MANN+HUMMEL
Intelligent
Air Solutions

Leadership in Filtration

MANN+HUMMEL


CLEAN AIR


POWER GEN
& MARINE


CLEAN ROOM


INDUSTRIAL

Clean Air
Air Filter Product Range

Clean air. We can't see it, smell it, taste it or feel it, yet it is a vital part of our everyday lives: ensuring the efficient generation of energy; protecting valuable equipment and artefacts; making indoor environments more comfortable; even preserving life itself.

At MANN+HUMMEL, our entire business is about creating clean air, and our sole aim is to do so in the most efficient way, at the most cost effective price, and with minimal impact on the world around us.

From humble coarse dust filters through to the latest laminar flow operating theatre ceilings, each product in our range is developed around our customers' exact needs using all the application know – how you could wish for.

QUALITY YOU CAN DEPEND UPON

The Eurovent Certification scheme is designed to give you the con dence that the filter you select really does what you expect.

Eurovent Certification is an independently operated scheme for the air filtration industry. Companies applying to join must offer their M and F class filters for testing through Eurovent, an impartial and neutral trade association. The filters are randomly selected by Eurovent and their performance is verified according to the manufacturer's EN 779 claims. Only those manufacturers meeting their claims are awarded certification.

You can now be sure that what we say has been checked by an independent body. Eurovent certified manufacturers can be trusted.

CLEAN AIR AT THE LOWEST POSSIBLE COST

eco16 Clean Air Management System

Energy consumption and air quality are vital considerations in specifying an air delivery system. Thankfully, our eco16 programme guarantees a required level of air cleanliness in the most efficient manner possible. By analysing your exact requirements and operating environment, we balance all of the constituent parts of your air handling unit and provide you with a filtration system that offers the necessary cleanliness at the lowest possible cost – both to you and the environment.

Sounds simple, but thanks to the array of factors that contribute to the make-up of an internal environment finding the optimum solution is no easy task, which is why we have patented eco16 as a method of selecting air filters for indoor air. No other company can provide this solution.

MANN+HUMMEL participates in the ECC programme for Air Filters. Check ongoing validity of certificate: **www.eurovent-certification.com or www.certiflash.com**

Contents

Filter Class, Typical Contaminants and Applications

Group	Class	Typical Contaminants	Typical Applications
G **Coarse Dust EN 779**	G1	Leaves | Insects | Textile Fibres	Low Grade Applications (e.g. for protection against insects and leaves)
	G2	Human Hair | Sand | Water Droplets	Low Grade Applications (e.g. for protection against insects and leaves)
	G3	Beach sand | Plant spores	Low Grade Applications (e.g. for protection against insects and leaves)
	G4	Pollen | Fog	Compact room air conditioners | Prefilter for F7 and F8 filters
M **Medium EN 779**	M5	Spores | Sedimenting Particles | Cement	Inlet filter for very low requirement rooms | Prefilter for F8 and F9 filters
	M6	Larger Bacteria & Germs | PM10 dust	Inlet filter for low requirements rooms | Prefilter for F9 and H10 filters
F **Fine Dust EN 779**	F7	Soot | Lung Damaging Dust (PM2.5)	Inlet filter for low requirements rooms | Prefilter for F9 and H10 filters
	F8	PM 2.5-dust | Cement Dust (fine fraction)	Recirculated air in AC plants | Prefilter for H11 and H12 filters
	F9	Oil Smoke | Bacteria	Prefilter for H13 and H14 filters | Prefilter for gas adsorption filters
E **EPA Filters EN 1822**	E10	Germs | Tobacco Smoke	Final filter for air conditioned rooms of very high standard (e.g. hospitals)
	E11	Viruses on Carrier Particles | Carbon Black	Final filter for cleanrooms ISO class 7 – 8
	E12	Oil Fumes | Sea Salt Nuclei	Final filter for cleanrooms ISO class 5 – 6
H **HEPA Filters EN 1822**	H13	Radioactive Particles	Exhaust air filter in nuclear industry | Final filter for military shelters
	H14	Viruses	Final filter for cleanrooms ISO class 4 – 5
U **ULPA Filters EN 1822**	U15	All Air Suspended Particulate Matter	Final filter for cleanrooms ISO class 3 – 4
	U16	All Air Suspended Particulate Matter	Final filter for cleanrooms ISO class 2 – 3
	U17	All Air Suspended Particulate Matter	Final filter for cleanrooms ISO class 1
A **Gas Filters**	Physisorption	VOCs | Solvent Vapours | Kitchen Odours	Airports | Office Buildings | Hotels | Hospitals | Improvement of IAQ
	Gas Filters	Acidic Gases | SO_2 | SO_2 | NO_2 | NOX	Computer & Control Rooms | Microelectronics | Museums | Libraries
	Chemisorption	Amines | NH_3 | NH_4 | NMP | HMDS	Recirculated air in Microelectronics Industry

Contents

Synsafe
Synthetic Air Filter Media

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Synsafe is a high quality air filter media with excellent dust holding performance. Available in filter classes G2 – M5, Synsafe Media is intended for the coarse and fine filtration of supply and exhaust air in a number of environments.

Constructed from synthetic fibres, Synsafe Media features a progressive structure where the density of the filter mat gradually increases with the depth of the material. This prevents early surface clogging of the filter material and results in high dust holding capacity and long service life.

Synsafe Media is mechanically and thermally bonded, so that the structure and properties of the filter material are retained even under difficult operating and climatic conditions.

Furthermore, Synsafe Media has a high resistance to mechanical stresses, reducing the risk of damage on installation in ceiling frames and wire cages.

KEY FACTS

- High performance synthetic fibres
- High dust holding capacity
- Progressive density
- Robust and durable
- Filter classes G2 – M5
- Mechanically and thermall bonded

Synsafe
Technical Data

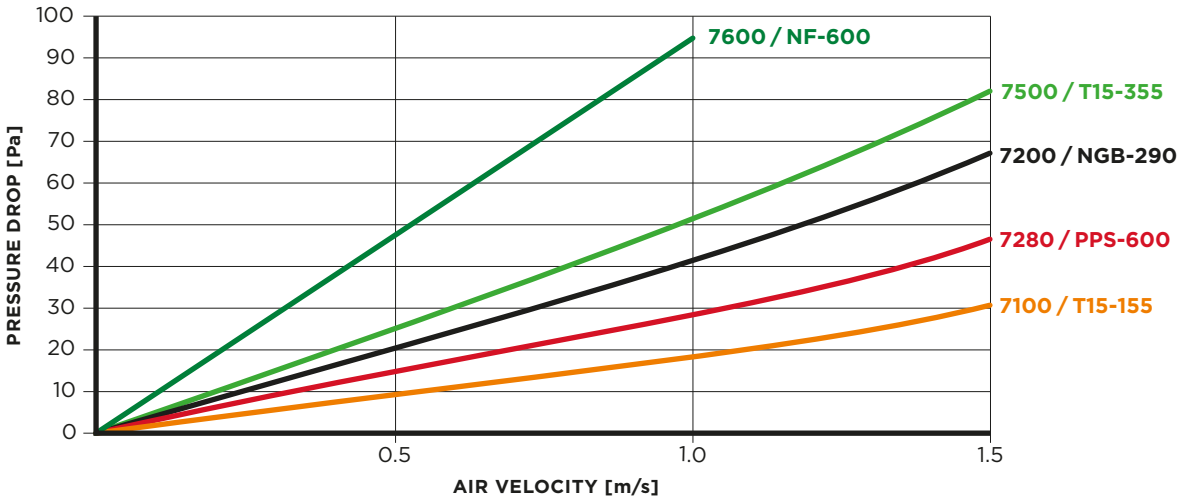
The media detailed below represents a small selection from the wide MANN+HUMMEL range.
Other grades and designs are available to order.

Article No.	7100 / T15-155	7200 / NGB-290	7280 / PPS-600	7500 / T15-355	7600 / NF-600
Filter Class*	G2	G3/G4	G3/G4	G4	M5
Arrestance (%)	80 – 90	80 – 90	80 – 90	90 – 95	> 95
Fire Resistance**	F1	F1	F1	F1	F1
Depth (mm)	12	21	50	22	20
Weight (g/m²)	140	270	330	330	270
Max. Temperature (°C)	70	70	70	70	70
Max. Humidity (%)	100	100	100	100	100
Colour – Inlet Side	White	White	Blue	White	White
Colour – Outlet Side	White	White	White	White	White
Width x Length (m) – Standard Rolls***	1 x 50 / 2 x 50	1 x 20 / 2 x 20	1 x 10 / 2 x 10	1 x 20 / 2 x 20	1 x 20 / 2 x 20

*) EN779:2012 **) DIN 53 438 part 3 ***) Special rolls can be supplied in any width between 0.1 to 2 metres. Filter mats can be supplied in optional size.

PRESSURE DROP – AIR VELOCITY

Recommended final pressure drop: 2 – 2.5 times initial pressure drop.



ACCESSORIES
MANN+HUMMEL has a wide range of frames, filter banks and filter casings for integration into other units.

ORDERING KEY
Ordering example:
Synsafe 7200 (W x L)

Glass Panel Filters Coarse Dust Filters for HVAC Systems

CLEAN AIR

POWER GENERATION

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INDUSTRIAL

Low on cost, high on performance, MANN+HUMMEL's glass panel air filters represent a cost effective solution to coarse dust filtration. All are rated to G3 according to EN 779, but with a variety of sizes and media options, our range of glass panels provides a selection of filters designed to meet the exact requirements of an array of applications.

For use in general heating, ventilating and air conditioning systems where protection is required from larger particle contamination.

Fitted as a pre-filter to protect plant room equipment and duct linings, and to extend the installed life of higher cost secondary filters.

KEY FACTS

- Compact design: For simple storage, installation, handling and removal
- Wide range of size and media options available: To suit a wide variety of applications
- Suitable as a pre-filter: For the protection of higher cost secondary filters
- Heavy duty, moisture-resistant chipboard case: For rigidity and strength in operation
- Cases creased prior to folding: Eliminates moisture ingress

Glass Panel Filters Technical Data

CONSTRUCTION

Filters are manufactured from heavy duty moisture-resistant chip-board cases which are creased prior to folding to prevent moisture ingress. Filters can be supplied with scrim backing if required.

INSTALLATION

The filters are designed to locate into front withdrawal, side access or rear mounted holding fames. If required, frames with all clips, gasketing, sealant and support rods can be supplied. Alternatively, frame banks can be supplied in modules.

IF1 PANEL

IF1 panel filters are manufactured from a spun glass fibre filter media with a grade G3 efficiency, which is inserted into a card frame. Designed to combine high air flow rates with low clean pressure drops.

VG2 PANEL

A pad of graduated density Veeglass media, impregnated with a viscous agent and retained in a rigid cardboard frame.

VG3 PANEL

Similar to VG2 panels but employing a pad of three-stage Veeglass media. Direction of air flow: Panels must be installed with the air flow in the direction indicated by the arrow on the panel side.

Performance Chart

Product	Depth mm	Vel m/s Rating	Clean Pressure Drop	EN 779	Avg. Arr	Dust Holding @250 Pa, g/m²
IF1	22	1.85	38	G3	>80%	270
IF1	47	1.85	40	G3	>80%	500
VG2	22	1.85	25	G3	>80%	480
VG2	47	1.85	35	G3	>80%	834
VG3	47	1.85	50	G3	>80%	534

Maximum recommended final pressure: 250 Pascals

Pleated Panel Filters
High Standards of Protection for HVAC Systems

CLEAN AIR

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INDUSTRIAL

With a concertinaed synthetic media, the MANN+HUMMEL range of Pleated Panel filters packs more into less. Offering superior performance over standard panel filters, our Pleated Panels enclose a far greater volume of filtering material into their chipboard cases.

Not only does this afford a larger media surface area, providing longer life and higher dust holding capacity, but it also strengthens the entire filter, improving stability and assuring performance in operation.

KEY FACTS

- Compact design: For simple storage, installation, handling and removal
- Synthetic media: No fibre loss or shedding
- Specially-finished support grid: Eliminates oxidisation
- Chemically bonded media and support grid: Ensures pleat stability throughout operational life
- High arrestance coupled with small particle control: Suitable for critical applications

Pleated Panel Filters Technical Data

CONSTRUCTION

IF2 filters are manufactured with profile pleated synthetic media, laminated onto an 'expanded diamond' grid with 98% open area. The support grid has a special finish to prevent oxidisation. To ensure pleat stability throughout the installed life of the filter, the media is chemically bonded to the support grid.

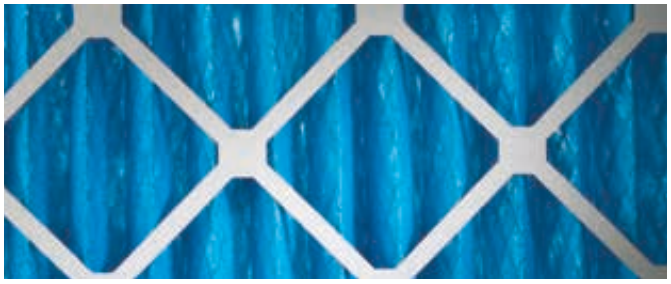
Supervee panel filters are manufactured from pleated Veelon media, backed with expanded diamond grid to provide maximum support and retained in a grid cardboard frame 50 mm deep. Where added strength is required, Supervee panel filters can be supplied with reinforced hardboard cases. They are available as 50 or 100 mm deep panels and in a range of sizes suitable for most applicants.

Multivee 99 similar to Supervee panels, but employing two stage filtration by the addition of a pad of Veeglass media to improve performance. Where added strength is required, Multivee 99 panel filters can be supplied with reinforced hardboard cases. They are available as 50 or 100 mm deep panels and in a range of sizes suitable for most applicants.

Performance Chart

Product	Depth mm	Vel m/s Rating	Clean Pressure Drop	EN 779 Rating	Avg. Arr
IF2	47	1.85	35	G4	90%
IF2	98	2.6	70	G4	90%
S/Vee	47	1.85	50	G4	90%
M/Vee 99	47	1.85	65	G4	92%

Maximum recommended final pressure: 250 Pascals



Macrofalt
Pleated Filter for Coarse and Fine Dust

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Macrofalt is used in air conditioning applications when optimisation of air filtration to a small area is required. A compact construction with a height of only 48 mm, a large filter area and high dust holding capacity, are key features of this filter. The ratio of filter area to face area is: 13:1 – a value rarely found in competing filters.

Macrofalt filters have been tested at an independent laboratory and reach the filter classes G4 and M5 according EN779 and are suitable to VDI6022.

CONSTRUCTION

Macrofalt consists of well-established, nonwoven technology of different filter efficiencies. The media is pleated at optimised distances and fixed with flexible distance holders according to a patented technique. With this process filter packs are generated which will be fixed in the plastic frames tightly and provide an excellent seal.

KEY FACTS

- Maintenance free: For simple, low cost of ownership
- Large filter area: Provides a long service life and high dust holding capacity
- No dust break through: For assured performance
- Patented, flexible pleat distance holders: Allows a uniform air flow across the filter surface
- Free from metal and fully incinerable: For easy, environmentally friendly disposal

EUROVENT CERTIFIED PERFORMANCE
AIR FILTERS
CLASS M5-F9
www.eurovent-certification.com

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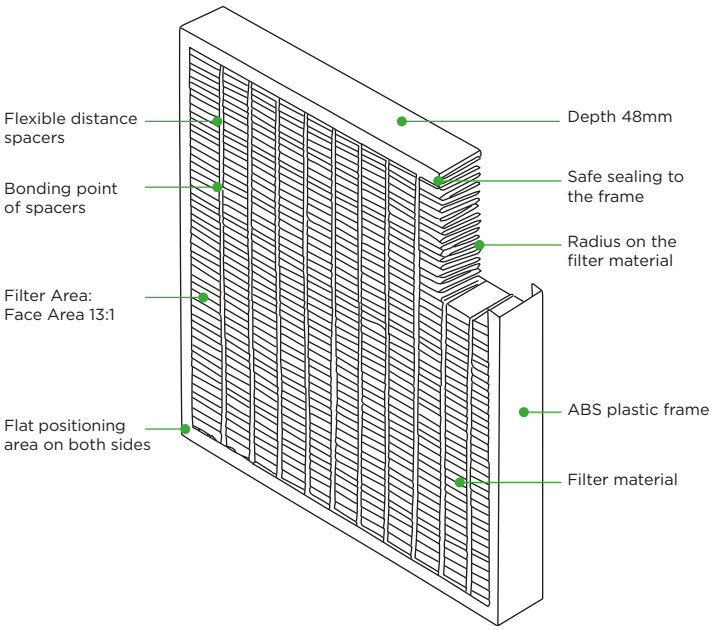
Macrofalt Technical Data

G4 Type	Unit	MF30B36	MF30B56	MF30B66
Average Arrestance (EN 779)	%	>90	>90	>90
Dimensions (W x H x D)	mm	287 x 592 x 48	490 x 592 x 48	592 x 592 x 48
Nominal Air Flow	m^3/h	1,700	2,550	3,400
Initial Pressure Drop	Pa	50	50	50

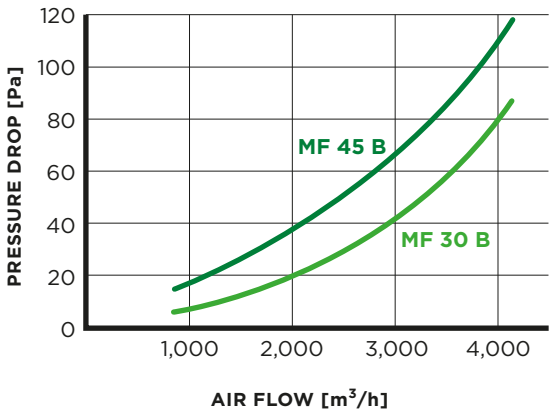
M5 Type	Unit	MF45B36	MF45B56	MF45B66
Average Arrestance (EN 779)	%	96	96	96
Average Efficiency (EN 779)	%	40-60	40-60	40-60
Dimensions (W x H x D)	mm	287 x 592 x 48	490 x 592 x 48	592 x 592 x 48
Nominal Air Flow	m^3/h	1,700	2,550	3,400
Initial Pressure Drop	Pa	80	80	80
Energy Rating *	-	E	E	E

Macrofalt General Data				
Recommended Final Pressure Drop	Pa	250	250	250
Relative Air Humidity	%	100	100	100
Continous Operating Temperature	°C	80	80	80
Filter Area	m^2	2.2	3.8	4.6
Frame Size	mm	305 x 610	508 x 610	610 x 610
Weight	kg	0.6	0.8	1.0

* Energy Rating – as is the case with many consumer goods, our M5 – F9 filters are rated according to their energy efficiency on a scale of A+ (the best) to E (the worst). These ratings are certified by Eurovent and in accordance with the 4/21 scheme.



PRESSURE DROP / AIR FLOW



Macropac Pleated Filter for Coarse and Fine Dust

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Macropac is used in air conditioning applications providing optimisation of air filtration to a small filtration area. With a compact construction and a depth of 96 mm, a large filter area and high dust holding capacity, are key features of this filter.

Independently tested, filters reach class G4 according to EN 779. Fire resistance is according to DIN 4102 class B.

CONSTRUCTION

Macropac is based on non-woven media layers of varying efficiencies. The patented assembly method ensures that the media is pleated at optimised distances and held with flexible distance holders. In this way the fiter packs are secured tightly in the frames, ensuring a good seal. Changing the filter is also a simple task requiring no tools.

KEY FACTS

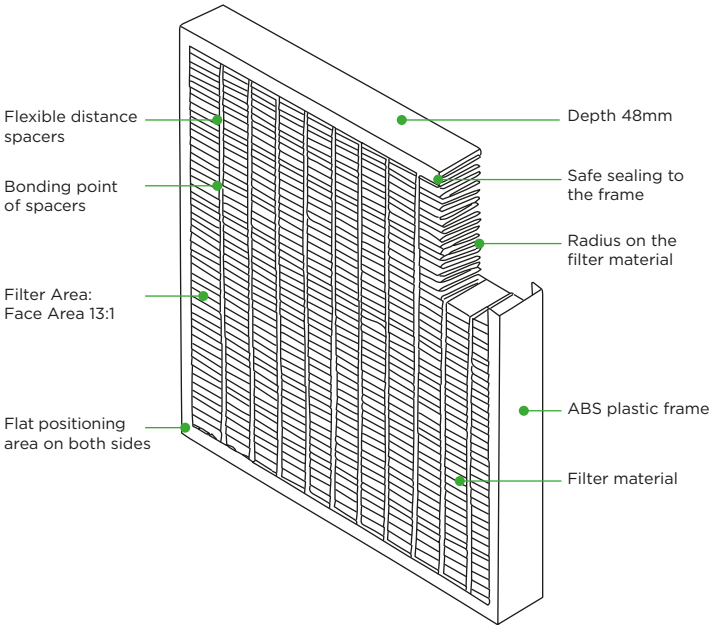
- Maintenance free: For simple, low cost of ownership
- Large filter area: Provides a long service life and high dust holding capacity
- No dust break through: For assured performance
- Patented, flexible pleat distance holders: Allows a uniform air flow across the filter surface
- Free from metal and fully incinerable: For easy, environmentally friendly disposal

Macropac
Technical Data

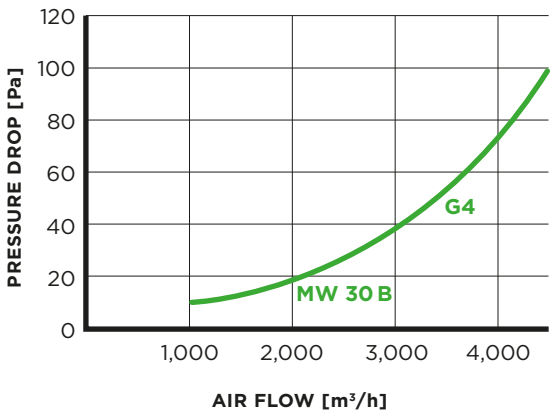
Technical Data				
Dimensions of Frame	mm	287 x 592 x 130	490 x 592 x 130	592 x 592 x 130
Dimensions of Filter	mm	245 x 450 x 96	450 x 550 x 96	550 x 550 x 96

G4 Type	Unit	MW 30 B	MW 30 B	MW 30 B
Average Arrestance (EN 779)	%	> 90	> 90	> 90
Nominal Air Flow	m^3/h	1,700	2,550	3,400
Initial Pressure Drop	Pa	50	50	50

Macrofalt General Data				
Recommended Final Pressure Drop	Pa	280	280	280
Relative Air Humidity	%	100	100	100
Continous Operating Temperature	°C	80	80	80
Filter Area	m^2	3.2	5.7	6.4
Weight	kg	2.0	2.6	3.4



PRESSURE DROP / AIR FLOW



Micratex FP-P
Fine Dust Filter

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

With 10 m² of media packed into a self-supporting frame only 100 mm deep, Micratex FP-P offers a high dust holding capacity and long life in a compact, rigid design.

Available in a wide array of efficiencies and sizes, Micratex FP-P is suited to a diverse range of applications, but particularly those which require a high-level of safety and assured performance.

A plastic cavity-profile frame makes disposal easy by incineration and a low pressure drop reduces energy consumption and operating costs.

KEY FACTS

- Air flow up to 3,400 m³/h per cell: Suited for even the most demanding of applications
- Glass fibre paper: No fibre loss or shedding
- Large filter surface of 10.0 m²: For a high dust holding capacity and long service life
- Lightweight: Easy to install, handle and remove
- Low pressure drop: Reduced energy consumption
- Self-supporting and rigid: Provides a high burst pressure and eliminates dust migration
- Fully incinerable, plastic cavity profile frame: For simple, environmentally-friendly disposal
- Compact with an installation depth of only 100 mm: Easy to handle and store

EUROVENT CERTIFIED PERFORMANCE
AIR FILTERS
CLASS M5-F9
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Micratex FP-P
Technical Data

Micratex FP-P	Unit	F6 - 610	F7 - 610	F8 - 610
Air Flow (normal service life)	m^3/h	3,400	3,400	3,400
Initial Pressure Drop	Pa	135	150	170
Air Flow (long service life)	m^3/h	3,000	3,000	3,000
Initial Pressure Drop	Pa	110	120	135
Filter Class as per EN 779	–	M6	F7	F8
Efficiency, 0.4 µm DEHS, EN 779	%	65	81	91
Arrestance, Gravimetric Average, EN 779	%	≥ 96	≥ 98	≥ 99
Energy Rating*	–	E	E	D

* Energy Rating – as is the case with many consumer goods, our M5 – F9 filters are rated according to their energy efficiency on a scale of A+ (the best) to E (the worst). These ratings are certified by Eurovent and in accordance with the 4/21 scheme.

Application Parameters	
Continuous Operating Temp.*	≤ 65 °C
Pressure Drop	
Rec. Final Pressure Drop	≤ 450 Pa
Max. Final Pressure Drop	≤ 800 Pa
Burst Pressure (new filter)	>1,000 Pa
Admissible Relative Humidity	<100 %

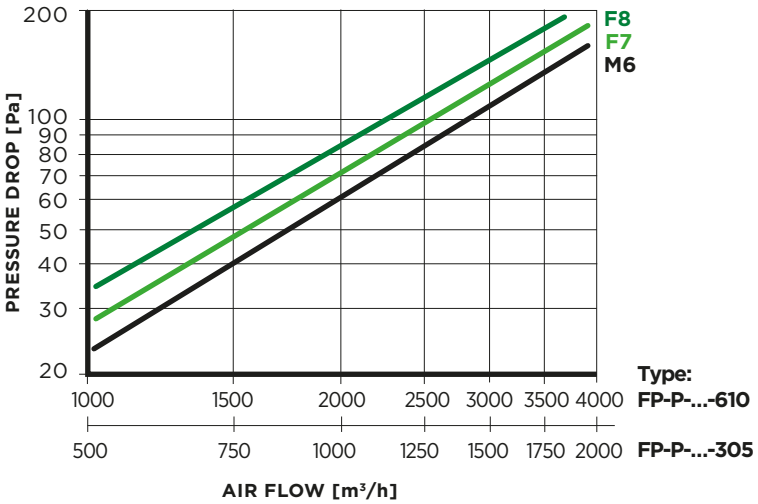
*120°C HT-version also available

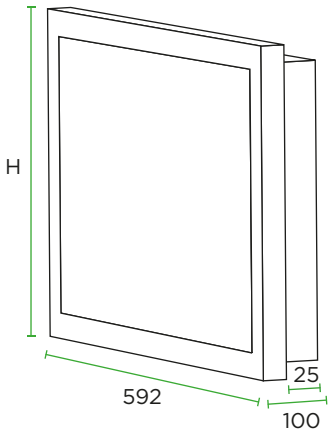
Materials	
Filter Media	Micro-glass fibre paper pleated to form mats
Frame	Halogen-free incinerable polystyrol
Sealant	Polyurethane
Flam. Class	K2/F2 according to DIN 53438

All components are classified as class 1 (no visible microbiological growth)

Available Types	-305	-420	-508	-610
Dim. H (mm)	287	402	490	592
Dim. H (mm)	1.5	2.0	2.2	2.5

PRESSURE DROP VERSUS AIR FLOW





Micratex FP-P-HT
The Superior Solution

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Designed to operate within the harshest of environments, Micratex FP-P-HT is the high temperature version of our popular Micratex FP-P.

A galvanised steel frame allows this filter to operate continuously in temperatures of up to 120 °C, meaning that even in the most inhospitable of conditions Micratex FP-P-HT will retain its high performance and rigidity.

A filter surface area of 8.5 m^2, coupled with a depth of only 88 mm and a light weight, mean that Micratex FP-P-HT provides a long life and low pressure drop in a compact, durable design.

KEY FACTS

- Operating temperature of up to 120 °C: Suitable for use in the most extreme of operating environments
- Glass fibre paper: No fibre loss or shedding
- Large filter surface of 8.5m^2: For a high dust holding capacity and long service life
- Lightweight: Easy to install, handle and remove
- Low pressure drop: Reduced energy consumption
- Air flow up to 3,000 m^3/h per cell: Suited for even the most demanding of applications
- Self-supporting and rigid: Provides a high burst pressure and eliminates dust migration
- Fully incinerable, plastic cavity profile frame: For simple, environmentally-friendly disposal
- Compact with an installation depth of only 88 mm: Easy to handle and store

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Micratex FP-P-HT Technical Data

Micratex FP-P-HT	Unit	M6-610	F7-610	F8-610	F9-610	E11-610	E12-610
Air Flow (normal service life)	m^3/h	3,000	3,000	3,000	2,500	2,500	1,500
Initial Pressure Drop	Pa	100	120	155	180	250	300
Air Flow (long service life)	m^3/h	2,500	2,500	2,500	2,000	2,000	1,000
Initial Pressure Drop	Pa	75	90	120	140	190	190
Filter Class as per EN 779 EN 1822	-	M6	F7	F8	F9 (E10)	E11	E12
Efficiency (atmospheric), average, EN 779	%	79	82	93	98	-	-
Arrestance (gravimetric), average, EN 779	%	≥ 98	≥ 99	≥ 99	~ 100	-	-
Efficiency (MPPS-DEHS), EN 1822	%	-	-	-	> 85	> 95	> 99.5

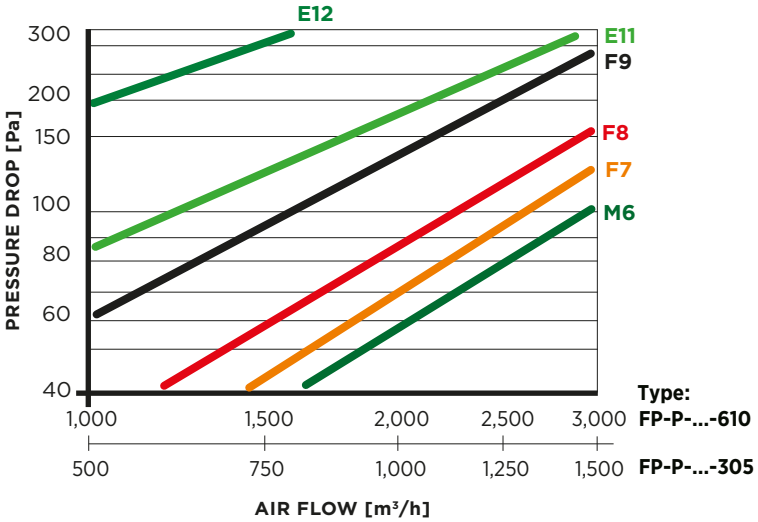
Application Parameters	
Continuous Operating Temp.	≤ 120°C
Rec. Final Pressure Drop	≤450 Pa
Max. Final Pressure Drop	≤800 Pa
Burst Pressure (new filter)	>1,000 Pa
Admissible Relative Humidity	<100 %

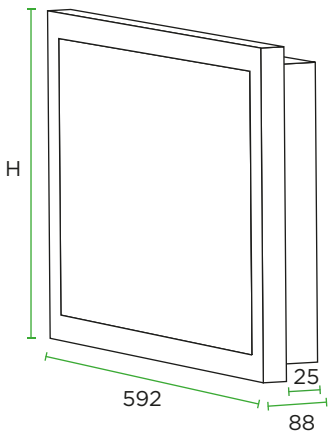
Materials	
Filter medium	Micro-glass fibre paper pleated to form mats
Frame	Galvanised steel
Sealant	Polyurethane
Flam. Class	K1/F1 according to DIN 53438

All components are classified as class 1 (no visible microbiological growth)

Available Types	-305	-610
Dimensions H (mm)	287	592
Weight (kg)	2.0	3.0

PRESSURE DROP VERSUS AIR FLOW





Micratex P
Fine Dust Filter

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Ideal for use in HVAC systems where space is limited, Micratex P provides dependable performance from a compact form. Two versions are available: the deeper Micratex P packs 12.8 m² of media into it's 96 mm deep frame, whilst a 48 mm version is designed for use in truly low-space installations.

The moisture-resistant, plastic frame provides robust-ness and rigidity in all conditions, and features a hollow profile to minimise weight and simplify installation.

The mini-pleated micro-glass media delivers excellent particle separation and hotmelt separators ensure an even air flow across the filter area.

KEY FACTS

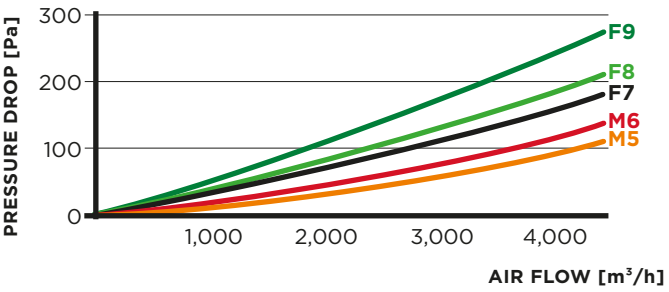
- Air flow up to 3,400 m³/h per cell: Suited for even the most demanding of application
- Hollow-profile, plastic frame: Moisture and corrosion resistant
- Mini-pleated, micro-glass media: For excellent particle separation
- Lightweight: Easy to install, handle and remove
- Low pressure drop: Reduced energy consumption
- Self-supporting and rigid: Provides a high burst pressure and eliminates dust migration
- Fully-incinerable: For simple, environmentally-friendly disposal

Micratex P
Technical Data

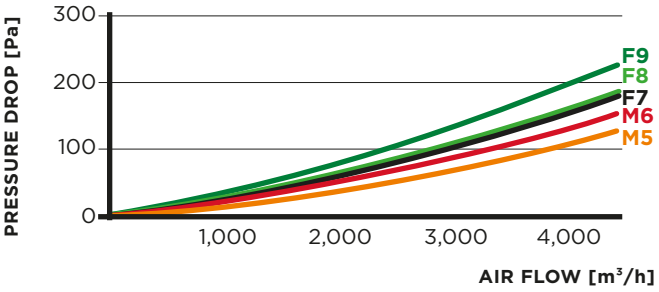
Micratex P – 48 mm	Unit	M5	M6	F7	F8	F9
Initial Pressure Drop (Nominal Air Flow – 3,400 m³/h)	Pa	71	91	129	152	198
Initial Pressure Drop (Long-life Air Flow – 2,900 m³/h)	Pa	52	71	103	122	161
Initial Efficiency (EN 779:2012)	%	–	–	52	60	85

Micratex P – 96 mm	Unit	M5	M6	F7	F8	F9
Initial Pressure Drop (Nominal Air Flow – 3,400 m³/h)	Pa	73	93	125	134	162
Initial Pressure Drop (Long-life Air Flow – 2,900 m³/h)	Pa	68	85	98	106	131
Initial Efficiency (EN 779:2012)	%	–	–	45	63	85

MICRATEX P – 48 mm Pressure Drop Performance



MICRATEX P – 96 mm Pressure Drop Performance

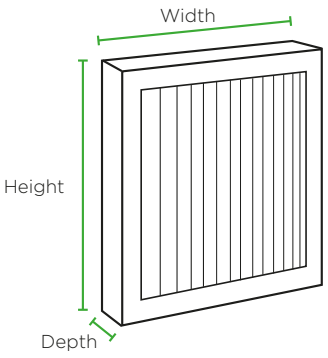


Application Parameters	
Continuous Operating Temp.*	≤ 70 °C
Rec. Final Pressure Drop	≤ 450 Pa
Max. Final Pressure Drop	≤ 500 Pa
Burst Pressure (new filter)	max. 600 Pa
Admissible Relative Humidity	< 100%

Materials	
Filter media	Pleated micro-glass fibre
Frame	ABS
Sealant	Polyurethane
Flammability Class	K2/F2 (DIN 53438)
Gasket	PU-foamed

Standard Dimensions	-305	-420	-508	-610
Width/Height (mm)	287	402	490	592
Depth (mm)	48 or 96			

Dimensions refer to DIN EN 15805:2010-09; Further dimensions available upon request; Add 5 mm for compressed gasket; mounting on both sides possible; All values for Micratex P type 610; Filter class according to EN 779:2012; Filter media area installed: Micratex P - 48 mm = 6.3 m² / Micratex P - 96 mm = 12.8 m²



Micratex V
State of the Art
Filter Exchange System

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Save waste, costs and time with the Micratex V changeable filter system. Featuring replaceable filter elements in a compact, robust frame, Micratex V provides all the performance you will ever need in a low cost, environmentally-friendly package.

Because you only need to change the filter element, as opposed to the entire filter, Micratex V saves you time and money throughout its life. Simple to install, easy to change, and, thanks to the fact that you only need dispose of the filter elements at change-time, cost effective to dispose. All-in-all, Micratex V offers fantastic performance with an incredibly low cost of ownership.

KEY FACTS

- Changeable filter system: Reduces cost and benefits the environment
- Simple filter change requiring no tools: For ease of use and maintenance
- Lightweight: For simple filter change
- Incinerable, metal and silicone free: For simple, environmentally-friendly disposal
- Lowers waste: Low cost disposal

ADVANTAGES

- Easy to change filters
- Dustfree filter change
- Filter change within seconds
- Low weight filter elements
- Free of metals
- Fully incinerable
- Optimised positioning of filter elements
- Safe and tight sealing
- Low transport and stock costs
- All filter elements are the same size – no extra stock required
- Low disposal costs
- Avoidance of waste

Cost of ownership is very economic and the system is well-proven in the marketplace. The filters offer design engineers a true costsaving solution.

EUROVENT CERTIFIED PERFORMANCE ENERGY EFFICIENCY CHECK ENERGY CLASS ON www.eurovent-certification.com

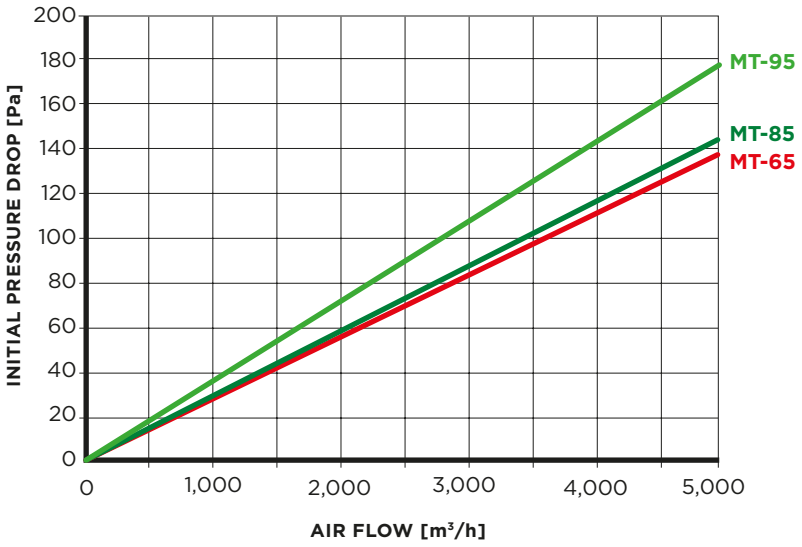
Micratex V Technical Data

Type	Unit	MT65	MT85	MT95
Filter Class according to EN 779	–	M6	F7	F9
Nominal Air Flow	m³/h	3,400	3,400	3,400
Initial Pressure Drop	Pa	91	96	120
Recommended Final Pressure Drop	Pa	450	450	450
Average Arrestance, Gravimetric (EN 779)	%	>95	99	>99
Average Efficiency (EN 779)	%	60–80	80–90	>95
Maximum Operating Temperature	°C	80	80	80
Relative Air Humidity (up to)	%	100	100	100
Energy Rating*	–	D	B	B

Type	Unit	XR00A66	XR00A36
Air Flow	m³/h	4,250	2,125
Number of Cells	–	2 Pairs = 4 Pieces	1 Pair = 2 Pieces
Filter Area	m²	18	9
Dimensions	mm	592/592	287/592
Suitable for Supporting Frames	mm	610/610	305/610

* Energy Rating – as is the case with many consumer goods, our M5 - F9 filters are rated according to their energy efficiency on a scale of A+ (the best) to E (the worst). These ratings are certified by Eurovent and in accordance with the 4/21 scheme.

PRESSURE DROP VERSUS AIR FLOW



CONSTRUCTION

Micratex V Filters consist of well known micro ne-nonwovens of different efficiencies. The media is pleated together with thermostatic distance holders to achieve streamlined and optimised geometry. This process ensures that the filter packs are tightly sealed into U profile frames. The filter elements are tightly positioned due to guidance tracks. The exchange of filter elements is very easy and requires no tools due to their low weight. The Micratex V Change System can be used in every common mounting frame for pocket or fine dust filters.

Compatex FP
The Superior Solution

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Packing up to 20 m² of filter media into a robust, space-saving design, Compatex FP provides maximum performance from a minimal size. Thanks to a highly efficient media, pleated into mats and fitted into a rigid self supporting frame, Compatex FP provides an outstanding dust holding capacity, along with a high burst resistance. This ingenious design also eliminates dust migration and fibre loss.

In addition, with a fully incinerable frame constructed from recyclable materials and a low pressure drop which reduces energy consumption, Compatex FP has been designed to minimise its impact on the environment, as well as reducing your CO_2 emissions.

