

➤ Clean air through experience



## More than just clean air

HS-Luftfilterbau GmbH is one of the leading manufacturers in the field of air filtration.

Being a medium-sized company we offer standard filtration, as well as customized product that are geared to fit individual needs. Our customers benefit from 40 years of experience – we guarantee clean air through effectively working filters and exceptional service.

These objectives we achieve by acting onto your individual needs – every day and around the world. Knowledge, experience, and tradition allow us to find the most fitting product portfolio for any customer.

We are sure to use the most current fabrication methods, IT-technologies, and quality management. For the production of highquality filter media from environmental friendly substances, you can count on our highly trained team. They are qualified to operate any of our modern fabrication devices such as robots, pleating machines, and scanning devices.

Foresight is our basis for future business activities. This also means that we are aware of our responsibility towards environment, society, customers, and employees.



Certified acc. to ISO 9001, ISO 14001, GOST  
and KTA-standard 1401

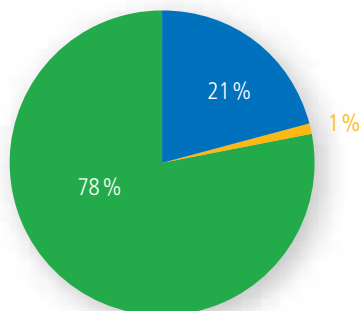
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### Atmospheric Air

Air is a mixture of various gases: Regular atmospheric air contains 21 percent oxygen, 78 percent nitrogen, one percent argon, 0.03 percent carbon dioxide, as well as small amounts of other gases such as hydrogen, neon, krypton, helium, ozone, xenon and varying amounts of steam.



- 78 % nitrogen
- 21 % oxygen
- 1 % diverse gases and particles

Air is essential for the survival of mankind. Only slight changes in its combination will make it useless for humans and animals. While being exposed to atmospheric pressure, the intake of air containing less than 12 percent oxygen as well as more than five percent carbon dioxide is dangerous to living beings. Over a longer period of time, changes in the mixture of air might have a profound impact on health.

Humans use up about 30 liters of oxygen per hour. Hence, our need for air is likewise small: 150 liter/h or 0.15 m<sup>3</sup>/h. However, because we also produce carbon dioxide our body requires about 5 m<sup>3</sup>/h of fresh air in order to keep the amount of carbon dioxide below a life-threatening level.

When installing an air conditioning (AC) system it is sufficient to determine the amount of air needed. It will usually be set at 15 - 20 m<sup>3</sup> per person and hour. However, larger volumes of air might be necessary for managing warmth and cold or draw off polluted air.

### Atmospheric Dust

Air also contains a lot of particles set free by processes such as erosion through wind, evaporation, earthquakes, automotive and industrial exhaustions, or other procedures of shaping and producing materials. Therefore, atmospheric dust is a combination of fog, smoke, small

particles of grain, and fiber. An analysis of air usually shows traces of soot, quartz, clay, fragments of metal, weathered parts of plants and animals, as well as other organic material from cotton- and plant-fiber. Air further holds organisms like sprouts, spores, and pollen. Those particles, which are to be found floating in air and gas, are called „aerosols“. Even though air always contains these small amounts of impurities, they are of decisive significance for our environment. They influence the absorption of ultraviolet light, the forming of clouds and the development of statics in the atmosphere. Living beings as well as materials – such as buildings – suffer most from invisible effects of atmospheric pollution. In order to reduce or avoid damages, particles of various sizes have to be filtered out of the air.

### Importance of Eliminating Dust

Keeping the air clean of dust and aerosols is not only important for maintaining buildings and their interior, it also guarantees healthy inhabitants and their well being.

Obviously, keeping air clean also means reducing pollution. Unfortunately, there is no overall data on the reduction of maintenance costs after installing air filters in buildings.

Particles made up of fine smoke cause the most damage – their extraction involves the use of high-efficient air filter systems.

Heat exchanger, airshafts, and false ceilings are known to collect a lot of dust. The costs of cleaning the latter are high, but being left to themselves they are a fire hazard. Also, not cleaning the ventilation pipes might lead to diseases such as the „Sick-Building-Syndrome“. Removing a false ceiling after years of use often reveals an alarming condition – particularly when the AC was simply equipped with coarse dust filter. Fibers can also stick to heat exchanger. This may lower their effectiveness as well as raise the costs for maintenance and energy.

Particles of gravel in the air also cause wear on buildings and machines. Most people are not comfortable with the sight of layers of dust or grime on their desks. Fibers stick to things very easily and make a regular dusting necessary, if the office is not protected by an effective air conditioning systems. But a high amount of dust in the air has even more serious effects: As mentioned earlier it might trigger

## Necessity of Air Filtration

the "Sick-Building-Syndrome". The symptoms of this disease are headaches, leaking eyes, and tiredness. The "Sick-Building-Syndrome" is often caused by not changing the filter as often as required. Meaning, the filter might not have reached their recommended final pressure difference yet, but are clogged with germs and dust. That way, the micro-organisms in the filter can multiply and are released into the air stream. Therefore, it is important to choose a shorter period of time between replacing the filter. Filter with anti-bacterial effect should not be used due to their high amount of bactericides, fungicides etc.; off-gassing may than cause allergies as well.

Germs may also be found in the air. Generally, they are transferred by fibers and other particles. People suffering from hay fever know what kind of effects they have on the respiratory system. Animal fibers can also cause an allergic reaction. Smoke may aggravate one's airways. Tobacco smoke also holds smallest particles that may anger non-smoker. They can only be removed with high-quality fine dust filter.

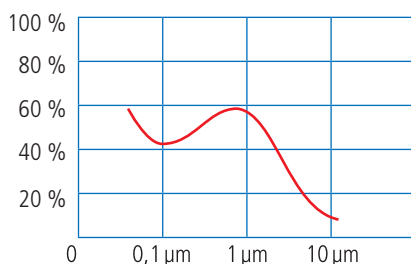
Diesel exhaust particles are continuing to be a major problem in cities. Newest diesel engines produce the most harmful particles, which may cling to pollen and hence may also cause an allergic reaction. On behalf of everyone's health, physicians have stressed this fact again and again.

The diagram shows the percentage of particles of various size being able to penetrate the lung and cause diseases. As indicated, only particles of 1 micron ( $\mu\text{m}$ ) in size and such below 0.3  $\mu\text{m}$  in size enter the respiratory system. Bigger substances remain in the upper part of the air pipes and do not enter the lungs. Unfortunately,

ly, coarse dust filters hardly absorb particulate matter below 1  $\mu\text{m}$  in size. Fine dust filter and pre-filter will absorb 95 to 100 percent of particles 1  $\mu\text{m}$  in size, and also have a high efficiency with smaller matter.

Naturally, industrial cleanrooms or sterile rooms such as operation rooms in hospitals, pharmaceutical or food factories use filtration systems that produce the cleanest air possible. In these systems HEPA-filter of various efficiencies are used as last step in the filtration process.

It is also proven that the quality of products made in the metal and mechanical engineering industry depends on the degree of dust in the air, since modern systems include delicate parts which only have a tolerance level as low as a hundredth millimeter or less. Even a single particle of dust may corrupt the entire system. Examples are small ball-bearings, optical instruments, nano-mechanic or electrical parts.



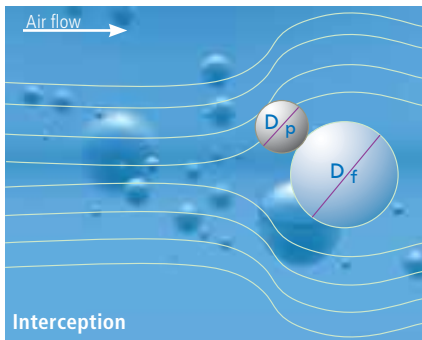
Percentage of particles entering and remaining in the human lung according to their size in  $\mu\text{m}$



## How Filters Work

The filter's ability to retain particles depends on physical and mechanical characteristics such as diffusion, interception, impaction, and filter effect. Electrostatic effects between particles and fibers are also significant.

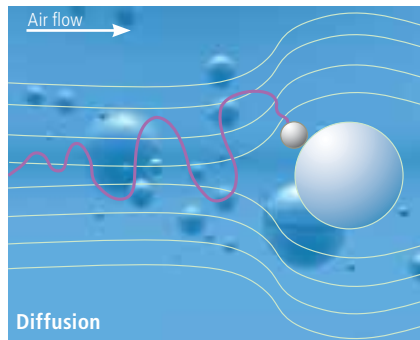
### Interception



Small, light elements are able to be carried past the fiber by the airflow. If the particle's center gets closer to the fiber than the particle's diameter [ $D_p$ ], it gets caught and sticks to the fiber.

The speed of the air stream has no effect on interception as long as it doesn't change the fiber's shape. The bigger the particle, the smaller the fiber and the gap between them, the more effectively interception works. Meaning: The filter media should contain lots of small fibers of the same diameter as the particle to be adhered.

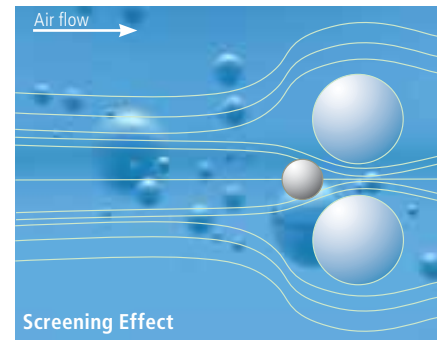
### Diffusion



Particles below  $1\text{ }\mu\text{m}$  in size don't follow the airflow past the fibers. They are influenced by the Brownian motion: Molecules in the air make these small particles obtain a zigzag motion. When touching the fibers they will adhere to it.

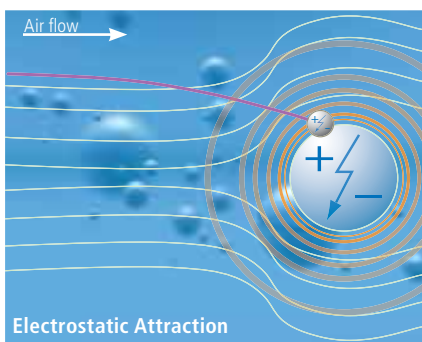
The possibility that these particles attach themselves to a fiber increases with a decreasing amount of speed and decreasing particle and fiber size.

### Screening Effect



Particles that are bigger than the passage between two fibers are blocked by them.

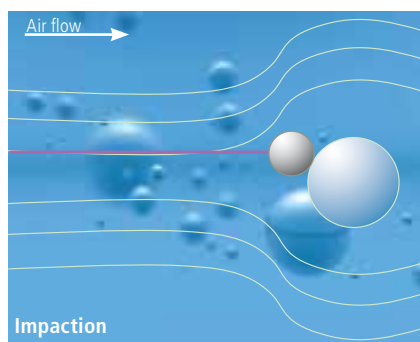
### Electrostatic Attraction



Electrostatic fields are installed as plate condenser as an active filtration element. Alternatively, they can be preloaded onto the fibers of synthetic filter media. Thus, around the fibers or collectors respectively an electric field will form, which will attract complementary charged particles. Precharged electrostatic within the fibers will abate after the filter's initiation.

External influences may benefit or weaken this effect.

### Impaction



Heavier particles' moment of inertia is too big for them to follow the airflow running around the fiber. Those particles keep following their original path and therefore impact the fiber on its air side. Inertia increases with the speed of the airflow, particle size and a decreasing fiber size.

### Air Filters

Air filters are used to extract particles out of airflows entering ventilation systems as well as contaminated or polluted air, e.g. in nuclear power plants, laboratories and isolation wards. Lately, air filters are also commonly found in industrial processes, in high-tech areas, or other applications with low occurrences of dust.

Not considering carbon filters – which are used to absorb gas and odour – filters are classified as follows: Coarse dust filter, fine dust and high efficiency filter, HEPA-, and ULPA-filter. They are classified due to their filter media, its particle holding capacity, as well as the effect used for absorbing – hence, due to their area of application.

Furthermore, there are electro filters, which work on the electrostatic level. However, these filters play only a minor part in the field of ventilation technology due to reasons of safety and costs of ownership.

### Coarse Dust Filter



Coarse Dust Filter are made of fiberglass or synthetic fibers (PP, PS, PTFE, etc.) with a fiber diameter between 30 and 50  $\mu\text{m}$  and a gap between fibers ranging from 200 to 400  $\mu\text{m}$ . Particles are being extracted by the so called impaction, which takes advantage of the element's inertia. They don't follow the airflow around the fiber but adhere to its air side. To reach this effect, the air stream needs to penetrate the filter media with 2 to 2.5 meter/second. It also calls for particles of sufficient measurements. If the airflow's velocity is too slow, the particles will be led past the fiber. Too high velocities will entrain adsorbed dust. In both cases filtration will decrease. Therefore coarse dust filter won't be efficient with variable airflows as they occur with central pre-filtration or engines with switchable poles.

A sufficient filtration efficiency via impaction will be reached with a particle size above 5  $\mu\text{m}$ . If the particles have a size of less than 2 to 3  $\mu\text{m}$ , efficiency will be practically inexistent. Smoke particles, which cause the most pollution in buildings or air ventilation systems, are as small as 0.01 to 1  $\mu\text{m}$  and won't be retained by these filters.

### Fine Dust Filter & HEPA/ULPA-Filter



The filter media used in these filters is very dense: the fibers have a diameter of  $<1$  to 10  $\mu\text{m}$  and a spacing of 10  $\mu\text{m}$  and less. Inflow velocity through the media ranges from 2 to 12 centimeters/seconds. Within the filter various filtration effects are at work. Therefore, it can be assumed that the filter has a minimal efficiency under certain conditions. Interception and impaction work best with the bigger the particle; the diffusion effect decreases with particle size. The former correlates with particles' inertia and therefore with size and speed. The degree of precipitation depends on the airflow through the filter as well as on particles size and massiveness. Impaction will start decreasing with particles of 1  $\mu\text{m}$  in size. Diffusion has the reversed effect: the smaller the particles the better precipitation. Here, the critical particle size is indicated with 0.1 to 0.3  $\mu\text{m}$ .

Because of these differences in efficiency, the filter are classified according to their level of productivity, the so called most penetrating particle size (MPPS).

### Activated Carbon Filter



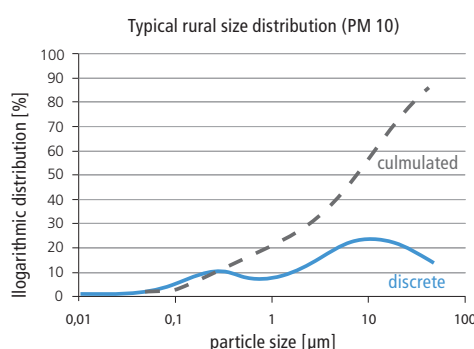
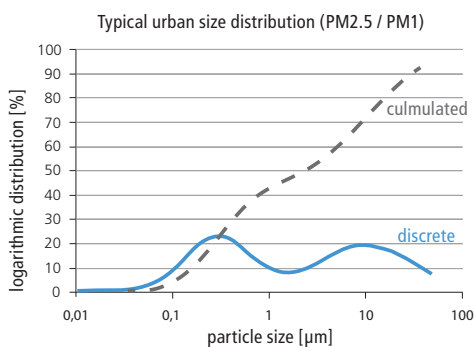
Activated Carbon Filter are an appropriate instrument to adsorb gaseous impurities, which are smaller than 0.01  $\mu\text{m}$  and can't be adsorbed by filter media made from fibers. They are used with HVAC and other ventilation systems to purify supply, exhaust as well as circulating air. The efficiency of this filter is due to its inner design. Because of the microscopic structures within the carbon, a few grams are comparable to the surface of a soccer field. Its capillary structure with supply pores of molecular size is equal to a sponge. The activated carbon's surface accumulates gas or liquids on the surface and adsorbs them – made possible by the slight gravity that exists between the molecules (so called Van-der-Waal effect).

The supply pores transfer the air that needs cleaning towards the capillary system. Here the impurities become a solid part of the activated carbon.

Another advantage of activated carbon is that it can be used for diverse purposes. By impregnating the inner surface, for example; it may be used for adsorbing iodine or acidic gases. By using optimized production and processing procedures and in combination with specific carrier matter, basic materials such as hard coal or coconut shells can be customized for various applications. HS-Luftfilterbau offers many kinds of activated carbon filter systems such as cartridge filter, panel filter, filter cells etc.



Particle distribution of finedust in the atmospheric air according to ISO 16890-1:



Our testlab for ISO 16890, EN 779 and ASHARE 52.2



Atmospheric air holds diverse substances deriving from particulate matter, gases, or fibers. These particles in breathable air are called aerosols. The particles suspended in the air are called aerosols. Their number of concentrations and distribution in assumed to be the outdoor air size in ISO 16890. These particles in breathable air are called aerosols. Their quantity and size distribution is determined as classification basis to classify filters according to ISO 16890. Studies about the level of harmful substances and their impact on health have resulted in recommending the installation of air purification systems – especially in ACs and ventilation systems. In general, we have to differentiate between filters for coarse dust, fine dust as well as particulate matter.

A filter's efficiency depends on criteria such as velocity, humidity etc. Considering that micro-organisms might accumulate inside the filter, the maximal final differential pressure should not be the only criteria for its replacement. The dust holding capacity is given in gram; it describes how much dust the filter media retained until the final pressure difference was reached while being tested. The different testing methods and requirements for air purification cannot be compared directly. But similar test specifications form a good basis for comparing the various medias' disabilities.

For gaseous impurities that occur in low concentrations, Luftfilterbau offers several kinds of activated carbon for standard and customized usage. Impregnated activated carbon is especially equipped for extracting acid smoke, ammonia, hydrogen sulphide, methyl iodine, or similar substances.

Filters for collecting coarse and fine dusts are evaluated and classified according to ISO 16890. By August 2018, this standard will have replaced the currently applied test standard EN 779. HEPA filters are classified according to EN 1822, a standard which is in line with ISO 29463.

The following table depicts the standards in use along with their corresponding classification.

## EN 779

The test standard EN 779 has been in force since 1994 and was replaced in 2018 by the new test standard ISO 16890. It was a destructive test method due to the fact that the filter is fully loaded with test dust. The standard differentiated between three groups on classes:

**Coarse dust filters** of classes EN 779 G1 to G4 will be exposed to dust in order to determine the degree of gravimetric segregation. .

**Fine dust filters (middle & fine)** class EN 779 M5 to F9 are additionally tested with DEHS test aerosol to determine the efficiency. The average filters efficiency is determined against the particle size of 0,4 µm by optical particle counters. Filters of group **F** (F7 to F9) need to fulfill a minimum efficiency (M.E.).

Group	Class	Final ΔP [Pa]	Average arrestance (Am) [%] against synthetic dust	Average efficiency (Em) @ 0,4µm particles [%]	Minimum efficiency (M.E.) @ 0,4µm [%]
Coarse	G1	250	50 < Am < 65	-	-
	G2	250	65 < Am < 80	-	-
	G3	250	80 < Am < 90	-	-
	G4	250	90 < Am	-	-
Middle	M5	450	-	40 < Em < 60	-
	M6	450	-	60 < Em < 80	-
Fine	F7	450-	-	80 < Em < 90	35
	F8	450	-	90 < Em < 95	55
	F9	450	-	95 < Em	75

G<sup>3</sup><sub>4</sub>

M<sup>5</sup><sub>6</sub>

F<sup>7</sup><sub>9</sub>



# Particle Size & Filtration Systems

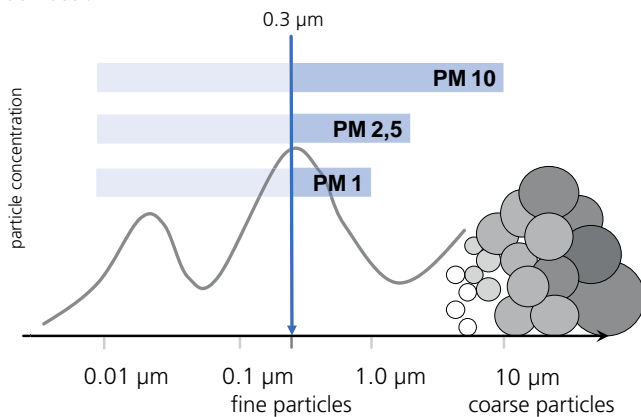
## ISO 16890

This standard is a destructive test method and the tested filter is dust saturated after being tested. In a first step, filtration efficiency for particulate matter of sizes 0.3 to 10 µm will be determined. Afterwards, a potential electrostatic filtration effect will be ruled out by exposing the filtration element to an atmosphere saturated with isopropanol alcohol.

A subsequent test will establish results for a purely mechanical filtration efficiency with various fractions. These test results are also used to determine the minimum efficiency factor of filters of classes ePM 1 and ePM 2.5. By calculating the mean value of both results, filtration efficiency for ePM 1 (particle size up to 0.1 µm), ePM 2.5 (particle size up to 2.5 µm), and ePM 10 (particle size up to 10 µm) will be determined. Based on this filtration efficiency factors, the filters are classified into four groups. Condition for this classification is a minimum filtration efficiency of 50 % for the respective particle size range. For example: In case the filtration efficiency for filter medium belonging to the fine dust range PM 1 is higher than 50 %, the filter will thus be classified as ePM1. The filtration efficiency will be given in percent, rounded down in fives.

Group	Classification specification	indicator
ISO Coarse	ePM10 < 50%	test dust
ISO ePM10	ePM10 ≥ 50%	0,3 - 10 µm
ISO ePM2,5	ePM2,5, min ≥ 50%	0,3 - 2,5 µm
ISO ePM1	ePM1, min ≥ 50%	0,3 - 1 µm

Chart: common particle distribution vs classification range of finedust classes according to ISO 16890:

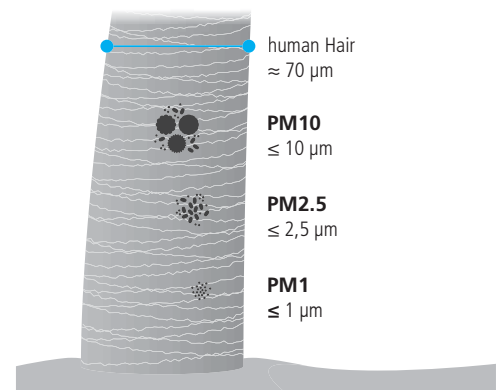


## ISO 16890 in comparison to EN 779

Filter classes in accordance to EN 779 can not be compared to the filter classes according to ISO 16890 due to diverging methods of measurement and evaluation. A normative key is not existing. The actual revision of VDI 6022-1 2018 recommends filterclasses in adaption of DIN EN 16 798-3 for air handling units:

Outdoor-air quality as per VDI 6022 Part 3a)	Quality demand ZUL 1 (very high)	Quality demand ZUL 2 (high)	Quality demand ZUL 3 (medium)
AUL 1 (clean)	ISO ePM10 50 % + ISO ePM1 50 %	ISO ePM1 50 %	ISO ePM1 50 %
AUL 2 (contaminated)	ISO ePM2,5 65 % + ISO ePM1 50 %	ISO ePM10 50 % + ISO ePM1 50 %	ISO ePM10 50 % + ISO ePM1 50 %
AUL 3 (highly contaminated)	ISO ePM1 50 % + ISO ePM1 80 %	ISO ePM2,5 65 % + ISO ePM1 50 %	ISO ePM10 50 % + ISO ePM1 50 %

Size comparison of the fraction ranges:



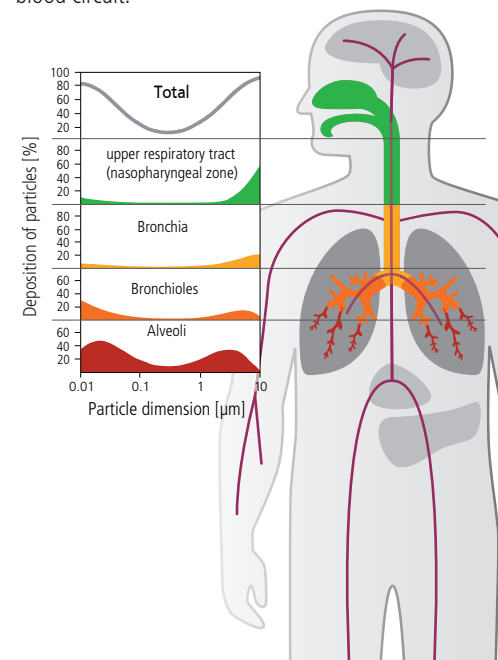
ISO  
COARSE

PM  
10

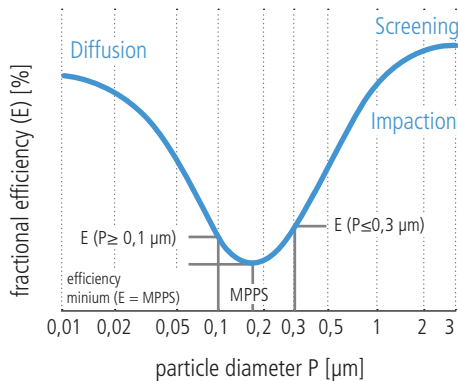
PM  
2.5

PM  
1

Deposition of airborne particles within the human body. Particles in the range of up to 0,1µm may reach inner organs and cause damage over the lungs by blood circuit.



Typical efficiency curve of a fiber-based filter as a function of filter effects. Their interaction is worst in the MPPS range, so that particles in this spectrum have the highest penetration rate.



MPPS: Most Penetrating Particle Size  
Efficiency minimum

## EN 1822 and ISO 29463

Efficient Particulate Air Filter (EPA), High Efficient Particulate Air Filter (HEPA) and Ultra Low Penetration Air Filter (ULPA) show the highest efficiency with mechanical air filtration. The range of application of EPA filters place high demands on both the performance test and the integrity of the air filter. As a result, filter manufacturers have to deliver products which meet this demand; qualification test after the installation and during the filters application phase have to prove true. The European test standards EN 1822 and ISO 29463, which is based on EN 1822, have become the globally excepted standard procedure for testing and classifying EPA, HEPA and ULPA filters

The EN1822 scantestprocedure requires to expose the test filter with test aerosol at the nominal air flow of the concerning filter. The average particle size of the aerosol must have its median particle size distribution in the range of the most penetrating particle size (MPPS). On the clean air side (downstream) of the filter the particle penetration is measured with (CNC) movable probes while the entry particle concentration is measured upstream. Based on the determined values, both the local efficiency values and the overall efficiency (integral efficiency) is generated. The filter is deemed leak-proof if the locally determined penetration does not exceed the limit value given in the standard for this particular filter. During this test, temperature, humidity as well as pressure drop of the filter at nominal volume flow will also be measured.

HEPA filters (class H13 and H14 or ISO 35H to ISO 50H) alternatively can be tested by applying the oil thread test. This test is also used when the filter's geometry does not permit scanning. The oil thread test is a visual testing method. As a set-up, the filter is placed horizontally into a diffuser and is subject to a flow of an oil-drop aerosol. Leaks are indicated by nebulizing strands. EPA filters are not fit for this test due to their high penetration rate.

Once successfully tested, reports on leak-proofness or for local and integral efficiency will be compiled along with documentation of the test conditions. All reports have to contain a test number, which allow the correct allocation of the test documentation to the test filter. The leak-proof test along with the substantiated integral efficiency will allow the classification according to the corresponding filter class. The latter has to be indicated in the test report as well.

