

1. Ventilation Systems Description

1.1 Pizza Oven Extract Ventilation System

The pizza oven manufacturers specify an extract air rate of $0.16\text{m}^3/\text{s}$ for the Valoriani UK 120 Igloo W model

The DEFRA risk assessment for the pizza extract system, would indicate a low level of odour control, and with the high velocity, vertical exhaust at 1m above eaves level, odour control equipment is not deemed a necessity.

The pizza oven extract fan would be a Flakt Woods Estoc Targe (Powerbox) model 50-355-1, high temperature rated with the motor out of the airstream, and with an external pressure availability of 340pa, however, once the final ductwork route has been established, the system pressure should be recalculated, if different from the design drawing layout,

The fan should have a high temperature rated sound attenuator at the inlet and the outlet of the extract fan.

The fan should have an inverter driven speed controller.

Extract ventilation ductwork, would be stainless steel, double skinned with insulation between the 2 x skins.

The internal diameter of the ductwork system should be 150mm diameter, in order to maintain an in-duct velocity of min 8.5m/s

The connection to the top of the pizza oven would also include a counterbalanced air-dilution inlet damper.

The ductwork should include sufficient access/cleaning doors or removable cap ends, for internal cleaning of the ductwork system

The stainless steel ductwork system should be supported via the brackets specified by the manufacturers of the stainless steel ductwork.

The exhaust terminal, should be a high velocity (15m/s) vertical jet cowl, and be positioned at least 1m above the roof eaves.

The pizza oven extract system fan controller will be wall mounted and connected to the Carbon Monoxide safety panel

1.2 Main Kitchen Extract Air Ventilation System

The proposed cookline for the main kitchen comprises:-

One – Silverlink 600, 7kW griddle

One – Silverlink 600, 6kW twin fryer (2 x 3kW)

One – Silverlink 600, 6kW pasta cooker (2 x 3kW)

The thermal convection calculation for this equipment gives an extract air volume of $0.404\text{m}^3/\text{s}$ so to allow for a potential increase in capacity, the extract fan should be rated at $0.5\text{m}^3/\text{s}$ with an external pressure availability of 340pa, however, once the final duct route is established, this should be recalculated, if different to the design drawing.

The DEFRA risk assessment for the main kitchen extract system, indicates a high level of odour control is necessary, and so it is proposed to install the following odour control equipment:-

2 x Purified Air Ltd, ESP3000 modules, in double pass formation

1 x Purified Air Carbon Filter module with 6 x site safe carbon cassettes

The service/maintenance recommendations, supplied by the manufacturers, Purified Air Ltd, should be scheduled and regulated to ensure full odour control efficiency at all times.

The extract fan would be a Flakt Woods Estoc Targe (Powerbox) model 67-400-1, high temperature rated with the motor out of the airstream, and with an external pressure availability of 340pa, however, once the final ductwork route has been established, the system pressure should be recalculated, if different from the design drawing layout,

The fan should have a high temperature rated sound attenuator at the inlet and the outlet of the extract fan.

The fan should have an inverter driven speed controller., and should be connected to the Carbon Monoxide safety panel.

The extract canopy will be manufactured from 20swg 304 grade stainless steel, with a full perimeter condense drain channel, an extract plenum to the rear, fitted with standard stainless steel baffle type grease filters.

An insulated fresh air plenum to the front of the canopy with perforated stainless steel diffusers, to distribute fresh air into the kitchen.

The fresh air plenum would also have integral high temp rated LED lighting modules.

The main kitchen extract air ductwork will be manufactured in accordance with the HVCA DW172 specification, for commercial kitchens., with sufficient access/cleaning doors.

The ductwork should be 300mm diameter (or equivalent cross sectional area) to maintain an in-duct velocity of approx. 6.5m/s

Any extract ductwork within the bin store should be fire rated to 2 hours, by the application of FireMac FM120, in accordance with the FireMac specifications.

The exhaust louvre should be approx. 600mm x 300mm free are, for an exhaust velocity of 3m/s

1.3 Fresh (replacement) Air Ventilation System

DEFRA guidelines call for fresh replacement air ventilation, at a rate of 80% of the extract air, when carbon fuel is being utilized, and as the pizza oven is wood fired, fresh replacement air will be necessary, and the fresh air supply should be approx. $0.5\text{m}^3/\text{s}$.

The fresh air fan would be a Flakt Woods (Powerbox) model 50-355-1, with an external pressure availability of 340pa, however, once the final ductwork route has been established, the system pressure should be recalculated, if different from the design drawing layout,

The fan should have a sound attenuator at the inlet and the outlet of the extract fan.

The fan should also have an inverter driven speed controller.

The fresh air ductwork would be manufactured and installed in accordance with the HVCA DW144 specification, with access doors at each item of equipment.

The ductwork would connect to the fresh air plenum of the stainless steel canopy, with air being supplied to the kitchen via the canopy face, perforated stainless steel diffusers.

A standard G4 filter module, to prevent ingress of insects/dust should be positioned between the intake louvre and the fan.

The intake louvre should be approx. 600mm x 400mm free area, for an air intake velocity of $2\text{m}/\text{s}$.