KEY FACTS

- Energy efficient grade A (F7-F9): For eco-friendly, low cost performance
- Large filter surface of up to 20 m²: Provides extremely long service life and air flows up to 5,000 m³/h
- Glass fibre paper media: No fibre loss
- Cavity profile frame from recycled plastic: For rigidity and stable performance
- Low pressure drop: Reduces energy consumption
- Fully incinerable without pollutant emission: For simple disposal
- Constructed from recyclable materials: Environmentally-friendly
- Comprehensive range Suited to a wide range of application
- Independently tested: For assured quality and performance
- Self-supporting and rigid: Provides high burst pressure and eliminates dust migration
- Multi-directional air flow and installation: To suit a variety of air handling units

EUROVENT CERTIFIED PERFORMANCE ENERGY EFFICIENCY CHECK ENERGY CLASS ON www.eurovent-certification.com

MANN+HUMMEL participates in the ECC programme for Air Filters. Check ongoing validity of certificate: **www.eurovent-certification.com or www.certiflash.com**

Compatex FP
Technical Data

F-NT & HT	FP-	M6-610	F7-610	F8-610	F9-610
Air Flow V_M (normal service life)	m³/h	5,000	5,000	5,000	5,000
Initial Pressure Drop *	Pa	140	155	165	180
Air Flow V_R (rated service life)	m³/h	3,400	3,400	3,400	3,400
Initial Pressure Drop *	Pa	75	80	90	98
Filter Class as per EN 779	–	M6	F7	F8	F9
Efficiency (atmospheric), average, EN 779	%	60 - 80	80 - 90	90 - 95	> 95
Arrestance (gravimetric), average, EN 779	%	98 >	99 >	99 >	~ 100
Energy Rating***	–	C	B	B	B

H-NT **	FP-	E10-610	E11-610	E12-610	H13-610
Air Flow V_M (normal service life)	m³/h	4,250	3,400	3,400	2,500
Initial Pressure Drop V_M*	Pa	190	180	290	235
Air Flow V_R (rated service life)	m³/h	3,400	3,000	3,000	2,000
Initial Pressure Drop V_R *	Pa	140	155	260	180
Filter Class V_R as per EN 1822 (and EN 779)	–	E10 - (F9)	E11	E12	H13
Average Atmospheric Efficiency V_R EN 779	%	98	–	–	–
Min. Initial Efficiency V_R EN 1822 (MPPS-DEHS test)	%	85 >	95 >	99.5 >	99.95 >
Typ. Initial Efficiency V_R EN1822 (MPPS-DEHS-Test)	%	86	96	99.8	99.98

* Tolerance ± 10% ** FP-HT not available in EPA & HEPA grades

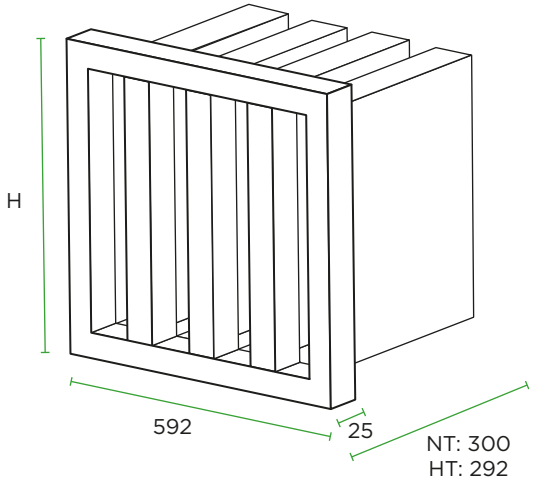
*** Energy Rating – as is the case with many consumer goods, our M5 – F9 filters are rated according to their energy efficiency on a scale of A+ (the best) to E (the worst). These ratings are certified by Eurovent and in accordance with the 4/21 scheme.

Application Parameters	
Continuous Operating	NT: < 75 °C HT: < 120 °C
Pressure Drop - Recommended Final Pressure Drop - Max. Final Pressure Drop	450 Pa 800 Pa
Bursting Pressure (new filter)	M6 – F9: > 1,500 Pa E10 – H13: > 2,000 Pa
Admissible Relative Humidity	< 100 %

Materials	
Filter Media	M6 – F9: 18 m² glass fibre paper pleated to form mats E11 – H13: 20 m² glass fibre paper pleated to form mats
Frame - NT	Incinerable halogen-free recycled Polystyrol
Frame - HT	Plastic and galvanized steel
Sealant	Polyurethane
Flammability Class of Materials used	NT: K2/F2 according DIN 53438 HT: K1/F1 according DIN 53438

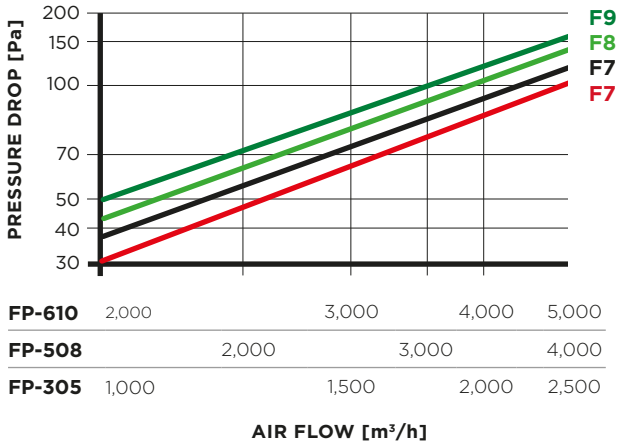
Compatex FP
Technical Data

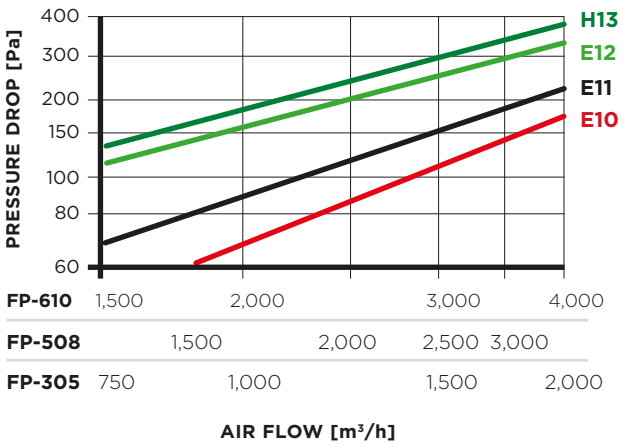
DIMENSIONS (mm)



FP-...	305	420	508	610
Dimension H	287	402	490	592
Weight kg (F)	2.7	3.6	4.2	5.0
Weight kg (H)	3.2	4.4	5.2	6.2

PRESSURE DROP VERSUS AIR FLOW





Compatex TMP/C
The Outstanding Choice for Combustion Air Intakes

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Combining industry-leading pressure drop with the highest available dust holding capacity and unrivalled burst resistance, Compatex TMP/C provides unbeatable performance for gas turbine applications.

Designed specifically to remove harmful particulate from engine intake air, Compatex TMP/C provides complete defence against fouling, erosion and corrosion – maximising turbine performance and minimising downtime.

Available in a variety of filtration efficiencies and media capacities, Compatex TMP/C can be tailored to suit the exact environmental conditions and application requirements.

The TMPC version features excellent water tightness and a self-draining system, making it ideally suited for off-shore and coastal regions. Its design is well-proven in applications worldwide and provides assured reliability in operation, even in the wettest of environments.

KEY FACTS

- Comprehensive, fully tested range: For assured performance
- Available with three different filter surface areas up to 30 m²: For normal, extended or extra-long filter life
- Fully-sealed and weather resistant TMPC version: Ideal for offshore and coastal application
- Low pressure drop: Maximises turbine power output
- Fits all commonly used filter frames: For ease of installation
- Robust hollow profile plastic frame: Provides industry-leading burst resistance
- Fully incinerable with recyclable materials: For simple, environmentally friendly disposal
- High-density, micro-glass fibre media: Provides high efficiencies at low pressure drops
- Foamed one-piece PU-gasket with closed surface: Ensures optimum performance

Compatex TMPC

EUROVENT CERTIFIED PERFORMANCE ENERGY EFFICIENCY CHECK ENERGY CLASS ON www.eurovent-certification.com

Compatex TMP/C Unsurpassed Performance for Gas Turbine

Whilst the primary purpose of a gas turbine filter is to remove harmful particulate from the intake air, its effect upon the overall performance of the engine is far greater than this. An air intake filter can be judged according to the three key elements detailed below. Fortunately, Compatex TMP/C provides industry-leading performance for each of these aspects.

01 PRESSURE DROP

By reducing the resistance to the air flow entering the turbine, a filter with a lower pressure drop improves engine efficiency. Because of this, specifying such filters is probably the simplest and most cost effective way of boosting engine performance. It is generally agreed that reducing intake pressure drop by 50 Pa causes an increase in electrical power output of around 0.1 %. Thanks to its unique design and media construction, Compatex TMP/C provides unrivalled pressure drop performance without compromising filtration efficiency. So, installing Compatex TMP/C will improve overall turbine efficiency with no retrofit and minimal downtime.

02 BURST RESISTANCE

An air intake filter retains all kinds of particulate harmful to the delicate inner components of a gas turbine. So, it is no surprise that a burst filter can cause untold damage to an engine as such particulate, along with any remnants of the filter, are released into the air flow. Combining an extremely strong media and rigid frame, Compatex TMP/C offers burst resistance in excess of 5000 Pa – an unmatched level of safety that eliminates concerns of filter failure and associated damage, disruption and downtime.

03 SERVICE LIFE

A filter's service life essentially comes down to how much particulate it can hold before compromising pressure drop to an unacceptable level. Filters with a lower dust holding capacity quickly become clogged, choking the air flow entering the turbine and impairing performance. Of course, filters with a shorter life must be changed more frequently too, increasing filter spend, maintenance costs and disruption. Compatex TMP/C features an unparalleled dust holding capacity thanks to its unique design. Firstly, up to 30 m^2 of media is packed into each element, providing a massive filter surface area to retain particulate. Furthermore, the V-formation of the filter mats allows even distribution of particulate across the filter, eradicating localised dust build-up within the filter.

Compatex TMP/C Construction

Foamed, one-piece PU gasket with closed surface ensures secure installation.

Frame is either mechanically locked together (TMP) or welded (TMPC). Further rigidity comes from visible and internal stiffening sections.

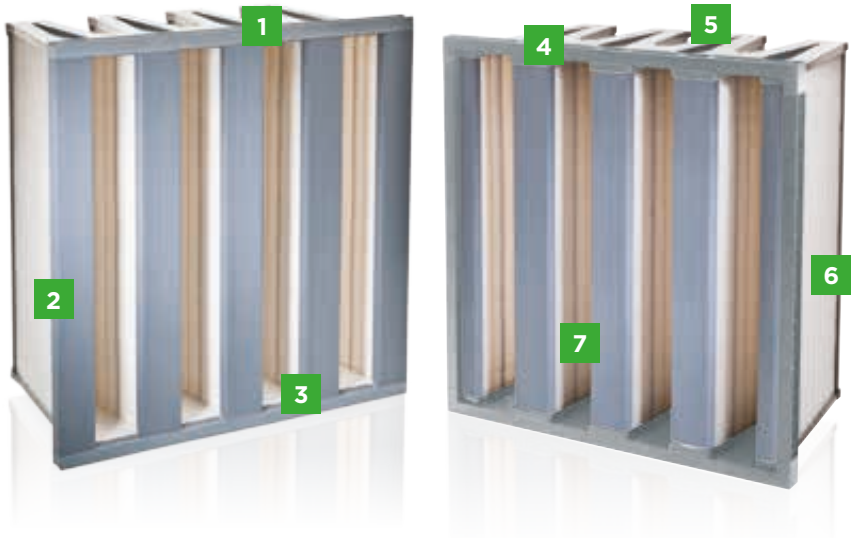
Fully-potted TMPC version for effective water drainage.

Unique hollow profiles provide rigidity whilst saving weight.

Moulded handles (top and bottom) allow easier transportation and removal of the filter from the transit carton.

Micro-glass fibre paper is mini pleated and formed into robust mats.

Face area affords the maximum open space for air entry, resulting in an extremely low pressure.



Compatex TMP/C Filter Surface Area

Whilst filters may share common external dimensions, Compatex TMP/C packs much more into its frame.

Thanks to the latest developments in high-density glass fibre media and an innovative pleating technique, the latest generation of Compatex TMP/C filters boast up to 30 m^2 of filter media within its modest frame dimensions – around 50 % more than its predecessor. This means that Compatex TMP/C can capture a vast amount of particulate before needing to be replaced – cutting filter spend, maintenance costs and downtime.

Conversely, not all applications or customers will require such a long service life from their intake filters. It is for this reason that for all filtration efficiencies, Compatex TMP/C is available with three filter areas to suit all levels of atmospheric particulate and budget size. No matter what the individual requirements, there will be a suitable Compatex TMP/C configuration to match.

Type	Filter Area	Application
N	20 m^2	Suitable for 'normal' applications where budget is the primary concern
E24	24 m^2	Extended surface for areas with raised levels of atmospheric particulate
E30	30 m^2	Demanding applications requiring the lowest pressure drop and longest life

ENGINE DAMAGE FROM PARTICULATE
Damage caused by ingesting particulate typically falls into one of three categories:

EROSION
Caused by particles greater than 10 µm in diameter, erosion affects both the edge and thickness of the blades, compromising performance.

CORROSION
Salts and moisture entering the turbine cause an electrolytic reaction which damages the blade structure and scales metal alloys.

FOULING
A thin layer of soot and dirt deposited on the compressor blades altering their profile, fouling inhibits compression rates and shaft power output.

Compatex TMP/C E30 has a filter surface 480 times the area of this page.

Compatex TMP/C Balancing a Multi-Stage Filter System

The overall cost of operating a multi-stage filter system relies upon the interaction between the filters within each stage. Changing the efficiency of the prefilter, for example, can have a dramatic impact upon the overall system performance and operating costs.

A prefilter arrestance which is either too low or too high can increase the overall cost significantly, and the higher the efficiency of the final stage, the narrower this optimum performance window becomes (Fig. 2).

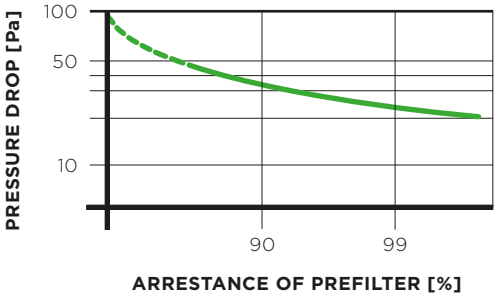
Based on this and extensive practical experience, MANN+HUMMEL specialists can assist in finding the correct balance, ensuring that the selected pre and final filter combination performs to an optimum level. With a solution tailored to the local environmental and operating conditions, the filter system will provide high efficiency, optimum filter life and the lowest possible pressure drop.

HOW WE REDUCE YOUR COST

The initial pressure drop of Compatex TMP/C filter combinations is extremely low. These low pressure drops provide significantly higher engine power output. In addition, extremely high dust holding capacities ensure low maintenance and replacement cost.

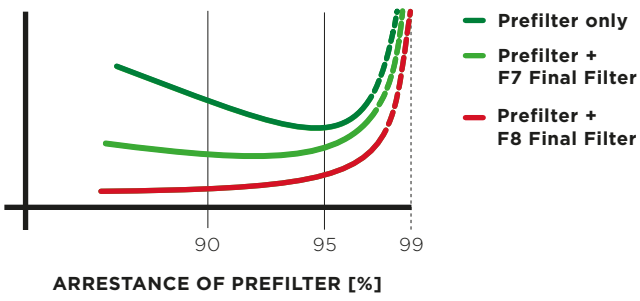
MANN+HUMMEL filters are designed for a nominal air flow of 4,250 m^3/h (2,500 cfm), and when compared with the traditional 3,400 m^3/h (2,000 cfm) units, they offer a 20 % space saving for a comparable life expectancy. When traditional units with an air flow of 3,400 m^3/h are exchanged, the MANN+HUMMEL filter combination typically provides double the life.

Fig. 1 Dust Holding Capacity of Final Filter [%]



Tests confirm that dust holding capacity of the final filter is reduced with increasing arrestance of the prefilter.

Fig. 2 Overall Filtration Cost



Compatex TMP/C Compatibility with Other Stages

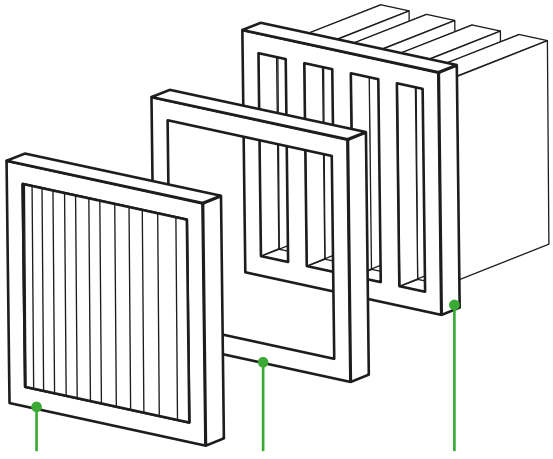
Compatex TMP/C is part of a wider system that protects a gas turbine from external contaminant, so its ease of installation and integration with other stages are crucial benefits.

In a traditional air intake configuration, coalescer panels are employed in the first stage to stop water (in the form of fog or mist) from entering the system. These panels retain moisture well, but quickly become clogged at higher air flows and as they become dirty, choking the air flow and raising differential pressure.

Now though, Macrogen GT Duo™ provides prefiltration and water removal in one filter element, allowing the removal of a dedicated coalescer stage, along with its associated pressure drop.

Accommodating a new filter configuration can require capital investment in new frames and involve significant downtime to alter the mechanical structure of the filter house. To avoid this, Macrogen GT Duo™ and Compatex TMP/C have been designed to be integrated together using simple fastening strips. This ensures straightforward deployment with no modification to the intake structure.

Cut differential pressure and boost turbine performance with no retrofit or capital investment.

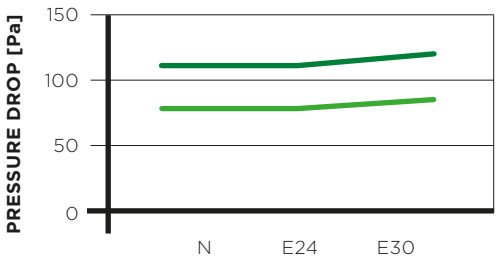



Macrogen GT Duo™

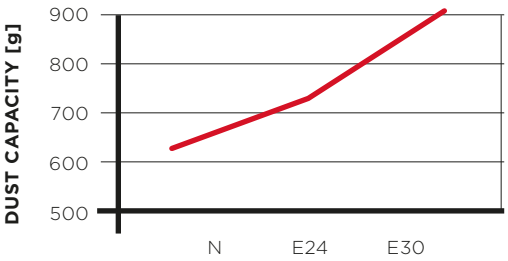
Compatex TMP/C Technical Data

F7	Unit	N	E24	E30
Air Flow Rate V_N (Nominal Service Life)	m^3/h	4,250	4,250	4,250
Initial Pressure Drop at V_N*	Pa	113	115	118
Air Flow Rate V_L (Long Service Life)	m^3/h	3,400	3,400	3,400
Initial Pressure Drop at V_L*	Pa	80	80	82
Filter Class as per EN 779	–	F7	F7	F7
Efficiency, Atmospheric, Average**	%	80 – 90	80 – 90	80 – 90
Arrestance, Gravimetic, Average**	%	> 99	> 99	> 99
Filter Media Area (Installed)	m^2	20	24	30
ASHRAE Dust Holding Capacity**	g	624	724	906
Energy Rating***	–	B	B	B

F7 PRESSURE DROP

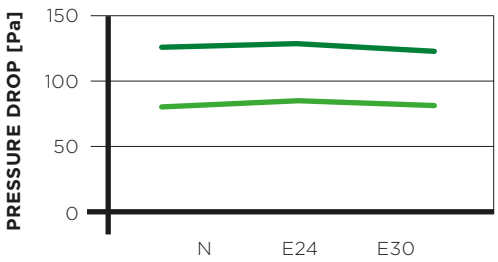


F7 DUST HOLDING CAPACITY^

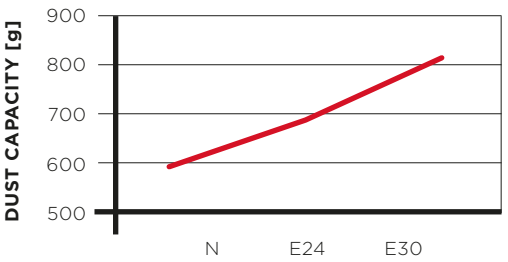


F8	Unit	N	E24	E30
Air Flow Rate V_N (Nominal Service Life)	m^3/h	4,250	4,250	4,250
Initial Pressure Drop at V_N*	Pa	130	130	119
Air Flow Rate V_L (Long Service Life)	m^3/h	3,400	3,400	3,400
Initial Pressure Drop at V_L*	Pa	85	85	80
Filter Class as per EN 779	–	F8	F8	F8
Efficiency, Atmospheric, Average**	%	90 – 95	90 – 95	90 – 95
Arrestance, Gravimetic, Average**	%	> 99	> 99	> 99
Filter Media Area (installed)	m^2	20	24	30
ASHRAE Dust Holding Capacity**	g	596	692	809
Energy Rating***	–	B	B	B

F8 PRESSURE DROP



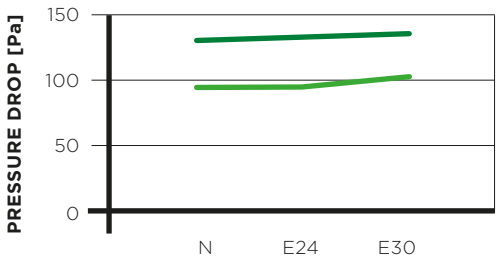
F8 DUST HOLDING CAPACITY^



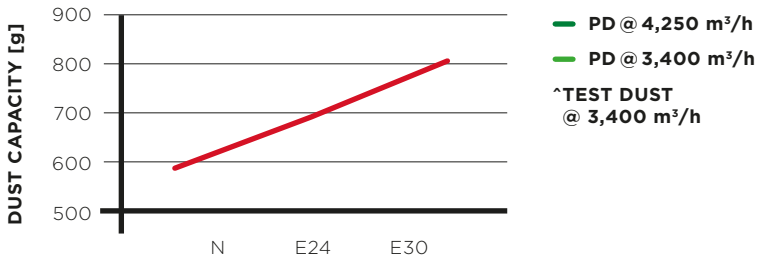
Compatex TMP/C Technical Data

F9	Unit	N	E24	E30
Air Flow Rate V_N (nominal service life)	m^3/h	4,250	4,250	4,250
Initial Pressure Drop at V_N*	Pa	127	127	137
Air Flow Rate V_L (long service life)	m^3/h	3,400	3,400	3,400
Initial Pressure Drop at V_L*	Pa	94	94	102
Filter Class as per EN 779	–	F9	F9	F9
Efficiency, Atmospheric, Average**	%	>95	>95	>95
Arrestance, Gravimetic, Average**	%	100	100	100
Filter Media Area (installed)	m^2	20	24	30
ASHRAE Dust Holding Capacity**	g	593	696	803
Energy Rating***	–	A+	A	A

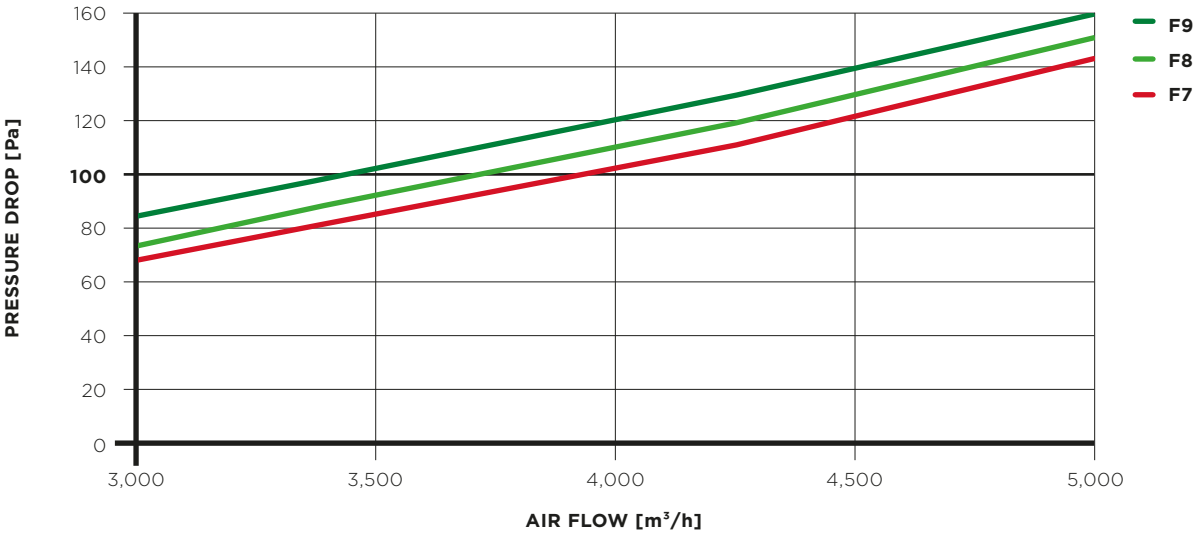
F9 PRESSURE DROP



F9 DUST HOLDING CAPACITY^



PRESSURE DROP VS AIR FLOW



All values for Compatex TMP/C type 610

* Tolerance ± 10%

** Tested according to EN 779, for 3,400 m^3/h (2,000 cfm) up to 450 Pa final pressure drop

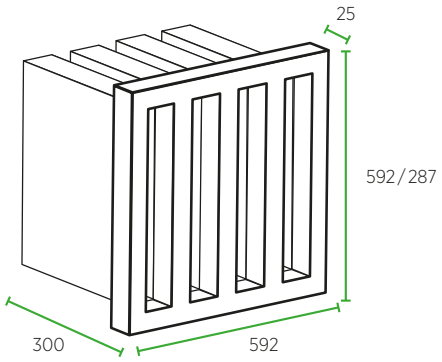
*** Energy rated according to Eurovent 4/21 guidelines

Compatex TMP/C Technical Data

Application Parameters	
Recommended Final Pressure Drop	450 Pa
Maximum Final Pressure Drop	800 Pa
Static Burst Pressure (new filter)	3,500 Pa (TMP) / 7,500 Pa (TMPC)
Dynamic Burst Pressure (new filter)	3,500 Pa (TMP) / 7,500 Pa (TMPC)
Maximum Air Flow Rate	5,000 m^3/h
Continuous Operating Temperature	< 70 °C
Admissible Relative Humidity	< 100 % (TMP) / ≤ 100 % (TMPC)

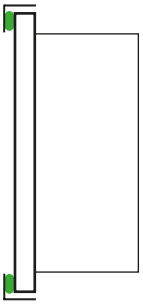
Materials Specification	
Filter Media	Micro glass-fibre bonded to paper
Filter Frame*	Incinerable, halogen-free, recycled polystrol / ABS (TMP)
Flammability Class (standard)	DIN 53438- K2/F2
Flammability Class (upon request)	DIN 53438- K1/F1 | DIN 4102- B2 | UL 900, Class 2
Sealant	Two-component polyurethane
Gasket	Polyurethane – foamed in one piece with closed surface

DIMENSIONS (mm)

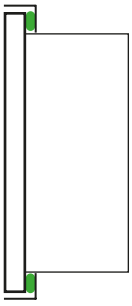


GASKET OPTIONS

Front-Face



Rear-Face



PRODUCT NOMENCLATURE

Compatex - **TMPC** - **F7** - **610** - **E30**

Product Series
TMP: cost effective, entry-level filter
TMPC: fully-sealed, weather resistant model

Filter Class
F7 – F9

Dimensions
305/610

Filter Area
N: Normal (20 m^2)
E24: Extended (24 m^2)
E30: Extended (30 m^2)

* Maximum permitted torque per mounting point along the plastic frame is 1.4 Nm
Compatex TMP/C-E30 types use an improved hotmelt separator technology together with a strong backing screen attached to the media packs.

Novatex
Progressively Structured Synthetic Bag Filters

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

With excellent dust holding capacities, Novatex bag filters offer a longer service life to make yours easier. Reduced filter expenditure, lower maintenance costs, fewer change-outs, less to dispose of – Novatex will save you time and money.

With rigid pockets, low pressure drop and a progressively-structured media, Novatex proves that a long life does not have to come at the expense of performance, and, with a range of sizes and filtration efficiencies, there's a combination to suit all requirements.

KEY FACTS

- Synthetic filter medium: For reliability in operation
- Long lifetime in operation: Lowers costs
- Fully incinerable: Easy, environmentally-friendly disposal
- Free of glass fibres: Eliminates shedding
- Low pressure drop: Reduces energy consumption & operating costs

EUROVENT CERTIFIED PERFORMANCE
AIR FILTERS
CLASS M5-F9
www.eurovent-certification.com

MANN+HUMMEL participates in the ECC programme for Air Filters. Check ongoing validity of certificate: **www.eurovent-certification.com or www.certiflash.com**

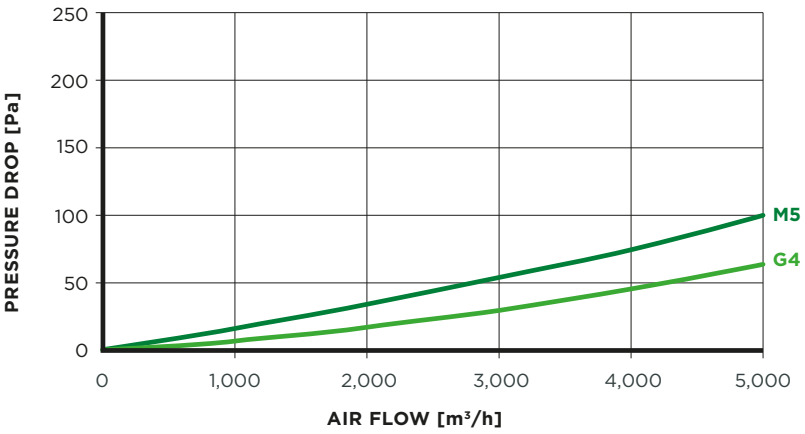
Novatex
Technical Data

Filter class	Unit	G4	M5
Nominal Air Flow *	m^3/h	3,400	3,400
Arrestance (acc. to EN 779)	%	≥ 90	–
Efficiency (acc. to EN 779)	%	–	40 – 60
Initial Pressure Drop *	Pa	36	55
Recommended Final Pressure Drop	Pa	250	450
Energy Rating **	–	–	B
Pocket Length (standard type)	mm	350	600
Number of Pockets (standard type)	Units	6	6
Size of Header Frame (1/1)	Pa	592 x 592	592 x 592

* Tolerance: ± 10%

** Energy Rating – as is the case with many consumer goods, our M5 - F9 filters are rated according to their energy efficiency on a scale of A+ (the best) to E (the worst). These ratings are certified by Eurovent and in accordance with the 4/21 scheme.

PRESSURE DROP / AIR FLOW



QUALITY

To ensure the highest standards of quality, Novatex filters have been tested in accordance with EN 779:2002 and are part of the Eurovent Fine Filter Certification scheme.

Available Variations	
Frame	Plastic or Metal: 20 or 25 mm
Number of Pockets	6 pockets
Pocket Lengths 1)	200, 300, 350, 500, 600 mm
Gasket	Without; PU foamed or at gasket available on request
Temperature	up to 80 °C
Relative humidity	up to 100 %

1) Other dimensions available upon request

SoniQ II Ultrasonically-Sealed Bag Filters

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Packed with features, SoniQ II bag filters are ultrasonically-sealed (hence the name) to nullify the drawbacks associated with traditionally sewn pockets. Removing stitch holes is obviously the main benefit, but ultrasonically-sealing also provides greater strength, uses less space inside the pocket and also lessens the risk of contamination from within the filter.

When this is coupled with a media that resists microbial growth and the build-up of mould or mildew, we are left with a filter suited to a wide range of applications, from hospitals and computer suites, through to offices and public buildings.

IMPROVED EFFICIENCY

SoniQ II has been specifically developed to offer high levels of filtration efficiency across its service life. A key part of this is meeting the requirements of EN 779:2012 by offering dependable performance whether clean, dirty or discharged. This is achieved thanks to SoniQ II's enhanced media that provides high mechanical efficiency in addition to its inherent electrostatic charge, so no matter what the operating environment presents, SoniQ II will keep providing assured performance and high efficiency levels.

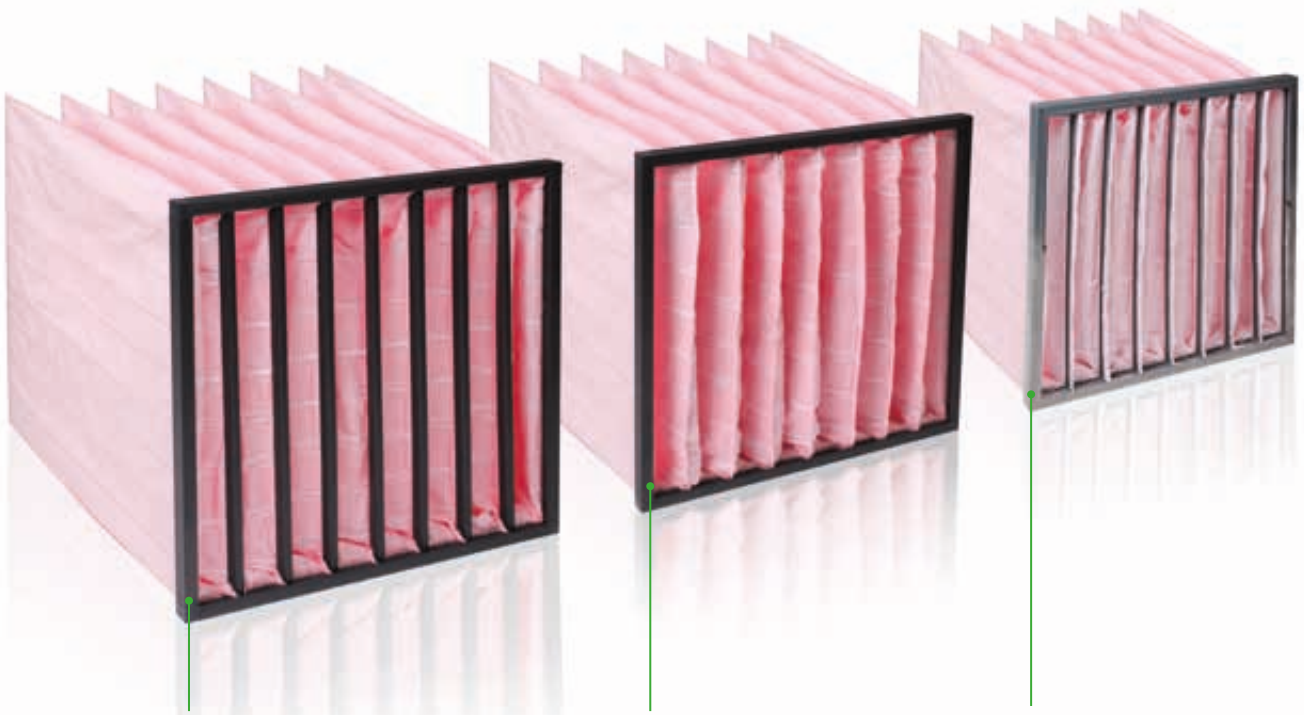
KEY FACTS

- Meets requirements of latest EN 779 standard: Assured performance throughout service life
- Ultrasonically-sealed: For greater strength and performance in even the most challenging of conditions
- Resists microbial growth: Prevents the build-up of mould or mildew
- Long lifetime in operation: Lowers costs
- Plastic frame: Lightweight and for easy, environmentally-friendly disposal
- Free of toxic chemicals: Eliminates leaching into airstream
- Longitudinal separators: Provide even air distribution throughout the filter

EUROVENT CERTIFIED PERFORMANCE
AIR FILTERS
CLASS M5-F9
www.eurovent-certification.com

MANN+HUMMEL participates in the ECC programme for Air Filters. Check ongoing validity of certificate: **www.eurovent-certification.com or www.certiflash.com**

SoniQ II
Range Overview



SoniQ II

Superior frame with aerodynamic cover glides
The standard SoniQ II plastic frame offers excellent rigidity and strength. This version also features aerodynamic cover glides to aid air flow.

eSoniQ II

Budget-friendly, plastic frame
Whilst eSoniQ II's frame may not be as rigid as the standard version, it provides ample strength for less demanding applications where budget is the primary concern.

mSoniQ II

Galvanised steel frame
mSoniQ II's galvanised steel frame is designed for use in applications where plastic frames are unsuitable.

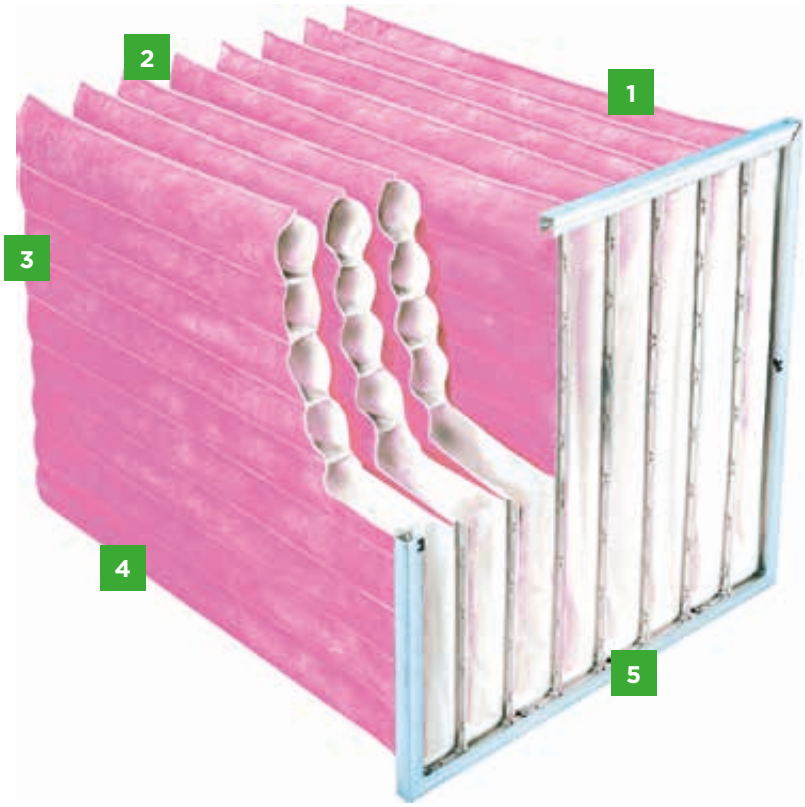
POCKET DESIGN & BURST RESISTANCE

SoniQ II features pockets designed to inflate and remain separated from one another to allow even distribution of the air flow across the entire filter. With the dust-loading dispersed consistently, the filter media provides both increased efficiency and greater dust holding capacity. Independent burst tests undertaken on the SoniQ II media have shown that even at pressures exceeding 750 Pa, no significant distortion takes place with the media remaining completely intact.

TESTING

As well as internal testing on EUROVENT/ASHRAE test rigs, the SoniQ II range is also regularly subjected to independent checks in accordance with EN 779:2012 and as part of the Eurovent Certification scheme for fine filters.

SoniQ II Construction



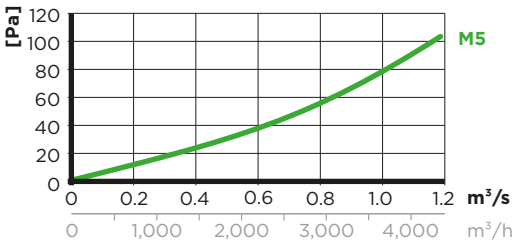
1. Plastic frame - easy waste disposal, fully incinerable, no sharp edges and 30% lighter than mild steel. Metal headers (as pictured) are available upon request.
2. Ultrasonic bonding around each pocket perimeter ensures strength under heavy dirt loading conditions.
3. Multiple rows of equally spaced longitudinal separator lines maintain optimum pocket configuration to provide even air distribution through the filter pack.
4. Greater media area per pocket as no hotmelt required to seal stitch lines.
5. Pocket lines recessed from header to produce an open entry shape

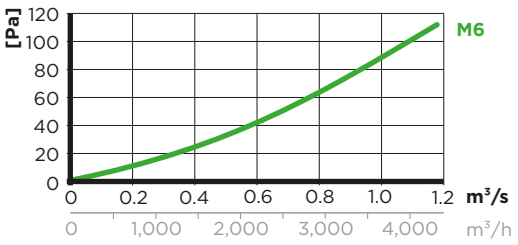
SoniQ II
Technical Data

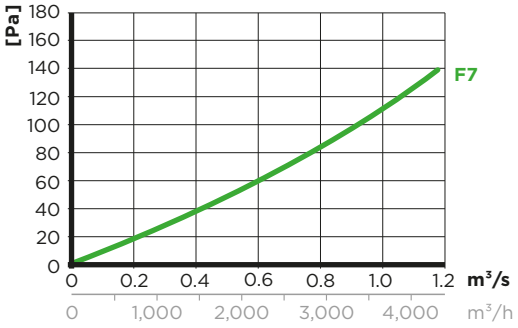
Filter class	M5	M6	F7	F8	F9
Air Flow (m³/h)	3,400	3,400	3,400	3,400	3,400
Initial Pressure Drop (Pa)	70	80	100	140	175
Rec. Final Pressure Drop (Pa)	450	450	450	450	450
Pocket Length (mm)	635	635	635	635	635
No. of Pockets	8	8	8	8	10
Energy Rating*	E	E	C	C	C
Flam. Classification acc. to DIN 53438	K2/F2	K2/F2	K2/F2	K2/F2	K2/F2

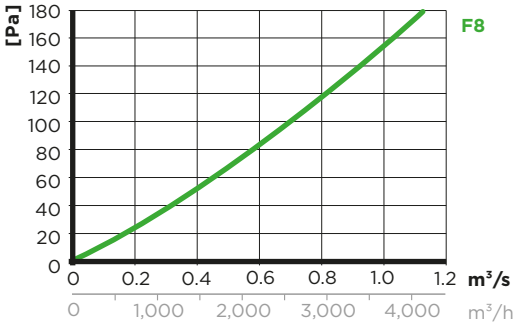
*Energy Rating – as is the case with many consumer goods, our M5 – F9 filters are rated according to their energy e ciency on a scale of A+ (the best) to E (the worst). These ratings are certified by Eurovent and in accordance with the 4/21 scheme.

