

Recirculation Tower Operating and Maintenance Manual

Client:

Disclaimer

Every care is taken to ensure the information contained within this manual is accurate, no responsibility is implied, or otherwise, is accepted for loss or damage incurred due to this information.

It is the responsibility of the owner or user to ensure the method used is suitable in accordance with appropriate and relevant health and safety legislation for their particular application, The owner or user should satisfy themselves by undertaking and preparing risk assessments and method statements before proceeding with a trial or sample component.

The information within this document should not be regarded as a guarantee for the properties of materials or products used.

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OPERATING AND MAINTENANCE MANUAL

Section 1

Preambles

Section 1: Preambles

Introduction

The purpose of this manual is to provide sufficient information to the Client and their representatives to undertake basic maintenance procedures and ensure trouble free operation of the recirculation canopy.

The information contained within this manual should be made available for inspection by any person who may need information in the manual for the purpose of complying with the requirements and prohibitions imposed on them by or under the relevant statutory regulations and provisions.

This includes persons who clean, maintain, alter, refurbish, repair or demolish / remove any part of the structure or installations within the building. Those people are required by the Management of Health and Safety at Work Regulations 1999 to carry out risk assessments in respect of the tasks they are intending to undertake. To do this effectively they need adequate information about the part of the property or installation which will be worked upon and any possible hazards which may exist. The provision of this information to these people is the fundamental purpose of the operating and maintenance manual and ultimately the overall project health and safety file.

The content of this manual will provide sufficient knowledge to allow basic maintenance to be carried out safely by skilled and competent services engineers, experienced in operational and maintenance procedures.

It should be noted that this manual does not provide a planned maintenance programme. It will be the Client's and / or Landlord's responsibility to determine such a programme utilising the technical information. Subsequent alterations to the installed plant and equipment, changes to the building function or occupational hours shall require revision to the content of this manual to maintain its purpose.

Should it be necessary to appoint a Principal Designer or Principal Contractor for future '*construction work*' as defined by the Construction (Design and Management) Regulations 2015 on any part of the property or installations then this manual should be provided to the appointed company or person.

It should be noted that this manual is not intended to supersede any inspection or maintenance routines that may already be operated within the building.

Contents of Manual

This Manual is contained within four sections and has been divided into sub-sections dealing with a specific aspect of the recirculation canopy. It is intended to provide the user with an understanding and working knowledge of the equipment. The manual's main use will therefore be as reference documentation. Since the user will require to identifying certain different aspects i.e. general reference, technical information, operating details, etc., the sub-division has been arranged to hopefully provide for this degree of application.

A brief description of the contents forming each section is given as follows:

Section 1

This section contains miscellaneous information that is required to understand the following sections and provide general information in relation to the project.

Section 2

This section contains an overview of the recirculation canopy and component enclosure, glossary of terms and operational description

Section 3

This section contains the general arrangements required for successful installation of the canopy and component enclosure.

Section 4

This section describes the periodic frequencies of inspection and maintenance to be undertaken on the installed system

OPERATING AND MAINTENANCE MANUAL

Section 2

Overview

Section	Content
2.1.	Recirculation Tower
2.2.	Glossary of Terms
2.3.	Operational Description

Section 2: Overview

2.1. Recirculation Tower

The recirculation tower and component enclosure is constructed from Grade 304 stainless steel and made up of several sections fixed together to form the overall filtration product.

The overall tower installation is made up from the following components enclosed within a common stainless steel accessible enclosure on a raised plinth:

- 3No Extract air mesh type filter.
- 1No G4 Grade Filter.
- 1No Hepa Filter.
- 2No Carbon Filter.
- Extract/Recirculation Fan.
- Control Panel.

