



Odour Assessment

Proposed Construction of a New McDonald's Drive Thru Restaurant at

Ashgrove Road West, Aberdeen AB16 5EH

28 March 2022

ENVIRONMENTAL AND
SUSTAINABILITY CONSULTANTS

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Executive Summary

Encon Associates were commissioned McDonalds to carry out an odour assessment in connection with the proposed new McDonalds restaurant and Drive-Thru off Ashgrove Road West, Aberdeen (the 'Site').

An assessment of odour from the proposed kitchen facility has been undertaken using the EMAQ Guidance on the Control of Odours and Noise from Commercial Kitchen Exhaust Systems¹.

Based on the risk assessment criteria, the proposed kitchen facility is identified as having a High Risk of producing odour impacts at adjacent receptors. To ensure an adequate level of odour control an extraction system will be installed within the kitchen incorporating the following features:

- A built-in Hi-Catch filter on all fryer and grill hoods to remove 98% of airborne grease at source
- Control of extract air volumes to within the effective grease removal range of the filters
- Extraction rates set to between 35 and 40 air changes per hour
- A Purified Air ESP 4500E electrostatic precipitator within the extract duct before the extract fan to remove grease and smoke particles
- A Plasma Clean Xtract 2100 Ozone injection unit within the extract duct before the extract fan to remove and neutralise odours
- Removal of extract air via an external vertical discharge flue located at roof level
- Backward curved centrifugal extract fan connected to extract system to ensure a high discharge velocity of 10-15 m/s to ensure effective dispersal of emissions into the atmosphere
- Location of discharge flue 0.9 m above roof level, approximately 2.3 m from the parapet wall that runs around the edge of the roof area to ensure effective dispersion without compromise from adjacent structures.

¹ EMAQ (2018) Control of Odour and Noise from Commercial Kitchen Exhaust Systems

In addition, an effective maintenance program will be implemented including regular cleaning of grill and fryer hoods, ducting, filters, ESP and Ozone units.

Based on the above extraction system and maintenance program it is considered that odour emissions will be effectively controlled, and no adverse effects will be experienced at nearby sensitive receptors.

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1 Introduction

1.1 General

Encon Associates were commissioned McDonalds to carry out an odour assessment in connection with the proposed new McDonalds restaurant and Drive-Thru on Ashgrove Road West, Aberdeen (the 'Site').

The Site falls within the district of Aberdeen City Council (ACC) within the centre of the City.

This report assesses odour impacts associated with the proposed development. Potential sources of emissions are identified and assessed in the context of the nature and location of receptors.

1.2 Scope of the Assessment

The application is for the construction of a new McDonalds restaurant providing both restaurant and Drive-thru facilities. A commercial kitchen will be included to serve both the restaurant and Drive-thru facilities. There is the potential for odour emissions to occur during opening times therefore an odour assessment has been undertaken in accordance with the updated guidance on the control of odour from commercial kitchen exhaust systems² to assess the potential for odour nuisance at nearby sensitive receptors and identify odour control measures which will be installed and adequately maintained within the kitchen facilities to prevent odour at adjacent properties.

The scope of the assessment has been agreed with Senior Authorised Officer Barbara Hill at ACC.

² EMAQ (2018) Control of Odour and Noise from Commercial Kitchen Exhaust Systems

2 Site Description

2.1 The Existing Site

The Site is the current location of the Rosehill Day Centre located on a parcel of land on the corner of Ashgrove Road West and North Anderson Drive. The Site is bounded to the west and south by Ashgrove Road West (minor road) and further to the west by North Anderson Drive A92 and further south by Ashgrove Road West A9011 (main road).

Land uses surrounding the Site include an employment building to the east and telephone exchange building to the north. Residential areas are located to the west of North Anderson Drive on Willowpark Crescent, further north beyond the telephone exchange at Woodhill Court and further north-east and east beyond the adjacent employment site on Castleton Way and Castleton Drive. To the south of Ashgrove Road West is Woodhill House occupied by ACC.

The location of the Site is shown in Figure 2.1.

Figure 2.1: Location of proposed development site



2.2 Proposed Development

2.2.1 Site Layout

The proposed application is for the construction of a new McDonalds restaurant with Drive-thru. The new building will include a 100-seated restaurant and commercial kitchen, with an additional external seating area to the east of the building. Parking for up to 51 vehicles (including 2 accessible bays and 2 reserve bays) will be located to the south of the building with the Drive-thru route traversing the building to the west and north exiting to the south onto Ashgrove Road West. Access to the Site will be via the same location on Ashgrove Road West.

An indicative site layout of the Site is shown in Figure 2.2.

The building will have a flat roof with parapet wall running around the edge of the building. The wall will be of varied height at 2200 mm above the dining area and 1650 mm above the back of house (kitchen and staff rest areas). All external extract and ventilation equipment will be located on the roof, with the kitchen extract system being located above the kitchen area as shown in Figure 2.2.

Figure 2.2: Indicative Layout of Site



2.2.2 Kitchen Facilities

The kitchen area will be located along the northern side of the building and will include the following equipment, as detailed in Figure 2.3:

- Large kitchen store with freezer and chiller
- Commercial counter refrigerator units
- 2 separate 4 x Vat friers with associated overhead VAT extraction Hood
- Dishwasher and washing machine
- Egg cooking equipment
- Single chassis grills with 2 x overhead grill hoods
- Muffin toasters, bun rack, protein steamer and hash brown trolley
- Drinks stations providing hot and cold drinks
- Ventilation and extraction system with odour control.