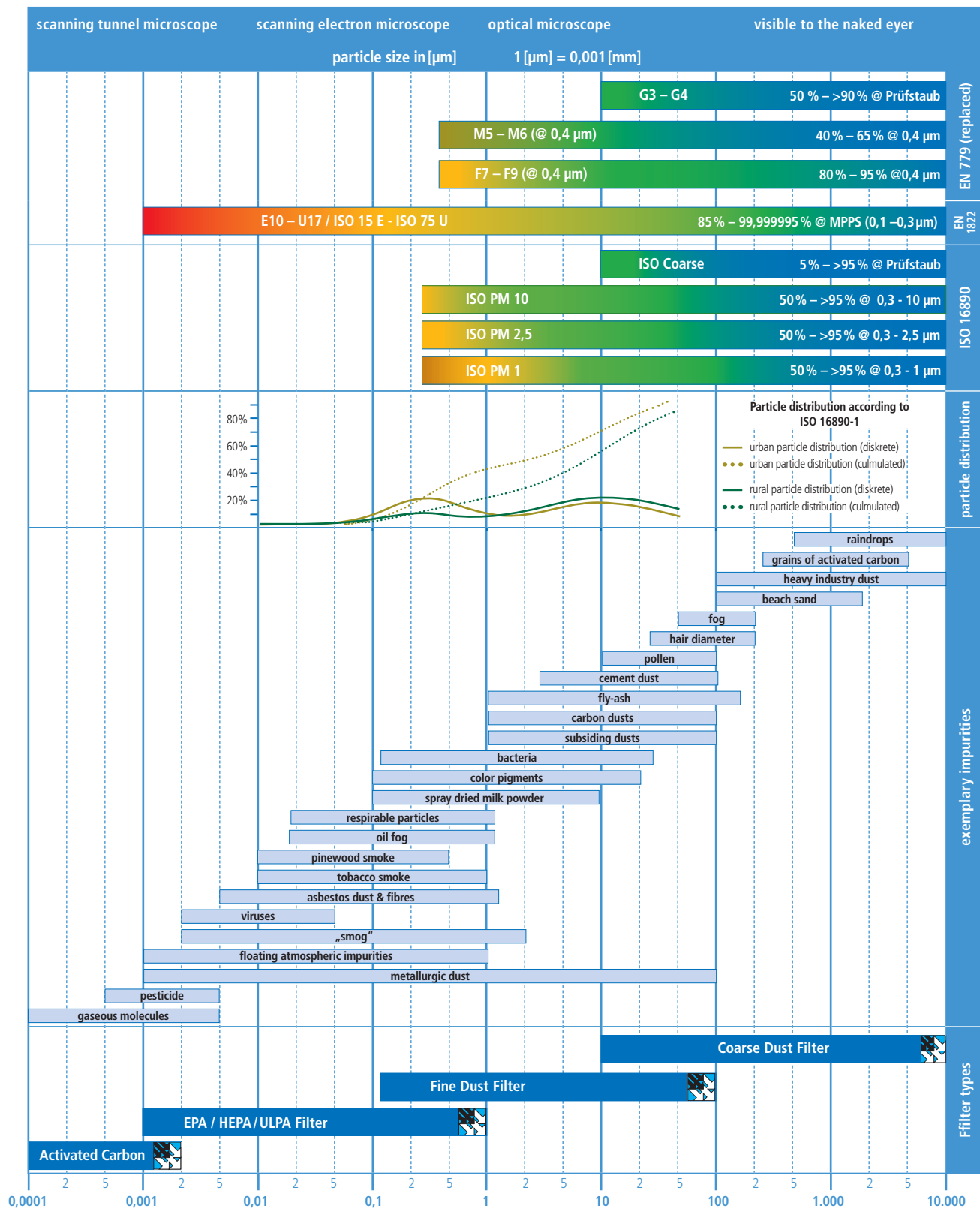
EPA filter are normally tested by filter type examination; its efficiency is the result of the mean value coming from distinct, random tests. The test method in accordance to EN 1822/ISO 29463 is nondestructive and can be repeated several times when required (i.e. for leak repair).

The following table lists the filterclasses and required performances:

Group	Class		Integral Value		Local Value	
	EN 1822	ISO 29463	Efficiency @ MPPS [%]	Penetration @ MPPS [%]	Efficiency @ MPPS [%]	Penetration @ MPPS [%]
<b>E<sup>10</sup><sub>11</sub></b> E (EPA)	E10	-	≥ 85	≤ 15	-	-
	E11	ISO 15 E	≥ 95	≤ 5	-	-
	-	ISO 20 E	≥ 99	≤ 1	-	-
	E12	ISO 25 E	≥ 99,5	≤ 0,5	-	-
	-	ISO 30 E	≥ 99,9	≤ 0,1	-	-
<b>H<sup>13</sup><sub>14</sub></b> H (HEPA)	H13	ISO 35 H	≥ 99,95	≤ 0,05	≥ 99,75	≤ 0,25
	-	ISO 40 H	≥ 99,99	≤ 0,01	≥ 99,95	≤ 0,05
	H14	ISO 45 H	≥ 99,995	≤ 0,005	≥ 99,975	≤ 0,025
	-	ISO 50 U	≥ 99,999	≤ 0,001	≥ 99,995	≤ 0,005
<b>U<sup>15</sup><sub>16</sub><sub>17</sub></b> U (ULPA)	U15	ISO 55 U	≥ 99,9995	≤ 0,0005	≥ 99,9975	≤ 0,0025
	-	ISO 60 U	≥ 99,9999	≤ 0,0001	≥ 99,9995	≤ 0,0005
	U16	ISO 65 U	≥ 99,99995	≤ 0,00005	≥ 99,99975	≤ 0,00025
	-	ISO 70 U	≥ 99,99999	≤ 0,00001	≥ 99,9999	≤ 0,0001
	U17	ISO 75 U	≥ 99,999995	≤ 0,000005	≥ 99,9999	≤ 0,0001



■  $\mu\text{m} = 1 \text{ Mikron or Micrometer}$  ■  $1 \mu\text{m} = 0,001 \text{ mm}$   
■ **MPPS = Most Penetrating Particle Size** (0,1 - 0,3 $\mu\text{m}$ )



# Particle Size & Filtration Systems






viruses	smoke	bacteria	oilfog	tonerdust	spores	pollen	hair	coarse dust
0,002 – 0,05 [µm]	0,01 – 1 [µm]	0,2 – 25 [µm]	0,3 – 5 [µm]	5 – 20 [µm]	10 – 25 [µm]	10 – 100 [µm]	20 – 200 [µm]	100 – 2000 [µm]

## Filter Types & Areas of Application











	Type	HS-Luftfilterbau products	class ISO 16890	form of delivery	areas of application	note
Filter pad		HS-Glas 1" HS-Glas 2"	ISO coarse ISO coarse	rolled media/ pre-cut	pre-filtration media for HVAC & other ventilation systems; highly efficient for removing coarse dust; also usable as coalescent filter for filtering condensing moisture	
		HS-PA	ISO coarse	roll / pre-cut	for retaining paint-mist and coarse dust	
		HS-H600	ISO coarse	pre-cut	highly efficient and very durable; usable as pre- or sand filter; water-resistant and non-corrosive	media made from latex-coated coconut fibers
		HS-15/150 HS-B/290 (blau/ weiss) HS-15/350 HS-15/500	ISO coarse ISO coarse ISO coarse	roll / pre-cut roll / pre-cut roll / pre-cut roll / pre-cut	pre-filter for electrical control cabinets, machines, and filtration systems in general. Due to their plane velocity these filters are suitable for minor airflows with a high degree of coarse dust, which may occur in extreme areas of application	applicable as primary filters only according to VDI 6022
		HS-E/360 HS-A/560G	ISO ePM10 ISO ePM10	roll / pre-cut roll / pre-cut	pre-filter for electrical control cabinets that need a more demanding type of filtration system; ceiling filter in paint shops	std. filter pad more efficient than HS-E/360

	Type	HS-Luftfilterbau products	class ISO 16890	form of delivery	areas of application	note
Filter w. wire mesh		HS-Grease Filter	ISO coarse	Filter panel with wire mesh	filtration and condensation of greasy vapors in kitchens; also applicable as robust, regenerative and durable Coarse Dust Filter	fire-resistant but not to be used as fire-protection
Autom. Roll Filter		HS-Matic	ISO coarse	cartridge	filtration system for extracting coarse dust; if saturated, filtration media will automatically be wound into new position (by pressure control). Rolled media are a discontinued type for existing systems due to their low precipitation efficiency as well as higher demands on hygiene.	as primary filter not consistent with VDI 6022 since filter is classified as G3. Usage will be limited to industrial applications only.  - outdated filter type -
		HS-Kleen	ISO coarse	CEAG / AFF cartridge		
		HS-O-Fil	ISO coarse	Shipt / Farr cartridge		
		HS-Fibro	ISO coarse	Trox cartridge Delbag		


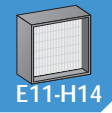



	Type	HS-Luftfilterbau products	class ISO 16890	form of delivery D= depth in [mm]	areas of application	note
Panel Filter		HS-Glas Z 1"	ISO coarse	panel filter D = 24	pre-filter cell for ventilation systems, supply air within industrial machines etc. These filters offer low differential pressure as well as a high degree of coarse dust adsorption.	filter frame: cardboard
		HS-Glas Z 2"	ISO coarse	panel filter D = 48		filter frame: cardboard
Panel Filter		HS-Z-50	ISO coarse ISO ePM10	panel filter D = 48	standard primary filter or main filter for various equipment, HVAC and other ventilation systems, etc.	filter frame: cardboard
		HS-Z-100	ISO coarse ISO ePM10	panel filter D = 96	standard primary or main filter for HVAC, or other ventilation systems; The filter offers more filter surface and therefore a higher flow rate due to the zig-zag folds of the filter media.	filter frame: cardboard
Panel Filter		HS-Alpha Pak 35	ISO coarse	panel filter D = 48 o. 96	alternative to HS-Z-50/HS-Z-100; with sturdy design due to the extruded plastic frame and a larger filtration surface. This filter has lower pressure drops and higher dust arrestance. Therefore, they are highly recommendable as pre-filter for combustion air.	filter frame: extruded plastic profile (VDI 6022: filtration level 1)
		HS-Alpha Pak 55	ISO ePM10	panel filter D = 48 o. 96		filter frame: extruded plastic profile (VDI 6022: filtration level 1)



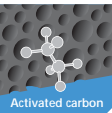


## Filter Types & Areas of Application

	Type	HS-Luftfilterbau products	class ISO 16890	form of delivery D= depth in [mm]	areas of application	note
Bag Filter		HS-Pak 25	ISO coarse	bag filter element D= 100 to 700	prefilter for HVAC and other ventilation systems as well as industrial applications with a high amount of coarse dust production; qualitatively better pre-filter for HVAC and ventilation systems with a high amount of coarse dust production	not applicable for areas that are conform with VDI 6022; accepted: VDI 6022 filtration level 1
		HS-Pak 35	ISO coarse			
Bag Filter		HS-Pak 35 PA	ISO coarse	bag filter element D= 360 to 500	prefilter for HVAC and other ventilation systems as well as industrial applications with a high amount of coarse dust production; qualitatively better pre-filter for HVAC and ventilation systems with a high amount of coarse dust production	ideal grease filter for kitchen exhausts as well as elimination of high appearances of dust within exhaust air of production processes
		HS-Pak 55 PA	ISO ePM10			
Bag Filter		HS-Pak 55	ISO ePM10	bag filter element D= 150 to 700	ideal pre-filter for HVAC and other ventilation systems; highly efficient for absorbing fine dusts pre-filter for industrial applications with a high demand on clean supply air main filter for applications with low demands on the air quality / fine dust removal	recommended VDI 6022: filtration level 1 HS-Pak 55 is made of high loft media for maximum dust holding capacity
		HS-Pak 65	ISO ePM10			
Bag Filter		HS-Pak 88	ISO ePM2.5	bag filter element D= 150 to 700	standardized main-filter for HVAC & other ventilation systems prefilter for HEPA/ULPA filtration areas, highly efficient for fine dust extraction; main filter for comfort HVAC.	HS-AirSynErgy are energy saving bag filters offering longer service lifetime and lower initial pressure drop.
		HS-AirSynErgy 88				
		HS-Pak 95 HS-AirSynErgy 95	ISO ePM1			
	Type	HS-Luftfilterbau products	class ISO 16890	form of delivery D= depth in [mm]	areas of application	note
Compact Filter		HS-Beta Pak 65 HS-Beta Pak 85 HS-Beta Pak 95	ISO ePM10 ISO ePM2.5 ISO ePM1	panel filter D= 48/96	compact pre- or main filter for HVAC and other ventilation systems as well as industrial applications; ideal for equipment of compact design, very robust and highly efficient for extracting particles	VDI 6022: filtration degree 1 or 2level
Compact Filter		HS-ECO Pak 65 HS-ECO Pak 85 HS-ECO Pak 95	ISO ePM2.5 ISO ePM1 ISO ePM1	panel filter D= 78/150/292 25 mm flange	compact pre- or main filter for HVAC & other ventilation systems as well as industrial applications; pre-filter within particulate matter filter; compact and more rigid than bag filters; offers higher initial efficiency in extracting particles than common bag filters.	VDI 6022: filtration level 1 or 2
Compact Filter		HS-Mikro Pak 65 HS-Mikro Pak 85 HS-Mikro Pak 95 HS-V Pak	ISO ePM2.5 ISO ePM1 ISO ePM1	V-shaped cassette D= 292 25 mm flange	Compact pre- or main filter for HVAC & other ventilation systems as well as industrial and turbine units recommended for high flow rates and higher efficiency in extracting particles	VDI 6022: filtration level 1 or 2 W= 592 mm
Compact Filter		HS-Makro 65 HS-Makro 85 HS-Makro 95	ISO ePM2.5 ISO ePM1 ISO ePM1	Kassette T= 78/150/292	pre- and main filter for industrial processes burst pressure >15 [kPa] or specific options like electro static grounding, FDA, or equipment within high temperatures up to 250 degree Celsius	ideal as pre-filter for particulate matter with toxic agents or in pharmaceutical industries
Compact Filter		HS-Makro F 65 HS-Makro F 85 HS-Makro F 95	ISO ePM2.5 ISO ePM1 ISO ePM1	cassette D= 78/150/292	standardized pre- and main-filter for industrial processes, e.g. as pre-filter for particulate matter filtration units or in security relevant systems	
Compact Filter		HS-Makro FV 65 HS-Makro FV 85 HS-Makro FV 95	ISO ePM2.5 ISO ePM1 ISO ePM1	V-shaped cassette D= 292	same area of application as HS-Makro F, however applicable for higher flow rates	

## Filter Types & Areas of Application

	Type	HS-Luftfilterbau products	class EN 1822	form of delivery D= depth in[mm]	areas of application	note
HEPA Filter	 E11-H14	HS-Mikro R HS-Mikro S	E11 H13/H14	cassette D= 78/150/292	HEPA-Filter for industrial and pharmaceutical processes bursting pressure till >15 [kPa] or specific options like electro static grounding, FDA, or equipped to meet temperatures up to 250 degree Celsius	also available as cleanable filter for dust extraction
HEPA Filter	 E11-H14	HS-Mikro RF HS-Mikro SF	E11 H13/H14	cassette D= 78/150/292	standard HEPA-Filter for industrial processes, clean rooms, ventilation systems in hospitals etc.	
HEPA Filter	 E11-H14	HS-Mikro RFV HS-Mikro SFV HS-Vpak SFV	E11 H13/H14	V-shaped cassette D= 292	standard HEPA-Filter for industrial processes, clean rooms, ventilation systems in hospitals etc. Due to their V-shaped assembly of the filterpacks, a higher performance can be obtained.	
HEPA Filter	 E11 - H13	HS-Mikro Pak RFV HS-Mikro Pak SFV	E11 H13	V-shaped cassette D= 292 25 mm flange	HEPA-Filter for specific industrial processes and removal of oil mist  also fits into standardized mounting frames for bag filter (add on kit to upgrade fom fine dust to HEPA Filtration)	usable as enhancement for Fine Dust Filtration Units up to a width of 592 mm
HEPA/ ULPA	 E11-U17	HS-Mikro SF-AL	E11 – U17	panel filter D= 30/69/78 D= 90/110/...	panel filter for clean rooms, clean benches or as terminal outlet filter for hygienic areas	detailed scantest is obligatory starting with class H14

	Type	HS-Luftfilterbau products	class	form of delivery D= depth in[mm]	areas of application	note
Cartridge	 AKP26	HS-AKP 26	none	Patrone T= 250/450/600	removal of odours, retention of hydrocarbon, aromatic solvents as well as filtration of tobacco smoke, welding smoke etc.	filter cartridges can be equipped with various adsorbent agents
Filtercell	 Aktivated carbon	HS-A055 HS-Carbo Pak	none	Kassette T= 78/150/292	cells for the expansion of existing systems or for systems with high volume flows and low contamination with odours, hydro carbons etc.	easy replacement (cassettes)
Sorption bed filters	 Aktivated carbon	HS-A053 HS-Kombifilter HS-Securesorb	none	V-shaped cassette, packed bed, block D= 292	The packed bed design is a custom made solution for security relevant areas or areas where welding smoke or soldering smoke have to be extracted from the air combination filter with filtration layers for particle and gas adsorption	HS-A053 or HS-Secure-sorb are used in applications with the highest level of operational safety

### Energy Efficient Products

We offer a wide range of filters, which are specifically designed for energy-saving applications. These products are marked with the following sign and comply with the requirements of the energy class A or A+ comparable to the standard Eurovent 4/21. Usually we do not explicitly mark Filters with other energy classes. We have decided not to strive for Eurovent certification for the time being. One of the main reasons is that we stand for the freedom of standards. Eurovent is not an independent standard like DIN, EN or ISO and therefore stands against independent competition. This attitude is currently not compatible with our values.



### For your satisfaction

With our demand-oriented production we are able to meet any customers requirements, the fast and cost-efficient way..

### „Unkaputtbar“

HS-Mikro Pak compact filter can optionally be supplied in a „high-strength“ version with 15% more filter surface, burst protector and special ultra durable sealant.

Compact filter with these features have survived the bursting pressure of the VTT Institute with the conditional maximum test pressure of 4500 Pa with ease.

### Foresighted

Our factory is certified for all usual Quality and environmental standards for more than 20 years. In addition to the compulsory certification according to **ISO 9001**, we are happy to meet the requirements of an environmental management system according to **ISO 14001**.

We are certified For other quality management systems, such as KTA 1401 and are qualified for GOST and 10CFR50.

### No Bypass

Upon request, HS-Bag Filter are available with foamed gasket. With every replacement you then will be able to meet with requirements according to hygiene regulations. You will be spared of regular and often troublesome replacing of worn out seals within the system.



### The extra in safety

Every HS-HEPA-Filter is given an individual quality- and efficiency-testing according to EN 1822.

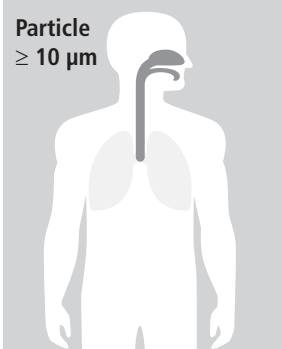
The result as well as the serial number are printed onto every filter.

The filter can be delivered in almost every dimensions.

Upon request, HS-Luftfilterbau offers various options for HEPA-filter – we make (almost) everything possible.

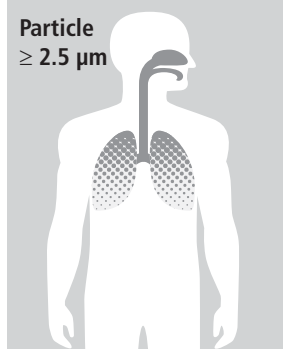
## How airborne particles enter the body by inhalation:

Particle  
 $\geq 10 \mu\text{m}$



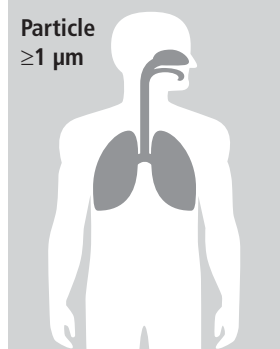
Dusts such as pollen, fine sand or hair remain in the upper respiratory tract and can easily be excreted

Particle  
 $\geq 2.5 \mu\text{m}$



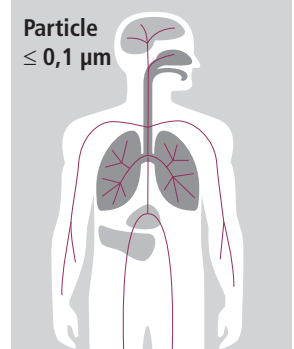
Particles such as bacteria, pollen, or toner dust are transported from the bronchi via cilia.

Particle  
 $\geq 1 \mu\text{m}$



Viruses, diesel soot, smoke such as e.g. cigarette smoke enters the alveoli. The body has to decompose or absorb these particles. Biopersistent particles such as asbestos fibres remain in the alveoli and cause cancer.

Particle  
 $\leq 0,1 \mu\text{m}$



Particles in the submicron spectrum (nanoparticles) can enter the blood circulation through the alveoli and thus into the organs and may damage them in the long term.

## Usage in hospitals

### 1 Pre-filter/Bag Filter (EN 779 G4/M5)



HS-Pak 35



HS-Pak 55

### 2 Main filter, roof unit

#### Bag Filter



HS-Pak 88

HS-Pak 95

HS-AirSynergy 88/95

#### Compact Filter



HS-Mikro Pak 85

HS-Mikro Pak 95

### 3 HEPA-filter



HS-Mikro SF

### 4 Filter housing



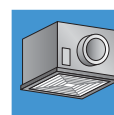
HS-S044 (HS-Mikro SF)

### 5 HS-ceiling outlet (supply with clean air)



fitted with HS-Mikro SF-AL

### 6 Ceiling outlet



equipped with HS-Mikro SF-ALL

### 7 Laminar Flow HEPA Filterelement



HS-Mikro SF-AL

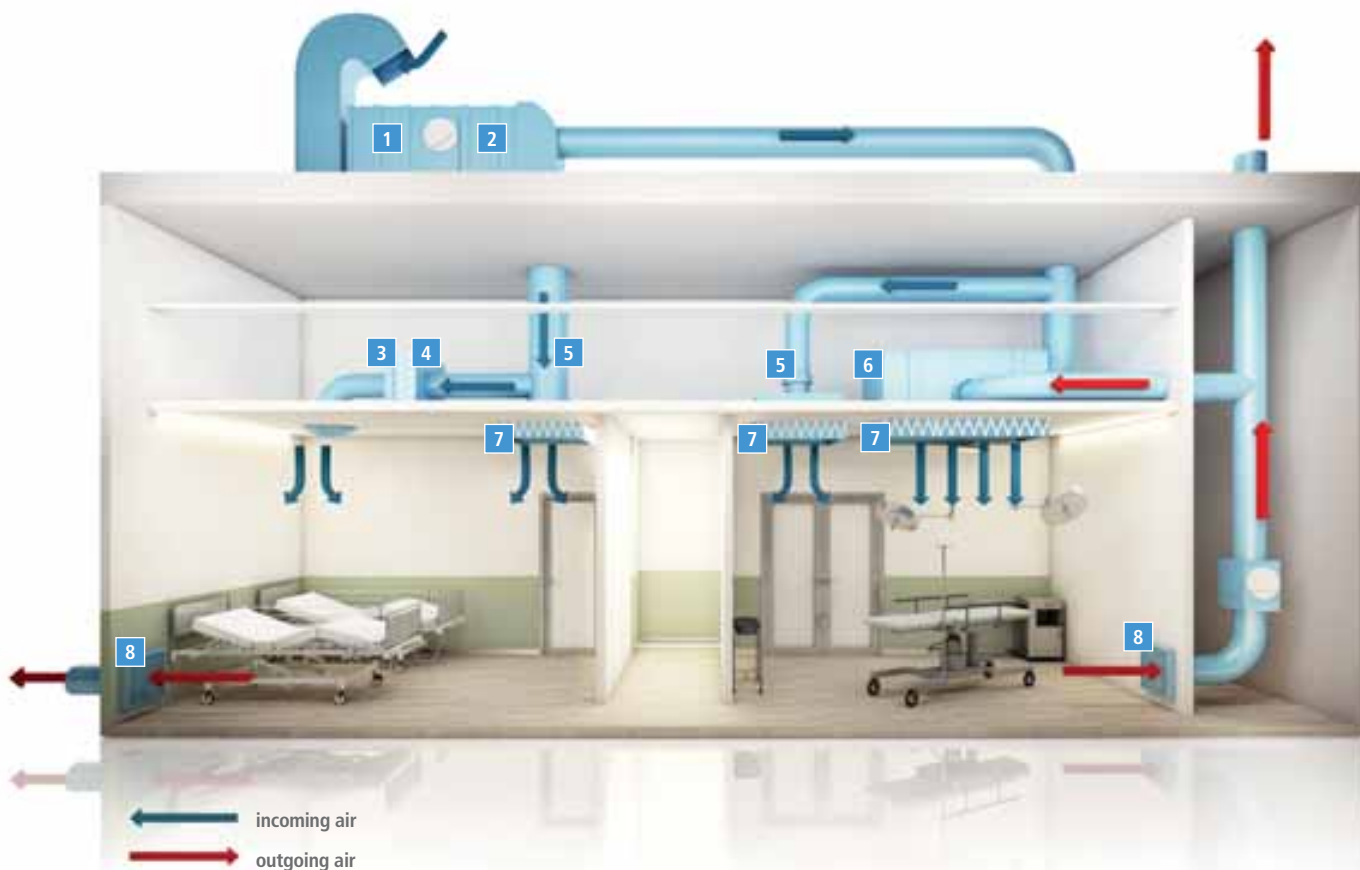
### 8 Abluft OP



HS-Beta Pak 65

HS-Beta Pak 85

HS-Beta Pak 95



Air is a potential carrier of contaminants, germs and viruses – a situation that is not acceptable for clinics and hospitals. Therefore, a high-performance ventilation system is essential to the establishment of an accepted hygienic standard.

HS-Luftfilterbau offers filter for supply air, outlet air, and circulating air. You will profit from

our specialized knowledge of filtration systems for sensitive areas such as ceilings in operation rooms and applications where total sterility is essential.

Because of our knowledge, HS-Luftfilterbau is leading in the field of filtration systems for German hospitals.



## Usage in HVAC and other ventilation

### 1 Pre-filter/Bag Filter (EN 779 G4/M5/F7)



HS-Pak 35



HS-Pak 55



HS-Pak 88  
HS-AirSynErgy 88

### 2 Main filter, roof unit

#### Bagfilter



HS-Pak 88  
HS-Pak 95

#### Compact filter



HS-Mikro Pak 85  
HS-Mikro Pak 95

### 3 Filter for switchboards and large-scale machines

#### Filter pads

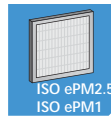


HS-B/290  
HS-15/500  
HS-15/150  
HS-E/360

#### Filter cartridges



HS-Z-Filter



HS-Beta Pak 65  
HS-Beta Pak 85  
HS-Beta Pak 95

### 4 Exhaust air in kitchens

#### Grease / Oil Filters



HS-Fett-fangfilter



HS-Pak 55 PA

#### Odour Filters



HS-AKP 26



HVAC and other ventilation systems are supposed to create a comfortable climate inside buildings. Besides the right temperature and humidity the degree of contamination is also an important factor for determining the degree of cleanliness in the air. Modern filtration systems extract coarse and fine dusts, odours, and gaseous impurities. Whether installed in office buildings, museums, or production halls, our fil-

tration systems offer the optimum in quality. As a matter of routine we produce filters for cleaning exhaust air coming from production processes in order to meet with current limits for emission of hazardous substances. For welding smoke, oil mist, or exhaust air from kitchens – we offer the ideal solution for any application area without being costly.

