



MULTILINE FLUE KIT

Evomax 2

30 40 60 80 100 120 150

30P 40P 60P 80P 100P 120P

When replacing any part on this appliance, use only spare parts that you can be assured conform to the safety and performance specification that we require. Do not use reconditioned or copy parts that have not been clearly authorised by Ideal.

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GENERAL

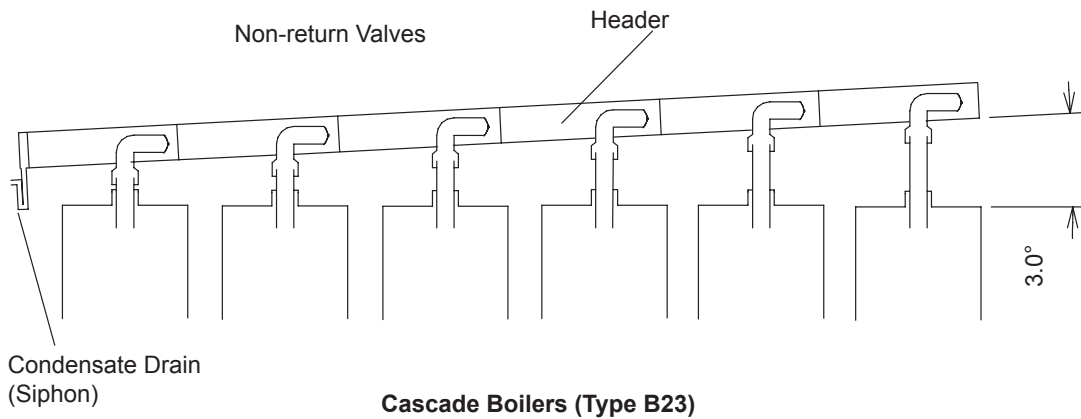
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NOTE TO THE INSTALLER: LEAVE THESE INSTRUCTIONS ADJACENT TO THE GAS METER.

INTRODUCTION

1.0 BOILER CASCADE FLUE SYSTEM



1.1 INTRODUCTION

The Cascade Flue system enables the boilers of 'open flue' Type B23 to be connected via a common flue header. The Cascade Header may be coupled to a bespoke flue outlet system designed by a flue specialist (section 3).

To ensure safety of operation a non-return valve is incorporated within the boilers themselves to prevent back-flow of combustion products through any individual boiler that is not firing. There is no requirement to fit an additional non-return valve in the flue system.

The condensate produced within the flue drains through the central trough of the header duct and exits via a siphon.

The maximum permissible system capacity is limited to the value shown in Table 1.2; this is necessary to ensure acceptable operation of any individual boiler operating at its minimum output under the influence of the total system pressure generated by the adjacent boilers.

There are optional system configurations that will provide different characteristics, these options should be considered to optimise the system performance. (Table 1.2).

1.2 SYSTEM CONFIGURATIONS

Option	Gas Type	Boiler Models	Max number of boilers	Max System Capacity
1	Natural Gas	Combinations of 100,120,150	6	600kW
2		Combinations that include a 30,40,60 or 80	6	400kW
3	Propane	Combinations of 30P,40P,60P,80P, 100P, 120P	6	400kW

Choosing the most appropriate configuration to the required application will influence the performance in the following ways;

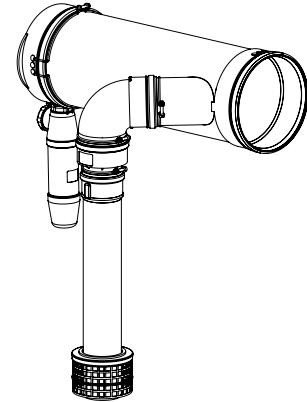
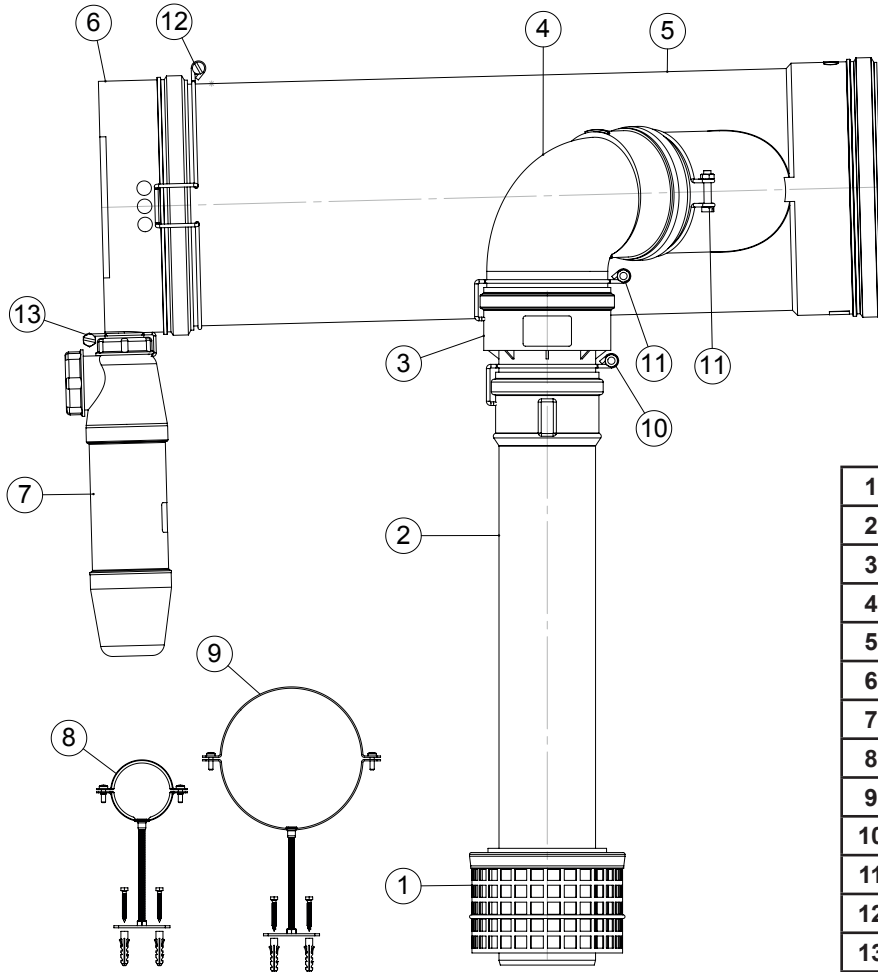
- System Capacity.
- Number of Boilers
- Turn-Down capability
- Flue length capability *Refer to Section 3.0 for details*