The kitchen extraction system will include the following odour control as a minimum:

- A built-in Hi-Catch filter on all fryer and grill hoods which removes 98% of airborne grease at source
- Extract air volumes controlled to within the effective grease removal range of the filters, established by tests carried out at the McDonalds testing facility in Rugby
- Extraction rates set to between 35 and 40 air changes per hour
- Removal of extract air via an external vertical discharge flue located at roof level, as shown in the indicative roof layout plan provided in Figure 2.4.
- Backward curved centrifugal extract fan connected to extract system to ensure a high discharge velocity of 15 m/s providing effective dispersal of emissions into the atmosphere
- Discharge flue located approximately 0.9 m above roof level, approximately 2.3 m from the parapet wall that runs around the edge of the roof area.

Effective maintenance is required to ensure any extract system works effectively and continues to remove odours from the extract air. The proposed system will include access doors at 3m intervals within the extract ductwork to allow for cleaning. All air filters will be changed quarterly in conjunction with six monthly cleaning of the ducting and six-monthly servicing. The effectiveness of the extract system will be monitored and the interval between cleaning of filters and ducting will be reduced if considered necessary.

Figure 2.3: Indicative Ground Floor Layout Plan

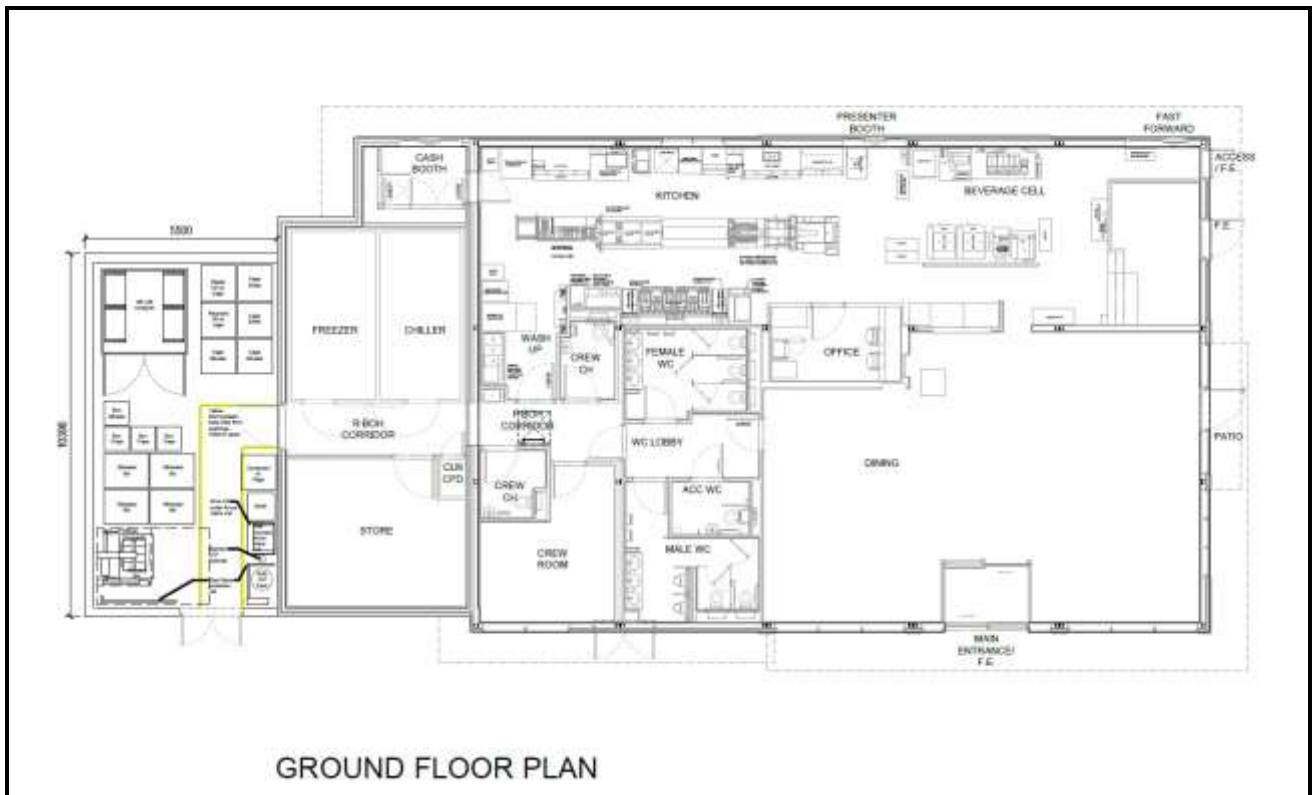
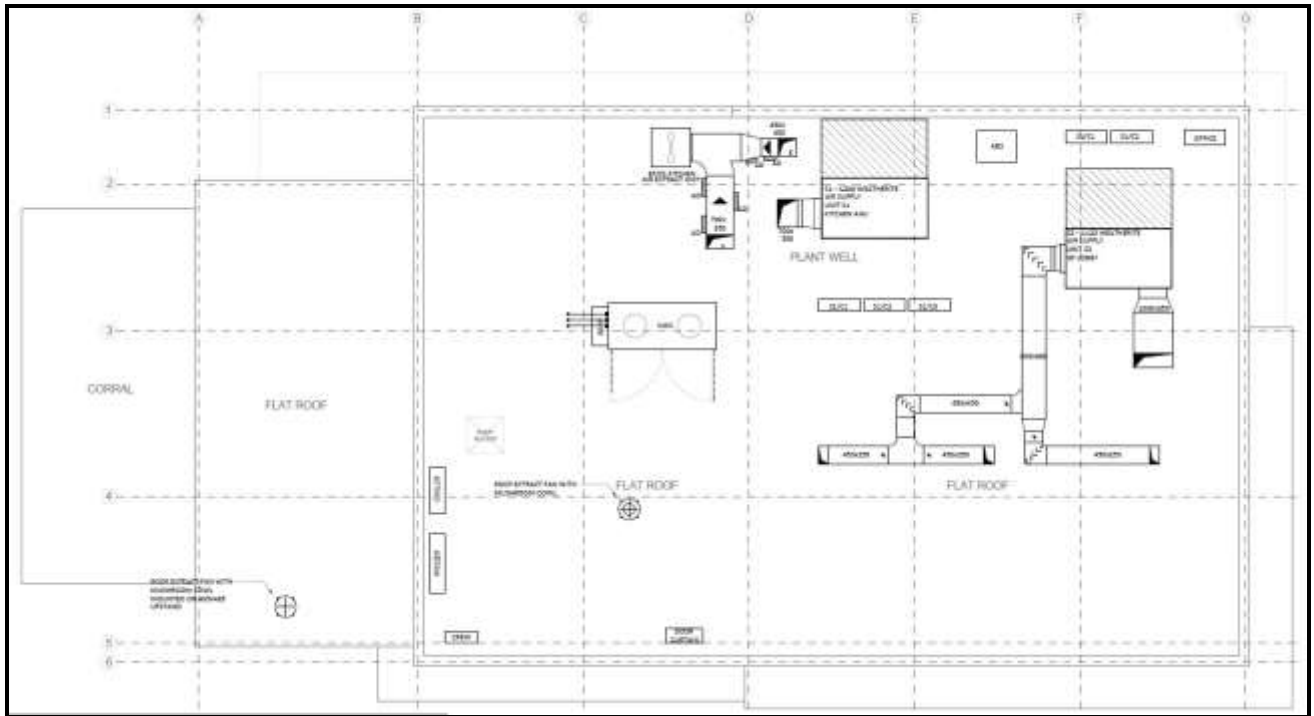


