

Cascade Flue System Guide

For use with the following appliances:

CPM 58
CPM 77
CPM 96
CPM 116
EF80
EF100
EF120

Introduction

This guide has been produced to assist in the selection of Lochinvar Cascade flue kits only and cannot be used for sizing any other type of flue. The final flue design should take into account relevant guides and regulations and pay particular attention to the requirements of the clean air act or memorandum

The Lochinvar Cascade flue kits consist of the vertical header from each appliance each with a non-return valve to prevent combustion products recirculating into non-operational appliances within the cascade. There is also a horizontal header. The final vertical flue and termination are not included within these kits.

Suitable appliances

The Lochinvar cascade flue system is suitable for use with the following appliances only:

- CPM 58
- CPM 77
- CPM 96
- CPM 116
- EF80
- EF100
- EF120

Using this Guide

To size a suitable cascade kit first check the standard kit sizing from table 1.1, this should then be checked using tables 1.2 and 1.3 or by using the cascade flue kit calculator. If the finished equivalent length is over the total allowed then select the next kit up if available and re-check. See example on page 5. Finally see the detailed breakdown of each kit starting on page 6, this also shows any available ancillaries to complete the flue system. If the system you are looking at is outside the parameters of the Lochinvar Cascade kits then a suitable flue manufacturer will need to be contacted for an alternative flue arrangement.

Model	Quantity	Total Boiler Output kW	(MEL) Maximum Equivalent Vertical Length (m)					
			150mm Header 150mm Flue	CASKIT	150mm Header 200mm Flue	CASKIT	200mm Header 200mm Flue	CASKIT
CPM 58	2	112	50	001	50	NA	50	N/A
CPM 77/EF80	2	148	50	001	50	N/A	50	N/A
CPM 96/EF100	2	184	50	002	50	N/A	50	N/A
CPM 116/EF120	2	222	50	002	50	N/A	50	N/A
CPM 58	3	168	50	003	50	N/A	50	N/A
CPM 77/EF80	3	222	29	003	50	004	50	005
CPM 96/EF100	3	276	23	006	50	007	50	008
CPM 116/EF120	3	333	13	006	50	007	50	008
CPM 58	4	224	13	009	50	010	50	011
CPM 77/EF80	4	296	N/A	N/A	50	010	50	011
CPM 96/EF100	4	368	N/A	N/A	50	012	50	013
CPM 116/EF120	4	444	N/A	N/A	50	012	50	013

Table 1.1 Cascade kit/appliance cross reference

Sizing

Once you have established the cascade kit required from table 1.1 any additional bends and lengths of flue need to be taken into consideration to ensure the total equivalent flue length (TEL) does not exceed the permitted maximum equivalent vertical flue length (MEL) from table 1.1. If TEL is greater than MEL then the next cascade kit up will need to be used. If there is no alternative shown the Lochinvar Cascade flue kit cannot be used.

Equivalent flue lengths

The tables below show the extra to add onto to the TEL for every additional metre of flue and elbow used on the flue system

Flue pipe size	Equivalent vertical length	
	150mm horizontal flue	200mm horizontal flue
150mm/150mm flue pipe	1.0	N/A
150mm/200mm flue pipe	4.4	1.1
200mm/200mm flue pipe	N/A	1.1

Note that vertical flue is counted as one metre per each metre of flue

Table 1.2 equivalent for horizontal flue lengths

Elbow type	Equivalent vertical length	
	150mm flue	200mm flue
45°	1.1	1.5
90°	2.5	3.3

