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Commercial Kitchen Report

Tom Brown,
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Manchester, M3 3BZ

Premier Commercial Kitchens Ltd does not accept liability for any matters arising outside the agreed scope of work.

Odour Risk Assessment

EMAQ guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems includes a risk assessment methodology for identifying the potential risk of odour impacts from commercial kitchen operations. The results of the risk assessment may then be used to determine a suitable level of odour abatement to be installed into a commercial kitchen.

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Risk Assessment for Odour

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

* Based on the sum of contributions from dispersion, proximity of receptors, size of kitchen and cooking type:

CriteriaScore	Score	Score	Details
Dispersion	Very poor	20	Low level discharge, discharge into courtyard or restriction on stack.
	Poor	15	Not low level but below eaves, or discharge at below 10 m/s.
	Moderate	10	Discharging 1m above eaves at 10 -15 m/s.
	Good	5	Discharging 1m above ridge at 15 m/s.
Proximity of receptors	Close	10	Closest sensitive receptor less than 20m from kitchen discharge.
	Medium	5	Closest sensitive receptor between 20 and 100m from kitchen discharge.
	Fair	1	Closest sensitive receptor more than 100m from kitchen discharge.
Size of kitchen	Large	5	More than 100 covers or large sized take away
	Medium	3	Between 30 and 100 covers or medium sized take away.
	Small	1	Less than 30 covers or small take away.
Cooking type (odour and grease loading)	Very high	10	Pub (high level of fried food), fried chicken, burgers or fish & chips.
	High	7	Kebab, Vietnamese, Thai or Indian.
	Medium	4	Cantonese, Japanese or Chinese.
	Low	1	Most pubs, Italian, French, Pizza or steakhouse.

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Dispersion

The risk rating for dispersion relates to the location of the discharge flue of the kitchen extraction system, and the flow rate of the exhaust air at the point of discharge.

The kitchen extraction system, and the flow rate of the exhaust air at the point of discharge.

The kitchen extract system terminates through a Jet cowl High level @14m/s near side of the building. Therefore, based on the information in Table 2, the risk rating for dispersion would be described as GOOD.

Proximity to Receptors

The risk rating for proximity to receptors relates to the distance from the point of discharge of the kitchen extraction system to the nearest sensitive receptor. Examples of high sensitivity receptors, as set out in the Institute of Air Quality Management (IAQM) Guidance on the Assessment of Odour for Planning (IAQM, 2018), include residential dwellings.

Residential properties rear to the commercial unit the application site will be within 20m from the flue; therefore, based on the information in Table 2, the risk rating for dispersion would be described as CLOSE.

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Size of Kitchen

The risk rating for the size of kitchen relates to the volume of food prepared by the kitchen, as described by the number of covers of a restaurant, or the size of a takeaway.

The unit in question will operate as a PUB/RESTAURANT; therefore, based on the information in Table 2, the risk rating for the size of kitchen would be described as MEDIUM.

Cooking Type

The risk rating for cooking type relates to the type of food prepared in the kitchen, and the cooking methods used.

The Restaurant will serve based on the information in Table 2, the risk rating for cooking type would be described as VERY HIGH.

Summary

A summary of the risk assessment and the total risk rating for the Pub/Restaurant is shown in Table 3. With regard to the significance scores set out in Table 1, the overall risk rating for the restaurant is High; therefore, the extraction system would require a HIGH level of odour control to mitigate the potential odour impacts at local sensitive receptors.

