Kitchen Canopies - All Stainless Steel Works
Ductwork & Steel Fabrication - Mechanical Installations
Air-conditioning - Electrical Services
Project Management & Design

Design and Specification
For
Kitchen Ventilation System

Client:
Rahim Rashid

Property:
Pepe's Piri Piri
3 Bryon Place
Uxbridge
UB10 0LZ

Unit 6 Meadway Trading Estate, 429 The Meadway,
Kitts Green, Birmingham B33 0DZ
Email: **k.sharred@krssteelservices.com**

Contents

.

1. Site Installation

A. Canopy Extraction

Canopy Installation: -

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

Canopy Extraction(s) 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
Add Miscellaneous items - Sink, tables, microwave etc.					0.206
Extract Volume Calculated (m^3/s)					1.740
Add Canopy factor (Overhead Wall Open One End) x 1.20					0.348
Total Extract Volume of System					**2.088**

External system Resistance 820Pa Clean – 940Pa Dirty

ai. Fan Selection

Flakt Woods EpowerBox 80 – as 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 35 – 40 Hz

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

aii. Attenuation Selection

A noise report has been commissioned by RandTech Acoustics - Proposal No MDR/J5651a as appendix A of this specification.

All attenuation will be installed as detailed in this specification to ensure all background noise levels achieve the levels required by the council for planning consent.

Attenuation to be installed will generally as detailed in their report ., namely:

Galvanised circular "pod" type inline silencers (CPS) or rectangular silencers (GRS) to be installed on the suction and discharge side of the fan in accordance with the data provided, to meet the council's planning consent requirements.

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 below are consistent with the performance requirements listed in this report.

Criteria	Impact	Score	Details
Dispersion	Very Poor	20	Low Level discharge
Proximity of Receptors	Close	10	Closest sensitive receptor less than 20 metres
Size of Kitchen	Medium	3	Between 30 – 100 covers or medium sized takeaway
Cooking Type	High	7	mainly fried food/fries and burgers, little or no onion or spices – using **low fat** oil
Total Score		**40**	

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	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 Very **high-level odour control item 1** 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 and Carbon Filters 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.

A Maintenance programme must be put in place and carried out to ensure these performance levels are always achieved.

Filtration Required:

Odour control required is considered as **high** with a **dwell** time of **0.4 - 0.8** seconds.

As such, the following filtration will be installed to achieve a dwell time of **0.48** seconds.

Longar Type 2 Premium Grease Baffle Filters in canopy (Large Grease Solids)

Purified Air – (1st Pass) 4500E Electrostatic preceptor (ESP) (Grease – Oil – Smoke Control)

Purified Air – (2nd Pass) 4500E Electrostatic preceptor (ESP) (Grease – Oil – Smoke Control)

Longar Type 4 Mesh Filters (Carbon Filter Protection)

Longar Type 8 Carbon Filters (Odour Control)

a.iii) System Velocities

Header ductwork on canopy 6.5 - 8 m/s

Ductwork within building 7 - 8m/s

Terminal Velocity 15m/s

B. Fresh Air Supply

Based on maximum 85% of extraction then duty required = **1.76 m³/sec**

bi. Fan Selection

External system resistance 245Pa Clean – 280Pa Dirty

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.

bii. Attenuation to be installed:

A noise report has been commissioned by RandTech Acoustics - Proposal No MDR/J5651a as appendix A of this specification.

All attenuation will be installed as detailed in this specification to ensure all background noise levels achieve the levels required by the council for planning consent.

Attenuation to be installed will generally as detailed in their report ., namely:

Galvanised circular “pod” type inline silencers (CPS) or rectangular silencers (GRS) to be installed on the suction and discharge side of the fan in accordance with the data provided, to meet the council’s planning consent requirements.

bii. Filters

Standard panel bag filters to be installed velocity range 1 to 2.5m/s)

1 – Longar Type G4 Panel Filter

1 – Longar Type F6 bag filter

b.iii) System Velocities

Ductwork within building 6 m/s

Duct branches 4 m/s

Inlet bird mesh 3 m/s

2. Drawings

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

KRS Steel Services Drg C4724(P)/M01 – Proposed Kitchen Canopy Extract and Fresh Air Make-Up Ventilation Layout – Plan and Elevation

3. Ducting Details

A mixture of galvanised rectangular and spiral wound ductwork will be supplied and installed, generally as shown on the tender drawing C4324(P)/M01.