# Usage in pharmaceutical production, laboratories, and research centers

## 1 Pre-filter/Bag Filter (EN 779 G4/M5)



HS-Pak 35



HS-Pak 55

## 2 Main filter, roof unit

### Bag Filter



HS-AirSynergy  
HS-Pak 88 / 95

### Compact Filter



HS-Mikro Pak 85  
HS-Mikro Pak 95

## 3 Pre-filtration cleanroom (EN 1822: H13/H14)

### HEPA Filters



HS-Mikro SF



HS-Mikro SFV

## 4 Laminar Flow Unit (EN 1822: H14, U15, U16)



equipped with HS-Mikro SF-AL

### Schwebstofffilter



HS-Mikro SF-AL

## 5 HS-Ceiling outlet (EN 1822: H14/U15)



equipped with HS-Mikro SF-AL

### HEPA / ULPA Filters



HS-Mikro SF-AL

## 6 Exhaust air purification (EX-area) safety filter housing



HS-S041

### Pre-Filter



HS-Makro 95, EX

### Safety-Filter



HS-Mikro S, EX

## 7 Re-feed into circulating and exhaust air (EN 779: F7/F9)

### Feinstaubfilter

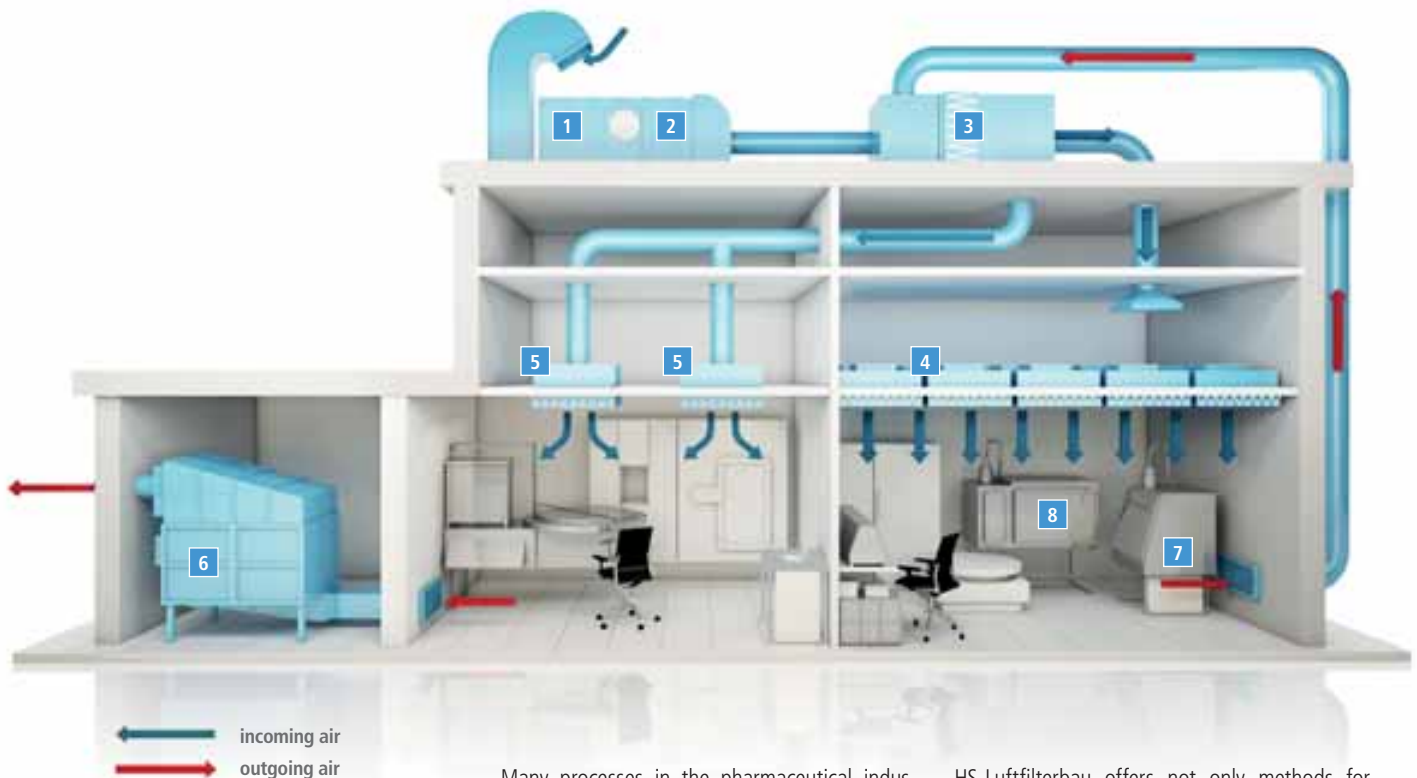


HS-ECO Pak 85  
HS-ECO Pak 95

## 8 HEPA / ULPA Filters



HS-Mikro SF-AL



Many processes in the pharmaceutical industry are not accomplishable without reliable air purification. Incoming air has to be completely sterile in order to meet the high standards these processes call for. Often, exhaust air produced by these processes is contaminated with radioactive or biological-active substances like viruses or bacteria that pose a great threat to the health of employers as well as to the environment.

HS-Luftfilterbau offers not only methods for sterilizing incoming air, but also flexible solutions when it comes to safely treating exhaust air. Besides filtration systems with Ex-Protection we also offer optimized units for contamination free filter exchange due to the use of the bag-in, bag-out procedure.

## 1 Pre-filter/Bag Filter (EN 779 M5-F7)



HS-Pak 55



HS-Pak 88  
HS-AirSynErgy

## 2 Main filter, roof unit

### Bag Filter



HS-Pak 95

### Compact Filter



HS-Mikro Pak 95

### HEPA-/ULPA-Filter



HS-Mikro SF



HS-Mikro SFV

## 3 Circulating air system

### AMC Filtration (molecular filtration)



HS-A055 AMC



HS-A053

### HEPA-/ULPA-Filter



HS-Mikro SF



HS-Mikro SFV

## 4 Laminar Flow Ceiling Unit (EN 1822: H14/U15)



HS-Mikro SF-AL

### HEPA-/ULPA-Filter



HS-Mikro SF-AL

## 5 Air supply, pressure plenum clean room

### Bag Filter



HS-Pak 88/95  
HS-AirSynergy

### Molecular Filter (Act. Carb.)



HS-AKP 26



HS-A055

### Particle- and pre-filter for clean rooms (EN 779: F7/F9) (EN 1822: H14)



HS-ECO Pak 95



HS-Mikro SF



HS-Mikro SFV

## 6 Ceiling filter for clean rooms/Fan Filter Units (EN 1822: H14, U15, U16)

### HEPA-/ULPA-Filter



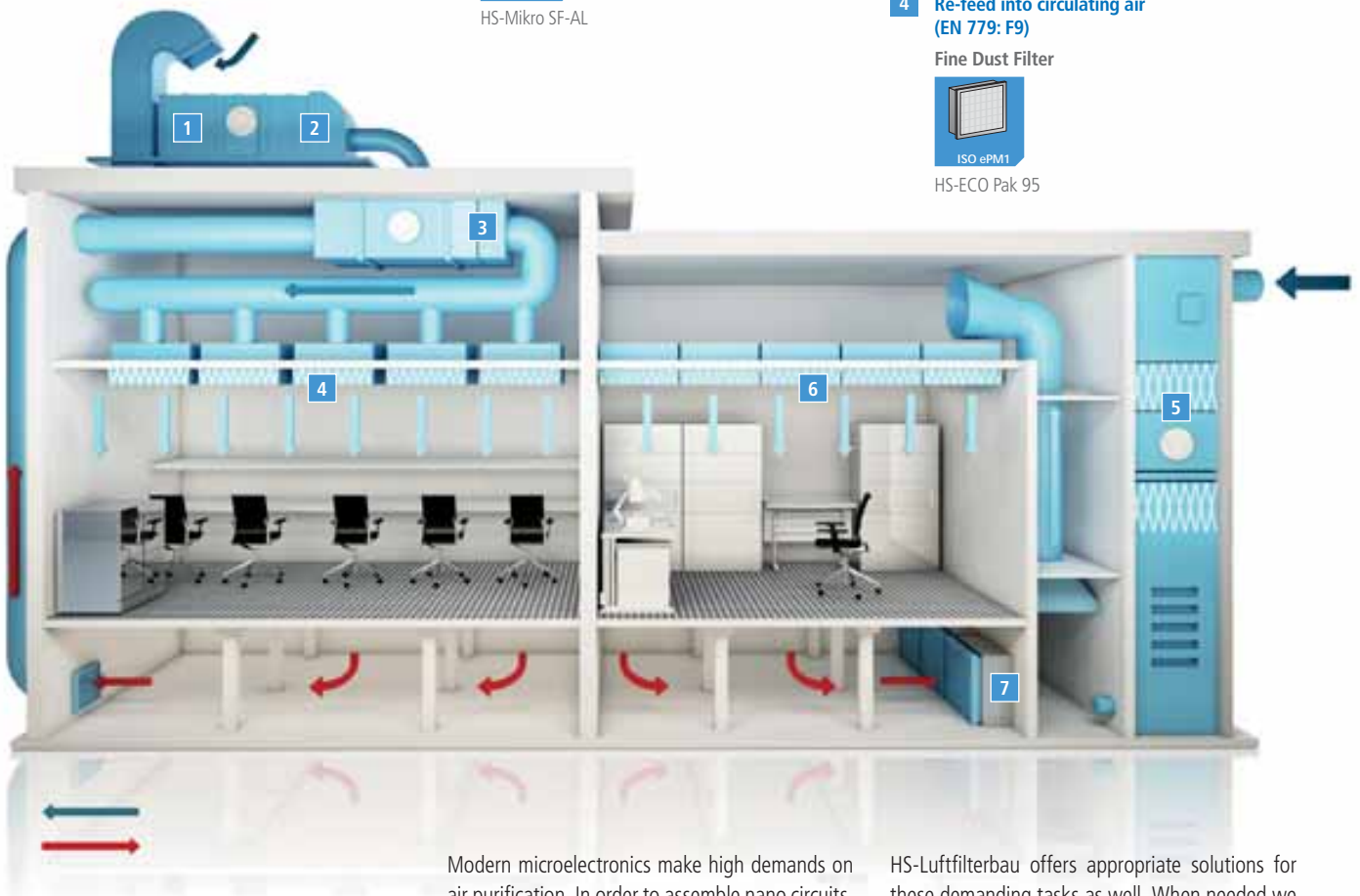
equipped with HS-Mikro SF-AL

## 4 Re-feed into circulating air (EN 779: F9)

### Fine Dust Filter



HS-ECO Pak 95



Modern microelectronics make high demands on air purification. In order to assemble nano circuits, the surrounding air has to be completely free of so called killer particles. Therefore, multi-level air filtration systems are necessary.

Also, gases that might corrupt the production process have to be removed from the incoming air as well as from circulating air (AMC-filtration).

HS-Luftfilterbau offers appropriate solutions for these demanding tasks as well. When needed we manufacture boron-reduced or boron-free clean room filter that are based on ePTFE membranes.

We are also able to design customized solutions in compliance with any requirements of your process.

## 1 Prefilter / Coalescerfilter

### Panel Filters



HS-Alpha Pak 35  
HS-Alpha Pak 55  
HS-Alpha Pak 55 GT

### Bag Filters



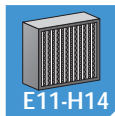
HS-Pak 35



HS-Pak 55 Extreme  
HS-Pak 55

## 3 Particle Filtration

### EPA & HEPA Filters



HS-Mikro R  
HS-Mikro S  
HS-Mikro RF  
HS-Mikro SF



HS-Mikro RFV  
HS-Mikro SFV

### Compact Filters



HS-Mikro Pak 4V RFV  
HS-Mikro Pak 4V SFV  
HS-Deka Pak RFV  
HS-Deka Pak SFV

## 2 Finedustfilter / Mainfilter

### Bag Filters



HS-Pak 65 Extreme  
HS-AirSynErgy 88  
HS-AirSynErgy 95

### Compact Filters



HS-Mikro Pak 95  
HS-Mikro Pak 4V 95  
HS-Deka Pak 95  
HS-Deka Pak 95 GT
















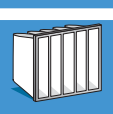
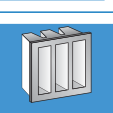

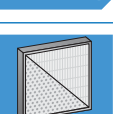



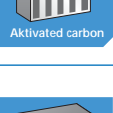
Gas turbines are used to drive power generators, pumps and compressors and to generate steam in applications such as gas power plants, seagoing vessels, offshore platforms, smelters, refineries and chemical plants. A gas turbine is a valuable asset, and the enormous amount of air it consumes during operation makes the quality of that air a critical factor in its availability, performance and reliability.

Compressor fouling reduces heat output (fuel efficiency) and over time causes both corrosion and turbine efficiency losses. HS-Luftfilterbau GmbH offers highly efficient filter systems for the supply air filtration of gas turbines and compressors, individually adapted to the application - worldwide. The performance of our air filters helps to significantly optimize the efficiency and maintenance requirements.



## Configuration Examples

HVAC (Heating & Ventilation)			
	Filtration class	Filter Type/ Use	note
Filt. level 1	 ISO ePM10	Bag Filter/ Coarse and fine dust	A classic structure. The filtration efficiency for fine dust in particular rises with increasing dust adsorbtion (both levels of filtration).
Filt. level 2	 ISO ePM2.5 ISO ePM1	Bag Filter/ Fine Dust	
Supply Air Unit for Process Technology, High-End Ventilation Units			
Filt. level 1	 ISO ePM10	Bag Filter/ Coarse and fine dust	A high-quality construction with an improved efficiency for adsorbing fine dust. Compact Filter are equipped with improved initial efficiency as well as lower pressure drop in comparison to bag filters. Also the compact filter offers a higher initial efficiency.
Filt. level 2	 ISO ePM1	Compact Filter/ Fine dust	
Odour & Hazardous Gas Adsorbtion within Ventilation Systems			
Filt. level 1	 ISO ePM10	Bag Filter/ Coarse and fine dust	A combination of particle and gas filter for treating supply and circulating air. Coarse and fine dust as well as odours and hazardous gases are filtered in a highly efficient way also.
Filt. level 2	 ISO ePM1	Compact Filter/ Fine dust	
Filt. level 3	 AKP26	Activated Carbon Cartridge	
Odour Adsorbtion (e.g. gastronomy)			
Filt. level 1	 G2	Wire mesh Grease Filter	Greasy steam condensates at the wire mesh, fine drops and aerosols are being held back within the Bag Filter (e.g. HS-PAK 55-PA). Cartridges of activated carbon are retaining bothersome odours.
Filt. level 2	 ISO ePM10	Composite/ Bag Filter	
Filt. level 3	 AKP26	Activated Carbon Cartridge	

ACs and Ventilation Systems within odour-burden air		
Filt. level 1	 ISO ePM10	Bag Filter / Coarse and fine dust
Filt. level 2	 ISO ePM2.5 ISO ePM1	Bag Filter / fine dust
Filt. level 3	 Aktivkohle	Aktivkohlezelle oder Kompaktfilter
VDI 6022 conform design for circulating air units. The activated carbon layer retains bothersome odours and hazardous gases (e.g. parts of tobacco smoke). Filtration levels 2 and 3 can be combined with other filters such as HS-Carbo Pak <sup>2</sup> ).		
Filtration of Incoming Air for Clean Rooms		
Filt. level 1	 ISO ePM10	Bag Filter / Coarse and fine dust
Filt. level 2	 ISO ePM1	Compact Filter / Fine dust
Filt. level 3	 E11-H14	primary HEPA-Filter
Filt. level 4	 E11-U17	terminal HEPA- / ULPA-Filter
Multi-level system for primary filtration of dust and particles. Filtration level 2 can be assembled as combinatory filter with activated carbon. Thus, the filter may be used to adsorb particular gases from clean rooms.		
Filtration of Exhaust Air, Toxic Matters, EX Protection Area		
Filt. level 1	 ISO ePM2.5 ISO ePM1	Particle Filter
Filt. level 2	 E11-H14	HEPA-Filter Unit
Filt. level 3	 Activated carbon	Safety Cell with Activated Carbon
Filt. level 4	 E11-H14	HEPA-Filter Unit „police filter / terminal filter“
These filtration levels are equipped with electrostatic discharging filter. The accumulation of electric charges may lead to formation of ignition sparks within the filter. These filters will prevent this effect. The filtration unit should contain a Bag-In-Bag-Out system (safe-change) for a contamination-free filter exchange.		
Optional, a 3rd filtration level may be installed. It adsorbs toxic and radioactive gaseous contaminations.		
An optional 4th HEPA-Filter level (or alternatively 3rd) prevents contaminations, should level 2 either be penetrated in prior levels or contaminated carbon particles set free. Hence, the overall efficiency is notably higher within the entire system.		

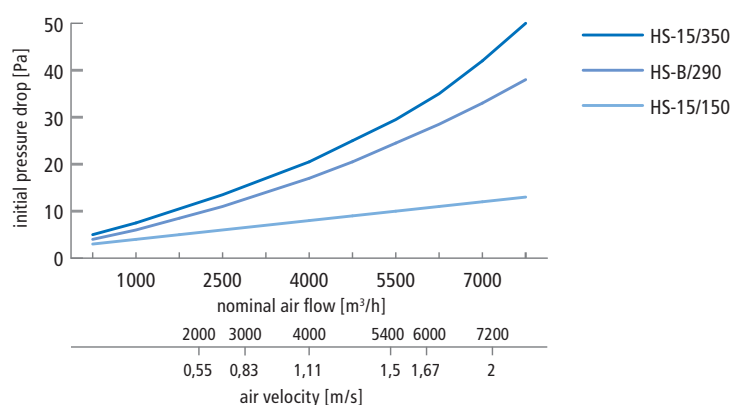
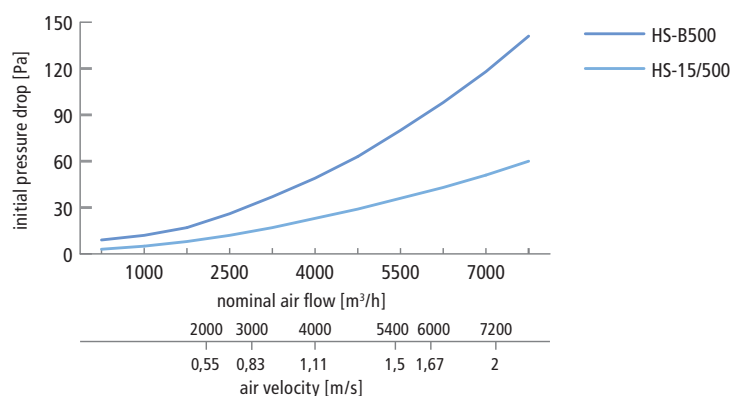
## Coarse Dust Filter Media (pads & rolls)



These HS-synthetic filter pads consist of synthetic-organic polypropylene fibers, which are non-breakable. They may be installed into HVACs and ventilation systems as well as ceiling fans and cabinets for machines. The design consists of randomly arranged synthetic fibers. Its density increases progressively towards the clean air side of the media. This specific structure of non-coated filtration mats ensures a high retention capacity towards dust with low pressure differences.

Type:	HS-B/290	HS-15/150	HS-15/350	HS-15/500	HS-B500
Class EN 779	G4	G3	G4	G4	G4
Class ISO 16890 ISO coarse	45%	30%	60%	75%	85%
Nominal air flow [m <sup>3</sup> /h*m <sup>2</sup> ]	5400	5400	5400	5400	6500
Nominal init. speed [m/s]	1,5	1,5	1,5	1,5	1,8
Initial-ΔP at nominal air flow [Pa]	25	10	30	35	90
Recommended final pressure drop [Pa]	250	250	250	250	250
Max. temp. [°C]	120	120	120	120	60
Thickness [mm]	18	11	20	22	50
Flameability	self extinguishing acc. to DIN 53 438				

\* HS-H600 consists of natural, latex bound fibers. The pads are available in sizes of 610x610 mm, 610x762 mm, as well as specific sizes up to 1000x2000 mm, and in thicknesses up to 20mm, 30mm and 40mm. Designs such as "Elastov" are also available..



**Form of delivery:**

- custom cut in various sizes
- rolled media (e. g. 2 x 20 m)
- bags
- shaped forms

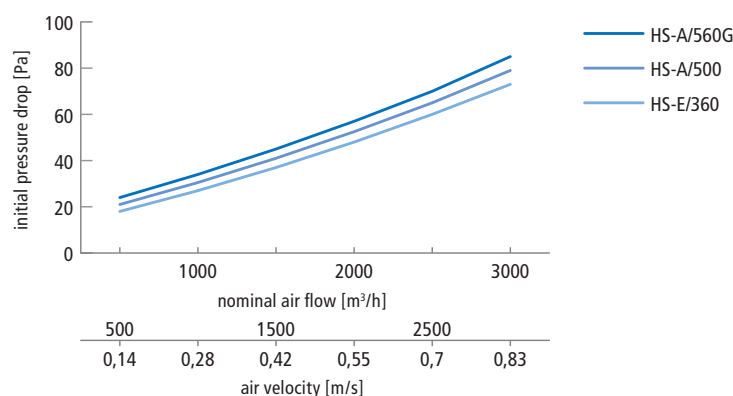
**Re-useable:** Yes

HS-Synthetic fiber pads are very efficient for the filtration of fine dust. Due to the thinness of the fiber and the layered design, the mats HS-E/360, HS-A/500 und HS-A/560G reach the optimum efficiency even with particles approaching submicron dimensions.

The fleeces consist of synthetic-organic, non-breakable polyester fibers that are 0,9–4 [µm] in diameter. They may be installed into HVACs and process ventilation systems as well as ceiling fans and cabinets for machines. The design consists of randomly arranged synthetic fibers. Its density increases progressively towards the clean air side of the media. This specific structure of non-coated filtration mats ensures a high dust holding capacity with low pressure differences. Due to their composition as well as their usage in the hygienic area the media is not re-usable.



Typ:	HS-E/360	HS-A/500	HS-A/560G
Class EN 779	M5	M5	M5
Class ISO 16890	ISO ePM10 50%	ISO ePM10 55%	ISO ePM10 65%
Nominal air flow [m³/h*m²]	2520	2520	2520
Nominal init. speed [m/s]	0,7	0,7	0,7
Initial-ΔP at nominal air flow [Pa]	60	65	70
Recommended final-ΔP [Pa]	400	400	400
Max. temp [°C]	130	130	130
Thickness [mm]	22	20	22
Flameability	self extinguishing acc. to DIN 53 438		



Form of delivery:

- custom cut in various sizes
- rolled media (e. g. 2 x 20 m)
- bags
- shaped forms

Re-useable: No

## Glass Fiber Media (pads & rolls)



### HS-Glas 1", HS-Glas 2", HS-Glas 4"

These standard-filter mats are just right for air condition and air ventilation systems. The pads consist of flexible fiberglass, which are equipped with plastic glue at their points. The weave's density increases progressively toward the clean airside. Therefore an excessive dust holding capacity is guaranteed. For more efficient adoptions and dust binding capability the media is coated with a non-toxic dust-binding agent.

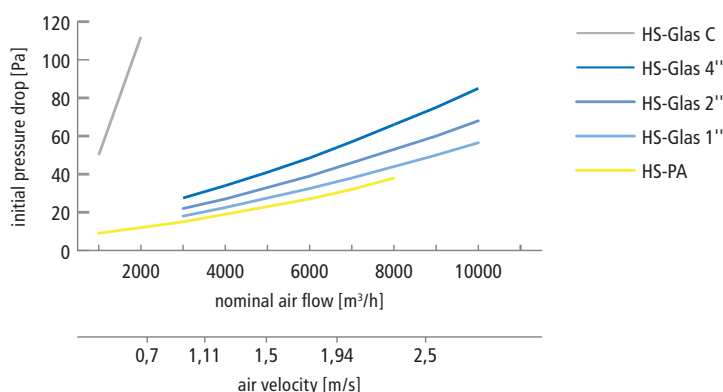
### HS-Glas-C

This high-quality filtration pad is used where extremely pure air is needed, such as in spray paint cabins or drying facilities. The media consists of finest fiberglass fleece, becoming solidified towards the clean air side. The filters will be placed without applying any agents. According to DIN 4012 the media is nonflammable.

### HS-PA

This special fiberglass pad should be placed with environments that demand high-grade extraction of paint mist e.g. as needed for exhaust air purification in spray paint cabins. The pad is made of un-coated elastic fiberglass weave, which becomes thicker and finer towards the clean air side. Due to this structure the 50 mm thick pad is able to store paint mist gradually. Therefore the media is able to hold more than 3500 g of paint mist per m<sup>2</sup> media surface. The pad is nonflammable.

Type:	HS-Glas 1"	HS-Glas 2"	HS-Glas 4"	HS-PA	HS-Glas C
Class EN 779	G2	G3	G4	G3	M5
Class ISO 16890	ISO coarse 20%	ISO coarse 30%	ISO coarse 50%	Paint arrestor	ISO ePM10 50%
Nominal air flow [m <sup>3</sup> /h*m <sup>2</sup> ]	9000	9000	9000	2500-4000	2500
Nominal init. speed [m/s]	2,5	2,5	2,5	0,7 - 1,5	0,7
Initial-ΔP at nominal air flow [Pa]	50	60	75	20	140
Recommended final pressure drop [Pa]	200	200	200	80	400
Max. temp. [°C]	180	80	80	180	200
Thickness [mm]	25	50	100	50	20
Flameability	-	-	-	non flameable acc. DIN 4102	



Form of delivery:

- custom cut in various sizes
- rolled media (e.g. 2 x 20 m)

Re-useable: No



Filter pads can be produced in nearly any size. With the HS-Rapid-Change-Frame we offer a likewise flexible holding frame. The standard model consists of a 25 mm galvanized U-profile but other frame depths are available. HS-Rapid-Change-Frames can be rapidly manufactured according to your specification.

The filter pad is fixed on the air entry side by a holding clip. A protective aluminium mesh on the air leaving side stabilizes the filter pad during operation. HS-Rapid-Change-Frames can be shoved in usual U-profile guides or standard mounting frames with clamp mechanisms. Even a direct mount to wall or channel openings can be done by simply anchoring screwed bolts to the wall or /channel and by fixing the gasketed frame with knurled head screws atop the opening.

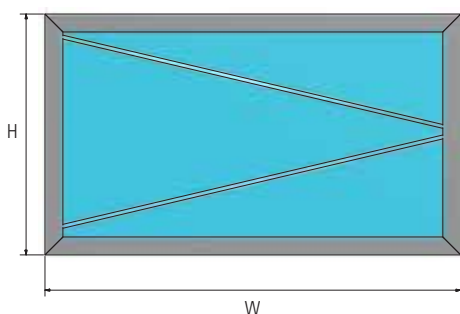
The holding clip can be released without requiring any tools by simply pressing the arms toward the center.



