7 Flue System and Air Supply

7.1 Air Supply

The Grant Spira wood pellet boiler draws air for combustion from the room in which it is located.

Any room or space containing an appliance must have sufficient permanent air supply to ensure correct combustion of the fuel and effective operation of the flue system (i.e. to discharge of combustion products to the open air).

NOTE

The ventilation area provided must be in accordance with the requirements of The Building Regulations Approved Document J – Section 2: Appliances burning solid fuel.

For a boiler operating with a draught stabiliser:

- If design air permeability >5.0m³/(h.m²) then:
  - 300mm²/kW for the first 5kW of appliance rated output
  - 850mm²/kW for balance of appliance rated output.
- If design air permeability ≤5.0m³/(h.m²) then:
  - 850mm²/kW of appliance rated output*.

** It is unlikely that a dwelling constructed prior to 2008 will have an air permeability of less than 5.0m³(h.m²) at 50 Pa unless extensive measures have been taken to improve air-tightness. See Appendix F of The Building Regulations Approved Document J.*

To achieve this, the following minimum vent openings are required:

Boiler model	Minimum vent open area	
	>5.0m³/(h.m²)	≤5.0m³/(h.m²)
5-18kW	125.5 cm² (20 in²)	153 cm² (24 in²)
6-26kW	193.5 cm² (30 in²)	221cm² (35 in²)
9-36kW	278.5 cm² (44 in²)	306 cm² (48 in²)
11-44kW	346.5 cm² (54 in²)	374 cm² (58 in²)
12-52kW	414.5 cm² (65 in²)	442 cm² (69 in²)
15-62kW	499.5 cm² (78 in²)	527 cm² (82 in²)
18-72kW	584.5 cm² (91 in²)	612 cm² (95 in²)

7.2 Flue Terminal Position and Clearances

The Grant Spira wood pellet boilers have high operating efficiencies and low flue gas temperatures. Only the Grant Biomass twin-wall insulated flue system must used with the Grant Spira boilers.

NOTE

The flue installation must be in accordance with the requirements of The Building Regulations Approved Document J – Section 2: Appliances burning solid fuel.

The following points MUST be taken into consideration with regard to the design and installation the flue system:

- Grant recommends that the flue is vertical for a minimum distance of 600mm (measured from the top of the boiler) before any elbow. However, this is not essential for the operation of the boiler.
- There must NOT be any change of direction greater than 45° from the vertical, e.g. two 45° elbows must not be used together to form a 90° elbow.
- The flue system must NOT include any horizontal sections of flue.
- Grant recommends that an adjustable flue extension be fitted in the flue system as close to the boiler as possible, to enable the flue system to be disconnected from the boiler flue connection, as and when required, for future boiler maintenance.
- The weight of the flue system must NOT be carried by the boiler, but must be supported using the various support options available in the Grant 'Biomass' flue system. Refer to Section 7.4.5.
- The minimum distance between the outer surface of any part of the flue system and any combustible material is 60mm. Refer to Section 7.3 for flue system designation. A minimum clearance of 25mm around the flue is required for the fitting/removal of locking bands.
- The flue terminal should be located in a downdraught free area, i.e. above the roof, where it can discharge freely and not present a fire hazard whatever the wind conditions. The flue outlet positions shown in Figure 7-1 (from Approved Document J) can meet this requirement.
- The heights and separation distances shown in Figure 7-1 may have to be increased in particular cases, e.g. where high wind exposure, surrounding tall buildings, or adjacent trees can cause adverse wind effects.
- The boiler flue cannot terminate into an existing brick or clay lined chimney. All masonry flues must be lined using the Grant 'Biomass' system stainless steel flexible flue liner.
- No other appliance can be connected to the boiler flue.
- Any condensate in the flue can run back into the boiler. A condensate drain at the base of the flue system is not required as the flue system is designed to allow the condensate to run back into the boiler.

NOTE

The only flue suitable for use with the Grant Spira condensing wood pellet boiler is the Grant Biomass twin-wall insulated conventional flue system.

This 125mm (5") 'Biomass' flue system is suitable for the 5-18kW, 6-26kW and 9-36kW Spira models.

For the 44kW, 52kW, 62kW and 72kW double boiler installations each boiler must have a separate flue system.

