

Design and Specification For Kitchen Ventilation System

Proposed property:

Fat Twins
109a Oxford Road
Reading
RG1 7UD

Date:

12th January 2021



Type of Cooking:

Burger Bar

Ref:

Revised Low level discharge



Introduction

Proposed system specification

Canopy information

Baffle filter information

Esp precipitator unit (Eliminate the oil, smoke and grease) First stage

Activated Carbon filter information

Extraction system information

Extraction fan details

Attenuator information

Air supply system

cleaning and Maintenance

Summary of detailed information attached in this specification

Extraction:

Volume m3/second	Resistance	Discharge Velocity	Dwell time of Carbon	Noise level
0.96 M3/sec	300pa	9.70	0.36 Sec ESP3000e	41 dba

Supply:

Volume m3/second	Resistance	Replacement Percentage	Air Filter	Noise level
0.82 M3/sec	120 Pa	85%	EU4	39 dba

Type of Cooking:

Cuisine	Discharge cowl Type	Discharge Termination	Carbon Size	Pre-filter
Burger Bar	Bird beak Cowl	Low level Cut off cowl	Single	Synthetic

Introduction

Canopy design

With the canopy supplied we have based the extraction airflow duty on the cooking type appliances underneath and calculated the volume required to capture the grease-laden air And heat removal over the appliances used.

Our Kitchen extraction Canopies are manufactured out of 430 or 304 grade stainless Steel. Stainless steel baffle filters within the canopy housing fully welded drain channel and complete with grease tap or grease pot.



Grease Tap

A stainless steel ball valve with plastic lever handle, threaded if want to make a permanent grease run off to grease pack.

These are installed at one or each end of the canopy, where the grease runs down the welded drain channel, turn the tap Anti-clockwise and drain off any excess grease or oil and wash with hot soapy water and turn lever clock wise to shut off.



Grease Pot

Installed in bottom plenum a removable pot at one or each end of the canopy, where the grease runs through hole above into the drain pot, remove the pot and dispose of the grease appropriately, wash out with hot soapy water and re-fit by pushing back into the slides, wash drain channel with hot soapy water and drain off any excess grease or oil.

This is for good house keeping for cleaning grease daily and is easily accessible

Our canopies are installed at a working height of 2000mm to 2100mm underneath the canopy. 300mm overhang on front and sides of appliances.

Proposed system specification

Brief description of site requirement

Low Level Discharge on the rear wall with a cut off cowl with bird mesh, Electrostatic precipitator mounted internally to eliminate smoke and grease particles, a activated Carbon Filtration to neutralise the odours before discharging at low level, fan and silencer mounted internally on anti-vibration hangers.

Due to the nature of the building all the extraction plant to be mounted internally which will require bulk heads in the ceiling due to Low ceiling levels.

The Odour neutralising system will reduce any odour, emanating from the premises.

This proposed system to be mounted or hung on anti-vibration mountings to reduce any reverberation type vibration from the extraction system, travelling through the building.

Access doors installed in ducting system 2-3 metre centres for cleaning and maintenance.

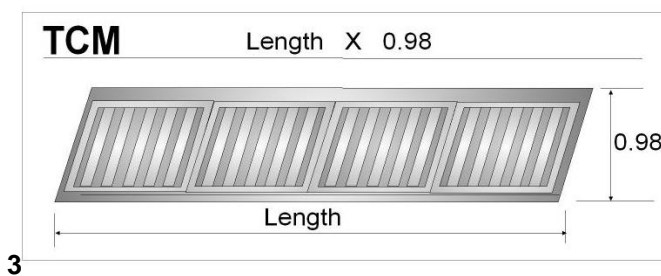
We can confirm that the design and specification for the extraction system at the above address is in accordance to DW172 specification.

Canopy information

Above Griddle hot plate 2000mmx1100mm canopy and a 1500mm x 1100mm above fryers, this will give a combined canopy size for calculations of:

3500mm (long) x 1100 mm (wide) 430 grade, brushed stainless steel wall canopy, complete with stainless steel baffle filters. Incorporated within each canopy would be a full length plenum built filter housing to accommodate 6off, 500mm (wide) x 500mm (high) x 50mm (deep) grease filters. Only extracting from electric deep fat fryers.

Length Metre	Width Metre	Type	Grade Satin	No: of filters	Filter Size	Filter Type	Canopy Style
C	3.50	Wall	430	6	500x500	Baffle	Box



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FVM Canopy Calculation volume based on total face velocity

Length		Width		M ²		Velocity		Volume m3/second
3.50	X	1.10	=	3.85	X	0.35	=	1.34 M3/sec

TCM Canopy volume based on face velocity required extraction through sloping filter plenum

Length		Width		M ²		Velocity		Volume m3/second
3.50	X	0.98	=	3.43	X	0.35	=	1.20 M3/sec

Guide line if equipment not known at this stage or if known can be worked out on Co-efficiency.

Minimum Requirements For Canopy

Velocity requirements:

Light loading – 0.25 m/s (applies to steaming ovens, boiling pans, stock-pot stoves) Pizza shop, bakery

Medium loading – 0.35 m/s (applies to deep fat fryers, solid and open top ranges and griddles) cafes, pubs

Heavy loading – 0.5 m/s (applies to char grills, specialist broiler units) Indian, Chinese, kebab shops.

Baffle filter information



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

A series of vertical Stainless Steel vanes are housed in a channel frame, with each of the baffles strategically aligned to provide the highest potential for grease removal.