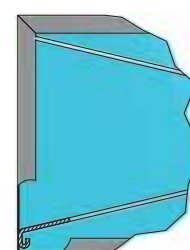
Dimensional boundaries [mm]	galv. steel	aluminium	plastic
Dim. H	270 - 1200	100 - 800	250 - 1200
Dim. W	270 - 1200	100 - 800	250 - 1200
Dim. D	25	20	20, 25, 48, 96
Recommended filtermedia:	HS-15/150 HS-B/290 HS-15/350 HS-15/500 HS-H600 HS-E/360 HS-Glas 1" HS-Glas C	HS-15/150 HS-B/290 HS-15/350	HS-15/150 HS-B/290 HS-15/350 HS-15/500 HS-H600 HS-E/360 HS-Glas C HS-Glas 1" HS-Glas 2" HS-PA

Frame	<ul style="list-style-type: none"> <li>galv. steel: D= 25 mm (standard)</li> <li>plastic: T= 20, 25, 48, 96 mm</li> </ul> max. Temp.: 65°C
Operational conditions	<ul style="list-style-type: none"> <li>max. rel.h. 100 [%]</li> <li>temperature resistance acc. to filtermedia 45 up to max. 200 [°C]</li> </ul>
Fitting for filterclasses	G2 to M5 [EN 779] / ISO coarse up to ISO ePM10 [ISO 16890]

Optional gaskets	size [mm]	form
foamed endless gasket, polyurethane (Standard)	6 oder 8	
Flat-gasket, neoprene, epdm, viton etc.	6 oder 8	



Detail: interior view  
holder clip, air entry side



## HS-Grease Collector

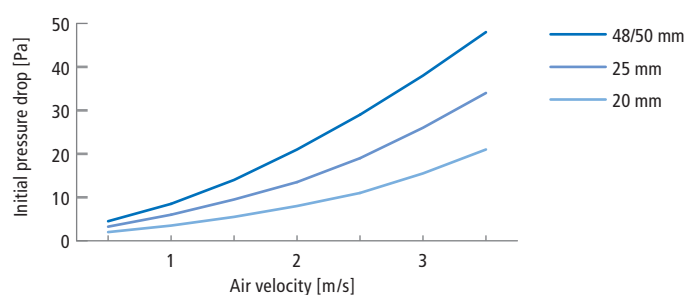


These filters are designed to meet requirements of kitchen applications. They may be applied to all environments where food is prepared and high amounts of oil, fat and other greases are common. Those particles are absorbed by steam, which will then be drawn off by our metallic filters.

The cells are made from interwoven metal wires. This weave has a relatively large cooling surface and a relatively low air flow resistance. It is held by a robust aluminium frame and fixed by a grid on both sides of the media. These wire mesh filters are available in all sizes and can be made from aluminium, steel or stainless steel.

Type: Depth [mm]					20	25	48/50
Initial-ΔP [Pa] at nominal air flow*					6	10	15
Standard dimensions [mm]					Nominal air flow [m³/h]		
Width	Height	Depth	Depth	Depth			
287	592	20	25	48/50	610		
290	595	20	25	48/50	620		
305	610	20	25	48/50	670		
490	592	20	25	48/50	1040		
590	590	20	25	48/50	1250		
592	592	20	25	48/50	1260		
595	595	20	25	48/50	1270		
605	605	20	25	48/50	1310		
610	610	20	25	48/50	1340		
350	500	20	-	-	630		
400	400	20	-	-	570		
450	400	20	-	-	640		
500	250	20	-	-	450		
500	300	20	-	-	540		
500	350	20	-	-	630		
500	400	20	-	-	720		
500	500	20	-	-	900		

\* The highest efficiency is reached with a velocity of 1,5 - 2 meter per second.  
Please ask for further dimensions and configurations.



Arrestance	The level of arrestance varies according to specification and thickness of the wire mesh from 90 to 99 %.
Dimensions	The grease collectors can be supplied in nearly any size.
Cleaning	The filters are easy to clean and can be put into most standard dish-washers.
Media options	galv. steel, aluminium, stainless steel

## HS-Pak 55 PA, grease and oilmist-prefilter

HS-Pak 55 PA are designed for filtration tasks with high concentrated air impurities, especially for those with sticky or clogging attributes. HS-Pak 55 PA ideally fits as second stage filter for exhaust air treatment of canteen kitchens or high amounts of heavy dusts. Alternatively HS-Pak 35 PA can be applied if coarse dusts with low oil- or grease compounds have to be filtered.

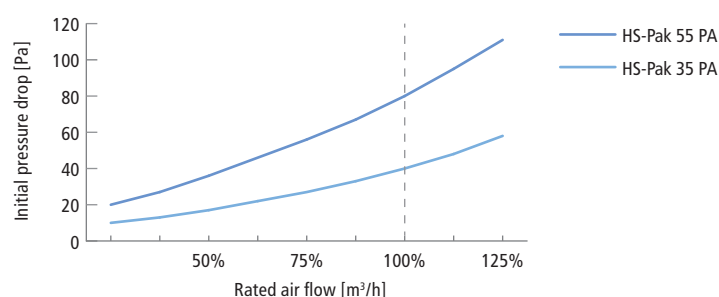
The combination of different filtermedia in one filter offers the opportunity of highly reduced space requirement for systems where pre- and mainfilter can not be installed in dedicated stages.

The filter is manufactured in bag-filter style. The filtermedia is a compound of a highly progressive fibre media and an efficiency layer for smaller dust and aerosol particles. Hence the HS-Pak 55 PA achieve a much better dust saturation and thus offers an increased service lifetime especially at problematic processes.



Type:	HS-Pak 35 PA	HS-Pak 55 PA
Class EN 779	G4	M5
Filterklasse ISO 16890	ISO coarse 90%	ISO ePM10 55%
Initial-ΔP [Pa] at nominal air flow	40	80
Dimensions [mm]	Nominal air flow [m³/h]	# of pockets
Width		
Height		
Depth 35/55 PA		
592	4200	3
490	3600	2
287	2100	1
287	1000	1
592	5500	3
287	4200	2

Please ask for other desired dimensions and designs.



Frame	<ul style="list-style-type: none"> <li>plastic / polystyrene 25 [mm] (veraschbar)</li> <li>galv. steel 25 [mm]</li> <li>aluminium 20 [mm]</li> </ul>
Operational conditions	max. rel. h. 100 [%], max. 65°C
Filtermedia	Glas-Synthetic-Composition
Combustible	YES (frame: plastic)
Options	<ul style="list-style-type: none"> <li>varying # of pockets</li> <li>foamed gasket on the header frame</li> </ul>

## HS-Fogdrain, self-draining oilmist filter



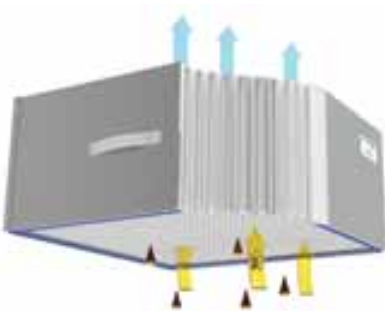
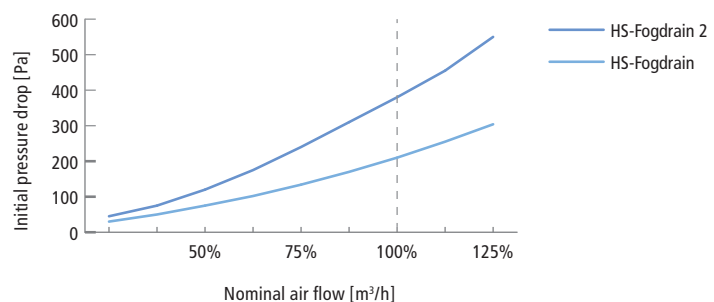
These filters serve for the removal of mists, fogs and filtration of wet aerosols and dusts. Air impurities arise in applications such as tempering, cold-drawing, oil-grinding, CNC milling or lathing or diecasting. These filter cassettes are self-draining, which means that condensing mists and oils are released by gravity. Therefore the filter needs to be installed either horizontal or in an angel of  $\leq 45^\circ$ . By request we offer complete filterunits including frequency controlled fans. HS-Fogdrain filters are also suitable for oilfog and oilsmoke solution if combined with HEPA and/or activated carbon filters.

The filter allows very long service lifetime thanks to the self draining characteristic. The released oils and aerosols might be filtered and recycled depending on the application and type of oil. HS-Fogdrain perfectly fit as replacement filter for absolent filtersystems (i.e. ODF 1000, ODF 2000 etc.)


Type:	HS-Fogdrain	HS-Fogdrain 2
Initial- $\Delta P$ [Pa]	210	380
Max. temp. [°C]	120°	70°
Class ISO 16890	ePM1 50%	ePM1 70%

Width	Dimension [mm]		Nominal air flow [m³/h]
	Height	Depth	
305	305	150	260
305	610	150	500
457	457	150	600
610	610	150	1050
762	610	150	1300
305	305	292	530
305	610	292	1050
457	457	292	1200
575	575	292	1850
595	595	300	2000
610	610	292	2100
762	610	292	2600

Please ask for other desired dimensions and designs.



Absorbed oils and fluids are constantly released from the filter by gravity.

Frame	galv. steel
Separators	profiled aluminium foil
Filtermedia	glass fibre fleece
Options	<ul style="list-style-type: none"> <li>protection screens (single or both sides)</li> <li>flange 25 [mm]</li> <li>handle</li> <li>gasket (single or both sides)</li> <li>EX-protected </li> </ul>

For environments with a particularly high demand for air purification these special filter panels are the product of choice. They were designed for the use in paint shops, spraying cabinets, and drying plants.

## Type HS-GTU, HS-GTB und HS-GTA

consist of multiple layers of homogeneous fiberglass fleece that is reinforced at the clean air side. They are non-flammable.

## Type HS-GT-1000 und HS-GTF 1000

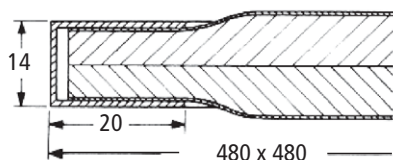
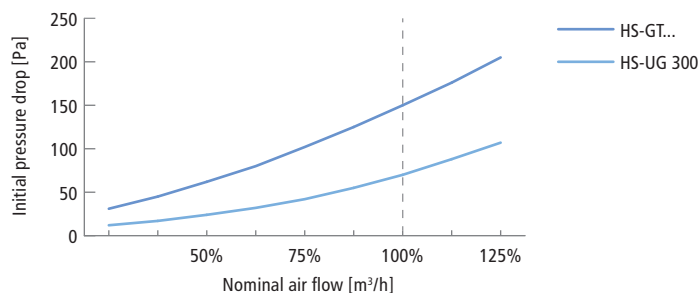
consist of multiple layers of fine synthetic fiber fleece that is reinforced at the clean air side. They are self-extinguishing in accordance to DIN 53438. The layers edging is fitted into the specific mounting frames.

## Type HS-UG 300 "Ultranglas"

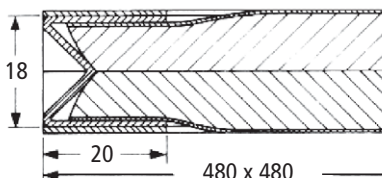
consists of a high-quality fiberglass media, which is mounted into a robust expanded grate aluminium-frame. This cell is designed for being used in environments with high temperatures (such as drying facilities). The maximum temperature is given with 300 °C; the panel is non-flammable according to class 1 – DIN 53438.

Type:	HS-GTU	HS-GTB	HS-GTA	HS-GT 1000	HS-GTF 1000	HS-UG 300
Class EN 779	M5	M5	M5	M5	M5	G4
Class ISO 16890	ePM10 65%	ePM10 65%	ePM10 65%	ePM10 65%	ePM10 65%	ISO coarse 75%
Nominal air flow [m³/h·m²]	500	500	500	1000	1000	1000 / 1600
Initial-ΔP at nominal-airflow[Pa]	150	150	150	150	150	70
Recommended final-ΔP in [Pa]	550	550	550	550	550	250
Max. temp. [°C]	100	100	100	100	100	300

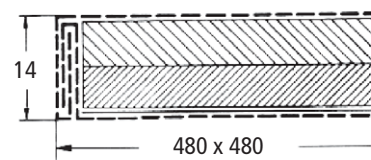
Please ask for other desired dimensions and designs.



Type HS-GTU and HS-GT-1000 with sturdy cardboard frame



Type HS-GTB and HS-GTF-1000 with elastic cardboard frame



Type HS-GTA and HS-UG 300 with aluminium grid-frame



## HS-Panel Filter

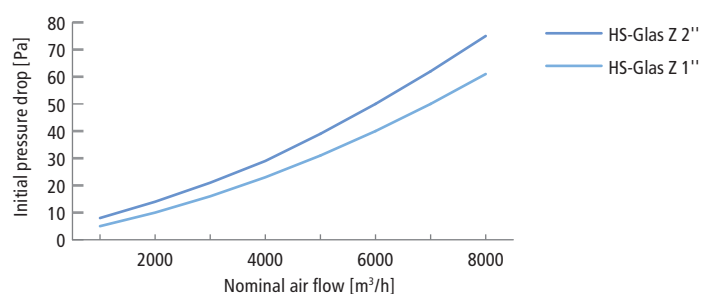


HS-Glas Z 1" and HS-Glas Z 2" are filtration cells mainly used for climatic and ventilation systems. The media consists of elastic fiberglass, which form a fleecy weave. A robust cardboard or extruded plastic frame holds it. For more efficient adsorptions and dust binding ability the media is coated with a non-toxic dust binder.

Type:	HS-Glas Z 1"	HS-Glas Z 2"
Class EN 779	G2	G3
Class ISO 16890	ISO coarse 20%	ISO coarse 50%
Nominal air flow [m <sup>3</sup> /h*m <sup>2</sup> ]	5400 - 7200	5400 - 7200
Initial-ΔP [Pa]	50	55
Recommended final ΔP [Pa]	140	160
Max. temp. [°C]	65°	65°

Width	Dimensions [mm]		Nominal air flow [m <sup>3</sup> /h]
	Height	Depth	
292	596	24	1000
393	495	24	1100
495	495	24	1350
596	596	24	2000
292	596	48	500
393	495	48	1000
495	495	48	1800
596	596	48	2500

Please ask for other desired dimensions and designs.



Optional gaskets	size [mm]	form
Foamed endless gasket, polyurethane (Standard)	6 oder 8	
Flat-gasket, neoprene, epdm, viton etc.	6 oder 8	

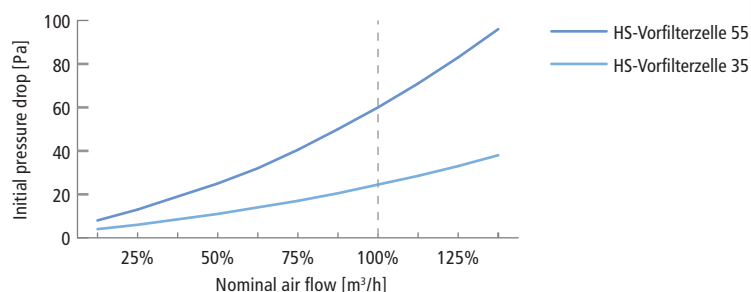
# HS-Prefilter Cell for Safechange Units

Pre-filtration cells are used for covering/protecting a succeeding/following filter. Its back is equipped with a supporting cross. The filter cell is metal free and therefore completely incinerable.

Typ:	HS-Prefilter Cell 35	HS-Prefilter Cell 55
Class EN 779	G4	M5
Class ISO 16890	ISO coarse 45%	ISO ePM10 50%
Initial-ΔP [Pa]	25	60
Recommended final ΔP [Pa]	250	400
Max. temp. [°C]	70°	70°

Dimensions [mm]			Nominal air flow [m³/h]	
Width	Height	Depth	HS-Prefilter Cell 35	HS-Prefilter Cell 55
610	305	50	1000	468
610	610	50	2000	930
610	762	50	2510	1170

Please ask for other desired dimensions and designs.



Frame	rigid 19 mm MDF
Operational conditions	max. rel. h. 100%, max. temp. 80°C
Options	<ul style="list-style-type: none"> <li>▪ Handle</li> <li>▪ Class G4 / ISO Coarse (B/290); M5 / ISO ePM 10 (E/360)</li> <li>▪ rounded edges and corners (eases BI-BO exchange)</li> </ul>

Optional gaskets	size [mm]	form
Foamed endless gasket, polyurethane (Standard)	6 oder 8	
Flat-gasket, neoprene, epdm, viton etc.	6 oder 8	



## HS-Panel Filter: HS-Z-50, HS-Z-100



HS-Z-Panel Filter may be inserted into control units as well as HVACs and other ventilation systems. They consist of folded fleeces. Due to the use of modern filtration media these panel filters don't need any supporting metal grids and are thus completely incinerable, which makes disposal easier.

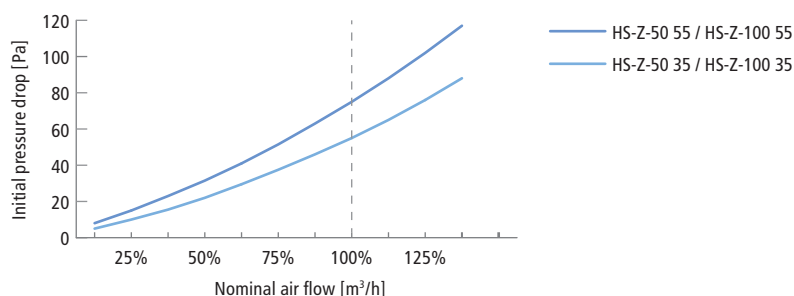
The filter media is encapsulated either by fully synthetic fibre flex (PP), a robust extruded plastic frame (PS) or cardboard. HS-Z Panel Filters are available in standard and customized sizes. Due to reasons of stability, lateral length of one single side should not exceed 610 millimeter.

HS-Z-100 may also be equipped with the pad HS-Glas 2", if integrated pre-filtration is required. This also increases the filters service lifetime.

Type:	HS-Z-50-G4	HS-Z-50-M5	HS-Z-100-G4	HS-Z-100-M5
Class EN 779	G4	M5	G4	M5
Filterklasse ISO 16890	ISO coarse 85%	ISO ePM10 50%	ISO coarse 85%	ISO ePM10 50%
Nominal air flow [m³/h*m²]	9500	9500	15500	15500
Initial-ΔP [Pa]	55	75	55	75
Recommended final ΔP [Pa]	250	400	250	400
Temp. resistance [°C]	65°	65°	65°	65°

Dimensions [mm]			Nominal air flow [m³/h]
Width	Height	Depth	
292	596	48	1000
393	495	48	1100
393	622	48	1400
495	495	48	1400
495	622	48	1700
596	596	48	1700
292	596	96	1700
393	495	96	1900
393	622	96	2400
495	495	96	2400
495	622	96	3000
596	596	96	3400

Please ask for other desired dimensions and designs.



Frame types	fibre flex (PP), cardboard, extruded polystyrene, MDF, galv. steel
Options	foamed gasket

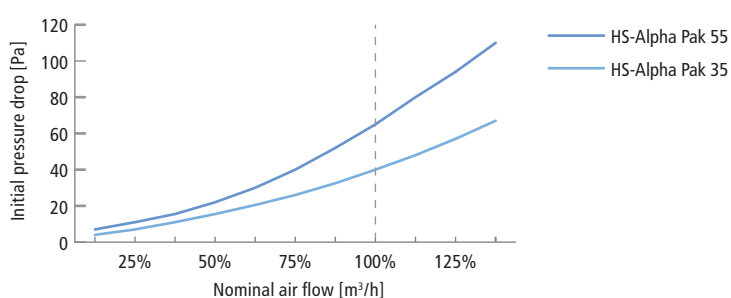
These compact filtercells serve as prefilter for HVAC systems and Turbines offering maximum filtration abilities at minimal dimensions. HS-Alpha Pak's greatest benefits is the compact construction with frame depths of 48 and 96 [mm], the outstanding dust holding capacity, maximized filter surface as well as hygienic design. The frame of HS-Alpha Pak is made of rigid extruded polystyrene profiles with edge connectors. This guarantees optimal hygienic as well as stability and also ensures easy disposal because the whole filter can be incinerated.

The high quality synthetic filter media offers deep-filtration effects thus achieving higher dust holding capacities than similar products from other manufacturers. It is pleated to self-supporting folds that are fixed by plastic spacers offering even more rigidity.

Type:	HS-Alpha Pak 35	HS-Alpha Pak 55
Class EN 779	G4	M5
Class ISO 16890	ISO coarse 90%	ISO ePM10 65%
initial-ΔP [Pa]	40	65
Temp. resistance [°C]	65°	65°

Width	Dimensions [mm]		Nominal air flow [m³/h]
	Height	Depth	
245	450	48	550
287	592	48	850
450	550	48	1200
490	592	48	1450
550	550	48	1500
592	592	48	1700
245	450	96	1100
287	592	96	1700
450	550	96	2400
490	592	96	2900
550	550	96	3000
592	592	96	3400

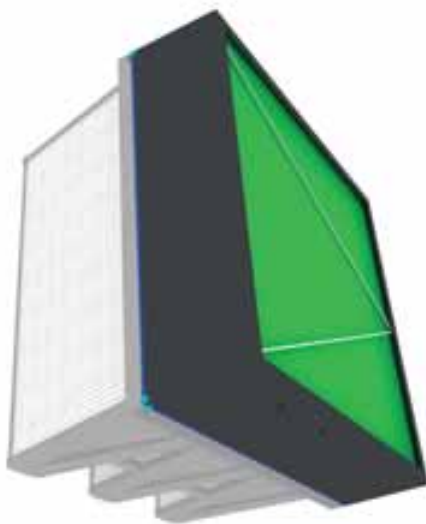
HS-Alpha Pak can be produced in nearly any dimension. For reason of stability we recommend a maximum limit length of 1200 [mm] per single side.



Frame	extruded hollow chamber profile with rigid corner connectors, depth: 48 or 96 mm, conforms VDI 6022
Operational conditions	max. rel. h. 100 [%], max. temp. 65°C
Filtermedia	synthetic fibre composit (polypropylene)
Combustible	YES
Options	<ul style="list-style-type: none"> <li>foamed gasket (single- &amp; double side)</li> <li>special gaskets (EPDM etc.)</li> <li>hook-and-loop tape (to attach filters directly to rigid bag filters)</li> <li>protection screen (aluminium, plastic)</li> <li>handle</li> </ul>



## HS-Alpha Pak GT Combo

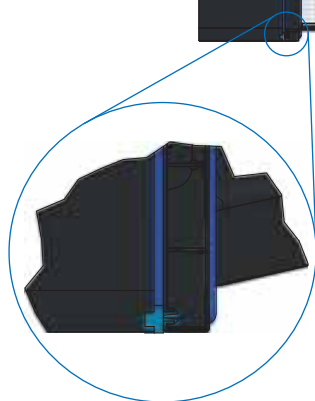
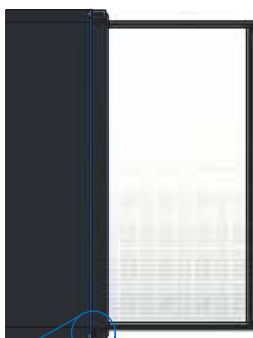


The HS-Alpha Pak 55 GT Combo is a prefilter system designed to be snapped to HS-Mikro Pak 95 GT Filters to serve as coalescer and dust filter. A layer of 50 mm coarse glass fibre media in class EN 779 G2 traps coarse dusts and agglomerates water droplets. The second stage within the filter consists of hydrophobic self-supporting pleat media suitable to remove vast amounts of fine dusts with EN 779 class F5 efficiency. Remaining moisture and fogging will be removed at this stage.

HS-Alpha Pak 55 GT Combo offers drainage holes in the bottom of the filter to lead the collected moisture out of the filter. The Class G2 glass media is held by an easy removable wire clamp, allowing quick filter exchange during operation.

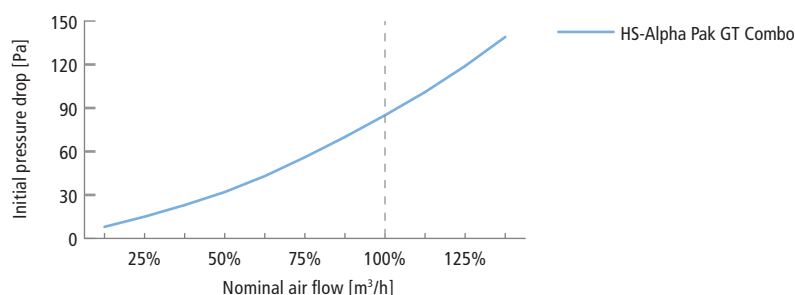
The whole unit is to be exchanged by saturation of the M5 filter stage. This also can be performed whilst the turbine remains in operation by simply plugging the HS-Alpha Pak 55 GT Combo off the HS-Mikropak 95 GT frame.

**HS-Alpha Pak 55 GT Combo**  
sideview, connected to  
HS-Mikro Pak 95 GT  
Total Depth: appx.  
450 mm



Closeup:  
Corner plug fixed to the  
following filter stage.

Type:			HS-Alpha Pak GT Combo
Class EN 779			M5
Class ISO 16890			ISO ePM10 65%
Initial-ΔP [Pa]			85
Max. Temp. [°C]			65°
Width	Dimensions [mm] Height	Depth	Nominal air flow [m³/h]
592	592	150	4250



Frame	<ul style="list-style-type: none"> <li>extruded polystyrene profile with rigid corner connectors</li> <li>dillings in the bottom allow moisture release</li> <li>open cellular gasket for moisture release on the clean air side</li> </ul>
Operational conditions	<ul style="list-style-type: none"> <li>rel. h. up to 100% (condensing)</li> </ul>
Filtermedia	<ul style="list-style-type: none"> <li>Prefilter 1st Stage: G2 / ISO coarse 20% exchangeable, progressive glassfibre media for coarse dust filtration and droplet agglomeration resp. coalescing</li> <li>Prefilter 2nd Stage: M5 / ISO ePM10 65% rigid-self supporting, pleated filtermedia for finedustprefiltration and fog coalescing / filtration.</li> </ul>

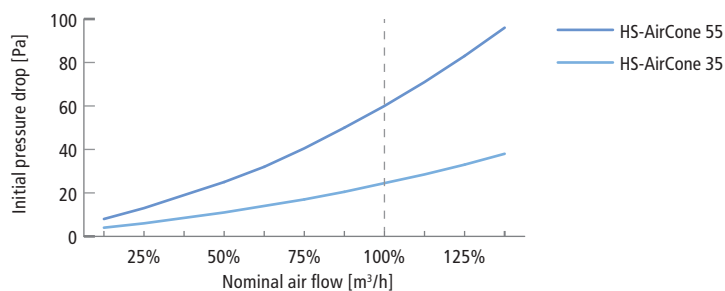


The HS-AirCone filter is suitable for all pipe applications with offering „safe-ends“. The filter can be fixed by using a T-piece and thus can be installed and replaced easily.

Due to the conical shape of the filter it is offering a surface about 5 times greater than the plain diameter of the tube. HS-AirCone therefore reaches a much lower pressure drop and longer service-lifetime in comparison to a flat filter or filterpad.

Type:		HS-AirCone 35	HS-AirCone 55
Class EN 779		G4	M5
Filterklasse ISO 16890		ISO coarse 90%	ISO ePM10 55%
Initial-ΔP [Pa] at nominal air flow		25	60
Max. temp. [°C]		65°	65°
Dimension [mm]		Nominal air flow [m³/h]	
Diameter	Length	HS-AirCone 35	HS-AirCone 55
100	220	220	110
125	260	270	135
160	340	490	245
200	420	760	380
250	892	1200	600
315	540	1850	920
400	860	3000	1500
500	1100	4800	2400
630	1350	7400	3700

Please ask for other desired dimensions and designs.