Table 1.3 equivalent for elbows

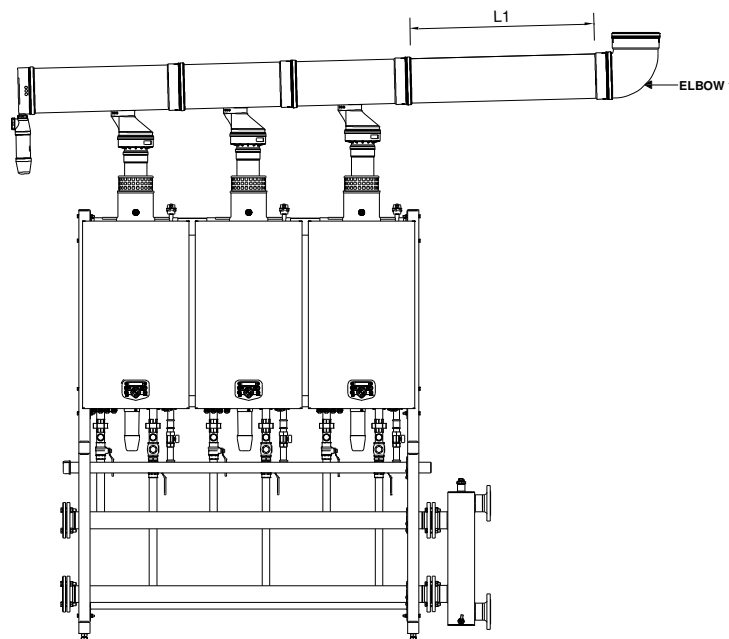


Diagram 1.0 Cascade Kit Showing L1 and Elbow1

Example

A boiler system of 3no CPM 77 boilers are to be used on a cascade system consisting of:

- 5 metre extra horizontal run after header – Dimension L1
- A total of 10 metres horizontal sections after Elbow 1
- 2 Additional 90° Bends after Elbow 1 - Do not count Elbow1
- A total of 22 meters vertical sections after Elbow 1

Using table 1.1 the first cascade kit available is the 150mmHeader/150mm Flue CASKIT 003, this has an **MEL of 29 metres**. Using tables 1.2 and 1.3 we can calculate the below:

Total equivalent length (TEL) = 5 metres horizontal flue (L1)	5.0 x 1.0 =5.0
90° bend (150mm)	2.0 x 2.5 =5.0
Additional Horizontal Sections	10.0 x 1.0 = 10.0
22 meters vertical flue	22.0 x 1.0 = 22.0
TEL =5.0+5.0+10.0+22.0 = <u>42.0 metres</u>	

The allowed MEL for CASKIT003 is **29.0 metres**, meaning this flue system is **not suitable**.

Now move up to the next available cascade kit 150mmHeader/200mmFlue CASKIT004
This has an **MEL of 50 metres**. Using tables 1.2 and 1.3 we can calculate the below:

Total equivalent length (TEL) = 5 meters horizontal flue (L1)	5.0 x 4.4 =22.0
90° bend (200mm)	2.0 x 3.3 =6.6
Additional Horizontal Sections (200mm)	10.0 x 1.1 = 11
22.0 metres vertical flue =	22.0 x 1 = 22.0

TEL =22.0+6.6+11.0 +22.0 =**61.6 metres**

Allowed MEL for CASKIT004 =**50** so this flue system is **not suitable**.

The next available cascade kit 200mmHeader/200mmFlue CASKIT005
This has an **MEL of 50 metres**. Using tables 1.2 and 1.3 we can calculate the below:

Total equivalent length (TEL) = 5 metres horizontal flue (L1)	5.0 x 1.1 =5.5
90° bend (200mm)	2.0 x 3.3 = 6.6
Additional Horizontal Sections	10.0 x 1.1= 11.0
22 meters vertical flue	22.0 x 1.0 = 22.0

TEL =5.5+6.6+11.0+22.0 =**45.1 metres**

The allowed MEL for CASKIT005 is **50.0 metres**, meaning this flue system is **suitable**.

CASKIT005 should be selected.

1. CASKIT001

CASCADE FLUE SYSTEM FOR 2 APPLIANCES

MODELS
CPM 58 & CPM 77
EF80

150 mm HEADER – 150 mm FLUE

Maximum Equivalent Flue Length = 50 Metres (All Models)

Deduct 2.5 metres for each 90° Bend
 Deduct 1.1 metres for each 45° Bend
 Deduct 1.0 metre for each 1.0 metre of 150 mm dia horizontal length

