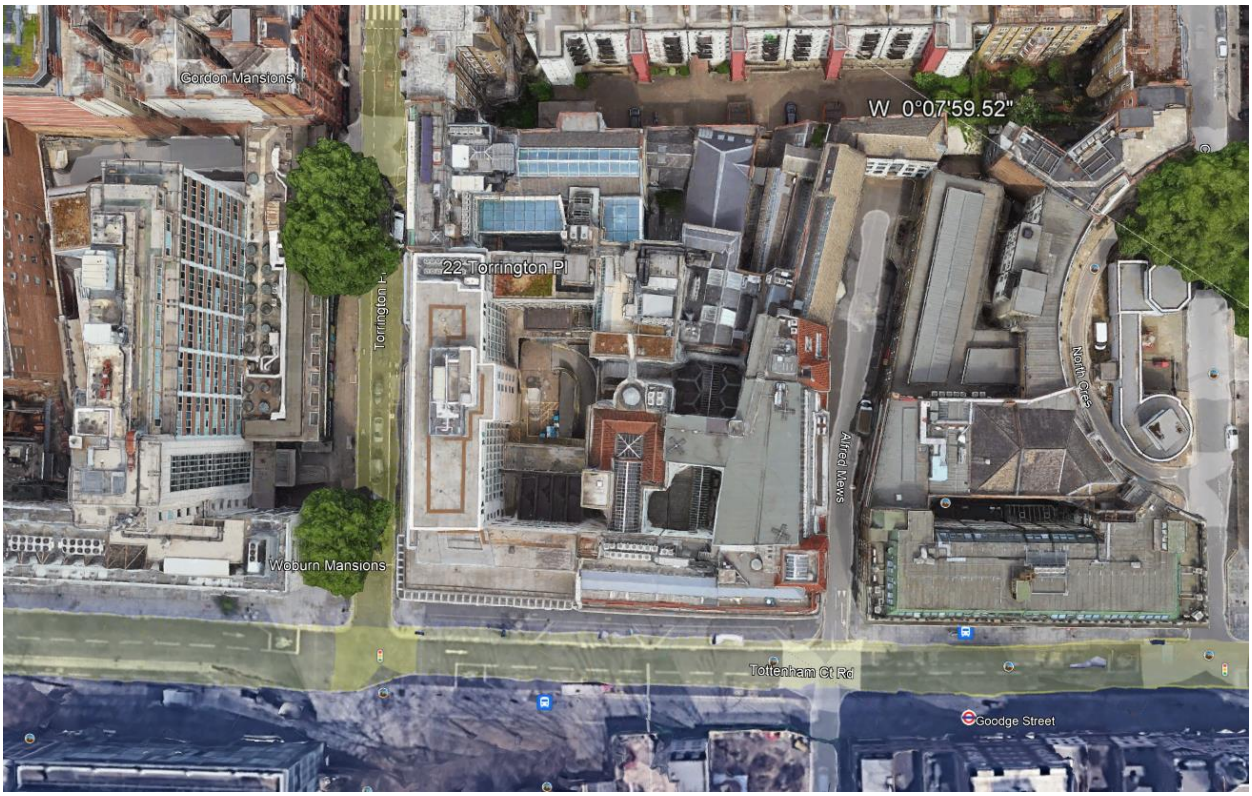
RISK ASSESSMENT FOR ODOUR & MAINTENANCE OF EQUIPMENT



Application Site: 22 Torrington Place London WC1E 7HJ

Proposal: Installation of new kitchen extract system with associated restaurant use

Our Ref: 24062

Date: August 2024

Planning & Architectural Consultants
For and on Behalf of ARCHPL Ltd.
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Control of Odour and Noise from Commercial Kitchen Exhaust Systems – EMAQ+

The following 'Risk Assessment for Odour' is derived from criteria outlined by EMAQ+ Guidance on the Control of Odour from Commercial Kitchen Exhaust Systems, which superseded DEFRA 2005.