Operational conditions	max. rel. h. 100 [%], max. 65°C
Filtermedia	progressive, synthetic polypropylene-fibre compound
Combustible	YES ( cone base frame is made from plastic )



## Bag Filter – Coarse Dust

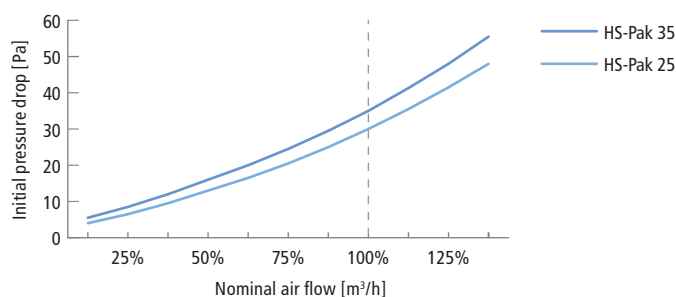


These bag filters have been proven to be efficient as pre-filters within HVACs and other ventilation systems. Spacers between individual bags ensure an even airflow throughout the filter, which allows dust loading and even distribution. This results in a long service life of the filter and reduces energy costs. The efficiency stays constant even with varying airflows. Also, the bags are intrinsically stiff while being exposed to the airstream. In order to guarantee a proper stability even with over-size filters, the front framework is being reinforced by angle bars. Customers may choose from front frames constructed of 25 [mm] thick galvanized sheet steel or plastic as well as 20 [mm] thick aluminium or plastic profiles. The ones with plastic frames are completely incinerable, which makes disposal easier. All products meet the hygienic requirements according to VDI 6022.

Type:	HS-Pak 25	HS-Pak 35
Class EN 779	G3	G4
Class ISO 16890	ISO coarse 55%	ISO coarse 65%
Initial-ΔP [Pa] at nominal air flow	30	35

Dimensions [mm]		Nominal air flow [m³/h]			# of pockets
Width	Height	Depth 200 [mm]	Depth 360 [mm]	Depth 500 [mm]	
592	592	1900	3400	4700	6
490	592	1600	2800	4000	5
287	592	900	1700	2300	3
287	287	500	950	1300	3
592	892	2700	4900	6000	6
287	892	1400	2400	3000	3

Please ask for other desired dimensions and designs.



Frame	<ul style="list-style-type: none"> <li>polystyrene 25 [mm] (combustible)</li> <li>galv. steel 25 [mm]</li> <li>polystyrene 20 [mm] (combustible)</li> </ul>
Operational conditions	max. rel. h. 100 %, max. temp. 70°C
Filtermedia	progressive synthetic fibre
Combustible	Yes (Frame: plastic)
Options	<ul style="list-style-type: none"> <li>various sizes and shapes (e.g. slanted filter bags)</li> <li>foamed gasket onto front frame</li> <li>EX protected Ex</li> </ul>

## Bag Filter – Medium / Finedust

HS-Pak 55 and HS-Pak 62 are being used as high-quality pre-filter (acc. to VDI 6022) or main filter for individual air purification as well as for industrial processes. They are being produced completely from synthetic fiber fleeces, which form wedge-shaped bags. This design ensures an even airflow throughout the filter. These filters have an exceptionally high dust storage capacity.

The efficiency stays constant even with varying airflows. Also, the bags stay intrinsically stiff while being exposed to the airstream. In order to guarantee a proper stability even with over-size filters, the front framework is being reinforced by angle bars. Customers may choose from front frames made from 25 [mm] thick galvanized sheet steel or plastic as well as 20 [mm] thick aluminium profiles. The ones with plastic frames are completely incinerable, which makes disposal easier.



Type:	HS-Pak 55	HS-Pak 65	HS-AirSynErgy 65
Class EN 779	M5	M6	M6
Class ISO 16890	ISO ePM10 55%	ISO ePM2.5 65%	ISO ePM10 65%
Initial-ΔP [Pa] at nominal air flow	45	65	55

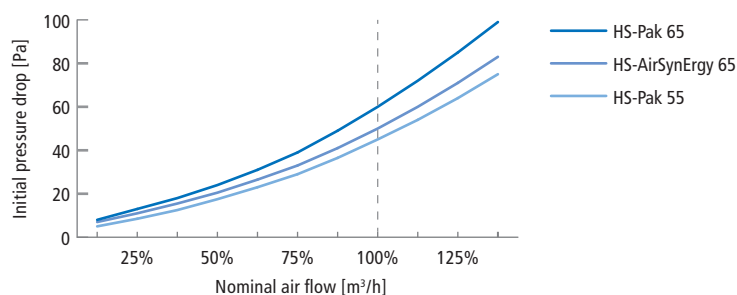
Performance data HS-Pak 55 (lofty media)


Dimensions [mm]		Nominal air flow [m³/h]			# of pockets
Width	Height	Depth 200 [mm]	Depth 500 [mm]	Depth 600 [mm]	
592	592	1360	3400	4000	6
490	592	1130	2800	3300	5
287	592	680	1600	2000	3

Performance data HS-Pak 65 (meltblown) & HS-AirSynErgy 65 (waved meltblown)

Dimensions [mm]		Nominal air flow [m³/h]			# of pockets
Width	Height	Depth 200 [mm]	Depth 500 [mm]	Depth 600 [mm]	
592	592	1570	2620	3400	8
490	592	1300	2160	2800	6
287	592	790	1310	1700	4

Please ask for other desired dimensions and designs.



Frame	<ul style="list-style-type: none"> <li>polystyrene 25 [mm] (combustible)</li> <li>galv. steel 25 [mm]</li> <li>polystyrene 20 [mm] (combustible)</li> </ul>
Operational conditions	max. rel. h. 100 %, max. temp. 70°C
Filtermedia	<ul style="list-style-type: none"> <li>progressive synthetic fibre</li> <li>microfibre meltblown (HS-Pak 65: green color)</li> </ul>
Combustible	Yes (Frame: plastic)
Options	<ul style="list-style-type: none"> <li>various sizes and shapes (e.g. slanted filter bags)</li> <li>foamed gasket onto front frame</li> <li>EX protected </li> <li>high performance microfibre-pre-filter layer for increased lifetime (HS-Pak 65)</li> <li>bio-static treatment to prevent growth of microorganisms, fungi and bacteria</li> </ul>

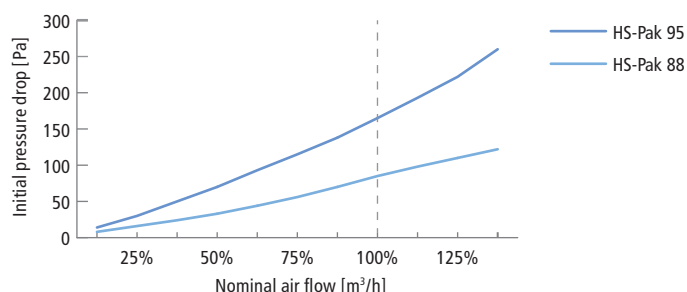
## Bag Filter – Finedust




The filter medium of the fine dust pocket filters consists of fine synthetic fibers sewn into wedge-shaped pockets. The filters serve as pre-separators for subsequent filter stages or as main filters, e.g. for fine dust separation in air-conditioning systems with very high air purity, supply air for high-quality assembly rooms and switchgear, in food production, pre-filters for clean room systems in the pharmaceutical industry, aerosol separation or other process protection.

In these high-quality HS pocket filters, parallel spacer seams along the entire length of the pocket ensure uniform airflow through the filter, so that the filter pockets can be loaded with dust over their entire depth. The advanced wave-structured filter media provides high efficiency at low pressure drops. Thanks to the high efficiency, HS-Pak 88 air filters achieve the required filtration efficiency in the ePM1 range according to VDI 6022 even with reduced filter area (fewer filter pockets). The collection efficiency of the filters is constant even with fluctuating and varying air flow rates.

Type:	HS-Pak 88		HS-Pak 95		
Class EN 779	F7		F9		
Class ISO 16890	ISO ePM1 65%		ISO ePM1 80%		
Initial-ΔP [Pa] at nominal air flow	90 / 105		160 / -		
Dimension [mm]		Nominal air flow [m³/h]			# of pockets
Width	Height	Depth 300 [mm]	Depth 500 [mm]	Depth 600 [mm]	
592	592	1570	2620	3400	8 / 6
490	592	1300	2160	2800	6 / 4
287	592	790	1210	1700	4 / 3
287	287	400	660	850	4 / 3
592	892	2360	3930	5100	8 / 6
287	892	1180	1970	2550	4 / 3
Please ask for other desired dimensions and designs.					



Frame	<ul style="list-style-type: none"> <li>polystyrene 25 [mm] (combustible)</li> <li>galv. steel 25 [mm]</li> <li>polystyrene 20 [mm] (combustible)</li> </ul>
Operational conditions	max. rel. h. 100%, max. temp. 70°C
Filtermedia	<ul style="list-style-type: none"> <li>synthetic filter media with inner waved structure</li> <li>color: pure white with class id print</li> </ul>
Combustible	Yes (Frame: plastic)
Options	<ul style="list-style-type: none"> <li>various sizes and shapes (e.g. slanted filter bags)</li> <li>foamed gasket onto front frame</li> <li>EX protected </li> <li>bio-static treatment to prevent growth of microorganisms, fungi and bacteria</li> </ul>

## Energy saving Bag Filters – Finedust

HS-AirSynErgy bagfilters offers a unique fully synthetic filtermedia with a special waveform structure allowing virtually the double filtersurface with the same construction dimensions as usual bag filters. Due to be increased inner surface the pressure drop of HS-AirSynErgy filters is up to 30% lower in comparison to standard bag filters. The added surface also offers a dramatically increased dust holding capacity which increases the filters service time 30 - 60%.

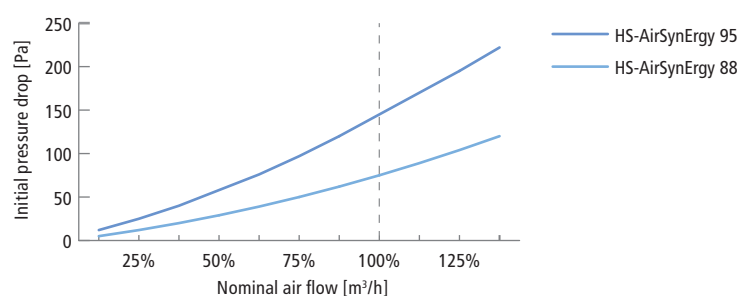
HS-AirSynErgy serve as ultra high capacity pre-filters for following filterstages or as premium class main filters i.e. for fine dust filtration in comfort air HVAC or areas with high demands for air hygiene such as food production plants. HS-AirSynErgy also serve process air systems i.e. for combustion engines or sensitive machinery.



Type:			HS-AirSynErgy 88		HS-AirSynErgy 95	
Class EN 779			F7		F9	
Class ISO 16890			ISO ePM1 60%		ISO ePM1 85%	
Initial-ΔP [Pa] at nominal air flow			75		145	
Dimensions [mm]			Nominal air flow [m³/h]	# of pockets	Energy class comparable to Eurovent 4/21	
Width	Height	Depth				
592	592	600	3400	8	<div><div>Low energy consumption</div><div><div>A+</div><div>A</div><div>B</div><div>C</div><div>D</div><div>E</div></div><div>A</div></div>	
490	592	600	2800	6		
287	592	600	1700	4		
287	287	600	850	4		
592	892	600	5100	8		
287	892	600	2550	4	High energy consumption	

Please ask for other desired dimensions and designs.

Please ask for other desired dimensions and designs.



Frame	<ul style="list-style-type: none"> <li>polystyrene 25 [mm] (combustible)</li> <li>galv. steel 25 [mm]</li> <li>polystyrene 20 [mm] (combustible)</li> </ul>
Operational conditions	max. rel. h. 100%, max. temp. 70°C
Filtermedia	<ul style="list-style-type: none"> <li>synthetik composit media with inner wave structure, offers appx. factor 2,5 more filtersurface than standard bag filter media.</li> <li>color: pure white with class id print.</li> </ul>
Combustible	Yes (Frame: plastic)
Options	<ul style="list-style-type: none"> <li>various sizes and shapes (e. g. slanted filter bags)</li> <li>foamed gasket onto front frame</li> <li>ePM1 60 - 70 % in energy class <b>A+</b></li> </ul>



Easy to notice: The cross section illustrates that the waved structure offers a much larger filtration surface in the same dimensions as usual flat media.



## Compact Filter – HS-Beta Pak



HS-Beta Pak are robust fine dust filters, employed as preliminary or main filters when long filter service lives are required in large and/or variable volume flows. Typical areas of application are electronics and computer rooms, pharmaceutical production areas, research laboratories, hospitals, industrial ventilation and preliminary filtration for particulate air filters. They fit in all standard framesystems or mounting frames of various manufacturers for particulate air filters, according to the design variant. They are suitable for use as replacement filters in all standard commercially available mounting frames.

Due their small depth HS-Beta Pak save space in new constructed ventilation systems. These filters are also great space savers when existing ventilation systems need to be rigged up for higher filter classes.

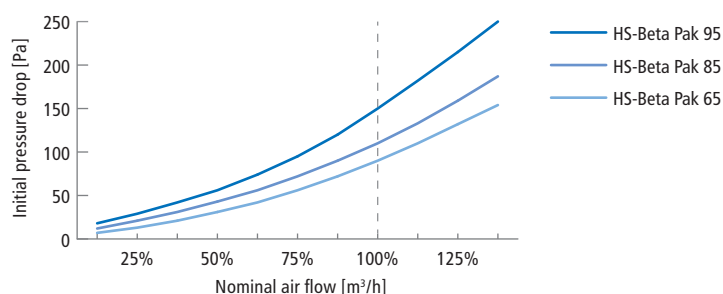
The sturdy plastic frame fulfills the demands for high rigidity and hygiene combined with the ease of disposal since the filters are completely metalfree and thus fully incinreable.

Type:	HS-Beta Pak 65	HS-Beta Pak 85	HS-Beta Pak 95
Class EN 779	M6	F7	F9
Class ISO 16890	ISO ePM2.5 65%	ISO ePM1 70%	ISO ePM1 80%
Initial-ΔP [Pa] at nominal air flow	90	110	150
Max. temp. [°C]	65°	65°	65°

Dimensions [mm]			Nominal air flow [m³/h]
Width	Height	Depth	
592	592	48	2000
490	592	48	1650
287	592	48	950
592	592	96	3400
490	592	96	2800
287	592	96	1550

Please ask for other desired dimensions and designs.



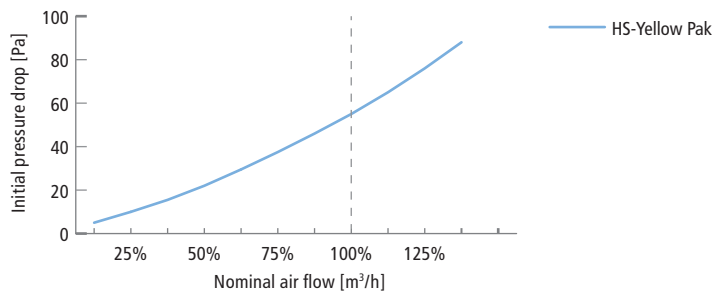
Frame	hollow chamber extruded polystyrene with robust injection mold corner connectors. Framedepth : 48 or 96 mm
Operational conditions	max. rel. h.100 %
Spacers	thermoplastic (minipleat)
Filtermedia	<ul style="list-style-type: none"> <li>high quality glass fibre paper (water resistant)</li> <li>optional: fully synthetic (more rigid, higher moisture resistance)</li> </ul>
Combustible	Yes
Options	<ul style="list-style-type: none"> <li>foamed gasket (single &amp; both sides)</li> <li>special gaskets (Viton, EPDM etc.)</li> <li>protection screen (single &amp; both sides)</li> <li>handle</li> <li>customer specific demands</li> </ul>

## Compact Filter – HS-Yellow Pak

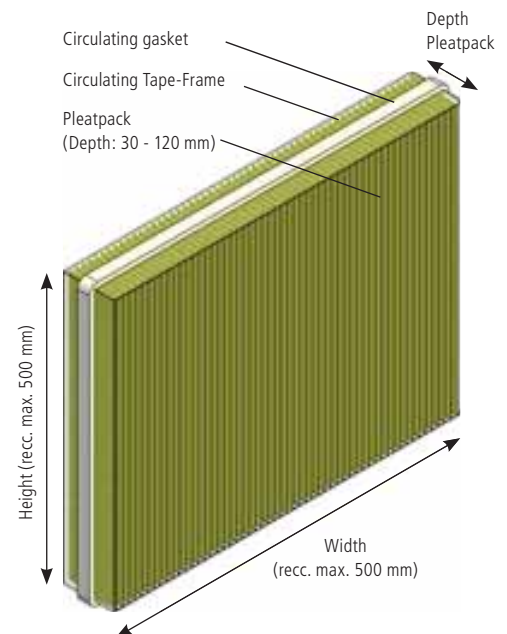
This filter relies on a most basic design consisting of pleated filtermedia, thermoplastic separators, a sticky tape frame and a circulating gasket. It is designed as a low-cost filter but offers unique features for various applications. The filtermedia pack is selfsupporting and therefore offers high rigidity while also allowing very low pressure drops. This helps to save energy and to downsize fans and housing at the intended application. HS-Yellow Pak is designed to be used for machinery or downsized HVAC units such as for example cooling fans or passive-house filtration. Even though the design is stripped down the filter is capable to efficiently operate as particle filter even against airborne submicron particles down to 0,4 µm size. The filtermedia is made from a semisynthetic fleece with nanoscopic pores. Due to its concept the rigidity allows use of the pack without the usual framing made from cardboard, plastic or steel. The media is robust and tolerant against mechanical stress. HS-Yellow Pak can be manufactured in nearly any size but we would not advise exceed side measures >500 mm. For bigger sizes we recommend framing in fiberplast, cardboard or sturdy extruded plastic profiles which come in standard depths of 48, 78, 96 or 150 mm. The filter can be cleansed several times by blowing out the collected dust with dry compressed air. This should only be done, if the hygienic circumstances of the application allows it (i.e. at machine filters). The filter is completely free of metal and therefore combustible to ease waste disposal.



Type:				HS-Yellow Pak
Max. efficiency @ 0,4 µm [%]				>85 %
Initial-ΔP [Pa] at nominal air flow				55
Max. temp. [°C]				65°
Dimension incl. filterframe [mm]			Pleatpack depth [mm]	Nominal air flow [m³/h]
Width	Height	Depth		
592	592	78	50	2200
490	592	78	50	1750
287	592	78	50	1100
592	592	96	80	3400
490	592	96	80	2800
287	592	96	80	1550
Please ask for other desired dimensions and designs.				



Frame	<ul style="list-style-type: none"> <li>fiberplast (polypropylene)</li> <li>cardboard (moisture resistand beverage board)</li> <li>polystyrene (extruded profile, depth: 48, 78, 96, 150 mm)</li> </ul>
Regenerateable	Yes (can be pulse cleaned)
Operational condition	max. rel. h.100 %
Spacers	thermoplastic (minipleat)
Filtermedia	<ul style="list-style-type: none"> <li>epoxy stabilized, semi-synthetic</li> <li>burst strength &gt;100 kPa (unfolded media)</li> <li>standard pleat depths: 50, 80, 120 mm</li> </ul>
Combustible	Yes
Options	<ul style="list-style-type: none"> <li>foamed gasket (on optional polystyrene frame)</li> <li>individual fold depth (30 - 120 mm)</li> </ul>



These pleatpacks offer maximal stability and self support. Therefore they don't require any usual framing such as cardboard, plastic or steel. The filtermedium is extremely robust and offers favourable resistance against high mechanical stress.

## Compact Filter – HS-ECO Pak



This production line serves as pre- or main-filter for fine dust in air-conditioning and ventilation systems. The filter can be installed where pocket or compact filters won't fit due to space limitations. Also HS-ECO Pak offer a much higher initial efficiency (up to +25%) than common bag filters. Thermo-plastic threads are used as spacers between the densely packed media folds to achieve even spacing. The frames are made from polystyrene. Therefore the filter is completely incinerable, easy to dispose and corrosion free.

The ruggedized design guarantees a high stability and durability. The media is water-resistant, and may thus be employed with highly humid airstreams – a temporarily pressure rise is typical. With a decreasing humidity level the resistance will also decline. Optionally the filter can be fitted with fully synthetic filtermedia, offering even more stability and moisture inertness.

HS-ECO Pak can be installed on the clean air side or the internal side. Because of their reduced installation depth HS-ECO Pak are ideal space-savers in particular within newly assembled units.

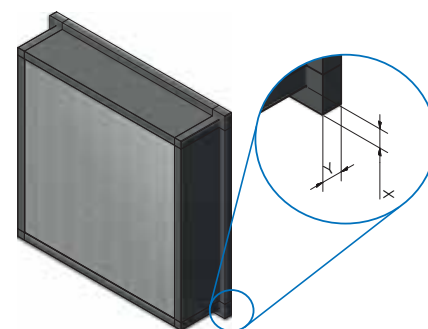
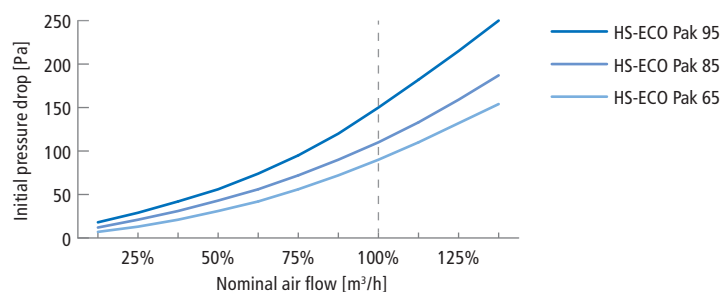
Type:	HS-ECO Pak 65	HS-ECO Pak 85	HS-ECO Pak 95
Class EN 779	M6	F7	F9
Class ISO 16890	ISO ePM2.5 65%	ISO ePM1 70%	ISO ePM1 80%
Initial-ΔP [Pa] at nominal air flow	90	110	150
Max. temp. [°C]	65°	65°	65°
Dimensions [mm]			Nominal air flow [m³/h]
Width	Height	Depth	
592	592	78	2150
490	592	78	1730
287	592	78	1050
287	287	78	500
592	592	98 / 100	2960
490	592	98 / 100	2380
287	592	98 / 100	1450
287	287	98 / 100	700
592	592	150	3400
490	592	150	2750
287	592	150	1700
287	287	150	850
592	592	292	5300
490	592	292	4350
287	592	292	2700
287	287	292	1250
Please ask for other desired dimensions and designs.			

Dok.-ID.: 06/002

documents might be subject to change / issue June 2018

Frame depth [mm] (profile type)	X [mm]	Y [mm]
78 /150	20	22
98	20	20
100	19	25
150 <sup>(1)</sup> / 292 <sup>(1)</sup>	20	21

<sup>(1)</sup> The Framedepth can be varied for these special profile types only.



Flange dimensions X and Y

Frame	polystyrene extruded profile, with header flange
Operational conditions	max. rel. h. 100%
Spacers	thermoplastic (minipleat)
Filtermedia	<ul style="list-style-type: none"> <li>high quality glass fibre paper (water resistant)</li> <li>optional: fully synthetic (more rigid, higher moisture resistance)</li> </ul>
Combustible	Yes
Fertigungsoption	<ul style="list-style-type: none"> <li>foamed gasket on the header flange</li> <li>protection screen (single or both sides)</li> <li>customer specific specialities</li> </ul>

## Compact Filter – HS-V Pak

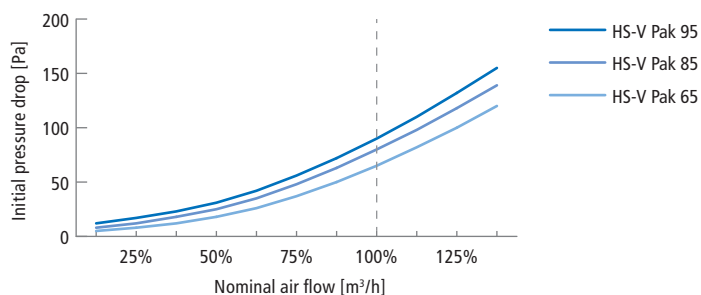


These compact finedust filters are used as pre- and main filters in stationary applications such as cleanroom, pharmaceutical, medical or nuclear (i.e. in gloveboxes, cleanbenches etc.). With mobile applications HS-V-Pak are used in machinery and vehicles (i.e. Waste disposal). HS-V-Pak filters are in use where less installation space or flexible arrangements are required. HS-V-Pak filters allow maximum usage available space in channel sections.

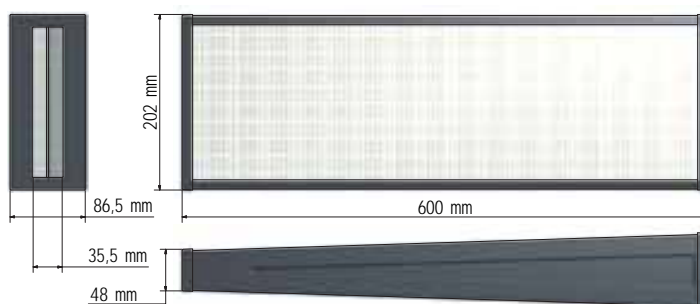
Our advanced production techniques enables us to bring in the maximum filtersurface on small-est filter sizes. This allows operational cost & energy consumption reductions by lowering pres-sure drop, longer lifetime and reduction of dimensions of new planned systems. HS-V-Pak filters consist from fully combustible raw materials so the filter can be completely incinerated after use. This allows easy disposal especially when toxic or bio-hazardous filtrates are collected by the filter.

Type:	HS-V-Pak 65	HS-V-Pak 85	HS-V-Pak 95
Class EN 779	M6	F7	F9
Class ISO 16890	ISO ePM2.5 55%	ISO ePM1 60%	ISO ePM1 80%
Initial-ΔP [Pa] at nominal air flow	65	80	90
Recommended final-ΔP [Pa]	600	600	600
Weight [Kg]	0,9 kg	1 kg	1kg
Temperature resistance [°C]	65°	65°	65°
Width [mm]	Height [mm]	Depth [mm]	Nominal air flow [m³/h]
86,5	202	600	200

Please ask for other desired dimensions and designs.