COMPONENTS

2.1 CASCADE FLUE COMPONENTS (FIGURE 2.1)

The Cascade Flue system is supplied in two kits.
A Starter Kit & Extension Kit.

Wire Retaining Clips are also provided to prevent movement of the tube connections by the influence of expansion and contraction. These **must** be fitted to the duct work to ensure safe operation of the system. *Ensure the cover does not block the inlet to the condense siphon.



1	Air Inlet Grill
2	Flue Extension
3	Expander
4	Elbow Short
5	Collector
6	* Cover
7	Siphon
8	Wall Bracket 80
9	Wall Bracket AL 200 + Wall Plate
10	Wire Retaining Clip 80
11	Wire Retaining Clip 100
12	Wire Retaining Clip 200
13	Wire Retaining Clip 32

2.2 STARTER KIT

This kit comprises all of the items shown in Figure 2.1.

There are two Kits available;
UIN 220925 for the 30-80 models
UIN 220927 for the 100-150 models
Drawings appended (p10 & p11)

2.3 EXTENSION KIT

This kit comprises the components required to fit additional single boilers to the system.

There are two Kits available;
UIN 220926 for the 30-80 models
UIN 220968 for the 100-150 models
Drawings appended (p12 & 13)

COMPONENTS

2.4 ASSEMBLY

It is recommended that boiler applications of the Cascade Flue System should be installed in combination with the Ideal Frame & Header Kit.

The Polypropylene flue tubes are designed to assemble together by push fit connection, a recessed flexible seal is incorporated to create a gas tight join.

The seal should be lubricated with water to facilitate assembly. Other lubricants must not be used.

The flue extension tube is either 80mm dia or 100mm dia according to the models being installed, the supplied flue tube length is 500mm.

The header gradient should be 3 degrees falling to the condensate drain end to allow adequate condensate drainage; to create this slope the extension tubes of adjacent boilers must be cut to the required length.

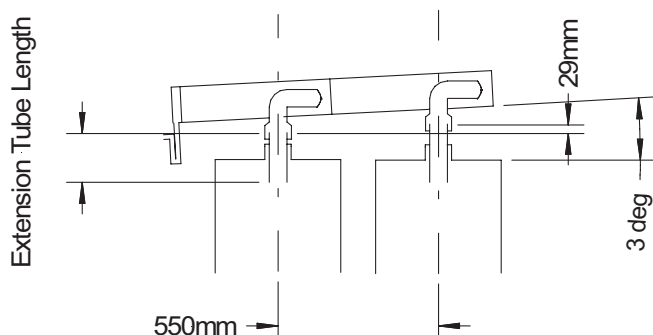
Condensate Drain Connection

For the correct termination of the condensate drain refer to the advice given with respect to condensate drain acceptable practice as provided in the Installation and Servicing Instructions provided with the appliance.

The flue connector is specific to either the 30-80 models or 100-150 models, the inner tube is manufactured in Polypropylene in accordance with the cascade system. Flue connectors with an aluminium inner tube must not be used.

FIGURE 2.5 CONDENSATE FALL DIMENSIONS

Increase in the extension tube length required between adjacent boilers = 29mm



2.6 WIRE RETAINING CLIPS

To prevent movement of the tube connections by the influence of expansion and contraction, securing clips are provided. The wire spring clip locates under the rim of the female component and is secured by a nut and bolt around the locating spigot, this creates a resistance to any opposing force. (Fig 2.8)

There is one Wire Retaining Clip provided for each of the flue connections.

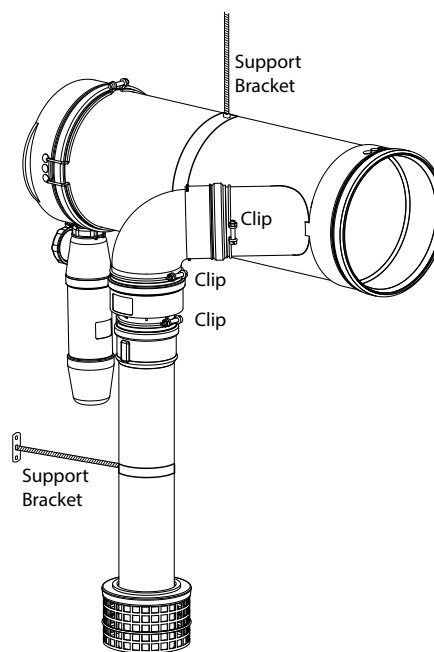
The wire retaining clips must be fitted to every join to ensure safe operation of the system.