This assessment has been undertaken to accurately score the site to EMAQ+ standards.

Odour control must be designed to prevent odour nuisance in a given situation. The following score methodology is suggested as a means of determining odour control requirements using a simple risk assessment approach. The odour control requirements considered here are consistent with the performance requirements listed in this report.

The guidance provides advice with respect to the various levels of odour control as follows.

Odour arrestment plant performance.

Low to medium level control may include:
1. Fine filtration or ESP followed by carbon filtration (carbon filters rated with a 0.1 second residence time).
2. Fine filtration followed by counteractant/neutralising system to achieve the same level of control as 1.

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.

Very high level of odour control may include:
1. Fine filtration or ESP followed by carbon filtration (carbon filters rated with a 0.4 to 0.8 second residence time).
2. Fine filtration or ESP followed by carbon filtration and by counteractant/neutralising system to achieve the same level of control as 1.
3. Fine filtration or ESP followed by UV ozone system to achieve the same level of control as 1.

The four main emissions that require removal from kitchen are:

- smoke;
- expanded air from the hot cooking processes;
- arisings generated by the cooking process, namely steam, grease and cooking odour; and
- exhaust fumes from direct fuelled appliances such as gas, charcoal and mesquite.

Odour Risk Assessment

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

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

Criteria	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 Dis-
	Good	5	charging 1m above ridge at 15 m/s

Criteria	Score	Score	Details
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
	Far	1	Closest sensitive receptor more than 100m from kitchen discharge

Criteria	Score	Score	Details
Size of kitchen	Large	5	More than 100 covers (several vendors)
	Medium	3	Between 30 and 100 covers or medium sized take away
	Small	1	Less than 30 covers or small take away

Criteria	Score	Score	Details
Cooking type (odour and grease loading)	Very high	10	Pub (high level of fried food), fried chicken, burgers or fish and chips
	High Me-	7	Kebab, Vietnamese, Thai or Indian
	dium Low	4	Cantonese, Japanese or Chinese
		1	Most pubs, Italian, French, pizza or steak-house

Based on the above significance score of 37, following should be implemented.

Very High Level of Odour Control for Kitchen Extraction Systems

This level will utilise four stages to reduce cooking odours and grease emissions.

Stage 1

Cyclone FR500 grease filters are used to block up to 75% @ 8 microns of airborne grease and flame from reaching the extraction system's plenum. This will ensure that only small organic particulates reach the extract ducts.

Stage 2

ESP – Electrostatic precipitators are used to separate solid or liquid particles from ventilation air. The particles distributed in the gas are electrostatically charged so that they stick to collection plates.

Stage 3

The use of controlled ozone/ion injection will break down the smaller organic particulates that pass through the grease filters and disperse them to the atmosphere in a form that will not register as an odour.

Stage 4

Daily cleaning of the FR500 type grease filters and following the maintenance regime set out below from Purified Air for the ESP and UV-O systems.

The guidance indicates that the proposed Restaurant would have a high odour potential, a high grease content and a high smoke content. It also indicates that there would be a heavy particulate loading and a moderate moisture content. The heavy loading on the system means that the face velocity at the canopy should be 0.5 m/s.

Maintenance Schedule

Cyclone FR500 grease filters collect 75% of the airborne grease @ 8 microns and offer a flame barrier to DIN 1889-5 standard.

Cleaning requirement – The filters should be removed from the canopy and placed in a dishwasher or cleaned manually. All grease deposits must be removed and the filter thoroughly dried before placing back into the canopy. **This procedure must be carried out daily.**

Purified Air Preventative Maintenance is as follows: -

Schedule of equipment: 1 x Purified Air ESP4500
1 x Purified Air UVO-1000 (10 lamp units)

Work to be carried out: ESP

Replace pre-filter, ioniser, collector and final filter (Those that are removed to be returned to the Purified Air stores for cleaning)

Drain off accumulated grease from filter compartment

Clean inside and outside of product with detergent

Check door sealing material

Check high voltage circuit

Check function of indicator lamps

Task: Service – every four weeks

UV-O System

Clean lamps/check ops

Replace lamps

Task: Service 2 x ESP4500 – every four weeks
Replace 2 x UVO filter – quarterly Re-
place 2 x UVO lamps – annually

Note that these frequencies are a 'best estimate' and may need to be amended

To ensure that the initial levels of odour, grease and flame control are maintained, it is essential that this programme is adhered to.

