@ ARCHITECT UK LTD

ARCHITECT . PROJECT MANAGER . INTERIOR DESIGNER

our Ref.: 15.0100

# Units 1a & 1b Gateway 36, Dearne Valley Parkway

## Operational Amenity Statement

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## BIN STORAGE

QFM have a generalised policy to use enclosed skips for refuse storage on drive thru sites

The typical type used is a 10yard Front End Loader – Fully enclosed and providing the equivalent of up to 8 x 1100ml bins. The refuse is usually collected and removed from site on a weekly basis or as necessary.

These skips are usually enclosed within a 1.8m high fenced area in order to obscure views into this area.

### 10yd FEL


### Details

The 10yd Front End Loader is the largest available FEL providing a capacity that can hold the equivalent of 6-8 1100l bins. These containers once placed cannot be manoeuvred.

The guide below is a brief overview of the waste types we accept for more information please click here

Dimensions: Length: 1.89m Width: 2.36m Depth: 1.37m

| Acceptable Waste | Unacceptable Waste |
|---|---|
| General Waste | Liquids |
| Industrial / Commercial waste | Hazardous Waste |
| Household Waste | Construction waste |

## KFC LITTER PLAN

1. KNOW THE AREA

The Restaurant manager is to assess the likely litter areas within the site, Local roads, Footpaths and parking bays. This is to be undertaken during the first four weeks following the restaurant opening date and is to be carried out by walking the site at 4 intervals throughout the day (On arrival, 11am, 2pm and 6pm) to assess the different needs throughout the day.

**This assessment will be taken from a minimum of 150metres in all directions**.

2. PLAN AND DOCUMENT

A litter patrol plan will be produced, however this is open to change should not all areas, which are affected by litter, be covered.

All litter within the KFC Boundary will be removed.

All litter within the immediate area around the restaurant; minimum of 10 metres will also be removed.

All KFC Litter (and where practical, other litter) will be removed within the litter patrol area, minimum of 100 metres from the restaurant or car park boundary.

**KFC litter will be the first priority if the area is heavily littered.**

3. IMPLEMENT CONTROLS

Sufficient crews will be scheduled to ensure that frequent litter patrols are carried out throughout both the day and night. During the winter nights more emphasis will be placed on the early morning litter patrols to enjoy crew safety.

The frequency and extent of litter patrols will be determined by the management assessment (section 1), However 3 per day will be a minimum.
In addition to the standard litter patrols, KFC also implement Quick litter picks (See Section 5).
**A copy of the litter patrol route will be on display for both management and crew reference.**

4. LITTER REVIEW

**A review of the litter patrol will be undertaken every six months following the first 4 week initial assessment.**

5. ACTIVITY / SITUATION

**Quick Litter Picks**

Quick litter picks during the hours of darkness.
The quick pick litter picks are to reduce the amount of visible litter to our evening customers and local residents.
Quick Picks are in addition to the current planned litter picks and can only be undertaken close to the store, where rubbish is easily accessible and visible and in lit areas. Waste bins that are close to the store may also be emptied.

6. ADDITIONAL INFO

RISK ASSESSMENT

**Hazard**

Serious injury could arise from contact with a motor vehicle.
Injuries could arise from tripping where pedestrian areas are not maintained.
Serious injury could arise if picking up sharp objects or syringes.
Serious injury could arise if member of the public becomes violent.

**Persons at risk**

Employees

**Controls to reduce risk**

- Quick pick litter picks are only carried out where employee safety is not compromised.
- Litter picking tool used to pick up hard to retrieve items or where item to be retrieved is not recognised or may not be safe.
- Chain Gloves available for use in areas of high risk of needle disposal
- High visibility vests available for use
- All litter picks planned and assigned to team members as a part of success routines and signed when complete
- Shift runner advised when litter pick to be undertaken.
- Full litter picks only undertaken in day light.

**Paperwork**

- All planned litter picks are detailed on the daily cleaning rotas and are signed by the person who is allocated the task and by the shift runner upon completion.
- Shift Runner Success Routines paperwork is held in the restaurant for three months.

**Litter picking equipment**

- Available from small wares supplier

**High visibility uniform**

- Available from uniform supplier

**Maintenance**

- Preventative maintenance and ongoing repairs for all exterior car parking, landscaping, drive thru lanes either leased or owned by KFC managed by Service Management Maintenance Company

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# Planning Consent Information

# Mechanical Ventilation & Environmental Control Equipment

## QFM LTD

## KFC Drive Thru Restaurant DEARNE VALLEY, BARNSLEY

# *INDEX*

# SECTION 1 : KITCHEN EXTRACT SYSTEM DETAILS

# DEFRA GUIDANCE ON THE CONTROL OF ODOUR AND NOISE FROM COMMERCIAL KITCHEN EXHAUST SYSTEMS

## ANNEX C : RISK ASSESSMENT FOR ODOUR

| CLIENT : | QFM LTD - KFC DRIVE THRU RESTAURANT, DEARNE VALLEY, BARNSLEY | DATE : | 2ND NOVEMBER 2015 |
|---|---|---|---|

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 REQUIRMENTS USING A SIMPLE RISK ASSESSMENT APPROACH. THE ODOUR CONTROL REQUIREMENTS CONSIDERED HERE ARE CONSISTENT WITH THE PERFORMANCE REQUIREMENTS LISTED IN THE MAIN DEFRA GUIDANCE REPORT THIS ANNEX IS DERIVED

| IMPACT RISK | ODOUR CONTROL REQUIREMENT | SIGNIFICANCE SCORE |
|---|---|---|
| LOW - MED | 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 |

SIGNIFICANCE SCORE IS BASED ON THE SUM OF CONTRIBUTIONS FROM DISPERSION, PROXIMITY OF RECEPTORS, SIZE OF KITCHEN, AND COOKING TYPE

| CRITERIA | DETAILS | SCORE | | SELECTION |
|---|---|---|---|---|
| DISPERSION | LOW LEVEL DISCHARGE, DISCHARGE INTO COURTYARD OR RESTRICTION ON STACK. | VERY POOR | 20 | 0 |
| | NOT LOW LEVEL BUT BELOW EAVES, OR DISCHARGE BELOW 10 METRES PER SECOND | POOR | 15 | 1 |
| | DISCHARGING 1 METRE ABOVE EAVES AT 10 TO 15 METRES PER SECOND | MODERATE | 10 | 0 |
| | DISCHARGING 1 METRE ABOVE RIDGE AT 15 METRES PER SECOND | GOOD | 5 | 0 |
| PROXIMITY OF RECEPTORS | CLOSEST SENSITIVE RECEPTOR LESS THAN 20 METRES FROM KITCHEN DISCHARGE | CLOSE | 10 | 0 |
| | CLOSEST SENSITIVE RECEPTOR BETWEEN 20 AND 100 METRES FROM KITCHEN DISCHARGE | MEDIUM | 5 | 1 |
| | CLOSEST SENSITIVE RECEPTOR MORE THAN 100 METRES FROM KITCHEN DISCHARGE | FAR | 1 | 0 |
| SIZE OF KITCHEN | MORE THAN 100 COVERS OR LARGE SIZED TAKE AWAY | LARGE | 5 | 0 |
| | BETWEEN 30 AND 100 COVERS OR MEDIUM SIZED TAKE AWAY | MEDIUM | 3 | 1 |
| | LESS THAN 30 COVERS OR SMALL TAKE AWAY | SMALL | 1 | 0 |
| COOKING TYPE (ODOUR & GREASE LOADING) | PUB (HIGH LEVEL FRIED FOOD), FRIED CHICKEN, BURGERS, OR FISH AND CHIPS | VERY HIGH | 10 | 1 |
| | KEBAB, VIETNAMESE, THAI OR INDIAN | HIGH | 7 | 0 |
| | CANTONESE, JAPANESE, OR CHINESE | MEDIUM | 4 | 0 |
| | MOST PUBS, ITALIAN, FRENCH, PIZZA OR STEAKHOUSE | LOW | 1 | 0 |

