

**Design and Specification
For
Kitchen Ventilation System
Our Ref: KRS/2028/Wa**

Contents

1. Specification.....	
2. Drawings.....	
3. Ductwork Details.....	
4. Noise Control Details.....	
5. Baffle Filter Details.....	
6. Odour Control Details.....	
7. KRS Ltd – Cleaning and Maintenance Details.....	
8. Gas Safe Interlock System.....	
9. System Supports.....	
10. Anti-vibration Details.....	

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1. Site Installation

A. Canopy Extraction

Canopy Installation – 1 No 4900mm x 1300mm stainless steel canopy of pop rivet construction with welded corners, grease trays and stainless steel baffle filters.

Based on HVCA Specification DW/172 2nd Edition 2018 Method 1 “Thermal Convection” as covered in CIBSE Guide B2

Canopy Equipment	Power	Plan Size (m x m)	Area (m ²)	Coefficient (m ³ /s per m ²)	Flow Rate (m ³ /s)
Rational Steam Oven	Gas	0.85 x 0.70	0.595	0.35	0.208
Henny Penny Smart Hold	Elec.	0.80 x 0.60	0.48	0.35	0.168
MagiKitchen Chargrill	Gas.	1.25 x 0.70	0.875	0.95	0.831
Chip Fryer 1	Gas	0.75 x 0.40	0.30	0.35	0.105
Chip Fryer 2	Gas	0.75 x 0.40	0.30	0.35	0.105
Chip dump	Elec.	0.60 x 0.50	0.30	0.15	0.045
Extract Volume Calculated (m ³ /s)					1.46
Add Canopy factor (Overhead Wall Open One End) x 1.20					0.29
Total Extract Volume of System					1.75

External system Resistance 480Pa Clean – 560Pa Dirty

ai. Fan Selection

Woods 50 SC Maxfan Compact – see details enclosed.

Fan is supplied with a Danfoss inverter speed controller complete with “+ or –“buttons to provide speed control of the fan

To ramp up the fan you press the “+” button which allow the fan to ramp up to a maximum of 50 Hz

To ramp down the fan you press the “--” button which allow the fan to ramp down to a minimum of 30 Hz

The Hz is equivalent of 2% of the fan duty and optimum speed is between 37 – 40 Hz

Fan should not to be run any lower than minimum settings as the velocity in the duct drops and will cause higher grease levels in the duct

Sound Data @ 3m: Inlet 79dB (A) – Outlet 80db (A) Outbreak 55

Aii. Attenuation to be installed:

Please refer to Rand Tech Consultants report MDR/J5024a dated 04-06-22 attached

Inlet of fan (Canopy side) 1- 500 Ø x 2D Pod type attenuator ref CPS500/2D

Outlet of fan (To Atmosphere)

1- 500 Ø x 2D Pod type attenuator ref CPS500/2D

Calculated noise level at nearest receptor < 34DdB(a)

aiii Odour Control

The following ‘Risk Assessment for Odour’ has been derived from criteria outlined by DEFRA 2005, Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems & EMAQ odour control guidance.

The assessment is carried to accurately score the site according to DEFRA/EMAQ standards. Odour control must be designed to prevent odour nuisance in a given situation.

The following score methodology is suggested as a means of determining odour control requirements using a simple risk assessment approach.

The odour control requirements considered here are consistent with the performance requirements listed in this report.

Criteria	Impact	Score	Details
Dispersion	Good	5	Discharging 1 metre above ridge @ 15 -17 m/s
Proximity of Receptors	Medium	10	Closest sensitive receptor less than 20 metres
Size of Kitchen	Medium	3	Between 30 – 100 covers or medium sized takeaway
Cooking Type	High	10	mainly grilled chicken in sauces and burgers, little or no onion or spices – French fries in low fat oil
Total Score		28	

Impact Risk

Impact Risk	Odour Control Requirement	Significant Score
Low/Medium	Low Level Odour Control	Less than 20
High	High Level Odour Control	20 - 35
Very High Level	Very High Level Odour Control	More than 35

In accordance with DEFRA/EMAQ “Odour arrestment plant performance” detailed above, odour control required can be considered as **high level odour control as item 2** as detailed following

Low to medium level control may include:

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

High level odour control may include:

1. Fine filtration or ESP followed by carbon filtration (carbon filters rated with a 0.2-0.4 second residence time).

2. Fine filtration or ESP followed by UV ozone system to achieve the same level of control as 1.

Very high level odour control may include:

1. Fine filtration or ESP followed by carbon filtration (carbon filters rated with a 0.4 –0.8 second residence time).
2. Fine filtration or ESP followed by carbon filtration and by counteractant/neutralising system to achieve the same level of control as 1.
3. Fine filtration or ESP followed by UV ozone system to achieve the same level of control as 1.
4. Fine filtration or ESP followed by wet scrubbing to achieve the same level of control as 1.

