

Kitchen Ventilation
SPECIFICATION
INFORMATION

Requirements for the installation of a complete kitchen ventilation system. Document includes canopy, ventilation and other associated specifics

Springfield Group

thespringfieldgroup.net - info@thespringfieldgroup.net

GDK FORT SHOPPING CENTRE

MANCHESTER

Information Provided By –

UNIT C1 OYO BUSINESS PARK
CASTLE VALE
BIRMINGHAM
B35 6AN

01675 430 490

info@thespringfieldgroup.net

Property Details

GDK

THE FORT SHOPPING CENTRE

CHEETHAM HILL

MANCHESTER

M8 8EP

Site Requirements

Brief description of site requirement

High level Horizontal discharge through cut off cowl with bird guard.

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 for cleaning and maintenance.

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

Summary of detailed information attached in this specification.

Extraction:

Volume M3/second	Resistance	Discharge Velocity	Filtration	Noise level
2.54 M3/sec	**525 pascals**	**10.32 M/sec**	**Convolute filters Activated Carbons (0.38 seconds dwell time ESP4500e**	**49 dba**

Supply:

Volume M3/second	Resistance	Replacement	Air Filter	Noise level
2.03 M3/sec	**140 pascals**	**100%**	**G4**	**37 dba**

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 convolute coil filters within the canopy housing fully welded drain channel and complete with grease tap or grease pot. Perforated from panel plenum to supply fresh ambient air.

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 housekeeping for cleaning grease daily and is easily accessible.

Our canopies are installed at a working height of 2000mm underneath the canopy. 250mm overhang on front and sides of gas appliances.

Proposed site system specification.

Brief description of site requirement

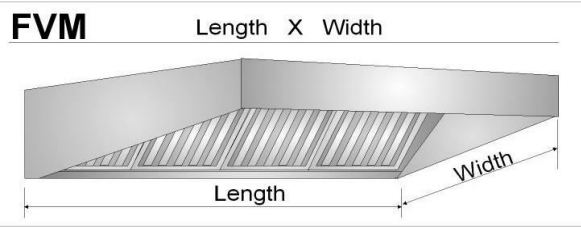
Due to the nature of the building with a designated plant room area, with all the equipment to be mounted at high level internally for maintenance and access. Air supply fan, filter unit and silencers mounted internally with no visible equipment on show externally.

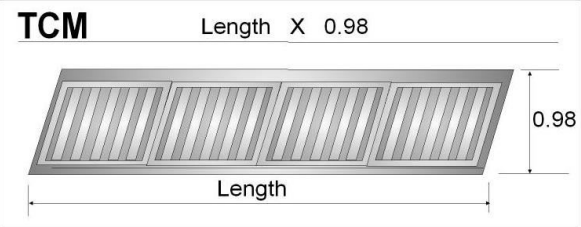


Canopy Information

One off wall canopy 5650mm (long) x 1300 mm (wide) brushed stainless steel wall canopy, complete with stainless steel convolute coil filters. Incorporated within the canopy would be a full-length plenum, built into the filter housing with drain points. Air supply plenum built into front face of the canopy with perforated panels to supply fresh ambient air.

Length Metre	Width Metre	Type	No: of filters	Filter Size	Filter Type	Canopy Style
5.65	1.30	Wall	10	500x500	Convolute	Box





FVM Canopy Calculation volume based on total face velocity.

Length		Width		M²		Velocity		Volume m3/second
5.65	X	1.30	=	7.34	X	0.45	=	3.30 M3/sec

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

Length		Width		M²		Velocity		Volume m3/second
5.00	X	0.98	=	4.90	X	0.45	=	2.20 M3/sec

Average required 2.45 M3/sec for canopy capture face area at the required velocity to suit cooking type and equipment underneath and non-cooking equipment element of the canopy extraction and large over hang.

Extraction System Information

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

Extraction spigots off the top of the extraction canopy to a common 600mm square galnvanised ducting to an ESP4500e electric precipitator filter to remove smoke element of the system and final treble activated carbon filter to neutralise the odour of the system, then transposing to a 630mm Acoustic cabinet mixed flow fan complete with a 900mm long splitter silencer before and after the fan, transposing to 630mm square ducting complete

High level extraction fan system

The extraction fan specified as a breakout noise through the fan casing of 51 decibels. This is the mechanical noise omitted through the sides, with the fan mounted internally it will be reduced greatly by the fabric of the building.The 630mm Mixed flow fan as a induct discharge noise of 68 decibels, with the 900mm long splitter silencer with spectrum attached this noise would be reduced by 16 decibels to give an overall discharge noise of 52 Dba @ 3 metres. Noise spectrum attached 49 Dba.

Attenuator



600mm x 600mm x 900mm baffled splitter attenuator with radius baffles.

Decibel reduction inline 16 Dba

63Hz	*125Hz*	*250Hz*	*500Hz*	*1000Hz*	*2000Hz*	*4000Hz*	*8000Hz*
5	9	12	21	22	24	19	24

Splitter silencer baffle pods on the sides and radiused centre pod, flange each side for installation. Highly efficient due to the large area of media and surface within the construction of the silencer.