Figure 2.4: Indicative Roof Layout Plan



3 Policy Context

3.1 Environmental Protection Act 1990

Part III of the Environmental Protection Act (1990)³ contains the main legislation on statutory nuisance and allows local authorities and individuals to take action to prevent statutory nuisance.

Section 79 of the Act defines, amongst other things, dust, steam, smell or other effluvia emitted from industrial, trade or business premises so as to be prejudicial to health or a nuisance. Statutory nuisance is defined as:

- 'fumes or gases emitted from a premises so as to be prejudicial to health or a nuisance; and
- 'any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance.

Statutory nuisance is not intended to secure a high level of amenity but rather to act as a basic safeguard standard that is intended to deal with excessive emissions. The test for considering whether a process presents a statutory nuisance relies upon considering a range of factors including the character of the locality, the frequency, duration and intensity of the impact.

Local Authority Environmental Health/Environmental Protection Officers have a duty to inspect their districts from time to time for statutory nuisance. They also have a duty to investigate any complaint of an alleged dust nuisance from the public. Once the authorised officer has formed the view that a statutory nuisance exists, the local authority has a statutory duty to serve an abatement notice on those responsible for the nuisance, requiring the nuisance to be abated.

Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

3.2 Odour Guidance for Local Authorities

The Defra Odour Guidance for Local Authorities⁴ provides guidance on preventing, investigating and managing odours. Guidance on odour assessment and control for facilities regulated under the Environmental Permitting Regulations 2010 is contained in the relevant Sector and Process Specific

³ Secretary of State, The Environment Act 1990 HMSO

⁴ Defra (2010) Odour Guidance for Local Authorities

Guidance Notes and Horizontal Guidance documents. However, there are many other activities that fall outside these specific environmental regimes and 'odour' from these premises are 'regulated' by local authorities under the statutory nuisance provisions of Part III of the Environmental Protection Act (EPA) 1990. The aim of this guidance document is to provide a toolkit for local authorities to assist them in providing a consistent, effective and fair approach to their regulatory duties with regard to odours and therefore endeavors to:

- explain the basic properties of odour;
- explain the legal and regulatory framework for preventing and controlling odours;
- identify the most common sources of odour and the methods that can be used to investigate and assess them; and
- explain the administrative and practical control measures available to local authorities and to provide guidance on how best to implement the service.

3.3 IAQM Odour Guidance

On 20th May 2014 the Institute of Air Quality Management (IAQM) released guidance on the assessment of odour for planning⁵.

The guidance is for assessing odour impacts for planning purposes. It provides background information relating to requirements for odour impact assessments and suitable impact criteria and draws from other sources of information such as that described in EPR H4 horizontal odour guidance. It also sets out guidance on undertaking and reporting sniff tests to assess ambient odour levels arising from an identified source.

3.4 Guidance on the Control of Odour from Commercial Kitchen Exhaust Systems

Problems associated with nuisance odour from commercial kitchen exhausts are a common problem, particularly in urban areas where housing may be adjacent to a catering premises. The Control of Odour from Commercial Kitchens guidance document published by EMAQ in September

⁵ IAQM (2014) Guidance on the Assessment of Odour for Planning

2018 and which updates the 2005 DEFRA guidance, provides best practice techniques to minimise odour from kitchen exhaust systems.