| SIGNIFICANCE SCORE | 33 HIGH |
|---|---|

# DEFRA GUIDANCE ON THE CONTROL OF ODOUR AND NOISE FROM COMMERCIAL KITCHEN EXHAUST SYSTEMS

## KFC ODOUR CONTROL EQUIPMENT SELECTION & METHODOLOGY

| | |
|---|---|
| EXTRACT AIR VOLUME RANGE (IN CUBIC METRES PER SECOND) | 2.80 MAXIMUM |

| SIGNIFICANCE SCORE RATING AND IMPACT RISK TAKEN FROM ASSESEMENT | VERY HIGH (36 AND ABOVE) |
|---|---|
| STAGE 1 | HALTON KSA 500 X 300 X 50 STAINLESS STEEL BAFFLE FILTERS INSTALLED WITHIN HALTON CAPTURE JET EXHAUST HOOD WITHIN KITCHEN |
| STAGE 2 | PURIFIED AIR LTD ELECTROSTATIC PRECIPITATOR MODEL ESP 4500 X 2NO. OR MODEL ESP 3000 X 3NO. DEPENDING ON INSTALLATION ARRANGEMENT |
| STAGE 3 | PURIFIED AIR LTD UV-C OZONE INJECTION MODULE MODEL UV-O-1000 X 3NO. |
| STAGE 4 | DUCTWORK CROSS SECTIONAL AREA TO BE SIZED TO ACCOMMODATE THE EXTRACT AIR SPEED COMBINED WITH THE LENGTH OF DUCTWORK AFTER THE UV-O-1000 CONNECTION OF 4 SECONDS |

| SIGNIFICANCE SCORE RATING AND IMPACT RISK TAKEN FROM ASSESEMENT | HIGH (20 TO 35) |
|---|---|
| STAGE 1 | HALTON KSA 500 X 300 X 50 STAINLESS STEEL BAFFLE FILTERS INSTALLED WITHIN HALTON CAPTURE JET EXHAUST HOOD WITHIN KITCHEN |
| STAGE 2 | PURIFIED AIR LTD ELECTROSTATIC PRECIPITATOR MODEL ESP 4500 X 2NO. OR MODEL ESP 3000 X 3NO. DEPENDING ON INSTALLATION ARRANGEMENT |
| STAGE 3 | PURIFIED AIR LTD UV-C OZONE INJECTION MODULE MODEL UV-O-1000 X 3NO. |

| SIGNIFICANCE SCORE RATING AND IMPACT RISK TAKEN FROM ASSESEMENT | LOW TO MED (LESS THAN 20) |
|---|---|
| STAGE 1 | HALTON KSA 500 X 300 X 50 STAINLESS STEEL BAFFLE FILTERS INSTALLED WITHIN HALTON CAPTURE JET EXHAUST HOOD WITHIN KITCHEN |
| STAGE 2 | PURIFIED AIR LTD UV-C OZONE INJECTION MODULE MODEL UV-O-1000 X 1NO. |

## 1.01 GENERAL

This specification covers standards for the selection, supply, delivery, installation, testing and commissioning of Kitchen ventilation in accordance with HVCA Specification DW/172 for Restaurant developments. The cooking of food involves appliances releasing heat, steam, fumes and airborne grease.

The cooking process requires extract ventilation for the removal of fumes, smoke and vapours generated by the cooking activity.

## 1.02 OBJECTIVES

To provide an acceptable working environment for all kitchen staff by the extraction / removal of heated air, fumes, steam and cooking smells, as well as preventing condensation. The extract canopies are designed to enable ease of access for cleaning throughout the system and distribution ductwork and primary fan equipment.

## 1.03 ODOURS

All fumes and odours from the food preparation areas of the kitchens shall be mechanically extracted utilizing an extract canopy specifically designed and installed by a nominated specialist to remove all cooking odours. This will take into account the dimensions of the kitchens in question, the type of grease filters used in the application and the cooking equipment within the grouped cooking range.

## 1.04 NOISE

All fan equipment, ductwork and filter housing shall be so mounted and installed so as not to give rise to a noise nuisance. Any noise generated by the extraction or supply systems as a whole shall not exceed the pre-existing hourly background noise level at nearby residential accommodation by more than 5dB(A). When measured and rated in accordance with BS 4142, entitled Method of Rating Industrial Noise Affecting Mixed Residential and Industrial Areas 1997

## 1.05 LOCATION

The canopies will be sited over the grouped cooking equipment, or any heat, steam or grease producing equipment.

## 1.06 SIZE

The canopies shall overhang the grouped cooking range by not less than 250mm and will be mounted at a height no lower than 2000mm from the finished floor level to the underside of the canopy.

## 1.07 FIRE SUPPRESSION (NOT APPLICABLE ON FREE STANDING BUILDINGS)

Were specifically required or instructed, an automatic fire suppression system will be installed to protect the cooking appliances, extract canopies and associated distribution ductwork. Fire suppression systems will be of the "Amerex" type, tested and approved to UL 300 specification with automatic and manual activation. Fire suppression systems will be designed, installed and commissioned by LPC1204 approved installers.

## 1.08 CANOPY CONSTRUCTION

The extract canopies shall be constructed from 18 swg (1.22mm thick) stainless steel type 304. All visible surfaces shall be ultra fine grain satin polished to 280 grit, and Polythene protected during installation. All constituent parts must be suitable for use in a working kitchen environment.

The canopies shall be cut, punched and folded into sub sections of up to 6000mm in length and factory assembled by means of computer controlled seam welds, and non visible mechanical fixings. All joints shall be formed to enable ease of cleaning with no cut edges or corners, which shall become an encumbrance to cleaning requirements. All metal edges shall be rolled smooth and shall be free from any sharp edges or projections.

The canopy lower edge at each end and the rear shall be formed into a condensation channel with inclined internal elevation to simplify cleaning requirements, the inner edges having crush folded safety finish.

When constructed, the canopies should be flush with sealing surface as should any ducting within the kitchen itself. This is to prevent the creation of a shelf which would permit the collection of dust etc. where this is not possible infill panels are to be fitted so there are no dust traps. All infill panel requirements shall be constructed from the same material as the canopy.

## 1.09 SPLASHBACKS

Stainless steel sheets of the same grade and polish finish should be fitted to the rear and side walls below the canopy. This should be, as a minimum, the width of the canopy and should be flush with the base of the canopy, the wall and down to the floor. All joints between the splashback, cooking equipment and the canopy should be sealed with a silicone sealant. Silicone sealant should be applied only when absolutely necessary to joints in a neat finish not protruding the metal surface. Silicone joints will not be accepted as an alternative for a welded or poor constructed joint.