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

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

Discharge velocity: 560mm Cut off cowl with bird guard with a free area (0.246 M2).

2.54 M3/sec. divided by 0.246M2 = 10.32 M/sec dispersal velocity to atmosphere.

Extraction fan details

Located Internally 4 pole, three-phase mixed flow fan at the designed Duty: 2.54 M3/sec @ 525 Pascal's resistance**.**

System resistance calculations

	Extraction system	**Pascal's**
1	Splitter silencer & system	150 Pa
10	Convolute grease filters in canopy	90 Pa
1	Quadruple activated carbon filters and pre-filters	140 Pa
1	ESP4500e Electro static filter	145 Pa
Total static resistance on the system		**525 Pa**

Extraction fan details

28/02/25

GDK FORT RETAIL
PARK
MANCHESTER

FlaktWoods Limited
Fan Selector - Technical Datasheet

FläktGroup

Project	:	**Project Code**	:
Quotation	:	**Date**	: 12 October 2023



Lang_ESTOC

ePowerBox 80-630-3-4
(7NA)
GDK BRIDGWATER
1 day - (Fan Only)

PRODUCT

Model Code	ePowerBox 80-630-3-4 (7NA)
Fan Diameter	630 mm
Installation	Type D - Form B
Fan Casing	Long Case - Horizontal

PERFORMANCE

Requested Duty	2.54 m³/s @ 525 Pa (Static)
Outlet Dynamic Pressure	39.8 Pa
Velocity	8.15 m/s

MOTOR

Motor Rating	3.28 kW [Integral Frame - 4 Pole]
Full Load Current	6.1 A
Starting Current	34.16 A
Electrical Supply	380 - 415 Volts 50 Hz 3 Phase
Motor Winding	Standard
Motor Type	Class F Insulation

EFFICIENCY GRADES

Regulation 1253 - 2014	
UVU Efficiency	56.1% (ErP Compliant) ✓
Nominal Flow Rate	2.25 m³/s @ 800 Pa
Effective Input Power	3.21 kW
Nominal RPM	1387 rpm
Internal Fan Efficiency	56.7%

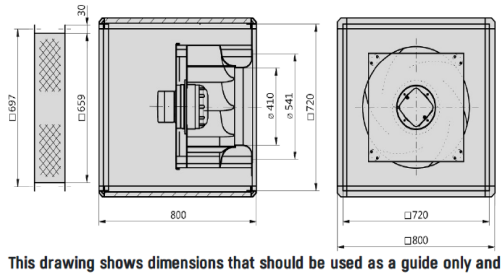
ENVIRONMENT

Air Density	1.2 kg/m³ / 20 °C / 0 m / 40% RH
Smoke Venting	No Smoke Venting
Operating Environment	Normal

RUNNING COSTS

Power from mains	2.81 KWh
Energy Consumption	5,614.60 (2,000.00 h/Year)
Running Cost / Year	£1,403.65
CO2 per Year	1,973.87 kgCO2e
SFP value	1.11 W/l/s @ Actual Duty

PRODUCT DIMENSIONS



This drawing shows dimensions that should be used as a guide only and are subject to change. Certified drawings are available on request.

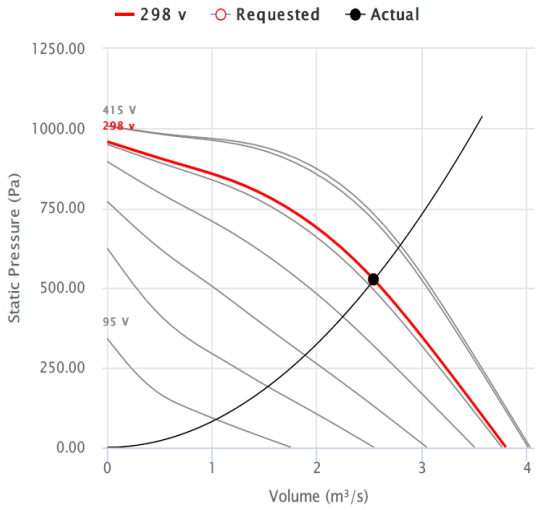
MECHANICAL

Operating Temperatures	0 °C to 70 °C
Minimum Running Speed	277 rpm [13850 Hz]

COMMENTS

A speed controller will be needed to control the speed of this product

FAN PERFORMANCE CURVE



ACOUSTICS

	Sound Spectrum (Hz)								Overall		Distance (3 m)
	63	125	250	500	1k	2k	4k	8k	Lw*	LwA*	LpA @ 3 m **
Inlet	79	69	70	73	72	72	69	63	105	82	62
Outlet	85	74	78	79	79	77	72	65	111	88	68
Breakout	68	65	64	54	53	51	47	41	95	71	51