Due to the smooth nature of the vanes the grease naturally runs downwards, through the drainage holes and into the collecting trays normally provided within the canopy holding casings.

Esp precipitator unit (Eliminate the oil, smoke and grease) First stage



Eliminates up to 98% of smoke, oil and grease particles, Filters particles down to sub-micron levels

Produces Ozone to help reduce malodours, Designed with an integral sump

Modular in design. Specifically designed for commercial kitchen application

Energy efficient: – uses no more than 50W

Greatly reduces grease build-up within the duct run

Activated Carbon filter information 2nd stage



The carbon filter is the ideal solution for a modular approach to fume removal. Activated carbon dates back many years. In the First World War, gas masks were filled with activated carbon to remove chlorine gas.

Today a wide range of carbon filters to deal with many noxious fumes and gases, whilst maintaining high levels of strength and low-pressure loss.

Manufactured from a number of carbon biscuits held in a vee formation within a corrosion-proof metal casing, these are sealed into the frames of our filters using polymer, which eliminates the possibility of any air bypass around the carbon.

Type 8 carbon filter features: High quality carbon – all grades available

Robust modular construction: Low-pressure losses: High carbon content

Assessment For Odour Neutralisation

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

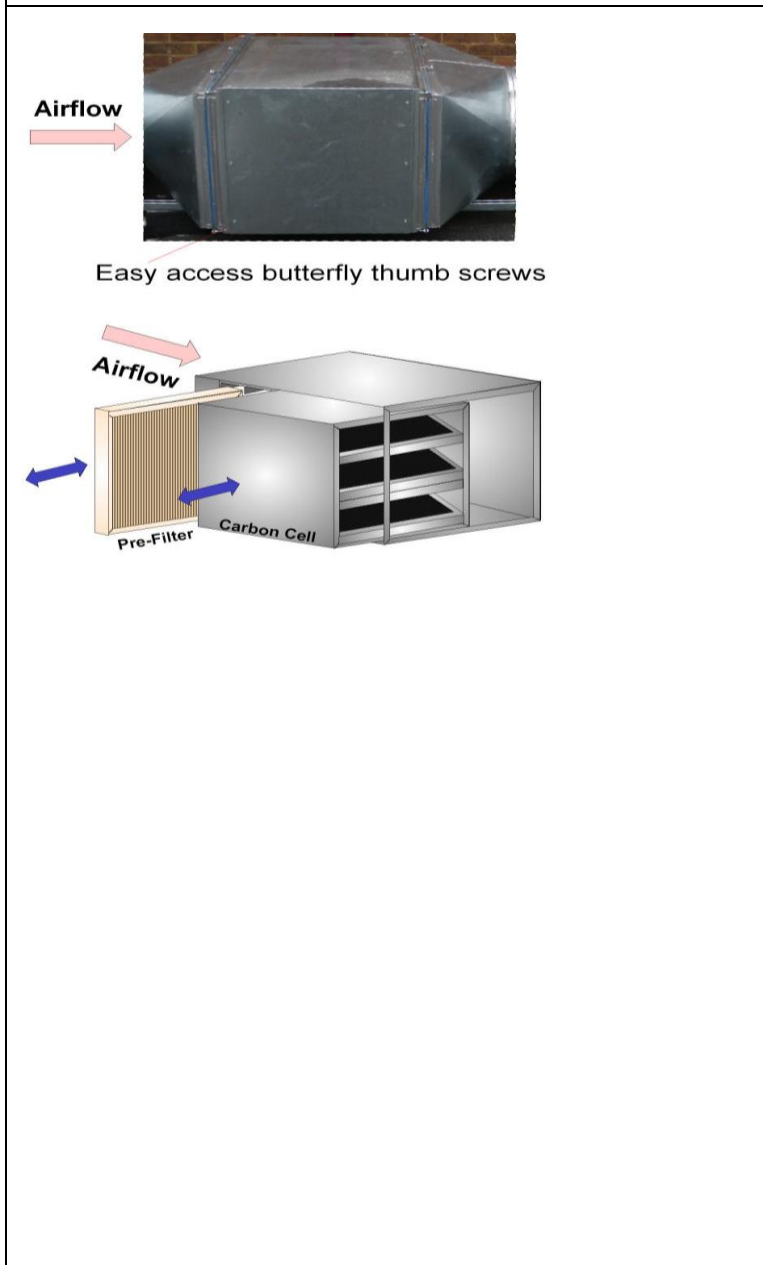
Type	Width	Height	Length	M2 Area	Pre-filters fitted
Single activated carbon	600	600	900	0.36	V Pleat Synthetic

Odour control method

Area M2	Multiply	Length	Divided	Volume m3/sec	Equals	Seconds dwell Time
0.36	x	0.90	÷	1.20	=	0.27
Synthetic fitted to take out any large particulates						0.03
Achieving a Total dwell time (seconds)						0.30

Typical required residence dwell times for various cooking Premises

Cooking Establishment	Capacity Required	Residence Time (seconds)
Canteen, Cafes, English style normal kitchen and restaurants	Normal'	0.1 – 0.2
Kitchens producing large amounts of fried foods or Concentrated cooking of Burgers, Takeaways	2 times 'normal'	0.2 – 0.4
Indian restaurants, Chinese, Kebabs etc. (spices etc.) Excess of onions or garlic smells from cooking.	3 times 'normal' but 4 times in Extreme cases	0.3 – 0.6 (up to 0.8 in Extreme cases)



The filtered air-stream will be free from grease and cooking particulates.