## 1.10 LIGHTING

The canopies shall be fitted with vapour proof lamps suitable for use in damp atmospheres. The lamps should have a diffuser, which can also withstand high temperature. Recess lighting is preferred to bulkhead fittings. Lighting within the canopies shall provide a minimum of 500 lux at the working surface.

## 1.11 FAN EQUIPMENT

All fans are to adequately sized to overcome the system resistance and to provide the required extraction/supply rate specified. Multiple fans rather than single units should be used to reduce noise in instances when the system resistance is inherently high.

All fan motors are to be totally enclosed, air cooled, class F rated, with motor protection IP55. All single phased motors are to have "sealed for life" bearings. The fan motor should have an operating temperature of -40 deg. Cent. to +50 deg. Cent.

All fans will be provided with suitably rated on/off variable speed controllers, and all fan equipment having local isolators and emergency stops fitted adjacent to the applicable equipment. Fans should be fitted with necessary resilient mounting to prevent noise and vibration transfer to the kitchen, other unit rooms and the external environment.

The Contractor will ensure that the fans are capable of producing the required air volumes as specified. All fans and motors arrangements shall be capable of running at 10% over the maximum specified duty.

The Contractor shall ensure that fan motors are suitable for the electrical supply available to the building.

Casing mounted fans shall have internal vibration isolation. Duct mounted fans shall have flexible duct connections consisting of or be externally protected by material having a fire penetration time of at least 15 minutes when tested in accordance with BS 476 Part 8 and shall comply with BS 476 Part 7, Section 2, Clause 2.8 (Class 1 : surface of a very low flame spread properties).

Fans shall be selected to meet the specified noise criteria.

The construction of the fan shall be such that is capable of withstanding the pressures and stresses experienced under continuous operation.

Fan casings shall be constructed such that access can easily be gained to motors and impellers, and that these can be removed if required for maintenance or replacement.

## 1.12 GREASE FILTERS

The canopies should be fitted with internal extract plenum(s) with grease filters cells across its length. The filters should be of a sufficient size and number to ensure that the velocity through them does not lead to grease "carry over" into the ductwork and onto the extract fan.

The grease filters should have rigid frames in stainless steel baffle filters of sufficient density to capture and hold airborne grease. Filters shall fit correctly into holding frames to eliminate any extracted air passing around the filter.

The extracted fumes shall first be passed through these filters designed to remove the grease entrained in the fumes; the filters shall be removed and cleaned of their deposits at the end of each working day.

The grease filters should be easily removed and should be adequately sized to fit easily within dishwashers to facilitate easy cleaning.

The location of the filters should be such that it is not affected by the heat of wall mounted equipment, such as grills. This is particularly important with replaceable filter fittings, which carbonize at high temperature.

## 1.13 DISTRIBUTION DUCTWORK

Kitchen canopy exhaust ductwork shall be constructed and installed in accordance with HVCA Specification DW/172 and HVCA Specification DW/144. Ductwork shall be routed to external source in the shortest possible route, without excessive use of bends and horizontal ductwork installation.

Ductwork shall be suitable for kitchen extract systems, with smooth internal surfaces that facilitate easy removal of grease deposits.

## 1.14 PARTICULAR MAIN CANOPY ARRANGEMENT

The kitchen area shall have a mechanical forced air system, with a side-wall mounted canopy arrangement over the main grouped cooking equipment, and supply air system with spot coolers fitted to the underside of the canopy for the cooking operatives benefit. The extract system shall have an on/off speed controller sited away from the kitchen area to suit site and operatives requirements. The canopy shall be a "Capture Jet" type canopy with 10% of the overall extract air from the canopy, supplied through an insulated plenum fitted integrally to the canopy.

The supply air shall then be discharged through personal spot ventilators, with each spot coolers having internal volume control. The supply air to the canopy shall be from the primary packaged unit, with the remaining supply air to the kitchen also supplied by the packaged roof top unit. The supply directly to the canopy shall constitute 45% (85% room total) of the extract air volume to achieve a negative pressure within the kitchen area. The canopy shall be sited over the grouped cooking range of equipment as per tender drawings. The canopy arrangement shall be as follows:

a) 6300mm Long x 1500mm Wide x 600mm High. (Dimensions to be checked prior to site start)
b) Four sided outer valance casing.
c) The canopy lower edge at each end shall be formed into a condensation channel with inclined internal elevation to simplify cleaning requirements.
d) Full area horizontal ceiling plate, manufactured in tray form, fixed and sealed into the outer valance casing.
e) Full length single sided extract plenum, fixed and sealed to the canopy outer structure and complete with: -

   11 No. 500 x 330 x 50mm stainless steel baffle filters
   3 No. 500 x 300mm extract factory fitted duct connection collars.

f) 1 No. full length insulated integral make-up air plenum to introduce make-up air into the canopy and into the kitchen area, comprising:-

   6 No. 250 diameter supply factory fitted duct connection spigots
   Vertical discharge personal spot ventilators & Induction Slots
   Insulation to all internal surfaces of the supply plenum.

g) 3 No. 2 x 58 w fluorescent recessed luminaries manufactured to IP65, steam heat and grease proof to give an average level of illumination of 500 Lux upon the working surfaces.
h) Grease collection tray's
i) Full Length stainless steel splashback, 6300mm x 2000mm and side splashbacks of 1500mm x 2000mm.

   DUTIES: Canopy Extract volume 2.20 m3/sec. at a constant pressure drop of 140 pascals
   Canopy Supply volume 0.945 m3/sec. at a constant pressure drop of pascals.

   All duties to be checked against the manufacturers filter performance data.

## 1.16 PARTICULAR FRYER CANOPY ARRANGEMENT

The chip fryer in the kitchen area shall have a mechanically forced air system from an integral supply fan within the front of the hood. The extract system shall have an on/off speed controller sited away from the kitchen area to suit site and operatives requirements. The canopy shall be a "Capture Jet" type canopy with extract connections only to hood.

a) 1760mm x 1000mm Wide x 1680mm High. (Dimensions to be checked prior to site start)
b) Four sided outer valance casing.
c) The canopy lower edge at each end shall be formed into a condensation channel with inclined internal elevation to simplify cleaning requirements.
d) Full area horizontal ceiling plate, manufactured in tray form, fixed and sealed into the outer valance casing.
e) Full length single sided extract plenum, fixed and sealed to the canopy outer structure and complete with: -

   3No. 500 x 330 x 50 Stainless steel baffle filters
   2 No. 250 diameter extract factory fitted duct connection collars.

f) Grease drawers

   DUTIES: Canopy Extract volume 0.51 m3/sec. at a constant pressure drop of 85 pascals

   All duties to be checked against the manufacturers filter performance data.

NOTE : 85% of the air extracted from the kitchen shall be supplemented by supply air.

## 1.17 SUPPORTING DOCUMENTATION

TYPICAL KFC CANOPY DESIGN

# SECTION 2 : ODOUR ABATEMENT SYSTEM

## 2.01 GENERAL

As part of the KFC commitment to the brand, an odour control system will be installed to serve the kitchen extract system on the project.

## 2.02 ODOUR EQUIPMENT PARTICULARS

2no. ESP-4500-E Electrostatic Precipitator Modules.