All rectangular ductwork and fittings will be manufactured from galvanised mild steel sheet, folded and lock formed with mezz flanges each end in accordance with DW142/144/172 standards.

All spiral wound ductwork will be coupled together using purpose made matching fittings. Pop-riveted and mastic sealed.

Access doors to assist future clean will be installed as shown 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) are complete with anti-vibration mounts to prevent noise vibration to the structure above as detailed in section 10 of this manual.

4. Noise Control Details

Circular silencers are available in two standard lengths –

- 1D (length = Diameter) - 2D (length = 2 x Diameter) - 3D etc.

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

Rectangular attenuators are suitable for HVAC purposes and ideal for commercial/industrial applications.

Each attenuator incorporates splitters providing better low-frequency attenuation; this makes them more suitable for the control of low frequency noise emissions such as those from ventilation and generator systems.

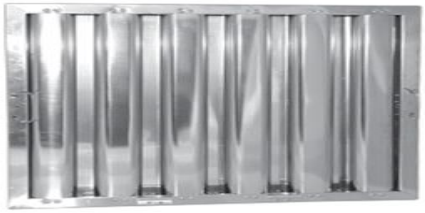
Rectangular Attenuators are available in different models to suit a variety of applications and duct dimensions.

They can be made in different widths and heights, and each model number denotes a different percentage open area and length combination.

The rectangular attenuators are available in various models for general HVAC purposes and suitable for all applications, they deliver good acoustic attenuation properties across a broad spectrum of sound frequencies while maintaining low air flow pressure drops through the attenuator, the range is suitable for dry and wet applications.

5. Baffle Filter Details

495 x 495 stainless steel type 2 baffle filters tested to UL1046 European standard DIN 16669-5 have been 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

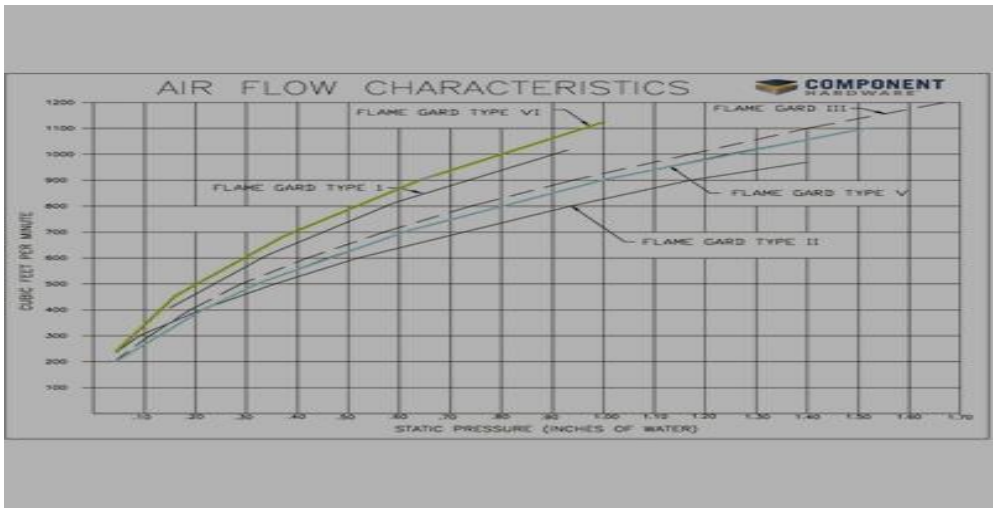
It is imperative that this product is regularly cleaned – according to use. This may be accomplished by steam cleaning, washing in a dishwasher using conventional detergents or cleaners.

Range

Baffle filters are available in a large range of standard sizes, they can also be manufactured in no-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**	**1000m 3/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.



<u>Pre filter Details (Fresh Air)</u>

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.