2.7 HEADER INSTALLATION

The Cascade Header is suspended from a ceiling or overhead structure by studding attaching to brackets holding the circumference of the header duct. There is one bracket and stud rod supplied with each of the Starter & Extension Kits. (Fig 2.8)

The boiler flue tube of each boiler is secured by a clamp and tie rod either to a wall or supporting structure. (Fig 2.8)

FIGURE 2.8



Wire retaining clips are also fitted to the starter kit End Cover and Syphon connection (not shown).

Refer to diagrams shown in pages 10-13 for correct location of all wire retaining clips.

Important: All wire retaining clips must be fitted to the duct work to ensure safe operation of the system.

FLUE DESIGN

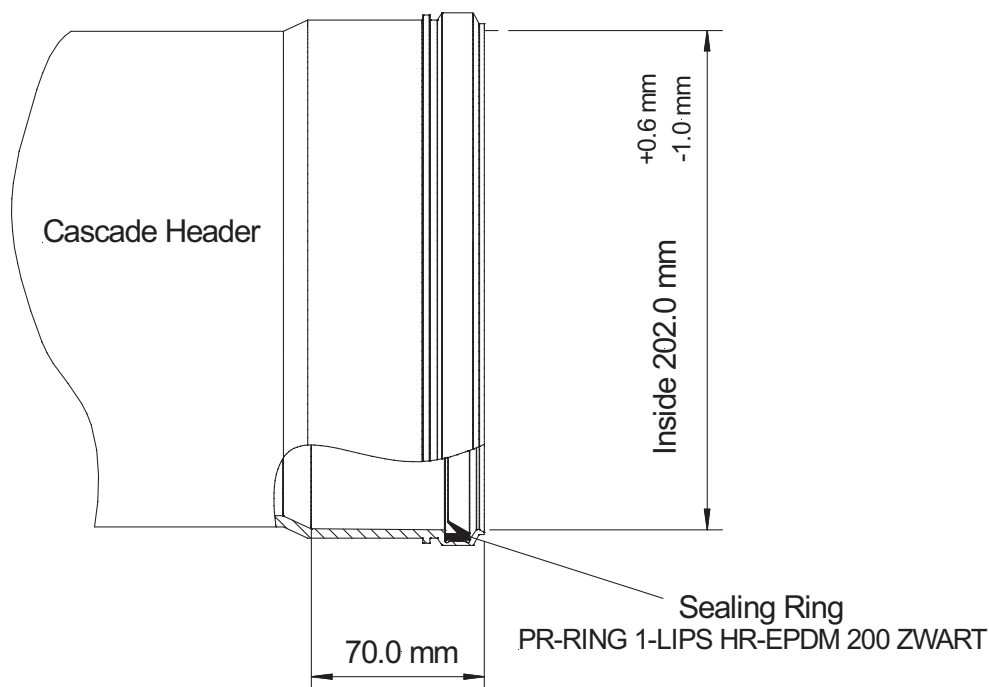
3.0 FLUE DESIGN



IMPORTANT: LEAKAGE OF FLUE PRODUCTS INTO THE ROOM WILL DEplete THE OXYGEN LEVEL & INHIBIT SAFE COMBUSTION.

- | | | | | | | | | | |
|--|--|--|-------------|-------------------------------|-----------|-------------------------------|---------|--|---|
| <p>3.01 The following standards are relevant to the construction, installation & testing of flue systems.</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 20%;">BSEN 14471</td> <td>Plastic Chimneys – requirements and test methods</td> </tr> <tr> <td>BSEN 1856-1</td> <td>Metal Chimneys – Requirements</td> </tr> <tr> <td>BSEN 1859</td> <td>Metal Chimneys – Test methods</td> </tr> <tr> <td>BS 6644</td> <td>Installation & Maintenance of gas fired hot water boilers 70kW – 1.8MW</td> </tr> </table> <p>3.02 The Flue Stack must be specified by a Flue Specialist</p> <p>3.03 Design of the connecting flue spigot must refer to the dimensions of the mating collar (Fig 3.1).</p> <p>3.04 The Polypropylene header and EPDM seal are certified to BSEN 14471.</p> <p>3.05 Integrity of the flue joints and safety of operation must be proven by the installer.</p> <p>3.06 The flue resistance at 'A' in Figure 3.2 is not permitted to exceed the maximum static pressure specification [Pmax] quoted in Table 3.3 when operating at the maximum capacity.</p> | BSEN 14471 | Plastic Chimneys – requirements and test methods | BSEN 1856-1 | Metal Chimneys – Requirements | BSEN 1859 | Metal Chimneys – Test methods | BS 6644 | Installation & Maintenance of gas fired hot water boilers 70kW – 1.8MW | <p>3.07 The flue route should be planned to enable the least directional change, one elbow is recommended as depicted in Figure 3.2.</p> <p>3.08 The flue pipe diameter must be at least 200mm, larger diameters will permit longer flue length.</p> <p>3.09 The flue material must be suitable for condensing operation.</p> <p>3.0.10 The terminal guard must prevent the ingress of objects greater than 15mm diameter to comply with EN15502.</p> <p>3.0.11 The Flue Terminal design should be selected to create the least resistance and not compromise the potential flue length. A wire mesh type is recommended with a 14mm grid.</p> <p>3.0.12 Rain ingress may be ignored as the header design enables excess water to be discharged through the condensate drain.</p> |
| BSEN 14471 | Plastic Chimneys – requirements and test methods | | | | | | | | |
| BSEN 1856-1 | Metal Chimneys – Requirements | | | | | | | | |
| BSEN 1859 | Metal Chimneys – Test methods | | | | | | | | |
| BS 6644 | Installation & Maintenance of gas fired hot water boilers 70kW – 1.8MW | | | | | | | | |