2.2. Glossary of Terms

Tower	Rigid stainless steel self-supporting structure for the extraction of grease laden air from the Kitchen
Enclosure	Rigid stainless steel structure to contain all necessary equipment required for the extraction, cleaning of dirty air and recirculation of kitchen air
Filter	Medium used for removing particulates from air at particular stages of the process
Fan	A fan with galvanized sheet steel with backward-curved impeller blades housed within the enclosure used to draw dirty air from the Kitchen through the filter stages and discharge clean air via fresh air grilles
Fresh Air Grille	Unit used for the supply of clean air into an area

2.3. Operational Description

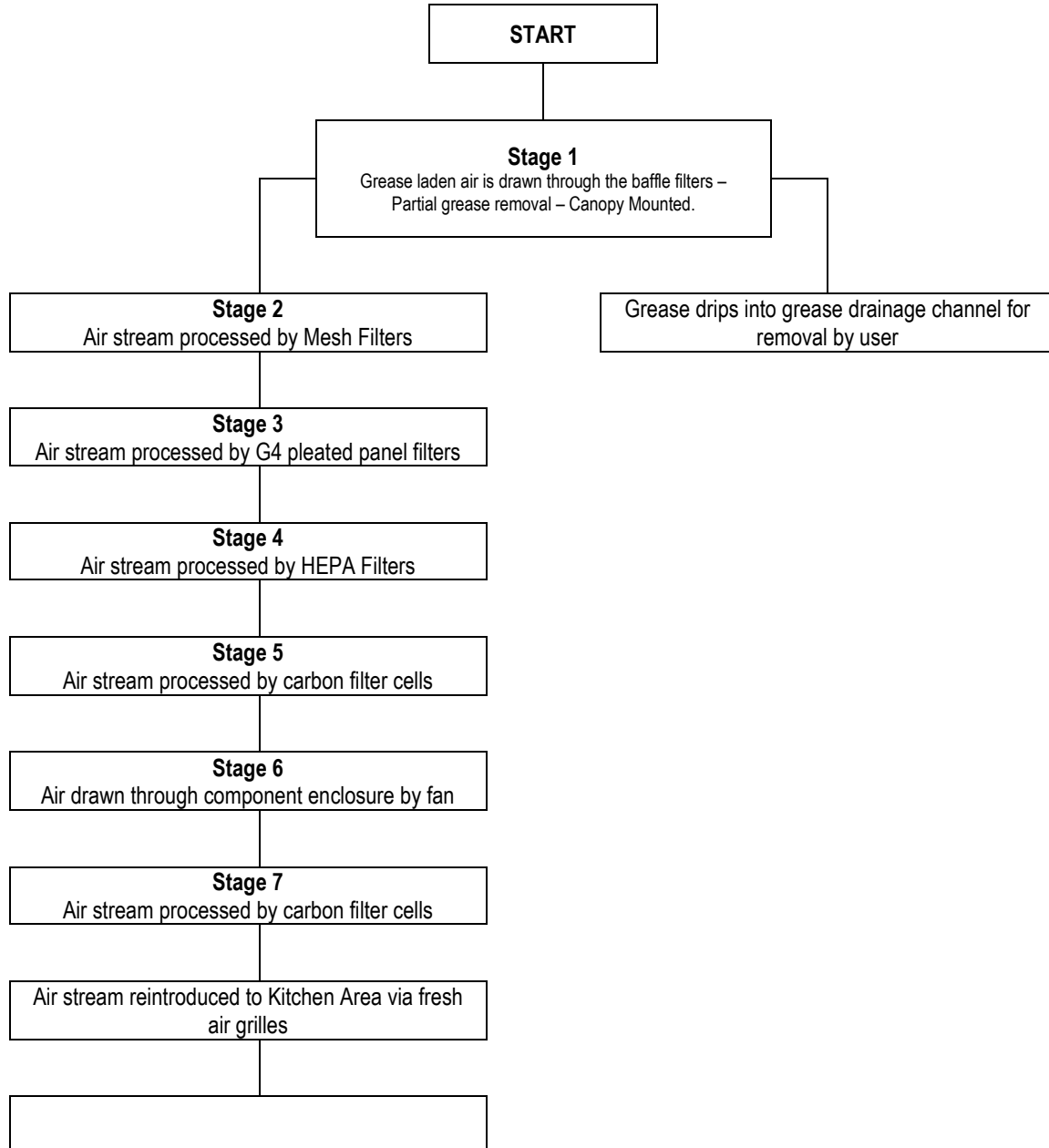
When cooking, hot, humid and grease laden air is extracted from the Kitchen area via the high level kitchen canopy.