Dwell time used is 0.1 seconds, this relates to 0.19m/sec through a 25mm nominal thickness panel. The dwell time may vary considerably according to the contaminant to be removed.

In order to be able to present adequate surface area to the airstream the panels will normally need to be mounted in ‘V’ formation within a casing or housing.

6. Odour – Grease – Smoke Control Details

Odour, grease, and smoke are controlled within the system in 8 stages namely:

Stage 1 (Course Grease)

Longar Type 2 Premium Baffle filters which will remove larger grease particles and offer flame barrier protection, will be installed in the canopy, which need to be cleaned on a daily basis along with the canopy drip trays.

Stages 2 and 3 – 1st Pass ESP (Medium Grease - Oil - Smoke)

The Purified Air 4500E ESP (Electrostatic Precipitator) system works in 2 ways.

Stage 2 The mesh prefilters prevent larger grease solids entering the electro charged ironized plates, which in turn prolongs the life of the plates.

Stage 3 The ESP (Electrostatic Separation Precipitator) is basically a series of charged electro charged ironized plates that charge the grease and smoke particles thus repelling them to drain as they pass the like for like charged ionisation plates.

Stages 4 and 5 – 2nd Pass ESP (Medium Grease - Oil - Smoke)

The Purified Air 4500E ESP (Electrostatic Precipitator) system works in 2 ways.

Stage 4 The mesh prefilters prevent larger grease solids entering the electro charged ironized plates, which in turn prolongs the life of the plates.

Stage 5 The ESP (Electrostatic Separation Precipitator) is basically a series of charged electro charged ironized plates that charge the grease and smoke particles thus repelling them to drain as they pass the like for like charged ionisation plates.

The efficiency of the unit can reach 97% under optimum conditions.

Stages 6 - 7 (Odour)

Stage 6 Longar type 4 Mesh prefilters to be installed to collect carry over of residue fine grease particles, which stops it collecting on the carbon to help prolong the life and effectiveness of the carbon filters.

Stage 7 (Odour) - 18 Number Purified Air site safe carbon filters will be installed which when working in tandem with the ESP's will achieve **0.024** second dwell time, so any odour will be neutralised before the extracted air is dissipated to atmosphere.

Stage 8 – Commercial Duct Clean

A BESA approved cleaning contractor will be commissioned with 8 weeks of opening to access and advise of a system cleaning programme – usually 4 month intervals but subject to contractor's recommendations.

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.

The cleaning of potential grease laden ducted extract systems 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 overload 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 as listed below can be carried out by the employee's staff or general cleaning contractors.

Canopy and Filter Maintenance (By Franchisee on a Daily Basis)

- Grease Filters to be cleaned daily by soaking in detergent overnight.
- Grease trap and condense channel must be cleaned daily
- **Canopy - extract duct system and extract fan to have professional deep clean, usually 3 to 6 months, as advised by the cleaning contractor after their initial site inspection and testing of the grease layers.**

Service Maintenance for ESP's and Carbon Filtration - (BESA Approved Contractor)

Before the restaurant is opened a service maintenance contract should be taken out with **Purified Air**, to enable their engineers to carry out the necessary service of the ESP4500 unit.

From their expertise and experience gained on current and past service contracts they have provisionally recommended the following service programme.

ESP's

Intervals of cleaning will be every 3 to 4 months, Engineers will visit to clean and service the ESP's, this will keep them working at 100% of design, removing any smoke produced along with the capture of oil and grease from the cooking process.

Carbon Filters

As the Site Safe Carbons are protected by the ESP system, and pre-mesh filters, they should last anything up to 12 months, but obviously the cleaning contractor will check the condition every time they visit and if necessary, will advise and replace.

Due care and attention must be followed when changing the main extraction filters, especially the Carbon blocks weigh in the region of 18Kg's each and manhandling will be a problem.

Meaningful access must be provided by the client to carry out the works and under no circumstance should the site engineers attempt to change same through ceiling tiles.

If in doubt the engineer will seek advice before changing or cleaning the filters.