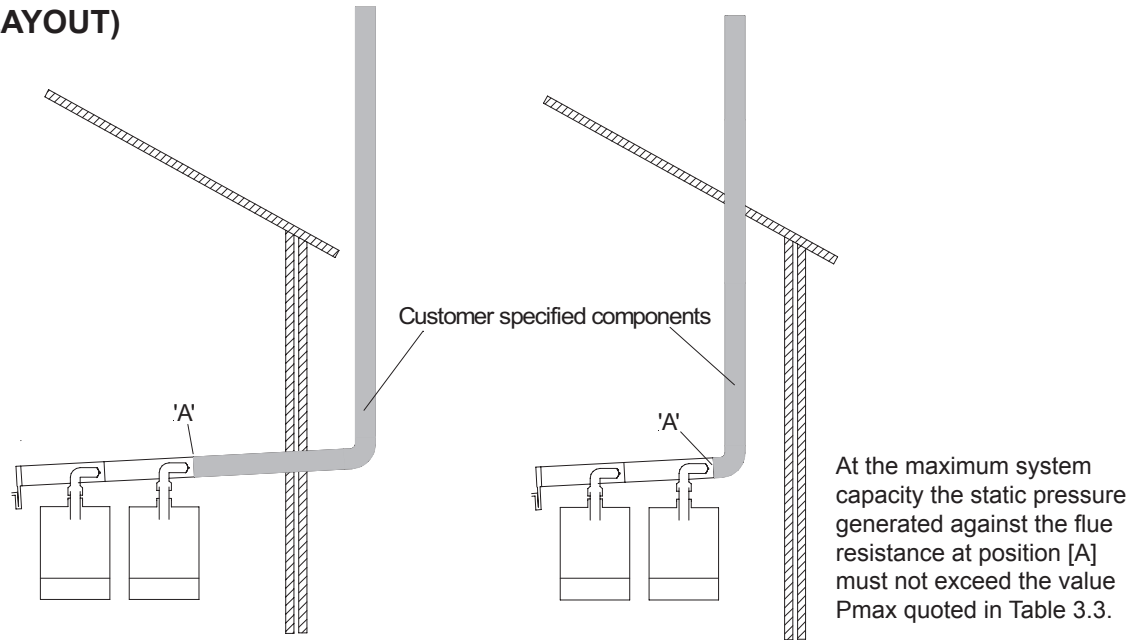
**FIGURE 3.1
(CASCADE HEADER INTERFACE DETAIL - FEMALE FLUE SOCKET CONNECTION)**



NOTE: Connecting flue must comply with CE approval requirements

FLUE DESIGN

**FIGURE 3.2
(FLUE SYSTEM LAYOUT)**



3.3 BOILER CASCADE FLUE SYSTEM DATA

Boiler Model Output		Cascade System Limits		Combustion Products Data		
Model		Maximum System Capacity	Max. Permissible Header Pressure 'A' (Static)	max rate CO ₂	min rate CO ₂	Temp. Max
Max	Min	Hmax	Pmax	± 0.5	± 0.5	
kW	kW	kW	Pa	%	%	C
30	7.5	400	40	9.7	9.0	72
40	10					
60	15					
80	20					
100	25	600	80	11.4	10.6	
120	30					
150	37.5					
30P	7.5					
40P	10	400	40	11.4	10.6	
60P	15					
80P	20					
100P	25					
120P	30	600	80			

3.4 DESIGN PROCEDURE

1. Determine the required total heat output. (H_{tot} refer to graph overleaf) [maximum of 6 boilers per system or 600kW].
2. Determine the required minimum heat output.
3. From Table 3.3 select the boiler models required.
4. Using Figure 3.5 read the Combustion Products Flow Rate (Q_{max}) at the Total System Capacity (H_{tot}).
5. Record the information in Table 3.6
6. Calculate the maximum permissible flue length at conditions Q_{max} & P_{max}.
 $L = [a - (c + d)] / b$ (Table 3.6)