The system should have an in-line electric heater battery, with fully integrated controls, that can raise $0.5\text{m}^3/\text{s}$ of air by 21°C

The heater should have a temperature/air pressure probe, to allow the heater to be activated when there is proven airflow, and to stop the heater from operating when a set duct temperature of $+20^\circ\text{C}$ is measured.

2.0 Carbon Monoxide Safety System

As the pizza oven is wood burning, and in addition to the fresh replacement air system, the kitchen should be fitted with a Carbon Monoxide (CO) safety system.

The system would comprise a wall mounted control panel, with a visual and audio alarm, to indicate high levels of Carbon Monoxide.

The panel should be mounted in the kitchen and include a 'sniffer' which constantly measures the air for Carbon Monoxide.

In the event that high CO levels are detected, and the kitchen is active with ventilation systems operational, a visual and audio alarm will sound, upon which the integrity of the extract fans should be checked. If the pizza oven extract fan has failed or faulted, then cooking should immediately cease, until the fan is repaired/replaced, and the main kitchen fan should remain in operation, until the audio/visual alarm has stopped, signalling the reduction of CO to safe levels.

If high levels of CO are detected when the kitchen is closed, the system will automatically activate the extract fans, until the CO level has returned to normal.

This should only occur if, for example, the pizza oven is left to 'burn down' at the end of a cooking shift.

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.

4.0 DEFRA Risk Assessment

A site survey was carried out on 14th September 2021, and all items on the DEFRA risk assessment form were investigated and assessed.

Pizza Oven Extract

Dispersion will be vertical, 1.0m above roof eaves, at over 15m/s so was scored **5**

Proximity of Receptors was assessed to be between less than 20m and receptors are both residential and commercial , it was subsequently scored **10**

Size of Kitchen falls into the small take-away bracket, less than 30 covers for indoor eating, and scored **1**

Cooking type is pizza etc, so was scored **1**

Total Score is **17** which falls into the 'low level' of odour control, and as the exhaust is vertical and high velocity, no odour control equipment is deemed necessary

Main Kitchen Extract

Dispersion will be low level, into rear access road, so was scored **20**

Proximity of Receptors was assessed to be between less than 20m and receptors are both residential and commercial , it was subsequently scored **10**

Size of Kitchen falls into the small take-away bracket, less than 30 covers for indoor eating, and scored **1**

Cooking type is pizza etc, so was scored **1**

Total Score is **32** which falls into the 'high level' of odour control, so grease filters in the kitchen canopy, double pass ESP modules to remove smoke/heavy particulates, and a carbon filter module to remove residual odours is required.

5. Fresh Air Ventilation Equipment details

Fresh Air Fan will be a Flakt Woods ePowerBox 50-355-1-

Data sheet enclosed, however system pressure estimated at 230pa, and will be re-calculated once final installation drawing completed.

Sound attenuators will be as manufactured by Northern Fans Ltd, and will be the equivalent to 2 x Diameter, (no internal pod) and indicated in the red box on the enclosed data sheets.

Heater Battery can be LPHW from the venues hot water boiler or mains electrical powered.

Data sheet not enclosed, as decision on power not yet made.

The heater should be sized to raise 0.5m³/s by 21°C which will allow for an ambient of -5°C

Filter Module will be manufactured to accommodate G4 filter panels as manufactured by Camfil Ltd.

Data sheet enclosed

6. Extract Ventilation & Odour Control Equipment details

Main Kitchen Extract Fan will be Flakt Woods Estoc Targe (powerBox 67-400-1)

Data sheet enclosed, however system pressure estimated at 340pa, and will be re-calculated once final installation drawing completed.

Sound attenuators will as manufactured by Northern Fans Ltd, and will be the equivalent to 2 x Diameter, (no internal pod) and indicated in the red box on enclosed data sheets.

ESP3000 modules (2 off) in a 'double pass' configuration, will be manufactured by Purified Air Ltd,

Data sheet enclosed

Carbon Filter Module will be manufactured by Purified Air Ltd, and each 600mm x 600mm x 600mm cube will comprise 3 x 200 x 600 x 600 site safe carbons

2 x carbon cubes in total

Data sheet enclosed

Pizza Oven Extract Fan will be Flakt Woods Estoc Targe (powerBox 50-355-1)

Data sheet enclosed, however system pressure estimated at 340pa, and will be re-calculated once final installation drawing completed.

Sound attenuators will as manufactured by Northern Fans Ltd, and will be the equivalent to 2 x Diameter, (no internal pod) and indicated in the red box on enclosed data sheets.

7.0 Cookline Equipment Data

ValorianaUK 120 IGLOO W

Silverlink 600, 7kW griddle

Silverlink 600, 6kW (2 x 3kW) twin fryer

Silverlink 600, 6kW (2 x 3kW) pasta cooker

8. Design Drawing

C661/1revA Kitchen Ventilation Design

Design Brief

for

Kitchen Ventilation Systems

at

**45 Churst Street West
Radcliffe
M26 2SP**

for

Luisa's Cucina Ltd

by

SWAN Projects

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