Frame	plastic polystyrol
Operational condition	max.rel. h. 100%
Spacers	thermoplastic (minipleat)
Filtermedia	<ul style="list-style-type: none"> <li>high quality glass fibre paper (water resistant)</li> <li>optional: fully synthetic</li> </ul>
Combustible	YES
Options	<ul style="list-style-type: none"> <li>protection screen (single side)</li> <li>gasket 6 mm (air entry)</li> </ul>
Sealing in ductwork / installation:	<ul style="list-style-type: none"> <li>with optional foamed gasket</li> <li>with sealing media (silicone, acryl etc.)</li> <li>with special adhesive tape (1 roll = appx. 100 filter elements)</li> </ul>





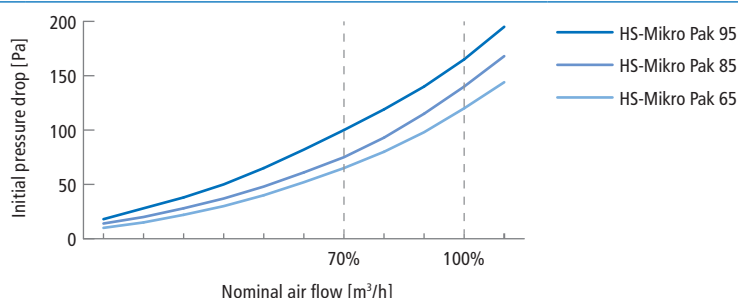
## Compact Filter – HS-Mikro Pak

PM<sub>10</sub> PM<sub>2.5</sub> PM<sub>1</sub> M<sub>5.6</sub> F<sub>7.9</sub>

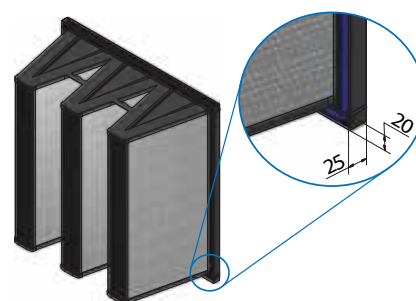
These filters serve as pre- or main-filtration elements for environments with voluminous air-streams and/or when long lifespan is necessary. HS-Mikro Pak can be used as fine dust filtration in air-conditioning, ventilation or turbine systems. The filters serve both as pre- and main-filters for adsorbing airborne particles, toxic dust, as well as aerosols in inside air outlets and outside air inlets. The rigid and corrosion resistant plastic frame ensures easy disposal of the used filter because it is totally combustible. Its design guarantees a high stability and is corrosion free. The media is water-repellent and therefore usable within air flows of high humidity. The air entry profiles are aerodynamically shaped to reduce the pressure drop at high flow rates. Upon request HS-Mikro Pak can be equipped with a burst protection grid on the clean air side. Tests at the VTT have proved that HS-Mikro Pak filters withstand the tests maximum pressure drop of >4500 Pa with ease. Various comparison tests have proved that HS-Mikro Pak has superior efficiency and service lifetime over most competitor products. If required we can supply you with more detail informations on this topic. HS-Mikro Pak fit to mounting frames of all major brands.

Typ:	HS-Mikro Pak			Energy class comparable to Eurovent 4/21	
	65	85	95		
Class EN 779	M6	F7	F9	<div>Low energy consumption</div> <div><div><div>A+</div><div>A</div><div>B</div><div>C</div><div>D</div><div>E</div></div><div>A</div><div>High energy consumption</div></div>	
Class ISO 16890	ePM10 80%	ePM1 60%	ePM1 85%		
Initial-ΔP [Pa] (A / B)	65 / 120	75 / 140	100 / 165		
max. final ΔP	600	600	600		
Max. temp. [°C]	65°	65°	65°		
Dimensions [mm]			Nominal air flow [m³/h]		Weight [kg]
Width	Height	Depth	A: standard	B: high flow rate	
592	592	292	3400	5000	7
490	592	292	2800	4100	5
287	592	292	1700	2500	3

Please ask for other desired designs.



Frame	corrosion resistant plastic
Operational conditions	<ul style="list-style-type: none"> <li>max. rel. h. 85 [%]</li> <li>max. temp. 65 [°C], short term peak up to max. 80 [°C]</li> </ul>
Spacers	thermoplastic (minipleat)
Filtermedia	<ul style="list-style-type: none"> <li>high quality glass fibre paper, pressure drop may temporarily increase at high humidity levels</li> <li>Optional: fully synthetic filtermedia for maximum rigidity, higher mechanical stress tolerance</li> </ul>
Combustible	YES
Options	<ol style="list-style-type: none"> <li>1.) burst protector / protection screen</li> <li>2.) foamed gasket on the clean air side of the flange</li> <li>3.) +14% more filtersurface</li> </ol>
Example applications	<ul style="list-style-type: none"> <li>main filter for gas turbines</li> <li>pre- and mainfiltration for particle and finedust removal</li> <li>main filter for comfort air filtration</li> </ul>



Detail: flange dimension (without gasket)  
Displays also options 1 & 2.

## Compact Filter – HS-Mikro Pak 4V



HS-Mikro Pak 4V compact filters serve as pre-filter and main filter when high flow rates and high initial efficiency are required.

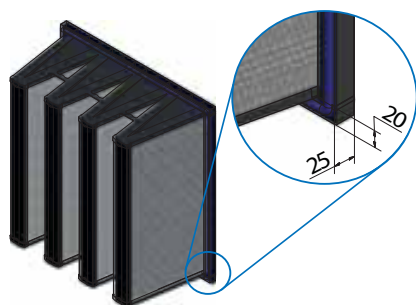
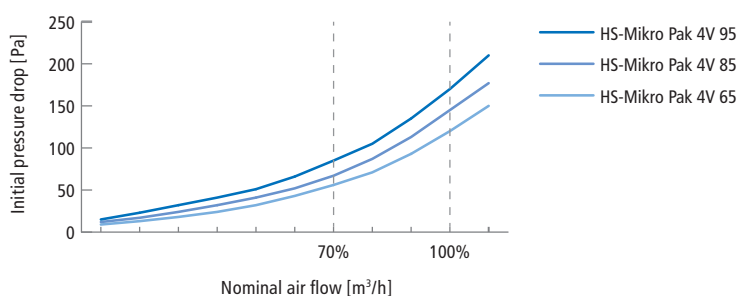
These filters offer more filter surface than the classic HS-Mikro Pak and can therefore achieve a higher dust storage capacity and thus longer service life.

Thanks to the aerodynamically shaped inlet profiles, these filters offer significantly lower initial pressures than comparable filters from other manufacturers. The robust plastic frame is corrosion-free and allows easy disposal - the filter is completely incinerable.

For applications with the highest demands, the filter can be reinforced on the clean air side with burst protection grids.

Typ:			HS-Mikro Pak 4V		<div>Energy class comparable to Eurovent 4/21</div> <div><div>Low energy consumption</div><div><div>A+</div><div>A</div><div>B</div><div>C</div><div>D</div><div>E</div><div>High energy consumption</div></div></div>	
			65	85		95
Class EN 779			M6	F7		F9
Class ISO 16890			ePM10 85%	ePM1 65%		ePM1 90%
Initial-ΔP [Pa] (A / B)			65 / 120	75 / 140		85 / 165
Recc. final ΔP			600			
Max. temp. [°C]			65° (optional 120°)			
Dimensions [mm]			Nominal air flow [m³/h]		Weight [kg]	
Width	Height	Depth	A: standard	B: high flow rate		
592	592	292	3400	5000	7	
490	592	292	2800	4100	5	
287	592	292	1700	2500	3	

Please ask for other desired designs.



Detail: flange dimension (without gasket)  
Displays also options 1 & 2.

Frame	corrosion resistant plastic
Operational conditions	<ul style="list-style-type: none"> <li>max. rel. h. 100 [%]</li> <li>max. temp. 65 [°C], short term peak up to max. 80 [°C]</li> <li>optional up to max. 120 [°C]</li> </ul>
Spacers	thermoplastic (minipleat)
Filtermedia	<ul style="list-style-type: none"> <li>high quality glass fibre paper (water resistant), pressure drop may temporarily increase at high humidity levels</li> <li>Optional: fully synthetic filtermedia for maximum rigidity, higher mechanical stress tolerance</li> </ul>
Combustible	YES
Options	<ol style="list-style-type: none"> <li>burst protector / protection screen</li> <li>foamed gasket on the clean air side of the flange</li> <li>+14% more filtersurface</li> <li>temperature resistance up to 120°C</li> </ol>
Example applications	<ul style="list-style-type: none"> <li>main filter for gas turbines</li> <li>pre- and mainfiltration for particle and finedust removal</li> <li>main filter for comfort air filtration</li> </ul>

## Compact Filter – HS-Deka Pak

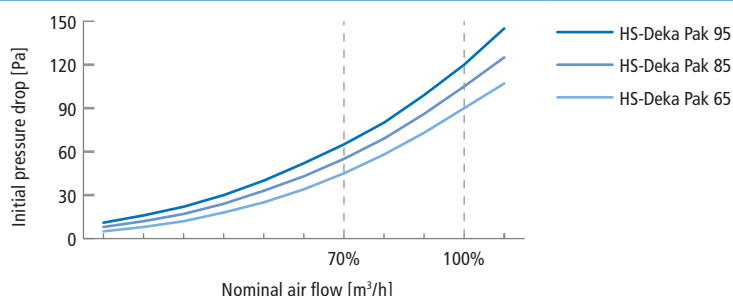


HS-Deka Pak compact filters provide twice the filter area compared to conventional types of rigid bag filters due to the greater depth of 420 mm. This allows for applications such as turbo machinery, process air and HVAC maximum flow rates and significantly longer service life. Your applications may profit from the of significantly lower energy consumption than with other types of filters. HS-Deka Pak are especially recommended for applications where installation space is critical but high flow rates are required. Due to the tolerance against high air speed this filter gives more freedom in the design of space saving filter processes. HS-Deka Pak ideally suit as pre- or main filter for filtration of fine dusts and aerosols. They serve as intake and exhaust air filter also in harsh operating environments with high humidity. For use in the offshore turbo machinery, process air or salt removal these filter can be equipped with synthetic filter media, which does not lack in structural strength and stability when completely soaked with moisture. The sturdy plastic frame is corrosion-free and allows for easy disposal, since the filter can be completely incinerated after ending it's service lifetime.

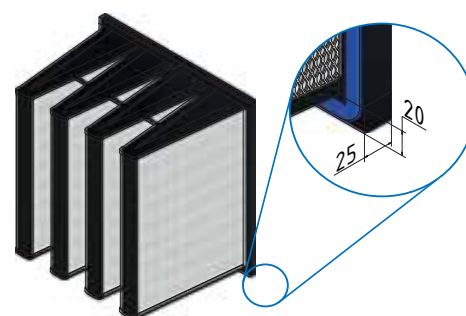


Type:	HS-Deka Pak			Energy class comparable to Eurovent 4/21	
	65	85	95		
Class EN 779	M6	F7	F9	Low energy consumption	
Class ISO 16890	ePM10 85%	ePM1 65%	ePM1 90%	<div><div>A+</div><div>A</div><div>B</div><div>C</div><div>D</div><div>E</div></div> <div>A+</div>	
Initial-ΔP [Pa] (A / B)	45 / 90	55 / 105	65 / 120		
Recc. final ΔP	600	600	600		
Max. temp. [°C]	65°	65°	65°		
					High energy consumption
Dimensions [mm]			Nominal air flow [m³/h]		Weight [kg]
Width	Height	Depth	A: standard	B: high air flow	
592	592	420	3400	5000	12
490	592	420	2800	4100	8
287	592	420	1700	2500	6

Please ask for other desired designs.



Frame	corrosion resistant plastic
Operational conditions	<ul style="list-style-type: none"> <li>max. rel. h.100 [%]</li> <li>max. temp. 65 [°C], short term peak up to max. 80 [°C]</li> </ul>
Spacers	thermoplastic (minipleat)
Filtermedia	<ul style="list-style-type: none"> <li>high quality glass fibre paper (water resistant), pressure drop may temporarily increase at high humidity levels</li> <li>Optional: fully synthetic filtermedia for maximum rigidity, higher mechanical stress tolerance</li> </ul>
Combustible	Yes
Options	<ol style="list-style-type: none"> <li>1.) burst protector / protection screen</li> <li>2.) foamed gasket on the clean air side of the flange</li> <li>3.) +14% more filtersurface</li> </ol>
Example applications	<ul style="list-style-type: none"> <li>main filter for gas turbines</li> <li>pre- and mainfiltration for particle and finedust removal</li> <li>high performance alternative for bag or std. 292 mm rigid bag filters.</li> </ul>



Detail: flange dimension (without gasket)  
Also displays options 1 & 2.

## Compact Filter – HS-Mikro Pak 4V Econergy

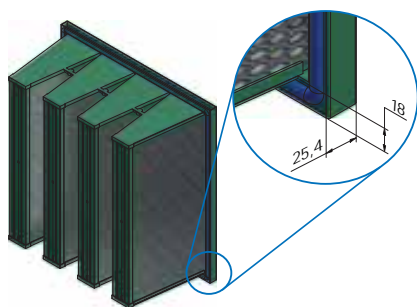
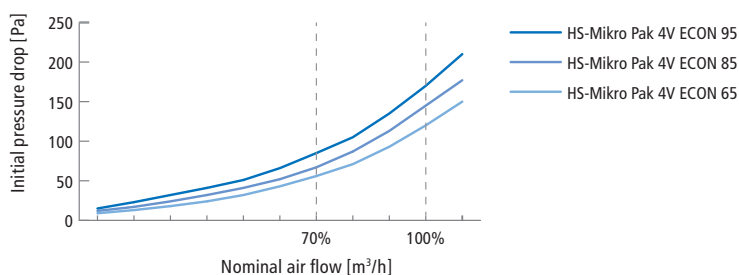
HS-Mikro Pak 4V ECONERGY are the more sustainable alternative for all HVAC and power systems. The large filter areas made of energy-saving filter media offer low initial pressures and an outstanding dust holding capacity for compact filters. This allows the potential energy savings in the processes concerned to be exploited to improve the CO<sub>2</sub> balance. The plastic components of HS-Mikro Pak 4V ECONERGY consist of up to 60% renewable raw materials to also improve the CO<sub>2</sub> balance of this consumer product. Unlike other resource-saving compact filter solutions, HS-Mikro Pak ECONERGY does not pose any risks in terms of efficiency or tightness. The robust plastic frame is corrosion-free and allows easy disposal, as the filter is fully incinerable and will emit 90% less fossil CO<sub>2</sub> when incinerated after usage.

The filter complies with the requirements of VDI 6022. Optionally, HS-Mikro Pak 4V ECONERGY can be equipped with advanced synthetic filter media.



Typ:	HS-Mikro Pak 4V			Energy class comparable to Eurovent 4/21	
	65	85	95		
Class EN 779	M6	F7	F9	<div>Low energy consumption</div> <div><div>A+</div><div>A</div><div>B</div><div>C</div><div>D</div><div>E</div></div> <div>High energy consumption</div>	
Class ISO 16890	ePM10 85%	ePM1 65%	ePM1 90%		
Initial-ΔP [Pa] (A / B)	65 / 120	75 / 140	85 / 165		
Recc. final ΔP	600	600	600		
Max. temp. [°C]	65°	65°	65°		
Dimensions [mm]			Nominal air flow [m³/h]		Weight [kg]
Width	Height	Depth	A: standard	B: high flow rate	
592	592	292	3400	5000	7
490	592	292	2800	4100	5
287	592	292	1700	2500	3

Please ask for other desired designs.



Detail: flange dimension (without gasket)  
Displays also options 1 & 2.

Frame	corrosion resistant plastic from renewable raw materials
Operational conditions	<ul style="list-style-type: none"> <li>max. rel. h. 100 [%]</li> <li>max. temp. 65 [°C], short term peak up to max. 80 [°C]</li> </ul>
Spacers	thermoplastic (minipleat)
Filtermedia	<ul style="list-style-type: none"> <li>high quality glass fibre paper (water resistant), pressure drop may temporarily increase at high humidity levels</li> <li>Optional: fully synthetic filtermedia for maximum rigidity, higher mechanical stress tolerance</li> </ul>
Combustible	YES
Options	<ol style="list-style-type: none"> <li>burst protector / protection screen</li> <li>foamed gasket on the clean air side of the flange</li> <li>+14% more filtersurface</li> </ol>
Example applications	<ul style="list-style-type: none"> <li>main filter for gas turbines</li> <li>pre- and mainfiltration for particle and finedust removal</li> <li>main filter for comfort air filtration</li> </ul>

## Compact Filter – HS-Mikro Pak 4V Econergy



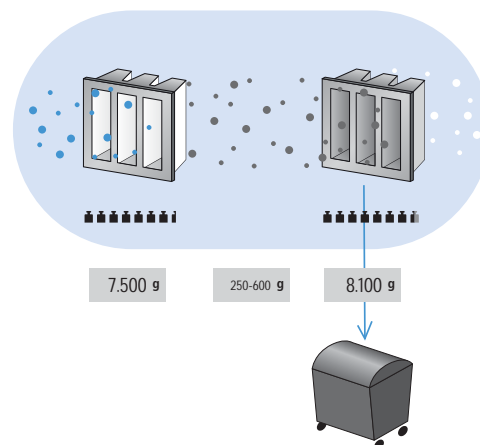
We at HS-Luftfilterbau GmbH have been following the approach of sustainable production since the end of the 1990's with the certification of our environmental management system. In the past we have focused on the optimization of our processes with regard to environmental compatibility. Now the time is more than ripe enough to also take risks in product development. We will offer the market and consumers products that not only increase the energy efficiency of your ventilation system, but also give you the choice to reduce the consumption of irreplaceable raw material supplies and the associated CO<sub>2</sub> release in the production of air filters.

Storage filters (in this sense "air filters" for short) are essential consumable components to ensure the functionality of air handling systems. They consist of a variety of more or less high-quality and elaborately manufactured materials. In addition to the filter media, which consist of synthetic nonwovens or meltblowns, glass fibers or synthetic membranes, other essential components include frames, seals, and special adhesives. Optimization of the sustainability of these products has largely failed to materialize due to consumer price sensitivity. Manufacturers' efforts are mainly focused on saving energy during operation and keeping manufacturing costs as low as possible. In both cases, it may be assumed that these aspects of sustainability are already very advanced.

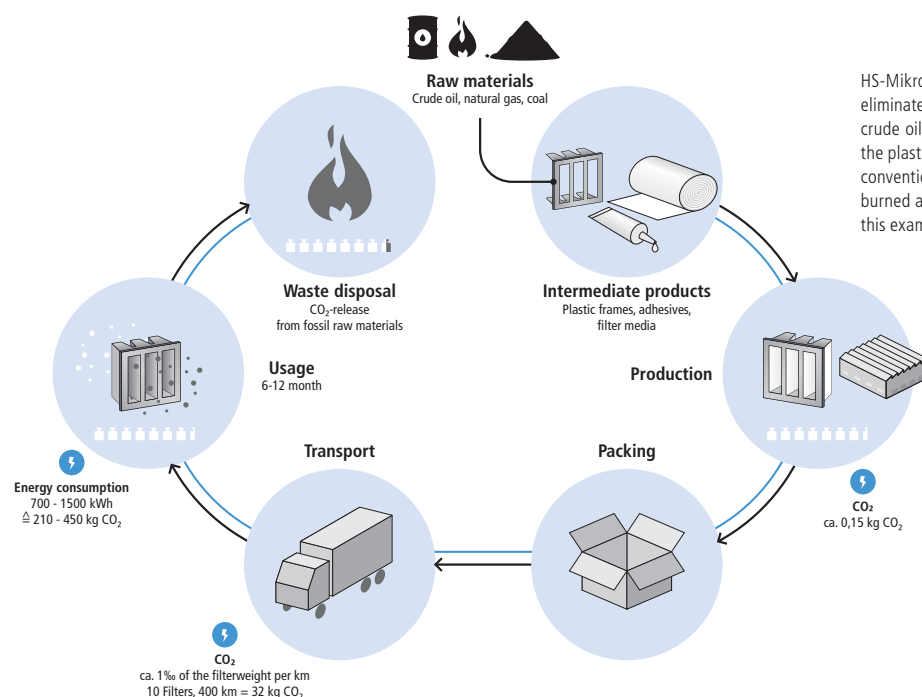
However, if you add up the resource requirements of a compact filter, which is used, for example, in HVAC systems, supply and exhaust air systems or gas turbines, an imbalance immediately becomes painfully apparent when you look at the figures. Filters of this type weigh 6 - 8 kg in standard dimensions. During the period of use, these filters store approximately 250 - 600 g of atmospheric dust, particles, and aerosols. In other words, a **7.5 kg filter** (592x592x292 mm) will be **disposed of after its weight increases to 7.9 kg** when the final pressure differential is reached. Or in other words: for a maximum of half a kilo of stored fine dust, 7.5 kg of mass must also be disposed of. Recycling of the components is not possible or would be extremely difficult simply because of the filtrates. Thus, the balance of utility effectiveness for these products is conceivably poor.

Depending on the configuration, the plastic components of HS-Mikro Pak 4V ECONERGY consist of more than 60% renewable raw materials. If we succeeded in replacing our total demand for plastics in this segment, we could save approx. **70 - 90 tons of polystyrene** per year and thus greatly reduce the consumption of fossil raw materials in this supply chain. These figures illustrate just how much: the production of 1 kg of polystyrene requires approximately 10 kg of crude oil, 7.4 kg of natural gas and 0.14 kg of coal to extract it.

The diagram below illustrates the resource lifecycle of conventional compact filters:



Compact filters are consumable products with a comparatively short service life and little "mass usage effectiveness".



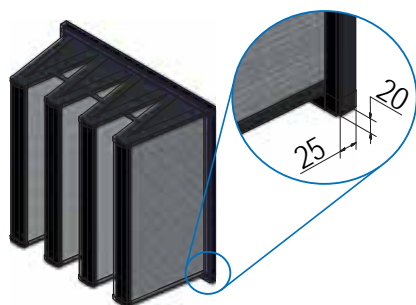
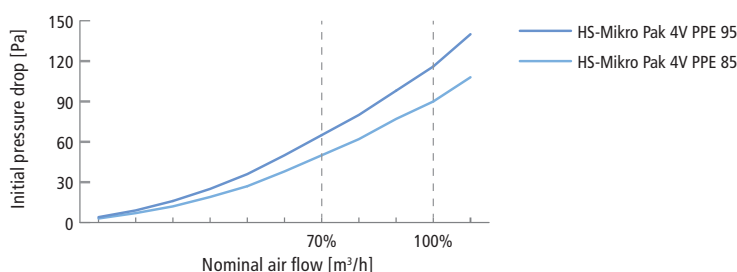
HS-Mikro Pak 4V ECONERGY essentially eliminates the need for the raw materials crude oil, natural gas and coal contained in the plastic components, which in the case of conventional compact filters are irretrievably burned at the end of the product's life, as in this example.

## Compact Filter – HS-Mikro Pak 4V PPE



HS-Mikro Pak 4V PPE offers impressive performance thanks to the use of the latest, energy-efficient filter media, which are brought into a perfect pleat geometry by our innovative pleating center. This ensures minimal design resistance. The revolutionary nanofiber filter media offers dust holding capacities of up to >1.1 kg with standard dimensions, which is up to twice the usual dust load for compact filters. At the same time, it is characterized by an incomparably low operating pressure difference. As a result, the operating energy requirement of the HS-Mikro Pak 4V PPE is 25% below the energy classification value for energy class A+, at just 650 kWh/a. The filter medium is extremely robust, tear-resistant and completely moisture-resistant. HS-Mikro Pak 4V PPE is therefore not only suitable for realizing considerable energy saving potential in HVAC systems, but also particularly suitable for process air applications, including power generators such as gas turbines and compressors, as well as for offshore applications. It meets the requirements of VDI 6022 and thanks to the extremely low operating pressures and high dust holding capacity, it is possible to significantly extend maintenance intervals depending on the application

Typ:	HS-Mikro Pak 4V PPE		Energy class comparable mit Eurovent 4/21
	85	95	
Class EN 779	F7	F9	<div>Low energy consumption</div> <div><div>A+</div><div>A</div><div>B</div><div>C</div><div>D</div><div>E</div><div>High energy consumption</div></div> <div>A+</div>
Class ISO 16890	ePM1 60%	ePM1 80%	
Initial-ΔP [Pa] (A / B)	50 / 90	65 / 110	
Recc. final ΔP	600		
Max. temp. [°C]	65°		
Dimensions [mm]			
Width	Height	Depth	
592	592	292	3400 5000 7,5
592	490	292	2800 4100 5,3
592	287	292	1700 2500 3,2
Please ask for other desired designs.			



Detail: flange dimension (without gasket)  
Displays also options 1 & 2.

Frame	corrosion resistant plastic
Operational conditions	<ul style="list-style-type: none"> <li>max. rel. h. 100 [%]</li> <li>max. temp. 65 [°C]</li> </ul>
Spacers	thermoplastic (minipleat)
Filtermedia	fully synthetic filter medium with progressive nanofiber structure for maximum moisture resistance and extreme mechanical resilience as well as maximum dust holding capacity
Combustible	YES
Options	<ol style="list-style-type: none"> <li>burst protector / protection screen</li> <li>foamed gasket on the clean air side of the flange</li> </ol>
Example applications	<ul style="list-style-type: none"> <li>main filter for gas turbines</li> <li>pre- and mainfiltration for particle and finedust removal</li> <li>main filter for comfort air filtration</li> <li>ultimate alternative to any other energy saving main HVAC filter</li> </ul>



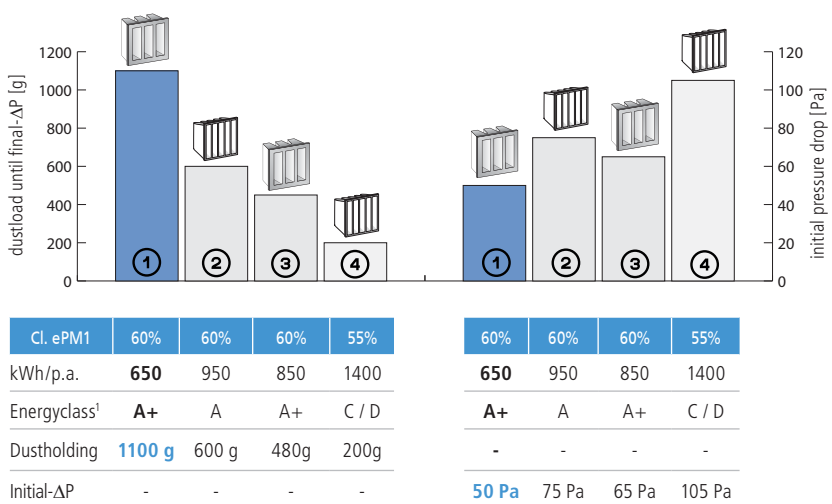
# Compact Filter – HS-Mikro Pak 4V PPE

## Nanofiber media offers unmatched performance potential

The high-performance Micro-Pak 4V PPE filters are characterized by their impressive performance characteristics, which are achieved through a filter media designed for maximum energy efficiency. The advanced construction with PFAS-free nanofibers enables high flow rates with low resistance. Robust coarse fibers form a stable random fiber mesh that retains large amounts of dust, while the finest fiber nets in the media composite also reliably separate submicron particles despite maximum air permeability. Our special manufacturing processes are also designed to get the best out of the filter medium. Even with these highly resistant filter media, they enable the precise formation of an optimum pleat geometry. Our advanced production facilities enable us to optimize the design filter resistance and thus offer users unprecedented service life and energy benefits.