FLUE DESIGN

FIGURE 3.5 COMBUSTION PRODUCTS FLOW RATE

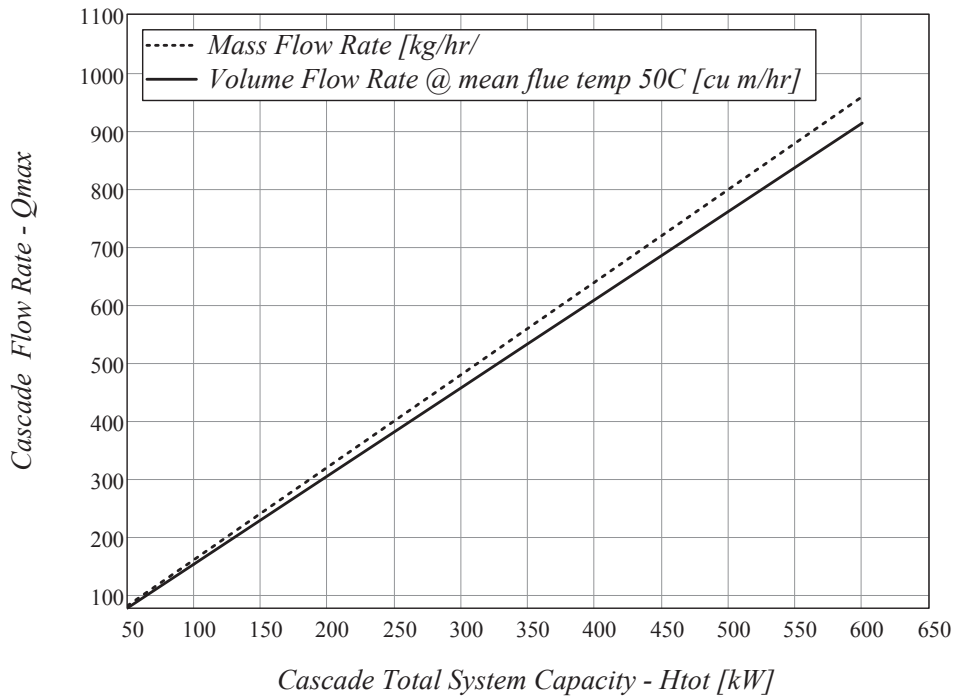


FIGURE 3.6 BOILER CASCADE FLUE SYSTEM DATA

System	System Models	System Capacities			Combustion Products Data		Flue Data				
		Total	Min	Turn Down Ratio	Flow Rate Qmax		Header Pressure Pmax	Pressure Losses			
		Htot	Hmin		Mass	Vol @ 50C	(a) static	(b) 1m	(c) 90°	(d) guard	L
		kW	kW		Kg/hr	m3/hr	Pa	Pa	Pa	Pa	m
Ex 1	(4x80) + (1x30)	350	7.5	40:1	550	525	40				
Ex 2	3 x 120	360	30	12:1	560	550	80				

Example 1

This example requires a total output of 350kW and comprises (4 x 80) + (1 x 30) models; the inclusion of the 30kW model enables the greatest turn-down (40:1) but the maximum permissible header pressure is limited to 40Pa.

Example 2

The heat requirement here is also 350kW; by selecting 3 x 120kW models (360kW) the maximum permissible header pressure is raised to 80Pa which will enable greater flue length. The turn-down ratio will be reduced to 12:1.

COMMISSIONING

4.0 COMMISSIONING

To accommodate the flue pressure generated by the connection of multiple boilers to a common flue, the minimum rate (equivalent to minimum fan speed) of each Evomax 2 appliance operating on the Multiline cascade system is increased to offset the maximum back-pressure created.

Table 4.1 shows the revised performance of each Evomax 2 model where it differs from standard standalone operation as shown in the Evomax 2 Installation & Servicing instructions.

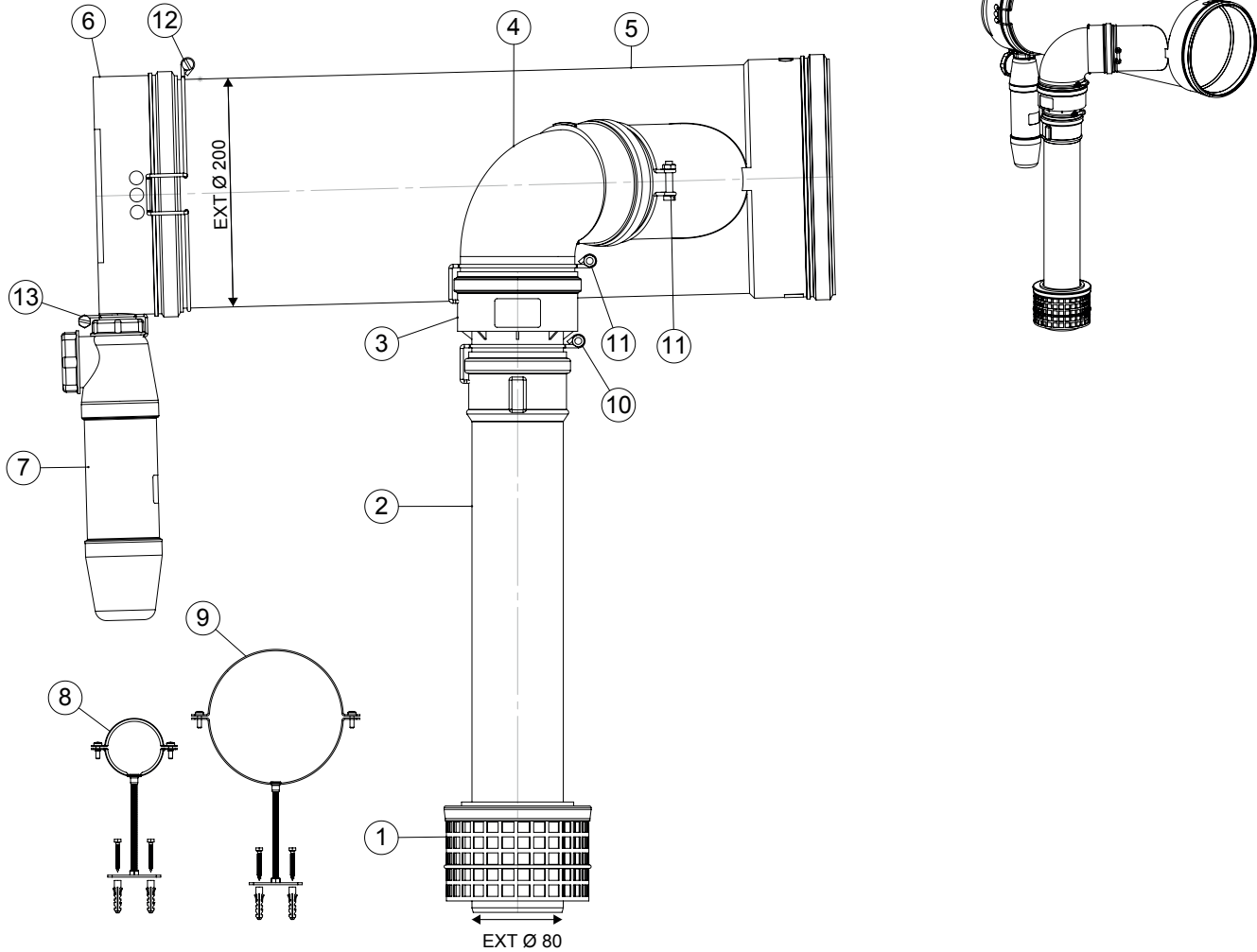
To configure operation with the Multiline flue as described, refer to the ICCS Manual and select the flue type during configuration.

