

ODOUR ASSESSMENT TO SUPPORT PLANNING
FOR KITCHEN VENTILATION SYSTEM

PREMISES REFERENCE – UNIT 33, Harpurhey District Centre,
Manchester M9 4DH



SPECIFIC GOVERNING DOCUMENTATION

‘CONTROL OF ODOUR AND NOISE FROM COMMERCIAL KITCHEN
EXHAUST SYSTEM’ – 5-9-18 APPENDIX 2

Prepared for SK Group

Project Reference SK-002

Rev A – Trading hours were 11.00 to 23.00 daily.

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1. INFORMATION ON PREMISES.

Premises is currently a restaurant/cafe. An application has been submitted for change of use to a pizza takeaway.

Proposed number of meals per day – 100.

Type of meal - Pizza

Method of preparation – hand formed pizza cooked in dry heat gas conveyor oven.

Proposed hours of operation – 10.00 to 24.00 Monday to Sunday

RISK ASSESSMENT – As Per Appendix 3

PREMISES – COOKED FOOD TAKEAWAY OUTLET

DISPERSION – Moderate – 10 pts – Discharge at 1m above local eaves level

PROXIMITY OF RECEPTORS – Close – 10 pts – Nearest Receptor within 20m

SIZE OF KITCHEN – Small – 1 pt – take-away.

COOKING TYPE – Medium – 4 pts – Gas fired pizza cooking.

TOTAL SCORE = 25

This corresponds to a requirement for High Level Odour Control,

Impact Risk	Odour Control Requirement	Significance Score*
Low to Medium	Low level odour control	Less than 20
High	High level odour control	20 to 35
Very high	Very high level odour control	more than 35

This is identified within governing documentation as:-

High level odour control may include:

1. Fine filtration or ESP followed by carbon filtration (carbon filters rated with a 0.2 - 0.4 second residence time).
2. Fine filtration or ESP followed by UV ozone system to achieve the same level of control as 1.

Our proposal is to use an ESP filter followed by a controlled ozone system.

2. PLANS AND DRAWINGS

Current drawings – Hattrell LLP Drg. No. C5343-A5-05 Rev. A and Drg. No. C5343-A5-06 Rev. A. It may be that these drawings will need modification based upon this odour assessment, due to the high SEFR (3.64m³/sec – see below) and the resultant fresh air requirement (3.01m³/sec)

3. PRE-FILTERS

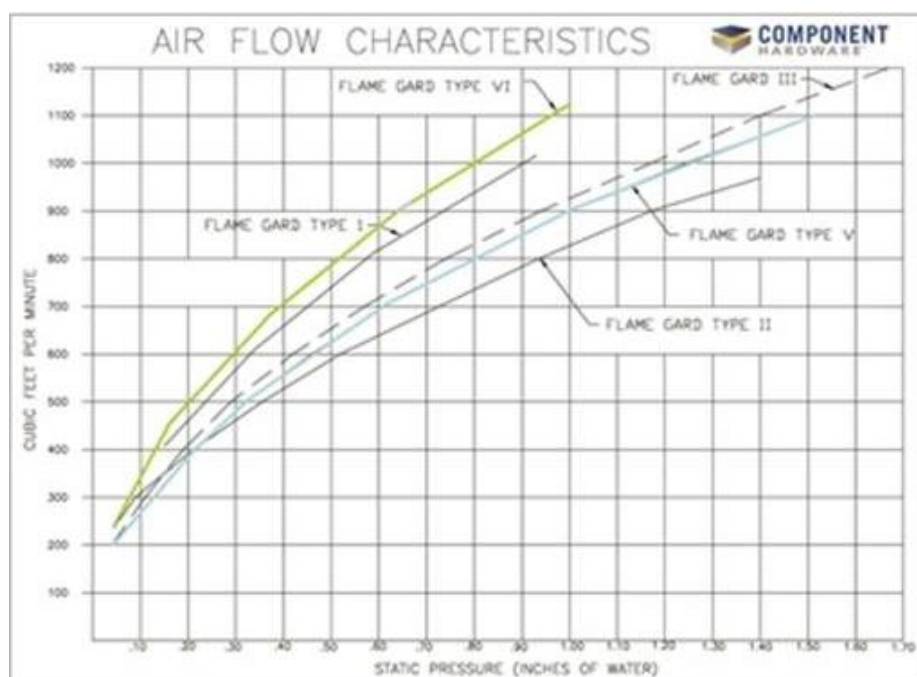
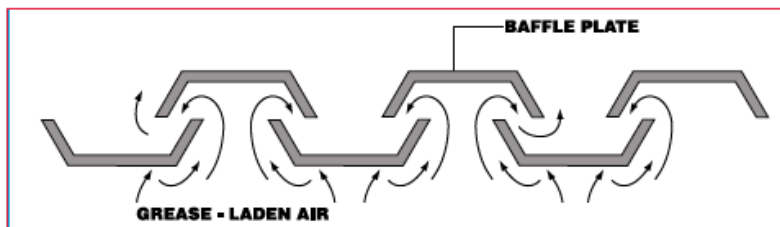
We have assessed the canopy as being a standard wall canopy with one filter bank at the rear of the canopy and one filter bank at the front of the canopy. This is due to the high SEFR calculated and therefore the number of filters required to accommodate this air flow.