Extraction system information

Galvanised mild steel sheet of lock-formed ducting in accordance with DW144. Constructed from hot-dip galvanized steel sheet. Joints and spigots sealed with High-pressure ducting sealant, which complies with HVCA specification DW144.

Off the top of the canopies to one common extraction duct running to the rear of the premises, with a Esp 3000e electrostatic precipitator remove smoke first stage filtration, then to a activated carbon filter to deal with the odour with a 450mm Mixed flow fan, silencer and speed controller. With the ducting through rear wall to a cut off cowl with bird mesh

Criteria: which our design is based on regarding airflow velocities.

High velocity cowl: 10-15 M/sec to give a high efflux velocity to disperse higher into the atmosphere and dilution.

Duct velocities should be as follows: Extract (m/s) Main runs 6-8 M/sec with the branch and spigots 5-7 M/sec.

Type of discharge cowl:

500sq Cut off cowl with mesh would be discharging @ 9.60 M/sec.

500mm mesh guard to increase velocity

Volume 1.20 M3/sec divided by 0.125 M2 = 9.60 M/sec this will create a higher efflux velocity to discharge high into the atmosphere.

Extraction fan details

Located Internally 4 pole, single-phase mixed flow fan at the designed **Duty: 1.20 M3/sec @ 250 Pascal's resistance.**

Grease filter resistance

Baffle filters	Quantity	System Volume	Equals each	Resistance in Pascal's
500x500	6	1.20 M3/sec	0.20 m3/sec	35 pa

System resistance calculations

*	Extraction system	Pascal's
1	Low level discharge cowl with bird guard and system	30 pa
1	Activated Carbon Filter unit	140 pa
6	Baffle grease filters	35 pa
1	Electrostatic precipitator ESP3000e	95 pa
		300 pa

Selected Fan Details

Fan Model	Type	Volume m3/sec	Resistance	Speed rpm	Phase	Noise level @ 3 metres
MUB 450E4	Mixed flow	1.20	300 Pascal's	1342	1	56 dba

Attenuator information

To reduce the discharge noise we would install a 600mm x 600mm x 450mm long splitter attenuator with baffles silencer panels, which would reduce noise by 15 decibels.

Noise level the source	56 dba
Silencer reduction after fan	-15 dba
Total noise level at 3 metres from discharge cowl	41 dba

MUB 042 500E4-A2 Multifan

Voltage	Frequency	Watts	Amps	S/Current	Temp	Class	Enc	Spl @ 3mtrs	KG
240 V	50Hz	458	3.04 A	---	55 C	F	55	56 db(A)	54

MUB 042 500E4-A2 Multifan description details



- Speed-controllable
- Modular system
- Integral thermal contacts
- Low sound level
- Flexible airflow direction due to removable panels
- Installation in any mounting position
- Maintenance-free and reliable

The MUB fans size 500E4 have an impeller with backward curved blades, manufactured from aluminium.

The MUB 500E4 is equipped with external rotor motors fully speed controllable. Motor protection is done by thermal contacts, which have to be connected to an external motor protection device. The casing consists of a corrosion-resistant aluminium frame with fibreglass reinforced plastic corners of PA6; highly shock-resistant.

The double skin panels are manufactured from galvanised steel with 20 mm mineral wool insulation. To avoid condensation the profile is provided with a separate chamber to fix screws.

The Multi-box fans are delivered for straight through airflow but can easily be rebuilt due to removable panels. This allows flexible ventilation solutions. The MUB can also be used as extract- or supply air unit in air handling units. Installation in any mounting position is possible.

Mid-frequency band, Hz

	Hz	Tot	63	125	250	500	1k	2k	4k	8k
LwA Inlet	dB(A)	75	62	64	68	70	69	66	61	54
LwA Outlet	dB(A)	77	64	66	70	72	71	68	63	56
LwA Surrounding	dB(A)	59	46	48	52	54	53	50	45	38

Measuring point: $qv = 1,06 \text{ m}^3/\text{s}$, $Ps = 250 \text{ Pa}$

Air supply system

Replacement air

It is advisable to install an air supply system either built into the front of the canopy with the fan and ducting mounted in the wall or through ceiling diffusers.

Fan complete with silencer and speed controller, supplying fresh ambient air through grilles mounted in the canopies front face.

Supplying fresh ambient air to replace approximately 85% of the extract flow rate volume of the extracted air.

Extraction Duty: 1.20 M3/sec 78% of the volume to be replaced Duty: 0.94 M3/sec

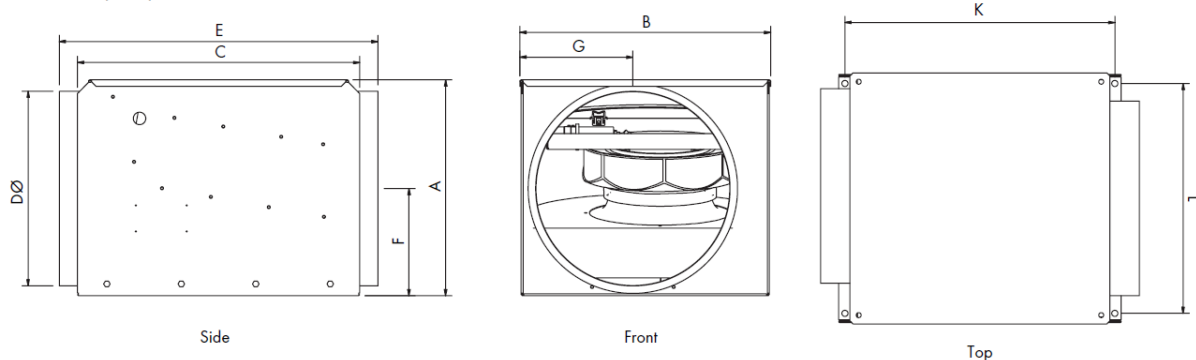
System resistance calculations

*	Supply system	Pascal's
1	Weather louver	45
1	EU4 Filter box	35
1	Grilles and ducting	20
Total static resistance on the system		100