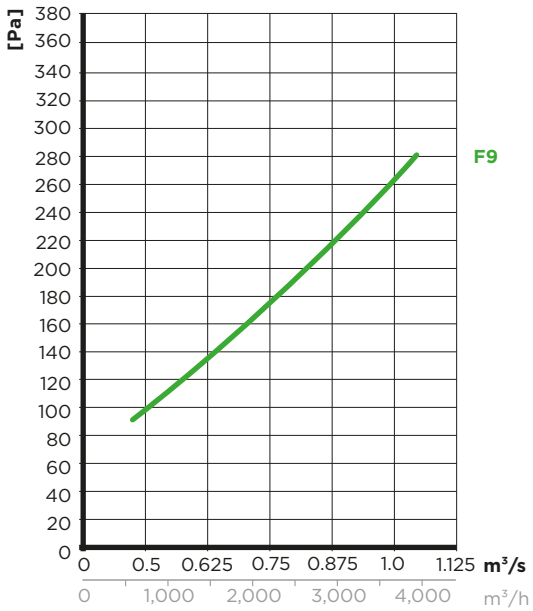
PRESSURE DROP VERSUS AIR FLOW











Revo II

The Next Stage in the Air Filter Revolution

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Just as the first incarnation revolutionised filter design, Revo II pushes the boundaries of filter technology even further. With a state-of-the-art synthetic media incorporating nano fibres, Revo II provides a remarkable dust holding capacity and life, whilst maintaining a low pressure drop.

By changing over from conventional air-conditioning filters to Revo II, you will lower your energy consumption by thousands of kWh and at the same time, significantly reduce your CO_2 emissions.

Good for the environment and your budget.

KEY FACTS

- Meets the requirements of EN 779:2012: Provides validated performance
- High energy efficiency: For low cost and environmentally-friendly operation
- Nanofyne+™ media: Maximum efficiency with minimal pressure drop
- Specially designed polypropylene frame: Guarantees the seal between filter media and frame
- Extended filter surface and high dust holding capacity: Provides up to double the service life and lowers life-cycle costs
- Recyclable or fully incinerable: Easy, environmentally-friendly disposal
- Stiff frame and durable filter media: Simplifies filter replacement
- Stiff, welded pockets: Ensure an air-tight seal and eliminate particle loss from air flow variations
- Mechanically bound fibres: Prevent shedding and provide resistance to humidity and potentially harmful chemicals
- Aerodynamic design: Reduces pressure drop, saves energy and contributes to low life-cycle costs

EUROVENT CERTIFIED PERFORMANCE
AIR FILTERS
CLASS M5-F9
www.eurovent-certification.com

MANN+HUMMEL participates in the ECC programme for Air Filters. Check ongoing validity of certificate: **www.eurovent-certification.com or www.certiflash.com**

Revo II
More Performance

Whilst Revo II retains many of the features that made the first incarnation such a success, the most notable bene t over the previous model is the additional service life. Thanks to a unique filter media, Revo II provides up to double the operating life than the previous model, which already boasted excellent longevity itself.

This additional life is not at the expense of performance, however – efficiency levels are improved for all filtration grades, in fact. And, with both initial and minimum test efficiencies also enhanced, Revo II comfortably meets the requirements of EN 779:2012.

With this added performance and life comes a two-fold benefit to filter spend. Obviously, a longer life reduces the outlay required for primary filters, but Revo II also eliminates the need for a separate prefilter too, further lessening filter spend. In addition, the removal of a prefilter stage immediately improves the pressure drop of the system, reducing energy consumption even further.

Stiff, welded pockets

Pocket separators improve air flow

Multi-layered, synthetic media

Robust and rigid polypropylene frame

Aerodynamic inlet with tapered pockets

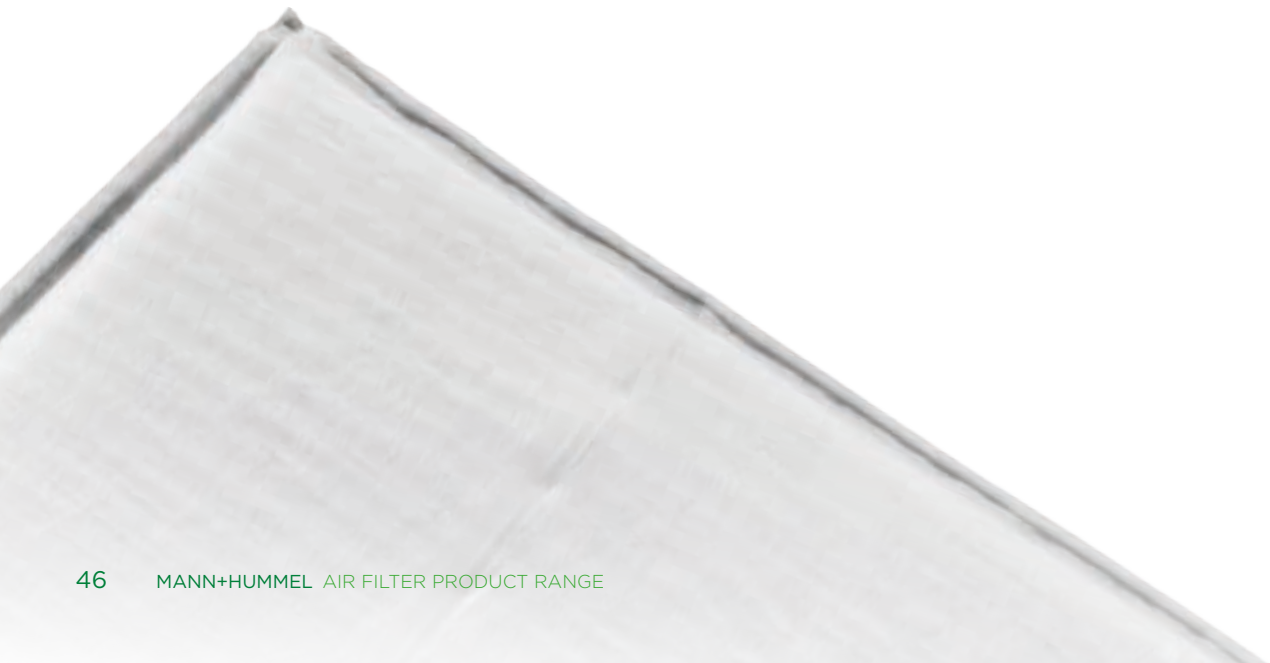
Revo II
Progressive Filter Media

Revo II is constructed from several layers of media to provide progressive filtration for different particle sizes. The first layer has a coarse structure and filters the largest of particles. The second, Nanofyne+™ layer, removes the smallest of particles. Whilst the outer layer comprises of a stiff composite material that also gives the media its rigidity. This multi-layered solution allows contaminant to be depth loaded into the media, increasing dust holding capacity and prolonging life.

LAYER 1
Pre-filter with a coarse structure to remove the largest particles

LAYER 2 (F7–F9)
Secondary fine filter with Nanofyne+™ removes the smallest particles

LAYER 3
Supports the second layer, ensuring the media retains its form during air flow variations and performs as expected



Revo II Nanofibres

We first introduced nano fibres to the filtration marketplace in 2006 through our Nanofyne Technology™ line. Since then, it has been widely adopted and established at the forefront of filter technology. Revo II is the first product to feature the latest nanofibre media – Nanofyne+.

With a diameter of less than 1 µm, nanofibres provide reduced pressure drop without compromising filtration efficiency, giving you better performance than old-fashioned glass fibre.

When we combine the characteristics of Nanofyne+ with the electrostatic charge of synthetic media, we get a filter with unique performance – high efficiency from the start and low pressure drop, which reduces the energy consumption of the fan.

ENERGY EFFICIENCY

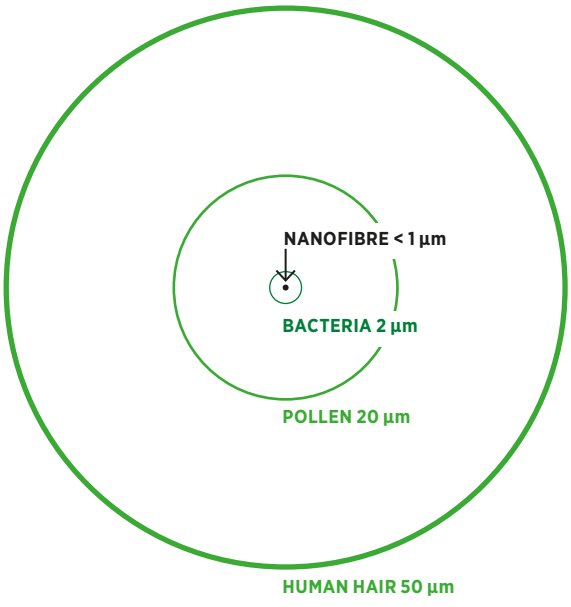
A filter consumes energy by creating a resistance to the air that flows through it. This pressure drop means that the ventilation fan has to work harder to move the air. The effort required is directly related to the energy consumed by the fan motor. Put simply, if the pressure drop over the filter is lowered, the fan works less hard and therefore consumes less energy.

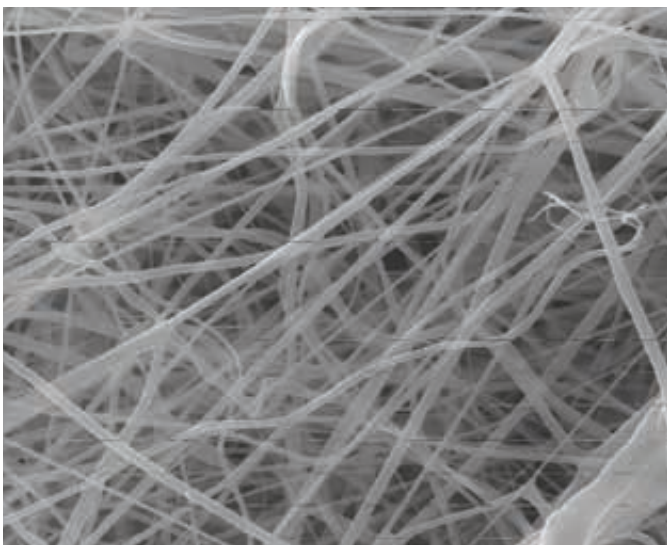
As a rule, the higher the filter efficiency, the higher the pressure drop, but the other aspects of a filter design are crucial in determining the pressure drop relative to comparable filters. That's why the Revo II with its multitude of energy saving-features has the lowest pressure drop available.

In fact, tests have shown that fitting an air handling unit with Revo II typically reduces the pressure drop of the entire system by more than 20%.

INCREASED AIR FLOW

Alternatively, in environments requiring greater quantities of delivered air or those with direct-drive fans, the lower pressure drop a orded by Revo II can provide a dramatic increase in air flow. In such situations, installing Revo II effectively upgrades an air delivery system without the expense of retrofitting new air handling units.





Revo II filter media photographed with an electron microscope at 2,500 times magnification

Revo II
Lowering your Operating Costs!

LIFE-CYCLE COST (LCC)

An LCC-analysis of air filters shows that approximately 80 % of the costs*) are a result of the pressure drop across the filter. The purchase price does not represent such a large proportion of the total cost as many think, typically equalling just 20 %.

In order to give our customers the best possible value, the focus of our development work on Revo II has been concentrated upon lowering life-cycle costs. This has given us a filter with a high dust holding capacity and low pressure drop.

Revo II can lower your operational costs considerably.

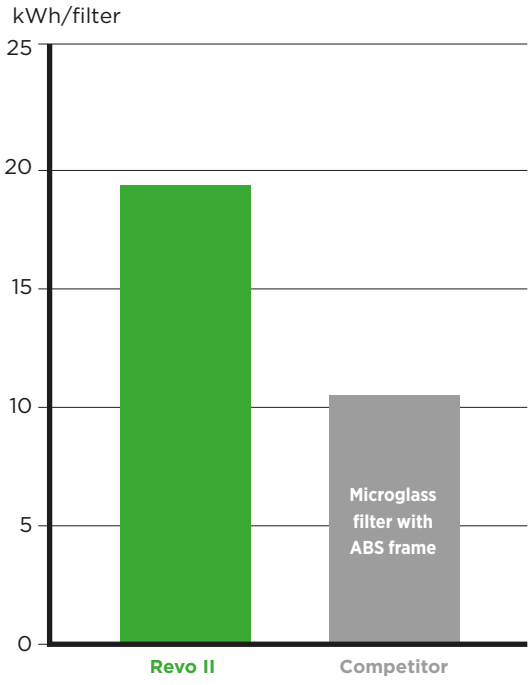
We would be delighted to help you calculate how much you can save by changing to Revo II!

ENERGY CONTENT WITH COMBUSTION

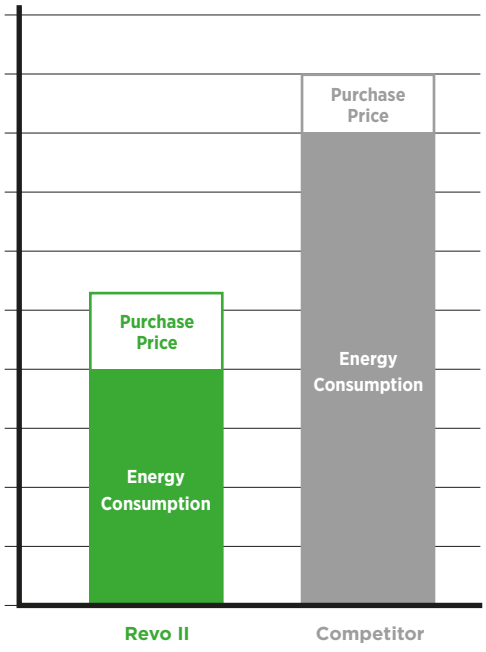
Synthetic filters with plastic frames are a highly appreciated combustible waste product for wastepowered incineration plants. This is due to the high energy value emitted when the product is burned and the small amount of ash left after combustion.

When one burns a new Revo II the energy emitted corresponds to 90 % of the energy created from burning the same amount of heating oil.

RECOVERED ENERGY WITH COMBUSTION



*) FILTER CLASS F7



Revo II
The Key to a Long Life – Dust Holding Capacity

Awareness is growing of the environmental benefits that air filters can provide. As manufacturers, we are constantly striving to lower the pressure drop of our products to reduce their energy consumption. We use environmentally-friendly materials such as synthetic filter media to reduce their negative impact during production and disposal, choosing incinerable materials so that energy can be reclaimed once they have served their purpose.

But one of the most effective ways to enhance an air filters impact upon the environment is to simply lengthen how long it can be used for in the first place.

Using less material, less energy to produce, deliver and install, and less to throw away. Obviously, this also reduces the life cycle cost of the product too, saving our customers money in the process.

This is the core premise for Revo II. A revolutionary media construction provides all the efficiency you would expect but with an extremely high dust holding capacity. So high in fact, that it is possible to reduce the number of pockets required and still achieve the same dust holding capacity as many competitive products, thus lowering the pressure drop in the process.

This additional capacity is achieved through a unique media design that provides more filter media per module. Not only does this yield a service life up twice that of the previous Revo, but e ciency is improved too – increasing for all particle sizes, in fact. For example, initial efficiency, which is now independently verified by Eurovent, is over 65 % at 0.4 µm for an F7 filter.

AIR QUALITY

It is now widely accepted that we are living in an evermore polluted world, breathing air containing ever higher levels of contaminant. A UK government study found that reducing the concentration of $PM_{2.5}$ would be more beneficial to life expectancy than eliminating passive smoking and traffic accidents combined. With this in mind, the importance of choosing the correct level of filtration is clear. However, as a general rule, energy consumption increases proportionally to filter class. So whilst simply increasing the filtration efficiency will improve the air quality, it will do so at an increased energy cost – both financial and environmental.

So what is required is a solution that provides sufficient air quality at the lowest possible energy consumption.

But, given the disparate PM concentrations present in the World's air, there is unfortunately no 'catch-all' solution for the correct filtration level. Instead, a more tailored approach must be employed.

PM Particulate matter

PM_{10} Particles smaller than 10 µm in diameter

$PM_{2.5}$ Particles smaller than 2.5 µm in diameter

PM_1 Particles smaller than 1 µm in diameter

ECO16 – CLEAN AIR MANAGEMENT SYSTEM

This balance is exactly what our patented Eco16 system seeks to find. A clean air management system, Eco16 guarantees a required level of air cleanliness in the most efficient manner possible. By analysing your exact requirements and operating environment, we balance all of the constituent parts of your air handling unit and provide you with a filtration system that offers the necessary cleanliness at the lowest possible cost – both to you and the environment.

eco16

Thanks to its low pressure drop and high efficiency levels, Revo II is an integral tool in the Eco16 system. It is for this reason that we have included the expected PM removal efficiencies in the technical data overleaf. For further information on the Eco16 clean air management system, please contact your local MANN+HUMMEL representative.

Revo II
Technical Data

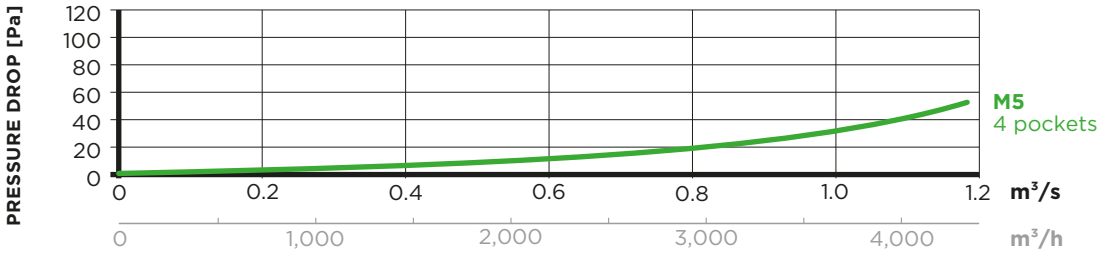
Filter class (EN 779)*	No. of pockets	eco16 – PM Removal**			Initial Service Efficiency*	Minimum Test Efficiency *	Nominal air flow		Pressure Drop Clean Filter (Pa)*	Energy Rating ***
		PM10	PM2.5	PM1			m^3/h	m^3/s		
M5	4	30 %	5 %	< 5 %		–	3,400	0.94	33	A+
M6	5	60 %	35 %	30 %		–	3,400	0.94	50	B
F7	8	85 %	60 %	50 %	55 %	45 %	3,400	0.94	70	B
F7	10	85 %	60 %	50 %	55 %	45 %	3,400	0.94	70	A
F8	8	95 %	80 %	75 %	75 %	70 %	3,400	0.94	100	B
F9	8	95 %	90 %	85 %	90 %	80 %	3,400	0.94	135	B

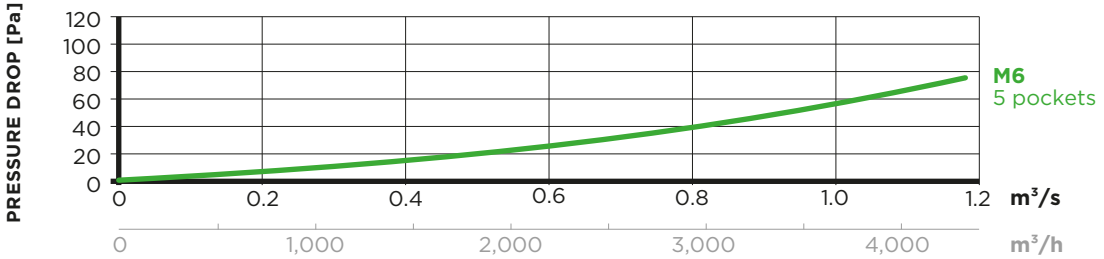
Notes:
Revo II is manufactured in a number of sizes and variants. The data above applies to the most usual standard sizes. Dimensions: 592 x 592 x 635 mm
The different energy ratings for the F7 class are caused by a higher dust holding capacity on the 10 pocket version.
* Values certified by Eurovent
** Calculated according to ISO/FDIS 16890-1 – values should only be used as an indication. Onsite survey required to obtain an exact measurement.
*** Energy Rating – as is the case with many consumer goods, our M5 – F9 filters are rated according to their energy e ciency on a scale of A+ (the best) to E (the worst). These ratings are certified by Eurovent and in accordance with the 4/21 scheme.

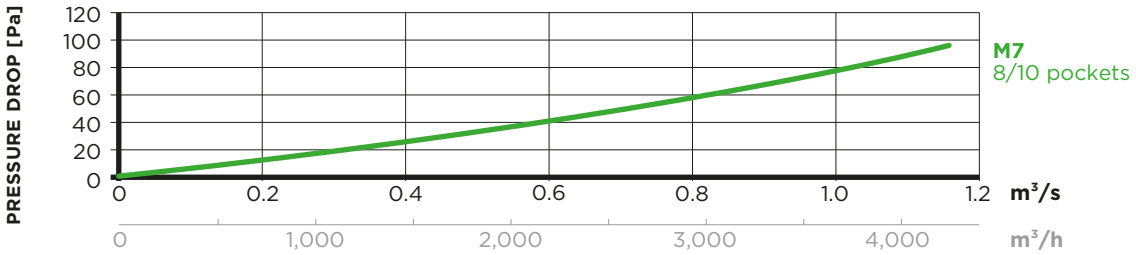
Maximum Operating Temperature	70 °C
Maximum Relative Humidity	100 %
Recommended Final Pressure Drop	2 – 2.5 times initial pressure drop

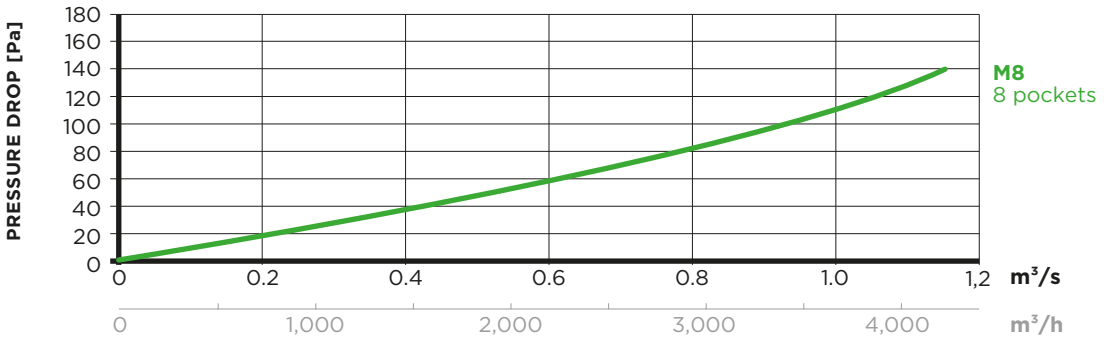
Revo II
Pressure Drop / Airflow

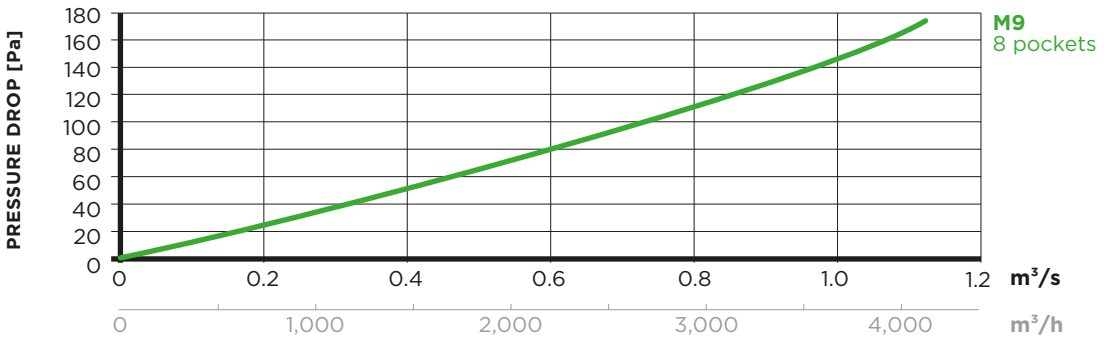
Revo II is manufactured in filter classes M5 – F9. The diagrams show the pressure drop with a clean filter and 1/1-module (635 mm)











Revo DuoSorb Combined Gas and Particle Bag Filter

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Removing particles and odours from the air is typically a two-stage process, requiring separate filter elements for each task. Revo DuoSorb changes this by delivering effective particle and odour separation in one filter element – removing the need for an additional stage.

This is thanks to Revo DuoSorb's synthetic filter media, which provides particle filtration to class M6 (EN779), whilst efficiently removing all odours and other dangerous gases.

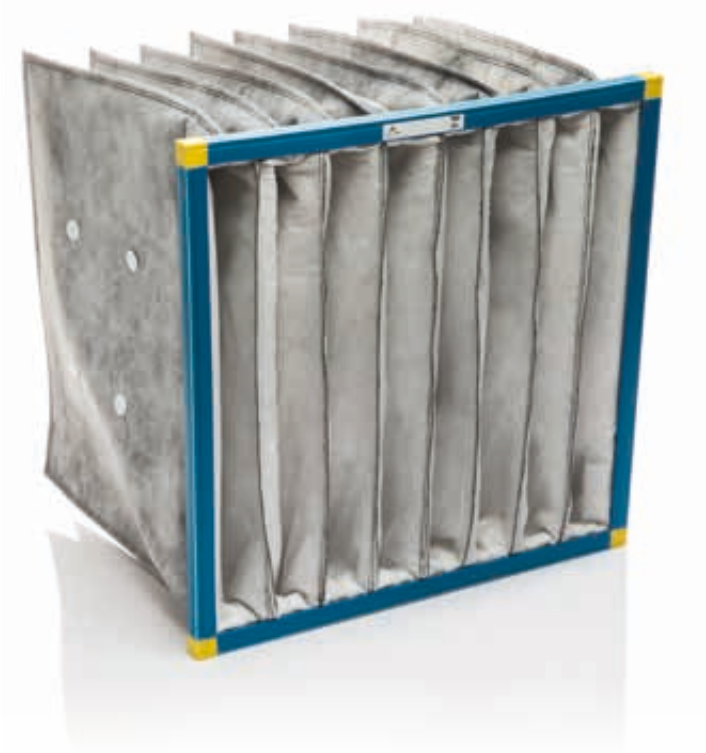
A strong gas adsorption performance makes Revo DuoSorb ideally suited to applications experiencing problems with emissions from traffic, combustion or other odorous processes.

Ventilation systems are usually designed with a limited number of particle filters in mind. With Revo DuoSorb, you can introduce high performance gas filtration without having to rebuild the facility.

Technical Data	
Filter Class	M6
Initial Pressure Drop	76 Pa @ 0.94 m^3/s *
Operating Temperature	-30/50 °C
Recommended Final Pressure Drop	200 Pa *
Recommended Maximum Relative Humidity	< 90 % *

*** Notes**

Revo DuoSorb is manufactured in a number of sizes and specifications. The data above refers to a filter 592 x 592 x 635 mm, with 8 bags.
If the maximum relative humidity is exceeded gas adsorption performance may be impaired. Gas adsorption will return to normal when the humidity drops below the maximum value.



Fibatex
Glass Fibre Pocket Filter M5 – F9

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

With a maximum operating temperature of 100 °C (for the metal framed version), Fibatex is designed to operate in the most extreme of environments.

Featuring pockets constructed of layered micro-fine glass fibres with an additional covering layer on the clean air side to eliminate shedding, Fibatex is ideally suited for use in a number of applications as both a pre- and primary filter.

Sealed stitches, a stiff corrosion-free frame and high dust holding capacity mean that Fibatex combines efficient operation with a long service life.

KEY FACTS

- Micro-fine glass fibre media: For assured performance in harsh conditions
- Additional covering layer: Eliminates fibre shedding into the downstream air flow
- High dust holding capacity: For a long life with fewer change-outs
- Rigid, corrosion-free frame: Simplifies filter replacement and prolongs life
- Sealed stitches: Ensures 100 % air tight seal
- Low pressure drop: Reduces energy consumption & operating costs

EUROVENT CERTIFIED PERFORMANCE
AIR FILTERS CLASS M5-F9
www.eurovent-certification.com

MANN+HUMMEL participates in the ECC programme for Air Filters. Check ongoing validity of certificate: **www.eurovent-certification.com or www.certiflash.com**

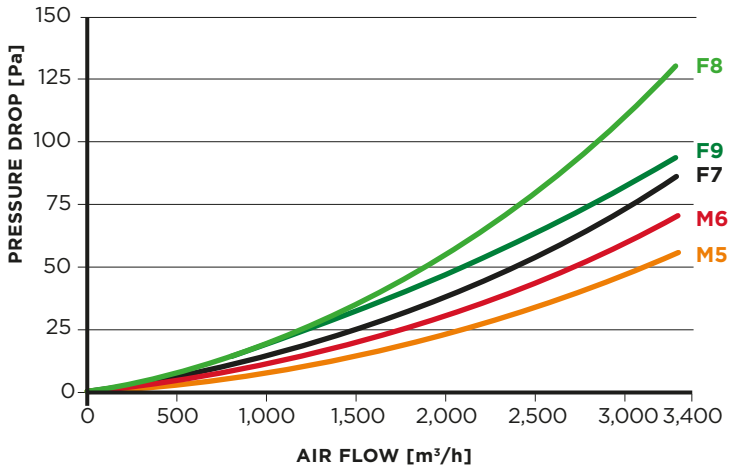
Fibatex
Technical Data

Filter Class	Unit	M5	M6	F7	F8	F9
Air Flow	m^3/h	3,400	3,400	3,400	3,400	3,400
Average Efficiency	%	40 – 60	60 – 80	80 – 90	90 – 95	> 95
Initial Pressure Drop	Pa	55	60	80	130	145
Recommended Final Pressure Drop	Pa	450	450	450	450	450
Pocket Length	mm	635	635	635	635	635
Number of Pockets	Units	6	8	8	8	10
Frame Dimensions	mm	592 x 592	592 x 592	592 x 592	592 x 592	592 x 592
Energy Rating *	–	B	B	B	B	B
Flam. Classification acc. to DIN 53438	–	KF/F2	KF/F2	KF/F2	KF/F2	KF/F2

* Energy Rating – as is the case with many consumer goods, our M5 – F9 filters are rated according to their energy efficiency on a scale of A+ (the best) to E (the worst). These ratings are certified by Eurovent and in accordance with the 4/21 scheme.

Possible Variations	
Frame	Plastic (20, 25 mm) Metal (20, 25 mm)
No. of Pockets	M5: 6 pockets M6 – F8: 8 – 10 pockets F9: 10 pockets
Pocket Length	380, 534, 635 mm
Sealing Gasket	Without; foamed polyurethane; or at gasket on request
Temperature Resistance	Up to 80 °C with plastic frame Up to 100 °C with metal frame
Relative Humidity	Up to 100 %
Additional Information	Corrosion free

PRESSURE DROP VERSUS AIR FLOW



QUALITY CONTROL
Fibatex pocket filters have been successfully tested according to EN 779.

Hepatex CR
Setting the Quality Standard

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Hepatex CR filters are high-efficiency submicron particulate air filters designed to protect people, equipment and processes from airborne particulate contamination.

Hepatex CR filters are used in situations requiring high or very high levels of air purity. They are primarily designed as intake filters for low turbulence displacement (or laminar) flow clean room ceilings and clean workbenches.

Typical applications can be found in: microelectronics, semiconductor manufacture, medicine, chemistry, pharmacy, microbiology, film and magnetic tape production, compact disc manufacture, laboratories and the food industry.

KEY FACTS

- Initial efficiency from 85 % to 99.999995 % for MPPS: Suited to all types of applications
- Optimised velocity distribution: For stable air flow and longer life
- Guaranteed leak-free: For assured protection
- Mechanically stable: For optimum performance
- Various frame types and sizes: To suit all requirements
- Two face guards and anodized aluminium frame: For rigidity, strength and safety in operation
- Integrated one-piece round, gel or knife edge gasket: To ensure an air-tight seal in all environments
- ULPACATS quality certificates available: For guaranteed safety and performance
- Low pressure drop: Reduced energy consumption and operating costs

Hepatex CR Construction and Design

CONSTRUCTION

A filter medium constructed from various grades of micro glass fibre paper is folded into a pack designed with the optimum pleat height and density for the specific operating conditions. Continuous thread separators coated with adhesive, support the individual pleats and impart great stability to the whole pack.

As standard, the entire pack is sealed into an anodised aluminium frame with a continuous one-piece gasket to ensure a perfect seal between the filter assembly and its housing.

DESIGN

MANN+HUMMEL became one of the first filter manufacturing companies to install an automated filter medium tester.

With this instrument the penetration of each individual medium as a function of particle size and velocity (diagrams 1 and 2) may be determined. This allows the selection of the optimum filter medium for any particular filter type and application from the wide variety of media available on the market.

This instrument is therefore also able to calculate, measure and guarantee all relevant filtration characteristics for individual projects.

Diagram 1 shows that every filter medium has a maximum penetration. The associated particle diameter is known as MPPS (Most Penetrating Particle Size).

The MPPS is a function of the particle and fibre diameters, velocity through the medium, thickness of the medium and the packing density.

The integral and local penetration values of all Hepatex CR filters are – beside the traditional NaCl values – specified for MPPS and thus conform fully to the stipulations of EN 1822.

PRE-FILTRATION

The service life of Hepatex CR filters can be prolonged by efficient prefiltration for which we would recommend the higher grades of the Compatex FP filters.

TYPICAL MEDIA PENETRATIONS

DIAGRAM 1

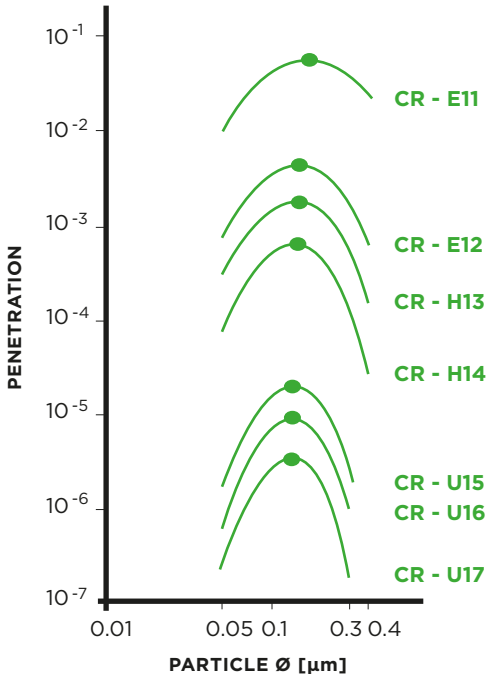
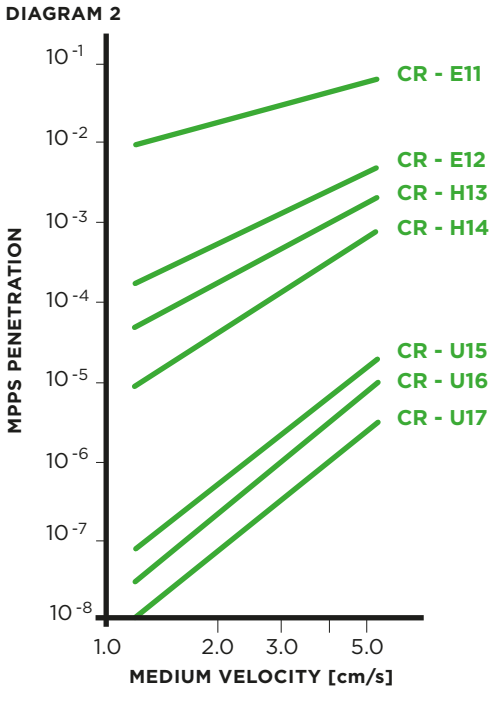


DIAGRAM 2



Hepatex CR Quality Policy

At MANN+HUMMEL we are committed to the design and production of filter equipment which is fit for its stated purpose, is of the highest quality, consistent in its performance and offers safety and reliability at the optimum price and product availability. This is achieved by operating and maintaining a comprehensive quality control system based on ISO 9001.

MANN+HUMMEL concentrates on the quality assurance of the: Filter medium, production process and finished filter element.

Hepatex CR filters are manufactured and tested in accordance with an established and audited procedure. During these processes, and depending on the requirements, a distinction is made between the different quality levels as explained below.

A

QUALITY LEVEL A

- Statistical control of filtration and other data at finished products and materials
- 100 % visual inspection of the finished product before packing

B

QUALITY LEVEL B

100 % leak test of the finished filters to EN 1822-4 (“oil thread test”, fig.1)

C

QUALITY LEVEL C

Batch test certificate to DIN EN 10204-2004-2.2

D

QUALITY LEVEL D

With ULPACATS (ULPA filter Computer Aided Test System), MANN+HUMMEL created new dimensions to quality assurance and test techniques: the filter is placed in a computer controlled test rig and runs at its rated air flow. It is challenged by an aerosol, and the upstream and downstream concentrations of that aerosol are measured by parallel traversing laser particle counters covering the entire surface of the filter.

The results are analysed at the MPPS for the particular filter, giving the integrated overall efficiency and the local penetrations in accordance with EN 1822. Should the local penetration be greater than an approved maximum, then the leaks are repaired on an associated rig where the actual leak locations are identified by the computer so that the smallest possible repair is carried out. The filter is then retested. All test readings are fully documented with an inspection certificate acc. to DIN EN 10204:2004-3.1 and the individual measuring protocols for the filter.

The ULPACATS test is a further guarantee of quality where particularly high levels of air purity are necessary (e.g. micro- electronic industry), avoids risks and ensures problem-free qualification and commissioning of the Clean Rooms.

Quality Levels by Efficiency

	E10	E11	E12	H13	H14	U15	U16	U17
Level A	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard
Level B	N/A	N/A	N/A	Standard	Standard	Standard	Standard	Standard
Level C	N/A	N/A	N/A	Standard	Standard	N/A	N/A	N/A
Level D	N/A	N/A	N/A	Optional	Optional	Standard	Standard	Standard

Hepatex CR
Technical Data

Hepatex CR	Unit	AS-H13	AL-H13	AS-H14	AL-H14	AS-U15	AL-U15	AS-U16	AL-U16
Nominal Air Flow (1) (2)	m/s	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Pressure Drop at Nominal Flow (2)	Pa	115	90	120	85	170	100	190	110
Recommended Final Pressure Drop (3)	Pa	240	150	240	150	340	180	380	200
Filter Surface Area per m² Face Area (1)	m²/m²	24	38	24	38	24	38	24	38
Filter Efficiencies									
EN 1822 Integral Value (typ. for CR) (4)	%	99.98	99.98	99.998	99.998	99.9998	99.9998	99.99997	99.99997
with MPPS-DEHS-aerosol (min.) (4)	%	≥ 99.95	≥ 99.95	≥ 99.995	≥ 99.995	≥ 99.9995	≥ 99.9995	≥ 99.99995	≥ 99.99995
EN 1822, MPPS-DEHS, Local Value (4)	%	≥ 99.75	≥ 99.75	≥ 99.975	≥ 99.975	≥ 99.9975	≥ 99.9975	≥ 99.99975	≥ 99.99975
Filter Class to EN1822	-	H13	H13	H14	H14	U15	U15	U16	U16

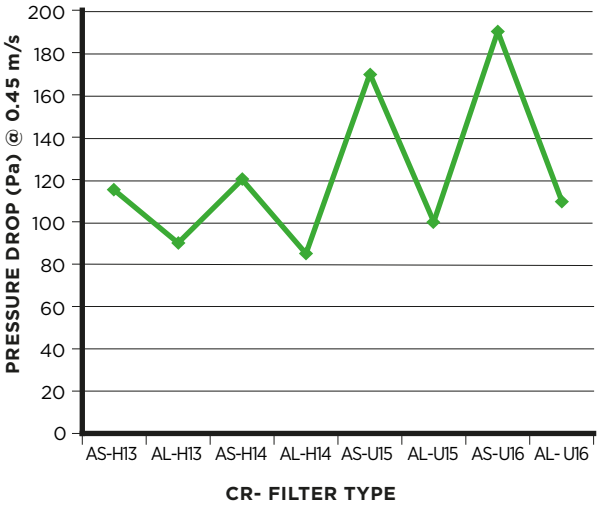
1) External filter dimensions. 2) Tolerance:± 10%. 3) Maximum final pressure drop ≤ 600 Pa. 4) DEHS = DieEthylHexylSebacat MPPS = Most Penetrating Particle Size.