12 No. stainless steel baffle filters – FLAME GARD TYPE III – size 495x495x45

The affluent from cooking processes contains aerosols of water vapor mixed with evaporated fat or oil. These are carried from the cooking surface by the moving air being drawn into the exhaust hood. Although small, each aerosol is much heavier than the air molecules surrounding it. Thus, when the air stream containing these aerosols strikes the Flame Gard® Baffle System, the inertial force of the moisture-grease aerosol is considerably greater than that of the air molecule. While the air molecule changes direction easily, the aerosol strikes the baffle with considerable force, causing it to “splatter” on the surface.

Whereas the heaviest aerosols, because of their greater inertial force, impinge on the surfaces of the baffles facing and perpendicular to the air flow, the lighter ones remain in the air stream. As the air stream is drawn through the baffle system, the restrictions in area created by the baffles cause the air to increase in velocity while changing direction by 180 degrees. Since the inertial force is a product of the mass and the square of the velocity, this increase in velocity serves to increase the inertial force of the remaining smaller aerosols, causing them to impinge on the inner surfaces of the baffles in the same manner in which the heavier aerosols impinged on the entering surfaces. The design of the baffle system provides several impingement surfaces and two rapid 180-degree direction changes. The grease slides down to the grease trough and then to the collection container.

Because Flame Gard® removes grease aerosols from the air stream and drain them away instead of retaining them. There is no build-up of grease in the path of the air Flame Gard® therefore, insures a constancy of air never before achievable with mesh-type filters.



Recommended cleaning canopy filters 2 to 3 times a week.

4. ESP

2 no. Single pass stacked Purified-Air ESP 4500E unit nominally rated at 2.1m³/sec (total 4.2m³/sec). This unit is preferred due to the inclusion of a dedicated oil sump for grease collection.

See accompanying Purified Air literature.

Electrostatic Precipitation (ESP) Filter Unit



ESP 4500

Max Air Volume	up to 2.1m ³ /sec
Dimensions	W1350mm H630mm D640mm
Weight	118KG
Power	40W

KEY FEATURES

- Eliminates up to 98% of smoke, oil and grease particles
- Filters particles down to sub-micron levels
- Produces Ozone to help reduce malodours
- Designed with an integral sump
- Modular in design
- Specifically designed for commercial kitchen application
- Energy efficient: – uses no more than 50W
- Greatly reduces grease build-up within the duct run.

Our Electrostatic Precipitators or ESP's have been specifically designed for kitchen extract systems and have integral sumps to collect the oil, grease and smoke particles filtered out of the exhaust.