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

Filtration Required:

Plasmaclean Electrostatix 7500 preceptor (ESP) with prefilters (Grease and Smoke Control)

Plasmaclean Xtract 2100 UV Ozone Injection System (Odour Control)

a.iii) System Velocities

Ductwork within building 7 - 10 m/s

Ductwork external 8.5 - 10 m/s

Terminal Velocity 15 – 17 m/s

B. Fresh Air Supply

Based on 85% of extraction rate = **1.27 m³/sec** (<80 airchanges if fan run maximum speed)

External system resistance 245Pa Clean – 280Pa Dirty

bi. Fan + Silencer selection

Elta SEL355/2-1AC – see details enclosed.

Control of the fan is via an ATC 1-10 step transformer which basically provides 10 steps of control 1 being slow 10 being fast.

Optimum setting for is between 7 – 8 settings

Sound Data @ 3m – Fan **full** speed: Inlet 59dB (A) – Outlet 63db (A) Breakout 42dB (A)

Attenuation to be installed:

Inlet of fan (Atmosphere side)

1- 355 Ø x 2D (Loss 12 – 16dB (A))

Outlet of fan (Room Side)

1- 355 Ø x 1D (Loss 8 – 10dB (A))

Therefore sound (L_{Pa}) at nearest receptor < 32dB(a)

bii. Filters

Standard bag filters to be installed (velocity range 2.5- 3.5m/s)

2 – 600 x 600 x 48 G4 grade panel filters

2 – 600 x 600 x 380 F6 bag filter

b.iii) System Velocities

Ductwork within building 6m/s

Duct branches 4 – 4.5 m/s

Inlet louvre 2.5m/s

2. Drawings

Please refer to the following drawings for reference to the installation:

Architecture Job No 2022-055 Section 4.00 Proposed Elevations 1

KRS Steel Services C2028/SK1 Canopy Extract Ventilation Schematic

3. Ducting Details



Galvanised spiral wound ductwork will be installed from the canopy, run across the ground floor ceiling void and rise to roof level generally as indicated on the above drawing.

At 1 metre above roof level the duct will terminate with a high velocity terminal to achieve a minimum of 15 m/s

All Ductwork will be manufactured from galvanised mild steel sheet, folded or spiral wound, with mezz flange joint construction (rectangular) or coupled together with matching fittings (Spiral)

All ductwork installed will be in accordance with DW/144 – DW172 Standard.

Access doors to assist future clean will be installed every 2.4 metres although additional doors maybe requested by any cleaning contractors (not part of this contract) once they have carried out an in-depth system appraisal.

All ductwork supports (including fans – attenuation – carbon housing) will be complete with anti-vibration mounts to prevent noise vibration through the structure to any habitable spaces

4. Noise Control Details

Flanged Square Silencers Specification

Silencers are available in two standard lengths –

- 1D (length = Diameter)
- 2D (length = 2 x Diameter)

Each length is then available with and without cylindrical centre-body or ‘pod’ which provides additional attenuation. These are identified by the inclusion of the product code ‘P’ for podded or ‘NP’ for unpodded versions.

When selecting the appropriate silencer, account needs to be taken of both the level of sound reduction achieved and, in the case of a podded silencer, the additional pressure drop in the system which needs to be overcome by the fan.

For sound, deducting the appropriate ‘dBA Attenuation’ figure from the dBA @ 3m’ figure in the relevant fan performance table gives a combined dBA @ 3m figure for the fan and silencer combination.

For pressure, the ‘^P’ figure should be added to the pre-attenuation pressure requirement before selecting the appropriate fan.

5. Baffle Filter Details



495 x 495 stainless steel type 2 baffle filters tested to UL1046 European standard DIN 16669-5 will be installed in the canopy

It is universally recognised that there is an increasing need to maintain and 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 degree 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 or Aluminium 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.

Construction

The WFG baffle filter range is available in Aluminium or Stainless Steel and is robustly constructed with filter removal handles fitted as standard.