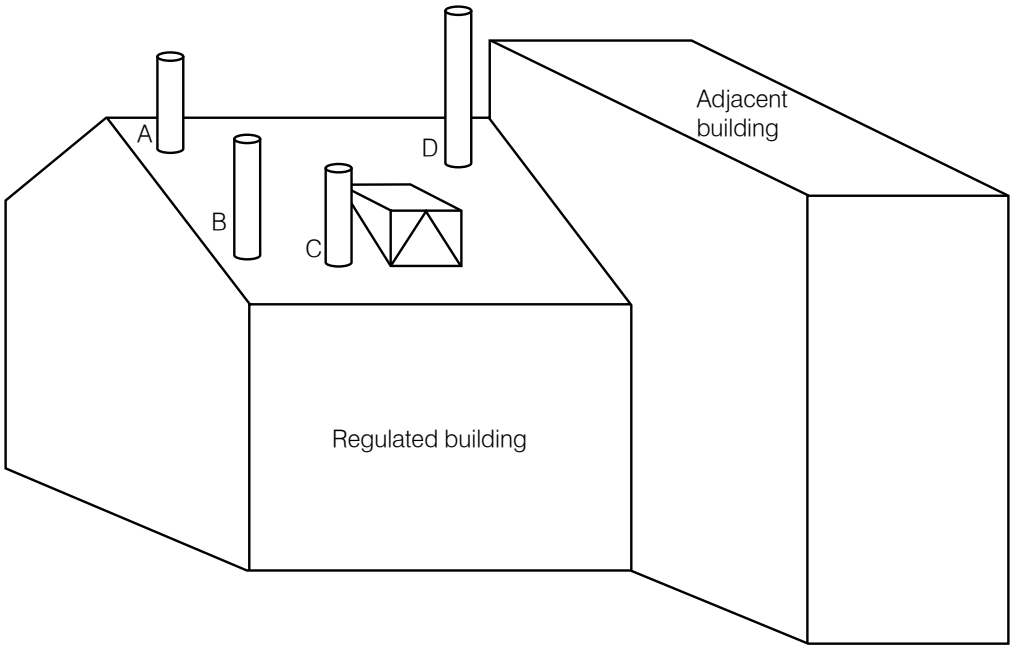


Figure 7-1: Flue terminal positions

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 a 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.

Notes
1) The weather surface is the building external surface, such as its roof, tiles or external walls.
2) A flat roof has a pitch less than 10°.
3) The clearance given for A or B, as appropriate, will also apply.
4) A vertical flue fixed to an outside wall should be treated as equivalent to an inside flue emerging at the nearest edge of the roof.

The above clearances are as specified in Building Regulations Approved Document J. Also refer to Approved Document J of either the England and Wales Building Regulations for further requirements on the installation of flue systems for solid fuel appliances.

7.3 Flue System Specification

The Grant 'Biomass' 125mm (5in) flue system is a fully insulated stainless steel twin-wall flue finished with a Black Polyester Powder paint finish.
This insulated flue system reduces the possibility of the condensate freezing in the flue, and also has a high corrosion resistance suitable for solid fuel.

The CE designation of this 'Biomass' flue system (to BS EN 1856-1) is:
T450 N1 W V2 L50 G 60
Where:
T450 – Temperature rating – 450°C maximum temperature for continuous operation
N1 – Pressure rating – negative pressure
W – Condensate resistance – able to contain condensate within the flue
V2 – Corrosion resistance – resistant to attack from products of combustion from natural wood
L50 – Liner material – 316L stainless steel
05 – Material thickness – 0.5mm
G – Soot fire resistance – tested at 1000°C for 30mins
60 – Distance to combustibles – 60mm minimum clearance is required from combustibles.

Masonry chimneys MUST be lined using the 125mm stainless steel flexible 'smoothbore' liner – available as part of the Grant 'Biomass' flue system. Refer to Section 7.4.9 for further information and the flue designation.

7.4 Flue System Assembly

7.4.1 Fan Box and Inspection Pipe

The fan box supplied with the boiler (packed in the accessories box) incorporates:

- Exhaust fan
- Draught stabiliser
- Flue connection (to fit Grant 'Biomass' flue system)

The fan box is supplied with a neoprene gasket for connection to the boiler. This neoprene gasket is to accommodate the low temperature wet flue system of the Grant Spira boilers. Refer to Section 4.10 for fitting details.

The lead for the flue fan (supplied factory-fitted to the fan box) is connected to the same 5-way plug as the lead for the wash system solenoid valve. Refer to Section 8.3 for connection details.

The flue system must include the Grant Inspection Pipe (product code: WPB/IP) supplied with the boiler. This should be fitted to the outlet of the fan box. Refer to Section 7.4.2 for guidance on how to join flue components. The Inspection Pipe incorporates a flue inspection hatch and combustion test point. The Inspection Pipe should be positioned such that the cover plate faces to the same side as the pellet hopper - but not to the front or rear.

When fitting the Inspection Pipe to the fan box, check the lip seal is fitted to the inner flue liner of the flue connector and the locking band is fitted to secure the joint.

When installed, the draught stabiliser must not be boxed in or obstructed from operation in any way.

A condensate drain at the base of the flue is not required as the 'Biomass' flue system is designed to allow the condensate to run back into the boiler.

NOTE

The combustion test point in the flue inspection pipe must NOT be used to monitor and adjust the % CO_2 when commissioning the Spira boiler. The combustion test point, located at the left rear corner of the rear access cover (on the secondary heat exchanger) must only be used for this purpose. Refer to Section 10.10 of these instructions for further details.

7.4.2 Joining Components

All the 'Biomass' system twin-wall flue components (with the exception of the elbows) use a 'twist lock' jointing system. The 'male collar' end of the flue component MUST always be uppermost when fitted.

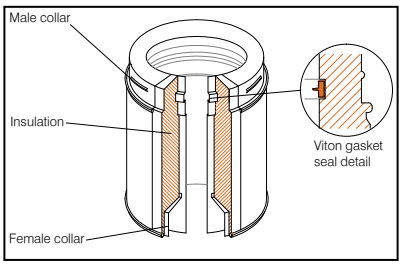


Figure 7-2: Male and female flue connections

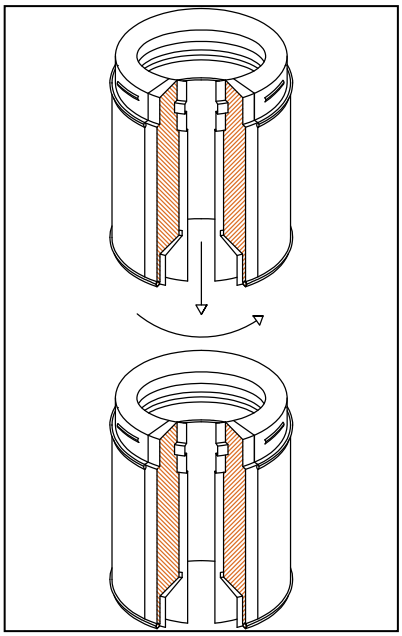


Figure 7-3: Twist lock joint between components

To join two components together:
All flue joints must have a lip seal gasket fitted. This seal is supplied with the flue component.