Each Flue Kit includes all items marked as Std Spec

Part No	Description	Std Spec
M81630	CASCADE SYSTEM - 150mm - 2 BOILERS	1
M85271	EXTENSION - 80mm X 500mm	2
M85283	EXPANDER 80mm - 100mm	2
M87927	AIR INTAKE FILTER 80/125 CONCENTRIC	2
M70359	ROOF TERMINAL - 150mm	
M70322	EXTENSION - 150mm x 1000mm	
M70324	EXTENSION - 150mm x 2000mm	
M70327	CONDENSATE DRAIN - 150mm	
M70331	ELBOW 150mm - 90°	
M70332	ELBOW 150mm - 45°	
M87196	WALL CLAMP - 150mm	

2. CASKIT002

CASCADE FLUE SYSTEM FOR 2 APPLIANCES

MODELS
CPM 96 & CPM 116
EF100 & EF120

150 mm HEADER – 150 mm FLUE

Maximum Equivalent Flue Length = 50 Metres (All Models)

Deduct 2.5 metres for each 90° Bend
 Deduct 1.1 metres for each 45° Bend
 Deduct 1.0 metre for each 1.0 metre of 150 mm dia horizontal length

Each Flue Kit includes all items marked as Std Spec

Part No	Description	Std Spec
M81630	CASCADE SYSTEM - 150mm - 2 BOILERS	1
M87957	AIR INTAKE FILTER 100/150 CONCENTRIC	2
M70359	ROOF TERMINAL - 150mm	
M70322	EXTENSION - 150mm x 1000mm	
M70324	EXTENSION - 150mm x 2000mm	
M70327	CONDENSATE DRAIN - 150mm	
M70331	ELBOW 150mm - 90°	
M70332	ELBOW 150mm - 45°	
M87196	WALL CLAMP - 150mm	

3. CASKIT003

CASCADE FLUE SYSTEM FOR 3 APPLIANCES

MODELS CPM 58 & CPM 77 EF80

150 mm HEADER – 150 mm FLUE

Maximum Equivalent Flue Length = 50 Metres (CPM 58)

Maximum Equivalent Flue Length = 29 Metres (CPM 77 & EF80)

Deduct 2.5 metres for each 90° Bend
Deduct 1.1 metres for each 45° Bend
Deduct 1.0 metre for each 1.0 metre of 150 mm dia horizontal length

Each Flue Kit includes all items marked as Std Spec

Part No	Description	Std Spec
M81630	CASCADE SYSTEM - 150mm - 2 BOILERS	1
M81631	CASCADE SYSTEM - 150mm - ADDITIONAL BOILER	1
M85271	EXTENSION - 80mm X 500mm	3
M85283	EXPANDER 80mm - 100mm	3
M87927	AIR INTAKE FILTER 80/125 CONCENTRIC	3
M70359	ROOF TERMINAL - 150mm	
M70322	EXTENSION - 150mm x 1000mm	
M70324	EXTENSION - 150mm x 2000mm	
M70327	CONDENSATE DRAIN - 150mm	
M70331	ELBOW 150mm - 90°	
M70332	ELBOW 150mm - 45°	
M87196	WALL CLAMP - 150mm	

4. CASKIT004

CASCADE FLUE SYSTEM FOR 3 APPLIANCES

MODELS
CPM 77
EF80

150 mm HEADER – 200 mm FLUE

Maximum Equivalent Flue Length = 50 Metres

Deduct 1.1 metres for each 150 mm 90° Bend
 Deduct 3.3 metres for each 200 mm 90° Bend
 Deduct 1.1 metres for each 150 mm 45° Bend
 Deduct 1.1 metres for each 200 mm 45° Bend
 Deduct 4.0 metres for each 1.0 metre of 150 mm dia horizontal length
 Deduct 1.1 metres for each 1.0 metre of 200 mm dia horizontal length

Each Flue Kit includes all items marked as Std Spec

Part No	Description	Std Spec
M70342	EXPANDER 150mm - 200mm	1
M81630	CASCADE SYSTEM - 150mm - 2 BOILERS	1
M81631	CASCADE SYSTEM - 150mm - ADDITIONAL BOILER	1
M85271	EXTENSION - 80mm X 500mm	3
M85283	EXPANDER 80mm - 100mm	3
M87927	AIR INTAKE FILTER 80/125 CONCENTRIC	3
M70439	ROOF TERMINAL - 200mm	
M70322	EXTENSION - 150mm x 1000mm	
M70324	EXTENSION - 150mm x 2000mm	
M70402	EXTENSION - 200mm X 1000mm	
M70404	EXTENSION - 200mm X 2000mm	
M70411	ELBOW 200mm - 90°	
M70412	ELBOW 200mm - 45°	
M87196	WALL CLAMP - 150mm	
M87198	WALL CLAMP - 200mm	