## HS-Mikro Pak 4V PPE in comparison with other filters

Energy efficiency, CO2 footprint and service costs - in short "life cycle costs" - remain a key issue in the procurement of capital and consumer goods. HS-Mikro Pak 4V PPE 85 can achieve a consumption of less than 650 kWh/a thanks to perfect product coordination. This means that the operating energy requirement according to the Eurovent model is approx. 25% below the entry-level requirements for energy class A+. Depending on the application, it is even possible to skip one or even two replacement intervals thanks to the longevity of this filter type. HS-Mikro Pak 4V PPE can absorb up to twice the expected amount of dust than conventional energy-saving compact filters until the final pressure drop is reached. The difference becomes clear when looking at different filter types in terms of initial pressure drop and dust holding capacity, where HS-Mikro Pak PPE shows its outstanding properties:



Filter #1: HS-Mikro Pak 4V PPE 85, Filter #2: energysaving bag filter (wave structure), Filter #3 usual rigid bag filter (V-Bank), Filter #4: low budget bag filter

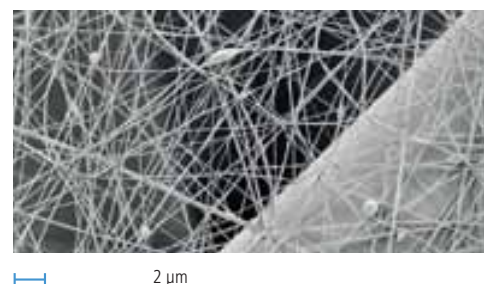
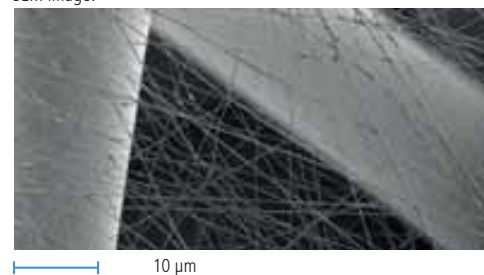
<sup>1)</sup> Energyclass is comparable to Eur.vent 4/21

## The extra edge in security

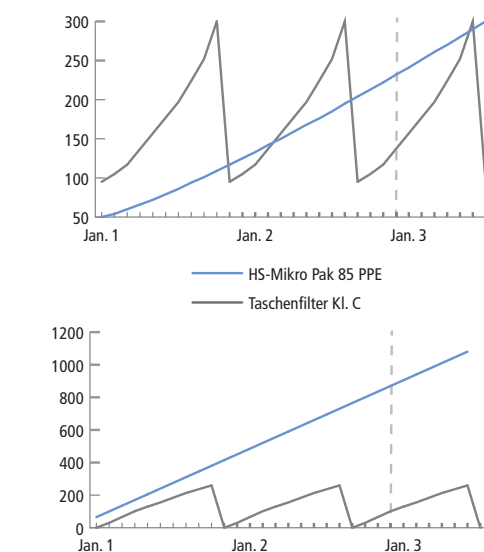
The fully synthetic structure of the filter and the elimination of glass fiber media opens up new possibilities. Glass fiber media contain acrylic binders. These are hydrophilic, so that moisture in glass fiber filters may lead to expansion of the filter medium, which on the one hand greatly reduces the tear resistance when wet and on the other hand increases the pressure difference. These effects do not occur with HS-Mikro Pak 4V PPE. The filter medium is extremely tear-resistant under all conditions so that no grip or burst protection is required for normal applications and even for gas turbines under difficult working conditions (fog) or other force generators.

These filters are also particularly suitable and certified for use in areas that fall under the EC 1935/2004 directive, for example, due to the choice of materials and the complete absence of glass fibers and other hazardous substances.

The fine nanofiber web of the active layer is clearly visible in the SEM image:



The diagrams show HS-Miko Pak 4V PPE 85 in comparison with an inexpensive standard pocket filter over the course of three years:



The time axis shows the replacement intervals (peaks) and the mandatory replacement after 24 months in accordance with VDI 6022. Industrial processes and power generators that benefit from extreme life cycles can be operated cost-effectively for much longer. Hygiene-related applications can reduce maintenance and save significant amounts of energy.

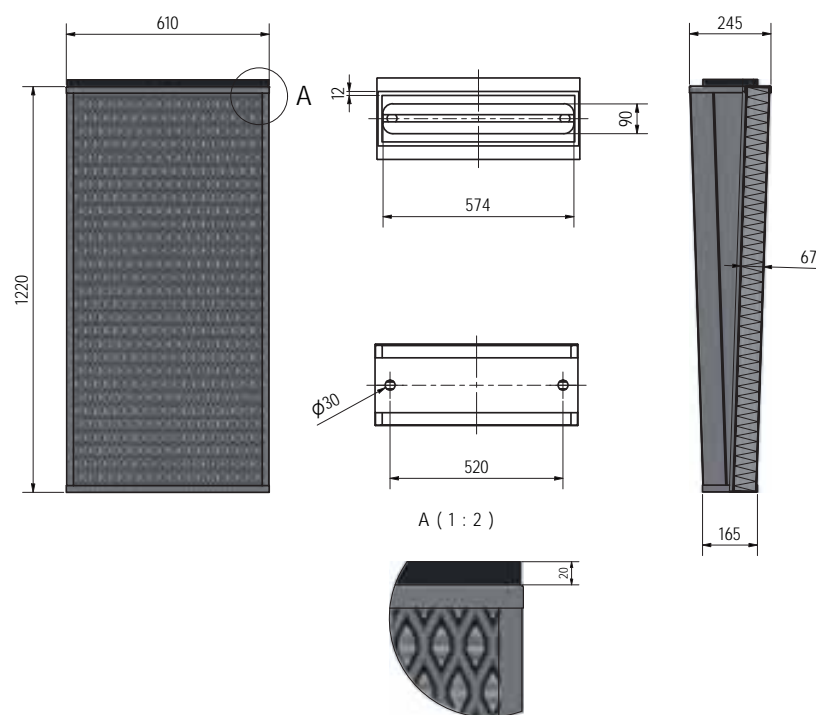


## Compact Filter – HS-V-Pak GT 90 *Pulse*



HS-V-Pak GT 90 Pulse filters are designed to upgrade existing self cleaning intake filter systems. Their design fits smoothly for common intelt air filtration systems at gas turbines. Advanced media processing machines allow us to install the latest developments on pulse cleaning filter medias. The sturdy steel framework is corrosion protected by epoxy coating encapsulating the media packs. The filtermedia is consiting from fully synthetic bico media, containing no cellulose for maximum moisture resistance, low pressure drop, highest rigidiry and superior dust release while pulsing. HS-V-PAK GT90 also offer an optimizied fold geometrys compared to the classic product. The Filtermedia ist evenly distanced in full depth of the filtermedia and fixated by sturdy gluelines. Instead of four over-the-top gluelines HS-V-PAK GT 90 Pulse offer one stabiliziationstring every 25 mm over the whole surface. That allows a perfect aspect ratio between fold entry and depth of a mediafold. This brings pressure drop furtherly down, allows highly improved dust release and more energy efficiency at pulse cleaning and operation.

Type:	HS-V-Pak GT 90 <i>Pulse</i>		
Class EN 779	F9		
Class ISO 16890	ISO ePM1 70%		
Class ISO 29461	T9		
Initial-ΔP [Pa] at nominal air flow	245		
Dust holding capacity [g]	>1200 (ASHRAE)		
Weight [kg]	24		
Temperature resistance [°C]	65° (opt. 120°)		
Width [mm]	Height [mm]	Depth [mm]	Nominal air flow [m³/h]
240 / 165	610	1220	2200
Frame	phosphated steel, epoxy coated		
Operational condition	max.rel. h. 100%		
Spacers	thermoplastic (heavy duty minipleat)		
Filtermedia	bico, pulsecleaning, fully synthetic with nanofibres (~45 m²)		
Combustible	No		
Options	protection screen (single side) gasket 20 or 12 mm		



Clean air through experience since 1974!

With 50 years of air filtration expertise, state-of-the-art technology and sophisticated materials, we create your customized filter solution..







This durable fine dust filter is suitable as pre- or main-filtration element in systems where relatively high volumes as well as variable airflows is typical. Areas of use include pre-filtration of airborne particles, as filter for industrial processes, food production or turbo machinery.

The high-quality media is laid in narrow parallel pleads, and fixed evenly by spacers made from corrugated aluminium foil – these make it possible to use the filter in high temperature environments up to 350 °C (Type: HS-Makro HT), electrical grounding of the filter, and provide a maximum of dust protection. Profiled spacers with seamed edges provide the filter package with extra stability.

HS-Makro filters are silicon-free as a standard, and can therefore be employed for surface technologies.

Due to our flexible manufacturing process we can fit the filter into mounting frames by all major brands. Upon request HS-Makro Filters can be supplied with FDA conform design.

Type:	HS-Makro 65	HS-Makro 85	HS-Makro 95
Class EN 779	M6	F7	F9
Class ISO 16890	ISO ePM2.5 55%	ePM1 60%	ISO ePM1 80%
Initial- $\Delta P$ [Pa] at nominal air flow	100 / 130	140 / 170	160 / 190
Max. temp. [°C]	120° / 350°	120° / 350°	120° / 350°

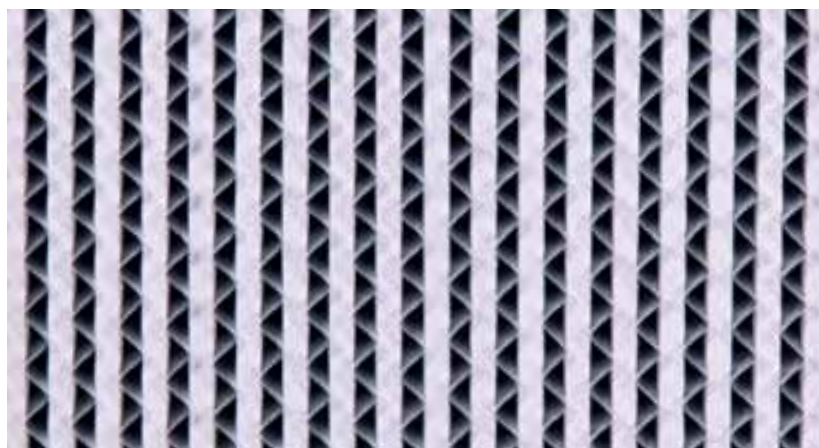
Dimensions [mm]			Nominal air flow [m³/h]		Weight [kg]
Width	Height	Depth	standard	opt. high air flow	
305	305	78	240	-	2,1 kg
305	610	78	540	-	3,5 kg
457	457	78	620	-	4,8 kg
575	575	78	1020	-	5,4 kg
610	610	78	1160	-	6,0 kg
762	610	78	1460	-	7,2 kg
305	305	150	500	890	4,0 kg
305	610	150	1000	1910	6,0 kg
457	457	150	1110	2200	7,0 kg
575	575	150	1840	3600	9,0 kg
610	610	150	2000	4090	10,0 kg
762	610	150	2650	5170	11,0 kg
915	610	150	3200	6260	13,0 kg
1220	610	150	4240	8310	17,0 kg
1525	610	150	5360	10480	22,0 kg
1830	610	150	6400	12530	26,0 kg
305	305	292	780	1150	7,0 kg
305	610	292	1800	2300	10,0 kg
457	457	292	1950	2600	11,0 kg
575	575	292	3190	4100	13,2 kg
610	610	292	3600	4700	20,0 kg
762	610	292	4500	5800	21,0 kg

Please ask for other desired dimensions and designs.

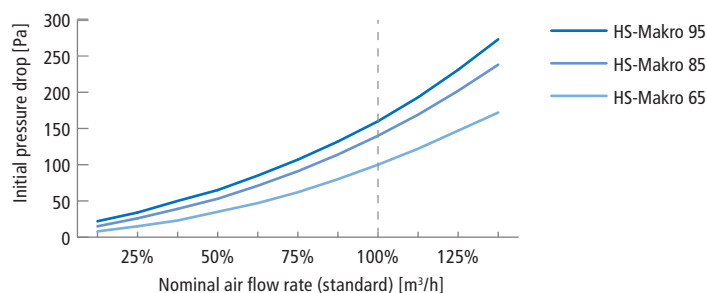
### High air flow rate option






Filters with this option offer more than +30 % filter surface than equivalent standard variants and thus offer following benefits:

- comparable higher nominal air flow of +30% **or**
- comparable lower pressure loss of - 30%
- increased service lifetime of up to +60 %



Aluminium-spacer technology ranges back to the beginnings of finedust and particle absolute filtration. We are still producing these work intensive products with aluminium or stainless separators for demanding applications such as high-temp resistance (i.e. 120°C, 250°C or 350°C) or anti static conductivity according to ATEX. This design together with special filter media allows us to produce dedustable filters for in-line pulse cleaning.



Frame	<ul style="list-style-type: none"><li>▪ MDF / medium density fibre board (Standard)</li><li>▪ plywood</li><li>▪ ABS plastic</li><li>▪ galv. steel or stainless</li><li>▪ aluminium</li></ul>	
Operational conditions	<ul style="list-style-type: none"><li>▪ max. rel. h. 100 [%]</li><li>▪ temperature resistance max. 120 [°C]     optional up to max. 350 [°C] for industrial uses (HS-Makro HT)</li><li>▪ food &amp; pharma up to max. 250 [°C] (HS-Makro HT, silicone sealant)</li></ul>	
Spacers	corrugated aluminium, optional: stainless	
Filtermedia	high quality glass fibre paper (water resistant)	
Options	<ul style="list-style-type: none"><li>▪ burst- and protection screens (single or both sides)</li><li>▪ more filtermedia for higher airflows</li><li>▪ flanges (i.e. 25 [mm]); handles</li><li>▪ gasket on both sides</li><li>▪ dedustable filtermedia</li><li>▪ EX protected </li><li>▪ FDA compliant design</li><li>▪ many more customer specific options (i.e. such as rounded corners)</li></ul>	
Gasket options	height [mm]	form
seamless foamed polyurethane gasket (standard)	6 or 8	
flat sectionized neoprene gasket	6 or 8	
leak test gasket	7,5	
fibre glass cord gasket	Ø = 7	

## Compact Filter – HS-Makro F



This durable fine dust filter is suitable as pre- or main-filtration element in systems where relatively high amounts of volumes as well as variable airflows is typical. Areas of use include pre-filtration of airborne particles, as filter for industrial processing, or in hospitals, computing centres, offshore or power generating systems.

The filtermedia by standard is high quality glass fibre paper. A temporary rise of the pressure drop with high moisture levels is normal. This filtertype might optionally be fitted with special heat resistant thermoplastic spacers for temperature ranges of up to 120°C. Such filters are marked with the model name HS-Makro F-T.

Due to our flexible manufacturing process we can fit the filter into mounting frames by all major brands. We also deliver matching duct cases and assembly systems.

Type:	HS-Makro 65 F	HS-Makro 85 F	HS-Makro 95 F
Class EN 779	M6	F7	F9
Class ISO 16890	ISO ePM2.5 55%	ISO ePM1 65%	ISO ePM1 80%
Initial-ΔP [Pa] at nominal flow	110	140	180
Max. Temperature [°C]	65° / opt. 120°	65° / opt. 120°	65° / opt. 120°
Dimensions [mm]			Weight [kg]
Width	Height	Depth	
305	305	78	1,5 kg
305	610	78	2,5 kg
457	457	78	2,5 kg
575	575	78	3,4 kg
610	610	78	6,0 kg
762	610	78	7,2 kg
305	305	150	3,4 kg
305	610	150	5,2 kg
457	457	150	5,6 kg
575	575	150	7,6 kg
610	610	150	8,1 kg
762	610	150	9,6 kg
915	610	150	11,0 kg
1220	610	150	14,0 kg
1525	610	150	16,9 kg
1830	610	150	21,0 kg
305	305	292	6,3 kg
305	610	292	8,9 kg
457	457	292	10,4 kg
575	575	292	13,6 kg
610	610	292	14,4 kg
762	610	292	16,0 kg

Please ask for other desired dimensions and designs.

### High air flow rate option

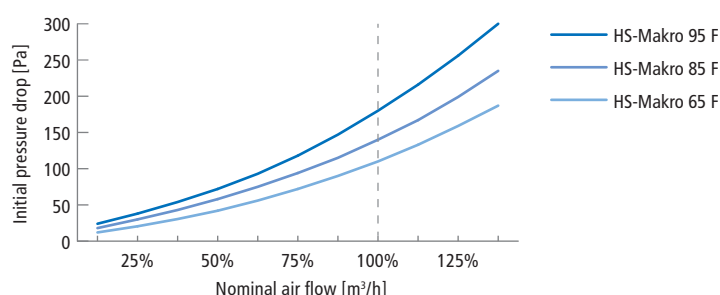
Filters with this option offer more than +30 % filtersurface than equivalent standard variants and thus offer following benefits:

- compareable higher nominal air flow of +30% **or**
- compareable lower pressure loss of - 30%
- increased service lifetime of up to +60 %





Designing HEPA filter and fine dust filters large flows, high dustloads loads or to perform with the best energy efficiency requires an uncompromising quality of the pleat geometry. Finedust, EPA, HEPA and ULPA Filter made by HS-Luftfilterbau always offer optimal filtersurface usage thanks to our technically advanced production methods, allowing perfectly straight folds up to 250 mm fold depths.



Frame	<ul style="list-style-type: none"> <li>▪ MDF / medium density fibre board (standard)</li> <li>▪ polystyrene (depth= 78, 150 and 292 mm)</li> <li>▪ ABS (depth= 78, 150 and 292 mm, 120°C)</li> <li>▪ galv. steel or stainless</li> <li>▪ aluminium</li> </ul>
Operational conditions	<ul style="list-style-type: none"> <li>▪ max. rel. h. 100 [%]</li> <li>▪ max. temp. 65 [°C] (standard)</li> <li>optional: HS-Makro F-T max. 120°C</li> </ul>
Spacers	thermoplastic (Minipleat)
Filtermedia	high quality glass fibre paper (water resistant)
Combustible	Yes (frame: MDF, plywood, polystyrene, ABS)
Options	<ul style="list-style-type: none"> <li>▪ burst- and protection screens (single or both sides) [affects ΔP]</li> <li>▪ more filtermedia for higher airflows</li> <li>▪ handle</li> <li>▪ gasket on both sides</li> <li>▪ customized gaskets (epdm, viton, ptfe or other customer specific)</li> <li>▪ FDA compliant design</li> <li>▪ Special design customizations i.e.: grooves, guide rails, boxed versions etc.</li> </ul>

Gasket options	height [mm]	form
seamless foamed polyurethane gasket (standard)	6 or 8	
flat sectionized neoprene gasket	6 or 8	
leak test gasket	7,5	

## Compact Filter – HS-Makro FV



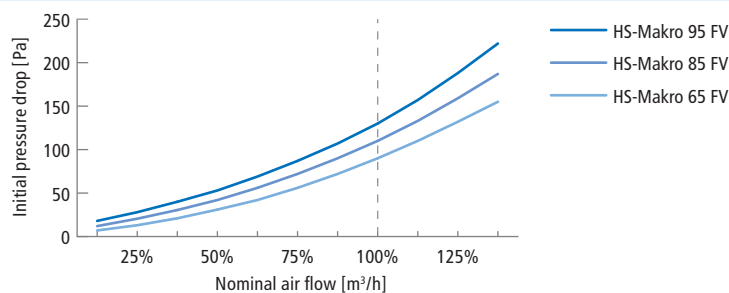
This durable fine dust filter is suitable as pre- or main-filtration element in systems where relatively high volumes as well as variable airflows are typical. Areas of use include pre-filtration of airborne particles, as filter for industrial or food processing, in hospitals or any other high-flow application. Due to our flexible manufacturing process we can fit the filter into mounting frames by all major brands. The media is laid in narrow pleads, and fixed evenly by thermoplastic spacers. Single filter packages are placed into the mounting frame forming a V-shape. This design allows maximum filter surface within comparably small filters. Various customized specifications are possible. This filter type might optionally be fitted with special heat resistant thermoplastic spacers for temperature ranges of up to 120°C. Such filters are marked with the model name HS-Makro FV-T.


Type:	HS-Makro 65 FV	HS-Makro 85 FV	HS-Makro 95 FV
Class EN 779	M6	F7	F9
Class ISO 16890	ISO ePM2.5 55%	ePM1 60%	ISO ePM1 80%
Initial-ΔP [Pa] at nominal air flow	90	110	130
Max. temp. [°C]	65° / opt.120°	65° / opt.120°	65° / opt. 120°




  

Dimension [mm]			Nominal air flow [m³/h]	# of filterpacks
Width	Height	Depth		
610	305	292	2000	8
457	457	292	2550	6
575	575	292	3600	6
610	610	292	5000	8
762	610	292	6000	10

Please ask for other desired dimensions and designs.



Frame	<ul style="list-style-type: none"> <li>▪ MDF / medium density fibre board (standard)</li> <li>▪ plywood</li> <li>▪ galv. steel or stainless</li> <li>▪ polystyrene</li> <li>▪ ABS plastic (120°C)</li> </ul>
Operational conditions	<ul style="list-style-type: none"> <li>▪ max. rel. h. 100 [%]</li> <li>▪ max. temp. 65 [°C] (standard)</li> <li>optional: HS-Makro FV-T max. 120°C</li> </ul>
Spacers	thermoplastic (Minipleat)
Filtermedia	high quality glass fibre paper (water resistant)
Combustible	Yes (frame: MDF, plywood, polystyrene, abs)
Options	<ul style="list-style-type: none"> <li>▪ burst- &amp; protection screens [Attention! Initial-ΔP will be much higher]</li> <li>▪ handle</li> <li>▪ gasket on both sides</li> <li>▪ customized gaskets (epdm, viton, ptfе or other customer specific)</li> <li>▪ EX protected </li> <li>▪ customizations i.e.: grooves, guide-rails, boxed filter etc.</li> </ul>

Gasket options	height [mm]	form
seamless foamed polyurethane gasket (standard)	6 or 8	
flat sectionized neoprene gasket	6 or 8	
leak test gasket	7,5	

## High Temp Filter – HS-Makro F-HT

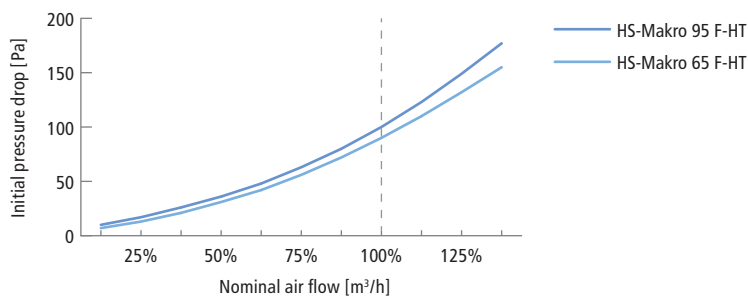


These filters are designed for high temperature processes and are used for supply and exhaust air purification. They are for example used in the range of drying ovens, sterilization equipment, hot gas venting etc. The pleated filter medium of these filters is fixed by glass fiber spacers. The filter medium is mounted between protective grills made of stainless steel (1.4301) and protected against shedding by a glass-fibre nonwoven. The design allows operating temperatures up to 350 °C for HS-Makro F-HT. If necessary, these filters can also be supplied ATEX compliant. HS-Makro F-HT are sealed with fiberglass and are therefore completely silicone free. A glassfibre cord serves as gasket.

Type:	HS-Makro 65 F-HT	HS-Makro 95 F-HT
Class EN 779	M6	F9
Class SO 16890	ISO ePM2.5 55%	ISO ePM1 75%
Initial-ΔP [Pa] at nominal air flow	90	100
Silicone free	Yes	Yes
Max. temp. [°C]	350°	350°

Width	Dimensions [mm]		Nominal air flow [m³/h]	
	Height	Depth	HS-Makro 65 F-HT	HS-Makro 95 F-HT
305	305	78	625	500
305	610	78	1250	1000
457	457	78	1400	1100
480	480	78	1550	1250
610	610	78	2500	2000
915	610	78	3750	3000
305	305	90	750	600
305	610	90	1500	1200
457	457	90	1680	1320
480	480	90	1860	1500
610	610	90	3000	2400
915	610	90	4500	3600

Please ask for other desired dimensions and designs.



Frame	extruded aluminum, galv. steel, stainless
Spacers	glass fibre strings
Filtermedia	high quality glass fibre paper (water resistant) with anti shedding protection fleece on air entry and air leaving site.
Gasket	glass fibre cord (up to 350°C)
Options	EX-protection, double sided gasket



Please follow our on site tempering instruction prior operation. Please contact us for more informations!

## High Temp Filter – HS-Makro FV-HT



Please follow our on site tempering instruction prior operation. Please contact us for more informations!

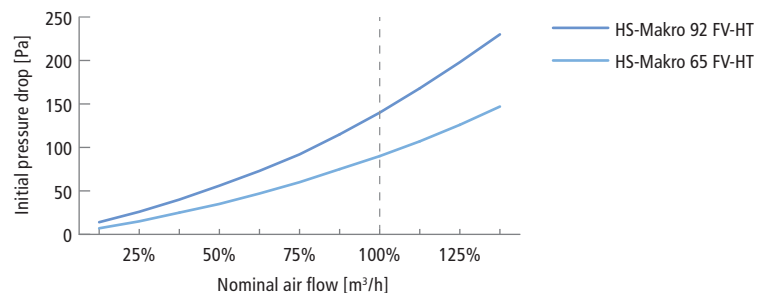
This product family enables secure throughput of large air flows at high operational temperatures. Typical fields of application are drying ovens, sterilisators, gas, smoke and fume exhaust systems. The glassfibre filtermedia is stabilized by glass fibre strings. The filtermedia is held between protection screens made of stainless steel and is additionally protected against shedding by glass fibre nonwoven. Depending on the specification up to 10 media packs can be V-shape mounted in a standard sized frame to maximize the filtersurface. This design allows operational temperatures of up to 350°C for HS-Makro FV-HT. These filters can be produced in an ATEX conforming version.

HS-Makro FV-HT are sealed with fiberglass and are therefore completely silicone free. A glass-fibre cord serves as gasket.

Type:	HS-Makro 65 FV-HT	HS-Makro 92 FV-HT
Class EN 779	M6	F8
Class ISO 16890	ISO ePM2.5 55%	ISO ePM1 65%
Initial-ΔP [Pa] at nominal air flow	90	140
Silicone free	Yes	Yes
Max. temp. [°C]	350°	350°

Dimensions [mm]			Nominal air flow [m³/h]	# of filterpacks
Width	Height	Depth		
287	592	292	1700	4
610	305	292	2100	4
592	592	292	3400	8
610	610	292	4250	8
287	592	400	2050	4
610	305	400	2500	4
592	592	400	4100	8
610	610	400	5000	8

Please ask for other desired dimensions and designs.



Frame	galv. steel, stainless
Spacers	glass fibre strings
Filtermedia	high quality glass fibre paper (water resistant) with anti shedding protection fleece on air entry and air leaving site.
Gasket	glass fibre cord (up to 350°C)
Options	EX-protection, double sided gasket

## Safety Filter – HS-Strongshield EX

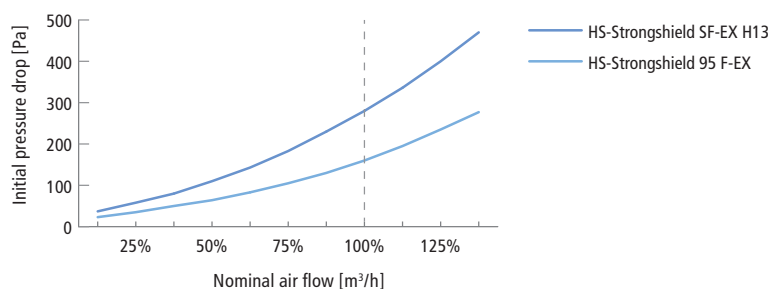


HS-Strongshield Filters offer the maximum security at processes with high hazard risk potentials. The groundbreaking HS-Strongshield filter technology provides a superior media tensile strength up to 400% higher than usual glass media. Different to usual Filters the HS-Strongshield filtermedia is armored by rigid layers of polyester. This ensures that HS-Strongshield filters offer an unmatched safety at extreme conditions such as high moisture, shock pressures, accident failures of pre-filterstages, presence of explosive atmospheres etc.. The air entry side of the filters is metalized and conductive to deplete any electrical potentials that can cause ignitions by grounding connectors on the filter. Hence HS-Strongshield filters ideally suit the safety needs of processes in ATEX areas. No additional protective grids are required due to the robust media structure. HS-Strongshield filters are dedustable by typical pulsejet or blast systems.