First fit the lip seal supplied into the groove (in the inner flue liner) at the 'male collar' end of the flue component. Refer to Figure 7-2. The lip seal should be fitted 'dry', i.e. with no lubricating grease applied at this stage. The lubricating grease (also supplied with the component) should be applied to the seal after it is fitted but before fitting the two flue components together.

Loosen the locking band at the 'female collar' end. Insert the 'male collar' into the 'female collar' and twist through 1/6 of a turn to lock in place. Refer to Figure 7-3.

Ensure that the two beaded ends of the flue components are in contact with each other all round. Position the locking and so that it grips the beaded edge of both components and fasten using the spring clip. The locking bands provided MUST be fitted at ALL flue joints. Refer to Figure 7-4.

To allow for alignment, the female collars of the elbows do NOT have the twist lock flutes, but the locking band MUST still be used to secure the two flue components together.

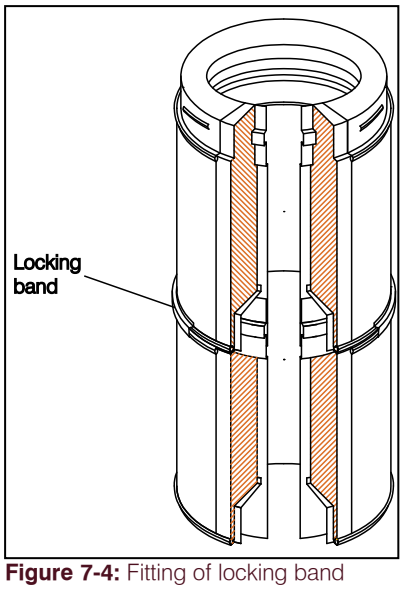


Figure 7-4: Fitting of locking band

To temporarily assemble the flue system components, to check component lengths, alignment of connections, etc. DO NOT fit the lip seals. However, for FINAL assembly the lip seals provided MUST be fitted at EVERY joint.

WARNING

All joints in the flue system must be accessible for inspection. No joints should be located within a wall, floor or ceiling spaces or any other inaccessible place.

7.4.3 Adjustable Length

The Grant 'Biomass' flue system includes an Adjustable flue extension. Refer to Section 7.9. This allows any of the straight flue extension components to be extended in length by between 100mm to 280mm (this does not apply to the 200mm extension) - refer to Section 7.9. This adjustable extension must be used in conjunction with any straight extension (1000mm, 500mm, 333mm or 200mm) to achieve the actual straight length required.

To fit the adjustable extension, first remove insulation from between the inner and outer walls of the component, as necessary. Fit the open end over the 'male collar' end of the fixed extension and adjust to achieve the required overall length. Secure the two components together using the wide locking band supplied.

NOTE

The adjustable section is NOT load bearing, therefore adequate support of the flue system MUST be provided immediately above the adjustable extension.

7.4.5 Support Components

The weight of the flue system is considerable. It must NOT be carried by the flue connection on the appliance, but requires independent support using one or more of the various flue support options available in the Grant 'Biomass' flue system.

Ventilated Support Plate (product code: WPB/SP)

On internal systems, the weight can often be supported where the flue passes through an upstairs floor, using the Support Plate with clamp band. A four-sided square opening, formed by timber stringers between the joists, is required to support the plate. Ensure that the minimum distance of 60mm is achieved between the flue outer surface and the any combustibles (e.g. timber joists). A Ventilated Fire Stop Plate (Grant Ref. WPW/FP or WPB/FP) should be fixed to the ceiling below.

Ventilated Fire Stop Plate (product code: WPB/FP)

This is not a support but a Ventilated Fire Stop Plate is required to be fixed to the ceiling below a Ventilated Support Plate. When passing through a second upstairs floor (in a 3-storey house) either a second support plate can be fitted or alternatively two ventilated fire-stop plates (one above and one below) need be fitted if the flue is adequately supported at the first upstairs floor level.

The slots in the Stop Plate allow air to pass through but will not allow the passage of flame. Also, the slots enable the distance from combustibles to be checked. If no combustible material is visible though the slots, then the minimum clearance distance of 60mm has been met.

Intermediate Top Plate (product code: WPB/TP)

Flue systems running up against either an Internal or external wall surface can be supported using the Intermediate Top Plate. This is mounted on either a pair of Wall Support Side Plates (Grant Ref. WPW/WS or WPB/WS) or a pair of Cantilever brackets (Grant Ref. WPB/CANT), which are fastened to the wall, to provide support at either the base, or part way up, a vertical section of flue.

The 'female collar' (on the underside of the plate) is fitted into the flue below and the 'male collar' (on the upper side of the plate) is a twist-lock connection into the flue above. Both joints are secured using the clamp bands provided.

Wall Brackets (product code: WPB/WB60)

Both the Wall bracket and the Adjustable Wall Bracket (Grant Ref. WPW/WB300 and WPB/WB300) are NOT load-bearing but are designed to give lateral support only. Wall brackets should be fitted with a maximum spacing of 3m on straight runs of flue and at any offset to ensure the system is rigidly supported.

