

3. Extract and Fresh Air rates calculations

The Main Kitchen extract air rate, has been calculated, in accordance with DEFRA Guidelines section 4.2.2 Thermal Convection Method.

The total cookline calculation is indicated on the flow rates data sheet

The above provides an extract airflow rate of $0.323\text{m}^3/\text{s}$

As the canopy is open at both ends and has a factor of 1.25

Therefore the calculated extract air rate is:- $0.404\text{m}^3/\text{s}$

However, to allow for some future increase in rating

An extract rate of $0.5\text{m}^3/\text{s}$ has been selected

The Pizza Oven Extract rate is specified in the manual of the manufacturer for the ValorianiUK 120 IGLOO W as $0.16\text{m}^3/\text{s}$

The fresh Air replacement rate is calculated as 80% of the extract air rate,

Therefore the fresh air replacement airflow rate is:-

$$(0.47\text{m}^3/\text{s} + 0.16\text{m}^3/\text{s}) \times 0.8 = 0.5\text{m}^3/\text{s}$$

System Static Pressure (in pascals) calculations are based on the design drawing, and are as per the following calculation sheets.

DUCT SYSTEM RESISTANCE Main Kitchen extract system

Section	Duct size - mm	Area	Length mtr	ζ	Volume m ³ /s	Velocity m/s	VP	Pa/m	Loss Pa
canopy					0.5				80
duct	300 x 300		3		0.5	6		1.5	
expanding bend 90° splitter	300 x 300 > 800 x 300			0.54	0.5	6	21.6		11.66
taper	800 x 300 > 800 x 475			0.325	0.5	2.2	2.9		0.94
ESP1 and 2					0.5				120
taper	800 x 475 > 500 x 475			0.05	0.5	2.2	2.9		0.145
taper	500 x 475 > 1200 x 600			0.635	0.5	2.2	2.9		1.842
carbon filters					0.5				60
taper	1200 x 600 > 550 x 550			0.07	0.5	2	2.4		0.168
FAN					0.5				
transform	230 x 550 > 300 dia			0.05	0.5	7.2	31.1		1.555
sound attenuator	300 dia				0.5				4
transform	300 dia > 600 x 400			0.35	0.5	7.2	31.1		10.89
exhaust louvre	600 x 400				0.5				34
									325.2

DUCT SYSTEM RESISTANCE Pizza Oven Extract System

Section	Duct size - mm	Area	Length mtr	ζ	Volume m ³ /s	Velocity m/s	VP	Pa/m	Loss Pa
inlet					0.16				8.21
duct	150 dia		0.5		0.16	8.6		6	3
bend 90°	150 dia			0.24	0.16	8.6	44.38		10.65
duct	150 dia		3		0.16	8.6		6	18
bend 90°	150 dia			0.24	0.16	8.6	44.38		10.65
duct	150 dia		4.7		0.16	8.6		6	28.2
sound attenuator	150 dia				0.16	8.6			5
duct	150 dia		0.5		0.16	8.6		6	3
fan entry				0.4	0.16	8.6	44.38		17.75
FAN	150 dia				0.16				
transform	150 dia			0.04	0.16	8.6	44.38		1.78
sound attenuator	150 dia				0.16				5
duct	150 dia		5.5		0.16	8.6		6	33
cowl	150 dia			1.25	0.16	15	146.02		182.53
									326.77

C661 Luisa's Cucina, Radcliffe Main Kitchen extract flow rate - thermal convection method

No	Description	size	Power	Area	Coefficient	Flow Rate m ³ /s
1	Silverlink 600 counter top griddle GS7/E	0.6m x 0.75m	7kW electric	0.45m ²	0.25	0.113
2	Silverlink 600 twin tank fryer DF66	0.6m x 0.6m	2x3kW electric	0.36m ²	0.35	0.126
3	Silverlink 600 pasta cooker, twin tank PB66	0.6m x 0.6m	2x3kW electric	0.36m ²	0.2	0.072
4	infil table	0.3m x 0.7m	n/a	0.21m ²	0.03	0.006
5	infil table	0.3m x 0.7m	n/a	0.21m ²	0.03	0.006
theoretical extract volume required						0.323
canopy factor - wall open both end						x1.25
specific extract flow rate required						0.404