3no. UV-O 1000 UV-C ozone injection system as supplied and commissioned by Purified Air Limited.

Mr Andrew James
Purified Air Limited
Lyon House
Lyon Road
Romford
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RM1 2BG
Tel. 01708 755414

## 2.03 SYSTEM DESCRIPTION

The first stage of the odour control system would be the grease baffle filters actually located within the extraction hood, which remove the large particles of grease and water vapour.

The second stage of the odour control system would be the 2no. stacked Electrostatic Precipitators which will be mounted in line with the air stream of the extract ductwork system. These remove small particles of grease and smoke as well as moisture from the exhaust air stream, thus reducing odours.

The final stage of the odour control system would be the UV-O ozone injection system which is mounted on the extract ductwork located externally in the rear yard area. The system is interlocked with the extract fan power supply so that it can only operate whilst the extract fan is running, as is the same for the Electrostatic Precipitators.

Under its own control, the UV-O system draws in fresh air from the immediate area, this passes through the unit and across the UV-C lamps, and injects ozone directly into the negative side of the extract fan ductwork. The ozone then breaks down any odour particles prior to discharge through the final duct outlet.

**How the Equipment Works**

Electrostatic Precipitation and its use for the separation of sub micron particles has been around since the late nineteenth century. The principle of operation is to impart a negative or positive electrical charge (Ionisation) to a particle. The particle is then passed between finely spaced parallel metal plates (average spacing 5-10mm) which are held at opposite electrical potentials. One plate will be charged to the same polarity as the ionised particle whilst the other will be earthed (opposite with respect to the positive/negative).

As the charged particle travels between the two metal plates it is forced away from the plate held at the identical polarity and drawn towards the earthed plate. During the path of travel the Parallel Effect takes place resulting in the charged particle becoming attached to the earthed plate due to the electrostatic difference, once attached the particle will either run off and be held in the sump or in the case of dry particulate remain suspended on the plate until cleaned off during maintenance.

The Electrostatic Precipitator is ideal for use in kitchen exhaust systems to separate the small grease and smoke particles that penetrate the main grease filters in the canopy.

**Efficiency**

The Electrostatic Precipitator is a very efficient means for separating the particulate phase; operating efficiency when clean can be as high as 98% at particle sizes down to 0.01 micron. However, as the plates and ioniser become laden with particles during the use the efficiency will reduce due to the insulating effect of the dirt.

**Pressure Loss**

The Electrostatic Precipitator does not present a high-pressure loss (10mm—15mm Water Gauge). This gives a specific advantage in that most standard Kitchen extractor fans will have the capability of overcoming this small differential. This is particularly advantageous when it is considered that if the pressure loss were high larger noisier fans would probably be necessary resulting in potential noise pollution.

**Maintenance**

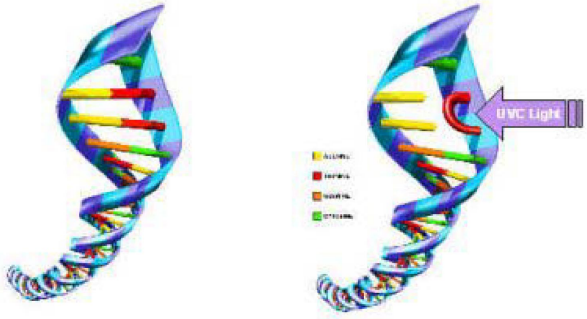
There are no replacement filters; all that is required is regular removal of the filters, ioniser and collector cells, which can be cleaned with chemicals and warm water. If the maintenance schedule is ignored or overruns there is no significant damage to the Electrostatic Precipitator. However, there is potential for electrical or electronic component failure for systems that are not maintained as required.

**UV Technology (Gaseous Phase)**

The system is based on the synergy that occurs when ozone and ultraviolet are combined. The system comprises a quantity of lamps a percentage of which are designed to produce UV light at 185nm, converting ozone from the oxygen present in the air. The remaining lamps combine to produce UV light at 254nm which destroys the ozone and any mercaptans remaining in the proximity of the lamps. A photo catalytic liner is used to enhance the production of hydroxyl radicals, which are both very short-lived and extremely oxidising. **A UV system cannot destroy smoke or other particulate although it has some affect in altering the make up of cooking grease to a better managed compound.**

**How does Ultraviolet Work?**

Strong sunlight permanently de-activates bacteria, spores, moulds and viruses. Over a century ago, scientists identified the part of the electromagnetic spectrum responsible for this well-known effect; wavelengths between 200nm and 300nmm, often called UV-C.




The mechanism of kill is well documented and unlike chemical disinfectants the organism is unable to develop any immune mechanisms. The mechanism of kill involves the absorption of photons of UV energy by the DNA, which fuses the DNA and prevents replication. DNA (Deoxyribonucleic acid) consists of a linear chain of nitrogen bases known as purines (adenine and guanine) and pyrimidines (thymine and cytosine). These components are linked along the chain by sugar-phosphate components. The DNA of most forms of life is double stranded and complementary; the adenine in one strand is always opposite thymine in the other, and linked by a hydrogen bond, and guanine is always paired with cytosine by a hydrogen bond. The purine and pyrimidine combinations are called base pairs. When UV light of a germicidal wavelength is absorbed by the pyrimidine bases (usually thymine) the hydrogen bond is ruptured. The dimer that is formed links the two bases together, and this disruption in the DNA chain means that when the cell undergoes mitosis (cell division) the DNA is not able to replicate.

**How is UV Light Generated?**

Ultraviolet light is most typically generated from a low pressure lamp as described below; Low Pressure lamps are the most common lamp type and are the oldest source of ultraviolet light.. They consist of a quartz envelope that separates two tungsten filaments. The lamp is evacuated and a level of mercury is introduced into the quartz envelope. The spectral output of this lamp type is monochromatic, a single line output at 253.7nm or 185nm. A fluorescent lamp is a low-pressure lamp that has the inner surface of the lamp coated with phosphors to absorb all of the 253.7nm light an only emit the longer wave.

**How the UV-O 1000 works.**

The Purified Air UV-O 1000 unit uses UV-C technology to produce ozone and hydroxyl free radicals to oxidize odours through a process of Ozonolysis. Unlike other UV-C systems, the UV-O 1000 is located outside the kitchen extract duct and connects via spigots and small diameter ducting. It is widely accepted that the best way to apply UV-C is in the airstream itself. However, the lamps quickly become dirty and the effectiveness is greatly reduced. By applying the lamps outside of the airstream we are able to fully control the condition of the lamps which provides for a uniform output, the air entering the UV-O 1000 does not come via the extract and is filtered on entry, the system allows a uniform delivery of clean treated air to enter the extract system. A further advantage is that the pressure loss exhibited when the unit is installed is low and uniform.

**Installation**

Simple to install, with low maintenance and running costs, the system is designed to be located on a wall in the kitchen or plant room or can be fitted to the ducting itself. The fact that it is located external to the ducting makes the unit ideal for retrospective installations.

**Technical & Safety Considerations**

The unit must always be installed on the negative side of the fan and the system should be switched via an interlock both connected to the fan and an airflow switch connected to the unit itself which will ensure that in the event the unit is disconnected from the duct or if the extract system is switched off the system will be isolated. The unit can only discharge into duct which is going to atmosphere the unit must not discharge into an enclosed space.