Hepatex CR filters offer significantly higher efficiencies and are designed for a wide range of different "Clean" applications. CR filters are suitable for highest Clean Room requirements up to class 1 as per ISO 16 644-1 and for class A sterile pharmaceutical zones.

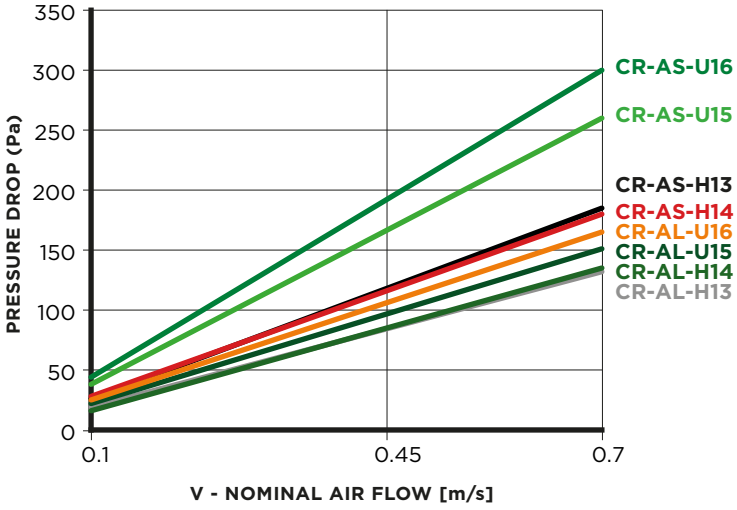
Hepatex CR filters of the CR-AL product line achieve a reduction in pressure loss of about 30 % with the same filtration performance. They offer an alternative solution with lower operating costs, significantly reducing energy consumption. Type CR-D and CR-V feature same performance data as the CR-A.

Specifications	
Filter Frame	
Type A/D/V	Anodized, extruded aluminium with mitred corners
Type AS/DS/VS	Normal pressure drops
Type AL/DL/VL	Very low pressure drops
Filter Medium	Water repellant micro-glass-fibre paper, pleated in a regular V-pattern
Face Guards	On both sides of the pleat pack, expanded sheet steel, powder coated in white (RAL 9010)
Sealing Compound	Fire-resistant, white two-component polyurethane
Gasket	EPDM foam, circular cross section with a closed surface
Max. Operating Temp.	70 °C (up to 120 °C available on request)
Fire Classification	K2/F2 to DIN 53438

CR- FILTER SELECTION DIAGRAM



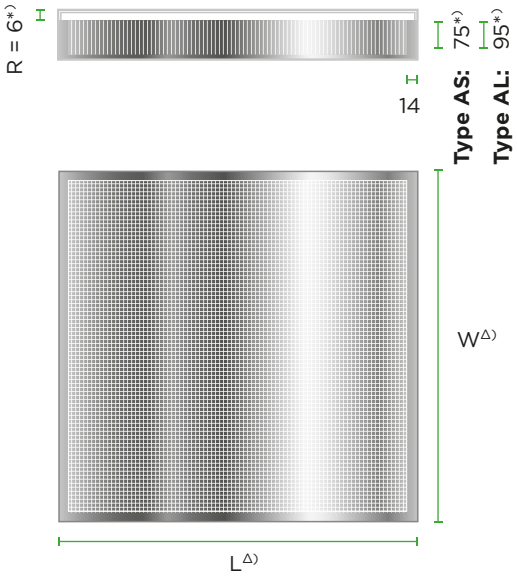
DP, V - DIAGRAM



Hepatex CR Dimensions and Order Code

Dimensions (mm)		Air ow Rate (m³/h) at 0.45 m/s	Weight (kg) with frame	
Length	Width		AS / DS / VS	AL / DL / VL
305*	305	140	1.8	2.2
457	305	210	2.5	3.0
610*	305	280	3.0	3.7
762	305	360	3.7	4.6
915	305	430	4.4	5.4
1,220	305	600	5.7	7.0
1,525	305	750	6.9	8.5
457*	457	320	3.2	4.0
557*	557	500	3.9	4.8
610*	610	600	5.1	6.3
762	610	750	6.1	7.5
915*	610	905	7.2	8.8
1,220*	610	1,205	9.3	11.4
1,525	610	1,510	11.3	14.0
1,830	610	1,810	13.4	16.6
762	762	940	7.9	9.7
915	762	1,130	9.1	11.2
1,220	762	1,510	11.5	14.2
1,525	762	1,880	14.7	18.2
915	915	1,355	10.6	13.2
1,220	915	1,810	13.4	16.7
1,525	915	2,260	16.9	21.0

DIMENSIONAL SKETCH (mm)



△) Dimension L and W
*) Seal compression from 1.5 to max. 2.0 mm

SPECIAL VERSIONS

The following special versions can be supplied on request:

- Different aluminium frame types, see next page
- Aluminium frames with single or noface guard
- Custom dimensions L x W
- Different filtration efficiencies and pressure drops
- CRM hooded filter module: Any CR filter can be combined and sealed to the CRM hood with intergrated spigot for individual air supply connection.

ORDER CODE AND EXAMPLE

This information is only required when ordering non standard versions.

CR - **AL** - **U16** - **610 x 610** - **(D)**

CR Filter Range

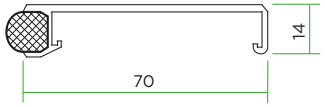
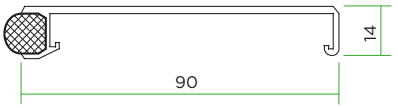
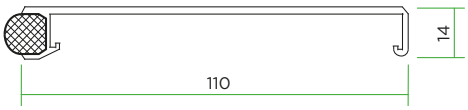
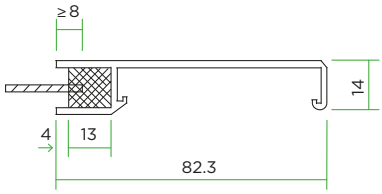
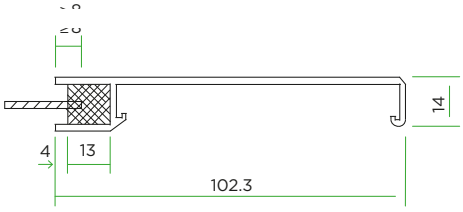
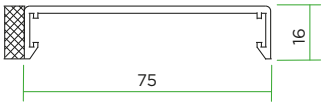
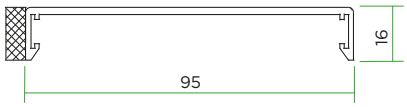
Frame Type (first letter):
A: Standard aluminium
D, V: Special aluminium (Details on next page)
Filter Design (second letter):
S: Standard pressure drop
L: Low pressure drop
E. Minimum Pressure Drop

Filter Efficiency:
Filter class to EN 1822

Cross-sectional dimensions:
Length x Width in mm

Face Guard:
B: Both sides (= standard for profiles A, D and V)
D: One sided, on gasket side
G: One sided, opposite to gasket side
O: No face guard

Hepatex CR Available Aluminium Frames

DIMENSIONAL SKETCH (in mm)	FRAME TYPE	APPLICATION
	**AS**	Standard frame for all CR-AS filters. Designed for normal pressure drops. With elastomer gasket.
	**AL**	Standard frame for all CR-AL filters. Designed for reduced pressure drops. With elastomer gasket.
	**AE**	Standard frame for all CR-AE filters. Designed to achieve minimum pressure drops. With elastomer gasket.
	**DS**	Special frame CR-DS, with a gel-seal filled groove, suitable to frame systems with knife edge. Normal pressure drops. CR-DS has the same performance data as the CR-AS.
	**DL**	Special frame CR-DL, with a gel-seal filled groove, suitable to frame systems with knife edge. Reduced pressure drops. CR-DL has the same performance data as the CR-AL.
	**VS**	Special frame CR-VS, is available with a single or two-sided flatgasket to accept installations using Filtrasept. Normal pressure drops. CR-VS has the same performance data as the CR-AS.
	**VL**	Special frame CR-VL, is available with a single or two-sided flat gasket to accept installations using Filtrasept. Reduced pressure drops. CR-VL has the same performance data as the CR-AL.

Hepatex CR-WS High-efficiency Protection

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Hepatex CR-WS filters are high-efficiency submicron particulate air filters designed to protect people, equipment and processes from airborne particulate contamination.

Hepatex CR-WS filters are used in situations requiring high levels of air purity. They are primarily designed as intake filters for low turbulence displacement (or laminar flow) clean room ceilings and clean workbenches.

Typical applications can be found in medical, chemistry, pharmacy, microbiology, hospital, laboratories and the food industry.

Hepatex CR-WS filters offer high efficiencies and are designed for a wide range of different “clean” air applications. CR-WS filters are suitable for the highest clean room requirements up to class 1 (ISO 16 644-1) and for class A sterile pharmaceutical zones.

KEY FACTS

- Optimised velocity distribution: For stable air flow and a long service life
- Scan test certificates available: For assured performance
- Solid wood frame: Provides rigidity and strength
- Mechanically stable: For optimum performance
- Optional face guards available: For media protection from harmful particles
- Low pressure drop: Reduces energy consumption and operating costs

Hepatex CR-WS Construction

CONSTRUCTION

A filter medium constructed from various grades of micro glass fibre paper is folded into a pack designed with the optimum pleat height and density for the speci c operating conditions. Hotmelt or continuous thread separators support the individual pleats and impart great stability to the whole pack. The pack is entirely sealed into the frame.

PRE-FILTRATION

The service life of Hepatex CR-WS filters can be prolonged by efficient pre-filtration for which we would recommend the higher grades of the Compatex FP filter range.

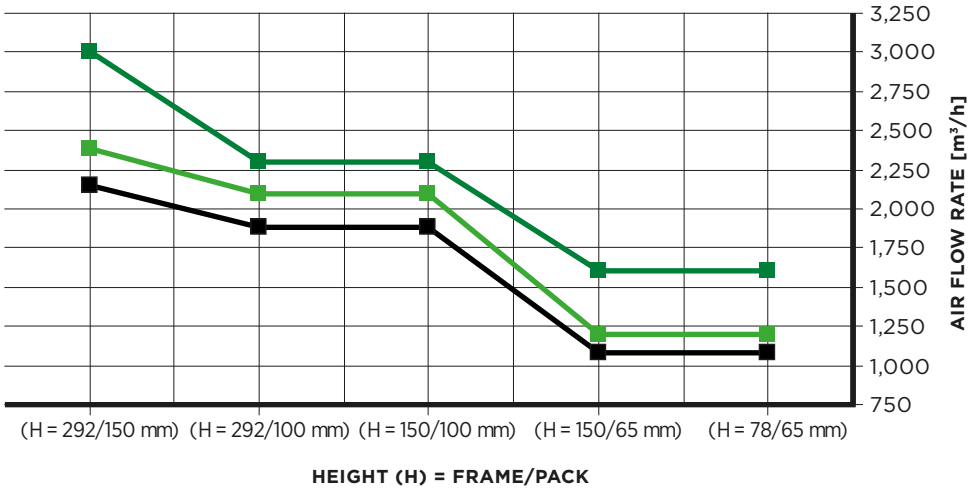
QUALITY POLICY

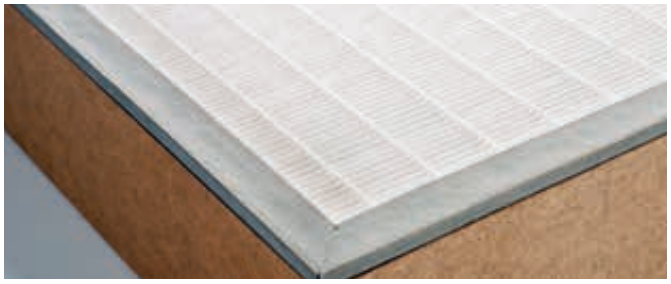
At MANN+HUMMEL we are committed to the design and production of filter equipment which is fit for its stated purpose, is of the highest quality, consistent in its performance and offers safety and reliability.

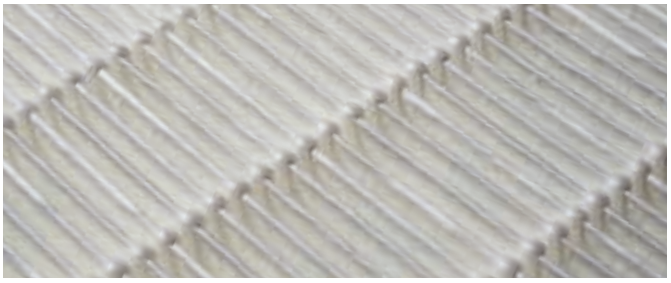
This is achieved by operating and maintaining a comprehensive quality control system based on ISO 9001. MANN+HUMMEL concentrates on the quality assurance of the filter medium, production process and finished filter element. Hepatex CR-WS filters are manufactured and tested in accordance with an established and audited procedure.

FILTER SELECTION DIAGRAM

Maximum Air Flow Rate for CR-WS-610x610 mm @ 250 Pa.







Hepatex CR-WS Technical Data

Filtration Efficiencies	Units	E11	E12	H13	H14
EN 1822 Integral Value (typ. for CR) [1]	%	97	99.8	99.98	99.998
with MPPS-DEHS-aerosol (min.) [1]	%	≥ 95	≥ 99.5	≥ 99.95	≥ 99.995
EN 1822, MPPS-DEHS, local value 1)	%	–	≥ 97.5	≥ 99.75	≥ 99.975
Filter Class to EN 1822	–	E11	E12	H13	H14

Specifications	
Filter Frame	Wooden construction – 46, 54, 69, 75, 78, 150, 292 mm deep[4]
Filter Medium	Water repellant micro-glass-fibre paper, pleated in a regular V-pattern
Face Guards	Optional on both sides of the pleat pack, expanded sheet steel, powder coated in white (RAL 9010)
Sealing Compound	Fire-resistant, white two-component polyurethane
Gasket	Various options available
Maximum Operating Temperature	70 °C
Fire Classification	K2/F2 to DIN 53438

Maximum air flow rates for CR-WS-610 x 610 mm @ 250 Pa		Air Flow Rate (m³/h)		
Height (mm)				
Frame	Pack	E12	H13	H14
78	65	1,600	1,200	1,080
150	65	1,600	1,200	1,080
150	100	2,300	2,095	1,885
292	100	2,300	2,095	1,885
292	150	3,000	2,385	2,150
Differential pressure (Pa) [2] [3]		250	250	250

Important note: E10 and E11 available upon request in pack height 65, 100 and 150 mm.

Standard External Dimensions (mm) [4]		Weight inc. frame (kg)
Length	Width	
305	305	2.0
457	457	3.4
557	557	4.2
610	305	3.3
610	610	4.9
1,220	610	8.2

1) DEHS = DieEthylHexylSebacat
MPPS = Most Penetrating Particle Size
2) Tolerance: ± 10%
3) Maximum final pressure drop: ≤ 600 Pa
4) Other dimensions available upon request

SUMMARY

Hepatex CR-WS ultra filters consist of a multi-layer wood or a MDF frame with a high-quality glass fibre paper medium folded into a 'V' formation. Hotmelt or optional textile thread spacers provide exceptional stability and the filter pack is secured in place with a two-component polyurethane sealant. PU foamed, flat or U pro le gasket types are available, and one or two-sided face guards are o ered as an option to protect the filter media and provide additional stability.

Hepatex DP Deep Pleat EPA and HEPA Filter

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Hepatex DP (available in classes E11-H14 – EN1822) can be used for supply, recirculation and exhaust air, where the highest demands are placed on air purity and filter life. For example, Hepatex DP can be used in the following areas:

- Industrial processes (pharmaceutical, food, medical, optics, biotechnology, etc)
- Operating theatres and hospitals
- Handling of hazardous materials, such as asbestos, heavy metals and carcenogenic compounds
- Nuclear power and nuclear research

Through the use of ultra-fine glass fibres and robust pleating technology with aluminium separators, Hepatex DP achieves a very high separating efficiency for sub-micron particles and guarantees optimum operating conditions, even under heavy duty operations.

KEY FACTS

- Available in a variety of frame materials: To suit a variety of applications
- Deep pleat design: For a longer life and reduced costs
- Ultra-fine, glass fibre media: Ensures maximum performance even under heavy duty operation
- Robust pleating technology: For stability in operation and optimised performance
- Temperature resistance to 120 °C: Suitable for use in the most extreme of operating environments
- Optional handle available: For ease of installation, handling and removal
- Guaranteed leak-free:For assured performance and safety

Hepatex DP Technical Data

Variations	
Frame	Plywood, MDF, stainless steel, galvanised steel
Depth	150 & 292 mm
Gasket*	Foamed Polyurethane
Handle	On request
Temperature	up to 120°C
Rel. Humidity	up to 100%

* Further gasket variations available upon request.

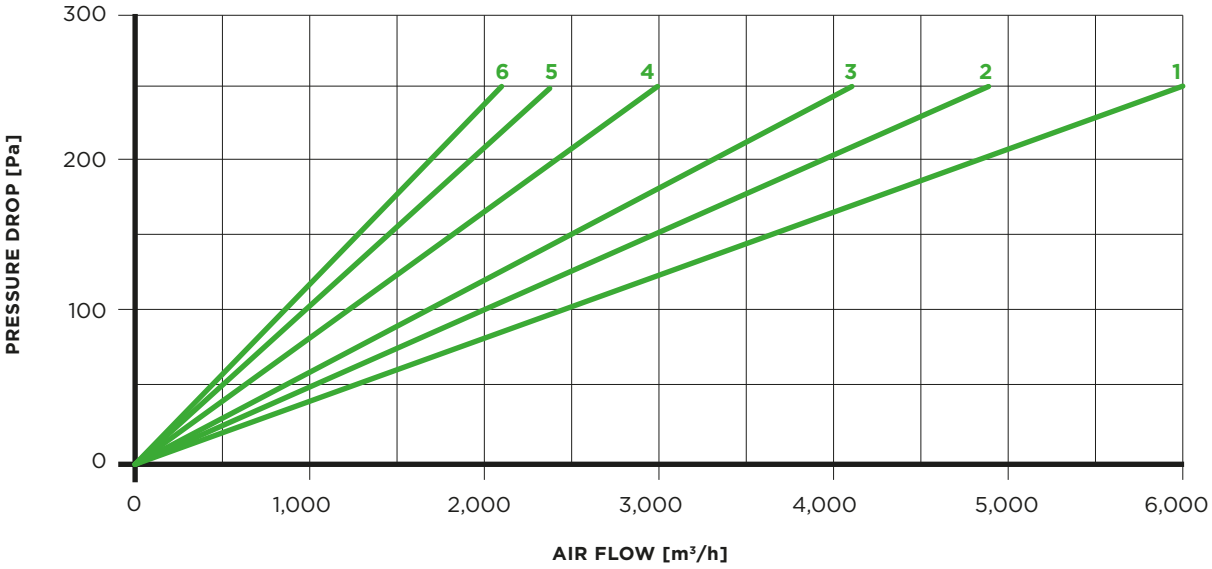
SPECIAL VERSIONS

- Cleanable filter (Reatex)
- Earthed for special applications. ATEX Guidelines.
- Slanted aluminium separators version for high burst resistance.

QUALITY ASSURANCE

Before despatch, Hepatex DP filters are subject to EN1822 (oil smoke) quality assurance tests.

HEPATEX DP PRESSURE DROP



Filter Class Graph	Unit	E11 1	E11 2	E11 3	H13 4	H13 5	H13 6
Dimensions	mm	610 x 610	610 x 610	610 x 610	610 x 610	610 x 610	610 x 610
Depth	mm	292	292	292	292	292	292
Separator Depth	mm	2.9	3.9	4.9	2.9	3.9	4.9
Air Flow	m³/h	6,000	4,800	4,200	3,000	2,400	2,100
Pressure Drop	Pa	250	250	250	250	250	250

Hepatex N
The Space Saver

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Rigid, robust and compact; Hepatex N is designed to provide assured performance and safety in all types of applications.

Hepatex N filters are manufactured to international standard dimensions based on 609 x 609 x 292 mm. They are designed for the separation of suspended matter in supply and exhaust air systems in industry, clean room applications, medical and nuclear installations.

For face velocities up to 3 m/s (air volumes up to 4,000 m³/h) Hepatex N with V-design filter mats (Fig. 1) are available in various pack densities as well as with various casing and gasket materials.

Hepatex N filters are unique in regard to their compact and robust construction with a one-piece front and end plate, minimising risk of damage and maximising service life by allowing a large active media area.

KEY FACTS

- Compact design: Saves space and simplifies handling
- Rigid and robust with one-piece front and end plate: Minimises risk of damage and ensures ultimate performance
- Large active media area: Maximises service life and reduces disposal and maintenance costs
- Low pressure drop: Reduces energy consumption
- Leak tested: Guaranteed leak-free for assured safety and performance
- Air flows up to 4,000 m³/h and efficiencies of F7 to U15: For assured performance in all types of applications
- Integrated handle: For ease of installation and transportation

EUROVENT CERTIFIED PERFORMANCE
AIR FILTERS
CLASS M5-F9
www.eurovent-certification.com

MANN+HUMMEL participates in the ECC programme for Air Filters. Check ongoing validity of certificate: **www.eurovent-certification.com or www.certiflash.com**

Hepatex N Design and Prefilter Options

DESIGN

Hepatex N filters are manufactured by a process that provides for extremely careful treatment of the material. The basic element in all filter types is the filter mat (Fig. 2) which is manufactured from a high quality glass fibre filter medium.

The pleats of the filter medium allow for a flow velocity at the filter mat that is approximately 100 times higher than for unfolded material. The number of storage cells for trapping dust particles is also increased by the same factor. To keep the pleats uniformly spaced, special threads or a high temperature hot melt are inserted.

Thus, the filter mat not only achieve high strength but also excellent elasticity. It is assembled as a self supporting element into a solid wood or steel casing. The filter medium is sealed with its frame using a two-component Polyurethane compound. EPDM is used as gasket material. It is particularly resistant to acids, brines, light and ageing. In high temperature versions Silicone can replace Polyurethane or EPDM.

PREFILTER FOR HEPATEX N

The service life of the Hepatex N filters can be extended by pre filtering larger particles. In general (depending on the application), the choice of a pre filter 3 classes lower than that of the final filter results in a service life of the final filter of approximately double. We recommend the Compatex FP fine dust filters as pre filters for Hepatex N filters of groups E, H or U.

Special Constructions

Various Hepatex N filters for special applications are available on request.

Operating Limits

The maximum relative humidity is 100%, however, the air temperature must remain higher than the dew point. Continuous operating temperature can be exceeded up to a max. of 1 hour and 10 °C.

Disposal

Filters contaminated by exterior air can be disposed of in the same way as normal industrial refuse in accordance with local regulations. Filters contaminated with bacterial, toxic and/or radioactive matter must be disposed of as harzardous waste in accordance with local regulations.

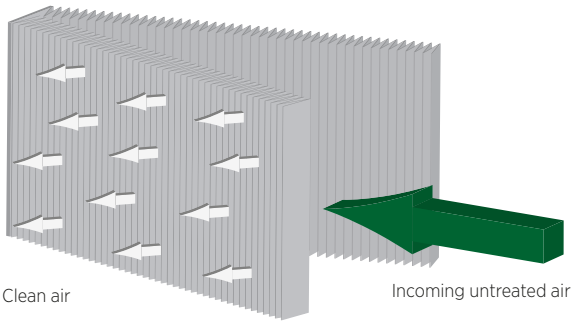


Fig. 1: V-shaped arrangement of filter mats in Hepatex N filters

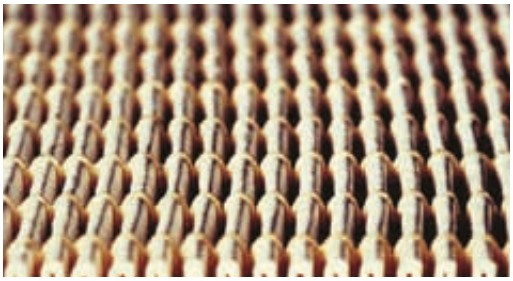


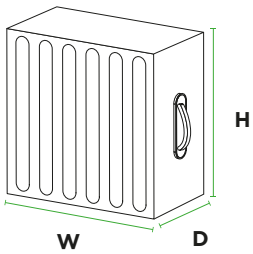
Fig. 2: Filter mat

Hepatex N
Technical Data

Filter type	N-	F7-V40	F9-V40	E11-V35	H13-V30	H13-V34-T	H13-V40	H14-V35	U15-V30
Rated Air Flow[1] (V_N)	m³/h	4,000	4,000	3,500	3,000	3,400	4,000	3,500	3,000
Rated Face Velocity	m/s	3.0	3.0	2.6	2.25	2.55	3.0	2.6	2.25
Initial Pressure Drop[1] at V_N[2]	Pa	140	170	190	250	270	290	250	250
Recommended Final Pressure Drop[3]	Pa	450	450	600	600	600	600	600	600
Continuous Operating Temperature	°C	125	125	125	125	220	125/100[7]	125	125
Typical Efficiences									
EN 779 (average efficiency)	%	83	97	-	-	-	-	-	-
EN 1822 (typ. MPPS[4] integral value)	%	–	–	98	99.97	99.99	99.98	99.998	99.9998
EN 1822 (min.MPPS[4] integral value)	%	–	–	95	99.95	99.95	99.95	99.995	99.9995
EN 1822 (min. MPPS[4] local value[5])	%	–	–	-	99.75	99.75	99.75	99.975	99.975
Filter Class acc. to EN 779 / EN 1822[1]		F7	F9	E11	H13	H13	H13	H14	U15
Flam. Classification acc. to DIN 53 438		K1/F1	K1/F1	K1/F1	K1/F1	K1/F1	K1/F1	K1/F1	K1/F1

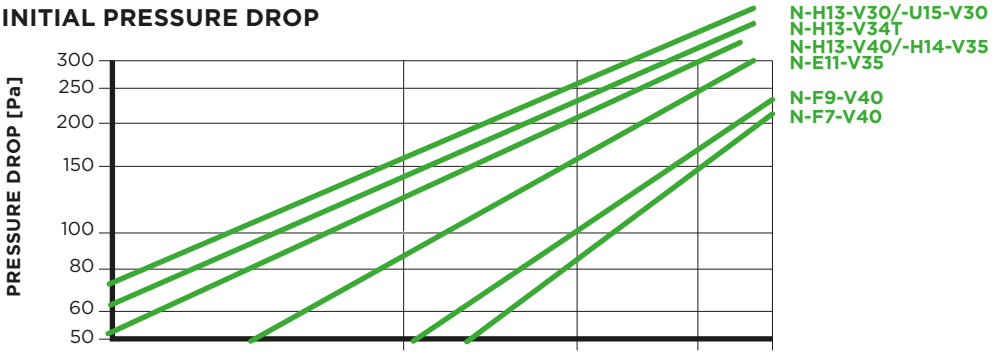
1) For cell size "610". Rated values for other filter sizes see "Available Types". 2) Tolerance ± 15%. 3) Maximum final pressure drop < 900 Pa
4) MPPS = Most Penetrating Particle Size. Aerosol DEHS = to (2-ethylhexyl) sebacate. 5) Local value = minimal value of efficiency at a leakage, tested with scanning.

DIMENSIONS (mm)



Type	610	305	762	205	595
H (mm)	609 (±1)/ 595 (±1)	609 (±1)/ 595 (±1)	609 (±1)/ 595 (±1)	609 (±1)/ 595 (±1)	609 (±1)/ 595 (±1)
D (mm)	292 (±1)	292 (±1)	292 (±1)	292 (±1)	292 (±1)
W (mm)	609 (±1)	304 (±1)	762 (±1)	205 (±1)	595 (±1)

INITIAL PRESSURE DROP



Type						Dimensions W x H
610/595	1,000	2,000	3,000	4,000	5,000	610 x 610 mm
305	500	1,000	1,500	2,000	2,500	305 x 610 mm
762	1,200	2,400	3,600	4,800	6,000	762 x 610 mm
205	333	666	1,000	1,333	1,666	205 x 610 mm

For related air flows only. Please contact us for values at other flow rates.

AIR FLOW [m³/h]

Hepatex N
Available Types

Filter type	Dimensions W x H x D [mm]	Rated Airflow	Filtering Area	Frame Material	Sealant Material	Gasket Material	Weight [kg]
N-F7-V40-610-vz	610 x 610 x 292	4,000 m³/h	26 m²	Galv. Steel	PU	EPDM	19 kg
N-F7-V40-305-vz	305 x 610 x 292	2,000 m³/h	13 m²	Galv. Steel	PU	EPDM	12 kg
N-F7-V40-305-vz	610 x 610 x 292	4,000 m³/h	26 m²	Galv. Steel	PU	EPDM	19 kg
N-F9-V40-305-vz	305 x 610 x 292	2,000 m³/h	13 m²	Galv. Steel	PU	EPDM	12 kg
N-E11-V35-610-vz	610 x 610 x 292	3,500 m³/h	26 m²	Galv. Steel	PU	EPDM	19 kg
N-E11-V35-305-vz	305 x 610 x 292	1,750 m³/h	13 m²	Galv. Steel	PU	EPDM	12 kg
N-E11-V35-762-vz	762 x 610 x 292	4,100 m³/h	30 m²	Galv. Steel	PU	EPDM	23 kg
N-H13-V30-610-vz	610 x 610 x 292	3,000 m³/h	26 m²	Galv. Steel	PU	EPDM	19 kg
N-H13-V30-305-vz	305 x 610 x 292	1,500 m³/h	13 m²	Galv. Steel	PU	EPDM	12 kg
N-H13-V34-T-610-rf	610 x 610 x 292	3,400 m³/h	37 m²	Stainless Steel	Silicone	Silicone	20 kg
N-H13-V34-T-305-rf	305 x 610 x 292	1,700 m³/h	18.5 m²	Stainless Steel	Silicone	Silicone	13 kg
N-H13-V40-610-vz	610 x 610 x 292	4,000 m³/h	37 m²	Galv. Steel	PU	EPDM	20 kg
N-H13-V40-305-vz	305 x 610 x 292	2,000 m³/h	18.5 m²	Galv. Steel	PU	EPDM	13 kg
N-H13-V40-762-vz	762 x 610 x 292	4,700 m³/h	43 m²	Galv. Steel	PU	EPDM	24 kg
N-H13-V40-205-vz	205 x 610 x 292	1,300 m³/h	12.5 m²	Galv. Steel	PU	EPDM	10 kg
N-H13-V40-595-vz	595 x 595 x 292	4,000 m³/h	18.5 m²	Galv. Steel	PU	EPDM	19 kg
N-H13-V40-610-rf	610 x 610 x 292	4,000 m³/h	37 m²	Stainless Steel	PU	EPDM	20 kg
N-H13-V40-305-rf	305 x 610 x 292	2,000 m³/h	18.5 m²	Stainless Steel	PU	EPDM	13 kg
N-H13-V40-762-rf	762 x 610 x 292	4,700 m³/h	43 m²	Stainless Steel	PU	EPDM	24 kg
N-H13-V40-610-sp	610 x 610 x 292	4,000 m³/h	37 m²	Chipboard	PU	EPDM	15 kg
N-H13-V40-305-sp	305 x 610 x 292	2,000 m³/h	18.5 m²	Chipboard	PU	EPDM	10 kg
N-H13-V40-762-sp	762 x 610 x 292	5,000 m³/h	46 m²	Chipboard	PU	EPDM	18 kg
N-H14-V35-610-vz	610 x 610 x 292	3,500 m³/h	40 m²	Galv. Steel	PU	EPDM	21 kg
N-H14-V35-305-vz	305 x 610 x 292	1,750 m³/h	20 m²	Galv. Steel	PU	EPDM	14 kg
N-H14-V35-762-vz	762 x 610 x 292	4,100 m³/h	47 m²	Galv. Steel	PU	EPDM	25 kg
N-H14-V35-610-rf	610 x 610 x 292	3,500 m³/h	40 m²	Stainless Steel	PU	EPDM	21 kg
N-H14-V35-305-rf	305 x 610 x 292	1,750 m³/h	20 m²	Stainless Steel	PU	EPDM	14 kg
N-H14-V35-762-rf	762 x 610 x 292	4,100 m³/h	47 m²	Stainless Steel	PU	EPDM	25 kg
N-U15-V30-610-rf	610 x 610 x 292	3,000 m³/h	40 m²	Stainless Steel	PU	EPDM	21 kg
N-U15-V30-305-rf	305 x 610 x 292	1,500 m³/h	20 m²	Stainless Steel	PU	EPDM	14 kg

ORDER CODE AND EXAMPLE

N - **U15** - **V30** - **305** - **-rf**

Filter Range

Filtering efficiency:
Filter class acc. to EN 779 or EN 1822

Design:
V: Filter mats in V arrangement
Rated airflow, etc.:
30: VN = 3,000 m³/h
35: VN = 3,500 m³/h
40: VN = 4,000 m³/h
For filter size 610 mm:
T: High temp. version

Filter dimension W
H = 610/595 mm
D = 292 mm

Frame Material:
sp: chipboard
vz: galvanized steel
rf: stainless stee

Hepatex PB
For the Separation of Fine Suspended Particles

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Hepatex PB filters are designed for the separation of fine suspended particles such as bacteria, viruses, soot, dust etc. They are used in supply and exhaust air systems, or in clean room installations in the nuclear, electronic, optical, medical or chemical industries.

Hepatex PB can be combined in a variety of units to suit most applications, particularly where the available space is limited.

Our filters offer long service life thanks to a manufacturing process that ensures high product quality.

The filter medium is tested for penetration, pressure drop, tensile strength, density, weight and water repellency. Each “glass” quality filter is submitted to the oil mist test and is guaranteed leak-free.

KEY FACTS

- Low pressure drop: Reduced energy consumption and operating costs
- Fully-utilised, large filter surface: Extremely long service life
- Optimised air flow: For optimum performance and longer life
- Paper filter medium: No fibre loss
- Inherently stable filter mat: Eliminates dust penetration
- Self-supporting, robust, cellular structure: For rigidity, strength and high burst pressure

Hepatex PB

Hepatex PB
Technical Data

DESIGN, MATERIALS

Hepatex PB are maintenance-free filter cell units, of size 86.5 x 202 x 600 mm, consisting of cell frame in galvanised or stainless steel, with cast-in, self-supporting mini-pleated filter media of cellulose, cellulose and glass, or glass fibres.

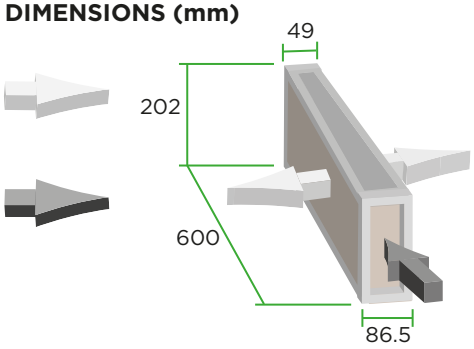
INSTALLATION

Whenever possible, Hepatex PB should be installed on the pressure side of the system, i.e. between the fan and the distribution duct work.

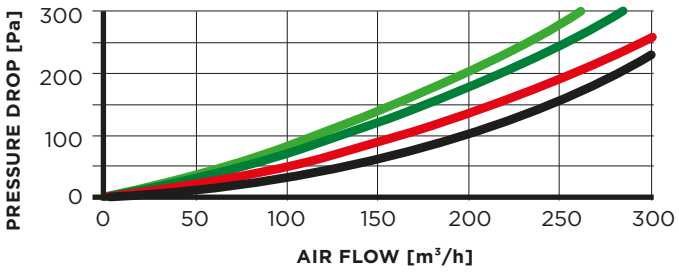
SEALING THE FILTER CELL

With Silicone or PU mastic or by special adhesive tape. One roll is sufficient for approx. 100 PB filters.

DIMENSIONS (mm)



INITIAL PRESSURE DROP



Technical Data	Unit				
Filter Media	–	Cellulose	Cellulose	Cellulose + Glass	Glassfibres
Active Filter Surface per Cell	approx. m²	2.8	3.4	3.4	2.8
Weight per Filter Cell	approx. kg	1.2	1.5	1.45	1.25
Rated Air Flow (V_{LN}) per Filter Cell	m³/h	200	200	200	200
Rated Air Flow per 610 x 610 mm Module	m³/h	4,250	4,250	4,250	4,250
Initial Pressure Drop at V_{LN}	Pa	105	140	180	205
Nominal Final Pressure Drop [1]	Pa	600	600	600	800
Max. Admissible Relative Humidity	%	85	85	85	100
Max. Continuous Temperature	ºC	100	100	100	125/220
Filter Class to EN 779/EN 1822	–	F9	E10	E11	H13
Flammability classification to DIN 53438	–	K2/F2	K2/F2	K2/F2	K1/F1
Initial Separation Efficiency					
Sodium Flame Test, EUROVENT 4/4 [2]	%	–	92.3	98.6	> 99.995
MPPS-DEHS-Test to EN 1822	%	–	> 85	> 95	> 99.97
Efficiency to EN 779 [3]	%	> 95	–	–	–

1) Recommended final pressure drop approx. 2.5 times the initial pressure drop. 2) GB: B.S. 3928 3) As well as ASHRAE 52.1

Hepatex PL
The Compact Solution for Highly Pure Air

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Hepatex PL filters are high-efficiency submicron particulate air filters designed to protect people, equipment and processes from airborne particulate contamination.

Hepatex PL filters are used in situations requiring high or very high levels of air purity. They are primarily designed as intake filters for low turbulence displacement laminar flow clean room ceilings and clean workbenches.

Typical applications can be found in: microelectronics, semi-conductor manufacture, medicine, chemistry, pharmacy, microbiology, film and magnetic tape production, compact disk manufacture, laboratories and the food industry.

KEY FACTS

- Available in efficiencies of 95 % and 99.98 % according to EN 1822: To suit a variety of applications
- Large filter area: For a long service life
- Anodised aluminium frame: For rigidity, strength and low weight
- 100 % leak-tested: Guaranteed leak-free for assured performance
- Low frame height – only 30 mm: For space-saving installation
- Fits securely into Filtrasept units: For use directly at air outlet

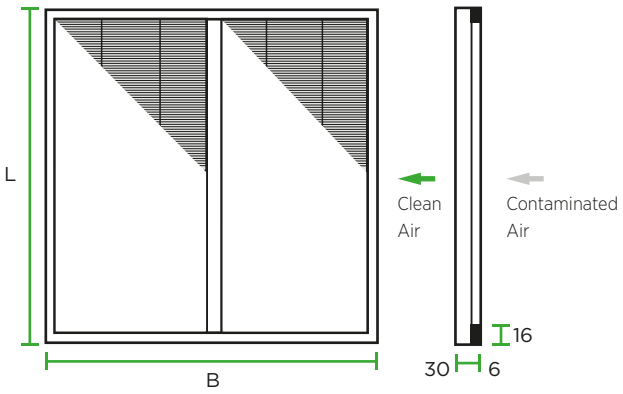
Hepatex PL

Hepatex PL
Technical Data

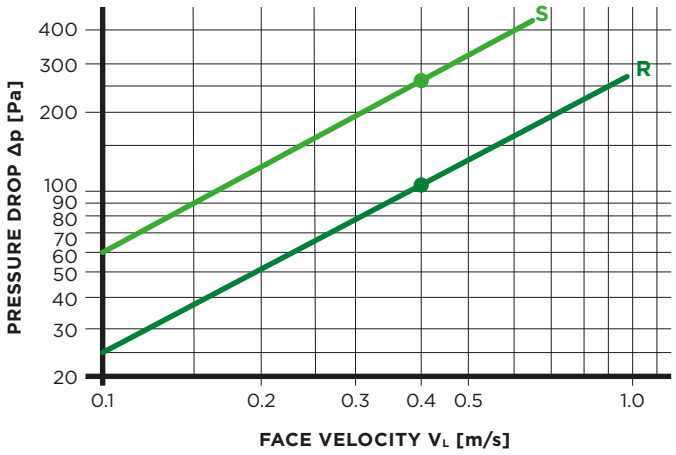
Technical Data	Unit	PL-R	PL-S
Rated Face Velocity *)	m/s	0.40	0.40
Initial Pressure Drop at Rated Face Velocity	Pa	105	250
Final Pressure Drop	Pa	300	500
Filter Medium Area per m² Face Section *)	m²/m²	10	11
Filter Class According to EN 1822	–	E11	H13
Flammability Class According to DIN 53 438	–	K1/F1	K1/F1
Max. Continuous Temperature	°C	125	125
Admissible Relative Air Humidity	%	100	100
Initial Separation Efficiencies: EN 1822 (MPPS-DEHS aerosol)	%	95	99.95

*) Relative to external filter dimensions

DIMENSIONS (mm)



INITIAL PRESSURE DROP



AVAILABLE SIZES

Length L [mm]	Width B [mm]	Face area [m²]	Air flow @ 0.4 m/s [m³/h]	Weight [kg]
204	610	0.12	180	1.2
610	610	0.37	535	3.0
762	610	0.46	670	3.7
915	610	0.56	805	4.4
1,220	610	0.74	1,070	5.8
762	762	0.58	835	4.6

Material Specification	
Filter Medium	Micro glass fibre paper
Frame	Anodised aluminium
Sealant	Polyurethane
Gasket	EPDM foam-rubber with closed pores and surface skin

Hepatex JG, JK and JP High Efficiency Cylindrical Air Filters

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

The JG, JK and JP are cylindrical filters designed to filter particles such as bacteria, viruses or general contaminants suspended in air, compressed air or gases. The JP is a fine dust filter and the JG and JK are HEPA filters.