Roof Support Band (product code: WP/RS)

As with the Wall Brackets, the Roof Support Band is not load bearing but is designed to give lateral support only.

Guy Wire Bracket (product code: WPB/GB)

Where the flue is free standing above the roof and its height exceeds 1.5m beyond the last support of the roof (e.g. Roof Support Band) a Guy Wire Bracket MUST be used and at every 1.5m thereafter. Grant does not supply the guy wires or tie rods to use with this bracket.

Structural Locking Band (product code: WPB/LBEXT)

A height of up to 3m above the last support at the roof can be achieved, without the need for guy wires, by using an extended Structural locking band at the joint immediately below, and at every joint above, the last flue support.

7.4.6 Elbows

Two elbows are available - 30° (product code: WPB/30) and 45° (product code: WPB/45). To allow for alignment, the female collars of these elbows do NOT have the twist lock flutes, but the locking band MUST still be used to secure the two flue components together.

There should be no more than 2 elbows – of maximum angle 45° from the vertical – fitted between the inspection hatch of the flue Inspection pipe (at the boiler) and the terminal. This can be increased to a maximum of four elbows (maximum 45°) between the boiler and terminal if there is a second flue Inspection Pipe fitted between the second and third elbows. Any Inspection hatch must be accessible for checking and cleaning purposes.

WARNING

Failure to maintain a clean flue can result in the emission of flue gases into the dwelling or damage from fire in the flue. Refer to Section 11.4.

7.4.7 Wall Sleeves

In accordance with the Building Regulations Approved Document J, a wall sleeve should be used where the flue system passes through a wall. A suitable wall sleeve is available as part of the Grant 'Biomass' flue system (product code: WP/SLE).

This 45° angled wall sleeve is available in 230mm diameter - giving a 25mm clearance all round from the 180mm diameter outer surface of the flue passing through it.

The sleeve is 45° mitred at one end. The other end of the sleeve should be cut on site to the correct length, to leave it flush with the wall on both sides. The sleeve should be adequately weatherproofed using a good quality mastic and fibre rope.

Oval one-piece trim collars are available to be fitted at either end of the wall sleeve (product code: WPB/TC). These should be fastened to the inside or outside wall using a suitable method of fixing. The trim collars should be adequately weatherproofed back to the wall using a good quality building mastic or similar.

7.4.8 Firestop Plates

Ventilated Fire Stop Plate (product code: WPB/FP)

A Ventilated Fire Stop Plate should be fixed to the ceiling below a Ventilated Support Plate. When passing through a second upstairs floor (in a 3-storey house) either a second support plate can be fitted or alternatively two ventilated fire-stop plates (one above and one below) need be fitted if the flue is adequately supported at the first upstairs floor level.

The slots in the Stop Plate allow air to pass through but will not allow the passage of flame. Also, the slots enable the distance from combustibles to be checked. If no combustible material is visible though the slots, then the minimum clearance distance of 60mm has been met.

Magnetic Fire Stop Plate Cover Plate (product code: WPB/MF)

This can be fixed below a Ventilated Fire Stop Plate to cover the ventilation slots but still allow air flow through them. The Cover Plate is held in place by the four circular magnets provided in the kit. These are fixed using the four screws securing the Ventilated Fire Stop Plate to the ceiling. The cover can be lowered for inspection purposes by pulling it downwards and off the four magnets.

The Magnetic Fire Stop Plate can also be used as a 'Bungalow' Fire Stop Plate. This unventilated fire stop plate may only be used on a combustible ceiling in a bungalow where there is a minimum distance of 60mm between the flue and any combustibles, where the flue penetrates the ceiling area and the roof space above the ceiling is open and ventilated. Within the roof space a protective wire mesh guard must be built around the flue to ensure a minimum distance of 60mm from combustibles is maintained.

To fix the plate to the ceiling: drill four equi-spaced holes 25mm in from the outer edge and use suitably sized screws to secure to ceiling.

7.4.9 Flexible Flue Liner Kit

A 125mm diameter twin skin stainless steel flexible flue liner is available to line a masonry chimney, if required. Both inner and outer layers are made from corrosion resistant 316L stainless steel. The outer is corrugated for high crush resistance and the inner is smooth to allow easy drain down of condensate, less opportunity for deposits to collect and ease of sweeping.

The CE designation for this flexible flue liner (to BS EN 1856-2) is:
T600 N1 W V2 L50012 G

This flexible flue liner must be installed as one continuous length with NO joints.

The liner is supplied in three standard lengths of 6m, 8m and 10m as part of a Flexible Flue Liner kit, as follows:

Grant product code	Liner length
WPKIT6/125	6 m
WPKIT8/125	8 m
WPKIT10/125	10 m

Prior to Installation

In all cases the chimney should be inspected for deterioration and, if necessary, and remedial work required should be carried out. The chimney should be swept, preferably by a member of the National Association of Chimney Sweeps (NACS) or a suitably qualified chimney sweep who would provide a certificate after sweeping and checking, which should be retained for future reference.

The flaunching at the top of the stack should be checked to ensure it is not cracked and if so it must be replaced. The brickwork pointing and flashings should be checked to ensure they are in good order and corrected as necessary. This is required to prevent the ingress of rainwater which, if mixed with the carbon deposits on the inside wall of the chimney, could damage the flue liner and the fabric of the building.