Sound Data At Requested Duty. * Lw dB re 10^{-12} W * Lw dB re 10^{-12} W

FAN & ACCESSORIES

Item Description	Part Number	Qty	Lead-Time
ePowerBox 80-630-3-4 (7NA)	BI101234	1	1 Day

Springfield Group

EXTRACT FAN REQUIREMENTS

Volume	2.45 m3/s	Resistance	525 Pa
		Resistance Clean	480 Pa

EXTRACT FAN

Type of Fan	Acoustic Box	Make	FLAKT WOODS
Model	POWER BOX 630/4/3	Blade Angle	N/A
Curve Volume	2.45 m3/s	Curve Resistance	460 Pa
Speed Controller Required?		Type of controller	
Speed Control Volume		Speed Control Resistance	

NOISE CHARACTERISTICS

Fan Inlet Acoustic Information

	Octave (Hz)							
	63	125	250	500	1000	2000	4000	8000
Given Value (dB)	85	74	78	79	79	77	72	65
Calculated / Given Value (dBA)	58.8	57.9	69.4	75.8	79	78.2	73	63.9

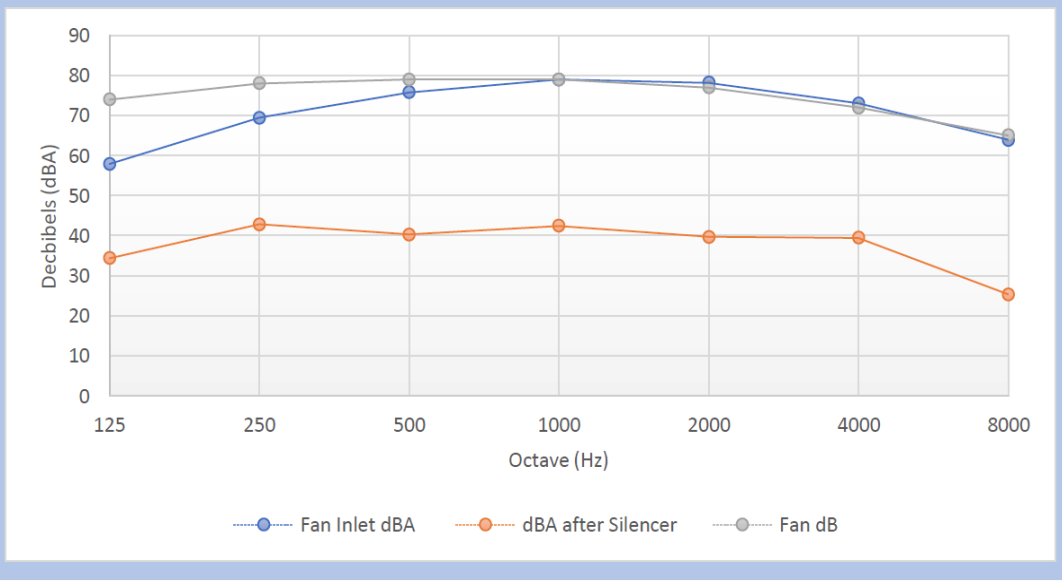
Overall (dB)	88 dB	Overall dBA	

Silencer

Type	SPLITTER SILENCER	Make	
Model	SPL 60X60X90	Dimension	600mm SQ X 900 LONG

	Octave (Hz)							
	63	125	250	500	1000	2000	4000	8000
Given Value (dB)	-5	-9	-12	-21	-22	-24	-19	-24
At Distance	3 m			Directivity Factor	Between two perpendicular planes			
New dBA levels	39.3	34.4	42.9	40.3	42.5	39.7	39.5	25.4