The unit comes as standard with six lamps but a further rack can be added to make a total of twelve lamps. Dependant on the type of cooking the maximum each set of six lamps will be capable of handling will be 0.5 m3/sec. UV-C technology cannot remove smoke or other particulate, for instance where there is a lot of smoke produced due to the cooking style, for example char-grilling. Then Purified Air recommends that the UV-C system be used in conjunction with a filtration system such as their Electrostatic Precipitator (ESP).

**Mixed Media Filters**

In order to provide a high efficiency odour filter we must provide a medium which is capable of acting as a high quality molecular sieve. It is important that the medium is effective at high separation efficiency with the broad spectrum of gases present in the kitchen exhaust. In the Mixed Media Filter we use three mediums to adsorb the volatile gases. All of the media is micro porous in structure and it is therefore important that the majority of the particulate phase is eliminated prior to the odour control stage, it is not sufficient to use normal canopy filters as this will result in too much carry over of grease, a high quality filtration process is required combining a number of stages of technology. Various different primary stage particulate filters are manufactured by Purified Air, details available on request.

Set out below are the three mediums used in the Purified Air System:

**Activated Carbon grade 207C -** This is one of the highest grade Coconut Carbons which provides a surface area of 1200 square metres per gram. Activated Carbon is well known for odour control finding applications in many processes.

Whilst Activated Carbon covers a broad spectrum of gases it has limitations with some of the volatile gases found in a standard cooking exhaust. As previously mentioned some of these volatile gases can be detected by the olfactory receptor at parts per billion it is therefore insufficient to remove these gases at levels of fifty percent or less.

**Zeolites -** These are crystalline aluminosilicates in which atoms form an extensive three dimensional framework with uniform surface pores and channels. Their shape selective structure allows them to be designed and manufactured to adapt and act as a molecular sieve and a catalyst to specific molecules. Through design the Zeolite can adsorb, at high efficiency, the molecules with which Activated Carbon is inefficient. The available surface area will depend on the design and application, however, for typical cooking our Zeolite bed will have a surface area between 700 - 900 square metres per gram.

**Rare Earth's -** These components are well known to improve the performance of filters and magnetic devices, they are produced as ultra fine metal powders which are incorporated in minute quantities into both the Activated Carbon and Zeolite beds via ion exchange or impregnation. Mixed Media Filters are highly effective against the gases produced from the cooking process.

The filter cartridges are tightly packed and are either made from a loose fill pelletised mix or constructed by bonding the granules together, permanent suspension, using a patented bonding process with conductive material to form a homogenous biscuit. Standard sizes are manufactured to suit repeat applications. Turn key projects can also be accommodated using our known design process and with reference to the specialist manufacturers of the raw material. As far as cooking applications are concerned we have a library of formulae to cover all types of cooking. Most variations allow for increased dwell time combined with different percentage mixes of the raw material.

**Ionising of Effects / Electrostatic Enhancement of Filtration Performance**

The filters as described above can be enhanced by the use of ionisation. Purified Air Limited are the owners of a filtration enhancement process, protected by world-wide patents.

The process provides for sub micron particles and gases to be ionised before entering the filter medium thus imparting a negative charge in the region of 10,000 - 15,000 volts negative. Once charged the components seek to discharge on a positively charged or grounded surface. Our mixed bed filter is constructed from highly conductive materials which are laid on a perforated metal bed in a metal frame.

The filter is grounded on the opposite side of the High Tension circuit thus making it positively charged with respect to the negatively charged pollutant. As the negatively charged pollutant is drawn into the positively charged filter the natural adsorption process is magnified by the electrostatic difference thus ensuring a much greater degree of separation.

It is known that activated carbon normally has an adsorption capacity of one percent by weight, when used in our process the adsorption capacity is increased to as much as ninety percent by weight. In addition to the increased adsorption capacity the filtration performance is also greatly improved, tests carried out by the ministry of defence in France have shown that when tested for separation of florescent gases with a measured value of $0.08_{u}$m our process increased separation efficiency from $0.3 \times 10^{-2}$ to $0.3 \times 10^{-5}$.

**ON 100 Odour Neutraliser (Gaseous Phase Odour Control)**

The patented system combines physics and chemistry. A venturi spigot is connected to the duct; this is connected to the O.N. 100 via a non-conductive flexible hose. Ambient air is drawn into the O.N. 100 where it is mixed with the neutralising chemical to form a vapour or gas, the vapour is then ionised to 15,000 V negative and discharged into the duct. The duct is earthed through the electrostatic circuit thus making the contents of the duct at an opposite electrical potential to the ionised chemical. The electrostatic difference forces the chemical to combine physically with the contaminant after which a chemical reaction takes place to neutralise the cooking odour.

Further information about our odour, smoke and grease control technology can be found at www.odourcontrol.com.

## 2.04 PREVENTATIVE MAINTENANCE

A maintenance contract will be taken out directly between the Occupier and the Odour Control equipment manufacturer, namely, Purified Air Ltd.

Work to be carried out is :-

Electrostatic Precipitators

1. Replace pre-filter, ioniser, collector and final filter. Those that are removed to be returned to Purified Air's stores for cleaning (clean filters are brought to site in the first instance)
2. Drain off accumulated grease from filter compartment.
3. Clean inside and outside of product with detergent.
4. Check door sealing material.
5. Check high voltage circuit.
6. Check function of indicator lamps.

UV-O System

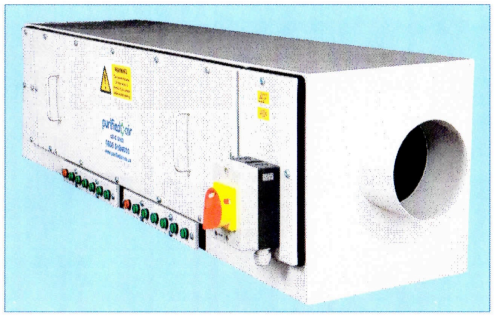
1. Clean lamps and check operation
2. Replace Filter
3. Check operation and air flow filter switch

Frequency

| | | |
|---|---|---|
| 1. | Service ESP | 4 weekly |
| 2. | Clean UV-O lamps | 4 weekly |
| 3. | Change UV-O Filter | Quarterly |
| 4. | Change UV-O lamps | Annually |

## 2.05 SUPPORTING DOCUMENTATION

# UV-O 1000



### INTRODUCTION

Reduction of cooking odours from commercial kitchens is an increasingly important issue, different combinations of product are required to do this.

### HOW IT WORKS

The Purified Air UV-O 1000 unit uses UV-C technology to produce ozone and hydroxyl free radicals to oxidise odours through a process of Ozonolysis.