5. CASKIT005

CASCADE FLUE SYSTEM FOR 3 APPLIANCES

MODELS
CPM 77
EF80

200 mm HEADER – 200 mm FLUE

Maximum Equivalent Flue Length = 50 Metres

Deduct 3.3 metres for each 90° Bend
 Deduct 1.5 metres for each 45° Bend
 Deduct 1.1 metres for each 1.0 metre of 200 mm dia horizontal length

Each Flue Kit includes all items marked as Std Spec

Part No	Description	Std Spec
M81632	CASCADE SYSTEM - 200mm - 2 BOILERS	1
M81633	CASCADE SYSTEM - 200mm - ADDITIONAL BOILER	1
M85271	EXTENSION - 80mm X 500mm	3
M85283	EXPANDER 80mm - 100mm	3
M87927	AIR INTAKE FILTER 80/125 CONCENTRIC	3
M70439	ROOF TERMINAL - 200mm	
M70402	EXTENSION - 200mm X 1000mm	
M70404	EXTENSION - 200mm X 2000mm	
M70411	ELBOW 200mm - 90°	
M70412	ELBOW 200mm - 45°	
M87198	WALL CLAMP - 200mm	

6. CASKIT006

CASCADE FLUE SYSTEM FOR 3 APPLIANCES

MODELS
CPM 96 & CPM 116
EF100 & EF120

150 mm HEADER – 150 mm FLUE

Maximum Equivalent Flue Length = 23 Metres (CPM 96/EF100)

Maximum Equivalent Flue Length = 13 Metres (CPM 116/EF120)

Deduct 2.5 metres for each 90° Bend
 Deduct 1.1 metres for each 45° Bend
 Deduct 1.0 metre for each 1.0 metre of 150 mm dia horizontal length

Each Flue Kit includes all items marked as Std Spec

Part No	Description	Std Spec
M81630	CASCADE SYSTEM - 150mm - 2 BOILERS	1
M81631	CASCADE SYSTEM - 150mm - ADDITIONAL BOILER	1
M87957	AIR INTAKE FILTER 100/150 CONCENTRIC	3
M70359	ROOF TERMINAL - 150mm	
M70322	EXTENSION - 150mm x 1000mm	
M70324	EXTENSION - 150mm x 2000mm	
M70327	CONDENSATE DRAIN - 150mm	
M70331	ELBOW 150mm - 90°	
M70332	ELBOW 150mm - 45°	
M87196	WALL CLAMP - 150mm	

7. CASKIT007

CASCADE FLUE SYSTEM FOR 3 APPLIANCES

MODELS
CPM 96 & CPM 116
EF100 & EF120

150 mm HEADER – 200 mm FLUE

Maximum Equivalent Flue Length = 50 Metres (All Models)

Deduct 1.1 metres for each 150 mm 90° Bend
 Deduct 3.3 metres for each 200 mm 90° Bend
 Deduct 1.1 metres for each 150 mm 45° Bend
 Deduct 1.1 metres for each 200 mm 45° Bend
 Deduct 4.0 metres for each 1.0 metre of 150 mm dia horizontal length
 Deduct 1.1 metres for each 1.0 metre of 200 mm dia horizontal length

Each Flue Kit includes all items marked as Std Spec

Part No	Description	Std Spec
M70342	EXPANDER 150mm - 200mm	1
M81630	CASCADE SYSTEM - 150mm - 2 BOILERS	1
M81631	CASCADE SYSTEM - 150mm - ADDITIONAL BOILER	1
M87957	AIR INTAKE FILTER 100/150 CONCENTRIC	3
M70439	ROOF TERMINAL - 200mm	
M70322	EXTENSION - 150mm x 1000mm	
M70324	EXTENSION - 150mm x 2000mm	
M70402	EXTENSION - 200mm X 1000mm	
M70404	EXTENSION - 200mm X 2000mm	
M70411	ELBOW 200mm - 90°	
M70412	ELBOW 200mm - 45°	
M87196	WALL CLAMP - 150mm	
M87198	WALL CLAMP - 200mm	