This not only simplifies servicing but eradicates potentially dangerous spillage from the bottom of the units and greatly cuts down on buildups of grease within the ducting.

The ionisation voltage has been designed to run at a negative potential which enhances the ionisation of particles and also produces more ozone which is helpful in reducing cooking odours. Our ESP units fit in-line with the kitchen ducting and can be configured modularly to cope with all extract volume requirements.

5. PRE-CARBON FILTERS & CARBON FILTERS

Not applicable

6. ODOUR COUNTERACTANT OF NEUTRALISING SYSTEM

Not applicable

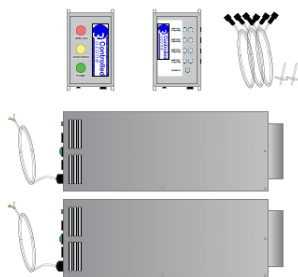
7. UV-C SYSTEM

We are proposing an Ozone Generator rather than a UV-C system (which generates ozone via an alternative method)

Proposed system Ecovery CMS 400 system with accompanying control panel and ozone monitor.

This system will generate ozone to accommodate up to 4m³/sec of extract air flow. The system incorporates monitoring technology which adjusts the amount of ozone being generated during the cooking process such that the level measured at the exhaust stays within World Health Organization guidelines. As such this system can be used in low level discharge scenarios where other UV/Ozone systems would need a heavy downstream carbon filter load to 'mop-up' any excess ozone.

CMS400



1 x Control Panel
2 x 20g Injectors
1 x Ozone Monitor
1 x Cable Pack

CMS400 Controlled Ozone Injector

- 10-40 grams per hour (0.9 to 3.8 m³/s capacity)
- Injector dimensions: 2x 450 x 155 x 155mm
- Weight: 2x 4kg
- Stainless steel casement
- Control box dimensions: 250 x 155 x 105mm
- Monitor dimensions: 250 x 155 x 105mm



Our Controlled Ozone System comprises of 1 Control Panel and between 1 and 4 Co Injectors to match the demands of the extraction system. The level of ozone being called off is indicated by the LED bulbs illuminated on the control panel, for example, with LED A and B on Injector 1 delivery is 20grams; LEDs up to A on Injectors 3 = 50grams etc.

CMS200 Injector 1 on its own

- A) Up to 1 m³/s ozone delivery is 10 Grams
- B) Up to 2 m³/s ozone delivery is 20 Grams

CMS400 Injectors 1 and 2 on

- A) Up to 3 m³/s ozone delivery is 30 Grams
- B) Up to 4 m³/s ozone delivery is 40 Grams

CMS SYSTEM

The Completely Monitored System

The Safe Intelligent Way to Harness the Benefits of Ozone to Control Cooking Odours

Ozone has long been recognised as a very effective medium for the neutralising of cooking odours, and injection into the kitchen extraction system has proven to be effective in the control of odour emissions, however, ozone emissions must be within safe levels.

Working within the accepted industry guidelines of 1 gram per 0.09 m³/s of air volume @ 1.5 seconds of dwell time within the ducts, to achieve neutralisation of 80% of cooking odours and maximum discharge levels of 0.3 ppm ozone concentration, the Controlled Ozone products are designed to be the first fully controllable, energy efficient, future proof units developed to reduce cooking odour emissions.

The monitoring processes of the CoRange start with the production levels of ozone being controlled via an electronic air-pressure sensor within the control panel, which controls the concentration ratio of air/ozone in the extract ducts.

To ensure the correct concentration the CoRange Injector will increase its output of ozone by 10 grams per every 1 m³/s of air volume within the duct,

Should ozone emissions from the extract system exceed permitted levels a second stage of control via a discharge monitor situated at the end of the extract duct is an optional addition, this monitor is factory set at 0.3 ppm of ozone to comply with HSE guidelines for discharge to atmosphere within 10 metres of the closest habituated premise.