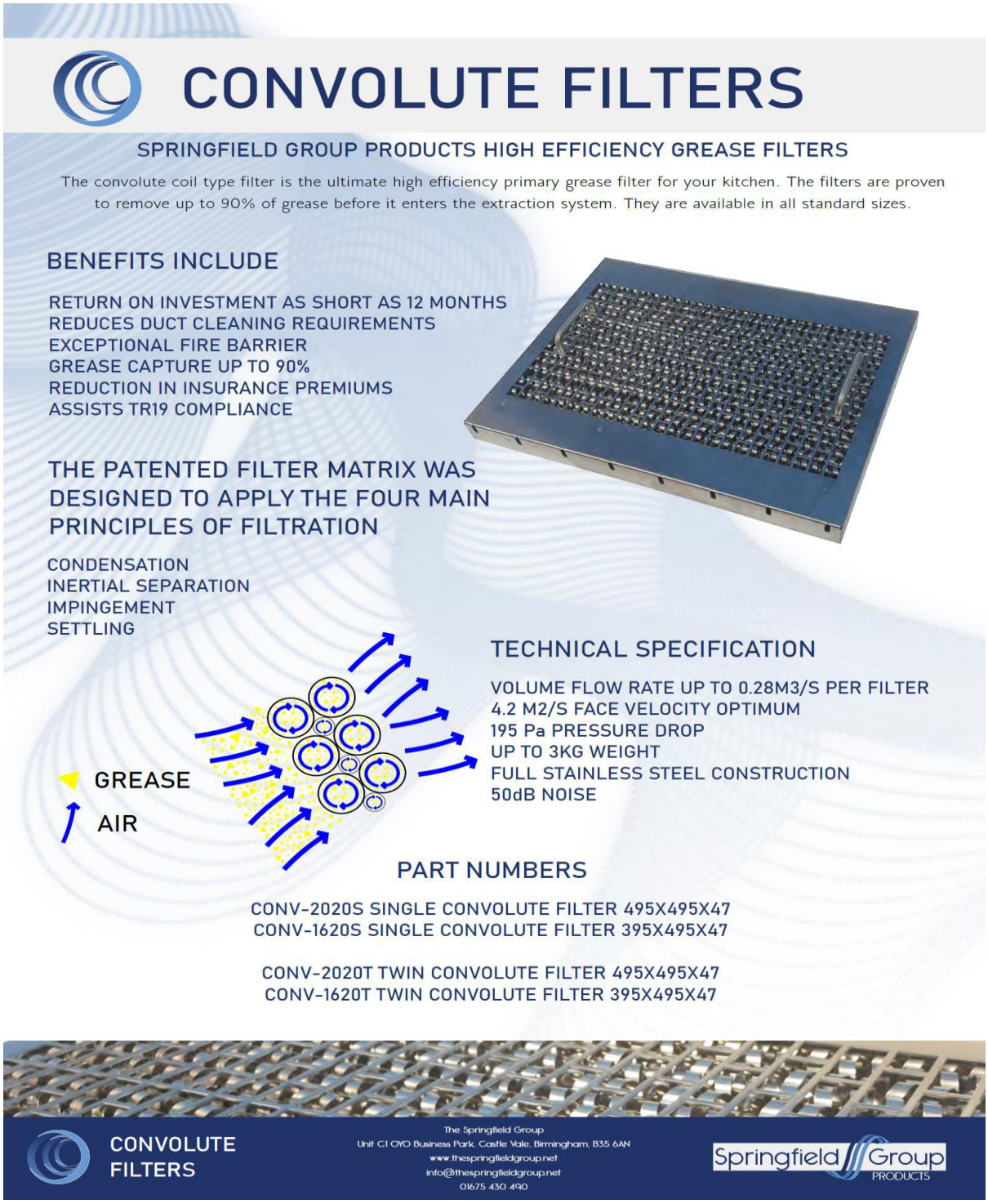
Overall Noise Level	**49dBA at 3m**



Extraction system odour control

First stage

Convelute coil grease filters in the canopy to remove 95% of the grease before entering the system, this reduces fire risk and give longevity to the ducting and filters by staying cleaner longer. Keeps maintenance and ducting cleaning to a minimum, remember never run a system with the grease filters removed, this will allow grease to enter the ducting and saturate the filters etc.



Second stage

Electrostatic precipitator filter unit complete with steel mesh pre-filters to remove the smoke element of the system.

Our ESP Range

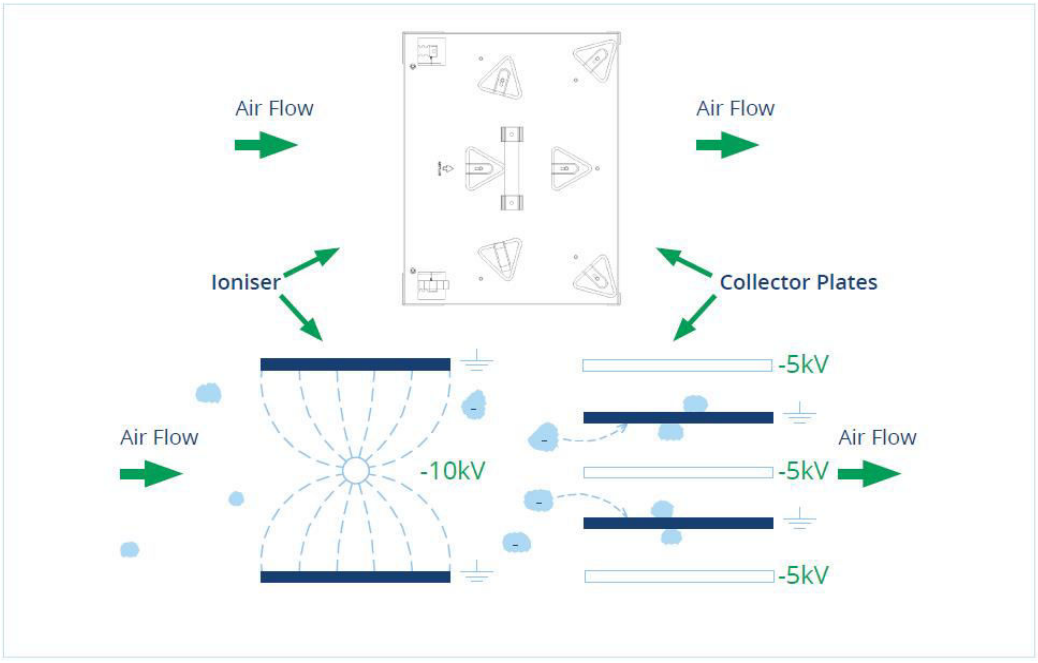


ESP 4500

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

Our ESP's have been specifically designed for kitchen extract systems; they have integral sumps to collect the oil, grease and smoke particles filtered out of the exhaust. This not only simplifies servicing but eradicates potentially dangerous spillage from the bottom of the units and greatly cuts down on build-ups of grease within the ducting.