Selected Fan Details

Fan Model	Type	Volume m3/sec	Resistance	Speed rpm	Phase	Noise level @ 3 metres
QP400C	Backward Curved	0.82	120 Pascal's	1340	1	62 dba

Dimensions (mm)

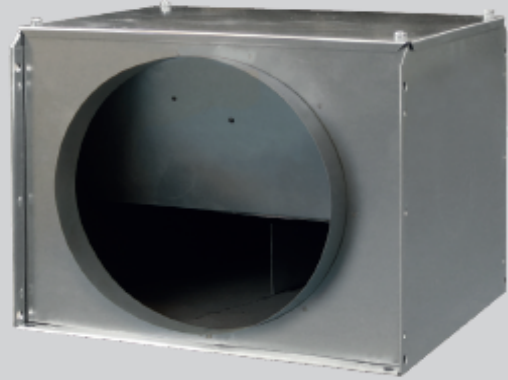


Stock Ref	A	B	C	∅D	E	F	G	K	L	kg
QP400C	456	572	730	400	792	227	243	710	540	46

Dia.	Motor Phase	Stock Ref	r.p.m	Curve Ref.	m ³ /s @ Pa					Motor kW	S.C. Amps	F.L.C Amps	dBA @ 3m
					0	100	200	300	400				
400	1	QP400C	1340	6	1.05	0.94	0.79	0.53	0.32	0.47	5.9	2.33	39

Quiet Pack (QP)

- 'O' Class rated acoustically treated casing, ensuring minimum duct and breakout noise levels
- Air volumes up to 1.59m³/s
- Suitable for external pressures up to 500Pa
- Designed to suit duct diameters from 100 to 500mm
- Operating Temperatures from -15°C up to +40°C
- Speed Controllable
- Quality Assurance to BS EN ISO 9001:1994
- Performance tested to BS848 Part 1 1980



The Quiet Pack in-line acoustic fans are as supplied from Roof Units, designed around a high performance centrifugal impeller, offering a highly efficient, quiet and compact in-line acoustic fan.

The Quiet Pack fan range is manufactured from prime quality galvanised sheet steel, ensuring a robust in-line fan for those tough site conditions.

Quiet Pack casings are suitable for internal mounting and internally treated with an 'O' class rated acoustic foam, which offers the benefits of excellent low level duct bound and breakout sound levels, in addition self extinguishing properties, zero burn rate, resistant to ignition, and no toxic fumes.

Quiet Pack fans are suitable for circular ducting ranging in sizes 100, 125, 150, 160, 200, 250, 315, 400 and 500mm, with air volumes from 0.016m³/s to 1.8m³/s and pressure development of up to 500Pa.

The casing are specially designed to allow the unit to be mounted via drop rods or anti vibration mounts, ensuring a quick and easy solution to installation of the Quiet Pack in-line acoustic fans. All manufacturing processes of the Quiet Pack fan units are computer designed and controlled to BS EN ISO 9001 Standards.

Impellers

The motor and backward curved impeller is factory matched, statically and dynamically balanced on precision machines, to DIN ISO 1940 Grade 6.3, to give quiet, vibration free running.

Motors

Motor insulation Class B, suitable for operating temperatures from -15°C to +40°C and atmospheres up to 95% RH.

All sizes are ideally suitable for speed control by electronic or voltage reduction. Vent-Axia would recommend that a voltage reduction Auto Transformer speed controller is used with all Quiet Pack units to ensure minimum noise levels during speed control and to eliminate any possibility of harmonic noise levels which may occur when using electronic speed controllers at lower speeds.

Performance

The fan performance is in accordance with tests to BS848 Part 1 1980, with the fan sound levels measured in a reverberant chamber in accordance with BS848 Part 2 1985.

Quality Assurance

Design and manufacture is in accordance with the standard for quality management systems BS EN ISO 9001:1994.

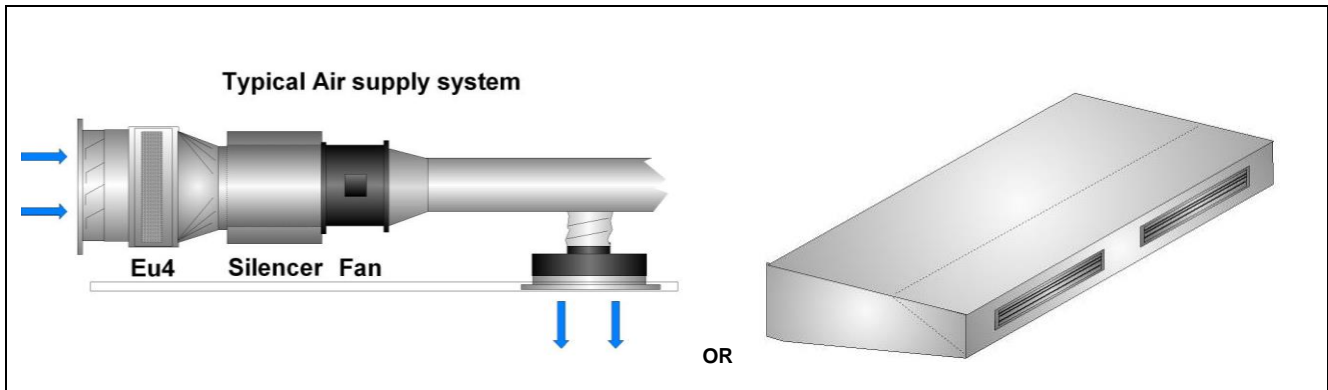
Accessories

A full range of accessories are available with the Fan Box range of fans such as:

- Auto Transformer Speed Controllers
- Electronic Speed Controllers
- D.O.L Starters
- Standard, Acoustic & Thermal Flexible Ducting
- Pre-Panel or Secondary Bag Filters
- Electric Heater Batteries
- Backdraught Shutters
- In-line Attenuators
- Wall & Roof Terminals
- Fast Clamps

To reduce the discharge breakout noise we would install a 450mm Diameter x 450mm long attenuator, which would reduce to noise by 15 decibels.

Noise level the source	39 dba
Distance factor from source to exhaust cowl 3 metres	- 3 dba
Total noise level at 3 metres from discharge cowl	36dba



J: cleaning and Maintenance

General guidelines to cleaning and maintaining an extraction system

The fans and ducting have been situated to maximise the full extraction potential, It is important that the following procedures are carried out as stipulated.

The canopy must be externally cleaned on a weekly basis.

All grease filters must be cleaned at Least three times a week using hot soapy water, to avoid grease carry over.

Cleaning and maintenance of extraction system:

The canopy and full extraction system must be professionally deep cleaned no later than twelve months after installation and certified.

Failure to adhere to these guidelines will prevent the system working to its full potential, and odours may arise due to grease residue inside the ducting giving a carry over.

Summary Cleaning Information

Canopy

Wash down weekly with hot soapy water ensures all fat channels are clear and clean.

Grease Filters

Clean at least three times a week using hot soapy water.

Ensure oil and fat outlets are clear and clean.

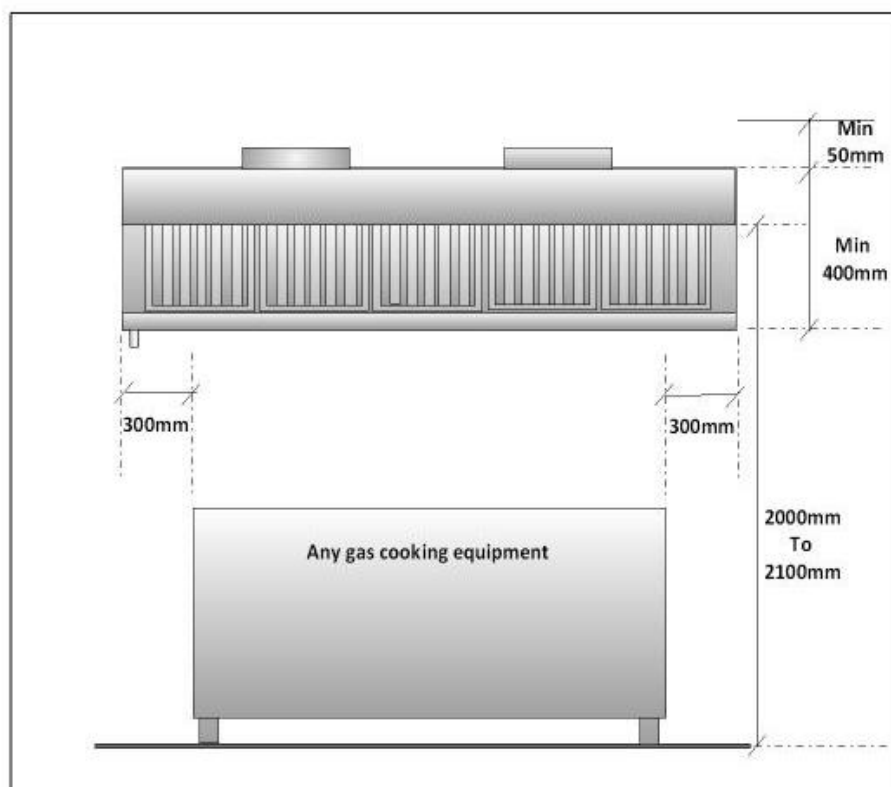
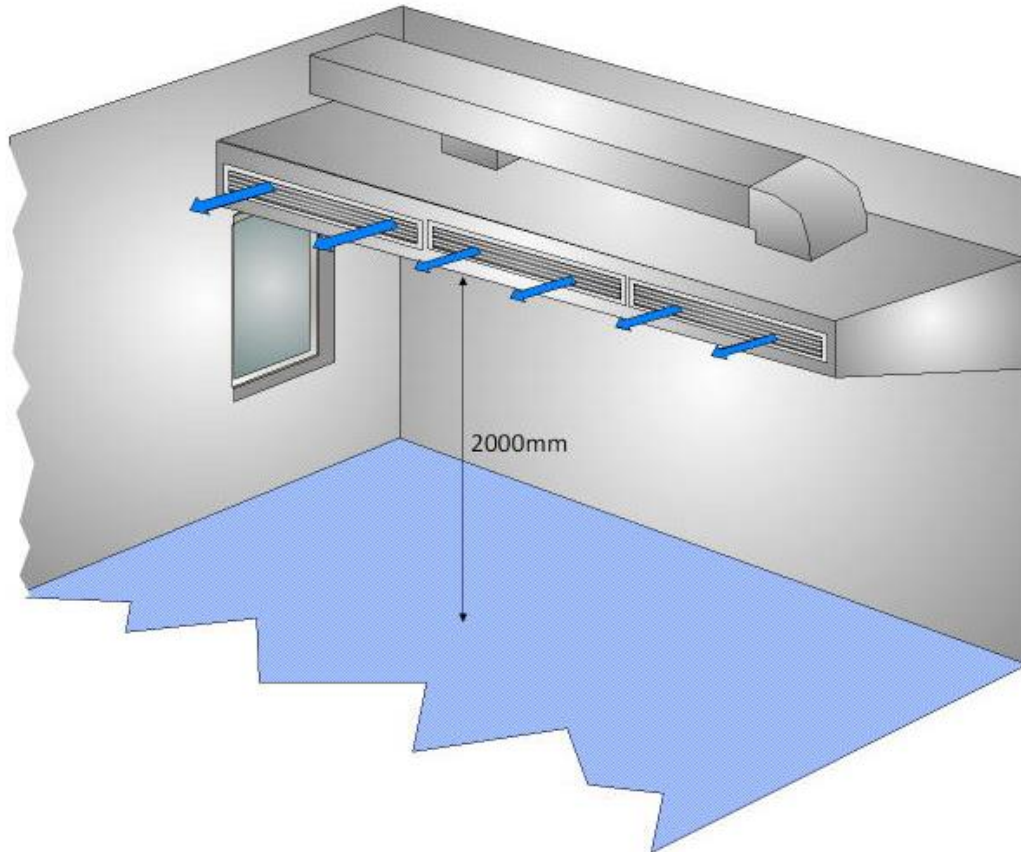
Replace filters with the drainage slots at the bottom facing down.