A backward curved centrifugal fan, mounted on a hinged swing out door mounted in the enclosure, extracts contaminated air from the canopy and passes it through the ductwork into the tower and through the following stages of filtration.

The five stages of filtration are:

- Stage 1:** High efficiency stainless steel baffle type grease filters mounted within the canopy. (not part of tower assembly).
- Stage 2:** Mesh filters mounted within the tower assembly.
- Stage 3:** G4 Pleated panel filter mounted within the tower assembly.
- Stage 4:** Hepa Filters mounted within the tower assembly.
- Stage 5:** Extract fan unit with enclosed backward curved impeller blades mounted within component enclosure.
- Stage 6:** Carbon filters mounted within the component enclosure after the extract fan unit.

Please note some of the above filter arrangements are in a double pass configuration dependent on the specific project requirements.



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Section 3

Installation

Section	Content
3.1.	Risk Assessment
3.2.	Access and Offloading
3.3.	Warnings
3.4.	Personal Protective Equipment (PPE)
3.5.	Tools and Equipment
3.6.	Preparation
3.7.	Installation

Section 3: Installation

3.1. Risk Assessment

A full risk assessment must be carried out before assembly and installation work commences on site.

Risk Assessments must be undertaken as required by Construction (Health, Safety and Welfare) Regulations 2015, Managing Health and Safety in Construction: Construction (Design and Management) Regulations 2015 – Guidance on Regulations and Electricity at Work Regulations 1989 and should be produced relevant to the activities to be undertaken. Each assessment should be suitable and sufficient to:

- Identify the significant risks arising from the works being undertaken.
- Enable personnel to identify and prioritise the measures needed to control the identified risks.
- Be appropriate to the nature of the work being undertaken and remain valid for a reasonable period of time.
- Ensure that all relevant risks or hazards are addressed.
- Address what actually happens in the work place or during the works being undertaken.
- Ensure that all groups of employees and others who might be affected are considered.
- Identify groups of personnel / workers who might be particularly at risk.
- Take account of existing precautionary or preventive measures being adopted.

It will remain the responsibility of the user to undertake risk assessments for the works associated with the maintenance activity or procedure for which they have been appointed to undertake. The risk assessments will form the basis of a documented Safe System of Work (Method Statement).

3.2. Access and Offloading

Access routes to and from the delivery point to the area of installation shall be clearly defined and agreed. These routes shall be kept clear of materials and equipment and safe for the movement of men and materials. The offloading point should be as close to the installation area as possible.

3.3. Warnings

Do not install the recirculating canopy for the ventilation of gas, oil or solid fuel equipment. The health of operatives is at risk through the actual combustion process which will use the available oxygen in the cooking area creating toxic carbon based emissions.

This recirculation canopy and equipment must only be used in association with electrically powered cooking equipment.

Only trained and competent personnel familiar with the assessment of hazards and risks associated with industrial electrical and ventilation equipment (fans etc) shall undertake installation works.

Where possible, lifting equipment with a suitable safe working load (SWL) shall be used in movement and installation processes.

Only stepladders in accordance with the relative British Standard shall be used for installation process.

Podium steps shall only be erected by competent and trained personnel and in accordance with the manufacturers assembly instructions. Podiums shall comply with the requirements of PASMA PAS 250 Standard for Low Level Work Platforms.

Mobile towers shall only be erected by competent and trained personnel (PASMA) and in accordance with the manufacturers assembly instructions.

Packaging provided is only suitable for protection against scratches. Do not stand on equipment supplied.

3.4.

Personal Protective Equipment (PPE)

The need for personal protective equipment shall be identified during the Risk Assessment process.