Installation

Prior to installation of the flexible liner, it is recommended that a test length (approximately 1.5m long), with a nose cone attached to each end, is pulled through the chimney to ensure that the chimney is suitably sized and free from obstructions. Failure to do so may lead to the guarantee on the liner being invalidated if damage has occurred due to snagging on an obstruction. The flue liner should be pulled down the chimney using a nose cone and string/ rope.

Care must be taken to avoid overbending or kinking of the liner during installation. The minimum bend radius for the liner is 375mm.

Orientation

It is essential that the flexible flue liner is installed the right way up. The arrow on the outside of the liner indicated the direction of the flue gas flow and must be pointing upwards, i.e. towards the terminal.

Cutting the Liner

Extreme care must be taken when cutting the liner, Strong industrial gloves and long sleeved overalls should be worn as the cut edges are very sharp. Any tape on the ends of the liner, provided for safe handling prior to installation, must be removed before connecting the flue liner.

In addition to the liner, the Flexible Flue Liner Kit also contains the following components:

Anchor Plate (product code: WPB/AP)

This is located on the top of the chimney with the male collar on the top and the spigot below the plate. Fit the flexible liner onto the spigot. Seal with high temperature mastic sealant and secure in place with self-tapping screws.

The plate should then be bolted to the chimney and sealed using Fire cement.

Flex flue adaptor (product code: WPB/CA)

This is located at the bottom end of the flexible flue liner, where it connects to the rigid twin-wall flue section of the flue system. The adaptor is fitted vertically with the socket uppermost. The flexible liner is pushed fully into this socket, sealed with high temperature mastic and secured with self-tapping screws.

Roof Cowl (product code: WPB/RC)

The Rain Cap type terminal is fitted either directly to the Anchor Plate on the top of the chimney or, if necessary (i.e. to achieve the required distance between the terminal and the roof surface), to a length of flue that is, in turn, connected to the Anchor Plate.

Fit the Terminal to either the Anchor Plate or flue extension and twist through 1/6 of a turn to lock in place. Ensure that the locking band (supplied with the terminal) is correctly fitted to secure the terminal in place. Refer to Section 7.4.2 for further details on connecting the flue components.

7.5 Flue Testing

Once installed, the flue system should be tested in accordance with the requirements of The Building Regulations Approved Document J, Appendix E, Section E13 – Smoke Test I.

7.6 Flue Notice Plate

The Building Regulations Approved Document J requires a notice plate that conveys essential information regarding the flue installed to be permanently displayed. A suitable self-adhesive notice plate is supplied with the Grant 'Biomass' flue system and this must be completed by the installer and displayed in an unobtrusive but obvious position within the building concerned, e.g. next to the flue system/boiler.

7.7 Carbon Monoxide Alarm

The Building Regulations Approved Document J requires a Carbon Monoxide alarm to be fitted in the room where the boiler is located.

This should be positioned between 1 and 3m horizontally from the boiler either:

- On the ceiling at least 300mm from any wall, or
- On a wall as high up as possible (above any windows or doors) at least 150mm from ceiling.