Should any changes be made to the equipment, cooking style or extraction configuration, odour / extract engineer should be notified to recalculate the risk.

These recommendations are based upon the EMAQ+ calculations and the information supplied by the projects M&E Consultant, including extraction and cooking equipment details.

Kitchen extract design volume calculation based on DW172 thermal convection method

Hood V.1

Item No	**Appliance**	**Plan Size (m)**	**Area**	Coefficient	No	Gas
1	Chinese Wok Range	1.05 x 1.00	1.050	x 0.78(CV)	1	0.82
2	Heavy duty deep fat fryer	0.410 x 0.740	0.3034	x 0.45	1	0.136
3	Stock Pot Stove	1.30 x 0.70	0.910	x 0.25	1	0.2275
4	Rice Cooker	0.970 x 0.840	0.8148	x 0.20	1	0.16296

Theoretical Extract Volume Required = 1.346m³s

Canopy factor - overhead wall: 1.15

Specific extract flow rate required: 1.346 x 1.15 = 1.54 m³s

Supply flow rate @ 85% of the extract flow rate = 1.31 m³s

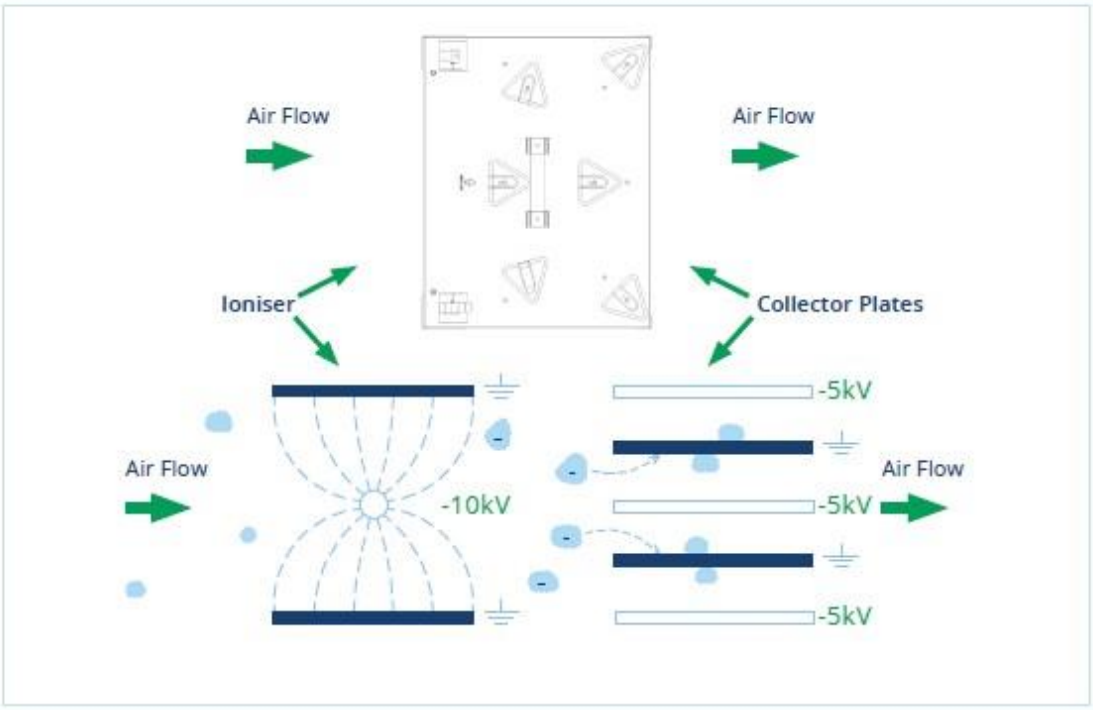
Our ESP Range

ESP 4500

- ESP 1500E which can handle up to 0.7m³/sec of air flow
- ESP 3000E which can handle up to 1.4m³/sec of air flow
- ESP 4500E which can handle up to 2.1m³/sec of air flow
- ESP 6000E which can handle up to 2.8m³/sec ofair flow

Our ESP's have been specifically designed for kitchen extract systems; they 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 build-ups 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.