Criteria	Rating	Significance score	comments
Proximity or receptors	Close	10	Closest sensitive receptorless than 20m from kitchen discharge.
Kitchen size	Medium	3	Between 30 and 100 covers or medium sized take away
Cooking type	Very High	10	Pub (high level of fried food), fried chicken, burgers or fish & chips
dispersion	Good	5	Not low level but below eaves, or discharge at below 10 m/s.
Overall risk rating	High	28	Level of odour control required

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Odour Mitigation

The odour risk assessment has identified that the proposed Take away would require a medium level of odour control (see Table 3). The EMAQ guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems outlines that abatement systems offering a moderate level of odour control may include:

1. Fine filtration or electrostatic precipitator (ESP) followed by carbon filtration (carbon filters rated with a 0.1-0.2 second residence time); or

2. Fine filtration or ESP followed by UV ozone system to achieve the same level of control as 1.

In addition to the recommended mitigation measures above, canopy hoods installed above all cooking areas. The canopy hoods are fitted with washable grease baffle filters. Grease laden air passing through the filter is forced through direction and velocity changes, depositing grease on the vanes, which is then drained from the filter. The use of baffle filters, which typically have a grease removal efficiency of 65-80%, will help prevent contamination of the fine filters of ESP. Mesh filters are not recommended as they do not provide a flame barrier.

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The extract flow rate of the system should be sufficient to ensure a capture velocity at the extract canopy appropriate to the type of cooking to be undertaken. An adequate capture velocity will also help prevent untreated odour emissions due to leakage from the building, i.e. through doors and windows.

Conclusions

The odour risk assessment has identified that the Premise Would have a HIGH risk rating with regard to odour effects.

An odour abatement system consisting of fine filtration or an ESP followed by carbon filtration (with a 0. 1-0.2 second residence time) or a UV ozone system is recommended.

It is judged that there will not be a significant risk of odour impacts from the Restaurant of the extract system installed, as specified, a Low level of odour control is installed. There should be no constraints to the development with regard to odour.

References

Defra (2005) Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems.

EMAQ (2018) Control of Odour and Noise from Commercial Kitchen Exhaust Systems.

IAQM (2018) Guidance on the Assessment of Odour for Planning (V1.1).

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Further Additional details

The canopy will be a straight overhead wall mounted hood. Constructed of 430 grade stainless steel with ultrafine grains. The stainless steel will be designed with a plain polish.

The canopy hood will be located on the Ground floor in the kitchen area. Tapered Shape 2900 x 1200 metres long.

The extraction rate for the canopy Duty no less than 1.5 m3/s
5400 m3/h

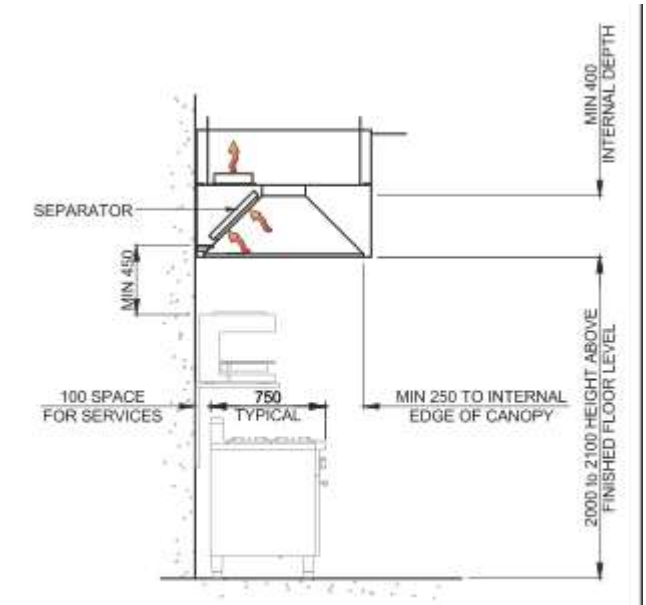


FIG 5b - TYPICAL CANOPY DIMENSIONS OVER SURFACE COOKING APPLIANCE SECTION THROUGH CANOPY

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Ductwork

The ducting will start form the Rear of the canopy hood going through the Building Leading Towards Premise rear terminating at a Jet cowl above ridge. The Internal extractor fan and ductworks are in accordance with HVCA Specification number DW /144.