7.8 Typical Flue Systems

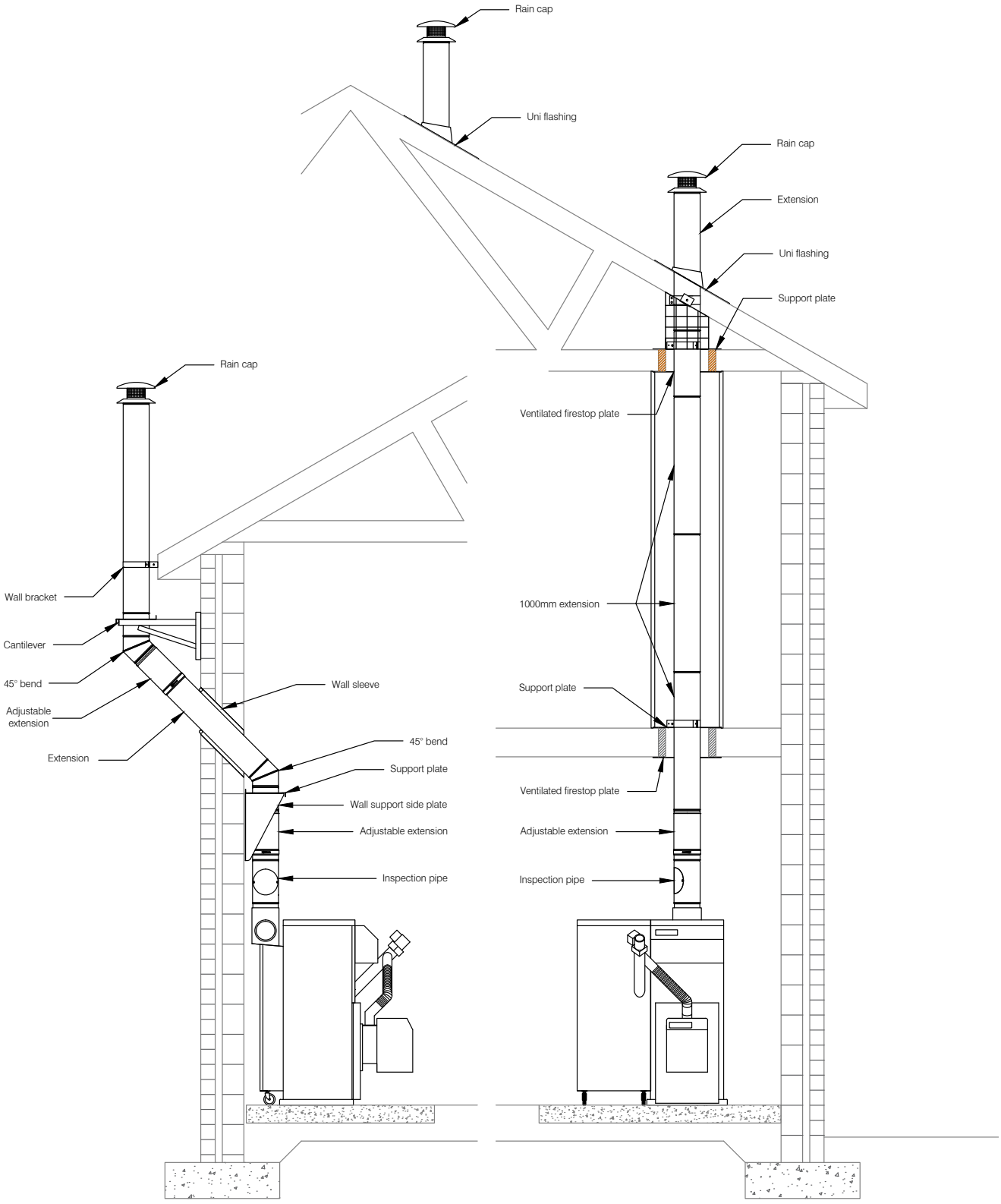


Figure 7-5: Typical flue installations details

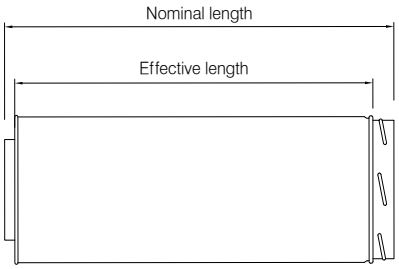
7.9 Flue Component Dimensions

200mm

333mm

500mm

1000mm

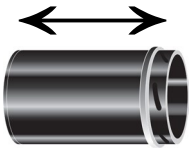


Straight pipe length		
Product code	**Nominal length (mm)**	**Effective length (mm)**
WPB/EXT200	200	160
WPB/EXT333	333	293
WPB/EXT500	500	460
WPB/EXT1000	1000	960

Adjustable pipe length		
Product code	**Nominal length (mm)**	**Effective length (mm)**
WPB/ADJ250	75 - 250 mm	50 - 230mm

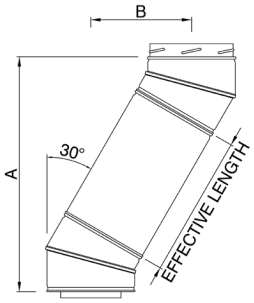
Complete with locking band.
Telescopes over pipe below.
Minimum engagement should be half the diameter.
This component is NOT load-bearing.

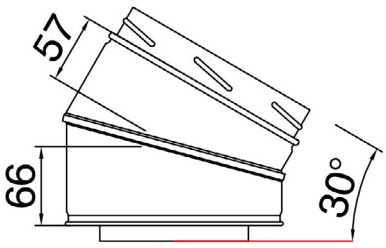
Effective lengths using a straight and adjustable extension		
Product codes	**Minimum (mm)**	**Effective length (mm)**
WPB/EXT200 + adjustable	350	440
WPB/EXT333 + adjustable	393	573
WPB/EXT500 + adjustable	560	740
WPB/EXT1000 + adjustable	1060	1240



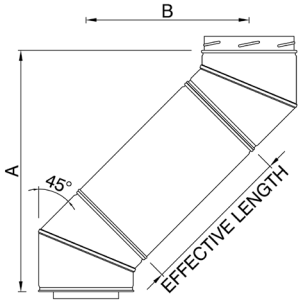
Adjustable 75 - 250mm

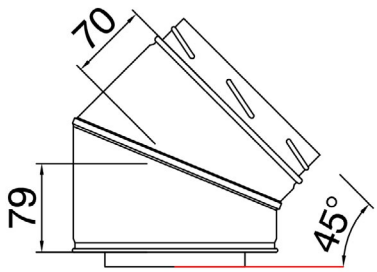
Double 30° bend and straight pipe length		
Effective length	**Dimension**	**Length**
960	A / B	1061 / 542
460	A / B	628 / 292
293	A / B	483 / 208
160	A / B	368 / 142



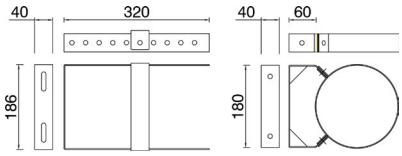


Double 45° bend and straight pipe length		
Effective length	**Dimension**	**Length**
960	A / B	933 / 784
460	A / B	580 / 431
293	A / B	462 / 313
160	A / B	367 / 218

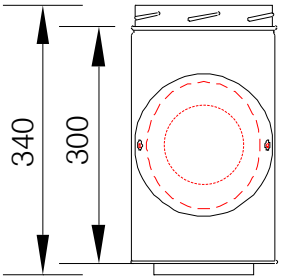




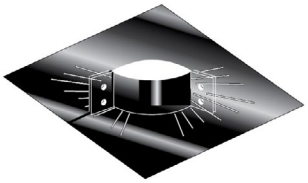
7.10 Flue System Components



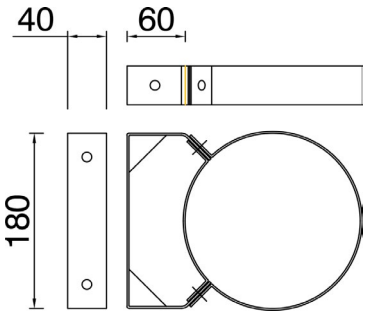
WPB/WB300 - Wall bracket (50 - 300mm)