Fresh Air Filter Maintenance

Supply air panel filters to be visually checked every few months and changed as required normally in the region of 6 – 12 months be changed every 6 months or when 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 Operation System Settings

The extract and supply systems will be commissioned to achieve optimum ventilation within your kitchen.

Each fan controller should be marked to coincide with the ventilation rates achieved.

For guidance the: -

Canopy Extraction – Will be approx. Step 3 - 4 on the controller for normal running – although this will need increased as system pressure increase indicating ESP or more likely the carbon filters need cleaning******

Fresh Air – Will be approx. Step 2 -3 on the controller although again this will be increased as he filters become dirty and in need of change.

**** 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 from the structure using non – drill anchors in the slab, drop rods to either a length of 41 x 41 heavy gauge slotted unistruct c/w uninuts and washers (rectangular ductwork) or split rings with locking nuts (Spiral ductwork).

A range of **Anti- vibration** mounts will be installed with the brackets (type best suited for the purpose intended) to pervert noise penetration to any occupied areas above

Typical anti-vibration shown below.

10. Typical Anti-Vibration

a. Male/Female Bobbins

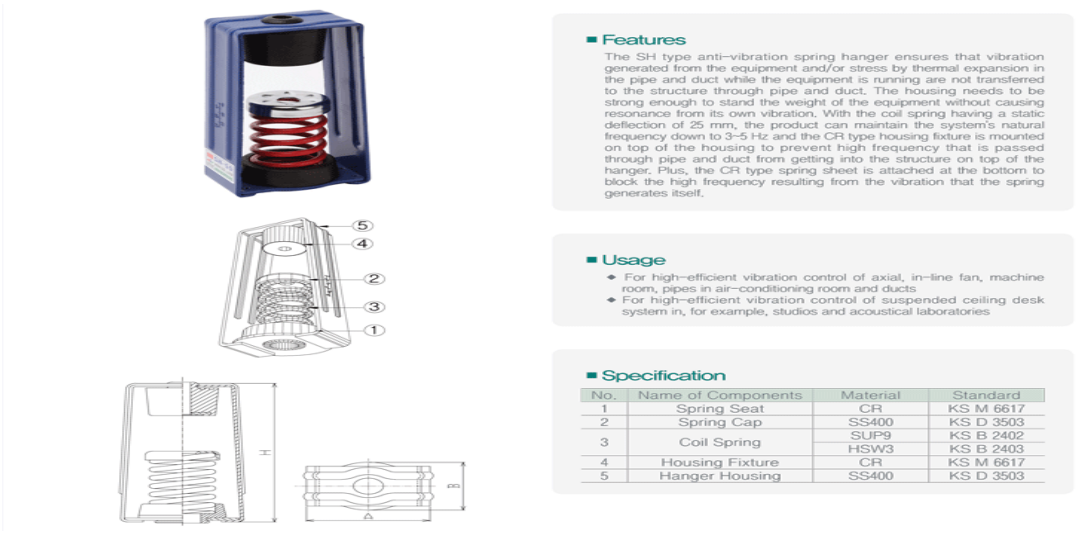
Male/female Bobbin Mounts are a low-cost solution to reducing vibration and shock. They can be used in either Compression or Shear or a combination and are available with various thread configurations.

Advantages:

- Load Range from 1Kg to 2000Kg per mounting
- Zinc Plated Corrosion Resistant
- metals (RoHS Compliant)
- Ease of Installation
- Excellent Levels of Vibration Absorption

b. 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 equipment 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

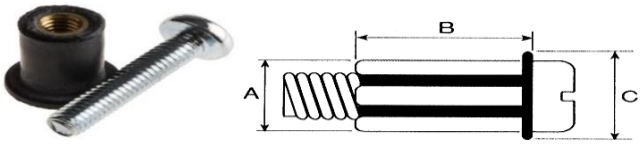
- For high-efficient vibration control of axial, in-line fan, machine room, pipes in air-conditioning room and ducts
- For high-efficient vibration control of suspended ceiling desk system in, for example, studios and acoustical laboratories

■ 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

c. 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
Fixing Hole Diameter	8mm
Maximum Fixing Thickness	4mm

d. 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

Signed K. Sharred
Owner

Date:12/07/2024