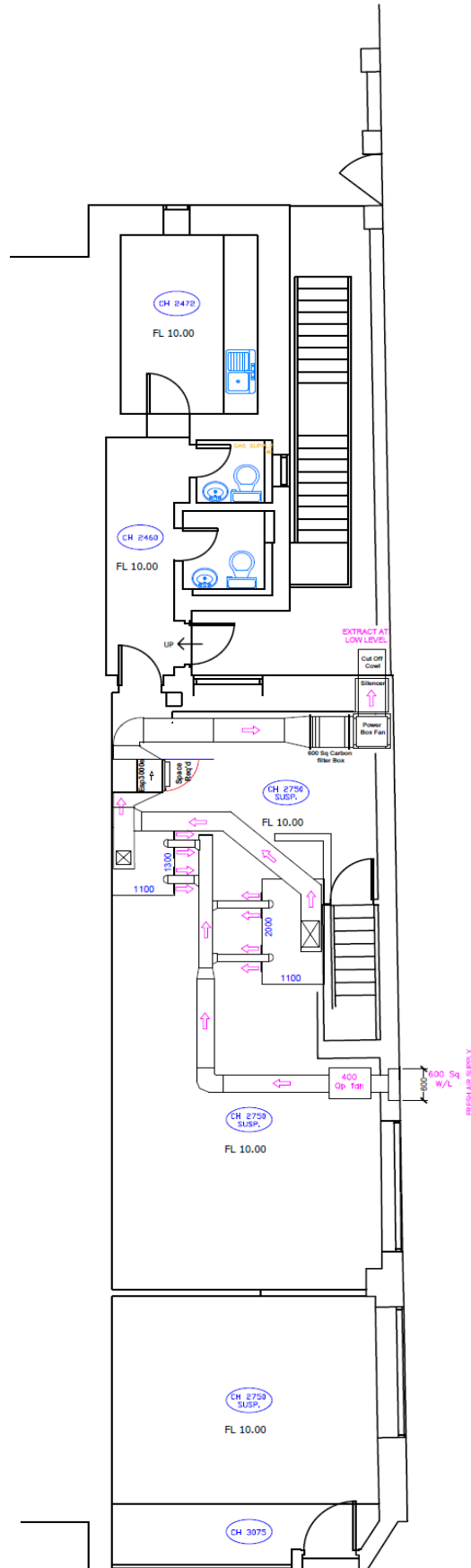
Carbon Filters

Inspect for signs off grease build up monthly. Change- manufactures Recommendation

Every eight - twelve months depending on hours used and type of deposits left on the Filters.