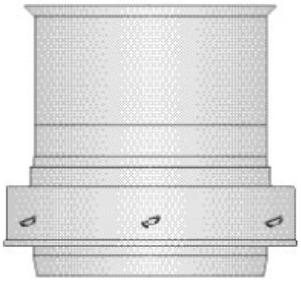
WPB/IP - Inspection pipe



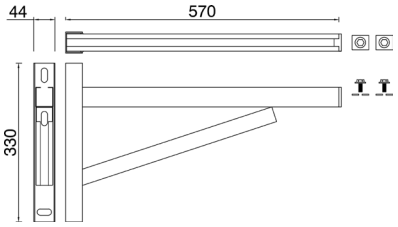
Support plate (2 pieces)



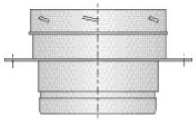
WPB/WB60 - Wall bracket (60mm)

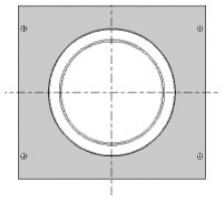


WPB/CA - Flue adaptor

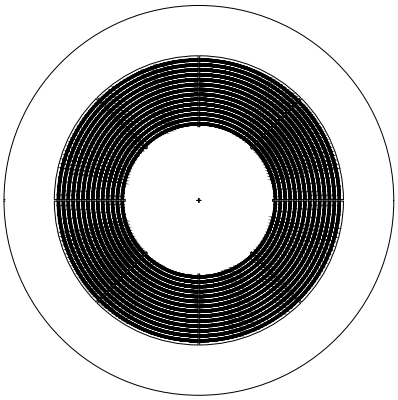


WPB/CANT - Cantilever (570mm)

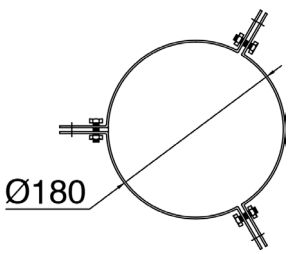




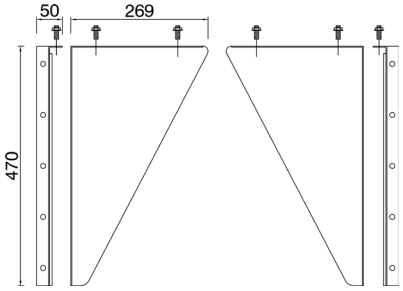
WPB/AP - Anchor plate



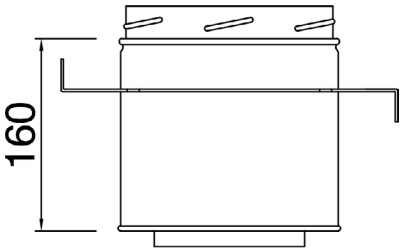
WPB/FP - Firestop plate (1 piece)

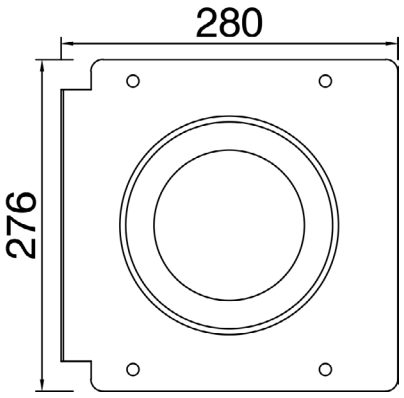


WPB/GB - Guy wire bracket

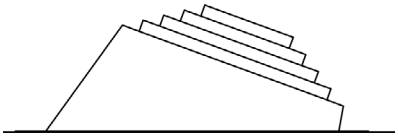


WPB/WS - Wall support side plate

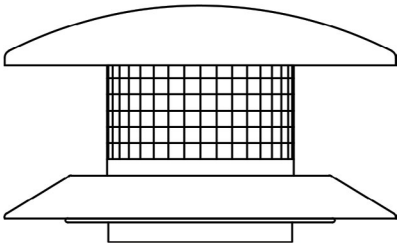




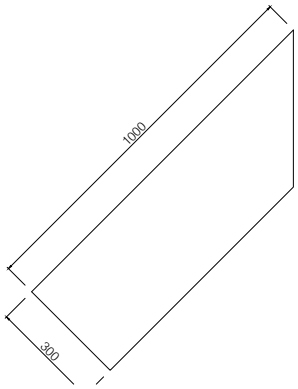
WPB/TP - Intermediate top plate



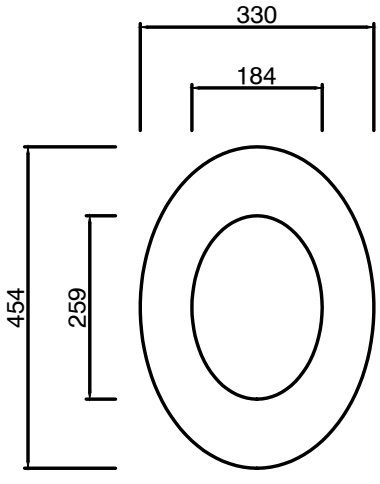
WPB/UF200 - Uni flashing (80 - 200mm)