A wide variety of sizes and casing types are available, making these filters usable in a vast field of applications such as medical technique, research and industry.

The media, casings, sealing compounds and gaskets are manufactured under close supervision. The filtration media are tested for separation efficiency, pressure drop, tensile strength, weight and water repellancy. Each completed JK and JG high efficiency filter must pass the DIN 24184 oil mist test after manufacture. JP fine dust filters are subjected to visual inspection after manufacture.

KEY FACTS

- Compact space-saving design: Simple to install
- Low pressure drop: Reduces energy consumption and lower operating costs
- Available in a wide variety of sizes and casing types: Suitable for a vast array of applications
- Large filter medium area: Provides a long life service
- Individually tested and leak-free: For assured performance
- Corrosion resistant (JK) with synthetic material casing (JKG-W): Ideal for use in demanding applications

Hepatex JG, JK and JP Efficiency Ranges and Guide Specifications

Filtering Efficiencies / Quality Classifications / Temperature Ranges

Initial Efficiency[1]	Filter type	JP	JG	JK
	Medium	Cellulose	Glass fibre	Glass fibreJP
MPPS Test[2] as per EN1822	%	–	99.99	99.99
Sodium Flame Test B. S. 3928	%	–	> 99.995	> 99.995
DOP-Test, Mil-Std-282	%	–	> 99.99	> 99.99
Efficiency to ASHRAE 52–76/B.S. 6540/ DIN 24185	%	> 95	–	–
Maximum Relative Humidity of Air	%	< 85	< 100	< 100
Classification to EUROVENT/SWKI 84	–	F9	H13	H13
Classification to DIN 24185/184	–	F9	S	S
Max. Continuous Temperature[3]	°C	90	90	90
Max. Final Pressure Drop	Pa	500	1,000	1,000

1) At nominal air flow 2) Test aerosol approx. 0.15 µm 3) For short period (approx. 1 h) max. 105 °C permissible

GUIDE SPECIFICATIONS

JP – Cylindrical fine dust filter class F9 (EN779).
Filtermedia made of cellulose fibres. Flanges made of elastic plastic material, serving as gaskets.

- Max. Admissible RH 85 %
- Max. Continuous Temp. 90 °C
- Separation Efficiency (EN779) 95 %

JG – Cylindrical HEPA filters to class H13 (EN1822).
Filtermedia out of submicron glass fibres, metal parts of aluminium. Connection threading 1'' (brass).

a) Execution without cover protective
b) Execution with steel cover, gasproof lacquered, 1 connection
c) Execution with sheet steel casing, gasproof lacquered, 2 connections

- Max. Admissible RH 100 %
- Max. Continuous Temp. 90 °C
- Separation Efficiency (EN1822) 99.99 %
- Accessory Locknut R1'' incl. gasket for connection of filter.

JK – Cylindrical HEPA filters to class H13 (EN1822).
Filtermedia out of submicron glass fibres. Ring and bottom disc made of Resocel.

- Max. Admissible RH 100 %
- Max. Continuous Temp. 90 °C
- Separation Efficiency (EN779) 99.99 %
- Accessories. Clamp for installation of the filter, consisting of: connecting ring, wedge (brass) and gasket made of EPR (ethylene propylene rubber).

JKG-W CASING
Plastic filter casing JKG-W 19/... for installation in air duct systems or for similar applications.

- Connection Diameter: 125 mm
- Casing to Accommodate a HEPA Filter Type JK 19/...
- Direction of Air Flow horizontal/vertical, downward/upward.
- Fitted with condensate drain, gasket and brackets for installation on wall or ceiling.

Hepatex JK

JK are cylindrical HEPA filters available in heights from 50 to 400 mm and in diameters of 150 or 190 mm. Each filter is leak tested and leak free.

MOUNTING

With clamps in a cut-out of diameter "D4" (see on page 79) or by means of a special gasket in filter casing JKG-W (see on page 82).

FILTER LIFE

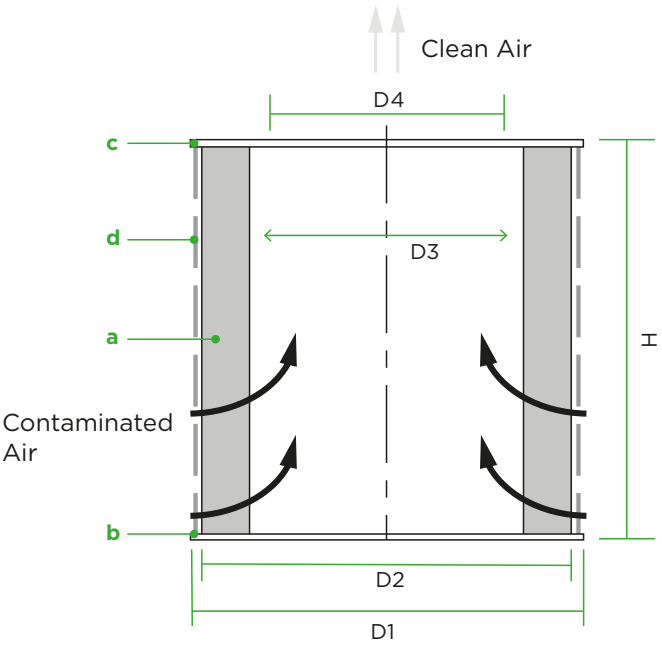
Depending on dust load and air flow. The filter should be changed if it has reached about 3 times the initial pressure drop, however latest at a final pressure drop of 1,000 Pa.

MATERIAL SPECIFICATIONS

a = Filter media: glass paper
b = sealant: synthetic resin
c = ring and bottom disc: Resocel
d = aluminium protection grid

DIMENSIONAL SKETCH

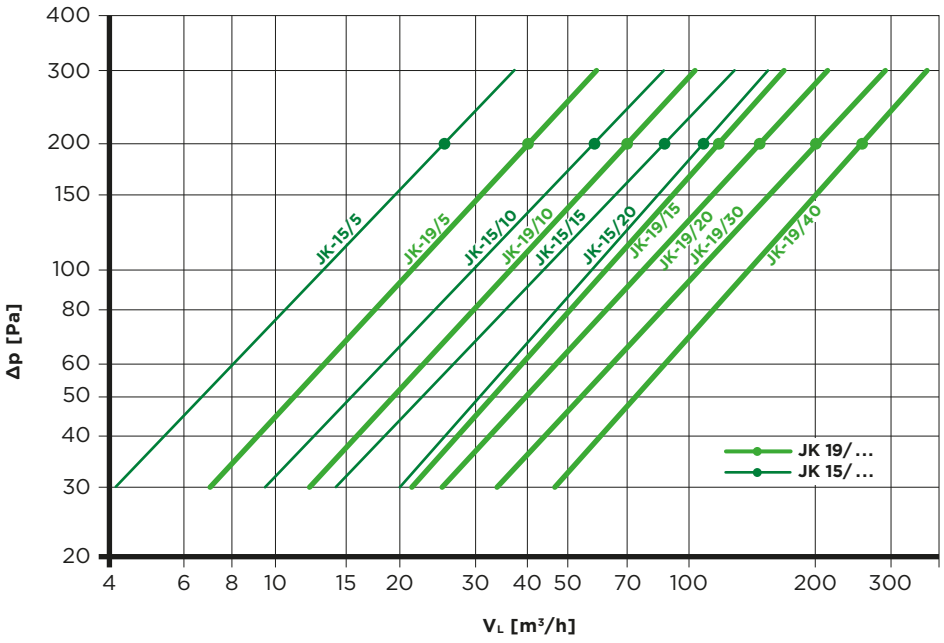
Dimensions in mm



Normal air flow [1]

INITIAL PRESSURE DROP

[Δp] as function of air flow [V_L]



Hepatex JK Technical Data and Part Number

Type	Dimensions [mm]					Rated Air Flow V_N [m³/h]	Δp a V_N [Pa]	Active Filter Surface [m²]	Filter Weight [kg]
	D1	D2	D3	D4	H				
JK 15/5	155	150	110	95	50	25	200	0.2	0.11
JK 15/10	155	150	110	95	100	55	200	0.5	0.16
JK 15/15	155	150	110	95	150	80	200	0.8	0.21
JK 15/20	155	150	110	95	200	110	200	1.1	0.25
JK 19/5	200	190	150	130	50	40	200	0.3	0.20
JK 19/10	200	190	150	130	100	70	200	0.6	0.24
JK 19/15	200	190	150	130	150	115	200	1.0	0.33
JK 19/20	200	190	150	130	200	150	200	1.3	0.39
JK 19/30	200	190	150	130	300	200	200	1.9	0.55
JK 19/40	200	190	150	130	400	250	200	2.5	0.70

ACCESSORIES

Clamp for JK 15 filter (incl. gasket)
Clamp for JK 19 filter (incl. gasket)
Tool for installation[2] of JK 19 clamp

CLAMP

for installation of JK filters in a cut-out of D4 ± 0.5 mm diameter.

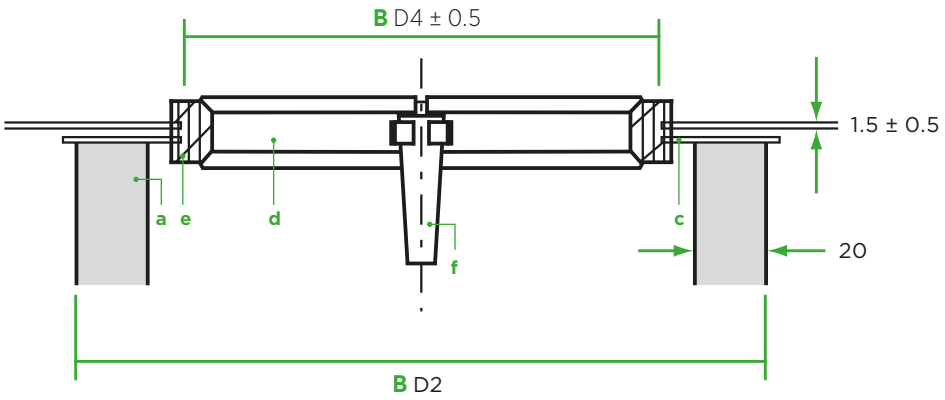
SPECIALS

At request JK-filters may also be supplied in other filter efficiencies, heights, diameters and with supporting grill.

Remarks

1) Reverse air flow is permitted and may be an advantage when filtering toxic or radioactive dust (filter serves as a dust container).
2) For fast and easy mounting of filters.
3) Guide specifications see on page 77.

CUT-OUT ON SITE



MATERIAL SPECIFICATIONS[3]

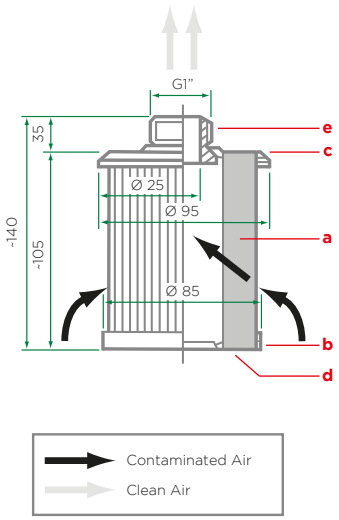
a = filter media: glass paper
c = flange: Resocel
d = connecting ring: brass
e = gasket: synthetic material
f = wedge: brass

Hepatex JG

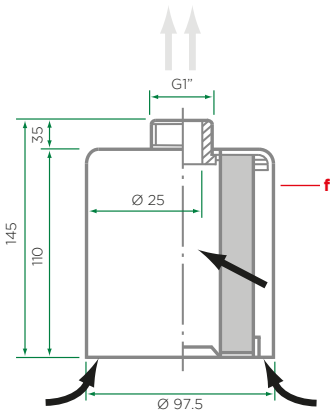
DIMENSIONAL SKETCH

Dimensions in mm

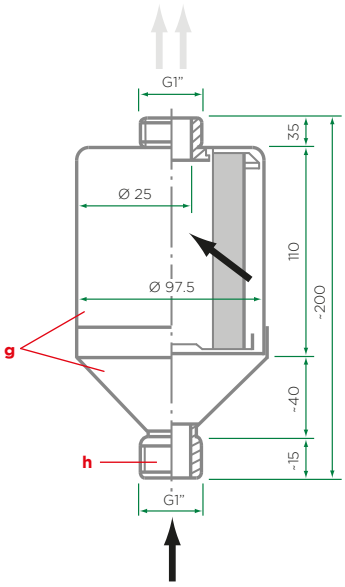
JG without Protective Cover



JG with Protective Cover

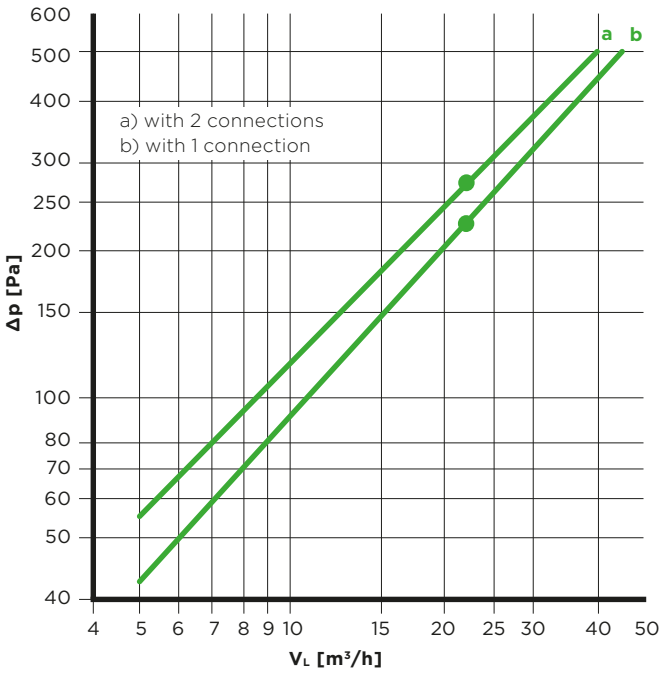


JG with Casing



INITIAL PRESSURE DROP[1)]

[Δp] as Function of Air Flow [V_L]



ASSEMBLY

The threaded connection on the clean air side "e" is to be inserted through a cut-out of min. 35 mm diameter and fastened by means of a gasket and locknut.

Attention: the filter should not be screwed-in holding filterpart "c", "f" and "g".

MATERIAL SPECIFICATION[2)]

a = Filter Media: Glass Bres
b = Sealant: Synthetic Material
c = Flange: Aluminium
d = Base: Aluminium
e = Connection Socket: Brass
f = Protective Cover: Mild steel, gas proof laquered
g = Casing (2 connections): mild Steel, gasproof laquered
h = Connection Socket: Brass

Remarks

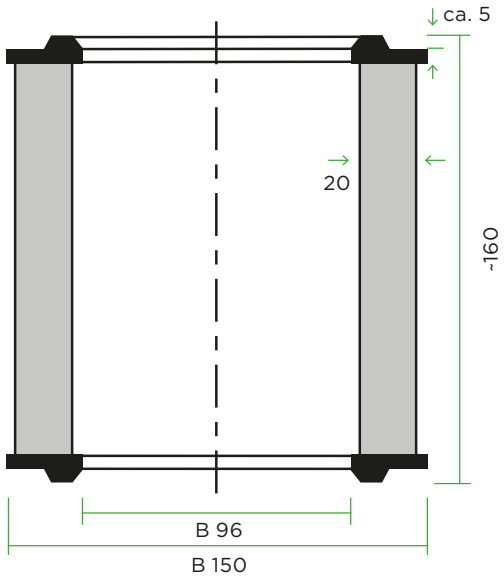
1) Recommended final pressure drop approx. 3 times the initial pressure drop, but max. 1,000 Pa.
2) For guide specifications see on page 77.
3) Max. differencial pressure at 20 °C: PB(max.) = 1.5 bar.

Technical Data/ Part Number	Air Flow Rating V_N [m³/h]	Δp[1)] at V_N [Pa]	Active Filter Surface [m²]	Weight [kg]
Filter Type JG, without cover	22	230	0.3	0.30
Filter Type JG, with cover	22	230	0.3	0.40
Filter Type JG, with casing[3)]	22	280	0.3	0.68
Accessory Lock nut G1" incl. gasket				

Hepatex JP

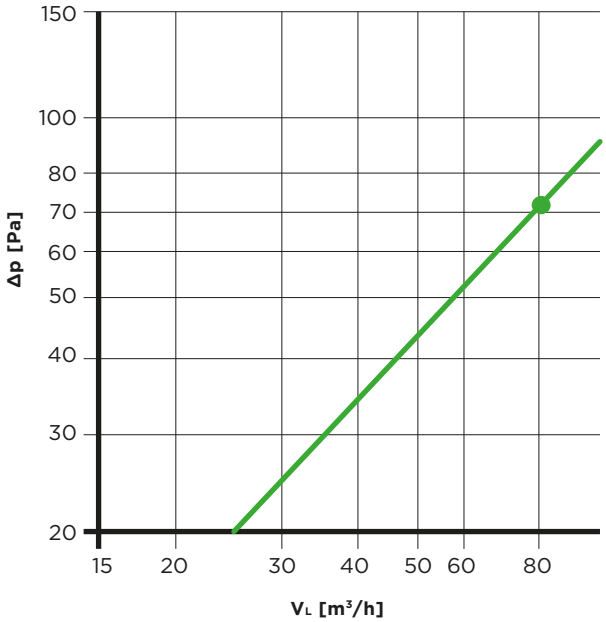
DIMENSIONAL SKETCH

Dimensions in mm



INITIAL PRESSURE DROP[1)]

[Δp] as Function of Air Flow [V_L]



JP are cylindrical fine dust filters with elastic, pliable flanges, serving simultaneously as a gasket.

MATERIAL SPECIFICATIONS [2)]

Filter Media: Cellulose Paper
Flanges: Elastomer (elastic and pliable)
Clamp: Aluminium
Coupling/End cover: Galvanized Steel

Technical Data / Part Number	Air Flow Rating V_N [m³/h]	Δp[1)] at V_N [Pa]	Active Filter Surface [m²]	Weight [kg]
Filter type JP-Blue	80	70	1.3	0.30

ACCESSORIES

Clamp, End cover, Coupling.

CLAMPS

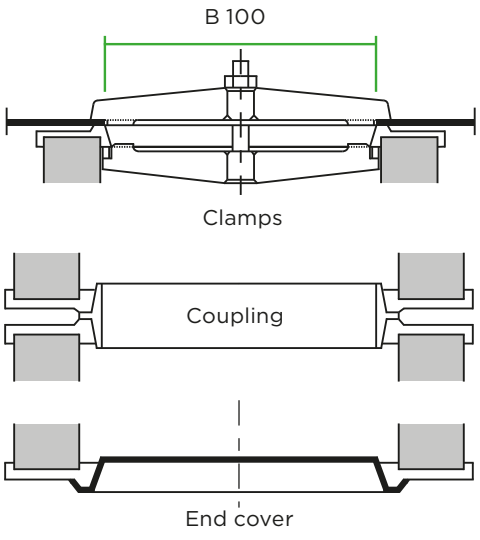
consisting of clamping cross for 96 mm diameter hole and spacing ring. Suitable for assembly of JP filter in a cut-out of 100 mm diameter.

COUPLING

for the joining of two filter cells (series connection).

END COVER

suitable for bottom aperture of 96 mm diameter.



Remarks

1) Recommended final pressure drop approx. 3 times the initial pressure drop, however max. 500 Pa.
2) For guide specifications see on page 77.

Hepatex JKG-W

JKG-W casing is a cylindrical synthetic material casing for all JK19 filters (see on pages 78 + 79). It can be installed directly into the piping system and is easy to mount on walls and ceilings.

APPLICATION

Suitable for all systems where small quantities of air are to be effectively filtered, especially inlet- and outlet air of laboratories, water reservoirs, various containers, working places and as bleed filter.

MATERIAL SPECIFICATIONS[1)]

g = Casing: plastic (welded)
h = Gasket: synthetic elastomer
i = Connection for condensate extraction pipe

EXTENT OF SUPPLY

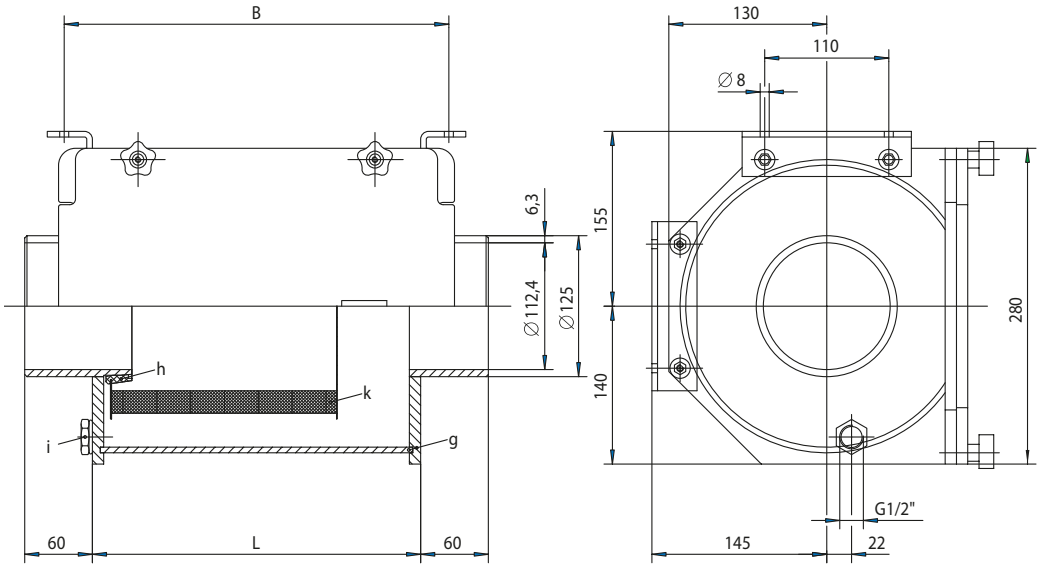
Case equipped with gasket, condensate drain and brackets for installation on wall or ceiling.

LIMITS

Temperature: T (max.) = 50 °C
Differential pressure: PB (max.) = ± 14 000 Pa } at 20 °C
PB (Max.) = ± 0.14 bar

DIMENSIONAL SKETCH

Dimensions in mm



Combinations/dimensions/part number

Casing Type	Matching Filter Type	Dimensions		Weight of Casing [kg]
		L (mm)	B (mm)	
JKG-W 19/20	JK 19/20	291	341	5.2
JKG-W 19/30	JK 19/30	391	341	7.0
JKG-W 19/40	JK 19/40	491	341	9.4
2 Sleeves (B 125 mm) with 4 Clips				

Remarks

1) For guide specifications see on page 77.
2) Reversed air flow permitted (see to remark 1 on page 79).

AFP-AZ Process Removal of Trace Air Constituents in Process Applications

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

AFP-AZ Process adsorption filters are applied where even small concentrations of gases in the air have an impact on the quality of products.

These processes can be used in the electronic industry, such as micro-electronics and semi-conductor production, as well as in the manufacture of optics, MEMS (micro-electrical-mechanical systems) or high-precision mechanical devices.

Moreover, AFP-AZ Process filters are to protect precious objects and artefacts in museums and libraries from the deteriorating effects of trace gases in the air.

AFP-AZ Process filters contain a composite filter material including fine granules of specially designed activated carbon. The activated carbon is a non-impregnated version for maximum performance on a broad variety of Volatile Organic Compounds (VOC) as well as Condensable Organic Compounds (COC); condensables as per ISO/FDIS 1464 4-8:2005).

AFP-AZ Process filters are available in 4 standard sizes.

KEY FACTS

- Standard air flow 2,500 m^3/h: Suitable for even the most demanding of applications
- Low pressure drop. Reduces energy consumption and lowers operating costs
- Optimised flow design: For low, stable pressure drop and homogenous air flow
- Composite media: No particle generation
- Lightweight: For simple filter change
- Activated carbon media: Designed specifically for process air applications
- Large filter surface 10 m^2: For high efficiency and long service life
- Both incinerable or non-flammable frame systems available: For simple disposal and demanding applications
- Fits standard air handling units: For simple, low cost installation and switchover

AFP-AZ Process Design and Application

DESIGN

AFP filters are designed as rigid cellular 4-V filters with mini-pleated media in a header frame, to fulfil the demands of industrial applications.

Using a mini-pleated composite media, there is no risk of settlement of sorbent material and leakage as in systems using sorbents in bulk form. The design of the composite filter material, the production parameters and the optimised flow design of the rigid cell, provide the best possible conditions for low and stable pressure drop in operation, as well as homogeneous filter flow. Generally poluyrethane is being used to cast the activated carbon pleat packs to the frame. With the implementation of self-sealing pleat packs this is not necessary anymore with the advantage that undesired outgassing of the polyurethane can be avoided.[1)]

The design of the composite material is comparable to a fixed bed of microgranular sorbent particles. Fixation of the granules prevents movement and settlement of sorbent in the air stream. Hence the dense packing guarantees of high filtration efficiencies for trace gas components and ideal pleat shape. No particles or dust are generated by AFP filter material as can be proven by particle measurements downstream of the filter during operation.

AREAS OF APPLICATION

AFP-AZ Process filters are particularly effective in the removal of:

- Hospital and antiseptic odours
- Volatile organic compounds (VOC) or hydrocarbons from air streams in recirculated air or fresh air for production under clean room conditions
- Condensables (COC) as per ISO/FDIS 14644-8: 2005 from air streams in recirculated air or fresh air for production under clean room conditions
- Dopants as organo-phosphorous compounds or organo-boron compounds from air streams in production processes
- Ozone from outside air supplies or air recirculation
- Odourous combustion products, kerosene and diesel
- Many other gaseous contaminants
- Organic solvent trace gases from recirculated air of production environments, such as PGMEA, PGME, acetic acid esters

Occurrence of the target compounds to be removed and applications for AFP-AZ Process filters:

- Micro-electronic industry and display manufacturing
- Optical industry and laser application
- Imaging and photography processes
- Museums and archives
- Airports, office buildings and hospitals

1) Operational pressure should not exceed 500 Pa.

AFP-AZ Process Installation and Disposal

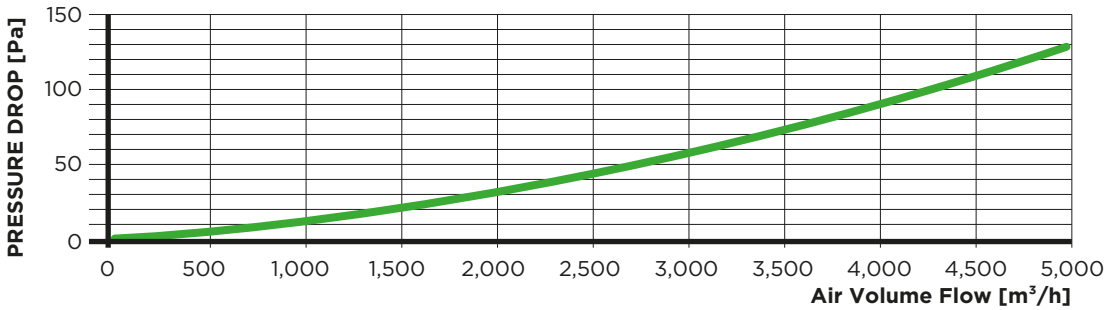
INSTALLATION

AFP Process filters can be easily installed in standard fine dust filter frames. F-frames can be combined with filter barriers and installed into ducts, air conditioning units and wall openings. Install the filter in a vertical position (Vertical V`s)

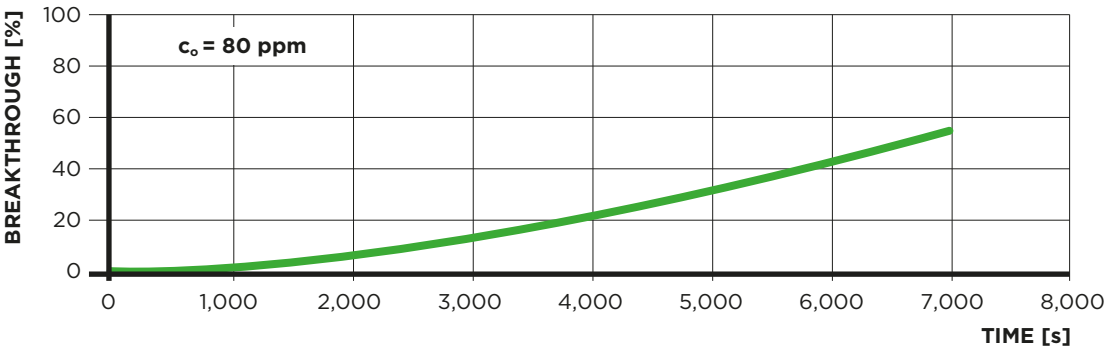
DISPOSAL

AFP Process filters used under standard operation conditions to remove trace contaminations from process air environments can be disposed in the same way as normal industrial waste (e.g. incineration, landfill). Filters soiled by toxic and/or radioactive constituents must be disposed as hazardous waste in accordance with local regulations.

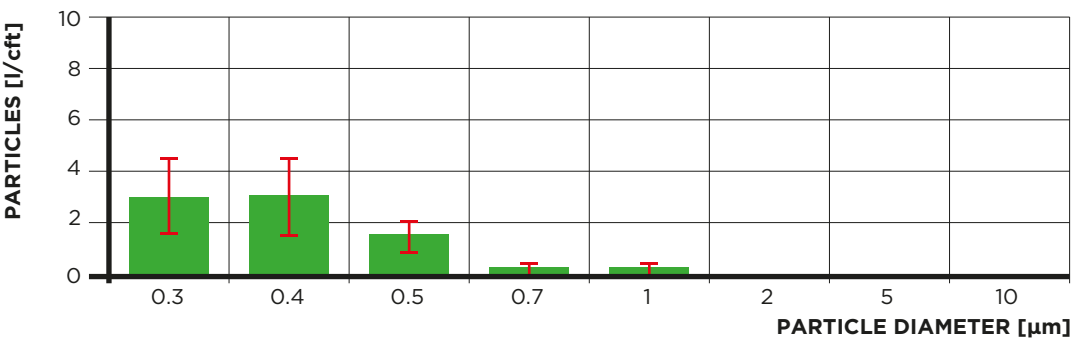
PRESSURE DROP VERSUS AIR FLOW (FOR AZ-610)



TOLUENE ABSORPTION (FOR AZ-610)



SHEDDING TEST



AFP-AZ Process
Technical Data

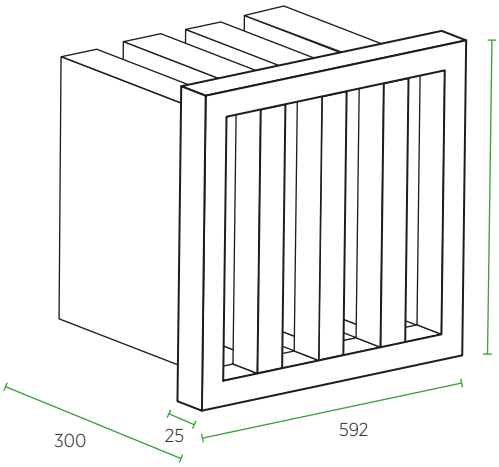
Technical Data	AFP-	AZ-610-P	AZ-508-P	AZ-420-P	AZ-305-P
Nominal Air Flow V_n (normal service life)	m^3/h	2500	2000	1650	1250
Pressure Drop at V_n	Pa	45	45	50	50
Rated Air Flow V_r (long service life)	m^3/h	1800	1450	1200	900
Pressure Drop at V_r	Pa	25	25	30	30
Total Weight of Filter	kg	8.8	7.6	6.6	5.2
Sorbent Net Weight	kg	5.1	4.2	3.3	2.3
Filter Medium Area	m2	6.4	5.3	4.1	7.9
Initial Efficiency at Rated Air Flow	%	98	98	98	98
Adsorption Capacity at Rated Air Flow V_r [1)]	g	700	550	450	300

Operation Conditions	
Maximum Operating Temperature	< 50 °C
Recommended Operating Temperature	< 30°C
Maximum Relative Humidity	< 90 %
Recommended Relative Humidity	< 30 % < x < 60 %
Minimum Pre-Filtration	M6
Recommended Pre-Filtration	F9
Back-Up Filtration Required	None – no particle shedding

Materials	
Frame Material	Polystyrene, free from halogenated compounds, incinerable
Filter Material (HT-version)	Polyamide, galvanized steel, non-flammable, UL 94 V0 frame version
Filter Material	Synthetic fibre composite material, fine grain sorbents embedded in fibre matrix

1) for toluene c_0=80ppm, acc. to ISO 11155-2, capacity until 50% efficiency

DIMENSIONS (mm)



AFP-305: 287
AFP-420: 402
AFP-508: 490
AFP-610: 592

AFP-AZ Comfort
Rigid Pocket Filter for Odour Removal

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Odour removal filter AFP-AZ Comfort is an efficient solution for removing gaseous, odourous compounds from room air. Odours may occur in ambient air, fed to a building, due to impact from a car or airplane exhaust. Moreover they occur due to material emissions and processes indoors.

AFP-AZ Comfort removes odours efficiently and for a long service time. It improves the air quality and positively affects symptoms relating to "Sick Building Syndrome".

AFP-AZ Comfort purifies the air by making use of a high-quality activated carbon composite material. The composite material is based on fine grain granular adsorbents embedded into a synthetic textile matrix.

AFP-AZ Comfort filters can be supplied in 4 standard sizes.

KEY FACTS

- Nominal air flow of 3,400 m^3/h per cell: Suitable for environments with high air flows requirements
- Low Pressure Drop: Reduces energy consumption and lowers operating costs
- Large filter surface of 10 m^2: For a longer life and high retention capacity
- Activated carbon composite material: No dust generation
- Fully incinerable, plastic cavity profile frame: For simple, environmentally-friendly disposal
- Lightweight: Simplifies handling, installation and removal
- Compact – installation depth only 300 mm: Installed in standard bag filter framework
- Self supporting and rigid: For reliability in operation

AFP-AZ Comfort
Design and Installation

DESIGN

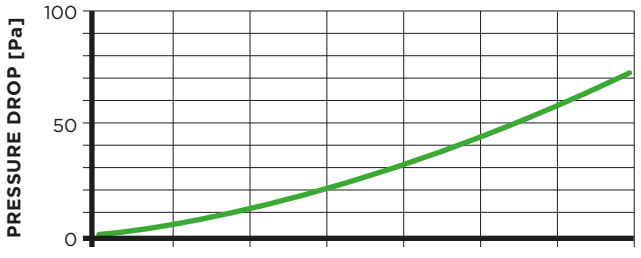
AFP filters are designed as rigid cellular 4-V filters with mini-pleated media in a header frame, to fulfil the demands of industrial applications.

Using a mini-pleated composite media, there is no risk of settlement of sorbent material and leakage as in systems using sorbents in bulk form. The design of the composite filter material, the production parameters and the optimised flow design of the rigid cell, provide the best possible conditions for low and stable pressure drop in operation, as well as homogeneous filter flow. Generally poluyrethane is being used to cast the activated carbon pleat packs to the frame. With the implementation of self-sealing pleat packs this is not necessary anymore with the advantage that undesired outgassing of the polyurethane can be avoided.[1)]

INSTALLATION AND DISPOSAL

AFP-AZ Comfort can be easily installed in standard fine dust filter frames. Install the filter in a vertical position (Vertical V`s). Service life should be two years under normal conditions of climate and air contamination, but filters should be changed and serviced according to national hygienic standards for air handling units. Filters that have been used under standard environ-mental conditions can be disposed as industrial waste (incineration/landfill, please refer to local regulations). Filters soiled by toxic and/or radioactive constituents must be disposed as hazardous waste in accordance with local regulations.

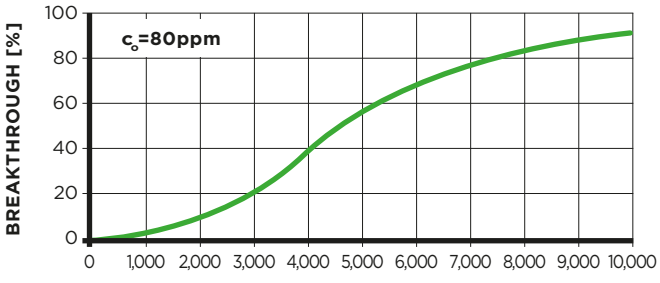
PRESSURE DROP VERSUS AIR FLOW



610	0	1,000	2,000	3,000	3,500
305	0	500	1,000	1,500	1,750

AIR VOLUME [m³/h]

TOLUENE ABSORPTION (FOR AZ-610)



TIME [s]

1) Operational pressure should not exceed 500 Pa.

AFP-AZ Comfort
Technical Data

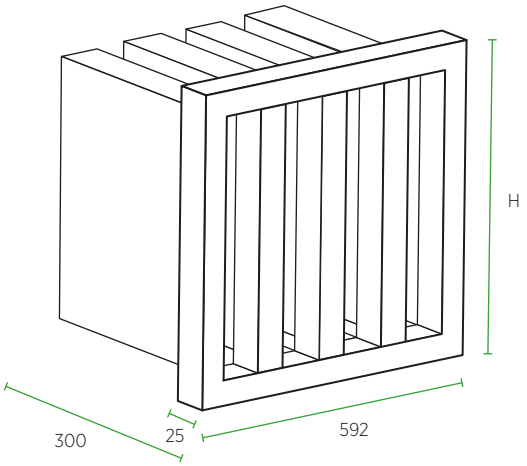
Technical Data	Unit	610	508	420	305
Nominal Air Flow (normal service life)	m³/h	3,400	2,700	2,300	1,700
Pressure Drop	Pa	70	70	75	75
Nominal Air Flow (long service life)	m³/h	1,700	1,350	1,150	850
Pressure Drop	Pa	22	22	25	30
Total Weight | Carbon Weight	Kg	8.8 | 5.1	7.6 | 4.2	6.6 | 3.3	5.2 | 2.3
Spontaneous Efficiency – toluene [1)]	%	> 95	> 95	> 95	> 95
Adsorption Capacity [1)]	g	950	750	600	400

Operation Conditions	
Maximum Operation Temperature	< 50 °C
Recommended Operation Temperature [3)]	< 30 °C
Maximum Relative Humidity [3)]	< 90 %
Recommended Relative Humidity	< 60 %

Materials	
Frame Material	Polystyrene, free of halogenated compounds, incinerable[2)]
Filter Material	Synthetic meltblown composite; synthetic fibre composite material with fine grain activated carbon embedded

1) For toluene c_0=80 ppm, acc. to ISO 11155-2, capacity until 95% breakthrough.
2) Flammability classification of materials used: F1/K1 according to DIN 53438.
3) Deviations from the operation condition cause a reduction of efficiency. Deviation from more than one of the operation conditions would cause a significant loss of performance.

DIMENSIONS (mm)



AFP-AZ Duo
Combined Odour and Particle Filtration

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

AFP-AZ Duo filters are an efficient solution to remove both particles and gaseous, odorous compounds in one filter stage. Particles and dust occur in ambient and indoor air due to natural sources, traffic and production processes.

Odours may occur in ambient air, fed to a building, by impact of car or aircraft exhaust. Moreover they occur due to material emissions and processes indoors, and as a consequence on return air.

AFP-AZ Duo removes particles from the air stream by a first layer of high efficiency synthetic fibres. This layer performs according to filter class F7 (EN 779). Moreover, AFP-AZ Duo purifies the air by a high-quality activated carbon composite material. The composite material is based on fine grain, granular adsorbents embedded into a synthetic textile matrix.

AFP-AZ Duo is available in 4 standard sizes.