The ionisation voltage has been designed to run at a negative potential which enhances the ionisation of particles and also produces more ozone which is helpful in reducing cooking odours.



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

Third & Final Stage

Treble carbon filter unit complete with G4 synthetic pre-filters to reduce the odour element of the system.

Dwell time Calculation

600mm x 600mm Carbon face 0.36 M2 X 3 = 1.08 M2

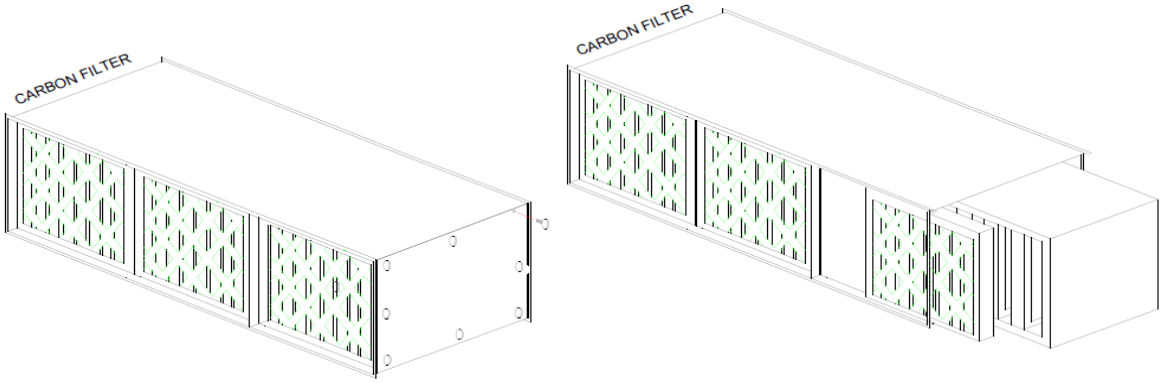
1.08 M2 x 0.90 long = 0.97 M3

0.97 M3 divided by 2.54 M3/sec = 0.38 Seconds dwell time

Fine grade G4 pre-filters

Total 0.38 Seconds

Activated carbon filter unit complete with synthetic pre-filters to reduce the odour element of the system.





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 several 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 –
Robust modular construction: Low-pressure losses: High carbon content.

Typical required residence dwell times for various cooking Premises

Cooking Establishment	Capacity	Residence Time (seconds)
Canteen, Cafes, English style normal kitchen and restaurants, pizza and bread shops	Normal'	0.10 – 0.15
Kitchens producing large amounts of fried foods or Concentrated cooking of burgers	2 times 'normal'	0.20 – 0.35
Indian restaurants, Chinese, Kebabs etc. (spices etc.)	3 times 'normal'	0.40 – 0.60

Air supply details

Air supply ducting mounted in front of the canopy and running into the kitchen, perforated panels in the canopy front plenum supplying 80% of extraction volume with fresh ambient air with a synthetic media filter, 20% of the extracted volume to ceiling diffusers front of house, Galvanised ducting mounted at high level to a 560mm Woods 4 pole 3ph axial fan complete with 560mm 1D Silencer before and after the fan, connecting to a 1200mm x 600mm filter box, transposing to 560mm diameter ducting through flat roof and terminating with a cut off cowl complete with bird guard.

Extraction Volume 2.54 M3/sec (100% volume of extraction) = 2.54 M/sec @ 140 Pascals
The 560mm JM Woods axial fan as a induct discharge noise of 57 decibels, with the 560mm silencer reducing 10 decibels on induct and out duct reducing the discharge or inlet noise. Reducing the noise to 37 Dba @ 3 Metres.

Pleated Panels

Our pleated panel filters are constructed using a core of pleated fibrous media designed specifically for use in air filtration. This is then thermally bonded onto a galvanised steel support mesh for maximum rigidity which is then fully bonded into a moisture resistant rigid white lined card frame. These filters are used as stand-alone pre filters or as a pre filter to bag filters filtering oil and grease particles.