The above diagram shows, in a basic visual, how an electrostatic precipitator works. As air passes into the combined ioniser / collector cell, the particulates in the air stream are polarised to a negative potential. As they continue through the ioniser and between the collector cell plates, the polarised particulates are repelled away from the negatively charged plates and attracted to the earthed plates where they stick and so are filtered out of the air flow.

Our ESP units fit in-line with the kitchen ducting and can be configured modularly to cope with all extract volume requirements.

1. Cooking particulates and odours
2. Canopy Grease Filter
3. ESP - Particulate Control Unit
4. Airflow

KEY FEATURES

- Eliminates up to 98% of oil, grease and smoke 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

3 ESP Units Stacked in modular formation

4 ESP Units Stacked in modular formation with a double pass

Technical Specification

	ESP 1500E	ESP 3000E	ESP 4500E	ESP 6000E
Electrical Supply	220/240V 50Hz	220/240V 50Hz	220/240V 50Hz	220/240V 50Hz
Power Consumption	20 Watts	30 Watts	40 Watts	50 Watts
Max Air Volume	up to 0.7m^3/sec	up to 1.4m^3/sec	up to 2.1m^3/sec	up to 2.8m^3/sec
Dimensions W/H/D	450mm/630mm/ 640mm	900mm/630mm/ 640mm	1350mm/630mm/ 640mm	1800mm/630mm/ 640mm
Weight	55Kg	85Kg	118Kg	153Kg

purified air® since 1984

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UV-O Range

Unlike other UV-C systems, our UV-O units are located outside of the kitchen extract duct and are connected via a spigot and spiral ducting.

KEY FEATURES

- **Easy to install**
- **Can be retro-fitted into existing duct**
- **Virtually no pressure loss**
- **No monthly maintenance needed**

Our UV-O range includes:-

- **UV-O 500 which handles up to 1 m³/sec of air flow**
- **UV-O 1000 which handles up to 2 m³/sec of air flow**

The UV-O 500 has been designed for smaller capacity commercial kitchens.

The UV-O range uses UV-C technology to produce ozone and hydroxyl free radicals to oxidise cooking odours through a process of ozonolysis.

Unlike other UV-C systems, our UV-O units are located outside of the kitchen extract duct and are connected via a spigot and small diameter ducting.

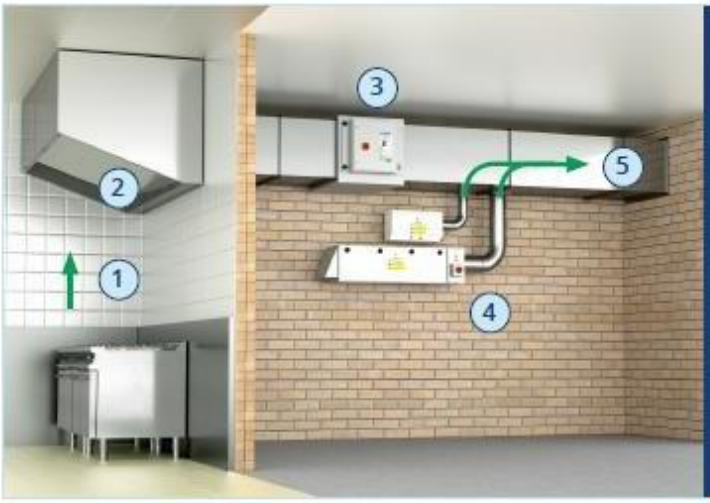
Although it is widely accepted that the best way to apply UV-C light is directly in-line with the air stream itself, performance will be impacted as the lamps get dirty.