KEY FACTS

- Nominal air flow of 3,400 m^3/h per cell: Suitable for environments with high air flows requirements
- Particle filtration and odour removal in one stage: Saves time, space and money
- Large filter surface of 10 m^2: For a longer life and high retention capacity
- Activated carbon composite material: No dust generation
- Fully incinerable, plastic cavity profile frame: For simple, environmentally-friendly disposal
- Lightweight: Simplifies handling, installation and removal
- Compact – installation depth only 300 mm: Installed in standard bag filter framework
- Self supporting and rigid: For reliability in operation

AFP-AZ Duo
Technical Data

Technical Data	Units	610	508	420	305
Nominal Air Flow (normal service life)	m^3/h	3,400	2,700	2,300	1,700
Pressure Drop	Pa	120	120	130	130
Nominal Air Flow (long service life)	m^3/h	1,700	1,350	1,150	850
Pressure Drop	Pa	50	50	60	60
Total Weight | Carbon Weight	Kg	9.0 | 4.2	7.7 | 3.4	6.2 | 2.9	4.8 | 1.9
Average Removal Efficiency – Em [1)]	%	88	88	88	88
Dust Holding Capacity (AC fine, 450 Pa)	g	550	480	350	260
Spontaneous Efficiency –Toluene [2)]	%	> 95	> 95	> 95	> 95
Sorption Capacity [2)]	g	950	770	640	430

INSTALLATION AND DISPOSAL

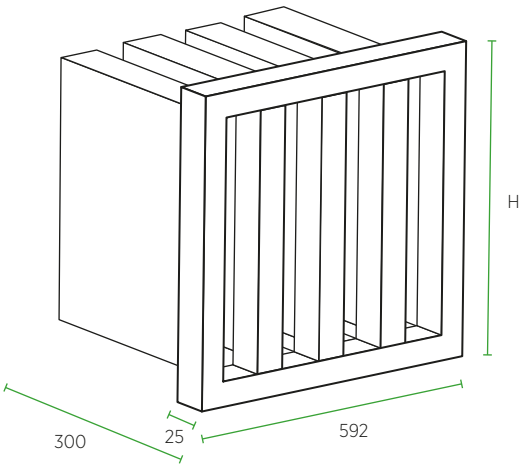
AFP-AZ Comfort can be easily installed in standard fine dust filter frames. Service life should be two years under normal conditions of climate and air contamination, but filters should be changed and serviced according to national hygienic standards for air handling units. Filters that have been used under standard environmental conditions can be disposed as industrial waste (incineration/land II, please refer to local regulations). Filters soiled by toxic and/or radioactive constituents must be disposed as hazardous waste in accordance with local regulations.

PRESSURE DROP VERSUS AIR FLOW

Duo-					
610	0	1,000	2,000	3,000	4,000
305	0	5,00	1,000	1,500	2,000

AIR VOLUME [m³/h]

DIMENSIONS (mm)



Materials	
Frame Material	Polystyrene, free of halogenated compounds, incinerable [3)]
Filter Material	Synthetic meltblown composite; synthetic fibre composite material with fine grain activated carbon embedded
Sealant	Polyurethane

Operation Conditions	
Maximum Operation Temperature [4)]	< 50 °C
Recommended Operation Temperature	< 30 °C
Maximum Relative Humidity [4)]	< 90 %
Recommended Relative Humidity	< 60 %

1) Filter class according to EN 779:2002. 2) Test according to DIN 71460 "Road vehicles – air filters for passenger compartments – Part 2: Test for gaseous filtration".
3) Flammability classification of materials used: F1/K1 according to DIN 53438 .
4) Deviations from the operation condition cause a reduction of efficiency. Deviation from more than one of the operation conditions would cause a significant loss of performance.

ScandSorb C Refillable Cartridge Carbon Filter System

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

The growing importance being placed upon protecting employees‘ and customers‘ health from the dangers of hazardous substances, makes it increasingly necessary to install appropriate filtering measures for the purification of incoming, outgoing and ambient air flows.

Filled with either a variety of differing quality activated carbons, Purotex or another media, the ScandSorb C refillable cartridges provide a great deal of flexibility. When ScandSorb C is combined with filters for the elimination of particles, ideal combinations for a wide variety of applications can be achieved.

KEY FACTS

- Elimination of odours and gas substances: Diminishes the causes of sick building syndrome
- Both physisorption and chemisorption varieties available: For gases which are difficult or impossible to eliminate with standard carbons
- Refillable cartridges: Lowers cost of ownership and reduces impact upon the environment
- Available in a variety of activated carbons and mediums. To suit the wide array of odours and gas substances
- Also available for the removal of radioactive and hazardous gases: Suited to even the most demanding of applications

ScandSorb C Activated Carbon

PHYSISORPTION - CHEMISORPTION

In most cases, contact times of around 0.1–0.2 seconds within the filter cartridge efficiently eliminate hazardous substances from the airflow. (Please find the formula for ascertaining the contact time in the technical data)

Cartridges are primarily filled with moulded carbons made from peat, coconut shells or hard coal with a specific surface of around 1,000 m^2/g. Moulded carbons – carbon rods – have a relatively high resistance to abrasion and a low resistance to air, which is advantageous for supplementary mechanical filtering and for the overall efficiency of the installation.

For the design of an activated carbon filter installation the following information regarding the air ow to be filtered is required:

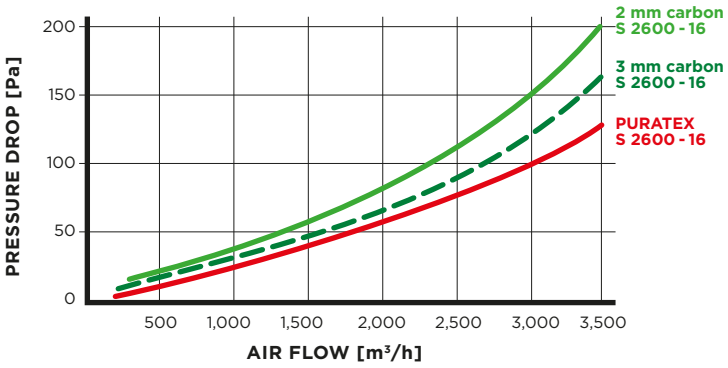
- Hazardous gas or hazardous gas combinations
- Hazardous gas(es) concentration
- Temperature
- Relative humidity

As these parameters influence each other, no definitive values for the design of an optimum filter installation can be prescribed. The following details should, accordingly, be regarded only as rough guideline values for non-impregnated standard activated carbons:

- Airflow temperature up to a maximum of 70 °C
- Relative humidity of the airflow up to a maximum of 70 %
- Contact time of the hazardous gases in adsorption of 0.1 seconds minimum

PRESSURE DROP

for a filter unit with 16 cartridges



Taking these details into account, the air volume for a filter unit with 16 cartridges (Type 2600) should not exceed 2,000-3,000 m^3/h. Please find pressure drop information in the diagram below.

For gases which are difficult or impossible to eliminate with standard activated carbons, impregnated carbons or Puratex are used. The hazardous substances are eliminated on contact with impregnated carbons by chemical adsorption (chemisorption). ScandSorb C is available with several types of impregnation on activated carbon for removing specific gases such as acids (HCl, HF, NO_x, SO_2) and bases (NH_3, amines).

If several hazardous substances are to be eliminated simultaneously, then among other possibilities, a multi-step filter installation with various gas adsorption media can be provided.

For radioactive gases, special types of carbon are required. We recommend that our engineers be consulted prior to designing a filter installation.

ScandSorb C Puratex

CHEMISORPTION

A feature of Puratex is that due to its composition, a large number of hazardous chemical substances are transformed into gases free of hazardous substances by molecular modification. In this process the entire mass, not just the surface of the pellets, is utilised for the chemical reaction.

The optimum temperature range for the reaction processes lies between -29 °C and +49 °C. Relative humidity should be within the range of 15 % – 95 %. The contact time of the hazardous substances in the filter medium should be no less (where possible) than 0.2 seconds.

Where hazardous gases with a high molecular weight would normally be eliminated with activated carbons, in the case of lower molecular mass, Puratex provides the ideal solution. Depending on the application, activated carbons and Puratex can be used in combination or, in the case of single-step filter installations, as a mixture. Gassorption and chemisorption need to be tested carefully in each case.

Puratex is a gas filtration substance in bead form and eliminates hazardous gaseous substances at the low-ppm level by chemical oxidation.

Puratex consists of activated alu-minium oxide (Al_2O_3) and potassium permanganate ($KMnO_4$) and:

- Is non-flammable
- Is non toxic
- Does not allow bacteria or fungi to develop
- Can be analysed quantitatively and qualitatively for residual potassium permanganate content and thus for its reactive capability

ScandSorb C
Technical Data

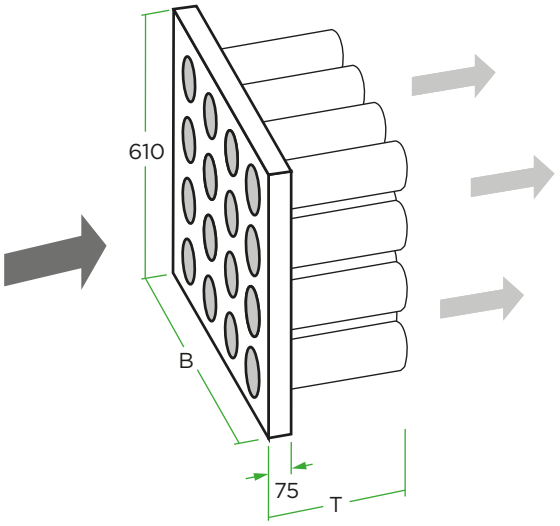
Cartridge type	2600	1000
Length (mm)	457	265
Wall depth (mm)	26	26
Carbon Load (l)	4,25	2,5

The air volumes given on the right are only guideline flows. They do not refer to hazardous substance adsorption in the purification of exhaust air. Please consult our office.

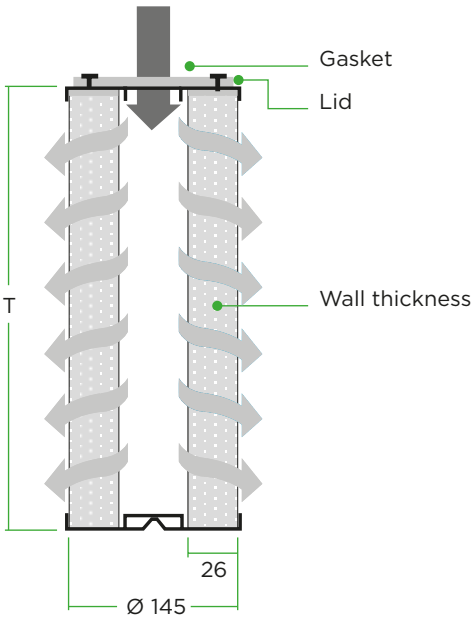
Cartridge installation frame

Type	S-66	S-56	S-36
Dimensions	610 x 610 x 75	508 x 610 x 75	305 x 610 x 75
Number of Cartridges	16	12	8
Carbon Volume (l)			
Type 2600	68	51	35
Carbon Volume (l)			
Type 1000	40	30	20
Air Flow (m^3/h)			
Type 2600	up to 3,400	up to 2,550	up to 1,700
Type 1000	up to 1,900	up to 1,420	up to 950

FRAME FORMAT



CARTRIDGE CONSTRUCTION



CONTACT TIME OF HAZARDOUS GASES WITH THE CARBON

The calculation is obtained from the carbon volume and the volume flow

$$tK[s] = \frac{\text{Carbon Volume } [m^3]}{\text{Volume Flow } [m^3/h]} \times 3{,}600$$

ScandSorb DP
Deep Bed Filter

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

ScandSorb DP is a deep bed gas filter that offers high capacity and security. Contaminated air flows through two 470 mm thick gas filter beds containing activated charcoal or a chemisorbent.

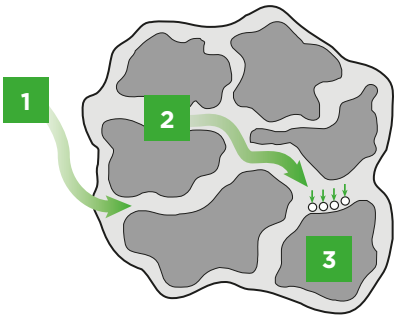
ScandSorb DP is designed for use in demading industrial applications and is available in either stainless or acid resistant stainless steel. To ensure ease of filter media replacement, ScandSorb features apertures at the top and bottom of the filter and a large sleeve coupling. It is also equipped with jacks for gas measurement during operation.

Providing the ideal solution for high contaminant concentrations, or for when high security is required, ScandSorb DP can be completely customised to suit your exact requirements.

KEY FACTS

- Ensures high safety levels
- Provides high efficiency filtration
- Designed for use in demanding industrial applications
- Simple-to-service

ScandSorb DP Deep Bed Filter



ADSORPTION PRINCIPLE

1. Molecule finds its way into the coal particle at the surface.
2. The molecule is transported through the macro-pores into the micro-pores, via a process called diffusion.
3. Adhesion by Van der Waals force.

ACTIVATED CARBON

Activated carbon is available in a variety of forms such as powders, granules and so-called extruded pellets. Using an entirely natural source substance (such as coconut shells, coal or wood), the raw material is carbonated in the charcoal kiln and then activated with steam at 1,000 °C. This high temperature provides a well-developed pore structure – high quality activated carbon has a pore structure of approximately 1,000 m^2/gram.

To distinguish between different qualities of coal, it is possible to ascertain efficiency by measuring the carbon adsorption capacity with carbon tetrachloride (CTC), for example. A carbon's ability to retain a substance is equal to relationship between the weight of the retained compound and the carbon weight.

CHEMISORBENT

An alternative to activated carbon, Chemisorbents consist of round pellets of alumina impregnated with potassium permanganate KMnO4 – an extremely strong oxidizing agent. In this process, the adsorbed gas or vapour reacts chemically with the sorbent to remove it from the airflow. Chemisorbents can also be used as a catalyst to break down a pollutant so that it can be adsorbed in a subsequent activated charcoal filter.

DIMENSIONING AND CHOICE

Nominal capacities for activated carbon or chemisorbent filters for comfort air applications are usually measured in m^3/s. These filters are typically used to separate temporary occurrences of odour such as automobile exhaust, cigarette smoke, and food etc.

In other applications, such as in heavy and often corrosive industrial environments, a more tailored approach must be adopted, with the exact filter specified according to a variety of factors. Choosing the correct quality and quantity of coal, along with suitable impregnation or chemisorbent, depends on the type of atmospheric gas or vapour, its concentration, the level of treatment required and the desired operating life of the adsorbent.

To determine the contact time (T) of the contaminated air with the sorbent, the following calculation can be employed:

$$T = \frac{m^3 \text{ adsorbent}}{m^3/s \text{ air}}$$

Contact time can vary considerably depending on the application. From the previous example, comfort air applications can have a contact time as low as 0.05 seconds whilst industrial applications can be as long as 5 seconds. MANN+HUMMEL's expertise in this area can provide you with assistance in making the correct choice of product.

ScandSorb DP Installation

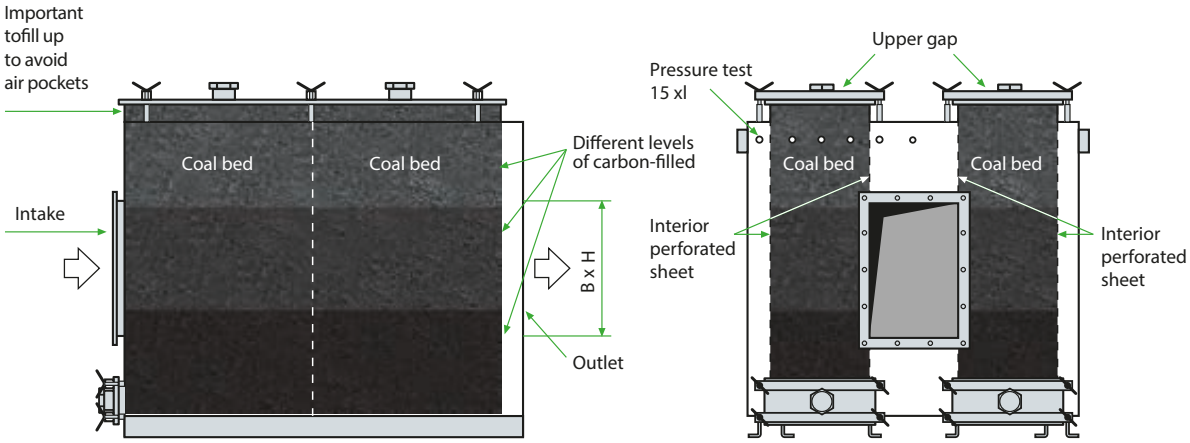
INSTALLATION

ScandSorb DP is delivered empty, with the activated carbon supplied in separate, individual packages. The filter is placed flat on a solid base (the weight of the filter is dependent on size) so that the weight is distributed evenly over the bottom profiles. Connect the filter to the inlet and outlet channels (see Figure 1) and install any monitoring equipment (gas detector, differential pressure gauge, electricity etc).

The coal beds are divided into specialized packets. It is recommended to open a bag at a time and gently bed the content of several packets so that the carbon is evenly distributed. (See Figure below)

Care should be taken when installing the carbon to eliminate the risk of damage to the perforated metal sheet which encloses the coal bed. To ensure that the coal is fully bedded in, a long object (such as a broomstick or similar implement unable to damage to the plate) is used to compact the coal down into the recess. Compact the carbon level to approximately 1 cm below the doors. This is necessary because the air movement will compress the carbon further.

THIS ACTIVITY CAN CREATE DUST - use respiratory protective equipment and eye protection.



MONITORING OF THE CARBON CONDITION

The coal will continuously adsorb pollutants (gas) from the air stream. Gas molecules bind to the carbon surface until it is saturated. To monitor the level of saturation, ScandSorb DP features a number of test connections (even in the coal bed itself – see Figure 1) where the air can be sampled for its gas composition. Through this gas measurement, an indication of how much of the carbon has been exhausted can be obtained. This provides the necessary information to determine the range of carbon exchange.

REPLACEMENT OF COAL

When emptying the deep bed filter, it is important not to empty a compartment completely when the pressure from the full trays may cause damage to the perforated sheet metal which encloses the coal bed.

There are several ways to empty the filter of the spent activated carbon:

1) Suck waste coal via the sleeve coupling present in the upper lids with a suction car or special suction equipment.

2) Open the lower lid and rake the coal out.

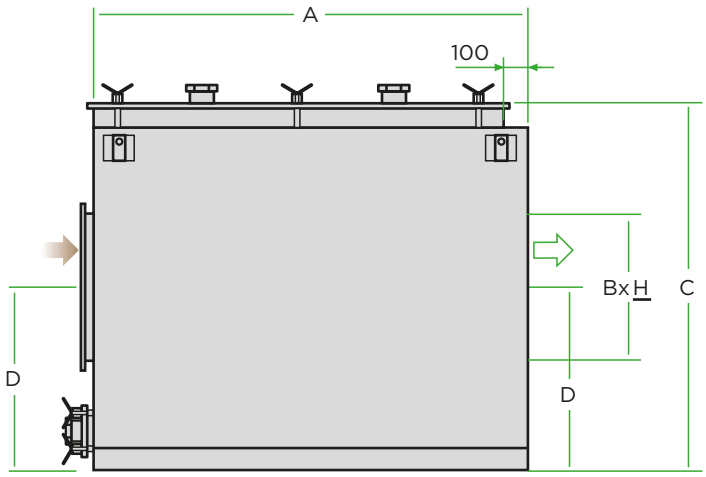
3) Suck out via the sleeve coupling in the lower lid – like 1) above.

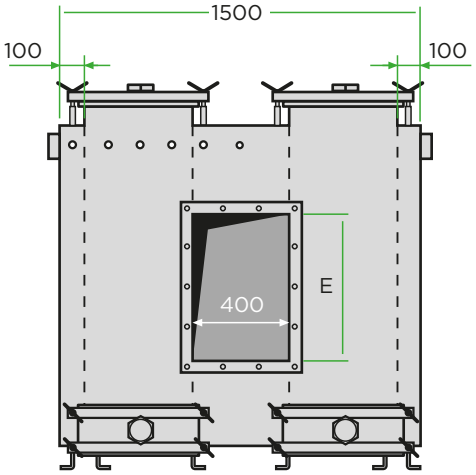
Recharging of the new activated carbon should be done as described in "Installation" above.

THIS ACTIVITY CAN CREATE DUST - use respiratory protective equipment and eye protection.

In some cases, the spent carbon is hazardous waste, so special handling, packing, and destruction/disposal procedures must be followed. Contact MANN+HUMMEL for further information. Replacement coal is delivered in bags, large or small, depending on filter size and customer preference.

ScandSorb DP
Technical Data





Size	Nominal Flow at 1 sec. Contact Time (m³/s)	*) Pressure Drop at Nominal Flow (Pa)	Dimensions				
			A (mm)	B x H (mm)	C (mm)	D (mm)	E (mm)
DP4000	1	600 – 800	1,100	500 x 500	1,300	750	500
DP8000	2	600 – 800	1,800	500 x 600	1,500	750	600
DP10000	3	600 – 800	2,000	600 x 900	2,000	850	900
DP15000	4	600 – 800	2,650	600 x 900	2,000	1,000	1,200

*) Dependent on choice of media.

ScandSorb TK For Effective Odour Removal

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

ScandSorb TK offers a cost effective way of removing odours from ventilation air, providing a simple method of reducing lower concentrations of bad smelling and/or corrosive gases and vapors in the air.

ScandSorb TK is designed for use in air handling systems to remove odours such as kerosene, diesel fuel, tobacco smoke, food smells and much more.

As adsorption filters are designed to remove gaseous and vaporous matters, ScandSorb TK should be protected by a particle filter (class F6 and upwards recommended) to prevent dust from blocking the activated carbon pores.

However, no secondary safety filter is required as ScandSorb TK does not release carbon dust.

KEY FACTS

- Fully incinerable
- Homogeneous, stable and permanent water resistant carbon bed
- Low differential pressure drop
- Large carbon content
- 6 sizes
- Does not release carbon dust, safety filter normally not needed

ScandSorb TK Technical Data

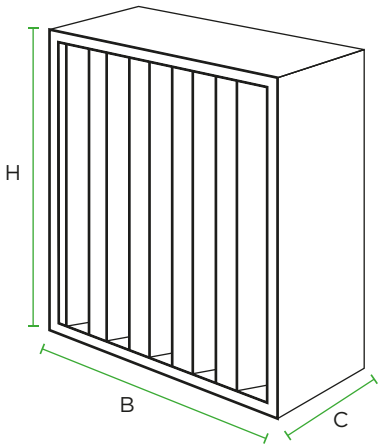
DESIGN

ScandSorb TK is manufactured from 100 % incinerable materials, with a casing constructed from durable MDF and a filtration element consisting of panels of bonded extruded carbon.

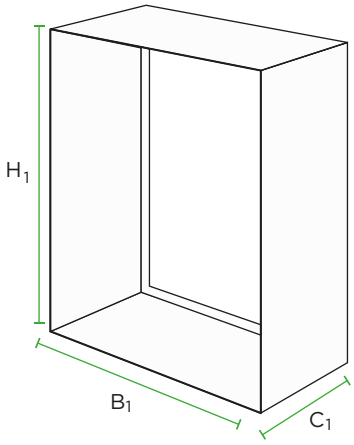
The production method for binding the carbon panels ensures that the active surface is maximised at 1,100–1,200 m^2/gram.

Casing and carbon panels are attached with adhesive to prefabricated cassettes and a neoprene gasket is on the clean air side.

FILTER CASSETTE



HOLDING FRAME



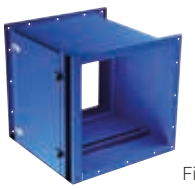
Type	Filter cassette B x H x C	Nom. capacity		Pressure Drop Pa	Contact Time sek	Carbon Weight kg	Total Weight kg	Holding Frame B_1 x H_1 x C_1
		m^3/h	m^3/s					
1/4 TK1	290 x 290 x 197	425	0.12	140	0.05	4	7,5	305 x 305 x 240
1/2 TK1	290 x 595 x 197	850	0.24	140	0.05	8	13	305 x 610 x 240
1/1 TK1	595 x 595 x 197	1,700	0.47	140	0.05	16	22	610 x 610 x 240
1/4 TK2	290 x 290 x 397	850	0.24	140	0.05	7	11	305 x 305 x 440
1/2 TK2	290 x 595 x 397	1,700	0.47	140	0.05	14	23	305 x 610 x 440
1/1 TK2	595 x 595 x 397	3,400	0.94	140	0.05	28	39	610 x 610 x 440

The chart above gives contact time at nominal capacity.

For other contact time use $t = \frac{m^3 \text{ carbon}}{m^3/s \text{ air}}$

For calculation help and more information – please contact MANN+HUMMEL.

ACCESSORIES
Holding frames for installation in filter walls. Filter housing type GDM or GDR.



Filter housing GDR

MANN+HUMMEL has a complete range of particle air filters from class G2 to H14 and a wide range of adsorptions filters and chemical sorbents for gaseous and vaporous impurities.

Mounting Frames
Front and Side Withdrawal and Pad Holding Frames

CLEAN AIR

POWER GENERATION

CLEAN ROOM

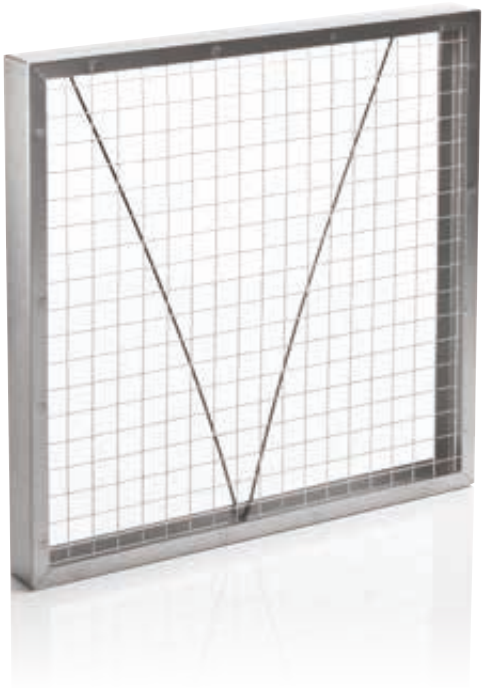
INDUSTRIAL

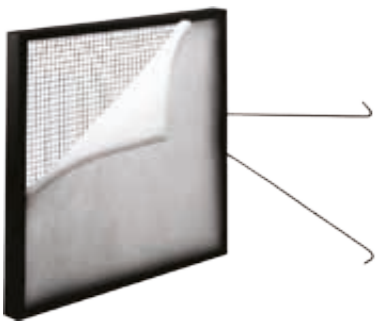
MANN+HUMMEL's mounting frames are designed specifically for use with our wide range of filters.

With a strong and robust construction, the frames ensure that the filters are installed correctly; providing optimum performance to the high standards for which they were intended. The mounting frames also retain the filters firmly in place during operation; eliminating the danger of movement or distortion and preserving their service life.

KEY FACTS

- Designed to accept our wide range of filters: To provide optimum performance and reliability
- Simple to install: For seamless integration with filters and ductwork/AHU
- Manufactured from galvanised, stainless or mild steel: Provides strength and robustness
- Supplied as single or in multiples: To meet the demands of a variety of applications
- Non-standard sizes to fit any aperture also available: To provide flexibility





Pad Holding Frame

Mounting Frames

FRONT WITHDRAWAL FRAMES

Front withdrawal frames can be manufactured from a variety of materials e.g. galvanised and stainless steel, and mild steel with a corrosion resistant paint finish. They are widely used by Air Handling Unit manufacturers, ductwork and building services contractors in A.H.U's and ductwork or can be installed directly into building fabric. Larger installations can be catered for by bolting frames together to form an increased face area. Front withdrawal frames accept single or pre and secondary filtration by increasing the retaining clip sizes. Frames are supplied with gasket fitted to eliminate air bypass.

Frames are supplied complete with clips and seal, four clips per frame. Clips are available in 1" – 6" to accomodate various filter depths. Each frame is complete with a neoprene seal bonded to the sealing surface of the holding frame and a high temperature seal can be supplied if necessary.

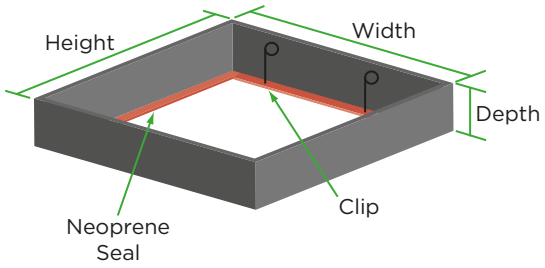
SIDE WITHDRAWAL FRAMES

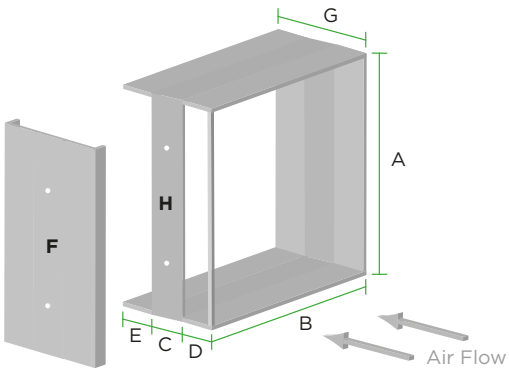
Manufactured from galvanised or stainless steel and have a blank channel for fixing to surrounding ductwork. The filter channel or channels, depending on single or double stage filtration, are complete with a brush nylon seal to hold the filters. On large face areas vertical or horizontal stiffening bars can be supplied for added rigidity. Frames are complete with removable panel for service of filters.

Side withdrawal frames are provided with single or double filter channels, which are equipped with brush nylon seals to ensure no air by-pass between filter and frame.

PAD HOLDING FRAMES

Manufactured from galvanised steel as standard, but can also be supplied in stainless steel, this type of frame can be fitted with glass or synthetic pads where card cases are unsuitable, and can also be beneficial where there is a high usage of panels. The frames are supplied with a weldmesh grill downstream to support the material and if required a clip on the front to retain the media in the frame. These can be fitted into front and side withdrawal frames.





Nominal Size, H x W x D (")	Actual Size, H x W x D (mm)
24 x 12 x 3	610 x 305 x 75
20 x 20 x 3	508 x 508 x 75
24 x 24 x 3	610 x 610 x 75
24 x 20 x 3	610 x 508 x 75

Side Withdrawal Frames	
A	Dimension – Height 300 or 600 mm
B	Dimension – Width 300 to 2,400 mm in 300 mm increments
C	Empty 50 mm channel for fixing adjacent side withdrawal frames together
D & E	Channels to locate primary and secondary filters. For depth see G
F	Access door with fixing drill holes to match those on H.
G	**Dimension – Depth varies as per the following:**
	75 mm single filter channel for 25 mm pre-filter or 22 mm header secondary filter
	100 mm single filter channel for 50 mm, pre-filter or PHF
	125 mm double filter channel for pre-filter and 22 mm header secondary filter
	150 mm single filter channel for 100 mm panel type filter
	175 mm double filter channel for 100 mm panel type filter and 22 mm header, secondary filter
H	Solid panel

Filtrasept
HEPA Filter Housings for Ceilings and Walls

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Filtrasept housings with integrated EPA/HEPA filters are designed to provide air filtration and distribution in one unit. Viruses, bacteria and dust particles are filtered out of the airstream immediately before the air outlet, eliminating the risks associated with central system filtration, such as cross contamination in the ventilation ducts.

Filtrasept is ideal for use wherever clean air or a germ-free atmosphere is needed, for example in:

- **Hospitals:** lower class operating theatres and treatment rooms, intensive care, sterile zones isolation areas, etc.
- **Industry:** clean production environments in pharmaceutical, chemical, food, optical and electronic industries
- **Laboratories:** clean zones and work areas, for supply of clean air and discharge filtration of toxic or hazardous aerosols

KEY FACTS

- Multiple sizes and combinations: To suit a wide variety of applications and operational requirements
- Integrated air-tight dampers according to EN 1751 (optional)
- Low construction height: With special versions for minimal vertical space
- Leakage test with test aerosol according ISO 14644-3 and measurement of pressure drop from clean room accessible side
- Easily removable air outlets: For easy maintenance and disinfection
- Comprehensive accessory range: For seamless integration with current systems
- Available powder coated (white, RAL 9010) or stainless steel (1.4301): To meet the demands of different applications

Filtrasept Product Range

Filtrasept Filter Housing

- Sealed housing constructed from galvanized steel (powder coated, RAL 9010, white), resistant against disinfectants. Available also in stainless steel, 1.4301 and with fire-protection coating
- 9 standard sizes; with or without damper according to EN 1751 (manually operated or electrical)
- Spigot available for top entry
- Test port for pressure drop, test groove and aerosol
- Available with FS Swirl Diffuser (fits swirl diffusers of all leading brands); fixed with central screw
- Available with perforated plate; fixed with 4 corner screws

FS Swirl Diffuser

- Adjustable air deflectors
- High quality, solid construction; mounted with M8 central thread
- Colour white, RAL 9010, other RAL colours as option
- Air deflectors black, option white

Filtrasept Low Ceiling Height

- Housing for low ceilings with rectangular spigot; construction height of only 275 mm
- Damper available – manual, hydraulic or electrical operation

Filtrasept Wall System

- Sealed housing constructed from galvanized steel (powder coated, RAL 9010, white), resistant against disinfectants. Available also in stainless steel, 1.4301
- Air outlets available as perforated plate or grid, connected with 4 corner screws to the filter housing
- Compatible with a large selection of filters

ZAL Ceiling Outlets for Exhaust Air

- Air outlet supplied without filter; available in sizes from 50 to 900 m^3/h; dimensions from 318 x 318 x 330 mm to 623 x 623 x 380 mm
- Equipped with integral fluff separator
- Optionally available with diffusers or perforated plate
- Available in galvanized or powder coated steel (white, RAL 9010)
- Horizontal or vertical spigot
- Available with damper for air volume controlling

Filtrasept – Ceiling Unit

CONSTRUCTION

Filtrasept Ceiling Units are constructed from powder coated (white RAL 9010) or stainless steel. Units are also available with a fire-resistant coating, while stainless steel fittings secure the filter and diffuser/perforated plate in place. The air is supplied through a circular, side-mounted spigot, with an optional air tight, shut-off damper (according to EN 1751), which is accessible from the room side.

Filtrasept can also be supplied with a top-mounted spigot, while Filtrasept for low ceilings (construction height 275 mm), features a rectangular spigot to minimise size. Filtrasept can be equipped with a two-way, four-way or swirl diffuser, fitted centrally, or a perforated plate, which is secured with 4 corner screws. Standard colour for outlet elements is white (RAL 9010), with other colours available upon request.

Equipped with an integral test port, accessible from the room side for pressure, seal and aerosol tests, both the system and filter can be easily tested with a seal test instrument.

INSTALLATION

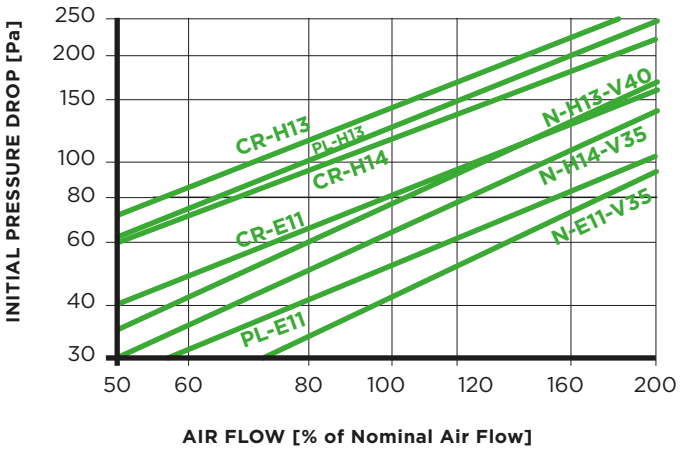
Filtrasept can be installed in all conventional ceiling systems, whilst custom connections can be designed to suit the exact requirements of cleanroom ceiling manufacturers. When designing the room layout, the consultant should ensure that Filtrasept units which are equipped with diffusers, are located far enough from walls, pillars and other air distribution units, in order to avoid disruption to the air flow pattern.

FILTRASEPT COMBINATIONS

Filtrasept units with perforated plates can be installed adjacent to each other, allowing coverage of significantly larger areas.

PRESSURE DROP AS FUNCTION OF NOMINAL AIR FLOW

If several Filtrasept units are used, of the same or different sizes but with the same pressure drop performance curve and upstream pressure, no air flow adjustment is required. This is because as the dust build-up becomes greater, the pressure drop for all sizes increases equally. If Filtrasept types with different performance curves are combined, the air flow must be adjusted.



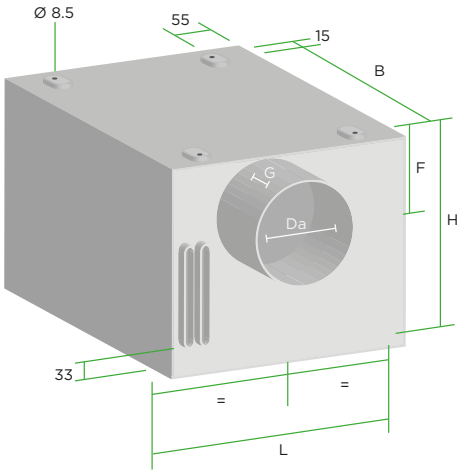
Air Flow in % of Nominal Flow (m³/h)[1]		50 %	60 %	80 %	100 %	120 %	160 %	200 %
Type 2	with **CR**	70	85	110	140	170	225	280
Type 3	with **PL**	135	160	215	270	325	430	540
Type 4	with **CR**	160	190	260	320	385	510	640
Type 5	with **PL**	270	325	430	540	650	865	1,080
Type 5C & 6C	with **CR**	600	720	960 [2]	1,200 [2]	–	–	–
Type 7 & 9	with **CR**	300	360	480	600	720	960	1,200
Type 8	with **CR**	250	300	400	500	590	790	990
Type 10	with **N**	535	640	850	1,070	1,280	1,710	2,140

1) At greater than 100% of rated air flow both the air acoustic limits and comfort criteria should be considered separately. Furthermore, the filters efficiency many decrease below the class limits.; 2) Please consider comfort criteria (avoid draft)

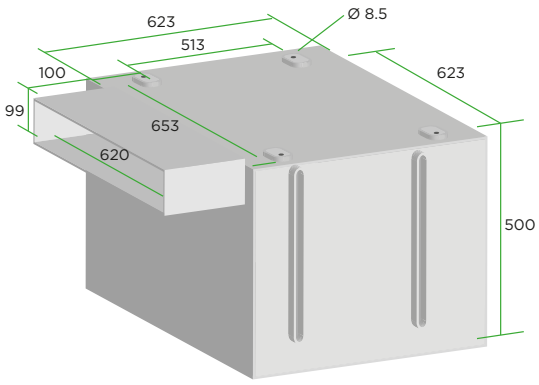
Filtrasept – Ceiling Unit Technical Data

DIMENSIONS (mm)

Ceiling Unit Sizes 1 – 9



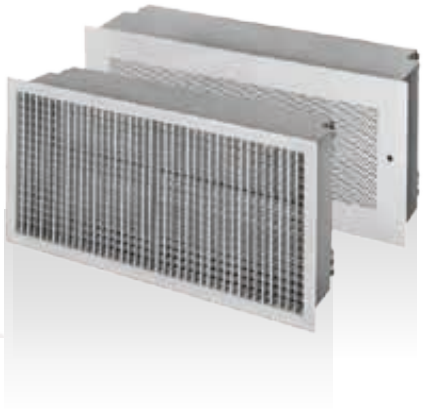
Ceiling Unit Size 10



Ceiling unit size	Installable Filter Type	Installable Filter Size	Dimensions of air outlets			Dimensions of case						Weight with Filter kg
			Perforate Plate ø mm	Diffuser ø mm	Swirl Diffuser ø mm	B mm	L mm	H mm	Da mm	F mm	G mm	
3	PL-E11/H13	610 x 610 x 30	623	(623) (676)	(623) (650 + 676)	623	623	345	198	120	60	20
5	PL-E11/H13	1,220 x 610 x 30	2 x 623	–	–	623	1,247	345	198	120	60	36
6	PL-E11/H13	1,220 x 610 x 30	2 x 623	–	–	1,247	623	345	198	120	60	36
2	CR-E11/H13/H14	305 x 305 x 75	(318)	359	(398)	318	318	345	148	95	60	12
4	CR-E11/H13/H14	457 x 457 x 75	(470)	498	498	470	470	385	198	120	60	18
5C	CR-E11/H13/H14	1,220 x 610 x 75	2 x 623	–	–	623	1,247	435	248	140	60	50
6C	CR-E11/H13/H14	1,220 x 610 x 75	2 x 623	–	–	1,247	623	435	248	140	60	50
7	CR-E11/H13/H14	610 x 610 x 75	(623)	623 676	623 650 + 676	623	623	400	222	125	60	30
8	CR-E11/H13/H14	557 x 557 x 75	(570)	598 623	(598) 623	570	570	400	222	125	60	26
9	CR-E11/H13/H14	610 x 610 x 75	(623)	623 676	623 650 + 676	623	623	435	248	140	80	36
10	N-F7/F9 N-E11/H13/H14	610 x 610 x 292	–	623 676	(623) (650 + 798)	623	623	500	-	-	-	45

Filter Performance	Unit	PL-E11	PL-H13	CR-E11	CR-H13	CR-H14	N-E11-V35	N-H13-V40	N-H14-V35
Typical Efficiency to EN 1822 (for MPPS with Test Aerosol)	%	97	99.97	97	99.98	99.998	97	99.95	99.998
Filter Class as per EN 1822	-	E11	H13	E11	H13	H14	E11	H13	H14
Maximum Final Pressure Drop	Pa	600	600	400	400	400	800	800	800

Filtrasept – Wall Unit



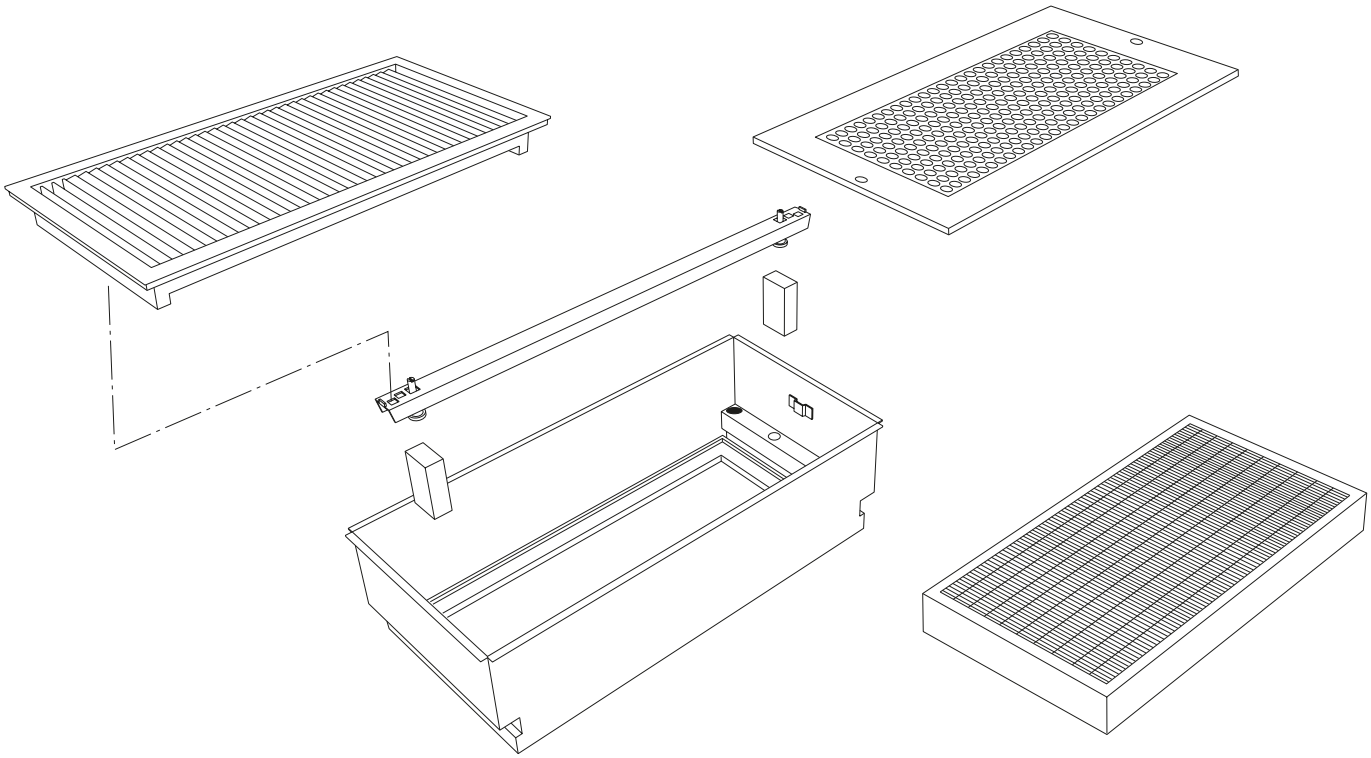
INSTALLATION AND ASSEMBLY

The Filtrasept Wall Unit is designed to be fitted to both the air duct and the wall or partition; with a wall frame available as an optional accessory for even simpler installation.