Unlike other UV-C systems, the UV-O 1000 is located outside the kitchen extract duct and connects via spigots and small diameter ducting. It is widely accepted that the best way to apply UV-C is in the airstream itself. However, the lamps quickly become dirty and the effectiveness is greatly reduced. By applying the lamps outside of the airstream we are able to fully control the condition of the lamps which provides for a uniform output, the air entering the UV-O 1000 does not come via the extract and is filtered on entry, the system allows a uniform delivery of clean treated air to enter the extract system. A further advantage is that the pressure loss exhibited when the unit is installed is low and uniform.

purified air®
providing a better environment
www.purifiedair.co.uk

### INSTALLATION

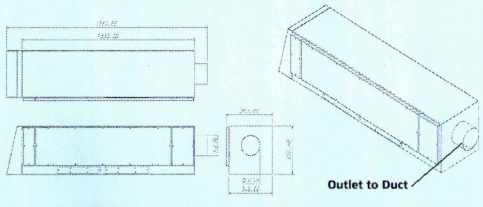
Simple to install, with low maintenance and running costs, the system is designed to be located on a wall in the kitchen or plant room or can be fitted to the ducting itself. The fact that it is located external to the ducting makes the unit ideal for retrospective installations.

### TECHNICAL & SAFETY CONSIDERATIONS

The unit must always be installed on the negative side of the fan and the system should be switched via an interlock both connected to the fan and an airflow switch connected to the unit itself which will ensure that in the event the unit is disconnected from the duct or if the extract system is switched off the system will be isolated. The unit can only discharge into duct which is going to atmosphere the unit must not discharge into an enclosed space.

The unit comes as standard with six lamps but a further rack can be added to make a total of twelve lamps. Dependant on the type of cooking the maximum each set of six lamps will be capable of handling will be 0.5 m³/sec.

UV-C technology cannot remove smoke or other particulate, for instance where there is a lot of smoke produced due to the cooking style, for example char-grilling. Then Purified Air recommends that the UV-C system be used in conjunction with a filtration system such as their Electrostatic Precipitator (ESP).




### OPTIONS

Lamp indicator remote or attached. Airflow switch.

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.

purified air®

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# 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 [2] which are then trapped on the earth plates in the collector cell [3] Larger particulate in the airstream would be removed by the pre-filter [1] and lastly through an afterfilter [4] to prevent any re-entrainment and provide good air distribution.

## 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.

## Efficiency Achievable

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

Efficiency varies 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.*

*excluding media filters where used.

## Controls

A separate enclosure houses the HT supply, and operating lights, with individual indication of mains and filter operation.

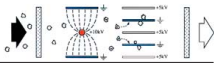
## Filter Technology


[1] **Pre-filter**
Eurovent Class 2

[2] **Ionisation section**

[3] **Collector section**
Eurovent class 9
Filter surface 28.4m²

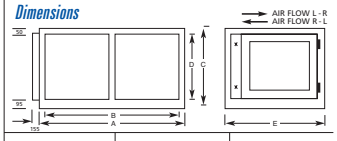
[4] **Final filter**
Eurovent Class 2



## 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.**

## Dimensions




| | ESP 1500 E | ESP 3000 E | ESP 4500 E |
|---|---|---|---|
| A - Width | 450mm | 900mm | 1350mm |
| B - Width | 350mm | 800mm | 1250mm |
| C - Height | 630mm | 630mm | 630mm |
| D - Height | 485mm | 485mm | 485mm |
| E - Depth | 660mm | 660mm | 660mm |
| AIR VOLUME MAX | 2500m³/h 1500cfm | 5000m³/h 3000cfm | 7500m³/h 4500cfm |
| ELECTRICAL SUPPLY | 220/240V 50Hz 1ph | 220/240V 50Hz 1ph | 220/240V 50Hz 1ph |
| POWER CONSUMPTION | 30W | 50W | 50W |
| WEIGHT | 60kg | 100kg | 140kg |
| 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®
providing a better environment

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ACMA Air Cleaner Manufacturers' Association

TÜV

NOV 2007

# Electrostatic Precipitator

purified air®
providing a better environment

# a 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. We can also provide specialist oil demisters and other pre filters for different applications. The units are all fitted with an angled drip tray and an oil drain 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 can, stacked as modules, be used as a central filter installation with a virtually unlimited capacity.

***Pressure Loss***
The ESP is characterised by a remarkably low pressure drop (120-170 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 detergents 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 assures 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.

## 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 compromise 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 contaminant that pass the grease filters in the cooker hood.

# The ESP Modular System

ESP 3000 E

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

ESP 1500 E

Two ESP 3000E in modular format

ESP 4500 E

# SECTION 3 : EXTERNAL PLANT NOISE CRITERIA



NOTE: Items detailed within this section are external plant items only.

## 3.01 GENERAL

KFC's have a common philosophy to provide a comfortable environment within restaurants for customers, with all areas having thermostatic control and adequate ventilation, which is further extended to their staff.

This section covers the technical information with respect to external plant equipment.

## 3.02 RESTAURANT ENVIRONMENTAL CONTROL SYSTEM DESCRIPTION

The Trade Restaurant area shall be provided with its cooling, heating and ventilation requirements via a mechanically forced air movement system, derived from a VRF refrigerant heat recovery air conditioning system. The indoor units mated to this system are above ceiling ducted units operating on a vapour comprehension cycle, utilising refrigerant R410A.

The units shall operate on a re-circulated basis, with the minimum fresh air requirement in conjunction with the specified occupancy level in accordance with Document F1 of Building Regulations, set and locked on the fresh air intake opposed blade volume control damper. The specific fresh air requirement shall be in accordance with Building Regulations and CIBSE Guide relating to minimum fresh air requirements per individual occupant. The actual quantity of fresh air is indicted within this specification and associated tender drawing.

Supply and return air distribution shall be through fabricated galvanised steel ductwork, routed generally as per the tender drawings, with air terminal devices situated within the false ceiling structure, dissipating air in the specified patterns.

Temperature control of the area shall be sensed at room conditions with a high level room mounted zone temperature sensor, and the mechanical refrigeration plant controlled accordingly.

The heat rejection plant in the rear yard shall be fully weather proofed, treated and situated on raised condenser blocks between unit and base, with levelling shims fitted were necessary. Allowances shall be made during the installation of the external condensing units to limit vibration.

The unit base shall be secured to the concrete floor finish using proprietary masonry anchor fixings.

The contractor shall be responsible for ensuring that the indoor and outdoor primary plant has the specified access space for maintenance and service around the packaged unit in accordance with the manufacturer's recommendations.

## 3.03 RESTAURANT ENVIRONMENTAL CONTROL SYSTEM PARTICULARS

The units serving the Trade Restaurant area shall be as follows: -

HRV-1

Mitsubishi Lossnay LGH100RX5-E Commercial heat recovery ventilation unit internal void mounted
1231 x 1144 x 399 High
59KG

ACU01A & 1B

Mitsubishi PEFY-P125VMA-ER2 ducted internal void mounted
1400 x 732 x 250 High
42KG
33/36/40DBA

CU1

Mitsubishi R2 series PURY500 YSJM External Condenser
Heat recovery outdoor unit
920 X 760 X 1710 High
240KG
57DBA
This unit is a common unit serving all internal air conditioning plant regardless of designated separate internal areas.

## 3.04 KITCHEN & STAFF AREA ENVIRONMENTAL CONTROL SYSTEM DESCRIPTION

The Kitchen and staff areas shall be provided with its cooling, heating and ventilation requirements via a mechanically forced air movement system, derived from a VRF refrigerant heat recovery air conditioning system. The indoor units mated to this system are above ceiling ducted units operating on a vapour comprehension cycle, utilising refrigerant R410A.

