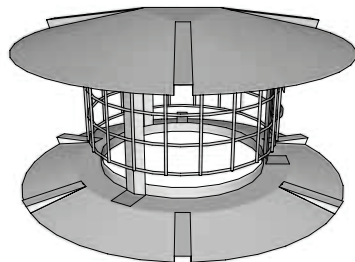
**Pot Hanger
fitted to Twin Wall Flexible Liner**



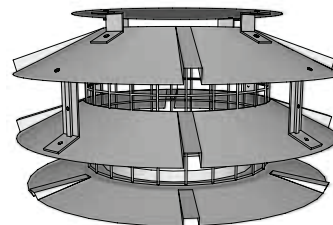
**Birdguard Pot Hanger
fitted to Twin Wall Flexible Liner
(with or without mesh)**



**Anti-Downdraught Pot Hanger
fitted to Twin Wall Flexible Liner
(with or without mesh)**



**Birdguard
fitted to Twin Wall System
(with or without mesh)**



**Anti-Downdraught
fitted to Twin Wall System
(with or without mesh)**

Installations shown are by way of illustration only. Manufacturer's installation instructions should always be consulted before installation.

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