JM Aerofoil

PRODUCT

Model Code	56JM/16/4/5/28
Fan Diameter	560 mm
Fan Speed	1420 rpm [Max 1428, Min 270]
Impeller	5 Blades, 28° Angle
Installation	Type D - Form B
Fan Casing	Long Case - Horizontal

PERFORMANCE

Requested Duty	2.54 m³/s @ 140 Pa (Static)
Outlet Dynamic Pressure	66 Pa
Velocity	10.52 m/s
Absorbed Power	0.780 kW
Peak Power	0.815 kW [Used to size motor]
Efficiency (Total / Static)	70.4 % / 48.4 %

MOTOR

Motor Rating	0.830 kW [CT9 Frame - 4 Pole]
Full Load Current	2.3 A
Starting Current	8.6 A
Electrical Supply	380 - 415 Volts 50 Hz 3 Phase
Motor Winding	Standard
Motor Type	Pad - Class F Insulation

EFFICIENCY GRADES

ErP [FMEG] Rating	N 57 (Not ErP Complaint) ✘
ErP [FMEG]	Target N 58
FMEG Blade Angle [Range]	24° [8° To 28°]
Measurement Category	D
VSD	No
Fan + Motor Efficiency	51.3% (2.32 m³/s @ 194 Pa)
Motor Input Power (ErP)	0.880 kW

ENVIRONMENT

Air Density	1.2 kg/m³ / 20 °C / 0 m / 40% RH
Smoke Venting	No Smoke Venting
Operating Environment	Normal

RUNNING COSTS

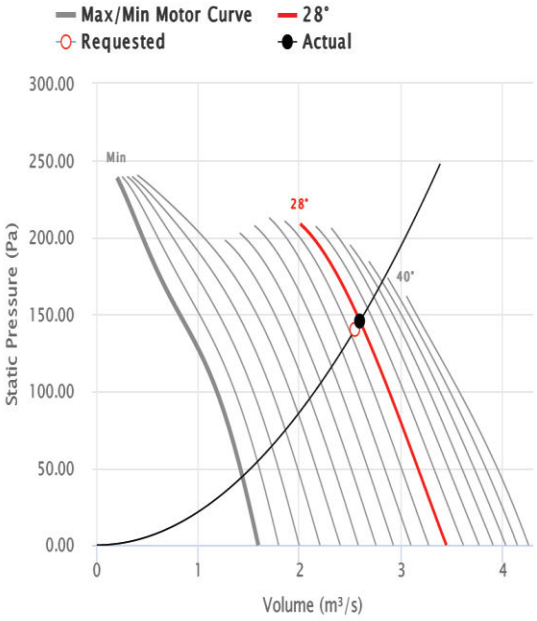
Power from mains	1.09 KWh
Energy Consumption	2,186.65 (2,000.00 h/Year)
Running Cost / Year	£546.66
CO2 per Year	768.74 kgCO2e

MECHANICAL

Casing	560mm Steel Casing
Impeller	Aluminium LM6 Hub, Aluminium LM6 Blades
Operating Temperatures	-20 °C to 50 °C
Maximum Running Speed	1428 rpm
Minimum Running Speed	270 rpm

COMMENTS

FAN PERFORMANCE CURVE



ACOUSTICS

	Sound Spectrum (Hz)								Overall		Distance (3 m)
	63	125	250	500	1k	2k	4k	8k	Lw*	LwA*	LpA @ 3 m **
Inlet	78	81	76	76	73	70	66	61	85	78	57
Outlet	79	82	76	76	73	70	67	63	85	78	58
Breakout	69	61	50	51	48	43	48	39	70	54	34

Sound Data At Requested Duty. * Lw dB re 10^{-12} W * Lw dB re 10^{-12} W

FAN & ACCESSORIES

Item Description	Part Number	Qty	Lead-Time

ODOUR ASSESSMENT SURVEY

Please find below our assessment of the potential nuisance Odour from the cooking carried out at the above site. This assessment has been carried out using: Risk assessment for Odour from the DEFRA & EMAQ guidance of the control of Odour and noise from Commercial Kitchen Exhaust systems.

PROJECT NO:	SG25-010
CLIENT:	GDK

SITE ADDRESS:
FORT RETAIL PARK

CHEETHAM HILL

MANCHESTER

DISPERSION

Description	Score	Details	Result
Very Poor	20	Low level discharge, into courtyard or restriction on stack	☐
Poor	15	Not low level but below eaves, or discharge at below 10 m/s	☑
Moderate	10	Discharging 1m above eaves at 10-15 m/s	☐
Good	5	Discharging 1m above ridge at 15 m/s	☐
		Score	15

PROXIMITY OF RECEPTORS

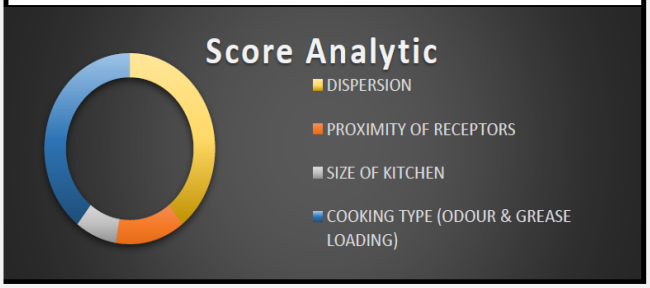
Description	Score	Details	Result
Close	10	Closest sensitive receptor less than 20 from Kitchen discharge	☐
Medium	5	Closest sensitive receptor between 20 to 100m from Kitchen discharge	☑
Far	1	Closest sensitive receptor more than 100m from Kitchen discharge	☐
		Score	5