General personal protective equipment as follows shall be worn during the offloading and installation activities:

- Safety Footwear EN ISO20345
- Goggles EN166 1F
- Hard Hat EN397
- Ear Defenders EN352:2002
- Gloves EN388 Cut Level 5
- Hi Visibility Vest EN471 Class 2
- Dust Mask EN149:2001 FFP3 (Valved)
- Disposable Overalls EN 14126 Type 6

3.5. Tools and Equipment

- General hand tools including spanners.
- Spirit level.
- Impact Driver (Powered/Cordless).
- Hammer Drill (Powered/Cordless).
- Suitably selected and approved lifting equipment.
- Mobile Towers
- Podium Steps
- Genie Lifts
- Stepladders

3.6. Preparation

Ensure the following documentation has been completed and approved prior to commencing installation works:

- Risk Assessment(s)
- Safe System of Work (Method Statement)
- Installation drawing(s)
- Technical Data Sheets.

WARNING:

Do not install the recirculating canopy for the ventilation of gas, oil or solid fuel equipment. The health of operatives is at risk through the actual combustion process which will use the available oxygen in the cooking area creating toxic carbon based emissions. This recirculation canopy and equipment must ONLY be used in association with electrically powered cooking equipment.

3.7. Installation

The Ventilation tower is a free standing, self-contained ventless recirculation unit designed to accommodate single or multiple pieces of kitchen cooking equipment. The unit uses sequential filtration to remove grease, particulate, smoke and odour.

The unit requires no direct duct connections to and from atmosphere negating the risk of fire spreading through ductwork and the need for fire resistant ductwork.

The system can only be used in conjunction with electrically powered cooking equipment and are not suitable for gas appliances.

The overall installation/unit comprises of several sections and components:

- Tower:** A stainless steel filtration tower, for the filtration of vitiated air.
- Plinth:** A 100mm high stainless steel plinth constructed of stainless steel channel is located at the base to raise the component enclosure from the finished floor. The electrical supply to the distribution board rises through the plinth to the relative service pod.
- Enclosure:** A stainless steel component enclosure comprising of four separate service 'pods' with accessible panels housing:
- Pod 1:** Contains mesh filters, ozone generator, F6 filter media, G4 filter media and H10 Hepa filter media. This pod connects to the discharge air opening on the extract canopy.
 - Pod 2:** Internal ductwork.
 - Pod 3:** Fan unit with ductwork connections and electrical distribution board.
 - Pod 4:** Carbon filter cells. This pod connects to the recirculated/clean air inlet connection on the extract canopy.

The canopy is secured to the building structure at the appropriate level above the floor level. The plinth is secured to the floor using appropriate fixings. The service pods are fixed sequentially together to form the overall enclosure with the bottom pods secured to the plinth and the top pods secured to the extract canopy. Any wall cladding sheets and solid end wall panel are fixed to the walls.

A fully interlocked internal control system provides speed control for the fan unit and local isolation of the overall installation.

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Section 4

Maintenance

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4.3.	Procedures
4.3.1.	Cleaning Stage 1 Stainless Steel Baffle Type Grease Filters.
4.3.2.	Cleaning Recirculating Canopy Lighting
4.3.3.	Cleaning Stainless Steel Surfaces (General)

Section 4: Maintenance

4.1. Overview

The recirculation tower and equipment enclosures have been designed for ease of maintenance and cleaning. Intervals between cleaning should not be left too long as grease deposits can become engrained and the cleaning process will require specialised attention.

Regular visual inspections of internal and external surfaces should be undertaken with particular attention being made to non-visible and readily accessible surfaces.

It should be noted that grease filtration is not 100% efficient and a small amount of grease will be carried on the airflow, through the filters and deposited on surfaces of ductwork and equipment.

The amount of grease is dependent upon the type and level of cooking. If internal grease deposits are left unclean there is a risk of fire and hygiene issues. It is imperative to have systems and components deep cleaned.

The efficiency and operational life expectancy of recirculation tower and associated components will rely upon the maintenance regime for the system, adopted by the user. Poor maintenance of individual system components can have a detrimental effect to other parts of the system ultimately causing permanent damage or failure.

A planned maintenance regime should be adopted immediately to ensure continued system efficiency and minimising risks to the health of personnel.

The cleaning and maintenance of recirculation equipment and associated components should only be undertaken by suitably trained and competent personnel with experience of specialised cleaning techniques and maintenance practices.