The units shall operate on a re-circulated basis, with the minimum fresh air requirement in conjunction with the specified occupancy level in accordance with Document F1 of Building Regulations, set and locked on the fresh air intake opposed blade volume control damper. The specific fresh air requirement shall be in accordance with Building Regulations and CIBSE Guide relating to minimum fresh air requirements per individual occupant. The actual quantity of fresh air is indicted within this specification and associated tender drawing.

Supply and return air distribution shall be through fabricated galvanised steel ductwork, routed generally as per the tender drawings, with air terminal devices situated within the false ceiling structure, dissipating air in the specified patterns.

Temperature control of the area shall be sensed at room conditions with a high level room mounted zone temperature sensor, and the mechanical refrigeration plant controlled accordingly.

The heat rejection plant in the rear yard shall be fully weather proofed, treated and situated on raised condenser blocks between unit and base, with levelling shims fitted were necessary. Allowances shall be made during the installation of the external condensing units to limit vibration.

The unit base shall be secured to the concrete floor finish using proprietary masonry anchor fixings.

The contractor shall be responsible for ensuring that the indoor and outdoor primary plant has the specified access space for maintenance and service around the packaged unit in accordance with the manufacturer's recommendations.

## 3.05 KITCHEN AND STAFF AREA ENVIRONMENTAL CONTROL SYSTEM PARTICULARS

The unit serving the Trade Kitchen including Staff Room/Managers Office & Dry Goods area shall be as follows:-

ACU01C & 01D (KITCHEN)

Mitsubishi PEFY-P125VMA-ER2 ducted internal void unit
1400 x 732 x 250 High
42KG
33/36/40DBA

ACU01E (DRY GOODS)

Mitsubishi PLFY-P25VCM-E2 internal ceiling mounted unit
570 x 570 x 235 High
18.5KG
28/32/35DBA

ACU01F (STAFF & OFFICE)

Mitsubishi PEFY-P40VMA-ER2 ducted internal void unit
790 x 732 x 200 High
18.5KG
23/25/30DBA

CU1

Mitsubishi R2 series PURY500 YSJM External condenser
Heat recovery outdoor unit
920 X 760 X 1710 High
240KG
57DBA
This unit is a common unit serving all internal air conditioning plant, regardless of designated separate internal areas.

## 3.06 KITCHEN EXTRACT FAN EQUIPMENT PARTICULARS

The main extract system within the kitchen shall serve the single wall mounted canopy arrangements as described in earlier sections of this document. The main extract fan shall also serve both the Main Canopy and Chip Fryer Canopy. The fan is mounted externally in the rear yard area.

The extract fan equipment shall be as follows: -

EF1

Elta Fans Limited
Model SCPP 560/4-1 Compact Power Plus Contra-rotating 2 stage fan
Motor : 1500 watts 4 pole1350rpm
Duty : 2.67 cu.m/sec @ 250 pascals
Sound Level : 66dBA@3 metres
Controller : TC110 transformer type
Electrical : 230 volt / 1 phase / 50 Hz
Weight : 60kg
Dimensions : 560mm diameter x 500mm long

## 3.07 SUPPLY FAN EQUIPMENT PARTICULARS

The main supply air system within the kitchen serves the single wall mounted canopy arrangements as described in earlier sections of this document. The supply fan shall also serve both the Main Canopy and general areas via ceiling mounted diffusers. The fan is mounted internally within the kitchen ceiling void. Details are included in this document for reference even though the equipment is not located externally

The supply fan equipment shall be as follows: -

SF1

Elta Fans Limited
Model SCPP 500/4-1 Compact Power Plus Contra-rotating 2 stage fan
Motor : 1100 watts 4 pole1350rpm
Duty : 2.09 cu.m/sec @ 200 pascals
Sound Level : 62dBA@3 metres
Controller : TC18 transformer type
Electrical : 230 volt / 1 phase / 50 Hz
Weight : 55kg
Dimensions : 500mm diameter x 500mm long

## 3.08 GENERAL EXTRACT FAN EQUIPMENT PARTICULARS

The general extract fan serves the toilet and staff area toilets and general areas. The fan is mounted internally within the staff area ceiling void. Details are included in this document for reference even though the equipment is not located externally

The extract fan equipment shall be as follows: -

EF2

Elta Fans Limited
Model SJ250A in line centrifugal tube fan.
Motor : 180 watts 2 pole 2450rpm
Duty : 0.24 cu.m/sec @ 100 pascals
Sound Level : 53dBA@3 metres
Controller : WC lighting circuit
Electrical : 230 volt / 1 phase / 50 Hz
Weight : 5.5kg
Dimensions : 335mm overall diameter x 230mm long

## 3.09 FOSTER REFRIGERATION LTD COLDROOM PLANT PARTICULARS

There are three coldrooms serving the KFC unit. The heat rejection condensers serving the coldrooms are mounted in the rear yard at a height below the yard wall, and one separate condenser serves each coldroom unit.

**Chiller Room:**
Split Refrigeration System

| **Prefix** | **-** | **Chiller Room** |
|---|---|---|
| Model | - | Duet Range Eco |
| Condenser Model | - | DCU2-1H ECO |
| Dimensions | - | 820 x 427 x 390mm high |
| Weight | - | 43 Kgs |
| Electrical Supply | - | 230-1-50 Hz |
| Main Fuse Rating | - | 20 |
| Net noise level | - | 60dBa |

**Freezer Room:**
Split Refrigeration System

| **Prefix** | **-** | **Freezer Room** |
|---|---|---|
| Model | - | Duet Range Eco |
| Condenser Model | - | DCU4-3L ECO |
| Dimensions | - | 820 x 427 x 427mm high |
| Weight | - | 78 Kgs |
| Electrical Supply | - | 400-3-50 Hz |
| Main Fuse Rating | - | 25 |
| Net noise level | - | 61Ba |

**Veg Chiller Room:**
Split Refrigeration System

| **Prefix** | **-** | **Veg Chiller Room** |
|---|---|---|
| Model | - | Duet Range Eco |
| Condenser Model | - | DCU2-1H ECO |
| Dimensions | - | 820 x 427 x 390mm high |
| Weight | - | 43 Kgs |
| Electrical Supply | - | 230-1-50 Hz |
| Main Fuse Rating | - | 20 |
| Net noise level | - | 60dBa |

# SECTION 4 : ROOF MOUNTED SOLAR PANEL EQUIPMENT

## 4.01 GENERAL

As part of KFC's energy directive and SBEM requirements, hot water systems at the store utilize first stage solar thermal roof top panels to supplement the restaurants hot water demand. This system heats a solar coil within the storage cylinder and provides upto 60% of the annual hot water demand for the restaurant.

The system comprises of roof top mounted solar panels, mounted to face South at an angle of between 30 and 45 degrees, plus an internal boiler room houses a twin coil solar cylinder, solar pump station, and solar controls, plus a gas fired condensing system boiler to supplement any solar short fall.