8. CASKIT008

CASCADE FLUE SYSTEM FOR 3 APPLIANCES

MODELS
CPM 96 & CPM 116
EF100 & EF120

200 mm HEADER – 200 mm FLUE

Maximum Equivalent Flue Length = 50 Metres (All Models)

Deduct 3.3 metres for each 90° Bend
 Deduct 1.5 metres for each 45° Bend
 Deduct 1.1 metres for each 1.0 metre of 200 mm dia horizontal length

Each Flue Kit includes all items marked as Std Spec

Part No	Description	Std Spec
M81632	CASCADE SYSTEM - 200mm - 2 BOILERS	1
M81633	CASCADE SYSTEM - 200mm - ADDITIONAL BOILER	1
M87957	AIR INTAKE FILTER 100/150 CONCENTRIC	3
M70439	ROOF TERMINAL - 200mm	
M70402	EXTENSION - 200mm X 1000mm	
M70404	EXTENSION - 200mm X 2000mm	
M70411	ELBOW 200mm - 90°	
M70412	ELBOW 200mm - 45°	
M87198	WALL CLAMP - 200mm	

9. CASKIT009

CASCADE FLUE SYSTEM FOR 4 APPLIANCES

MODELS
CPM 58

150 mm HEADER – 150 mm FLUE

Maximum Equivalent Flue Length = 13 Metres

Deduct 2.5 metres for each 90° Bend
Deduct 1.1 metres for each 45° Bend
Deduct 1.0 metre for each 1.0 metre of 150 mm dia horizontal length

Each Flue Kit includes all items marked as Std Spec

Part No	Description	Std Spec
M81630	CASCADE SYSTEM - 150mm - 2 BOILERS	1
M81631	CASCADE SYSTEM - 150mm - ADDITIONAL BOILER	2
M85271	EXTENSION - 80mm X 500mm	4
M85283	EXPANDER 80mm - 100mm	4
M87927	AIR INTAKE FILTER 80/125 CONCENTRIC	4
M70359	ROOF TERMINAL - 150mm	
M70322	EXTENSION - 150mm x 1000mm	
M70324	EXTENSION - 150mm x 2000mm	
M70327	CONDENSATE DRAIN - 150mm	
M70331	ELBOW 150mm - 90°	
M70332	ELBOW 150mm - 45°	
M87196	WALL CLAMP - 150mm	

10. CASKIT010

CASCADE FLUE SYSTEM FOR 4 APPLIANCES

MODELS
CPM 58 & CPM 77
EF80

150 mm HEADER – 200 mm FLUE

Maximum Equivalent Flue Length = 50 Metres (All Models)

Deduct 1.1 metres for each 150 mm 90° Bend
 Deduct 3.3 metres for each 200 mm 90° Bend
 Deduct 1.1 metres for each 150 mm 45° Bend
 Deduct 1.1 metres for each 200 mm 45° Bend
 Deduct 4.0 metres for each 1.0 metre of 150 mm dia horizontal length
 Deduct 1.1 metres for each 1.0 metre of 200 mm dia horizontal length

Each Flue Kit includes all items marked as Std Spec

Part No	Description	Std Spec
M70342	EXPANDER 150mm - 200mm	1
M81630	CASCADE SYSTEM - 150mm - 2 BOILERS	1
M81631	CASCADE SYSTEM - 150mm - ADDITIONAL BOILER	2
M85271	EXTENSION - 80mm X 500mm	4
M85283	EXPANDER 80mm - 100mm	4
M87927	AIR INTAKE FILTER 80/125 CONCENTRIC	4
M70439	ROOF TERMINAL - 200mm	
M70322	EXTENSION - 150mm x 1000mm	
M70324	EXTENSION - 150mm x 2000mm	
M70402	EXTENSION - 200mm X 1000mm	
M70404	EXTENSION - 200mm X 2000mm	
M70411	ELBOW 200mm - 90°	
M70412	ELBOW 200mm - 45°	
M87196	WALL CLAMP - 150mm	
M87198	WALL CLAMP - 200mm	