4.1 BOILER CASCADE FLUE SYSTEM – MINIMUM RATE BOILER SETTINGS & DATA

Boiler Model Size		30	30P	40	40P	60	60P	80	80P	100	100P	120	120P	150	
Fan Speed	rpm	2300	2260	2600	2490	2020	1980	2400	2180	2400	2400	2560	2460	1850	
	% fan cap	33.63	34.24	32.1	31.52	33.33	35.36	32.43	30.7	32	33.8	32.32	31.54	29.94	
Input	net	kW	7.2	7.5	10.2	10	15	15	20	20.2	25.7	25.7	30.3	30	38.6
	gross	kW	7.9	8.1	11	10.8	16.6	16.2	23	22.2	28.5	28	33.6	32.6	42.6
Output	non-condensing	kW	7.5	7.5	10	10	15	15	20	20	25	25	30	30	37.5
	condensing	kW	8	8	10.4	10.4	16	15.7	21.6	21.2	27	27	32.4	32.4	40.5
Flue CO ₂	+/- 0.5	%	8.6	10.5	9.3	10.3	8.7	10.3	8.9	11	9	10.15	9.2	10.9	8.6
NOx (weighted)	Cat 6	mg/kWh	35.9	55.2	35	68.6	36.9	70.6	36.3	66.3	36.7	69.1	36.2	44.1	38.4

STARTER KITS

STARTER KIT COMPONENTS FOR 30-80 MODELS [UIN 210264]

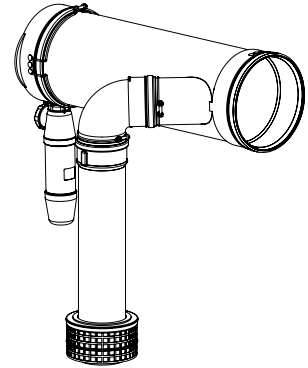
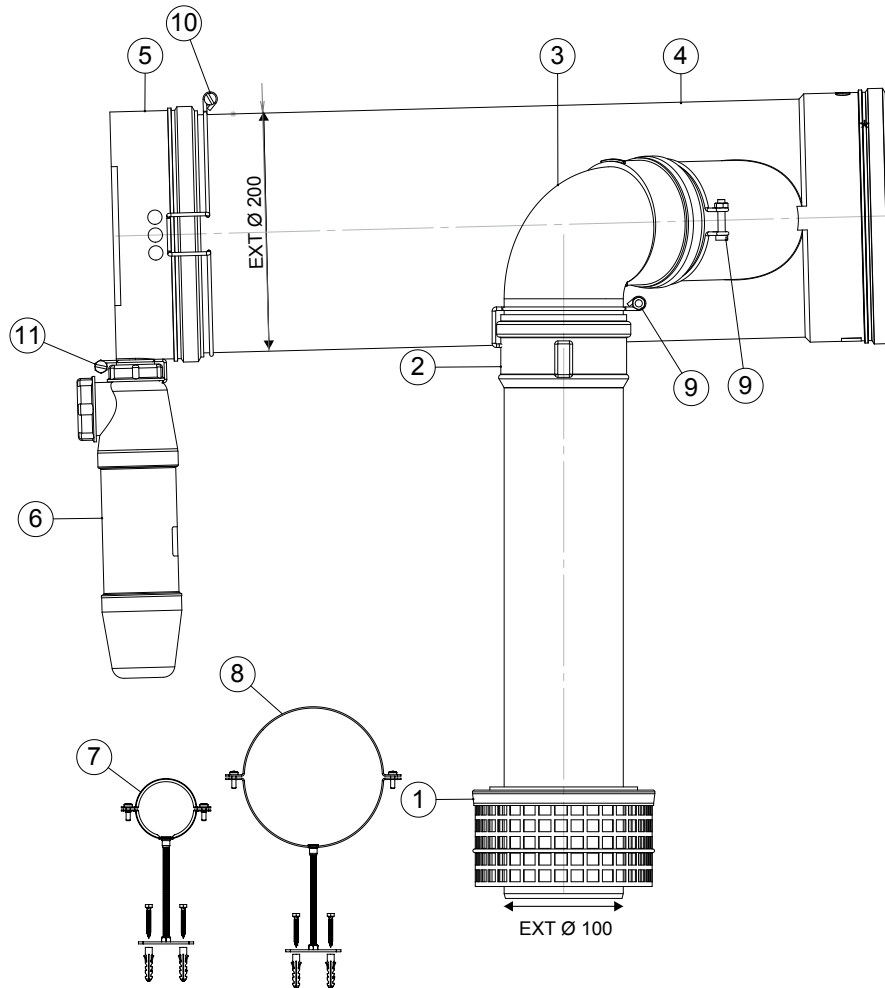