The guidance provides a background into odour, the potential sources and effects of odour from kitchens and the regulatory roles is assessing and controlling odour. The document also sets out the best practice for the design and operation of commercial ventilation systems and the control of grease odour and noise emissions.

Appendix 3 of the Guidance sets out a risk assessment that can be used to identify the likelihood of odour nuisance occurring from a commercial kitchen facility and to assist in determining appropriate odour control requirements based on the operations carried out at the selected premises.

4 Methodology

4.1 Odour Assessment

4.1.1 Introduction

A risk assessment of the proposed activities has been carried out to identify the likely potential for odour to arise from the Site following the installation and operation of the restaurant and associated kitchen facilities.

Unlike other air pollutants, odour impacts cannot be easily monitored either at the point of emission or at the point of impact. Furthermore, odour impacts are highly subjective; a level of odour which can lead to complaints from one resident may be acceptable to a neighbouring resident. This makes it less straight forward to determine what level of emission is acceptable or what constitutes a significant impact. However, current guidance has been used to undertake the risk assessment and a level of professional judgement used to determine whether the proposed restaurant is likely to cause a significant impact at neighbouring properties.

The assessment is based on a desktop review of the proposed restaurant layout (Figure 2.2), the location of the restaurant in relation to nearby sensitive receptors (i.e. residential properties), the type of food being prepared, and any kitchen extract system being proposed.

4.1.2 Methodology

Odour Risk Assessment (EMAQ Guidance)

An odour risk assessment of the on-site catering facilities has been carried out according to the methodology given in the EMAQ guidance, as recommended in the Defra Odour Guidance for Local Authorities. A simple risk assessment has been undertaken using the criteria set out in Appendix 3 of the guidance, which is reproduced in Table 4.1 below. This provides an indication of the level of odour likely to occur from the on-site kitchen facilities and allows a significance score to be calculated based on the identified level of risk of odour impacts at adjacent receptors.

The significance score is used to identify the Impact Risk as set out in Table 4.2. The identified risk has been used to determine an appropriate extraction system to prevent odour effects at nearby receptors.

Table 4.1: Risk Assessment of Odour from on-site Kitchen Facilities

Criteria	Descriptive Score	Significance 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 below 10 m/s
	Moderate	10	Discharging 1 m above eaves at 10-15 m/s
	Good	5	Discharging 1 m above ridge at 15 m/s
Proximity of receptors	Close	10	Closest sensitive receptor less than 20 m from kitchen discharge
	Medium	5	Closest sensitive receptor between 20 and 100 m from kitchen discharge
	Far	1	Closest sensitive receptor more than 100 m 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, Indian.
	Medium	4	Cantonese, Japanese or Chinese.
	Low	1	Most pubs, Italian, French, Pizza or steakhouse.

Table 4.2: Odour Impact Risk and Level of Control

Impact Risk	Odour Control Requirement	Significance Score¹
Low to Medium	Low level odour control	Less than 20
High	High level of odour control	20 to 35
Very High	Very high level of odour control	More than 35

¹ based on the sum of contributions from dispersion, proximity of receptors, size of kitchen and cooking type, as set out in Table 4.1

5 Odour Risk Assessment

The proposed restaurant would provide up to 100 covers within the internal restaurant area. In addition, there would be additional seating externally and the drive-thru facility. The kitchen has therefore been sized to accommodate over 100 cover per day. As shown in the plan set out in Figure 2.2, the kitchen will be located on the northern side of the building with the extract system terminating at roof height with the discharge flue being approximately 0.9 m above roof level approximately 2 m from the 1650 mm high parapet wall.

The nearest residential properties are located 80-90 m to the west on Willowpark Crescent.

A risk assessment of the potential for odour to occur from the proposed kitchen facilities, carried out in accordance with the EMAQ guidance, is provided below in Table 5.1.

Table 5.1: Risk Assessment for Odour from Proposed Restaurant

Criteria	Descriptive Score	Significance Score	Details
Dispersion	Poor to Moderate	10-15	The kitchen extract flue would be located at roof level but would be located less than 1m above the roof level below the height of the adjacent parapet wall. However, emissions would be discharged vertically, and the discharge flue would be located over 2m from the parapet wall, allowing for free flow of the emissions plume without disruption from adjacent structures. Furthermore, the discharge velocity would be at between 10-15 m/s. Dispersion is therefore considered to be moderate based on professional judgement, however taking a cautious approach would indicate poor dispersion.
Proximity of receptors	Medium	5	The nearest sensitive receptors are approximately 80-90 m to the west
Size of Kitchen	Large	5	The restaurant will provide internal seating for 100, but would also provide external seating areas and a drive-thru, therefore the number of covers would be over 100

Criteria	Descriptive Score	Significance Score	Details
Cooking type (odour and grease loading)	Very High	10	The restaurant would serve a high level of fried food (i.e. chips) plus burgers
Total Score	High	30 - 35	Overall score indicates a high risk of odour at adjacent receptors.

Based on the risk assessment criteria (Table 4.1), the proposed kitchen facility is identified as having a High Risk of producing odour impacts at adjacent receptors. This is due to the size of the restaurant and the poor to moderate level of dispersion from the discharge flue.

5.1 Mitigation of Odour

As detailed in the EMAQ guidance commercial kitchen ventilation systems should meet certain minimum requirements to ensure they meet best practice design. Details of these criteria are set out in Appendix A, including those relating specifically to odour control. Where a high level of odour control is required the extract system should be fitted with fine filtration or ESP followed by carbon filtration with a 0.2-0.4 second residence time or a UV ozone system.