Benefits

- Fully controllable by information gathered from both electronic air pressure switch and if required by ozone monitor
- Will deliver correct concentration of ozone from 0.8 to 8 m³/s of air flow
- Delivers low dwell times as it can inject active ozone into the system at the earliest possible opportunity
- Will not exceed permitted ozone discharge levels
- Can deliver ozone to multiple points within the extraction system to suit requirements ie. Plenum, ducts either before or after fans and inline filtration
- Easy to install
- Additional injectors can be added to the system easily
- Only uses power when it is required
- Control Panel can be sited away from injectors – in a position that is easy to view
- Outputs for Building Management Systems and Data loggers
- Two years warranty

ThMS System comprises of 1 off CMS\VM Control Panel and between 1 and 4 CMS Injectors to match the demands of the extraction system.

The level of Ozone being called off is indicated by the LED bulbs illuminated on the control panel, for example, with LED A and B on Injector 1 delivery is 20grams; LEDs up to A on Injectors 3 = 50grams etc.

Injector 1 on its own	A)	Up to 1 m ³ /s the ozone delivery is 10 Grams
	B)	Up to 2 m ³ /s the ozone delivery is 20 Grams
Injectors 1 and 2 on	A)	Up to 3 m ³ /s the ozone delivery is 30 Grams
	B)	Up to 4 m ³ /s the ozone delivery is 40 Grams
Injectors 1, 2 and 3 on	A)	Up to 5 m ³ /s the ozone delivery is 50 Grams
	B)	Up to 6 m ³ /s the ozone delivery is 60 Grams
Injectors 1, 2, 3 and 4 on	A)	Up to 7 m ³ /s the ozone delivery is 70 Grams
	B)	Up to 8 m ³ /s the ozone delivery is 80 Grams

To ensure that the levels of ozone being discharged are within guidelines the Co515 Monitor will cut the ozone production by 10g of ozone at a time until the monitor registers the desired ppm concentration of ozone at discharge.



CMS Ozone Injector

150 x 150 x 330 mm Stainless Steel Case
 2x 10 Gram per Hour Gaseous Ozone Reactors
 1x 5 Pin
 1x Power on Indicator Lamp
 1x Ozone Production Lamp



CMS / CoVM53 Control Panel

155 x 200 x 95 mm
 LED Indicator Lamps
 Electronic Air Pressure Sensor
 4x 5 pin Monitor Output Sockets
 1x 5 Pin CMS Output Socket
 1x 5 Pin Data Logger Output Socket



CMS / Co515 Ozone Monitor

155 x 200 x 95 mm
 1x Power on Indicator Lamp
 1x Monitoring Indicator Lamp
 1x Dwell Indicator Lamp

8. ODOUR COUNTERACTANT OF NEUTRALISING SYSTEM

Not applicable

9. COOKER HOOD

Proposed canopy size 3500 x 2000 x 500 with 2 extract filter banks to cope with high SEFR.

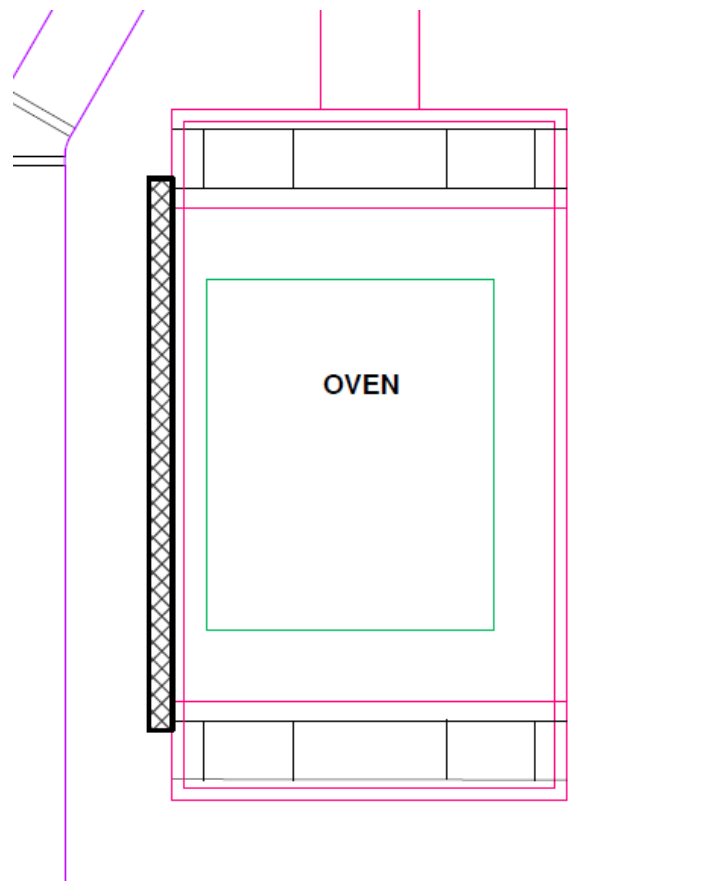
Canopy to be designed and manufactured to BESA Specification DW/172:2018 'Specification for Kitchen Ventilation Systems.