Cleaning

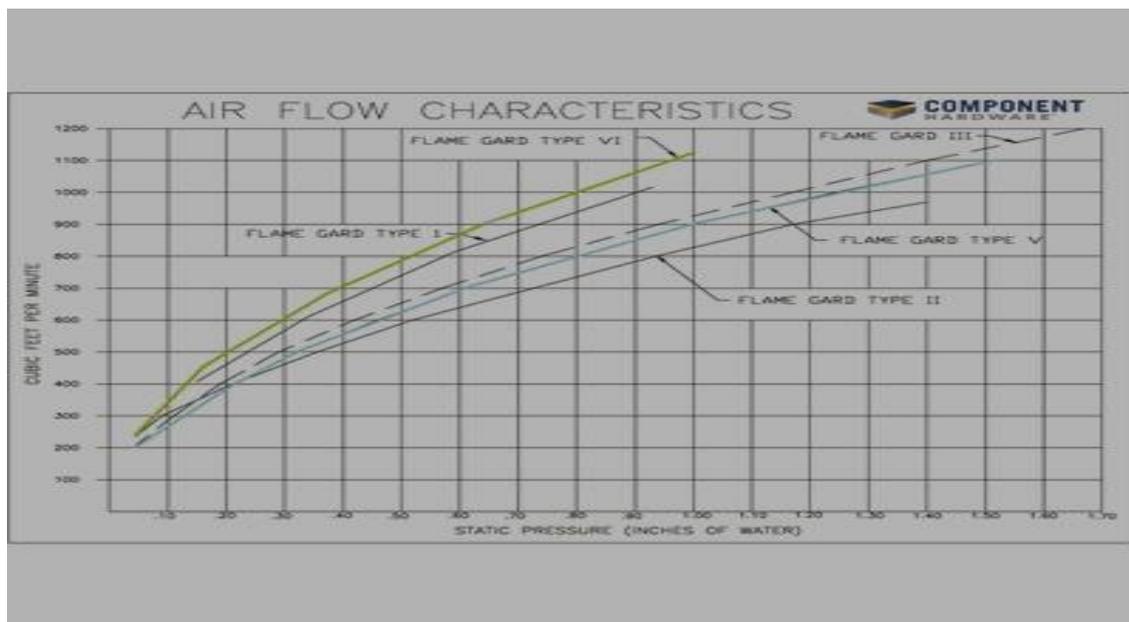
It is imperative that this product is regularly cleaned – according to use. This may be accomplished by steam cleaning, washing in a dishwasher using conventional detergents or cleaners.

Range

Baffle filters are available in a large range of standard sizes, they can also be manufactured in non-standard sizes, however the filter depth is always limited to 47mm due to the nature of the filter.

Normal Size H x W x D	Actual Size H x W x D	Rated Capacity*	Resistance
10 x 20 x 2"	241 x 495 x 45mm	500m ³ /hr	120pa
16 x 20 x 2"	395 x 495 x 45mm	830m ³ /hr	124pa
20 x 20 x 2"	495 x 495 x 45mm	1000m³/hr	104pa

*Note Baffle filters may be used at higher rated capacities whilst retaining their efficiency, however it should be noted that this will increase their resistance to air. Baffle filters must always be used with the baffles running vertically.



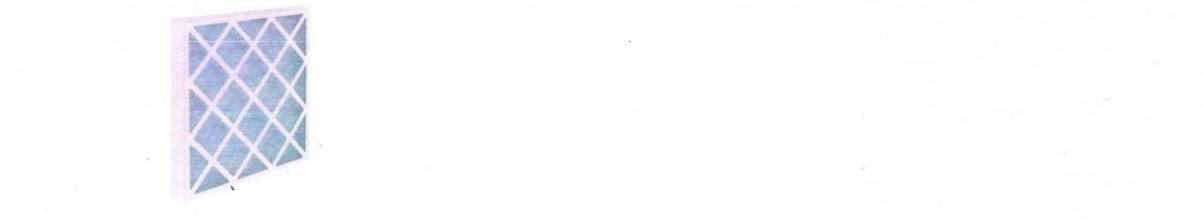
6. Odour Control Details

The Plasmaclean Xtract 2100 UV Ozone Injection System releases large doses of ozone directly into the kitchen ventilation extraction system.

Ozone is a superb disinfectant and odour neutraliser that eliminates cooking smells at source using ozonolysis and work in tandem with the canopy exhaust fan during all running hours of the plant.

Maintenance is low as detailed in section 7 following

Pre filter Details (Fresh Air)



WFV Pleated Disposable Panel

With the increased demands of advancing technology the WFV Disposable Filter provides a high level of protection at a low replacement cost. The product is suitable for use in general filtration applications or as the first line of protection for a more elaborate filtration system. Being fully incinerable the product is particularly suited for application where this form of disposal of the spent filter is anticipated.