In conjunction with the extract and filter systems and maintenance programme detailed in section 2.2 the following will be included within the extract system to ensure adequate odour control to prevent adverse impacts at nearby receptors:

- A Purified Air ESP 4500E electrostatic precipitator within the extract duct before the extract fan to remove grease and smoke particles
- A Plasma Clean Xtract 2100 Ozone injection unit within the extract duct before the extract fan to remove and neutralise odours
- The UV unit will be maintained according to the manufacturers recommendations including cleaning of UV lamps and replacement of filters every 2 months, internal cleaning every 3 months and replacement of UV lamps every 12 months

Details of the ESP and Ozone units are provided in Appendix B and C. An indicative layout of the extract system incorporating ozone and ESP odour control is shown in Appendix D.

The proposed extract system would meet the requirements of the EMAQ guidance in terms of odour control and incorporates sufficient odour control to ensure prevention of odour effects at nearby sensitive receptors.

6 Conclusion

Encon Associates were commissioned McDonalds to carry out an odour assessment in connection with the proposed new McDonalds restaurant and Drive-Thru off Ashgrove Road West, Aberdeen (the 'Site').

An assessment of odour from the proposed kitchen facility has been undertaken using the EMAQ Guidance on the Control of Odours and Noise from Commercial Kitchen Exhaust Systems.

Based on the risk assessment criteria, the proposed kitchen facility is identified as having a High Risk of producing odour impacts at adjacent receptors. To ensure an adequate level of odour control an extraction system will be installed within the kitchen incorporating the following features:

- A built-in Hi-Catch filter on all fryer and grill hoods to remove 98% of airborne grease at source
- Control of extract air volumes to within the effective grease removal range of the filters
- Extraction rates set to between 35 and 40 air changes per hour
- A Purified Air ESP 4500E electrostatic precipitator within the extract duct before the extract fan to remove grease and smoke particles
- A Plasma Clean Xtract 2100 Ozone injection unit within the extract duct before the extract fan to remove and neutralise odours
- Removal of extract air via an external vertical discharge flue located at roof level
- Backward curved centrifugal extract fan connected to extract system to ensure a high discharge velocity of 10-15 m/s to ensure effective dispersal of emissions into the atmosphere
- Location of discharge flue 0.9 m above roof level, approximately 2.3 m from the parapet wall that runs around the edge of the roof area to ensure effective dispersion without compromise from adjacent structures.

In addition, an effective maintenance program will be implemented including regular cleaning of grill and fryer hoods, ducting, filters, ESP and Ozone units.

Based on the above extraction system and maintenance program it is considered that odour emissions will be effectively controlled, and no adverse effects will be experienced at nearby sensitive receptors.

Appendix A

Best practice for Design and Operation of Commercial Kitchen Ventilation Systems

Minimum ventilation rates

- An internal ambient air temperature of 28°C maximum.
- Maximum humidity levels of 70%.
- Internal noise level should be between NR40 – NR50.
- Dedicated make up air system to be approximately 85% of the extract flow rate.
- Minimum air change rate of 40 per hour (based on canopy and general room extraction).

Minimum Requirements For Canopy

- Velocity requirements
 - Light loading – 0.25 m/s (applies to steaming ovens, boiling pans, bains marie and stock-pot stoves).
 - Medium loading – 0.35 m/s (applies to deep fat fryers, bratt pans solid and open top ranges and griddles).
 - Heavy loading – 0.5 m/s (applies to chargrills, mesquite and specialist broiler units).
- Material of construction
 - A material that would comply with the food hygiene requirement is stainless steel.
- Grease filtration
 - Have a minimum performance the same as a baffle filter.
 - Be easy to clean

Minimum Requirements For Duct Work

- All ductwork should be Low Pressure Class ‘A’ and constructed in accordance with HVCA Specification DW/144[1] with a minimum thickness of 0.8mm.
- Duct velocities should be as follows:

-	Supply (m/s)	Extract (m/s)	
-	Main runs	6-8	6-9
-	Branch runs	4-6	5-7
-	Spigots	3-5	5-7
- All internal surfaces of the ductwork should be accessible for cleaning and inspection. Access panels should be installed at 3.0m centres and should be grease tight using a heat proof gasket or sealant.
- Duct work should not pass through fire barriers.
- Where it is not possible to immediately discharge the captured air, fire rated ductwork may be required.

Minimum Requirements For Fans

Fans must be capable of dealing with the operating static pressure within the duct work and should be designed with a minimum 10% pressure margin [note operating static pressure will increase throughout a maintenance cycle.

Backward curved centrifugal, mixed flow or axial flow impellers are preferred as they are less prone to imbalance and are more easily maintained/cleaned due to their open construction. Fixed or adjustable metal impellers with a robust and open construction should be used.

Fan motors should be rated to IP55 with no need to mount the motor outside of the air stream. For fans that have motors within the air stream and are ventilating cooking equipment that produce high levels of temperature and humidity the specification for the motor should be upgraded to withstand more onerous conditions.

Drainage should be provided.

Minimum Requirements For Odour Control

Objectives

- for new premises or premises covered by planning conditions restricting the impact of odour the system shall be designed to prevent harm to the amenity.
- for existing premises not covered by planning conditions restricting the impact of odour, the system shall be designed to avoid statutory nuisance and shall comply with the principles of Best Practical Means.

To achieve these objectives the odour control system shall include an adequate level of:

1. odour control; and
2. stack dispersion.