CONSTRUCTION

Designed with a flange for connection to the wall and air duct, the unit offers an all-in-one solution for the installation of EPA/ HEPA filters. The air outlet is by way of a perforated plate (white, RAL 9010) or an outlet grill.

All Filtrasept wall units are equipped with a test port for pressure drop or aerosol measurement, and when fitted with EPA/HEPA filters the units can be specified with an integral test port for seal tests. Filters and connections are accessible from the room side.



Filtrasept – Wall Unit Technical Data

Types, Dimensions, Weights	Unit	Hepatex CR	Hepatex N	Micratex FP-P	Compatex FP
Installation Filter Size (W x D x H)	mm	305 x 610 x 75	305 x 610 x 292	288 x 593 x 88	288 x 593 x 292
Case Depth (D)	mm	240	450	240	450
Weight (with outlet, without filter)	kg	12.5	16.0	10.0	13.5

Filter and Air Flow Data

Unit Type	Installable Filters Size 610 x 305 mm	Filter Class (acc. to EN 779 & EN 1822)	Nominal Air Flow (m^3/h)[1)]	Pressure Drop (Pa)
Micratex FP-P	FP-P-HT-F6-305 to F9-305	F6-F9	1,250	75-180 Pa
	FP-P-HT-E11-305	E11	1,000	190 Pa
	FP-P-HT-E12-305	E12	750	300 Pa
Compatex FP	FP-F6-305 to F9-305	F6-F9	1,700	70-100 Pa
	FP-P-HT-E10-305 to E12-305	E10-E12	1,700	140-290 Pa
	FP-P-HT-H13-305	H13	1,250	240
Hepatex CR	CR-E11 to H14	E11-H14	3,00	120
Hepatex CR	N-F7-V40-305	F7	1,900	140
	N-F9-V40-305	F9	1,900	180
	N-E11-V35-305	E11	1,700	190
	N-H13-V35-305	H13	1,700	250
	N-H14-V40-305	H14	1,500	250

1) For air flows (V_L) ,<700 m^3/h the use of a perforated plate outlet and for V_L. >700 m^3/h a grille outlet is recommended. At V_L. >1,000 m^3/h eventual acoustic limits should be taken into account separately.

GDM
Filter Housing

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

GDM filter housings are standardised modular casings, designed to fit all MANN+HUMMEL bag filters, all types of compact filters and most carbon filter cassettes.

Constructed in standard form from galvanised steel for strength and durability, GDM can also be supplied in epoxy-coated or stainless steel. The hinged door hatch is equally robust and is fitted with sturdy, ergonomic locking handle. Points for differential pressure measurements are provided as standard.

KEY FACTS

- Modular design: For seamless integration with a variety of operational environments
- Parallelogram fitted filters: Ensures absolutely air tight filter installation
- Constructed from galvanised steel: For excellent strength and rigidity
- Side access and inspection door: Simplifies filter install and maintenance
- Compatible with the entire product range G3 – F9 and most carbon filters: For simple installation and utmost flexibility

GDM Filter Housing and Available Variants

GDM FILTER HOUSING

The GDM filter housing is produced in sections of galvanized steel sheet. As standard it comes uninsulated or insulated with double-walls and intermediate insulation (EI 30). The airtight side-access inspection door moves on hinges and is equipped with solid handles (as option with lock). Differential pressure connections for pressure drop measurements with pressure gauge are standard. The filters are fitted with a parallelogram that ensures absolute air-tightness. Both flange and PG joint duct connections are available.

The GDM housing is as option also available in stainless steel or epoxy coated.

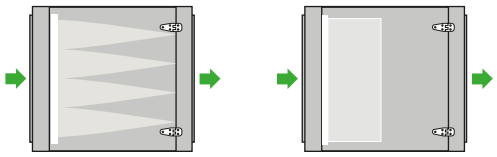
The filter cassette is installed from the side-access inspection door

The fitting of the air filter with parallelogram towards the gasket ensure airtightness

AVAILABLE VARIANTS

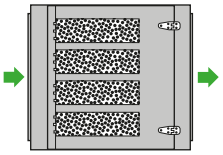
GDM-FK-S
for bag filters G2-F9

GDM-FK-K
for compact filter F6-F9 and carbon filter AFP-AZ



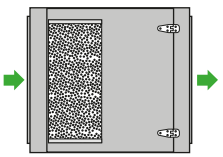
GDM-FK is designed for various types of filter cassettes. The filters are fitted into the casing through the side-access hatch and pressed with the parallelogram towards the gasket for efficient tightening. The inspection door can only be closed with the handle in locked position, which guarantee air-tightness.

GDM KK-C
for Scandsorb carbon cylinders



GDM KK-C is designed for Scandsorb cylinders filled with activated carbon or the impregnated spheres Unisorb Mark 2. The cylinders are fitted with bayonet joints on to the mounting plate inside the housing. The intermediate gasket ensures air-tightness. The cylinders can be refilled with carbon.

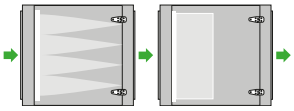
GDM KK-TK
for Odorex carbon cassettes



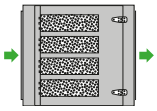
GDM KK-TK is designed for Odorex carbon filter cassettes type CF1 and CF2. The Odorex cassettes are fitted in the same way as the other filter cassettes with parallelogram. The Odorex filters are exchangeable cassettes with a galvanized steel sheet casing.

GDM – Technical Data

GDM-FK-S
GDM-FK-K



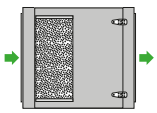
GDM KK-C



Dwelling time:
Carbon – 0.12 secs
Unisorb. – 0.6 secs

Size	No. of Filters, Module			Nominal Flow (m³/s)	No. of Cylinders	Activated Carbon (l)	Nominal Flow (m³/s)	Unisorb Spheres (litre)	Nominal Flow (m³/s)
	1/4 *)	1/2	1/1						
0.5 x 0.5	1	–	–	0.24	4	16	0.14	16	0.028
0.5 x 1	–	1	–	0.47	8	32	0.28	32	0.055
0.5 x 1.5	1	1	–	0.71	12	48	0.42	48	0.084
0.5 x 2	–	2	–	0.94	16	64	0.56	64	0.11
0.5 x 2.5	1	2	–	1.18	20	80	0.70	80	0.14
0.5 x 3	–	3	–	1.41	24	96	0.84	96	0.16
1 x 0.5	–	1	–	0.47	8	32	0.28	32	0.055
1 x 1	–	–	1	0.94	16	64	0.56	64	0.11
1 x 1.5	–	1	1	1.41	24	96	0.84	96	0.16
1 x 2	–	–	2	1.88	32	128	1.12	128	0.21
1 x 2.5	–	1	2	2.35	40	160	1.40	160	0.27
1 x 3	–	–	3	2.82	48	192	1.68	192	0.32
1.5 x 0.5	1	1	–	0.71	12	48	0.42	48	0.084
1.5 x 1	–	1	1	1.41	24	96	0.84	96	0.16
1.5 x 1.5	1	2	1	2.12	36	144	1.26	144	0.24
1.5 x 2	–	2	2	2.82	48	192	1.68	192	0.32
1.5 x 2.5	1	3	2	3.53	60	240	2.10	240	0.40
1.5 x 3	–	3	3	4.23	72	288	2.52	288	0.48
2 x 0.5	–	2	–	0.94	16	64	0.56	64	0.11
2 x 1	–	–	2	1.88	32	128	1.12	128	0.21
2 x 1.5	–	2	2	2.82	40	160	1.40	160	0.27
2 x 2	–	–	4	3.76	64	256	2.24	256	0.42
2 x 2.5	–	2	4	4.70	80	320	2.80	320	0.53
2 x 3	–	–	6	5.64	96	384	3.36	384	0.64
2.5 x 0.5	1	2	–	1.18	20	80	0.70	80	0.14
2.5 x 1	–	1	2	2.35	40	160	1.40	160	0.27
2.5 x 1.5	1	3	2	3.53	60	240	2.10	240	0.40
2.5 x 2	–	2	4	4.70	80	320	2.80	320	0.53
2.5 x 2.5	1	4	4	5.88	100	400	3.50	400	0.67
2.5 x 3	–	3	6	7.05	120	480	4.20	480	0.80
3 x 0.5	–	3	–	1.41	24	96	0.84	96	0.16
3 x 1	–	–	3	2.82	48	192	1.68	192	0.32
3 x 1.5	–	3	3	4.23	72	288	2.52	288	0.48
3 x 2	–	–	6	5.64	96	384	3.36	384	0.64
3 x 2.5	–	3	6	7.05	120	480	4.20	480	0.80
3 x 3	–	–	9	8.46	144	576	5.04	576	0.96

GDM KK-TK



Dwelling time:
0.04 secs

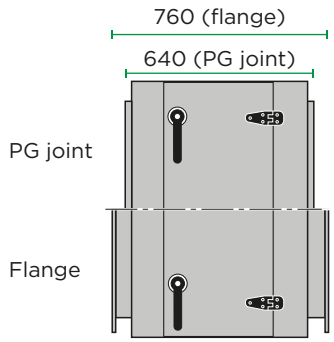
Note: For carbon filter cassette Scandsorb V25 and V75, use Filter housing GDR.

Size	No. of Cassettes CF1		Activated Carbon (l)	Nominal Flow (m³/s)	No. of Cassettes CF2		Activated Carbon (l)	Nominal Flow (m³/s)
	1/2	1/1			1/2	1/1		
0.5 x 1	1	–	10	0.24	1	–	20	0.47
0.5 x 2	2	–	20	0.47	2	–	40	0.94
1 x 1	–	1	20	0.47	–	1	40	0.94
1 x 2	–	2	40	0.94	–	2	80	1.88
1.5 x 1	1	1	30	0.71	1	1	60	1.41
1.5 x 2	2	2	60	1.41	2	2	120	2.82
2 x 1	–	2	40	0.94	–	2	80	1.88
2 x 2	–	4	80	1.88	–	4	160	3.76

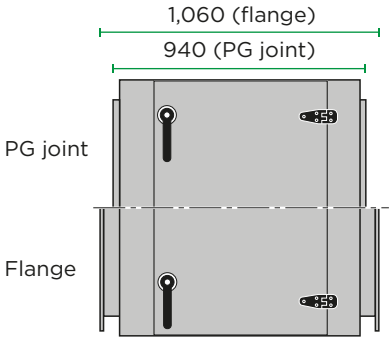
GDM – Technical Data

DIMENSIONS (mm)

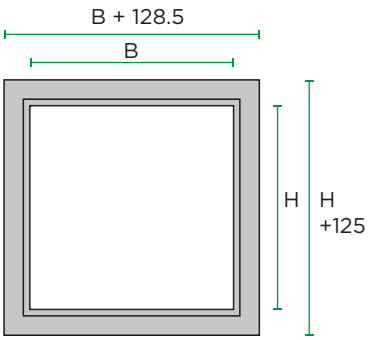
GDM-FK-K



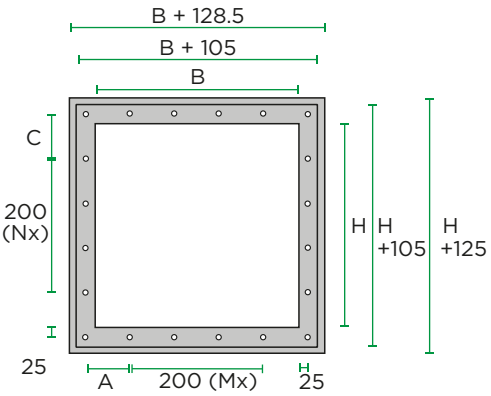
OTHER



PG Joint



Flange



Width (W)	Height (H)					
	310	615	920	1,225	1,530	1,835
325	0.5x0.5	0.5x1	0.5x1.5	0.5x2	0.5x2.5	0.5x3
625	1x0.5	1x1	1x1.5	1x2	1x2.5	1x3
925	1.5x0.5	1.5x1	1.5x1.5	1.5x2	1.5x2.5	1.5x3
1,225	2x0.5	2x1	2x1.5	2x2	2x2.5	2x3
1,525	2.5x0.5	2.5x1	2.5x1.5	2.5x2	2.5x2.5	2.5x3
1,825	3x0.5	3x1	3x1.5	3x2	3x2.5	3x3

B	A	M
1	137.5	2
1.5	187.5	3
2	137.5	5
2.5	187.5	6
3	137.5	8

H	C	N
1	132.5	2
1.5	185	3
2	137.5	5
2.5	190	6
3	142.5	8

WEIGHT (kg)

Weight of GDM FK-S filter housing with flanged connection (excluding filters).

O Uninsulated filter housing
I Insulated filter housing

Width (Module)		Height (Module)					
		0.5	1	1.5	2	2.5	3
0.5	O	39	56	74	89	108	123
	I	86	86	112	140	162	185
1	O	52	77	88	103	124	139
	I	74	115	134	157	186	209
1.5	O	67	84	109	122	146	161
	I	105	130	163	184	216	239
2	O	80	96	121	136	162	177
	I	126	150	183	206	240	263
2.5	O	95	112	139	155	183	199
	I	149	174	209	233	271	293
3	O	107	124	153	169	199	214
	I	169	194	231	255	293	316

GD-Slim
Filter Housing for Flat Filter Pads G2-G3

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Filter housing type GD-Slim is intended for flat filter pads G2-G3. The filter pad is inserted in a metal frame which is slided into a patented U-channel with holding springs and a low friction gasket to secure an air tight filter installation.

Type GD-Slim is manufactured from galvanized sheet steel provided with an access door on hinges. There are taps for a pressure gauge connection.

For integration with ductwork the housing may be ordered with PG-joint or flanges on in- and outlet.

Sizes – range from 200 x 200 mm to 2,100 x 2,100 mm in steps of 100 mm

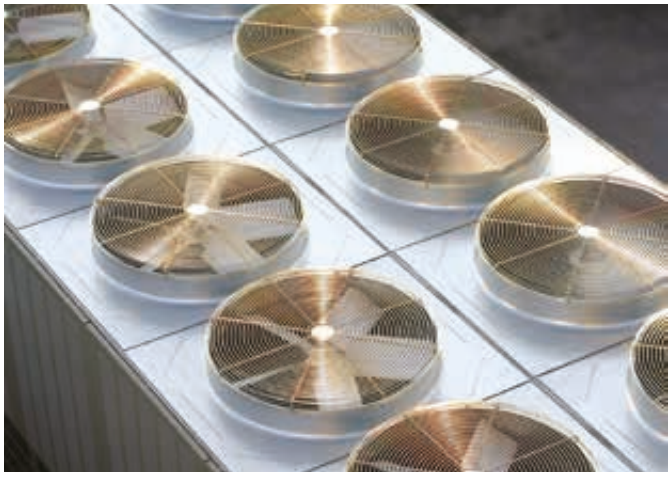
Capacity – 0.03 – 10 m^3/s

Optional filter types:

- G200P G2, max. face velocity 1.5 m/s
- Scandglas, yellow G2 max. face velocity 2.5 m/s
- G300P G3, max. face velocity 1.5 m/s
- HI G3, max. face velocity 2.5 m/s
- TI100 G3, max. face velocity 2.5 m/s

KEY FACTS

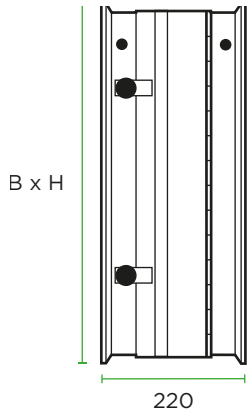
- Compact – only 220 mm deep: Suitable for use where space is limited
- Fitted with secure filter latches: To prevent accidental opening
- Constructed from galvanised steel: For excellent strength and rigidity
- Side access door and pressure gauge connection taps: Simplifies filter install and maintenance
- Both flange and PG joint duct connections available: For seamless integration with the ductwork



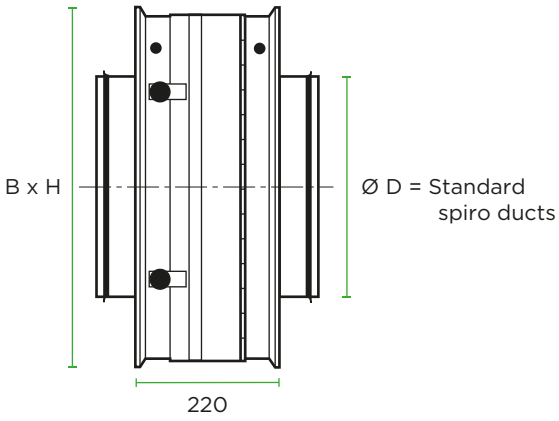
GD-Slim
Technical Data

DIMENSIONS (mm)

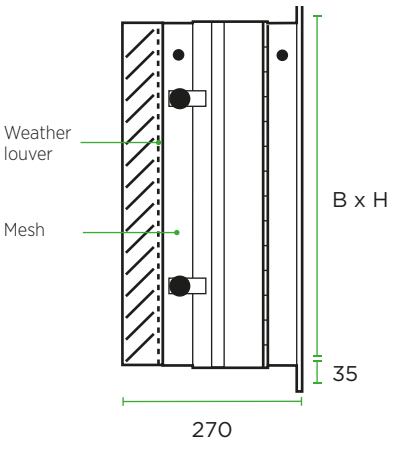
TYPE ST
For ductwork application



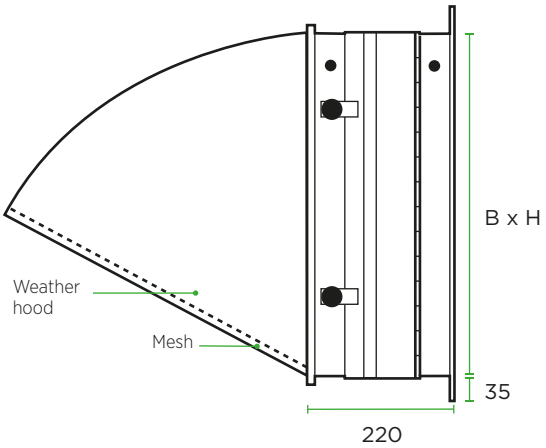
TYPE RT
For circular ducts



TYPE IT
Wall installations



TYPE HT
Wall installations



Dimensions

B	H	Nominal Air Flow, m³/s
200 – 2100	200 – 2100	0,03 – 10

Specification for Ordering. Example:
Type GD-Slim filter housing size 400 x 500, manufactured from galvanized steel with access door on hinges and taps for a pressure gauge connection. The filter housing shall include a weather hood type HT and a flange for wall installation. Type of filter – TI 100, G3.

NG
Filter Duct Housings

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

NG filter duct housings are solid-built housings, suitable for air flows of up to 12,000 m³/h. The housings can be used for the installation of various filter types, are fast and easy to assemble and available in several sizes.

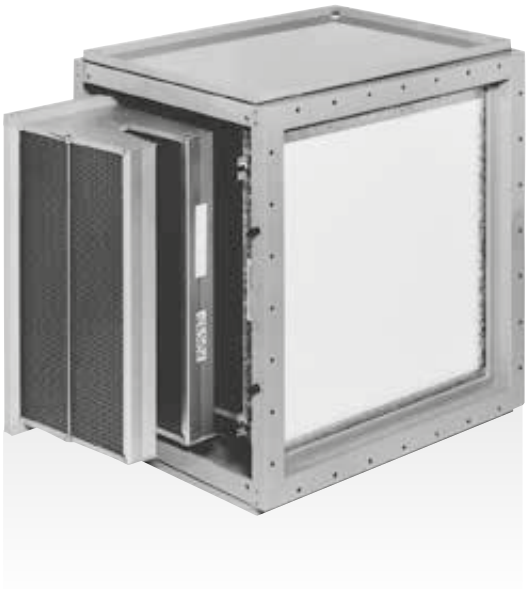
The NG filter duct housing is suitable for installation in duct systems for the supply of ultra-clean air. The air flow can be horizontal or vertical as required and servicing is recommended from the sides and underneath.

The housing, mounted as closely as possible to the air outlet, allows air distribution by conventional means in the area to be kept clean. Special advantages of this filter arrangment lie in the fact that the filter can be changed from outside the clean air zone.

Typical fields of application for NG housings are:
- Sterile zones in hospitals
- Clean air zones and clean working areas in laboratories and industry (pharmaceutical, food and electronics)
- Waste air purification to maintain the maximum emission values etc.

KEY FACTS

- Mounted in close proximity to the air outlet: Filter change can occur outside of the clean air zone
- Filter gasket test groove: Simplifies maintenance and safety inspections
- Guide rails for filter installation: For ease of assembly
- Optional integrated pre-filter: For pre- and final filtration in one unit
- Pre-filter separately fastened with clamping springs: Changeable independently of final filter
- Units may be installed in multiple combinations: Removable side cover plate allows high flexibility
- Optional pressure drop indication equipment: For at-a-glance maintenance



NG
Design and Combinations

DESIGN

The NG filter duct housing is designed for the installation of Hepatex N or CR final filters with or without a pre-filter (Compatex FP). The housing is constructed using two epoxy powder coated welded frames, reinforced with four galvanised/powder-coated struts and fitted with removable galvanised or powder-coated cover plates with gaskets. Flanges on both sides are drilled according to DIN 24159.

The filters can be slid in sideways on two guide rails. The pre-filters are fastened by the means of clamping springs.

Clamping attachment for final filter consists of:
- Guide rails, galvanised/powder coated steel
- Centering rails, powder coated steel
- Threaded bars with nuts, cadmium plated steel/stainless steel AISI 304
- Surrounding sealing frame, with/without test groove, made of aluminium

Clamping attachment for pre-filter (optional) consists of:
- Centering and guide angle, stainless steel AISI 304
- 2 clamping and 2 press-on springs in stainless steel AISI 304
- Foam-rubber sealing, housing side

Unit supplied with optional pressure measuring connections for separate measurement of pre-filter and final filter.

For the separation of radioactive, toxic or pathogenic ultra-fine dust and for operation with differential pressure >1,000 Pa, NSC Housings should be used. They are specially designed for “safechange” of contaminated filters using the “barrier bag method”.

COMBINATIONS

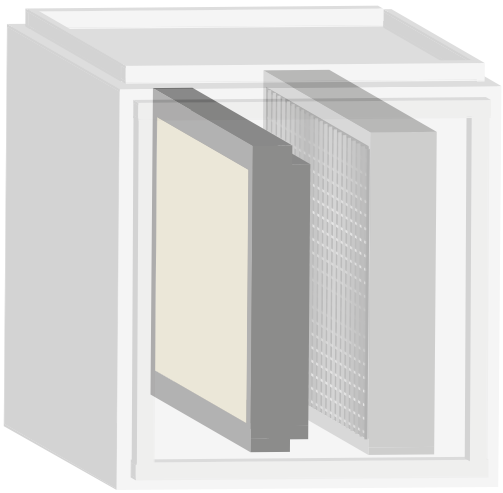
The single units can be easily combined to form larger units by removing the side cover-plate. We recommend the duct housing combinations to be assembled and sealed by us. For horizontal air flow a maximum of 2 units can be mounted side by side and a maximum of 3 units one above the other. For vertical air flow, any desired row length can be formed.

When combining units it has to be ensured that filter change is possible for each housing by side withdrawal. (Filters cannot be changed through the adjoining housing). For multiple stage filter installations NG housings may also be combined in series.

Available Types NG		
Size	Full ($^1/_1$)	Half ($^1/_2$)
Type	K	T
Filter Fastening	Yes	No
Fastening Material	Galvanised sheet steel parts with cadmium-plated bolts	Epoxy-coated sheet steel parts with stainless steel bolts

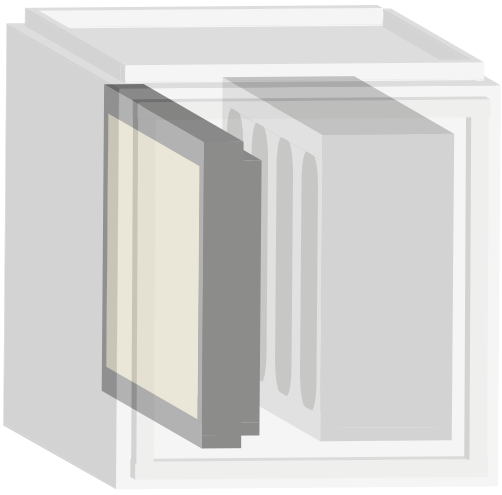
NG
Available Types

NG-K



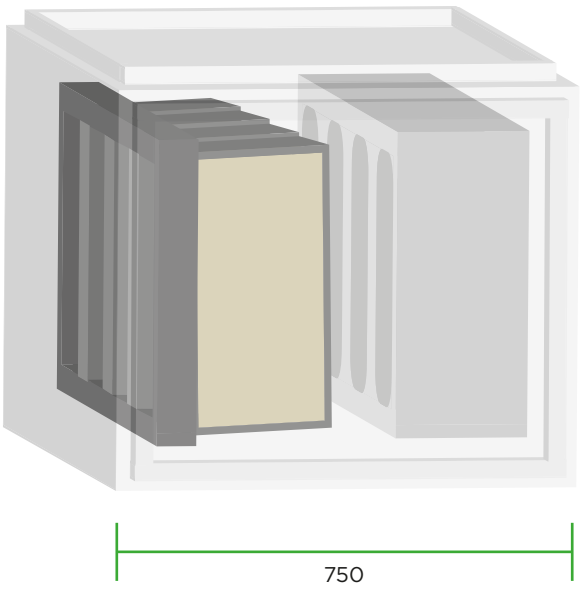
Micratex FP-P | Hepatex CR

NG-K



Micratex FP-P | Hepatex N

NG-T



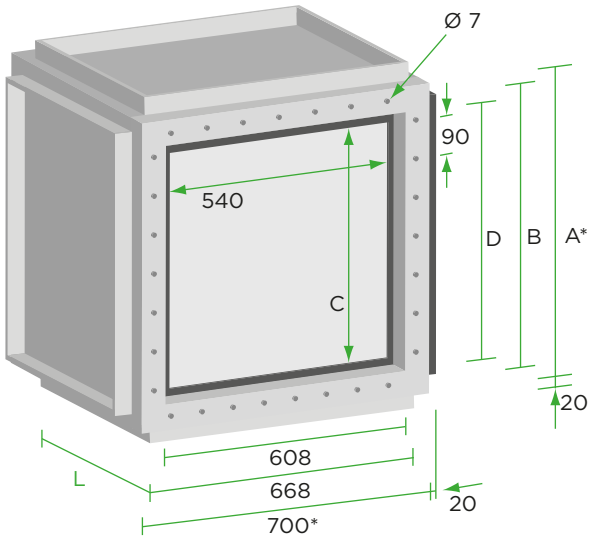
Compatex FP | Hepatex N

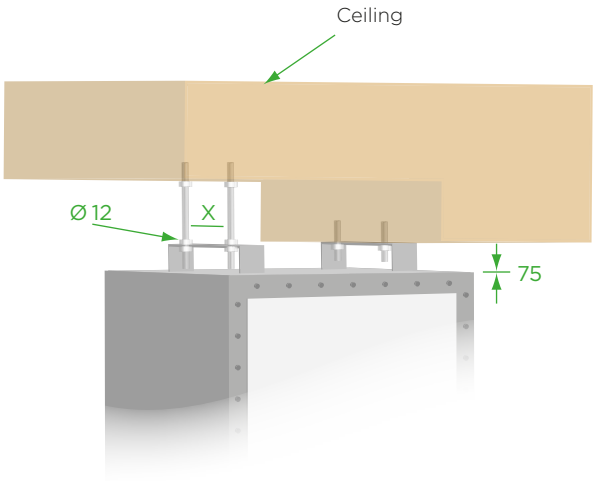
Filter Size	mm
NG “1/1”	610 x 610
NG “1/2”	305 x 610
Suitable Filters	**Qualities**
Hepatex CR	E11 – U17
Hepatex N	F7 – U15
Micratex FP-P	F6 – E12
Compatex FP *	F6 – H13
Carbotex AFP	AZ, AS, AA

* Compatex FP filters can be installed together with Hepatex N filters either in two NG-K-housings in series arrangement or in a NG-T-housing (additional fitting necessary).

Ceiling Mounted NG Housing

DIMENSIONS (mm)





Ceiling Mounted NG Housing

Type/Size	A	B	C	D	E	L	X	Weight**
NG-K-1/1	700	668	540	608	646	550	360	38 kg
NG-K-1/2	395	363	270	303	646/341	550	360	29 kg
NG-T-1/2	700	668	540	608	646	750	560	47 kg
NG-T-1/2	395	363	270	303	646/341	750	560	37 kg

*When combining several housings add 1 mm for the gasket
** Weight of the standard type without filter.

NG Installation

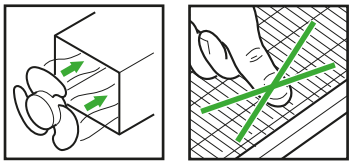
1. FITTING THE HOUSING

The NG housing can be used for horizontal as well as vertical air flows. The filters can be exchanged by removing the service cover-plate (quick fasteners with star knobs), in special cases also through the cover-plate on the opposite side (ordinary screws). The housing will be delivered with a service cover-plate, identified by a MANN+HUMMEL label and directional marker.

For the half-size housing the service cover-plate will have dimensions of 550 x 395 mm. The seal test groove and the pressure measuring connections (if existing) are located on the side of the service coverplate as well. When using the pressure measuring connections, pay attention to the removal of the protection caps and check the small tubes for blocking.

2. FITTING THE FILTER

Note – Prior to installing the filters, purge the complete ventilation system, including the empty NG Filter Duct Housing, for at least 24 h. **Caution – Do not touch the filter surfaces. Handle filters by the frame only.**



- Filters must be brought to the point of fitting in their original packaging and only removed from there, immediately prior to fitting.
- Visually inspect each filter for possible transport damage. Never fit a damaged filter but replace it by a new one.
- Clean the seal face of the NG Filter Duct Housing.
  Note – The main filter should be installed before the pre-filter. The main filter must be pushed in with its gasket side facing the frame with the aluminium test groove.
- Attach and tighten the rear clamps of the pre-filter before mounting the main filter.
- To install the main filter, first loosen the screws which are fastening the clamping profiles to a distance of the filter depth + 20mm from the test groove.
- Now slide the filter into the housing up to its stop. Check the gasket position relative to the test groove and adjust if necessary.
- Turn the nuts so as to compress the gasket 1 – 2 mm.
- Slide in the pre-filter (if present) into the rear spring clips. Make sure that the gasket will not be damaged during this process.
- Now attach and tighten the front clamps.
- Check the cover-plate gasket (replace if necessary) and fasten the cover, considering the directional marker affixed to it.
- For housings with test groove connections a seal test has now to be carried out.

3. REMOVING THE FILTER

- Remove the service cover-plate.
- Loosen and remove the visible clamps of the pre-filter. Grip the pre-filter on the corners of the gasket side and pull it out. Note – The ultra-filter can only be removed when the pre-filter is demounted. If the filter change is carried out vertically downward, the ultra-filter has to be safe-guarded by a support before loosening the nuts.
- Loosen the nuts of the 2 clamping profiles, bringing them to a distance of approx. 20 mm from the filter. Detach the filter from the test groove and pull it out.

4. MAINTENANCE

The interval between filter changes depends on the air flow rate and the concentration of airborne particles in the unfiltered air. This interval should be determined by periodic pressure drop measurements, at least 4 times per year.

The filters are intended for very long term use, often 2 to 4 years. The filter cleanliness is determined by measuring the pressure drop.

Filters should be changed when this has reached approx. twice the initial value or, for reasons of hygiene, after 5 years at the latest. Filters should only be changed when the ventilation plant is switched off.

5. DISPOSAL

- Defective, unused filters can be disposed of in the same way as normal industrial refuse in accordance with local regulations.
- Filters soiled by exterior air can be disposed of in the same way as normal industrial refuse in accordance with local regulations.

WARNING
Filters soiled by bacterial, toxic and/or radioactive matter must be disposed of as hazardous waste in accordance with local regulations.

NG Variations

ADDITIONAL EQUIPMENT – FACTORY INSTALLED

- Test groove
- Fastening device for pre-filter
  a) sheet steel parts galvanised, bolts cadmium plated.
  b) sheet steel parts epoxy coated, bolts stainless steel.
- Connection for measuring of pressure drop
  a) with pre-filter
  b) without pre-filter

ACCESSORIES

- 4 quick fasteners with star knob for servicing side
- Pair of counter-frames
  a) steel, powder coated
  b) stainless steel
- Floor or ceiling mounting rails
- U-tube manometer, range 0 – 1,000 Pa
- Seal test instrument

SPECIAL CONSTRUCTIONS

- NG-housings combined to larger units to customers requirements, factory assembled and sealed.
- NG-housings completely manufactured in stainless steel.

NSC Safe Change Housings Contamination-Free and Gas Tight Filter Change

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

NSC Safe Change Housings are gas tight, rigid casings for HEPA and activated carbon filters. They allow the contamination-free replacement of the filter using a change bag.

NSC Safe Change Housings are designed to be installed wherever high levels of filtration and safety are required, protecting the operator and the plant room environment from contamination during the filter change process. They are ideally suited for the extraction of radioactive, toxic or pathogenic dust particles and gases from ventilation systems, such as those found in:

- Nuclear installations
- Pharmaceutical and biotechnical facilities
- Hospital installations in nuclear medicine
- Radioactive isotope laboratories
- Epidemic and isolation units

KEY FACTS

- Rigid, gas tight, shock and vibration resistant: Robust and strong construction
- Operating pressure guaranteed to ± 8,000 Pa: Suitable for even the most demanding of environments
- Functional design, user-friendly operation: Simplifies installation and maintenance
- Self-adjusting filter sealing mechanism: To ensure an even and consistent sealing pressure
- Practical, versatile modular system: Customisable for seamless integration
- Comprehensive range, with various accessories: Flexible to meet the demands of a wide range of applications

NSC Safe Change Housings

DESIGN

NSC Safe Change Housings are manufactured from steel plate of 2 mm minimum thickness. The individual weld seams – and the whole housing unit if requested – are works-tested for gas tightness. The built-in test groove is a standard feature but a model with a smooth sealing face can also be supplied.

Filters slide into the housing from the side and are pressed against the sealing face with an easy to operate cam system. In order to ensure an equally distributed, consistent sealing pressure, the eccentric shafts of the final filter stage are mounted on a self-adjusting spring system. The filter insertion aperture has a steel collar with two circumferential grooves into which rubber gaskets engage to hold the change bag tightly against the housing. The housing is sealed by a removable door which also accommodates the rolled change bag. This cover is fitted with a handle and circumferential seal and is sealed to the housing by four, easy to operate star grip handles on swivelling screws.

For safety reasons the door can only be locked into place when the filter has been secured in position. All housing models are supplied with a pressure drop measuring connection before and after each filter stage (Serto joint).

MATERIALS/SURFACES

NSC Safe Change Housing and KS Ducts Connections can be supplied in:

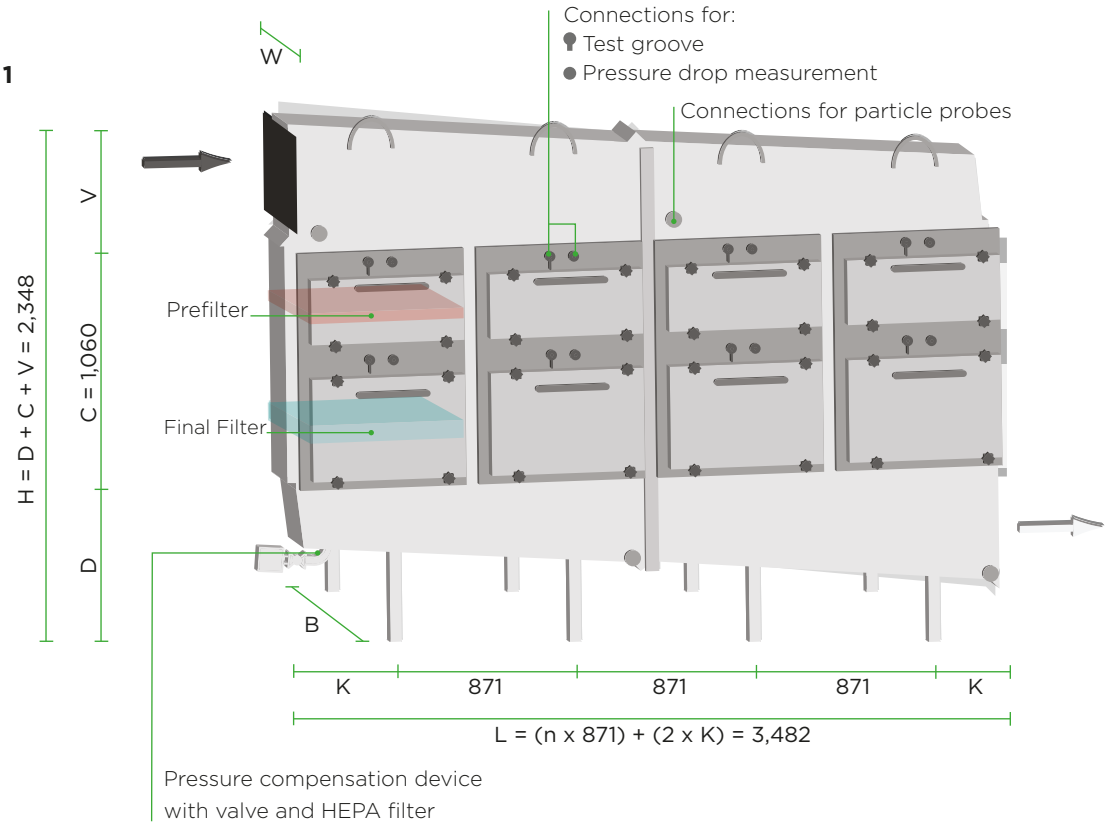
- Mild steel (Bl St 1203) with a high quality, acid-resistant and easily cleanable epoxy resin coating with a minimum thickness of 50 µm, colour white (RAL 9010) or
- Stainless steel (AISI 304 and DIN material no. 1.4301, respectively).