SIZE OF KITCHEN

Description	Score	Details	Result
Large	5	More than 100 covers or large sized take away	☐
Medium	3	Between 30 & 100 covers or medium sized take away	☑
Small	1	Less than 30 covers or small take away	☐
		Score	3

COOKING TYPE (ODOUR & GREASE LOADING)

Description	Score	Details	Result
Very High	20	Pub (high level of fried food) fried chicken, burgers or fish and chips	☐
High	15	Kebab, Vietnamese, Thai or Indian	☑
Medium	10	Cantonese, Japanese or Chinese	☐
Low	5	Most pubs, Italian, French, pizza or Steakhouse	☐
		Score	15



Total Score	38

Conclusion		
Low to medium	Low-level Odour Control	<20
High	High-level Odour Control	20-35
Very High	Very High-level Odour Control	DWELL
Maximum High	Extreme 3-4 Times normal Very High Odour Filtration Contr	0.20-0.40

NOTES:

METHODS OF CONTROL:

FANS AND DUCTING:

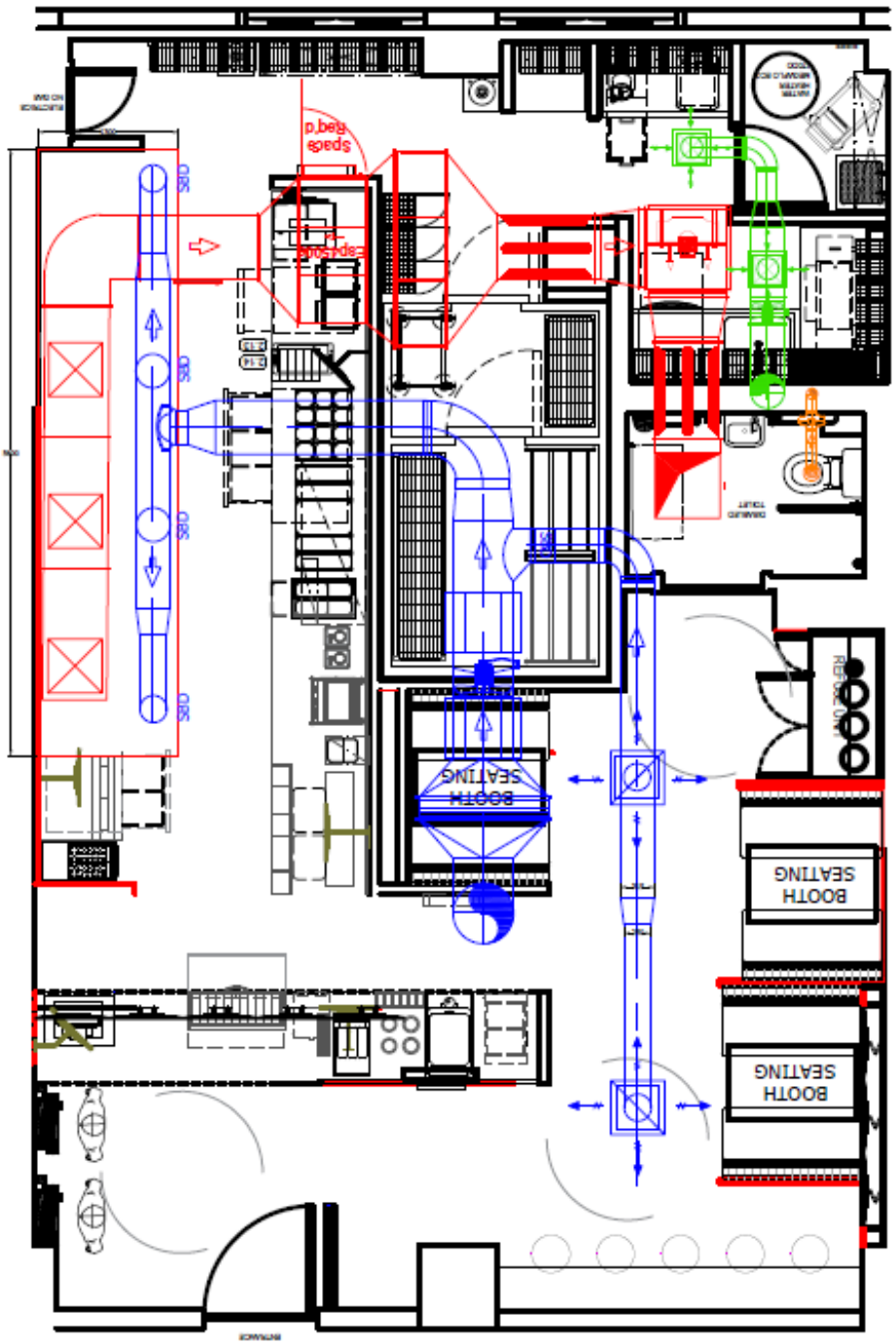
LARGEST PERMISSABLE DUCT SIZE WITH SILENCERS ON FANS

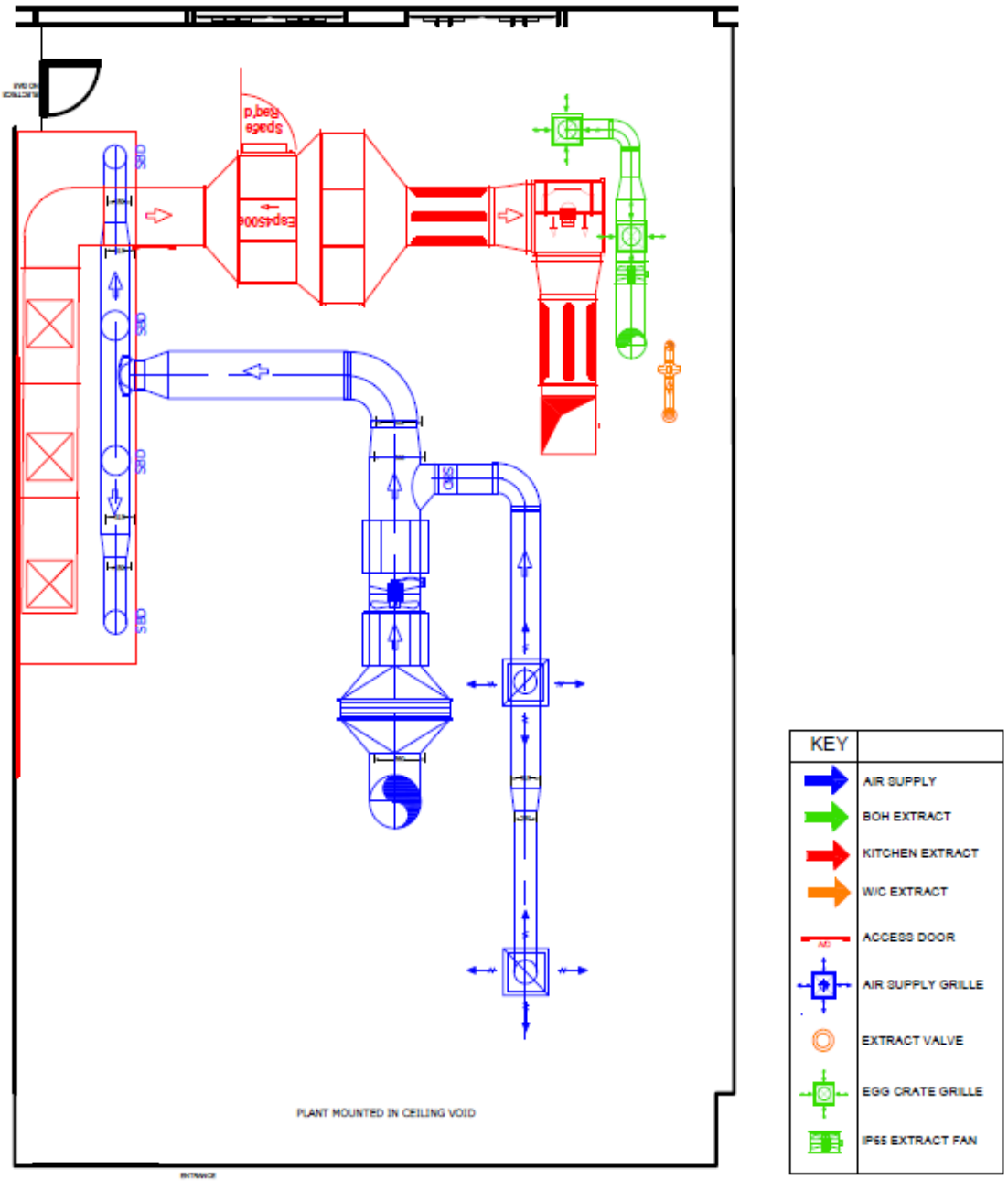
VERY HIGH FILTRATION 0.35 TO 0.40 SECONDS DWELL TIME, CANOPY WITH CONVOLUTE COIL FILTERS TO REMOVE 95% GREASE ENTERING THE SYSTEM

ESP4500e ELECTRO STATIC FILTER TO REMOVE SMOKE ELEMENT OF THE SYSTEM.

TREBLE CARBON FILTER TO REMOVE THE ODOUR ELEMENT OF THE SYSTEM.

DISCHARGE HIGH ROOF LEVEL ABOVE SHOPPING PARADE


BOOTH SEATING
BOOTH SEATING
BOOTH SEATING


PLANT MOUNTED IN CEILING VOID
KEY
AIR SUPPLY
BOH EXTRACT
KITCHEN EXTRACT
W/C EXTRACT
ACCESS DOOR
AIR SUPPLY GRILLE
EXTRACT VALVE
EGG CRATE GRILLE
IP65 EXTRACT FAN