It is recommended that a qualified contractor be engaged and retained to undertake all cleaning and maintenance. Failure to correctly maintain recirculation canopies and associated components will invalidate any guarantees or warranties.

4.2. Preventative Maintenance

The frequency of preventative maintenance depends upon:

- Type of establishment.
- Level of output.
- Type of cooking.
- Duration of cooking and how often.

The level of output and type of establishment can be categorised as follows:

Level of Output

Light

Light/Medium

Medium

Medium/High

High

Very High

Type of Establishment

Public House and Bar Food. Small Café's. Tea/Coffee Shops.

Schools. Hospitals. Care/Nursing Homes. Office/Workplace Kitchens.

Italian/French Restaurants. Hotel/Pub/Pizza/Supermarket Restaurants.

Small/Low Output Fast Food Restaurants. Steak Houses. Kebab/Chip Shops.

Large High Output Fast Food. Mexican/Oriental/Asian Restaurants.

Food Production Factories.

For suggested guidance on cleaning intervals refer to the following schedule:

Preventative Maintenance Intervals						
Equipment/Component	Light	Light/ Medium	Medium	Medium/ High	High	Very High
Cleaning Stainless Steel Component Enclosure	7 Days	7 Days	5 Days	5 Days	2 Days	2 Days
Cleaning Internal Surfaces of Recirculation Canopy and Component Enclosure	3 Months	3 Months	3 Months	2 Months	1 Month	1 Month
Cleaning Enclosure Internal Ductwork	3 Months	3 Months	3 Months	2 Months	1 Month	1 Month
Cleaning Stainless Steel – General Surfaces, Fingerprints, Stains/Discolouration, Oil and Grease Marks and Corrosion	Cleaning of general stainless steel surfaces is a non-scheduled activity and should be undertaken as required dependent upon level of output. Surfaces should be cleaned when dirty to restore to original condition.					
Replace Stage 2 Mesh Filters	2 Months	2 Months	2 Months	1 Month	1 Month	1 Month
Replace Stage 5 G4 Pleated Panel Filters	2 Months	2 Months	2 Months	1 Month	1 Month	1 Month
Replace Stage 6 HEPA Filters	3 Months	3 Months	3 Months	2 Month	2 Month	2 Month
Inspect and Clean Stage 7 Fan Unit	2 Months	2 Months	2 Months	1 Month	1 Month	1 Month
Replace Stage 8 Carbon Filters	4 Months	4 Months	4 Months	2 Month	2 Month	2 Month

4.3. Procedures

WARNING: Cleaning and maintenance of recirculation canopies and associated components should only be undertaken by Chapman Ventilation personnel, trained and competent in specialised cleaning techniques and maintenance practices.

General cleaning and wiping down of un-specialised components and stainless steel surfaces can be undertaken by in-house personnel. The following procedures should be used as guidance.

4.3.3. Cleaning Stainless Steel Surfaces (General)

- Step 1** Switch off, isolate and make safe electrical supply to recirculation canopy and enclosure at local isolator and appropriate distribution board. Allow light fitting to cool.
- Step 2** Allow the stainless - steel surfaces to cool.
- Step 3** Position suitable access equipment adjacent to the enclosure.
- Step 4** Wipe the enclosure surfaces with a damp cloth using a light concentrate of detergent in warm water. Using a clean damp cloth and warm water, rinse the surfaces and remove any residual detergent. Dry all surfaces with a clean soft cloth.

Note: In the event of finger prints, solvents such as Acetone or Alcohol may be used.

- Step 5** Re-energise the electrical supply to the recirculation canopy and enclosure by switching on at the local isolator and appropriate distribution board.