Extraction Fan

The extraction fan installed is a CVAT/4-6000/450N D this Accompanied with 1x 1D Attenuator

Cleaning & Maintenance

Cleaning of baffle filters is to be twice per week along with Stage 2 pleated Filter to be changed every two weeks Rigid Bag Filter to be Changed every 3 months, a further in-depth clean of system every 6 months (TR19)

The velocity through the grease separators and grilles.	2.1m/s
The velocity in the ductwork and at the bell mouths.	14m/s
The supply and extract flow rates.	Extract 1.5m3/s
Ambient and air temperatures in the ductwork.	
Air flow rate through the canopy itself must be verified and not just at the fan as this does not take into account leakage throughout the system.	
The total pressure drop for the system.	422pA
Starting and running currents used by the fan(s).	
Sound levels in the kitchen	55dBa

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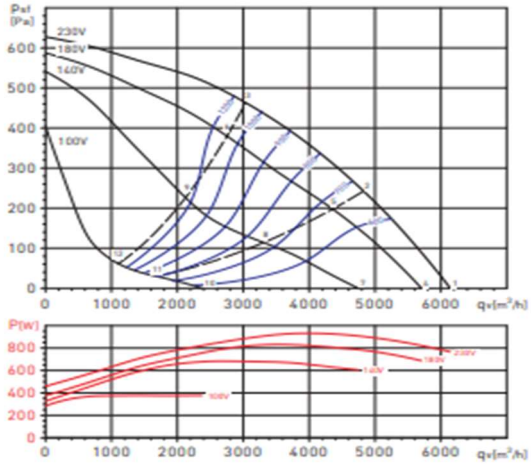
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EXTRACTION FAN DETAILS:

CVAB/4-6000/450N D



Working point		63	125	250	500	1000	2000	4000	8000	LwA
1	Inlet	41	60	66	68	67	65	62	51	73
	Outlet	45	59	65	67	68	63	57	47	73
	Break-Out	36	55	57	59	61	59	54	41	66
2	Inlet	38	60	66	67	67	64	59	50	73
	Outlet	40	58	63	66	69	64	55	46	72
	Break-Out	33	55	57	58	60	58	52	40	65
3	Inlet	38	58	63	66	67	64	52	59	72
	Outlet	38	54	60	64	67	64	56	48	71
	Break-Out	33	53	54	56	60	58	51	42	64
4	Inlet	40	40	65	67	66	64	61	49	72
	Outlet	43	38	63	65	62	67	56	45	71
	Break-Out	35	34	55	57	59	58	53	39	64
5	Inlet	37	38	63	65	65	63	57	47	70
	Outlet	39	37	61	63	61	66	52	43	69
	Break-Out	32	32	53	55	58	56	49	37	62
6	Inlet	36	36	60	62	63	61	55	46	68
	Outlet	36	36	58	61	61	64	53	44	68
	Break-Out	31	30	49	53	57	55	48	38	61
7	Inlet	38	55	62	63	62	61	57	44	69
	Outlet	41	54	60	61	63	59	52	40	68
	Break-Out	35	49	52	54	57	56	50	35	62
8	Inlet	33	52	58	59	59	58	50	39	65
	Outlet	35	51	56	58	61	56	46	36	64
	Break-Out	30	46	48	50	53	52	43	30	58
9	Inlet	31	47	53	55	57	54	48	40	62
	Outlet	32	49	51	55	59	55	45	36	62
	Break-Out	27	41	43	47	51	48	41	30	55
10	Inlet	31	45	51	53	53	53	40	31	59
	Outlet	33	46	48	50	54	48	37	30	57
	Break-Out	29	40	41	49	47	46	32	23	53
11	Inlet	26	43	48	50	50	47	36	30	56
	Outlet	29	44	46	48	52	44	35	29	55
	Break-Out	24	38	38	43	45	41	28	22	49
12	Inlet	24	41	45	47	47	43	31	36	52
	Outlet	26	42	44	47	51	44	34	29	54
	Break-Out	23	36	35	40	43	37	28	23	46