With the stainless steel version there is no risk of damage to the surface protection during transport or installation. Depending on the model selected, the cam bar mechanism is made of:

- Steel, galvanised-passivated (lacquered housings) or
- Steel, stainless, DIN material no. 1.4301 (stainless steel housings)

The seals for the doors are made from EPDM, heat resistant up to 120 °C, continuous operation. The seals for housing combinations are of Neoprene, heat-resistant up to 120 °C, continuous operation. The change bags are of synthetic film, heat-resistant to 70 °C, continuous operation.

FIGURE 1



NSC Safe Change Housings Combination Options

The NSC range is made up of modules which can be combined in a number of ways (see example, figure 1) to give either cost or space efficient solutions. All housing units are supplied with drilled flanges. Housings of the same cross section may therefore be vertically combined at will to create several filter stages. For large air volumes it is possible to link up to 8 rows of housing units in parallel to form a single filter bank.

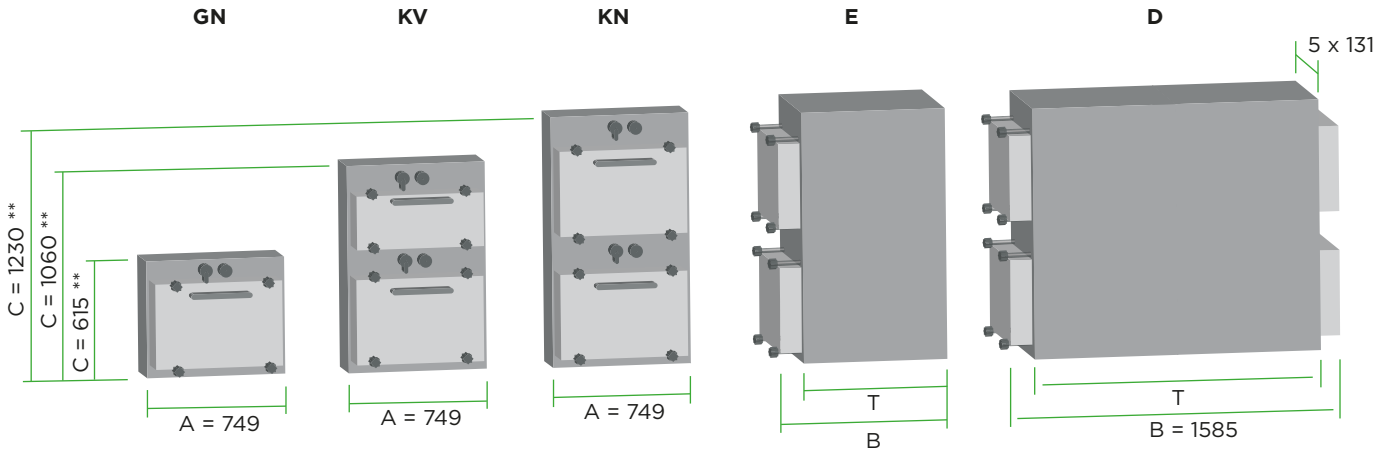
The basic housings (NSC...-GN) and the combined housings (NSC...-KV/N) can be supplied to take any of the three filter widths. The basic housing takes one 292 mm high filter. The combined housings contain a prefilter and a final filter section. The NSC..-KV model is used for prefilters of between 50 and 100 mm in height and the NSC-KN for those of 292 mm (see figures 1 and 2). The twin housing (NSC-D...) is only available for the standard filter width of 610 mm but can be supplied as basic (NSC-D...-GN) or as combined housings (NSC-D...-KV/N), allowing filter access from both sides (see figures 1 and 2).

Models/Dimensions/Weights

Housing Type		NSC-E.*-305-			NSC-E*-610-			NSC-E*-762-			NSC-E*-610-		
		GN	KV	KN	GN	KV	KN	GN	KV	KN	GN	KV	KN
Filter Size [0)]	mm	305 x 610			610 x 610			762 x 610			610 x 610 (2 units)		
Filter height[0)]	mm	292	75+292	292+292	292	75+292	292+292	292	75+292	292+292	292	75 + 292	292+292
Filter Types [0)]	-	N	CR + N	N + N	N	CR + N	N + N	N	CR + N	N + N	N	CR + N	N + N
Withdrawal		Single-Sided			Single-Sided			Single-Sided			Double-Sided		
Weight	kg	46	75	82	55	92	100	60	100	110	100	166	175
Dimension B	mm	515			820			970			1,585		
Dimension T	mm	3 x 117 = 351			5 x 131 = 655			6 x 134.5 = 807			10 x 131 = 1,310		

0) Available filter types | * Place for housing material, see 'Order Code', page 5.

FIGURE 2

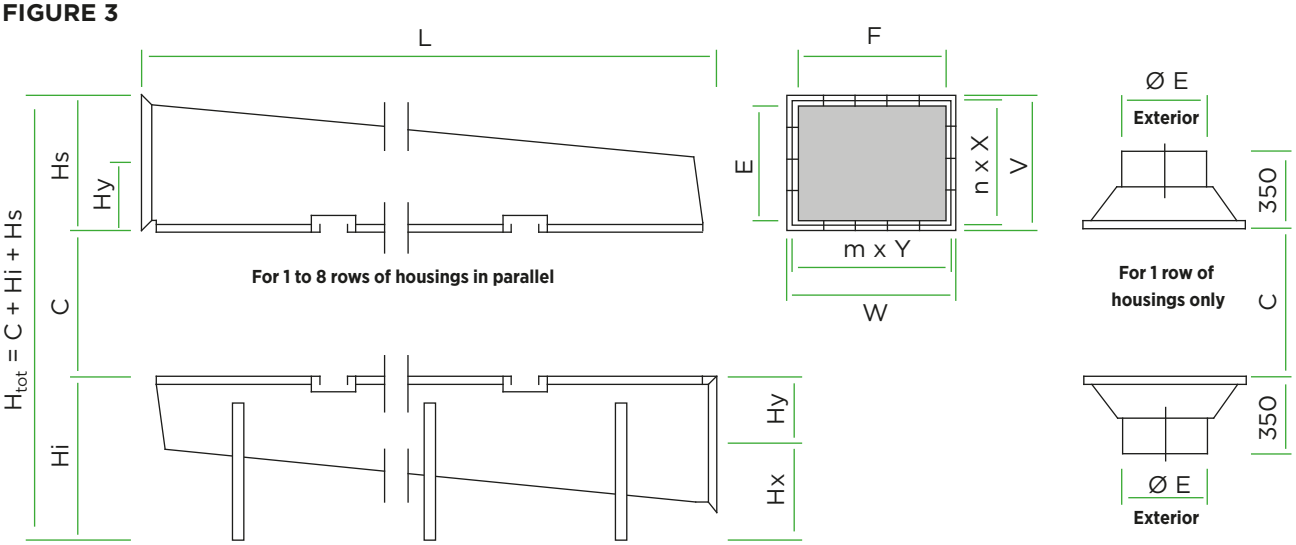


** Without dimension of gasket (+ approx. 2 mm)

Type KS-	Filter Size	No. Rows	E	F	Hx	Hy	Hi	Hs	L	V	n x X	W	m x Y	Weight
E.-305-	305 x 610	Ø	248	–	–	–	–	–	–	–	–	–	–	22
		1	105	316	548.5	151.5	700	291.5	869	280	2 x 122	402	4 x 122	46
E.-610-	610 x 610	Ø	353	–	–	–	–	–	–	–	–	–	–	28
		1	195	621	548.5	151.5	700	291.5	869	280	2 x 122	706	5 x 134	60
		2	353		469.5	230.5		449.5	1,740	438	3 x 134			116
		3	487		402.5	297.5		583.5	2,611	572	4 x 134			180
		4							3,482					256
		5	621		435.5	364.5	800	717.5	4,353	706	5 x 134			340
		6	755		518.5	431.5	950	851.5	5,224	840	6 x 134			423
		7	889		601.5	498.5	1,100	985.5	6,095	974	7 x 134			531
		8							6,966					623
E.-3762-	762 x 610	Ø	398	–	–	–	–	–	–	–	–	–	–	32
		1	195	773	548.5	151.5	700	291.5	869	280	2 x 122	858	6 x 137	67
		2	353		469.5	230.5		449.5	1,740	438	3 x 134			129
		3	487		402.5	297.5		583.5	2,611	572	4 x 134			200
		4							3,482					283
		5	621		435.5	364.5	800	717.5	4,353	706	5 x 134			373
		6	755		518.5	431.5	950	851.5	5,224	840	6 x 134			462
		7	889		601.5	498.5	1,100	985.5	6,095	974	7 x 134			580
		8							6,966					676
D.-610-	610 x 610 (2 units)	2	353	1,276	469.5	230.5	700	449.5	1,740	438	3 x 134	1,361	10 x 132.5	173
		3	487		402.5	297.5		583.5	2,611	572	4 x 134			262
		4							3,482					375
		5	621		435.5	364.5	800	717.5	4,353	706	5 x 134			483
		6	755		518.5	431.5	950	851.5	5,224	840	6 x 134			591
		7	889		601.5	498.5	1,100	985.5	6,095	974	7 x 134			737
		8							6,966					852

All dimensions in mm | All weights refer to a pair of duct connections | Ø represents a circular duct connection with one row

FIGURE 3



NSC Safe Change Housings Filter Change and Order Code

FILTER CHANGE

Toxic or radioactive dust particles are a potential source of danger for service staff in a conventional filter change. The usability of the room in which the housing is situated can also be put in question as a result of housing leakage. The NSC safe change housing is therefore ideal, facilitating the contamination-free replacement of filters with the safe “bag-in bag-out method”.

NSC housings are fitted with a collar to which the change bag is sealed using rubber rings. Once the filter cam bar mechanism has been released the dirty filter is withdrawn into the change bag and out of the housing.

Using the pressure compensation device (see “Accessories”) will significantly facilitate this and reduce the contamination risk. The service bag is then double welded between the housing and the filter and cut between the two seams, so the dirty filter can then be removed and disposed of without risk.

A fresh change bag is then fitted over the new filter and fixed to the housing collar. The rest of the dirty bag on the housing is then drawn into the end of the new bag behind the filter cell, the bag is double welded, cut between the seams and the contaminated bag and ring are removed, sealed within the end of the new bag.

The sealed remains of the new bag is rolled up into position, the housing cover locked into place, the pressure compensation device is closed and the system is ready for operation again.

ORDER CODE AND EXAMPLE

NSC	–	ER	–	610	–	KV

Housing or duct connection type
NSC: Safe change housing
KS: Duct connection

Filter withdrawal
E: Single-sided (1 service side)
D: Double-sided (2 service sides)

Casing material
L: Mild steel, epoxy resin coated
R: Stainless steel

Filter size
...: 1st digit of the filter’s cross section 305 x 610, 610 x 610 or 762 x 610 mm

Type of housing
G: Basic housing (1 Filter)
K: Combined housings (2 filters in Serie)

Overall filter height(s)
N: 292 mm (Filter type[s] N)
V: 50–100 mm (filter type CR aspre-filter) + 292 mm (filter type N as final-filter)

KS	–	DL	–	610	–	5

Number of rows (= filter in parallel)
1–8: Rectangular connection
Ø: Round connection

NSC Safe Change Housings Accessories

ACCESSORIES

- Gas tight welded KS duct connections, round or rectangular
- Probes for aerosol injection and particle measurement, with gas tight valve
- Pressure compensation and purge device, with gas tight valve and cylindrical JG HEPA filter
- Change bags with two matching rings, for all filter sizes
- Pre-filters and final filters, types Hepatex CR and N
- Activated carbon filters, type N-A
- Housing versions for temperatures of up to 200 °C, however only without change bag
- Factory assembly of housing units (NSC) and duct connections (KS) to form complete systems (see figure 1)
- Final factory tightness test of assembled systems
- Shock resistant version

Unipak
Air Filter Containment Systems

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

Unipak is a safe-change containment system developed for the installation of high efficiency (HEPA) air filters in air intake and extract applications. Particularly suited for extract systems handling contaminated air, Unipak helps to protect maintenance staff and the surrounding environment for contamination when the filters are changed.

The Unipak system is a modular design based on standard pre-filter and final filter housings. They are available as canisters for installation in ductwork systems, or as containment systems manufactured by linking a number of housings together with inlet and outlet headers. Systems can be designed to customers specifications or supplied as individual housings for installation in a customers existing system if required.

Unipak systems have been proven to meet stringent requirements on the quality of air being supplied to, or extracted from, process areas in environmentally critical applications over many years. These include nuclear power generation, nuclear fuel re-processing, biotechnology and pharmaceutical manufacturing.

KEY FACTS

- Modular design allows flexible system configuration and air flow capacity
- Integrated filter sealing faces to ensure high degree of flatness
- All units pressure or vacuum tested upon request
- All connecting flanges pre-drilled ready for installation into ductwork systems
- Unique cam locking mechanism prevents access door(s) from being closed unless the filters are sealed
- Twin stainless steel cam bars accurately position filters and provide even gasket compression
- Circular containment systems available for use with circular absolute filters

Unipak

UNIPAK HOUSING

The Unipak Safe-Change Containment System is based upon a modular design consisting of pre and final filter housings. Individual housings are manufactured from 2 mm carbon steel with a durable paint finish suitable for decontamination. Alternatively, housings can be manufactured from self-finish Austenitic Stainless Steel.

Unipak housings are all welded constructions and fabricated using CNC equipment. All filter sealing faces are formed as an integral part of the housing to provide a high degree of flatness. The filters are locked in position by two stainless steel cam bars, to accurately locate the filter in the housing and provide an even leak-free compression of the sealing gasket. The cam bar mechanism incorporates a positive locking mechanism to prevent the access door from being closed unless the filter is correctly positioned and sealed.

All Unipak housings are fitted with tapping points on both the inlet and outlet for testing the differential pressure across the filter. Unipak pre-filter and final filter housings are capable of handling air volumes up to 4000 m^3/h, depending on the filter selected.

All Unipak housings are manufactured with a welded spigot for the attachment of safe-change bags as standard. This allows the filters to be changed without risking the contamination of maintenance staff or the surrounding external environment.

UNIPAK CANISTER HOUSINGS

Unipak canister assemblies consist of a pre and/or final filter housing, along with transformation sections on the air inlet and outlet. The transformation sections are fitted with pre-drilled flanges, ready for connection into circular ductwork systems.

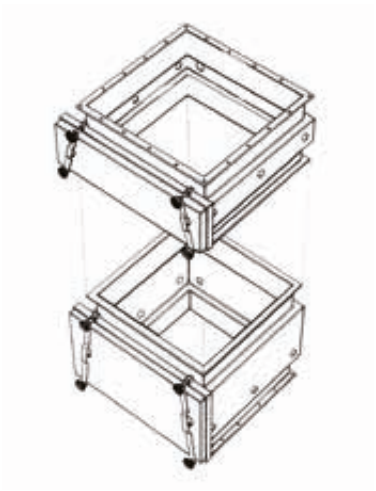
To allow the filters to be changed while the system is in operation, cell isolating dampers can be fitted either side of the filter housings. Alternatively, circular dampers can be fitted between the inlet/outlet transformation sections and the ductwork, to isolate a canister containment housing from the rest of the system.

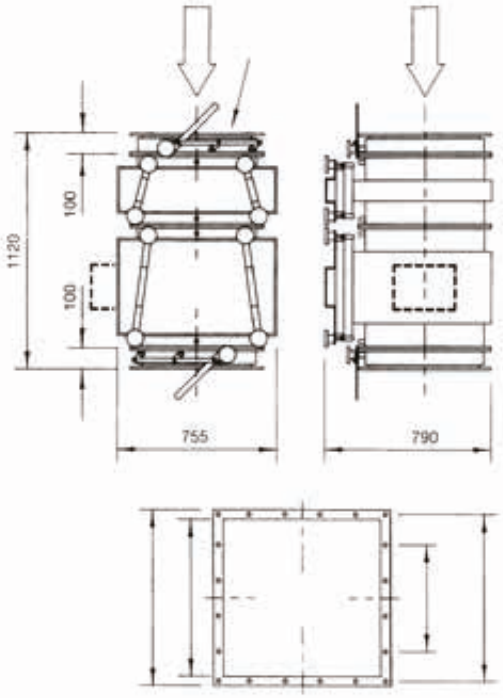
PROBLEM SOLVING DESIGNS

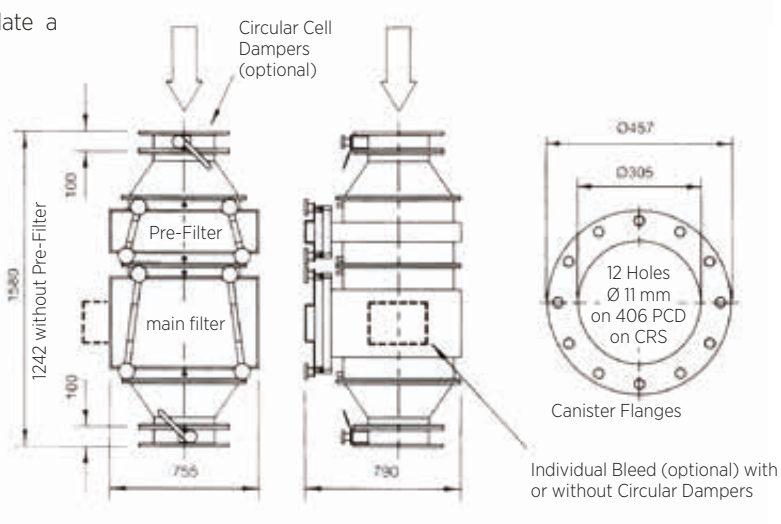
Due to the modular flexibility of the Unipak system and the considerable experience we possess in the design of critical air handling installations, the Unipak system can be adapted to meet a wide range of application requirements.

Typical of this problem solving capability is a space saving installation designed specifically to meet the requirements of the nuclear industry.

DIMENSIONS (mm)



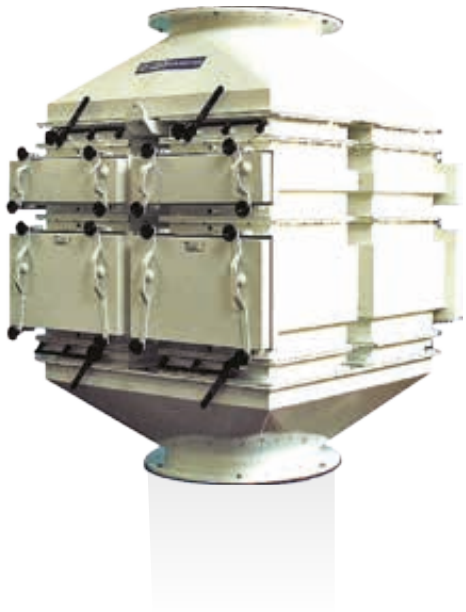




Unipak Containment Systems

Unipak Containment Systems are modular assemblies consisting of a combination of pre and final filter housings, connected top and bottom with a common header. The air flow capacity of a Unipak system is determined by the number of filter sections which make up a complete assembly. Normally each system consists of between one to six sections, though larger systems can be supplied. Where higher air flow capacities are required, two or more Unipak systems of the required number of sections can be installed in parallel. All header flanges are pre-drilled, ready for connection into rectangular ductwork systems.

Each section consists of a pre-filter and final filter housing in series, however systems can be supplied with or without pre-filter housings, or with two or more final filter housings. When multiple final filter housings are fitted, this is usually to accommodate either higher grade filters or activated carbon filters. To allow the filters to be changed while the system is in operation, system dampers can be installed across the air inlet and outlet ducts to isolate a Unipak system. Alternatively, individual cell isolating dampers can be fitted to isolate each filter housing.



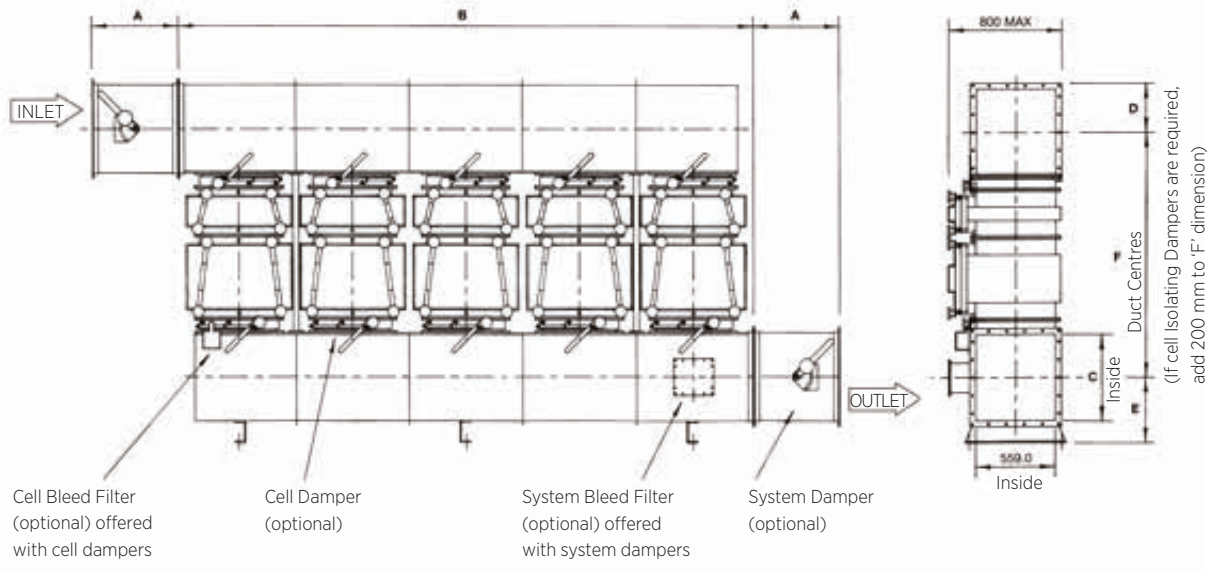
SYSTEM SELECTION

The following parameters should be considered when selecting a Unipak system:

- Filter housing design and type of system, including the number of sections necessary to handle the required air volume
- Required arrangement of pre and final filter housings
- Required position of the air inlet and outlet flanges as viewed from the filter change side
- Air flow direction through the system
- Requirement of seal test frames for the final filter housings
- Type and position of dampers and bleed filters
- Material of manufacture
- Required type of filters and filtration efficiency
- Desired nominal system pressure drop
- Overall dimensions of the system(s), allowing adequate space for the replacement of the filters
- Other optional extras required

Unipak
Technical Data

DIMENSIONS (mm)



No. Sections Long*	A System Damper (optional)	B	C	D	E	F Final Filter Housing only	F Pre & Final Filter Housings	F Pre & 2 Final Filter Housings	Weight (Kg) Pre & Final Filter Housings with ducts**
						Add 200 mm if Isolation Dampers fitted			
1	406	857	267	176	288	853	1,192	1,772	206
2	406	1,664	267	176	288	853	1,192	1,772	350
3	406	2,470	381	233	345	967	1,306	1,886	509
4	610	3,277	495	290	402	1,081	1,420	2,000	686
5	610	4,083	610	347	460	1,196	1,535	2,115	892
6	610	4,890	610	347	460	1,196	1,535	2,115	940

* Unipak Systems are based on a modular design, alternative configurations available upon request.
** All weights include filters and dampers. All dimensions approximate (mm)

PERFORMANCE

Volume Flow Rate

Each Unipak housing can handle up to 1,700 m^3/h when fitted with standard capacity HEPA filters or up to 4,000 m^3/h with high capacity filters. Unipak systems are normally manufactured with up to six sections, suitable for flow rates of up to 10,200 m^3/h or 20400 m^3/h depending on the filters selected. Higher capacity systems can be supplied upon request.

System Pressure Drop

Typical initial differential pressure drops for Unipak Systems one to six sections in size including filters:

System Arrangement	Differential Pressure Drop	
	Standard Filters 1,700 m^3/h	High Capacity Filters 3,400 m^3/h
Final Filter Housing Only	270	370
Pre and Final Filter Housings	320	440
Pre and Double Final Filter Housings	On Application	On Application

ScandSafe
Airing filter

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

ScandSafe airing filters provide efficient filtration of the inlet air to water reservoirs and similar applications.

With HEPA grade efficiency (H13 to EN 1822), ScandSafe removes all pollens, spores, combustion byproducts, etc, to provide a cost effect solution for keeping the water surface clean.

Installed in place of the air pipe, ScandSafe can be equipped with a locking device for protection against unauthorised access.

ScandSafe fulfils the demands of Swedish Standard SS-EN 1508 and is tested by the SP Swedish National Testing and Research Institute (report no ETv P3 02296).

KEY FACTS

- Airing filter for wter reservoirs, food containers, silos etc
- Air filter especially designed for humid environments
- High efficiency H13 HEPA filter

ScandSafe

THE PROBLEM

When the water level in the reservoir sinks, outside air is sucked into the tank and with it air pollutants. These pollutants soon cover the water surface and the inside walls of the reservoir. From a hygienic point of view, this layer of impurities is undesirable since it can spread through the water pipes to the users. The outdoor air holds many contaminants such as:

- Combustion products from car engines and incineration plants
- Heavy metals, lead, pollen, spores, fungus, etc.

Furthermore, resent terror events world-wide has created an awareness of the risks for sabotage in connection with easily accessible water reservoirs. In Switzerland, there has been a law since 1975 stating that all water reservoirs must be equipped with an airing protection system.

THE SOLUTION

To prevent contamination from entering the reservoir, an air filter housing complete with air filter is installed on the airing pipe. The microfilter is classified H13 according to the EN 1822 standard which means it filtrates 99.99% of all particles sized 0.3 µm or bigger. Using this type of filter ensures that most occurring types of contamination are filtrated. See Ultrafilter.

THE CLOSED AIRING SYSTEM

In order to achieve perfect function a closed airing system must be created, i.e. all air must pass through the filter. All other air valves must be closed and the air must only enter the reservoir through the microfilter in ScandSafe. As a precaution against possible filter clogging, ScandSafe WR-180 is equipped with two automatic, resetable vacuum valves. The valves open at 1,000 Pascal and automatically shut when the pressure decreases. This function makes it a maintenance free security system and guarantees that air passes through the filter when it is needed.

DIMENSIONING OF THE AIRING SYSTEM

The volume of the passing air defines the size of filter and filter housing. The maximum drawing off/refilling of water per unit of time = airflow. 1 litre of water ≈ 1 litre of air.

ULTRAFILTER

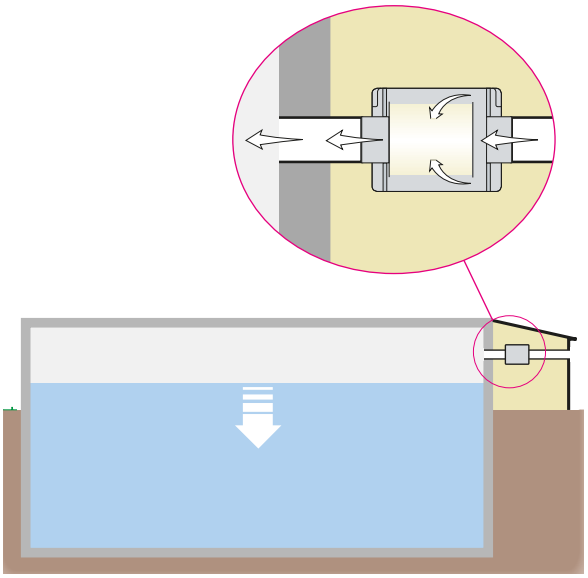
The microfilters used in the airing system are made of moisture-repellent material. The filters have a large surface area that combines with the low airflow to ensure a long lifetime. The normal lifetime of these filters, based upon experience and tests, is 3-4 years, but normally the filters are changed every second year.

Additionally, this type of filter in grade H13 is frequently used as protection against radioactive contamination, chemical and biological substances at civil defence and military establishments.

ScandSafe Functional Design

JKG-W

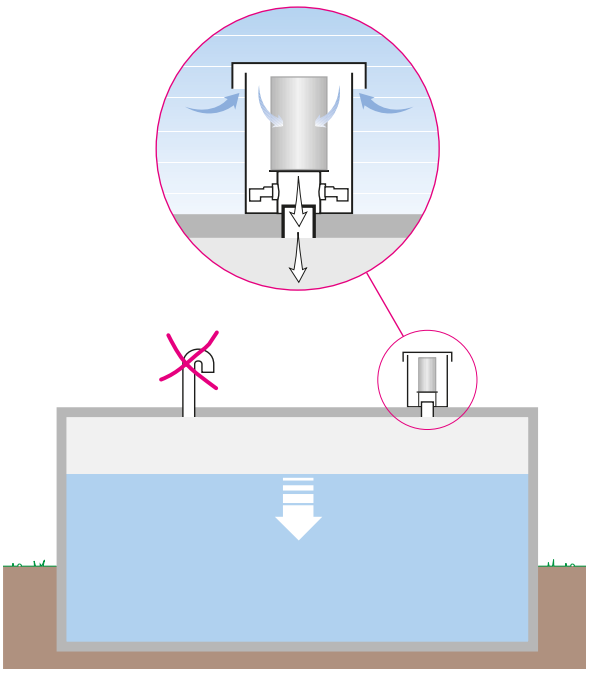
JKG-series is designed for indoor installations, horizontal on wall or in the ceiling. JKG-W-series is manufactured in welded PVC.



Functional design for JKG airing filter

SCANDSAFE WR

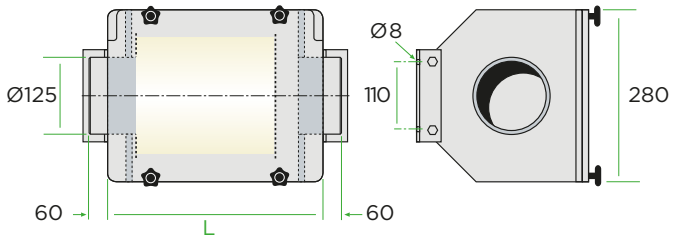
WR-series is designed for installations outdoors, on the reservoir roof and as replacement for the standard air intake pipe. WR-series is manufactured in acid proof stainless steel, AISI 316.



Functional design for ScandSafe WR airing filter

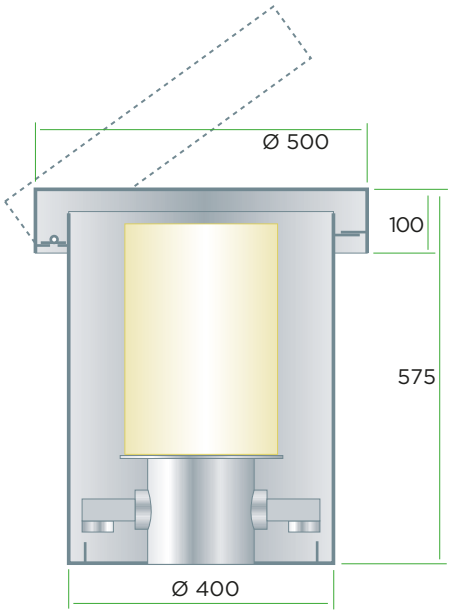
ScandSafe
Technical Data

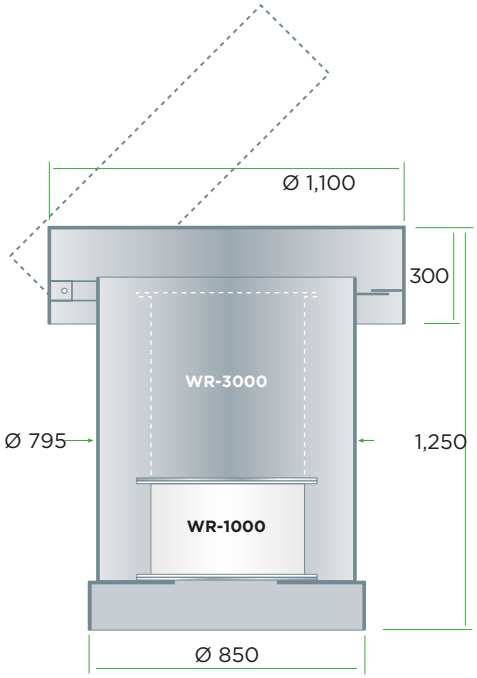
JKG-W



Type	JKG-W 19/20	JKG-W 19/30	JKG-W 19/40
Max. Air Flow (m³/h)	90	120	180
Transition (Ø mm)	125	125	125
L (mm)	291	391	491
Weight (kg)	6	8	10

SCANDSAFE WR





Type	WR-180
Max. Air Flow (m³/h)	180
Transition (Ø mm)	100-160
Weight (kg)	28

Type	WR-1000	WR-3000
Max. Air Flow (m³/h)	1,000	3,000
Transition (Ø mm)	max. 700	max. 700
Weight (kg)	135	150

In case of bigger air flows/treservoirs, please contact MANN+HUMMEL for tailor-made solutions.

DemiGuard
For Effective Removal of CO_2

CLEAN AIR

POWER GENERATION

CLEAN ROOM

INDUSTRIAL

DemiGuard is ideal for use wherever CO_2 must be removed from the air. This may be in industrial installations (e.g. water treatment) or in closed environments, where a certain CO_2 concentration may not be exceeded.

DemiGuard consists of two stages: a floating particle filter section and a CO_2 absorbing section. First, the air flows through the floating particle filter section, which incorporates a HEPA filter (H13 to EN 1822) to remove up to 99.95% of particles of 0.3 µm. After this stage, all the substances which could potentially damage the absorbent material have been filtered out, and the air passes through the absorbent to remove the CO_2.

The stainless steel cylinder is secured with a lead seal to prevent unauthorised opening.

KEY FACTS

- Particle Filtration and CO_2 absorption in one unit: To protect the CO_2 adsorbent from harmful substances
- Large filter surface: For a long service life
- Compact and robust construction: For assured performance and resistance from damage
- Simple to service: Low maintenance costs
- Integrated HEPA filter tested according to EN 1822: Forhigh levels of air cleanliness
- Integral filter change indicator: Simplifies maintenance
- Glass fibre paper medium: Guaranteed leak-free
- Stainless steel casing with lead seal: To prohibit unauthorised opening

DemiGuard
Floating Particle Filter

FLOATING PARTICLE FILTER

Due to the pleat formation of the glass fibre paper media, the floating particle filter features an exceptionally large filter surface; providing a high dust holding capacity and a long service life.

The retention efficiency for floating particles amounts to more than 99.95 % according to EN1822. Each element is verified to be leak-free prior to shipment, in addition to being tested according to EN 1822. By simply removing the casing cover, the floating particle filter elements can be extracted, and for even easier replacement, they are fixed by a combination of seal, locking sleeve and wedge.

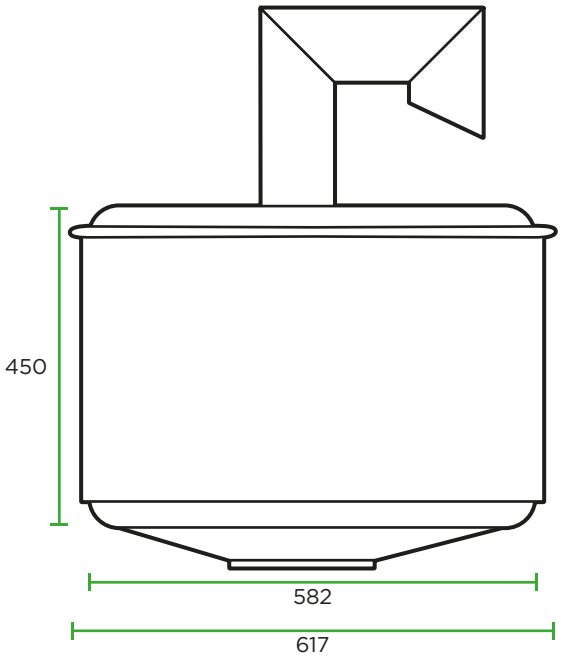
CO_2-FILTER

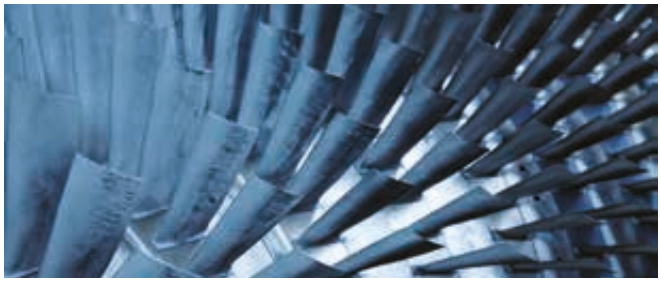
The CO_2 filter section consists of a high-grade absorbent material, specifically selected for it's performance, which provides high efficiency and a long working life. With a built-in-indicator, it is easy to determine the degree of exhaustion of the filter: the colour of the filter changes from it's original grey to a blue violet.

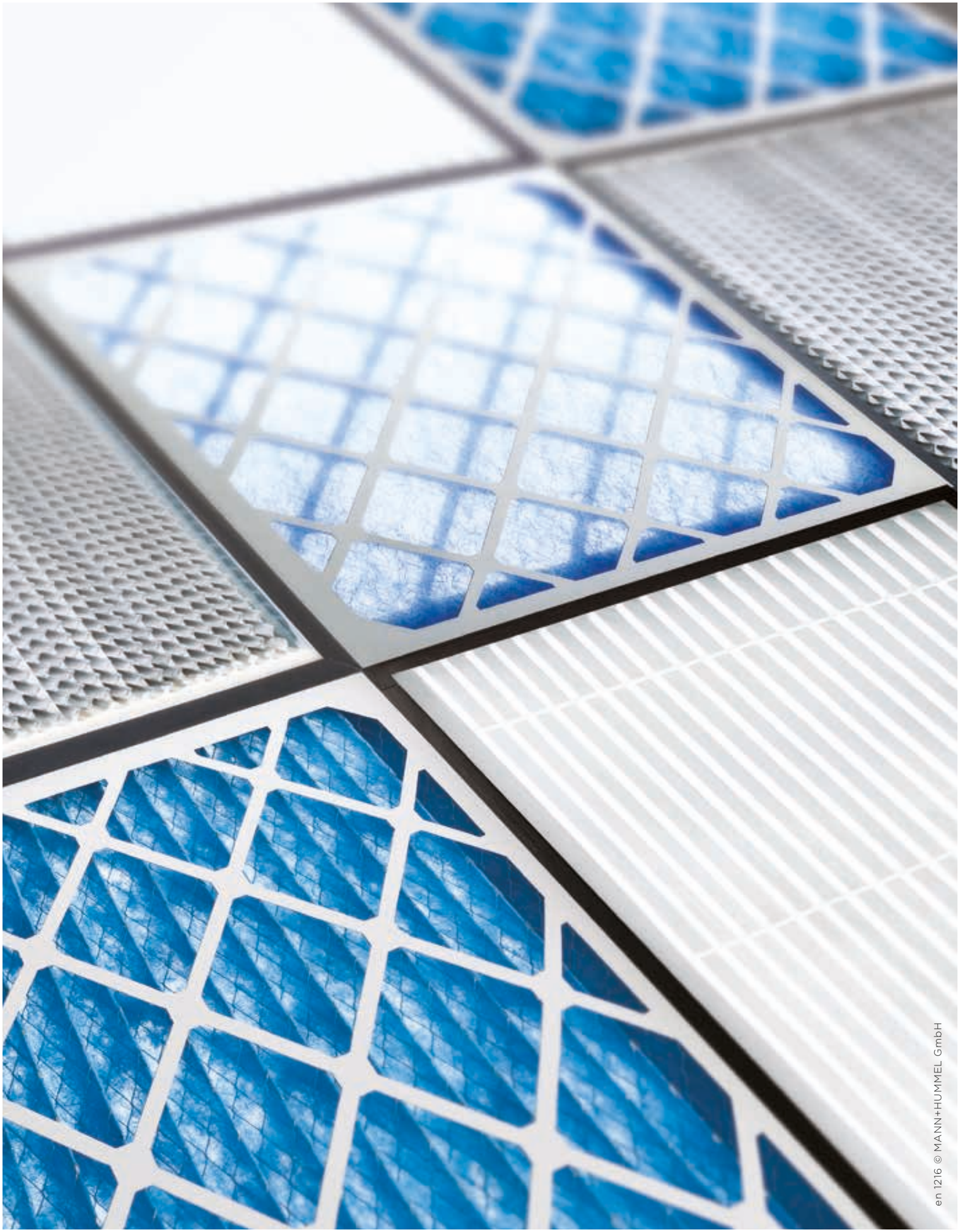
FILTER CONNECTION

An air inlet connection is provided on top of the casing cover with an air outlet connection located at the bottom. To ensure secure connection of the pipes, optional connecting pieces can be supplied.

DIMENSIONS (mm)







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