Construction

The WFV Disposable Filter contains a core of pleated non-hygroscopic and hydrophobic fibrous media designed specifically for use in air filtration. The media is manufactured with a graded fibre density to ensure optimum and even dust retention combined with low initial resistance and is thermally bonded onto a galvanised steel support mesh for maximum physical stability. The aerodynamic pack is then fully bonded into a moisture resistant rigid white lined card frame and fitted with an airflow indicator.

Applications

The WFV Disposable panel is suitable for use as a pre filter for higher grades of air filtration or for use as a simple filter for general use within air handling systems where the use of glass fibre is unacceptable.

Range

The WFV is available in a large range of standard sizes in 25, 50 and 100mm nominal depths (23, 47 & 97mm actual) and may also be produced in non-standard sizes to suit application requirements. The key attributes of the product are consistent efficiency, robust construction and long life combined with low replacement cost.

7. KRS Steel Services Ltd – Cleaning and Maintenance Details

Preface

The correct cleaning and care of your canopy extraction system is required to maintain the warranty of the plant installed.

Access doors have been installed to facilitate cleaning but these are our assessment of the locations needed.

It may be your cleaning contractor will notify of other locations cleaning doors are required and as such you would need to have these installed at additional cost to you.

The cleaning of potential grease laden ducted extract a system is a critical requirement of any installation to prevent such factors as:

- The system igniting putting the building and users at risk to fire
- Hygiene infection
- Vermin infestations
- Mechanical fan failure

Your insurance premiums could be lowered with correct procedures in place and you have a duty and care in law (negligence) to protect your employees in the work place.

Of less importance but extremely costly to replace if it fails is the extraction fan **which should be removed** from the system and cleaned and not be subjected to the more common practice of injecting de-greasing chemicals into the system, as the chemicals also attack the grease in the fans bearings causing them to run dry and cease, which in turn puts the motor winding into over load and burns the motor out.

Furthermore the fan manufacturer's state that warranty will be invalid if the above process is carried out, so all cleaning contractors should be removing the fans and cleaning them with a non-corrosive agent, whilst the duct can be cleaned with a de-grease agent **but must** be flushed and cleaned before the fan is **re-fitted** in the system.

All fans (especially the extract system with motors in the air stream) should be commissioned and run at the correct air flow **and not** run at low speed during quite times.

Too little air flow across the motor will cause high temperature to be generated in the fan housing which will eventually cause it to overheat and burn out.

We strongly recommend a BESA approved hygiene contractor be employed to carry out the main duct and fan installation as they will initially carry out a wet film test to establish the perceived level of grease production being produced by the type and cooking and system daily usage before recommending a cleaning level to suit your kitchen load.

In line with BESA status the contractor has an obligation to inspect the installation and advise the user of any inaccessible cleaning areas that should be addressed with additional access points and advise of areas of high risk where say ignition is most likely to occur.

The more daily routines can be carried out by the employee's staff or general cleaning contractors.

Canopy and Filter Maintenance

- Grease Filters to be cleaned daily by soaking in detergent overnight.
- Grease trap and condense channel must be cleaned daily
- **Canopy and extract fan and ductwork to have professional deep clean as defined in TR19 BESA guidelines:**

Heavy Use	12-16 hours Kitchen Operation	Every 3 months
Moderate Use	6 - 12 hours Kitchen Operation	Every 6 months
Light Use	2 - 6 hours Kitchen Operation	Every 12 months

The above deep clean is the **maximum** interval recommended - your cleaning contractor will offer a specific timescale once the system has been in use for the initial period.

Main Extraction Filters

It is advisable that the Plasmaclean equipment be maintained by the suppliers to insure correct cleaning and maintaining the warranty of the equipment.

Initially a service and inspection should be carried out after 3 months and subject to the checks of pre and post filters, ioniser, collector cells, etc. a full cleaning programme can be agreed – usually 3 monthly intervals given the use of the kitchen.

During each visit the Xtract 2100 should be inspected, filters changed and a yearly service be carried out.

Pre Filter Maintenance (Fresh Air)

- Supply air panel filters to be visually checked but should be adequate to be changed every 6 months unless heavy staining is evident.

General Cleaning – wall cladding, tables chairs etc.

- Using a damp cloth with mild detergent diluted in water wipe all stainless steel services
- Once dry using a mixture of 50% baby oil and 50% white spirits mixed together, applied to a non-abrasive cloth, lightly wipe down following grain to maintain the stainless steel.