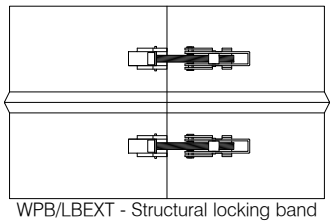
WPB/RC - Rain cap



WP/SLE - Wall sleeve (45°)
Also requires WPB/TC or WPW/TC x 2)

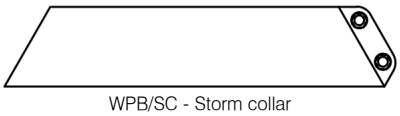


WPB/TC - Trim collar for Wall Sleeve (45°)

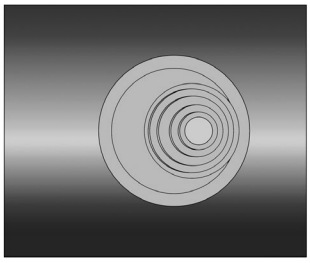


WPB/LBEXT - Structural locking band

WPB/RS - Roof support (stainless steel) band



WPB/SC - Storm collar



WP/PFL - Pitched lead flashing

7.11 Flexible Flue Liner

Flexible Flue Liner Kit Contents

6/8/10 metre liner, Anchor plate/flex adaptor, Flue system to flex adaptor, Rain cap, Locking band x 3, Viton gasket x 3, Lubricant, Packing list and instructions

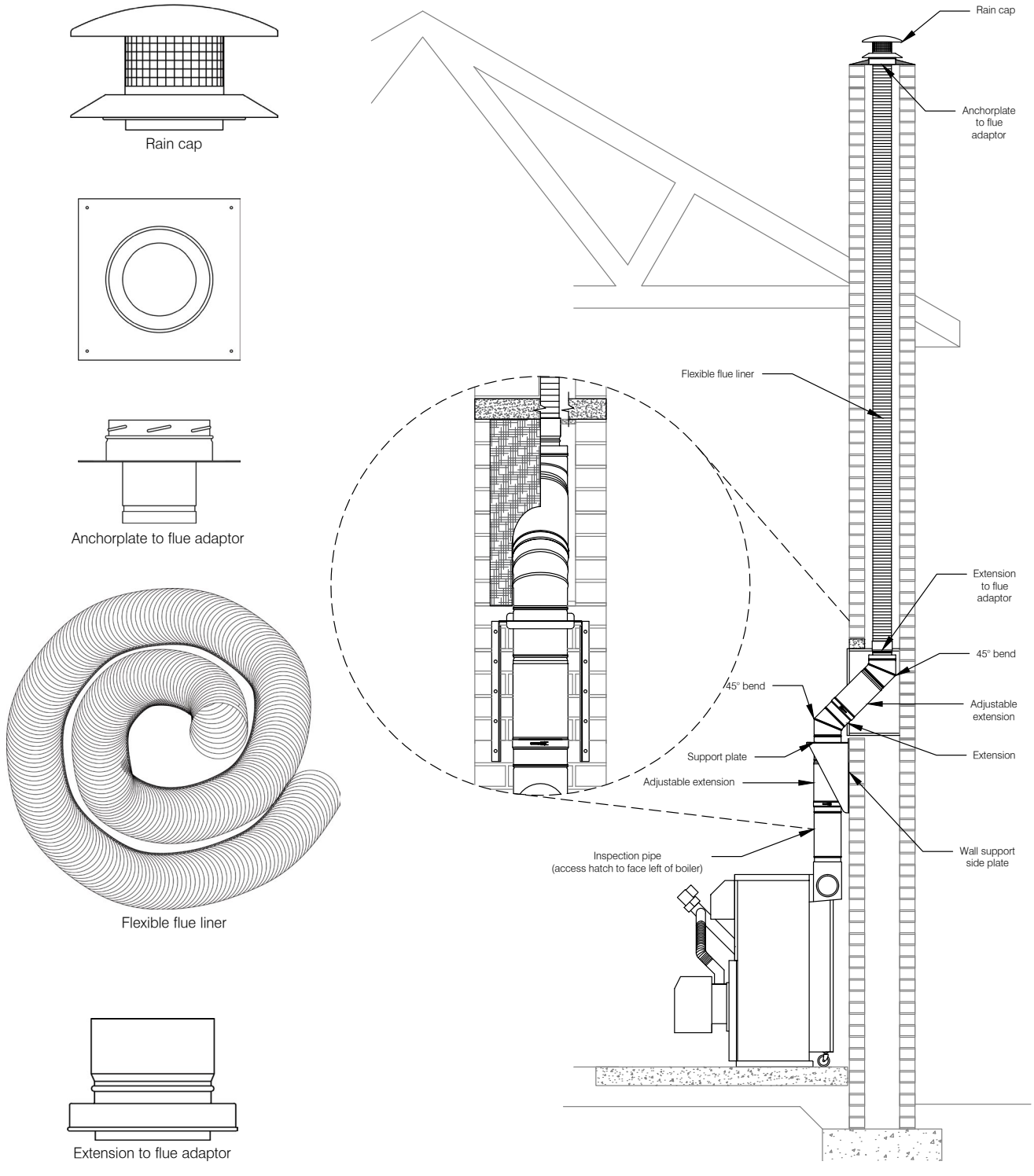


Figure 7-6: Typical flue installation (flexible flue liner)