The overall performance of the odour abatement system will represent a balance of 1 and 2.

Discharge stack

The discharge stack shall:

1. Discharge the extracted air not less than 1 m above the roof ridge of any building within 20m of the building housing the commercial kitchen.
2. If 1 cannot be complied with for planning reasons, then the extracted air shall be discharged not less than 1 m above the roof eaves or dormer window of the building housing the commercial kitchen. Additional odour control measures may be required.
3. If 1 or 2 cannot be complied with for planning reasons, then an exceptionally high level of odour control will be required.

Odour arrestment plant performance

Low to medium level control may include:

1. Fine filtration or ESP following 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 odour control may include:

1. Fine filtration or ESP followed by carbon filtration (carbon filters rated with a 0.4–0.8 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.
4. Fine filtration or ESP followed by wet scrubbing to achieve the same level of control as 1.

Maintenance must be carried out to ensure these performance levels are always achieved.

Maintenance

Proprietors of commercial kitchens have a duty to ensure that the ventilation system serving the respective premises are maintained and operated effectively. Good maintenance is a prerequisite for ensuring that a system complies with Best Practicable Means under statutory nuisance provision and will form a key element of any scheme designed to minimise harm to the amenity under planning regulation. Good maintenance is required by the food hygiene

regulations and will also minimise the risk of fire. The recommended cleaning period for extract ductwork is:

- Heavy Use 12-16 Hours Per Day 3 Monthly
- Moderate Use 6-12 Hours Per Day 6 Monthly
- Light Use 2-6 Hours Per Day Annually

Recommendations for maintenance of odour control system include:

- System employing fine filtration and carbon filtration.
 - Change fine filters every two weeks.
 - Change carbon filters every 4 to 6 months.
- Use a system employing ESP and other in line abatement.
 - Clean every 2-6 months

Appendix B

Electrostatic Precipitator (ESP)

Electrostatic Precipitator



Manual Clean & Autowash System

purified  **air**[®]
providing a better environment

the ESP solution to grease and smoke pollution...

Local Legislation

Local Legislation requires increasingly that the amount of grease and smoke in kitchen exhaust fumes is reduced to lessen the nuisance of smells to the neighbourhood. Our ESP system gives the restaurant a clean, non-polluting image, while complying with local legislation.

Fire Risk Reduction

Grease build up in the ducting is significantly reduced with an ESP. This reduces the risk of fire in the ducts and fire spreading from the source to different parts of the building.

Efficiency

The ESP system is a very efficient means for removing particles and it can remove particles down to sub-micron size (0,01). When installed correctly, the unit can achieve an efficiency up to 98%.

Pre and After Filters and Oil Drain

Each unit is provided with standard mesh filters designed to protect the electrostatic filter section (Mesh filters are not provided with Autowash). We can also provide specialist oil demisters and other pre filters for different applications. The units are all fitted with a drip tray and an oil drain point to allow collected waste grease and oil to be drained away.

Installations

The ESP is installed inline in the ducting. The unit should be located as close as possible to the extraction hood to reduce grease build up within the ducting. This reduces the need for regular duct cleaning. If space is limited in the kitchen then the unit(s) can also be installed outside, upstream of the extraction fan. Several ESP units, stacked as modules, can be used as a central filter installation with a virtually unlimited capacity.

Pressure Loss

The ESP is characterised by a remarkably low pressure drop (120-190 Pa). The advantage is that existing extract fans often do not need to be replaced.

Maintenance

Only regular cleaning of the filters, ioniser and collector cells with warm water and detergent is needed. Purified Air offer a cleaning and maintenance service operating on an exchange system. This is a cost effective service available in the UK direct from the manufacturer and in other selected countries via our agents. Taking out a maintenance contract ensures that your system is in full working condition at all times. This assumes an appropriate maintenance frequency and professional cleaning. The maintenance of the ducting and any other filter present in the ducting can be reduced (lower frequency) because of the effectiveness of the ESP. Please also see optional Autowash system.

The Electrostatic Precipitator is suitable for the removal of all grease and odour emissions from commercial kitchens



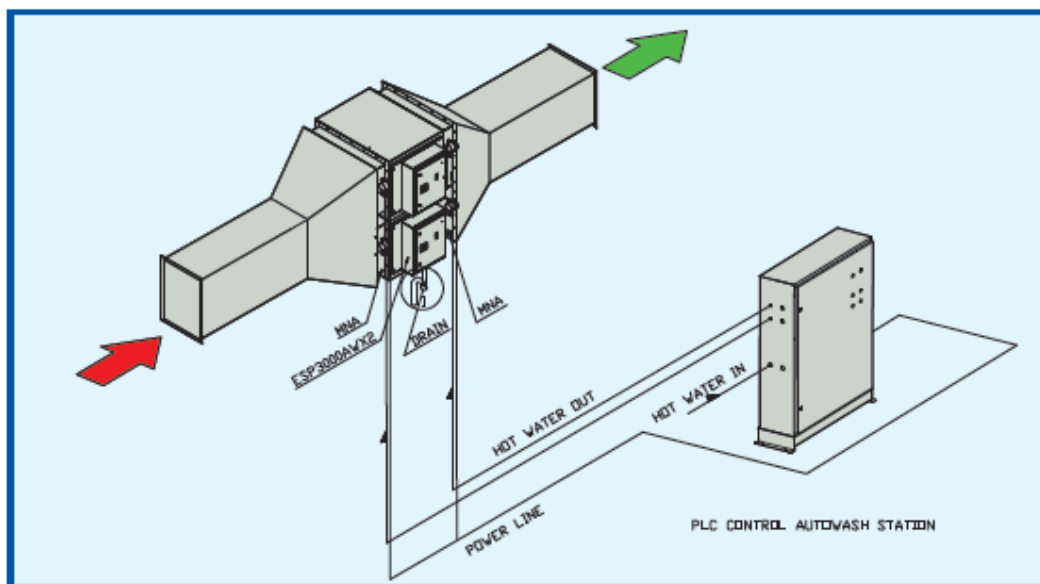
Any amount of grease and smoke can be eliminated. Purified Air has the complete solution for any kitchen or cooking method. The ESP system is supplemented by a number of other technologies manufactured by Purified Air designed to combat cooking odours, these systems comprise of UV-C, electronic and chemical neutralising and specially designed media and micro porous filters.