MUB/T 042 500EC

General description

- EC-motors, high level of efficiency
- 100% speed controllable
- Up to 120°C medium temperature, continuous operation
- Multi-functional use, e.g. for kitchen exhaust air
- Pre-assembled isolator is standard
- Low sound level
- Easy to maintain and reliable
- Motor outside the air stream
- Integrated motor protection
- Potentiometer included for ease of commissioning



Technical parameters

Nominal data	
Voltage	400 V
Frequency	50/60 Hz
Phase	3 ~
Input power (P1)	1536 W
Current	2,29 A
Max. airflow	2,26 m³/s
R.p.m.	1504 r.p.m.
Weight	71,3 kg

Temperature data	
Max. temperature of transported air	120 °C
Sound data	
Sound pressure level at 3 m	49 dB(A)

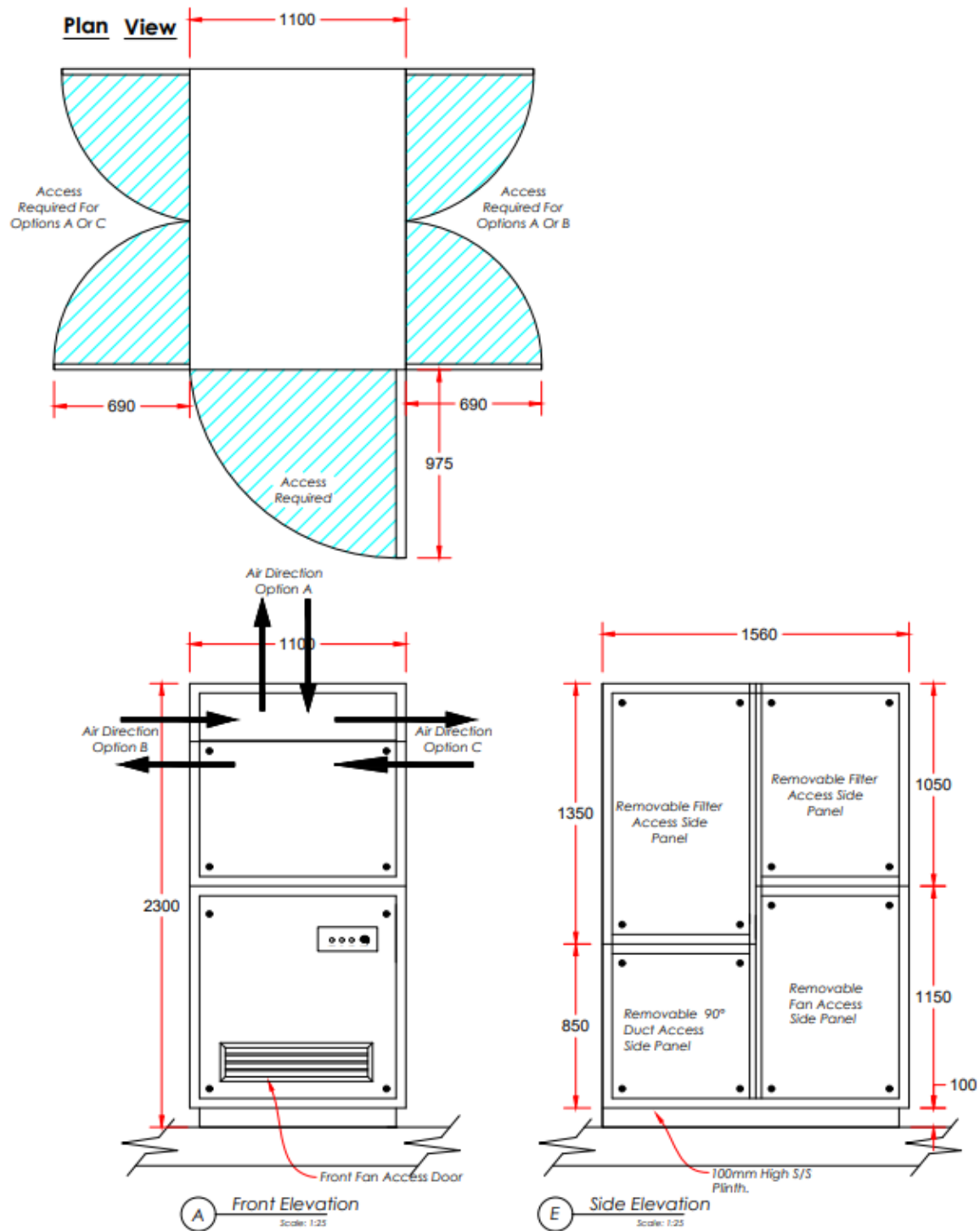
Max efficiency

Hydraulic data	
Working air flow	1,25 m³/s
Working static pressure	628 Pa
Power	1531 W
Speed	1505 r.p.m.
Current	2,28 A
SFP	1,23 W/(l/s)
Voltage	400 V