11. CASKIT011

CASCADE FLUE SYSTEM FOR 4 APPLIANCES

MODELS
CPM 58 & CPM 77
EF80

200 mm HEADER – 200 mm FLUE

Maximum Equivalent Flue Length = 50 Metres (All Models)

Deduct 3.3 metres for each 90° Bend
 Deduct 1.5 metres for each 45° Bend
 Deduct 1.1 metres for each 1.0 metre of 200 mm dia horizontal length

Each Flue Kit includes all items marked as Std Spec

Part No	Description	Std Spec
M81632	CASCADE SYSTEM - 200mm - 2 BOILERS	1
M81633	CASCADE SYSTEM - 200mm - ADDITIONAL BOILER	2
M85271	EXTENSION - 80mm X 500mm	4
M85283	EXPANDER 80mm - 100mm	4
M87927	AIR INTAKE FILTER 80/125 CONCENTRIC	4
M70439	ROOF TERMINAL - 200mm	
M70402	EXTENSION - 200mm X 1000mm	
M70404	EXTENSION - 200mm X 2000mm	
M70411	ELBOW 200mm - 90°	
M70412	ELBOW 200mm - 45°	
M87198	WALL CLAMP - 200mm	

12. CASKIT012

CASCADE FLUE SYSTEM FOR 4 APPLIANCES

MODELS
CPM 96 & CPM 116
EF100 & EF120

150 mm HEADER – 200 mm FLUE

Maximum Equivalent Flue Length = 50 Metres (All Models)

Deduct 1.1 metres for each 150 mm 90° Bend
 Deduct 3.3 metres for each 200 mm 90° Bend
 Deduct 1.1 metres for each 150 mm 45° Bend
 Deduct 1.1 metres for each 200 mm 45° Bend
 Deduct 4.0 metres for each 1.0 metre of 150 mm dia horizontal length
 Deduct 1.1 metres for each 1.0 metre of 200 mm dia horizontal length

Each Flue Kit includes all items marked as Std Spec

Part No	Description	Std Spec
M70342	EXPANDER 150mm - 200mm	1
M81630	CASCADE SYSTEM - 150mm - 2 BOILERS	1
M81631	CASCADE SYSTEM - 150mm - ADDITIONAL BOILER	2
M87957	AIR INTAKE FILTER 100/150 CONCENTRIC	4
M70439	ROOF TERMINAL - 200mm	
M70322	EXTENSION - 150mm x 1000mm	
M70324	EXTENSION - 150mm x 2000mm	
M70402	EXTENSION - 200mm X 1000mm	
M70404	EXTENSION - 200mm X 2000mm	
M70411	ELBOW 200mm - 90°	
M70412	ELBOW 200mm - 45°	
M87198	WALL CLAMP - 200mm	

13. CASKIT013

CASCADE FLUE SYSTEM FOR 4 APPLIANCES

MODELS
CPM 96 & CPM 116
EF100 & EF120

200 mm HEADER – 200 mm FLUE

Maximum Equivalent Flue Length = 50 Metres (All Models)

Deduct 3.3 metres for each 90° Bend
 Deduct 1.5 metres for each 45° Bend
 Deduct 1.1 metres for each 1.0 metre of 200 mm dia horizontal length

Each Flue Kit includes all items marked as Std Spec

Part No	Description	Std Spec
M81632	CASCADE SYSTEM - 200mm - 2 BOILERS	1
M81633	CASCADE SYSTEM - 200mm - ADDITIONAL BOILER	2
M87957	AIR INTAKE FILTER 100/150 CONCENTRIC	4
M70439	ROOF TERMINAL - 200mm	
M70402	EXTENSION - 200mm X 1000mm	
M70404	EXTENSION - 200mm X 2000mm	
M70411	ELBOW 200mm - 90°	
M70412	ELBOW 200mm - 45°	
M87198	WALL CLAMP - 200mm	