Specific Extract Flow Rate (SEFR) calculated at 3.64m³/sec using the Thermal Co-efficient Method as advised by DW/172:2018.

See accompanying SEFR calculation sheet for proposed cooking appliances.

Extraction via canopy with minimal overhangs for appliances below hood as dictated by DW/172:2018. In this case this would be 300mm from edge of appliance to outside 'active' edge of canopy.

Current canopy configuration as per client's current ventilation proposal drawing. Suggested filter bank arrangement would be one each along LHS and RHS internal perimeters as shown with 6 filters in each.



Face Velocity at filters – 1.8m/sec. At this velocity, the static profile of the filters should be checked such that it does not impact overall extract system static/ventilation design.

10. SYSTEM OPERATION

SPECIFIC EXTRACT FLOW RATE – $3.64\text{m}^3/\text{sec}$

VOLUME OF KITCHEN – With a nominal ceiling height of 2.4m AFFL, we would estimate 72m^3

EFFLUX VELOCITY – Discharge terminal via jet cowl to be sized to give an efflux velocity of 12-15m/sec.

11. FLUE DESIGN

As per current drawings – Hattrell LLP Drg. No. C5343-A5-05 Rev. A and Drg. No. C5343-A5-06 Rev. A. It is likely that these drawings will need modification based upon this odour assessment, due to the high SEFR ($3.64\text{m}^3/\text{sec}$) and the resultant fresh air requirement ($3.01\text{m}^3/\text{sec}$)

12. NOISE

Client has commissioned a noise impact assessment 'HOT FOOD TAKEAWAY, HARPURHEY PLANT NOISE ASSESSMENT Report 2860.RP.1.3 // 28 June 2023' by SUONO Ltd (accompanying this document) which has contributed to the acoustic treatment selection shown on the current client vent proposal drawing noted above. It is anticipated that a re-assessment of treatment may be required as plant size/selection may be changed to suit SEFR stated within this assessment.

Any noise assessment should also address noise generated by other external plant items.

13. MAINTENANCE

ESP should be serviced every 6 months by approved specialist contractor.

Maintenance of kitchen extract fan as per manufacturer's O&M information – every 6 months by approved specialist contractor.

Ozone system to be maintained by an approved contractor every 12 months.

Canopy filters should be deep cleaned 2 to 3 times a week.

Ductwork to be cleaned every 6 months as a minimum to recognised industry standards – BESA TR/19.

REFERENCED DOCUMENTATION

EMAQ+ 'CONTROL OF ODOUR AND NOISE FROM COMMERCIAL KITCHEN EXHAUST SYSTEM' – 5-9-18

BESA 'SPECIFICATION FOR KITCHEN VENTILATION SYSTEMS DW/172 SECOND EDITION 2018'

BESA TR/19 'GUIDE TO GOOD PRACTICE. INTERNAL CLEANLINESS OF VENTILATION SYSTEMS THIRD EDITION 2019'