## 4.02 SOLAR EQUIPMENT PARTICULARS

The full solar package is supplied by Worcester Bosch, roof top panels detail as :

2no. Worcester Bosch Solar Lifestyle flat panel collectors model 8 718 530 951

Each panel has the following properties

Length : 1175mm
Width : 2017mm
Depth : 87mm
Gross Collector Area : 2.37 sq.m
Aperture Area : 2.25 sq.m
Absorber Area : 2.18 sq.m
Performance Data : n0 : 77%
Performance Data : a1 : 3.327 W/m2k
Performance Data : a2 : 0.016 W/m2k

ashworth
The Westfields, Brookville Drive, Skewen, Swansea, SA10 6SR
+441792 536666 www.ashworthuk.com

END OF DOCUMENT

# DEFRA GUIDANCE ON THE CONTROL OF ODOUR AND NOISE FROM COMMERCIAL KITCHEN EXHAUST SYSTEMS

## ANNEX C : RISK ASSESSMENT FOR ODOUR

| CLIENT : | QFM LTD - KFC DRIVE THRU RESTAURANT, DEARNE VALLEY, BARNSLEY | DATE : | 2ND NOVEMBER 2015 |
|---|---|---|---|

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 REQUIRMENTS USING A SIMPLE RISK ASSESSMENT APPROACH. THE ODOUR CONTROL REQUIREMENTS CONSIDERED HERE ARE CONSISTENT WITH THE PERFORMANCE REQUIREMENTS LISTED IN THE MAIN DEFRA GUIDANCE REPORT THIS ANNEX IS DERIVED

| IMPACT RISK | ODOUR CONTROL REQUIREMENT | SIGNIFICANCE SCORE |
|---|---|---|
| LOW - MED | 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 |

SIGNIFICANCE SCORE IS BASED ON THE SUM OF CONTRIBUTIONS FROM DISPERSION, PROXIMITY OF RECEPTORS, SIZE OF KITCHEN, AND COOKING TYPE

| CRITERIA | DETAILS | SCORE | | SELECTION |
|---|---|---|---|---|
| DISPERSION | LOW LEVEL DISCHARGE, DISCHARGE INTO COURTYARD OR RESTRICTION ON STACK. | VERY POOR | 20 | 0 |
| | NOT LOW LEVEL BUT BELOW EAVES, OR DISCHARGE BELOW 10 METRES PER SECOND | POOR | 15 | 1 |
| | DISCHARGING 1 METRE ABOVE EAVES AT 10 TO 15 METRES PER SECOND | MODERATE | 10 | 0 |
| | DISCHARGING 1 METRE ABOVE RIDGE AT 15 METRES PER SECOND | GOOD | 5 | 0 |
| PROXIMITY OF RECEPTORS | CLOSEST SENSITIVE RECEPTOR LESS THAN 20 METRES FROM KITCHEN DISCHARGE | CLOSE | 10 | 0 |
| | CLOSEST SENSITIVE RECEPTOR BETWEEN 20 AND 100 METRES FROM KITCHEN DISCHARGE | MEDIUM | 5 | 1 |
| | CLOSEST SENSITIVE RECEPTOR MORE THAN 100 METRES FROM KITCHEN DISCHARGE | FAR | 1 | 0 |
| SIZE OF KITCHEN | MORE THAN 100 COVERS OR LARGE SIZED TAKE AWAY | LARGE | 5 | 0 |
| | BETWEEN 30 AND 100 COVERS OR MEDIUM SIZED TAKE AWAY | MEDIUM | 3 | 1 |
| | LESS THAN 30 COVERS OR SMALL TAKE AWAY | SMALL | 1 | 0 |
| COOKING TYPE (ODOUR & GREASE LOADING) | PUB (HIGH LEVEL FRIED FOOD), FRIED CHICKEN, BURGERS, OR FISH AND CHIPS | VERY HIGH | 10 | 1 |
| | KEBAB, VIETNAMESE, THAI OR INDIAN | HIGH | 7 | 0 |
| | CANTONESE, JAPANESE, OR CHINESE | MEDIUM | 4 | 0 |
| | MOST PUBS, ITALIAN, FRENCH, PIZZA OR STEAKHOUSE | LOW | 1 | 0 |

| SIGNIFICANCE SCORE | 33 HIGH |
|---|---|

# DEFRA GUIDANCE ON THE CONTROL OF ODOUR AND NOISE FROM COMMERCIAL KITCHEN EXHAUST SYSTEMS

## ANNEX C : RISK ASSESSMENT FOR ODOUR

| CLIENT : | QFM LTD - KFC DRIVE THRU RESTAURANT, DEARNE VALLEY, BARNSLEY | DATE : | 2ND NOVEMBER 2015 |
|---|---|---|---|

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 REQUIRMENTS USING A SIMPLE RISK ASSESSMENT APPROACH. THE ODOUR CONTROL REQUIREMENTS CONSIDERED HERE ARE CONSISTENT WITH THE PERFORMANCE REQUIREMENTS LISTED IN THE MAIN DEFRA GUIDANCE REPORT THIS ANNEX IS DERIVED

| IMPACT RISK | ODOUR CONTROL REQUIREMENT | SIGNIFICANCE SCORE |
|---|---|---|
| LOW - MED | 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 |

SIGNIFICANCE SCORE IS BASED ON THE SUM OF CONTRIBUTIONS FROM DISPERSION, PROXIMITY OF RECEPTORS, SIZE OF KITCHEN, AND COOKING TYPE

| CRITERIA | DETAILS | SCORE | | SELECTION |
|---|---|---|---|---|
| DISPERSION | LOW LEVEL DISCHARGE, DISCHARGE INTO COURTYARD OR RESTRICTION ON STACK. | VERY POOR | 20 | 0 |
| | NOT LOW LEVEL BUT BELOW EAVES, OR DISCHARGE BELOW 10 METRES PER SECOND | POOR | 15 | 1 |
| | DISCHARGING 1 METRE ABOVE EAVES AT 10 TO 15 METRES PER SECOND | MODERATE | 10 | 0 |
| | DISCHARGING 1 METRE ABOVE RIDGE AT 15 METRES PER SECOND | GOOD | 5 | 0 |
| PROXIMITY OF RECEPTORS | CLOSEST SENSITIVE RECEPTOR LESS THAN 20 METRES FROM KITCHEN DISCHARGE | CLOSE | 10 | 0 |
| | CLOSEST SENSITIVE RECEPTOR BETWEEN 20 AND 100 METRES FROM KITCHEN DISCHARGE | MEDIUM | 5 | 1 |
| | CLOSEST SENSITIVE RECEPTOR MORE THAN 100 METRES FROM KITCHEN DISCHARGE | FAR | 1 | 0 |
| SIZE OF KITCHEN | MORE THAN 100 COVERS OR LARGE SIZED TAKE AWAY | LARGE | 5 | 0 |
| | BETWEEN 30 AND 100 COVERS OR MEDIUM SIZED TAKE AWAY | MEDIUM | 3 | 1 |
| | LESS THAN 30 COVERS OR SMALL TAKE AWAY | SMALL | 1 | 0 |
| COOKING TYPE (ODOUR & GREASE LOADING) | PUB (HIGH LEVEL FRIED FOOD), FRIED CHICKEN, BURGERS, OR FISH AND CHIPS | VERY HIGH | 10 | 1 |
| | KEBAB, VIETNAMESE, THAI OR INDIAN | HIGH | 7 | 0 |
| | CANTONESE, JAPANESE, OR CHINESE | MEDIUM | 4 | 0 |
| | MOST PUBS, ITALIAN, FRENCH, PIZZA OR STEAKHOUSE | LOW | 1 | 0 |

| SIGNIFICANCE SCORE | 33 HIGH |
|---|---|