Proposed schematic view of typical extraction canopy

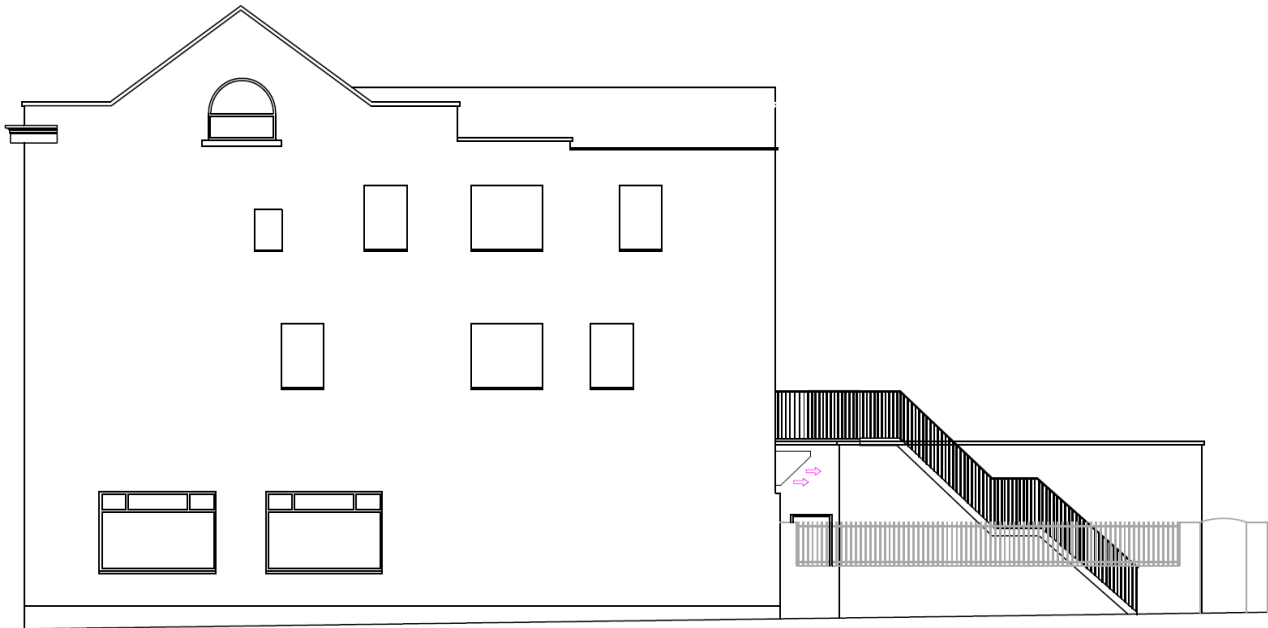




Proposed schematic view of elevation at rear



REAR ELEVATION



SIDE ELEVATION





AIRGARD™ FEATURES

- Rolled stainless steel section with safety edge on frame and blades.
- Welded construction.
- Folding handles.
- Drain holes.
- Optional mesh to front and rear.

TYPE 2 COMMERCIAL KITCHEN FILTER

For use in commercial kitchens and ventilation to extract grease laden air and act as a fire barrier. Fire barriers prevent any cooking flames traveling past the extract canopy. The new Type 2 is a development of customers requesting certain attributes for the baffle filter, the main ones being rolled edges on frame and blades. The Type 2 is available in 20mm or 45mm depths only, this is required for the filter to operate at a constant efficiency and to protect the system as a flame barrier as tested to European Standard DIN 18869-5. The Type 2 Baffle design has a higher grease filtration efficiency than other baffle filters on the market due to the blade design and spacing. Pressure drops and test results please see the enclosed chart below.

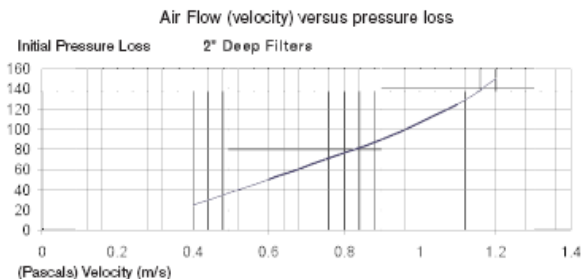
MATERIAL SPECIFICATIONS

As standard, all baffles are Stainless Steel 430 with a polished finish. (Other finishes and material are available)

TECHNICAL SPECIFICATIONS

Longar specifies the Baffle Filter as height x width x thickness. The handles are fixed to the height and drain holes punched on the width. The length of the baffle is the height, please ensure correct orientation is given when ordering.

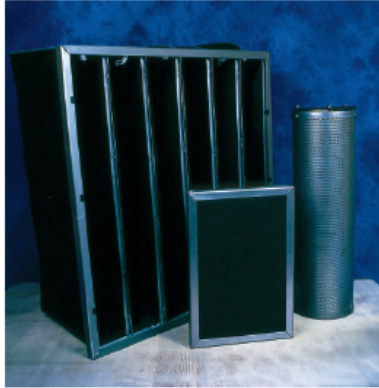
H x W x D Actual Size (mm)	
243 x 395 x 45	496 x 395 x 45
243 x 496 x 45	496 x 496 x 45
395 x 395 x 45	597 x 597 x 45
395 x 496 x 45	624 x 395 x 45
444 x 444 x 45	Custom sizes are available



PACKAGING

All filters are packed in secure corrugated cardboard cartons, tape sealed for protection against dust and other contaminants.

Longar Industries Limited
Unit 25, Glenmore Business Park, Colebrook Way, Weyhill Road, Andover SP10 3GZ
Tel: 01264 332993 Fax: 01264 332994 www.longar.co.uk



LONGAR INDUSTRIES LIMITED

FEATURES

- High quality carbon
- Robust modular construction
- High carbon content
- Special sizes available on request
- Available with handles and seals
- Low pressure losses

ACTIVATED CARBON UNITS (ACU)

For a modular approach to fume removal the ACU is the ideal solution. The ACU unit is manufactured from a number of carbon biscuits held in a vee formation within a corrosion proof metal casing. The carbon biscuits inside the units are 25mm thick and are also sealed into the frames using polymer which eliminates the possibility of any air by-pass around the carbon.

PRE-FILTRATION

Carbon filters are designed to remove fumes and odours and are therefore not able to filter fine particles and dust. If left unprotected, the life of the carbon is severely reduced. To protect the filters use pleated and bag filters to the correct grade; this will depend on the environment.

SIDE ACCESS HOUSINGS

These are housings which encompass the Activated Carbon Unit along with the Pre-Filtration (such as Bag/Panel Filters). All housings have a side panel which is removable so that access can be gained easily to replace the filters.

This type of housing is ideal for adding to existing installations such as catering extracts or industrial ventilation systems.