1	179587	Air Inlet Grill
2	179582	Flue Extension
3	179583	Expander
4	179591	Elbow Short
5	-	Collector
6	179588	*Cover
7	179581	Siphon
8	175456	Wall Bracket 80
9	-	Wall Bracket AL 200 + Wall Plate (x2)
10	179594	Wire retaining clip 80
11	179596	Wire Retaining Clip 100
12	179597	Wire Retaining Clip 200
13	179593	Wire Retaining Clip 32

**Ensure the cover does not block the inlet to the condense siphon*

STARTER KITS

STARTER KIT COMPONENTS FOR 100-150 MODELS [UIN 220927]

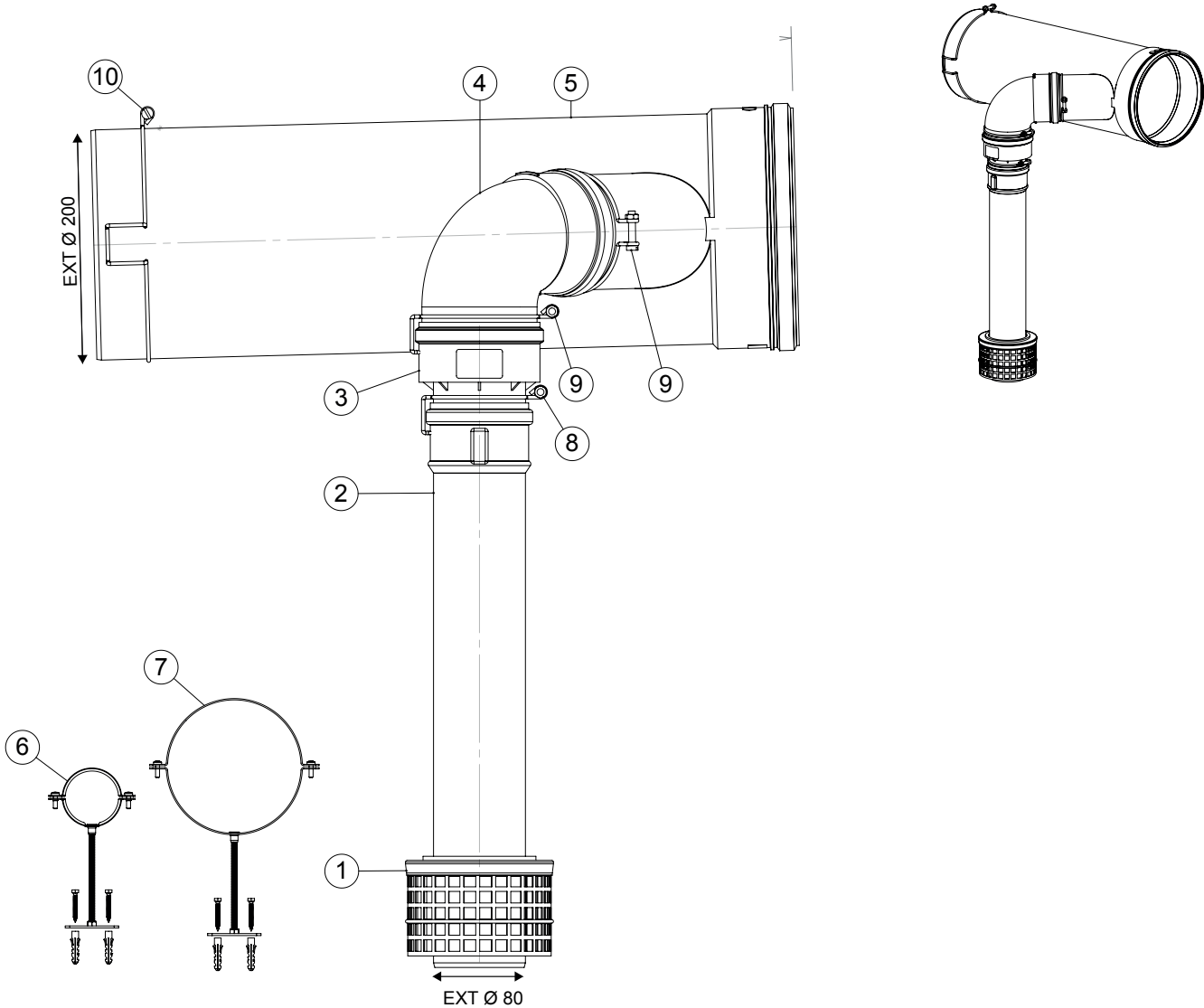


1	179580	Air Inlet Grill
2	179583	Flue Extension
3	179591	Elbow Short
4	-	Collector
5	179588	Cover*
6	179581	Siphon
7	175457	Wall Bracket 100
8	-	Wall Bracket AL 200 + Wall Plate (x2)
9	179596 (x3)	Wire Retaining Clip 100 (x3)
10	179597	Wire Retaining Clip 200
11	179593	Wire Retaining Clip 32