Acoustics

Sound power level	63	125	250	500	1k	2k	4k	8k	Tot
LwA Inlet	58	60	64	66	65	62	57	50	71
LwA Outlet	60	62	66	68	67	64	59	52	73
LwA Surrounding	43	45	49	51	50	47	42	35	56

Measuring point: qv = 1,25 m³/s, Ps = 628 Pa

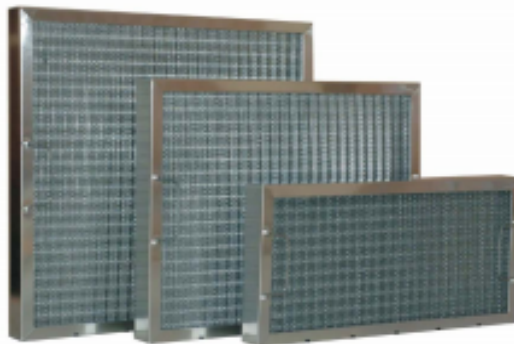


Mesh Grease Filters

Aluminium Frame

General description

These filters are designed for use in commercial kitchens and ventilation from food preparation areas where their primary function is to reduce grease carry over from the cooking area. These Filters are rated at 1.5m/sec - where the pressure drop is 15Pa for 45mm filters and less than 10Pa for 20mm filters.



Construction

These filters are manufactured by rolling a metal frame which holds a series of expanded and corrugated metal layers. These layers create an impingement barrier which catches grease from the extract air.

Features

- Aluminium Frame
- Strong rolled frame construction
- Scratch Free outer surface
- Fold down handles
- Drain Holes
- Low Pressure Drop
- Ex-Stock Delivery

Material Options

- Type GFS - Stainless Frame and Mesh
- Type GF - Aluminium Frame and Galvanised Steel mesh
- Type GFSE - Stainless Frame and Galvanised Steel mesh

VLINE Panel Filter

Economy Pleated Panel Filter

General description

The VLine pleated Panel filter is an economy specific disposable product offering a better than basic level of filtration, or pre-filtration in HEVAC applications. This product is made using patented Kimberly Clark Intrepid media which offers an upgrade from traditional cotton polyester products.

Construction

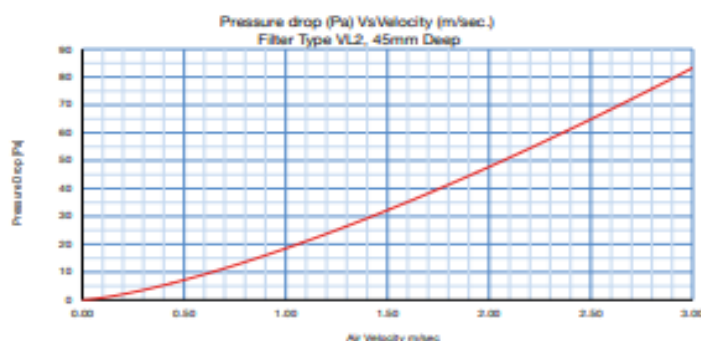
This product is constructed by bonding a pleat pack of G Line media into a water repellent AquaKote card frame.



Features

We use the heaviest AquaKote board available at 710microns for the entire range of panel filters we produce. The Elmendorf wet tear strength is rated at a massive 6963mN.

The adhesive used is specially formulated to maintain adhesion even under wet conditions. The expanded steel backing to the media is designed to provide maximum support whilst offering minimal airflow resistance.