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Stage 1 – Baffle Filters

Stainless Steel Baffle Filters

APPLICATIONS
Suitable for use in all catering applications to remove airborne grease

OPERATION
It is universally recognised that there is an increasing need to maintain and improve hygiene standards and reduce fire hazards within kitchens. The Baffle Grease filter accomplishes both needs through its clever design of interlocking baffles that provide a tortuous route for the passage of air through the filter by creating two rapid 180° air direction changes simultaneously. The grease molecules having a far greater inertial force than air impact themselves on the vanes

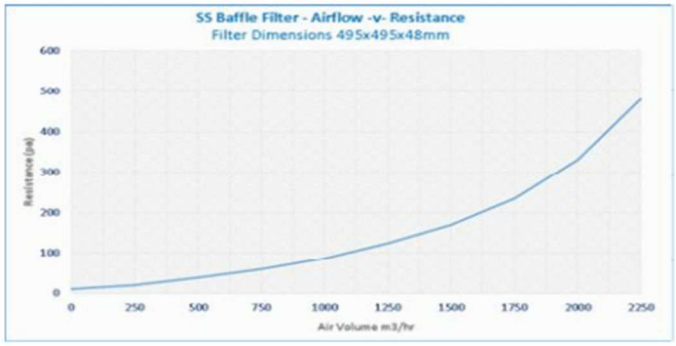
CONSTRUCTION
Robustly manufactured in stainless steel, a series of vertical vanes are housed in a channel frame with each of the baffles strategically aligned to provide the highest potential for grease removal. Due to the smooth nature of the vanes the grease naturally runs downwards through the drainage holes and into the collecting trays normally provided within the canopy holding casings.



- Consistent performance & long life
- Certified to DIN18869
- Robust construction
- Range of standard sizes
- Efficient removal of grease & oil

STANDARD RANGE (HxWxD)

495x495x48mm	395x495x48mm
495x395x48mm	495x245x48mm
595x595x48mm	



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Stage 2 – Fine Filtration

Fine Filtration Details:

Pleated G4 Panel Filter



- ISO Coarse 60% to ISO 16890
- Pre-filtration with low air resistance yet maximum protection
- Available in a vast range of sizes
- Bespoke sizes readily available
- Long life and robust construction
- Fully incinerable for easy disposal
- Made in Britain

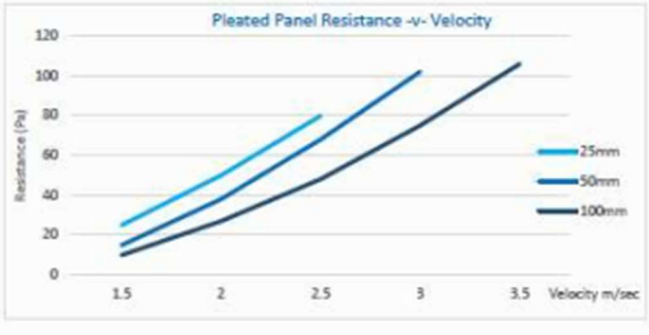
Applications

The G4 Pleated Panel is suitable for use as a prefilter for higher grades of air filtration or for use as a simple filter for general use within air handling systems where the use of glass-fibre is unacceptable.

Construction

The G4 Pleated Panel contains a core of pleated non-hygroscopic and hydrophobic fibrous media designed specifically for use in air filtration. The media is manufactured with a graded fibre density to ensure optimum and even dust retention combined with low initial resistance and is thermally bonded onto a galvanised steel support mesh for maximum physical stability. The aerodynamic pack is then fully bonded into a moisture resistant, rigid, white lined card frame and fitted with an airflow indicator.