Solving kitchen emission problems

Kitchen fume problems are not exclusively about the nuisance of grease or exclusively about odours. Both problems need to be solved 'at source'. The ESP system is the second stage of a sacrificial system, the first being the canopy filters and the third being methods for gaseous or odour control. The ESP is part of a family of products designed to eliminate grease, smoke and odour problems from commercial kitchens. The duct-installed ESP systems trap the smaller grease particles and other contaminants that pass the grease filters in the cooker hood.

AUTOWASH option...

The Autowash system has been designed as a cost efficient alternative to the manual wash type. The process is designed to operate a daily program to ensure that the electrostatic components remain in a clean and serviceable condition. As the program operates daily not only are there significant savings with maintenance costs but as the components are in a near new condition the performance of the electrostatic filter will always be at optimum. As components become dirty during normal use the filtration efficiency reduces as the dirt on the collectors builds up to form insulation, this affect will be minimised with the Autowash process. It should be noted that the Autowash system will still require some periodical manual maintenance.



The design uses minimal, energy, water and detergent so the overall process is cost-efficient. The system is designed to operate during the period when the kitchen is closed. The wash cycle is controlled via a PLC module and has several stages as follows:

1. The ESP system and the main extract fan are switched off.
2. First detergent cycle.
3. First rinse cycle.
4. Second detergent cycle.
5. Second rinse cycle.
6. Drying stage using the main extract fan.
7. Finally the extract system and the ESP are reactivated so that they are ready to switch on for the next day of operation.

The ESP module has been redesigned so that all 2011 generation models onwards can incorporate the Autowash option. Any new generation unit can be converted to an Autowash system you simply need to add the MNA (motorised nozzle attachment) to each flange of the ESP. The flanges are pre drilled to mate up. Once this is done the unit is simply connected to an Autowash cabinet.

The Principle of Electrostatic Precipitators

The ESP units are used to clean the airstream of grease and hydrocarbons (smoke) in kitchen exhaust systems. They are highly efficient and can remove particulate down to sub-micron (0.01micron) size. The filter efficiency of up to 98% is attained during a single pass through the ESP, based on the charging of particles by an ionisation section which are then trapped on the earth plates in the collector cell. Larger particulate in the airstream can be removed by the pre-filter and lastly an after filter can prevent any re-entrainment of agglomerated grease on the collector and aids good air distribution.

The Autowash Modular System



ESP 1500 AW



ESP 3000 AW



ESP 4500 AW



AUTOWASH CABINET



INTERIOR OF AUTOWASH CABINET

The ESP Modular System



ESP 3000 E

All units can be used individually or combined for greater air flows.



ESP 1500 E



Two ESP 3000 E in modular format



ESP 4500 E

Construction

ESP air cleaners are precision engineered to current industrial standards.

The case is of galvanised construction, spot welded and fitted with heavy duty hinges and bolt-on door equipped with compression locks.

Industrial neoprene seals fitted all round.

The ESP range of units are designed so that the direction of airflow can be easily altered from left to right or right to left. A simple operation using basic tools and changing the legend sticker which can be carried out in about fifteen minutes.

Efficiency Achievable

Particulate Micron	Efficiency
0.01	up to 98%
0.1	up to 97%
10.0	up to 98%

Efficiency can vary with different particulate and air volumes.

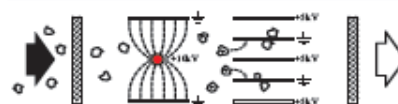
Maintenance

ESP air cleaners require only routine maintenance as all filter components are cleanable by means of steam, detergent, or pressure jet.* Autowash models are largely self cleaning but do still need periodic manual maintenance.

*excluding media filters where used.

Filter Technology

- 1 Pre-filter**
Eurovent Class 9
- 2 Ionisation section**
- 3 Collector section**
Eurovent class 9
Filter surface 15m² per collector
(ESP 1500E 15m²,
ESP 3000E 30m²,
ESP 4500 45m²)
- 4 Final filter**
Eurovent Class 9



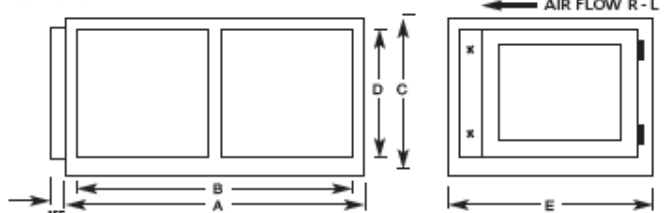
Standards

The ESP Units comply with current IEE, CE and other European standards, including the Health and Safety at Work Act. Rated to IP 53.