With our UV-O units the air flow does not come from the exhaust duct but from the ambient air around the unit, which is filtered on entry. This means that it is able to provide a uniform supply of ozone and hydroxyl free radicals into the extract system with an extremely low pressure loss.

For optimum performance we would recommend between 2 & 6 seconds of dwell time to allow the ozone to work effectively upon the malodorous gasses within the duct.

UV-O 500 Unit

UV-O 1000 Unit



1. Cooking particulates and odours
2. Canopy Grease Filter
3. ESP - Particulate Control Unit
4. UV-O 500 (above)
   UV-O 1000 (below)
   Odour Control Units
5. Ozone joins airflow

Technical Specification

	UV-O 500	UV-O 1000
Electrical Supply	220/240V 50Hz	220/240V 50Hz
Power Consumption	140 Watts	700 Watts
Max Air Volume	up to $1m^3$/sec	up to $2m^3$/sec
Dimensions	W 605mm H 300mm D 200mm	W 1568mm H 350mm D 363mm
Weight	10.5Kg	50Kg

This unit's tried and tested UV-C technology allows for the siting of commercial kitchens in locations such as residential areas and shopping centres, where previously planning permission may not have been granted. After extensive research and development Purified Air are able to devise the best combination of lamps to provide the most effective odour control.

Safety

Ultra-Violet band C light is the most powerful of the three bands, it is a very strong oxidant and as such exposure to UV-C light is dangerous. To ensure safety the UV-C lamps are secured behind locked panels and the system has been engineered to shut down automatically when these panels are unlocked. However, since the lamps typically have a minimum life of twelve months and with the system able to operate at optimum efficiency even if one lamp fails it is unlikely that, apart from routine servicing by experienced engineers, that the system will ever need to be opened.

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CYCLONE VENTILATION

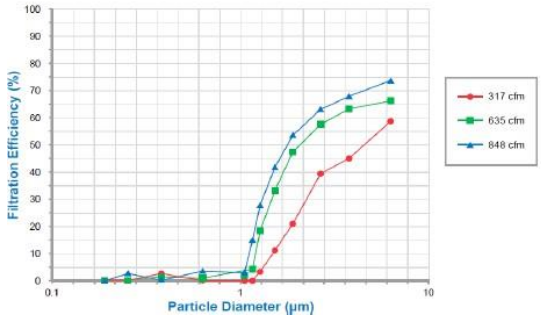
Applications
- Commercial Kitchens
- Water mist separation
- Spark arrestors
- Grease filtration

High Performance 75% Grease Filter Efficiency Baffle Filter
Cyclone FR-F-500 Fire Tested Grease Separator

- High Performance Baffle Filter 75% Grease efficiency at 8 micron
- 100% Flame barrier protection to DIN 18869-5
- Cut-safe safety edges and fully welded stainless steel construction
- Meets HVCA DW172 and insurance requirements
- Folding Handles and drain holes as standard
- Tested to American UL1046 and European DIN 18869-5 standards

CYCLONE VENTILATION

FR-F-500 Filter efficiency Data



Resistance to Airflow:

Airflow (m3/s)	Airflow cfm	Air Velocity (fpm)	Air Velocity (m/s)	Resistance (in. H2O)	Resistance (Pa)
0.075	159	67	0.290	0.04	9
0.112	238	84	0.435	0.09	22
0.150	317	114	0.580	0.16	41
0.150	318	114	0.580	0.16	41
0.187	396	140	0.725	0.26	64
0.200	424	153	0.775	0.30	74
0.225	476	171	0.871	0.37	93
0.300	635	229	1.161	0.68	168
0.300	636	229	1.163	0.68	168
0.375	794	286	1.452	1.07	265
0.400	848	305	1.551	1.22	304
0.500	1060	382	1.939	1.92	479