Filter Reference	Nominal size (mm)	Rated Velocity (m/sec)	Efficiency rating (EN779)	Initial resistance at rated Velocity (pa)	Rated final resistance (pa)	Maximum Humidity	Maximum temp °C
FF-PL1	25	1.5	G3	25	250	80% RH	80
FF-PL2	50	2.0	G4	38	250	80% RH	80
FF-PL4	100	3.2	G4	78	250	80% RH	80



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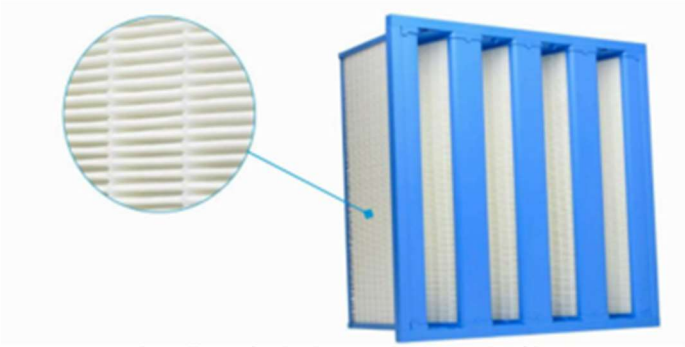
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PRODUCT DATA SHEET ePM1 55% F7 RIGID FILTER

APPLICATIONS

The ePM1 55% F7 Filter is designed for use in ventilation systems where a high standard of protection, combined with optimum energy efficiency of HVAC systems is of paramount importance. Often used as part of a multi-stage filtration system, this range of filters is commonly applied in environments where consistency of performance cannot be compromised and highly effective protection of building occupants, critical processes & other ventilation system components, alongside outstanding filter service life is desired.

CONSTRUCTION



Several pleat-packs form the basis of the filter design, and these are packaged into a lightweight, yet robust frame. The filter media itself is manufactured to exacting standards and uses a mini-pleated construction, whereby separators allow a huge surface area to be presented to airflow, without compromising on dustholding capacity. This allows for high air volumes to be filtered at a consistent efficiency and a much-reduced resistance to flow. This design can deliver significant energy savings owing to the reduction in power needed to push air through the system. Where higher volumes of delivered air are to be prioritized, this can also be achieved without exceeding the rated filter capacity.

- ePM1 55% (ISO16890) / F7 EFFICIENCY (EN779:2012)
- HIGHLY ENERGY-EFFICIENT
- OPTIMISED FILTER DESIGN
- CONSISTENT MECHANICAL FILTRATION PERFORMANCE
- EXTENDED SERVICE LIFE
- MADE IN BRITAIN

Face size (mm)	Rated volume (m^3/hr)	Efficiency (ISO16890)	Efficiency (EN779:2012)	Initial resistance (Pa)	Final resistance (Pa)	Max. humidity (% RH)	Max. temperature (°C)
592 x 592	3400	ePM1 55%	F7	79	300	100	80
592 x 492	2720	ePM1 55%	F7	79	300	100	80
592 x 287	1700	ePM1 55%	F7	79	300	100	80

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Stage 3 – OZONE

Process Information

Oxidation using ozone and activated oxygen ions is used to treat odour emissions from commercial and industrial kitchen processes (DEFRA, 2005: Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems).

The OC1 has been specifically designed for use in commercial kitchens. The system injects ozone into the kitchen extraction canopy or associated duct work where it reacts with odours, which are oxidized in a chemical reaction, which results in the production of carbon dioxide and water vapour. The ozone itself is consumed during the process and is converted back into oxygen.