Options are available depending on the application.

APPLICATIONS

Activated Carbon dates back many years. In the first World War gas masks were filled with activated carbon granules to remove chlorine gas. Today Longar produces a wide range of carbon filters to deal with many noxious fumes and gases, whilst maintaining high levels of strength and low pressure loss.

Major uses of carbon are in areas where toxic or offensive odours need eliminating. For example sewage works, hospitals, slaughterhouses, restaurant kitchens, airports, toilets, wash rooms, laboratories, office blocks and many more.

ACTIVATED CARBON

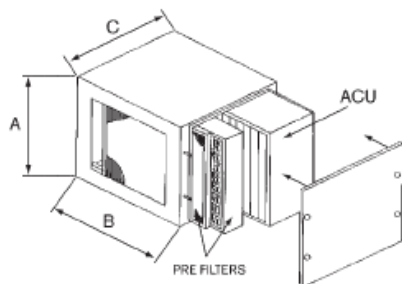
Activated carbon is different from the normal type of loose carbon granule panel in some ways. Firstly, and most importantly, activated carbon granules are fixed and set in position through a thermo-chemical process. With the loose fill granule carbon filters there is a tendency for the granules to rub against each other causing bedding down of the granules and excess dust which would need further filtration.

In addition, bedding down will also allow odours and toxic fumes to by-pass the filter.

The bonding process in our activated carbon filters joins the carbon granules by the points, leaving the pores free to absorb the unwanted contaminants.

This type of construction produces a strong carbon biscuit, which requires no internal structure to support the filter.

Width	Height	Depth	Panels	Flow and pressure loss @ 0.12 secs contact time		Flow and pressure loss @ 0.24 secs contact time	
				M ³ /sec	PA	M ³ /sec	PA
mm	mm	mm					
597	597	147	12	0.230	125	0.115	40
597	597	297	12	0.450	125	0.225	40
597	597	447	12	0.705	125	0.353	40
597	597	597	12	0.940	125	0.470	40
292	597	147	6	0.115	125	0.058	40
292	597	297	6	0.225	125	0.113	40
292	597	447	6	0.353	125	0.176	40
292	597	597	6	0.470	125	0.235	40



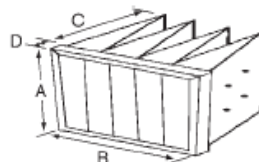
CARBON PLEATED PANEL & BAG FILTERS

The Pleated Panels like the Carbon Bag filters are made from non-woven synthetic filter media which is impregnated with activated carbon.

This type of filter is a good solution for less demanding applications, and an inexpensive alternative to the granular carbon filters.

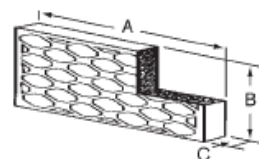
Due to the nature of the product, they can not offer the same life or dwell time associated with ACUs or the Carbon panel filters.

Available in various sizes.



ACTIVATED CARBON PANELS

The carbon biscuits are sealed into steel frames, a scrim is then added to protect the carbon surface from dust contamination. Sealing the carbon blocks in a frame stops any air by-pass, whilst protecting and supporting the carbon block. Please view the price list for stock sizes. Custom sizes are also available.



Longar Industries Limited

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Electrostatic Precipitation (ESP) Filter Unit



Technical and Operations Manual

For Models: ESP 1500EI
ESP 3000EI
ESP 4500EI
ESP 6000EI

2.2 Features

The following features are applicable to all four models covered by this manual:

- They can be installed outside without an additional weather housing.
The Unit's casings is fully weatherproofed, with the Main Door components having an IP Rating of 64 and the Door Assemblies themselves being tightly sealed to the main chassis.
- The ionisation voltage runs at a negative potential which enhances both the ionisation of particles and their consequent precipitation and the production of ozone which helps eliminate odours in a kitchen environment.
- A high degree of efficiency, with power consumption between 20 Watts and 50 Watts, depending on the model.
- The Unit can be linked to a Building Management System (BMS) via a suitable relay mounted on the DIN rail (See: *Connecting the Unit to a Building Management System on page 21*).
- All internal components are designed for easy removal.
- The Mesh Filters (Pre and Post) are designed to drain independently and the Collector Cell is designed to be efficient, robust and effective.
- The Collector Cells and Filter Carriers can be easily removed for cleaning.
- The Collector Cells can be fitted with ionisation wires or with stainless steel spiked ioniser blades.
- All internal surfaces are as smooth and as free from screw and rivet heads as practically possible to allow for ease of cleaning.
- Fully welded sumps prevent leakage of collected grease. The inward sloping edges of the sumps encourage the flow of grease away from both the ducting and either side of the Unit.
- The Door Assemblies are designed to allow the Unit to be quickly reconfigured for different airflow directions.

2.3 Operating Principles

Commercial kitchen exhaust pollution is composed of two distinct phases:

- The particulate phase; oil, smoke and grease particles.
- The gaseous or odour phase.

2.3.1 Oil, Smoke and Grease Filtration

The primary function of Purified Air's range of Electrostatic Precipitators (ESPs) is to effectively filter the particulate phase (oil, smoke and grease) of extracted kitchen fumes.

The Unit covered by this manual utilises an ionisation process to filter particulates in the exhaust down to a sub-micron level, with an efficiency of up to 98% when fitted correctly.

The ESP Filters have been exclusively designed for filtering extracted kitchen fumes and have integral sumps built in to collect the oil and grease particles. This not only simplifies servicing but eradicates potentially dangerous spillage from the bottom of the Unit.