*Ensure the cover does not block the inlet to the condense siphon

EXTENSION KITS

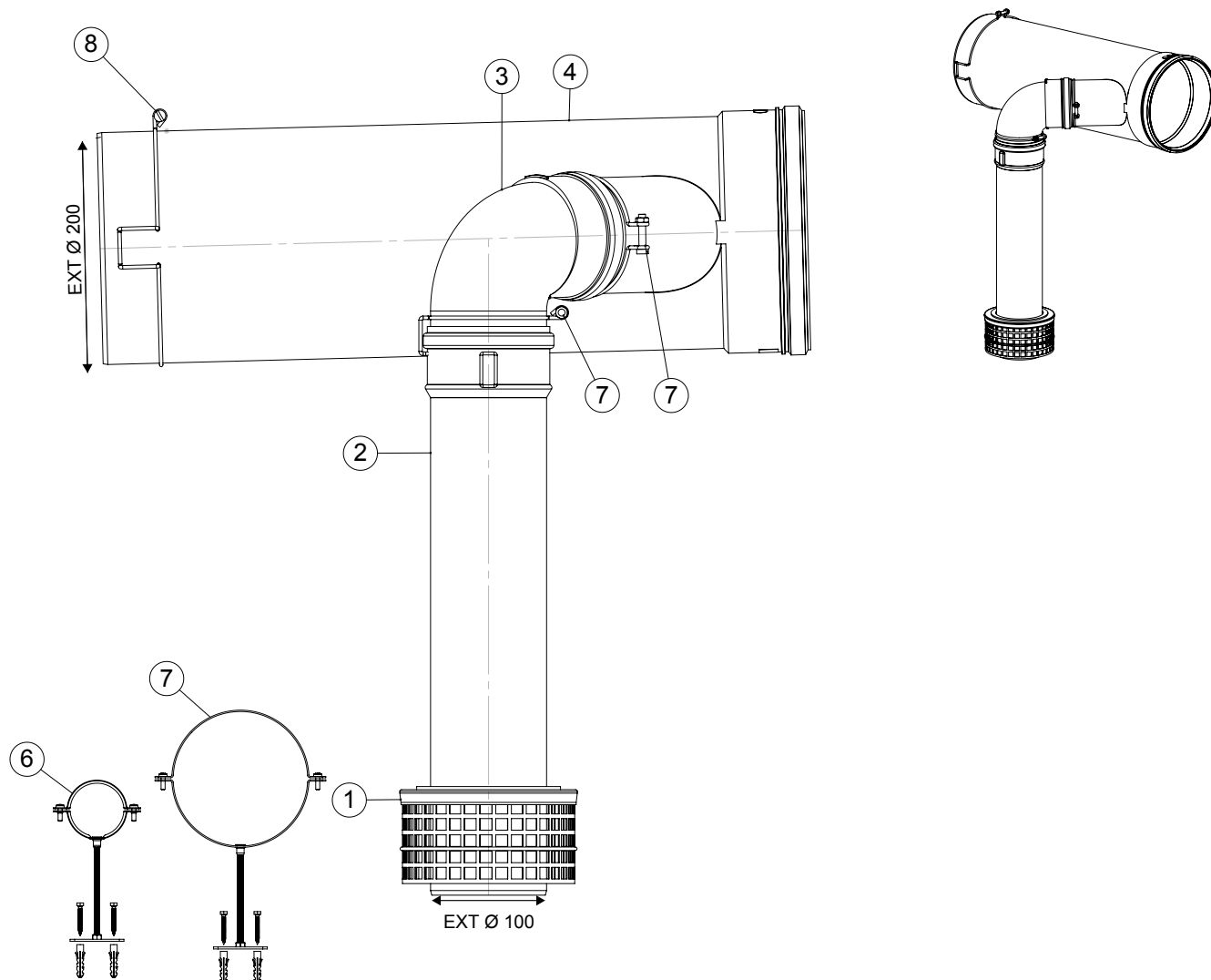
EXTENSION KIT COMPONENTS FOR 30 -80 MODELS [UIN 220926]



1	179587	Air Inlet Grill
2	179582	Flue Extension
3	179583	Expander
4	179591	Elbow Short
5	-	Collector
6	175456	Wall Bracket 80
7	-	Wall Bracket AL 200 + Wall Plate
8	179594	Wire Retaining Clip 80
9	179596 (x2)	Wire Retaining Clip 100 (x2)
10	179593	Wire Retaining Clip 200

EXTENSION KITS

EXTENSION KIT COMPONENTS FOR 100-150 MODELS [UIN 220928]



1	179580	Air Inlet Grill
2	179583	Flue Extension
3	179591	Elbow Short
4	-	Collector
5	175457	Wall Bracket 100
6	-	Wall Bracket AL 200 + Wall Plate
7	179596 (x2)	Wire Retaining Clip 100 (x2)
10	179597	Wire Retaining Clip 200

NOTES

NOTES

Technical Training

The Ideal Boilers Technical Training Centre offers a series of first class training courses for domestic, commercial and industrial heating installers, engineers and system specifiers. For details of courses please ring: 01482 498 432

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Ideal Boilers Limited National Avenue, Hull, HU5 4JB.

Telephone: 01482 492 251 Fax: 01482 448 858

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Ideal Installer/Technical Helpline: 01482 498 376
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