The benefits of purchasing an OC1 unit over traditional UV/Ozone systems are as follows:

- Compact, lightweight and quiet operation so is less obtrusive
- Quick and easy low cost installation
- Low capital and running costs – up to 50% less than traditional UVC systems
- Injection into ductwork – adding negligible back pressure to the system so requiring less energy to push air through the air handling system. This means less ductwork modifications
- The OC1 maintains efficiency as they remain outside of the air stream, they also require less maintenance and require less cleaning.
- Tested to EN13725:2003, CE Approved

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TECHNICAL INFORMATION

Ozone Output	24g/hr ozone output
Housing dimensions	300mm wide x 300mm length x 150mm height
Housing material	Stainless Steel powder coated white/grey
Duct work connection	100mm circular
Volume flow rate in ductwork	Up to 2m3/s per unit, subject to cooking odours.
Air residence time inside chamber	>0.1 seconds
Pressure drop	N/A
Weight of unit	5Kg approx.
Two individual Light Indicators	Green Power On / Green Ozone On
Electrical requirements	240V / 1 ph / 50/60Hz
Power requirements	168W
Safety	Built in Air pressure switch

INSTALLATION

It is recommended to locate the units with an injection point located closest to the source of odours (i.e. Canopy plenum or nearest accessible point on ductwork, in order to maximize dwell time. In any case the dwell time must be no less than 1 second.

The units in built air pressure switch is activated by the installation of the black three pined connector to the unit to the sensor lock connector.

MAINTENANCE

An optional service contract is available which entails a yearly inspection of the unit.
Please contact us for further information and pricing.

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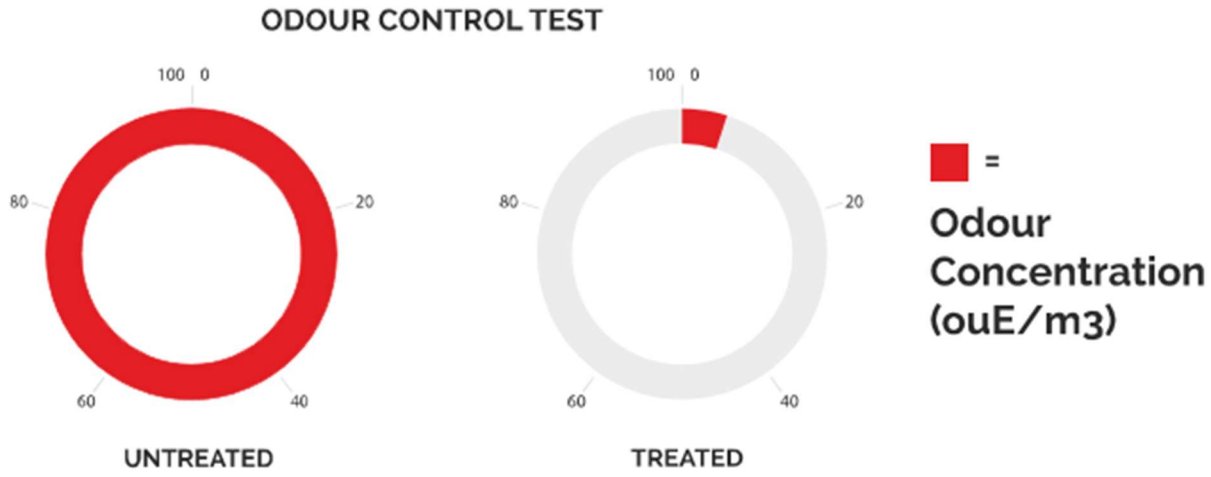
The OC2 has been specifically designed for use in commercial kitchens. The system injects ozone into the kitchen extraction canopy where it reacts with odours, which are oxidized in a chemical reaction, which results in the production of carbon dioxide and water vapour. The ozone itself is consumed during the process and is converted back into oxygen.

TESTING PROCEDURE

Independent tests were carried out using olfactometry. A number of individual contaminated air samples were taken and then examined.

During the tests foods with the following cooking odours (fish, garlic, onions, curry spices, bacon, burgers, various fried foods) were used in order to provide a varied and accurate results with both, with and without treatment with an OC2 unit.

Air samples which were treated with the OC2 unit, produced an odour reduction of up to 95%, for clear and easy to understand results we have shown this in terms of the graph/chart below.



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