Controls

A separate enclosure houses the HT supply, and operation indicators. We can also offer remote control of the system and integrated plc fault reading which will text or send an e-mail if a fault is detected. Please discuss additional control systems when ordering or planning a project!

Dimensions



	ESP 1500	E	AW	ESP 3000	E	AW	ESP 4500	E	AW
A - Width	450mm	450mm	A - Width	900mm	900mm	A - Width	1350mm	1350mm	
B - Width	350mm	350mm	B - Width	800mm	800mm	B - Width	1250mm	1250mm	
C - Height	630mm	630mm	C - Height	630mm	630mm	C - Height	630mm	630mm	
D - Height	485mm	485mm	D - Height	485mm	485mm	D - Height	485mm	485mm	
E - Depth	660mm	860mm	E - Depth	660mm	860mm	E - Depth	660mm	860mm	

AW STATION.....	78kg								
AIR VOLUME MAX.....	2500m ³ /h	1500cfm		5000m ³ /h	3000cfm		7500m ³ /h	4500cfm	
ELECTRICAL SUPPLY.....	220/240V	50Hz	1ph	220/240V	50Hz	1ph	220/240V		
POWER CONSUMPTION.....	30W			50W			50W		
WEIGHT.....	E = 55kg, AW = 68kg			E = 85kg, AW = 100kg			E = 118kg, AW = 138kg		
MIN/MAX WORKING TEMP.....	4/56°C			4/56°C			4/56°C		
MAX RELATIVE HUMIDITY.....	75%			75%			75%		

The design of cooking exhaust control systems varies. Different types of cooking and location have separate requirements and may require additional equipment. The equipment in this brochure is designed to be used in conjunction with other items of our manufacture. Purified Air Limited offer a free consultation service and will assist you with design, please discuss your project with us before selecting equipment.



purified air
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Installation of grease smoke and odour equipment must be made on the negative side of the fan and the systems must be switched via an interlock to ensure they are only operational when the extract fan is operational. If there is ductwork inside the premises on the positive side of the fan please ensure that it is completely sealed so as not to let fumes or odour control compounds back into the premises. In certain instances some equipment can be installed on the positive side of the fan but please discuss this with our technical department and ask them to provide a design statement to confirm that it can be done.

Appendix C

Plasma Clean Xtract 2100



Plasma Clean Xtract 2100

The Plasma Clean Xtract uses ozone - a well known disinfectant and odour neutralizer - which is released directly into the kitchen ventilation canopy. Here it immediately starts to act on cooking odours, grease and smoke.

Simple to install, with low maintenance and running costs, this versatile modular solution provides affordable and reliable odour control and grease reduction in one unit, making it the perfect partner for a wide range of cooking applications.

The compact and lightweight units have been designed for modern kitchens, where space is at a premium, and are an ideal solution for fast food bars, pubs and restaurants.

Plasma Clean Xtract versus conventional odour control solutions:

- Low capital and running costs
- Simple installation and maintenance
- No consumable chemicals
- Compact and lightweight
- Quiet operation
- Environmentally friendly
- Tested to EN13725:2003

Product Specification | Xtract 2100

Volume Flow rate	Up to 1 m ³ /s per unit
Power consumption	130 W
Power supply	230V/ 1 ph / 50Hz
Size HxDxL	307x185x343 mm
Weight	12kg
Safety	Circuit breaker 5A required Air flow proving switch installed Fan power supply interlock
Operation	Fully automatic

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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 Plasma Clean Xtract injects ozone into the kitchen extraction canopy where it reacts with odour, grease and smoke. These 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.

Compact and Lightweight

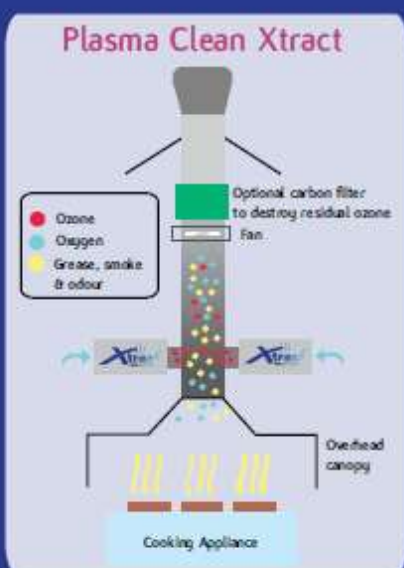
The unit has been designed to be compact (343mm(L)X185mm(D)X307mm(H)) and lightweight (12kg) so that it can be installed in kitchen areas where space is at a premium and / or where there is little load bearing capacity.

Installation

The unit has been designed to attach to the wall adjacent to the kitchen canopy. The outlet is then connected into the kitchen canopy and the unit is plugged in or hardwired into mains electricity (230V / single phase / 50Hz) via a main fan control box. Full installation and operating instructions are provided.

Silent Operation

The unit sits outside of the kitchen extraction canopy and ozone is drawn into the kitchen canopy by the existing fans. There is no need to upgrade the existing fan and the unit operates silently.



Servicing

Plasma Clean recommends a yearly service to ensure efficient operation, and can offer a planned maintenance contract.

Additional Options

A fan can be fitted in the unlikely event that the kitchen extraction fan can not draw air through the unit. A site survey option is available, as is a planned maintenance contract.

Plasma Clean is continuously improving its products and services and reserves the right to alter designs without prior notice.

Appendix D

Indicative Layout of Extract System including Ozone and ESP Odour Control