DO NOT USE ANY ABRASIVE MATERIAL/CLOTHS TO CLEAN OR CONCENTRATED CHEMICALS

i.e. mild steel wire wool cleaners

Fan and ESP – Odour Control Operation System Settings

The Xtract 2100 odour control unit will be wired to a fused spur and is permanently “live”.

Ozone injection is activated via an internal pressure switch which will allow ozone to inject into the extract ducted system as long as the fan is running

The ESP is wired in parallel with the extract fan controller and again will be active during the running time of the system is in operation.

Your extract and supply systems have been commissioned and to achieve optimum ventilation within your kitchen each unit should be turned on and run at:-

Canopy Extraction - ****36Hz and above ****

Fresh Air – $\frac{3}{4}$ setting on speed dial

**** Note running the extraction system below this setting will cause grease problems to occur more regularly and ultimately could lead to fan failure**

8 Gas Safe Interlock System

In accordance with current regulation the gas range will be supplied with a gas interlock system which prevents the gas solenoid valve from opening if the system canopy extract fan fails to run, or the manual knock off button has been activated.

Each system would comprise of:

- a. Banico Gas Minder 4 control panel which will monitor the fan air pressure switch and allow the gas valve to open once fan is running and shut down the gas valve should the knock off button be pressed.
- b. DSPA-20 Air differential switch1 (installed by the system extract fan) to detect system pressure and allows gas valve to open
- c. DK-1 Duct tubing part of the air pressure switch again installed by each extract fan.
- d. P/N 8936 Emergency knock off switch installed by kitchen cooking range to allow manual shut off of the gas valve should a fire occur whilst cooking.

9 System Supports

Both the plant and ventilation ductwork will be supported to the structure as follows:

To be supported by non – drill anchors in the slab, drop rods to either a length of 41 x 41 heavy gauge slotted unistruct, uninuts and washers (rectangular ductwork) or split rings with locking nuts (Spiral ductwork). **Anti- vibration** mounts will be installed on all brackets to pervert noise penetration to the space to above or through side walls.

10. Typical Anti-Vibration

a. Spring Mount

Please note all fans will be mounted on the SH type anti-vibration spring hanger and all inside ceiling brackets and cantilever wall brackets. We use a rawlnut multipurpose fixing into the brickwork and use the acoustic hangers for ductwork supporting.

■ **Features**

The SH type anti-vibration spring hanger ensures that vibration generated from the equipment and/or stress by thermal expansion in the pipe and duct while the equipment is running are not transferred to the structure through pipe and duct. The housing needs to be strong enough to stand the weight of the equipment without causing resonance from its own vibration. With the coil spring having a static deflection of 25 mm, the product can maintain the system's natural frequency down to 3-5 Hz and the CR type housing fixture is mounted on top of the housing to prevent high frequency that is passed through pipe and duct from getting into the structure on top of the hanger. Plus, the CR type spring sheet is attached at the bottom to block the high frequency resulting from the vibration that the spring generates itself.

■ **Usage**

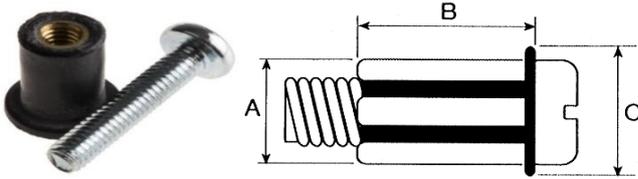
- ◆ For high-efficient vibration control of axial, in-line fan, machine room, pipes in air-conditioning room and ducts
- ◆ For high-efficient vibration control of suspended ceiling desk system in, for example, studios and acoustical laboratories

■ **Specification**

No.	Name of Components	Material	Standard
1	Spring Seat	CR	KS M 6617
2	Spring Cap	SS400	KS D 3503
3	Coil Spring	SUP9	KS B 2402
		HSW3	KS B 2403
4	Housing Fixture	CR	KS M 6617
5	Hanger Housing	SS400	KS D 3503

b. Acoustic Multipurpose Rawlnut

The Rawlnut multipurpose fixing consists of a rubber sleeve with a flange at one end and a bonded-in nut at the other.



Specification

Attribute	Value
Thread size	M4
Type	Wall Plug
Length	12.6mm
Fixing Hole Diameter	8mm
Maximum Fixing Thickness	4mm

c. Acoustic hanger

- Acoustic hanger for ducting
- Hole for M8 threaded rod

Metal bracket with rubber isolating bush typically fixed as an acoustic suspension point to the side of ducting or to timber joints.

Material

Brass, Rubber