Performance

- Filter Class EN779:2012 G4
- Filter Depth 45mm
- Rated Airflow 2.0m/sec
- Initial Pressure Drop 45Pa
- Final Pressure Drop* 200Pa
- *this is a recommended value only

Operating Temperature

- Continuous 80 °Centigrade

Ultima DP HEPA Filter

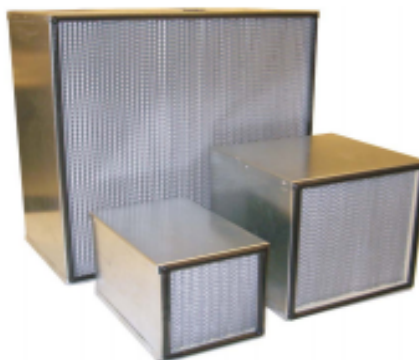
Type MA12

General description

To qualify to be called a High-Efficiency Particulate Air or HEPA filter, the filter must be able to remove, from the air that passes through it, 99.97% of particles down to a submicron level. of 0.3 microns. Our main use of HEPA filtration is the removal of smoke particles.

Features

A Range of HEPA Filters with steel Cases



Technical Characteristics

- MEDIA = Glass fibre paper
- SEPARATORS = Aluminium (WA)
- SEALANT = Two components cold moulded polyurethane.
- FRAME = Galvanised Steel
- GASKET = Single Piece PU Foam Gasket (double gasket option)
- FACE GUARDS= On request
- Depth Available 150mm

BS-EN 1822 FILTRATION CLASS		
Class	Filters global efficiency %for MPPS particles	Local Efficiency % for MPPS particles
H11	≥ 95 %	-
H12	≥ 99.50 %	-
H13	≥ 99.95 %	99.75 %
H14	≥99.995 %	99.98 %

Testing and Certification

Each filter Grade H13 and above is individually leak tested and certificates are issued.
We can also test and certify to EN1822 if required.
Every HEPA is issued with a unique serial number which allows full traceability right back to the filter media Batch and Roll.
Each roll of HEPA filter media is individually tested and certified.

Sitesafe Carbon Filters

Double Pass

General description

We manufacture Sitesafe carbon filters, these innovative carbon units measure 594x196x597mm, three combining to 594x594x597mm, directly replacing our original carbon blocks whilst providing exactly the same filter performance as an existing full size cell.

Their advantage is that they only weigh 18kg each against the 68kg of our original blocks. This takes the strain out of fitting and servicing, allowing only one engineer to complete the task where two had been previously required.

Our Sitesafe carbon filters use panels of activated carbon to remove the malodorous gases within the commercial kitchen extract duct through the process of chemical adsorption.

By installing our pre filters before our Sitesafe filters, the carbon life span is greatly increased, allowing it to nullify malodours at optimum efficiency for much longer.



Recommended minimum dwell times

Application	Recommended Dwell Time	Grade
Cooking - Low Odour, Tea Shop, Canteens	0.1 to 0.2 Seconds	Carbon grade Enhanced for improved performance for light catering odours
Cooking - Moderate Odour. Pizza, Steak House, French, Italian, Pubs, Chinese, Japanese, Cantonese	0.2 to 0.4 Seconds	Enhanced Carbon grade suitable for many applications 65% Minimum CTC
Cooking High Odour, Indian, Thai, Vietnamese, Kebab	0.4-0.6 Seconds	Enhanced Carbon grade suitable for many applications 65% Minimum CTC
Cooking Very High Odour. Fried Chicken, Pubs with large fried food turnover, Fish and Chip Shops, Fast Food / Burgers	0.4-0.8 Seconds	Enhanced Carbon grade suitable for many applications 65% Minimum CTC
Reduction of Kerosene Exhaust fumes	0.1 to 0.2 Seconds	General Purpose Activated Carbon
Reduction of Ozone	0.1 to 0.2 Seconds	General Purpose Activated Carbon
Reduction of Diesel Fumes, including H ₂ S, SO ₂ , NO _x , HCl	0.2 Seconds	Carbon Museum, Archive, Café Directive: SO ₂ SO _x NO ₂ NO _x Removal
Museum and Archives	0.2 Seconds	Carbon Museum, Archive, Café Directive: SO ₂ SO _x NO ₂ NO _x Removal