Type:	HS-Strongshield 95 F-EX	HS-Strongshield SF-EX H13
Class EN 779 / EN 1822	F9	H13
Class ISO 16890	ISO ePM1 80%	-
Initial-ΔP [Pa] at nominal air flow	160	280
Max. temp. [°C]	65° / opt. 120°C	65° / opt. 120°C

Width	Dimensions [mm]		Nominal air flow [m³/h]	
	Height	Depth	F9	H13
305	305	78	670	250
305	610	78	1500	540
610	610	78	1650	1100
305	305	150	890	330
305	610	150	1500	700
610	610	150	3400	1500
762	610	150	3750	1900
305	305	292	1000	520
305	610	292	1900	1050
610	610	292	4750	2100

Please ask for other desired dimensions and designs.



Frame	galv. steel (standard)	ABS Plastic (120°C)
	MDF or plywood	stainless steel
Operational conditions	<ul style="list-style-type: none"> <li>max. rel. h. 100 [%] up to 65[°C], opt. 120[°C]</li> <li>media tensile strength is not reduced at high air humidity</li> </ul>	
Spacers	thermoplastic (Minipleat)	
Filtermedia	<ul style="list-style-type: none"> <li>armored glass fibre media (air entry side is electrically conductive for usage in ATEX protection zones) waterrepellent, moisture resistant</li> <li>Filter ist dedustable by pulse jet or blast (please contact us for further details)</li> </ul>	
Combustible	YES (frame MDF, plywood, ABS)	
Options	<ul style="list-style-type: none"> <li>optional: without  functionality</li> <li>protection grid (single or both sides) [usually not needed with this filter]</li> <li>enlarged filter surface for higher flow and/or dust holding capacity</li> <li>handles</li> <li>gasket on both sides, special gaskets</li> <li>special adaptations i.e.: grooves, guide rails, grounding plates</li> </ul>	





HS-Mikro S are HEPA-Filter that can bear a high mechanical load capacity and may be used to filter suspended matter such as viruses, germs, toxic dusts, aerosols as well as in environments requiring a virtually sterile or dust-free air. HS-Mikro S are designed to meet demands for high loads and extended temperature ranges as they occur in particular within industrial processes as well as the pharmaceutical industries. The high-quality media is laid out in narrow pleats that run parallel to each other. Profiled, twice edged spacers made from aluminium or optionally stainless steel guarantee maximum stability. The design allows various variations in the usage such as dedustable media for up to 10,000 cleaning cycles or electrical grounding for EX protection according to ATEX standards. The optional narrow pleating for extended filter surface also makes the filter employable within high volume flows and low pressure differences respectively. Alternative filtermedias such as silicone or nomex bound ones are optionally available.

HS-Mikro S-HT filters are sealed with silicone and withstand temperatures up to 250°C.

Type:	HS-Mikro R	HS-Mikro S	
Class EN 1822	E11	H13	H14
Efficiency EN 1822 @ MPPS [%]	> 95 %	> 99,95 %	> 99,995 %
Initial-ΔP [Pa] at nominal air flow	125 / 160	250 / 300	260 / 330
Max. temp. [°C]	120° / opt. 250°	120° / opt. 250°	120° / opt. 250°

Dimensions [mm]			Nominal air flow [m³/h]		Weight [kg]
Width	Height	Depth	standard	opt. high air flow	
305	305	78	140	-	2,1 kg
305	610	78	300	-	3,5 kg
610	610	78	650	-	6,0 kg
305	305	150	250	330	4,0 kg
305	610	150	540	700	6,0 kg
610	610	150	1150	1500	10,0 kg
762	610	150	1450	1900	11,0 kg
915	610	150	1750	2300	13,0 kg
1220	610	150	2300	3100	17,0 kg
1525	610	150	2900	3850	22,0 kg
1830	610	150	3500	4650	26,0 kg
305	305	292	520	750	7,0 kg
305	610	292	1050	1500	10,0 kg
610	610	292	2100	3000	20,0 kg
762	610	292	2630	3500	21,0 kg

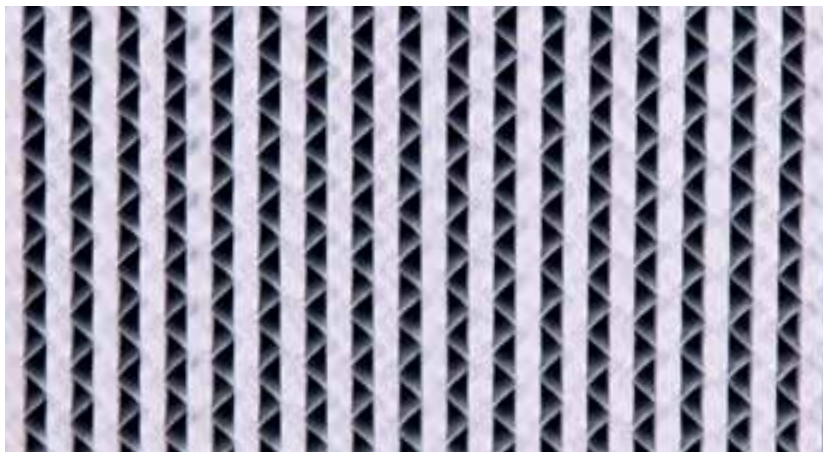
Please ask for other desired dimensions and designs.

### High air flow rate option

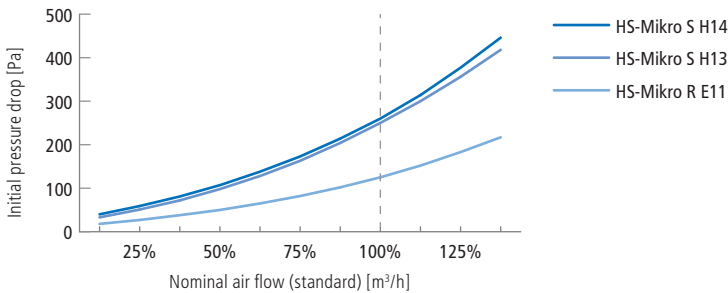
- Filters with this option offer more than +30 % filtersurface than equivalent standard variants and thus offer following benefits:
- comparable higher nominal air flow of +30 %
  - or
  - comparable lower pressure loss of - 30 %
  - increased service lifetime of up to +60 %

Gasket options	height [mm]	form
seamless foamed polyurethane gasket (standard)	6 or 8	
flat sectionized neoprene gasket	6 or 8	
leak test gasket	7,5	
fibre glass cord gasket	Ø = 7	





Aluminium-spacer technology ranges back to the beginnings of finedust and particle absolute filtration. We are still producing these work intensive products with aluminium or stainless separators for demanding applications such as high-temp resistance (i.e. 120°C, 250°C or 350°C) or anti static conductivity according to ATEX. This design together with special filter media allows us to produce dedustable filters for in-line pulse cleaning.



Frame	<div><div>▪</div>MDF / medium density fibre board (Standard)</div> <div><div>▪</div>plywood</div> <div><div>▪</div>ABS Plastic (120°C)</div> <div><div>▪</div>galvanized or stainless</div> <div><div>▪</div>aluminium</div>
Operational conditions	<div><div>▪</div>max. rel. h 100 [%] up to 120[°C]</div> <div><div>▪</div>optional with silicone seal up to max. 250 [°C] (HS-Mikro S-HT), high temp filters cant be dedustable!</div>
Spacers	<div><div>▪</div>aluminium</div> <div><div>▪</div>stainless</div>
Filtermedia	<div><div>▪</div>high quality glass fibre paper (water resistant)</div>
Combustible	<div><div>▪</div>NO</div>
Options	<div><div>▪</div>burst- and protection screens (single or both sides)</div> <div><div>▪</div>more filtermedia for higher airflows</div> <div><div>▪</div>flanges (i.e. 25 [mm]); handles</div> <div><div>▪</div>gasket on both sides</div> <div><div>▪</div>dedustable filtermedia (for in-line / off-line dedusting systems)</div> <div><div>▪</div>EX protected <div>Ex</div></div> <div><div>▪</div>FDA conforming desgin</div> <div><div>▪</div>many more customer specific options (i.e. such as rounded edges)</div>



HS-Mikro SF is the filter of choice for removal of particulate air impurities and can be titled a true “workhorse” absolute filter. HS-Mikro SF are used in versatile applications such as sterile- and clean rooms as well as in processes within industrial and technical environments. They securely filter suspended matter such as viruses, germs, toxic dusts, etc. Typical fields of application are among others within medical areas that are rated DIN 1946, within operating rooms, intensive care, laboratories as well as precision engineering or oil fog and smoke filtration. Due to their pleated design and thermoplastic separators, the filter have an effectively larger filtration surface than HEPA-Filter with aluminium spacers. They can be manufactured completely metal-free and thus are completely combustible to ease problematic filtrate disposal. The filter can be installed for supply air purification as well as for exhaust air filtration. Numerous options allow the filter to be adapted to suit the special requirements of diverse processes and operating environments. This filter type might optionally be fitted with special heat resistant thermoplastic spacers for temperature ranges of up to 120°C. Such filters have marked with the model name HS-Mikro SF-T.

Type:	HS-Mikro RF		HS-Mikro SF		
Class EN 1822	E11		H13	H14	
Efficiency EN 1822 @ MPPS [%]	> 95 %		> 99,95 %	> 99,995 %	
Initial-ΔP [Pa] at nominal air flow	125 (>175)		250 (>270)	260 (>290)	
Max. temp. [°C]	65° / opt.120°		65° / opt.120°	65° / opt.120°	
Dimensions [mm]			Nominal air flow [m³/h]		
Width	Height	Depth	standard	opt. high flow (Extreme)	
305	305	78	250	-	-
305	610	78	540	-	-
457	457	78	600	-	-
575	575	78	970	-	-
610	610	78	1100	-	-
762	610	78	1400	-	-
305	305	150	250	330	-
305	610	150	540	700	-
457	457	150	600	810	-
575	575	150	970	1330	-
610	610	150	1150	1500	-
762	610	150	1450	1900	-
915	610	150	1750	2300	-
1220	610	150	2300	3100	-
1525	610	150	2900	3850	-
1830	610	150	3500	4650	-
305	305	292	520	750	850 <sup>(1)</sup>
305	610	292	1050	1500	2000 <sup>(1)</sup>
457	457	292	1180	1700	1950
575	575	292	1970	2500	2800
610	610	292	2100	3000	3400
762	610	292	2630	3500	3900

Please ask for other desired dimensions and designs.

(1) with ePTFE membrane media only, max temp 65°C

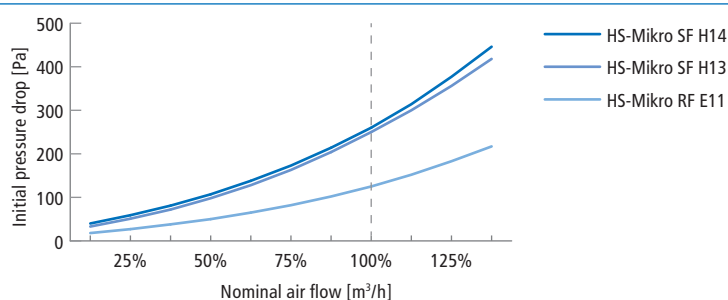
### High air flow rate option

Filters with this option offer more than +30 % filtersurface than equivalent standard variants and thus offer following benefits:




- compareable higher nominal air flow of +30%
- or
- compareable lower pressure loss of - 30%
- increased service lifetime of up to +60 %



Designing HEPA filter and fine dust filters large flows, high dustloads loads or to perform with the best energy efficiency requires an uncompromising quality of the pleat geometry . Finedust, EPA, HEPA and ULPA Filter made by HS-Luftfilterbau always offer optimal filtersurface usage thanks to our technically advanced production methods, allowing perfectly straight folds up to 250 mm fold depths.



Frame	<ul style="list-style-type: none"> <li>▪ MDF / medium density fibre board (standard)</li> <li>▪ polystyrene (depth= 78, 150 and 292 mm, 65°C)</li> <li>▪ ABS (depth= 78, 150 and 292 mm, 120°C)</li> <li>▪ plywood</li> <li>▪ galvanized steel or stainless</li> <li>▪ aluminium</li> </ul>
Operational conditions	<ul style="list-style-type: none"> <li>▪ max rel. h. 100 [%]</li> <li>▪ max. temp. 65 [°C]</li> <li>▪ optional: HS-Mikro SF-T up to max. 120 [°C] with glassfibre media only</li> </ul>
Spacers	thermoplastic (Minipleat)
Filtermedia	<ul style="list-style-type: none"> <li>▪ high quality glass fibre (standard): moisture resistant</li> <li>▪ ePTFE (optional): 100% boron free, reduced Initial-ΔP: -45 %, water resistant, resistant against disinfectant, highly mechanical &amp; chemical resistance</li> </ul>
Combustible	Yes (frames: MDF, plywood, polystyrene, ABS)
Options	<ul style="list-style-type: none"> <li>▪ burst- and protection screens (single or both sides) [affects ΔP]</li> <li>▪ more filtermedia for higher airflows</li> <li>▪ handle</li> <li>▪ gasket on both sides</li> <li>▪ customized gaskets (epdm, viton, ptfe or other customer specific)</li> <li>▪ Special design customizations i.e.: grooves, guide rails, boxed versions etc.</li> </ul>

Gasket options	height [mm]	form
seamless foamed polyurethane gasket (standard)	6 or 8	
flat sectionized neoprene gasket	6 or 8	
leak test gasket	7,5	



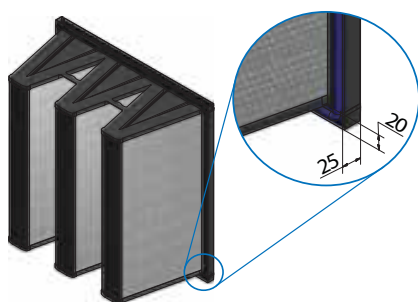
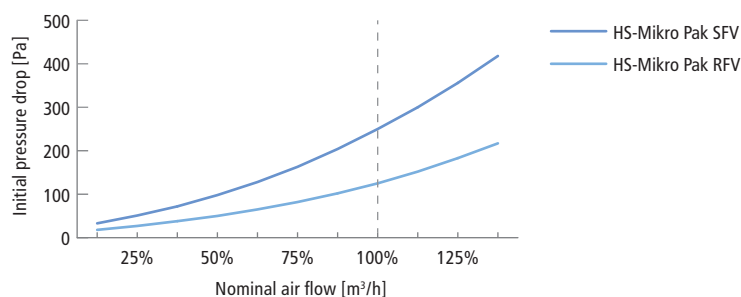
These filters ideally suit as main filter stage where high air flow rates and maximum efficiency are required. HS-Mikro Pak SFV are applied mainly in industrial process (i.e. as safety filter after mechanical oil-fog filters). HS-Mikro Pak SFV also fit as mainfilterstage for the removal of particles, toxic dusts or aerosols from the exhaust or supply air flows. The V-bank system offers superior filter surfaces and therefore ensure a long service lifetime. The filterframe offers maximum rigidity and is corrosion free. Existing bagfilterstages can be easily upgraded by exchange due to the fact that HS-Mikro Pak SFV fit into standard bag filter mounting frames. The filterframe consists of plastic and therefore guarantees an easy waste disposal because the whole filter is completely incinerable. The design also fulfils different hygiene regulations (like the German VDI 6022) and therefore is especially recommended for areas with high air humidity.

Type:	HS-Mikro Pak RFV	HS-Mikro Pak SFV
Class EN 1822	E11	H13
Efficiency EN 1822 @ MPPS [%]	> 95 %	> 99,95 %
Initial-ΔP [Pa] at nominal air flow	125	250
Rec. final pressure drop [Pa]	600	600
Max. temp. [°C]	65° (opt. 120°)	65° (opt. 120°)

Width	Dimensions [mm] Height	Depth	Nominal air flow [m³/h]	Weight [kg]
287	592	292	1200	3,2 kg
490	592	292	2000	5,3 kg
592	592	292	2500	6,0 kg

Please ask for other desired dimensions and designs.



Detail: flange dimension (without gasket)  
Displays also options 1 & 2.

Frame	corrosion resistant plastic (PS or ABS , 20°C)
Operational conditions	<ul style="list-style-type: none"> <li>max.rel. h. 100 [%]</li> <li>max. temp. 65 [°C]</li> <li>short term peak up to max. 80 [°C]</li> <li>optional up to 120 [°C]</li> </ul>
Spacers	thermoplastic (minipleat)
Filtermedia	<ul style="list-style-type: none"> <li>high efficient glass fibre paper (water repellent, moisture resistant)</li> <li>pressure drop may temporarily increase at high humidity levels</li> </ul>
Combustible	Yes
Options	<ol style="list-style-type: none"> <li>1.) burst / grasp protection grid</li> <li>2.) foamed gasket on the clean air side of the flange</li> <li>3.) +14% more filtersurface</li> <li>4.) temperature resistant 4V version for up to 120°C continuous operation</li> </ol>

HS-Deka Pak SFV EPA and HEPA filters provide twice the filter area compared to conventional types of rigid bag HEPA filters due to the greater depth of 420 mm. This allows for applications such as turbo machinery, process air and hygiene HVAC maximum flow rates and significantly longer service life. HS-Deka Pak SFV are especially recommended for applications where installation space is critical but high flow rates are required. Due to the tolerance against high air speed this filter gives more freedom in the design of space saving filter processes. HS-Deka Pak suit ideally as pre- or main filter for filtration of particles and aerosols. They serve as intake and exhaust air filter also in harsh operating environments with high humidity. The sturdy plastic frame is corrosion-free and allows for easy disposal, since the filter can be completely incinerated after ending its service lifetime. Existing bagfilterstages can be easily upgraded by exchange due to the fact that HS-Deka Pak SFV fit into standard bag filter mounting frames.

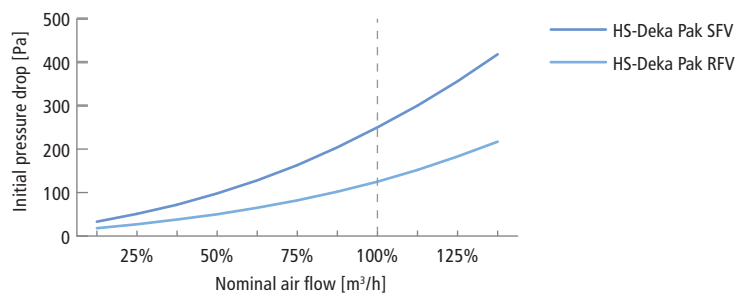


Type:	HS-Deka Pak RFV	HS-Deka Pak SFV
Class EN 1822	E11	H13
Efficiency EN 1822 @ MPPS [%]	> 95 %	> 99,95 %
Initial-ΔP [Pa] at nominal air flow	125	250
Rec. final pressure drop [Pa]	600	600
Max. temp. [°C]	65°	65°

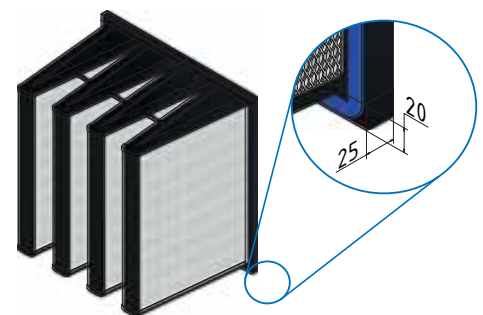
  

With	Dimension [mm] Height	Depth	Nominal air flow [m³/h]	Weight [kg]
287	592	410	1700	6 kg
490	592	410	2800	8 kg
592	592	410	3400	12 kg

Please ask for other desired dimensions and designs.



Frame	corrosion resistant plastic
Operational conditions	<ul style="list-style-type: none"> <li>max.rel. h. 100 [%]</li> <li>max. temp. 65 [°C]</li> <li>short term peak up to max. 80 [°C]</li> </ul>
Spacers	thermoplastic (minipleat)
Filtermedia	<ul style="list-style-type: none"> <li>high efficient glass fibre paper (water repellent, moisture resistant)</li> <li>pressure drop may temporarily increase at high humidity levels</li> </ul>
Combustible	Yes
Options	<ul style="list-style-type: none"> <li>burst / grasp protection grid</li> <li>flat section gasket on the flange, height 6 mm or 8 mm</li> <li>synthetic filtermedia (higher burst and moisture resistance)</li> </ul>
Example applications	Main filter stage for turbines Pre- and main filterstage for particle and aerosol removal



Detail: flange dimension (without gasket)  
Also displays options 1 & 2.



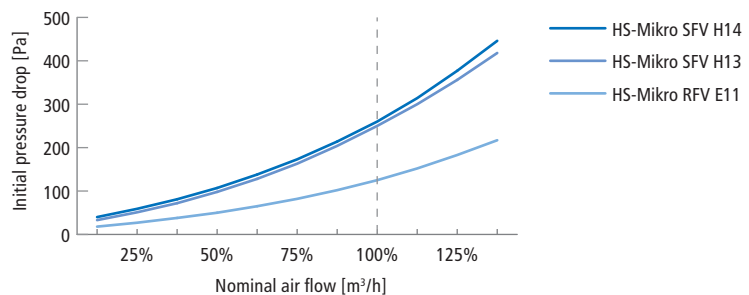
HS-Mikro SFV may be used as primary or main filter in environments requiring large or fluctuating flow rates as well as low pressure differences. Its elements are made up of pleated micro fiber glass media and are equipped with thermoplastic separators. Single filter packages are fitted into the frames in a V-shaped manner, in order to obtain maximal filter surface which may handle higher flow rates at the lowest possible pressure differences. HS-Mikro SFV may be installed into environments that need sterile clean air. They offer various options for the usage in industrial and technical processes. This product is almost metal-free and thus completely incinerable. This filter type might optionally be fitted with special heat resistant thermoplastic spacers for temperature ranges of up to 120°C. Such filters are marked with the model name HS-Mikro SFV-T.

Type:	HS-Mikro RFV	HS-Mikro SFV	
Class EN 1822	E11	H13	H14
Efficiency EN 1822 @ MPPS [%]	> 95 %	> 99,95 %	> 99,995 %
Initial- $\Delta P$ [Pa] at nominal air flow	125	250	260
Max. temp. [°C]	65° / opt.120°	65° / opt.120°	65° / opt.120°

Dimensions [mm]			Nominal air flow [m³/h]	# of filterpacks
Width	Height	Depth		
610	305	292	1300	8
457	457	292	1270	6
575	575	292	2160	6
610	610	292	3000	8
610	610	292	4000	10 <sup>(1)</sup>
762	610	292	3750	10

<sup>(1)</sup> special high air flow version, initial- $\Delta P$  >300 Pa  
Please ask for other desired dimensions and designs.



Frame	<ul style="list-style-type: none"> <li>▪ MDF</li> <li>▪ plywood</li> <li>▪ galv. or stainless</li> <li>▪ polystyrene plastic (65°C)</li> <li>▪ ABS plastic (120°C)</li> <li>▪ aluminium</li> </ul>
Operational conditions	<ul style="list-style-type: none"> <li>▪ max rel. h. 100 [%], max. temp. 65 [°C]</li> <li>▪ optional: HS-Mikro SF-T up to max. 120 [°C] with glassfibre media only</li> </ul>
Spacers	thermoplastic (minipleat)
Filtermedia	<ul style="list-style-type: none"> <li>▪ high quality glass fibre (standard), water repellant</li> <li>▪ ePTFE (optional) reduced Initial-<math>\Delta P</math>: up to -60%, water resistant, resistant against disinfectant, highly mechanical &amp; chemical resistance</li> </ul>
Combustible	Yes (frame: MDF, plywood, plastic)
Options	<ul style="list-style-type: none"> <li>▪ burst- &amp; protection screens [Attention! Initial-<math>\Delta P</math> will be much higher]</li> <li>▪ handle</li> <li>▪ gasket on both sides</li> <li>▪ customized gaskets (epdm, viton, ptfе or other customer specific)</li> <li>▪ antistatic filter for EX areas i.e. : <math>\epsilon_x</math> II 2GD IIA</li> <li>▪ customizations i.e.: grooves, guide-rails, boxed filter etc.</li> </ul>

Gasket options	height [mm]	form
seamless foamed polyurethane gasket (standard)	6 or 8	
flat sectionized neoprene gasket	6 or 8	
leak test gasket	7,5	



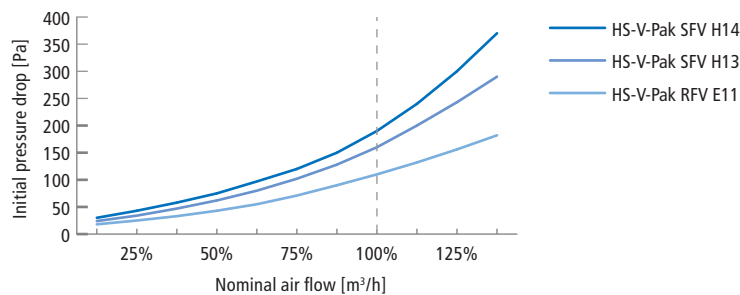
These compact HEPA filters are used as mainfilters in stationary applications such as cleanroom, pharmaceutical, medical or nuclear (i.e. in gloveboxes, cleanbenches etc.). With mobile applications HS-V-Pak SFV are used in machinery and vehicles that require controlled air quality (i.e. Waste disposal, exhaust into cleanrooms). HS-V-Pak filters are in use where less installation space or flexible arrangements are required. HS-V-Pak filters allow maximum usage available space in channel sections. Our advanced production techniques enables us to bring in the maximum filtersurface on smallest filtersizes. This allows operational cost & energy consumption reductions by lowering pressure drop, longer lifetime and reduction of dimensions of new planned systems. HS-V-Pak SFV filters consist from fully combustible raw materials so the filter can be completely incinerated after use. This allows easy disposal especially when toxic or bio hazardous filtrates are collected by the filter.



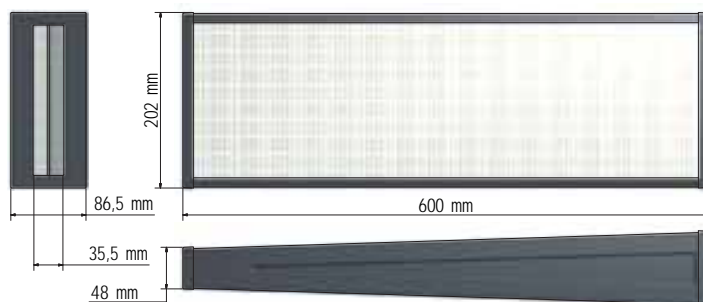
Type:	HS-V-Pak RFV	HS-V-Pak SFV	
Class EN 1822	E11	H13	H14
Efficiency EN 1822 @ MPPS [%]	> 95 %	> 99,95 %	> 99,995 %
Initial-ΔP [Pa] at nominal air flow	110	160	190
Recc. final-ΔP [Pa]	600	600	600
Weight [Kg]	1 kg	1 kg	1kg
Max. temp. [°C]	65°	65°	65°

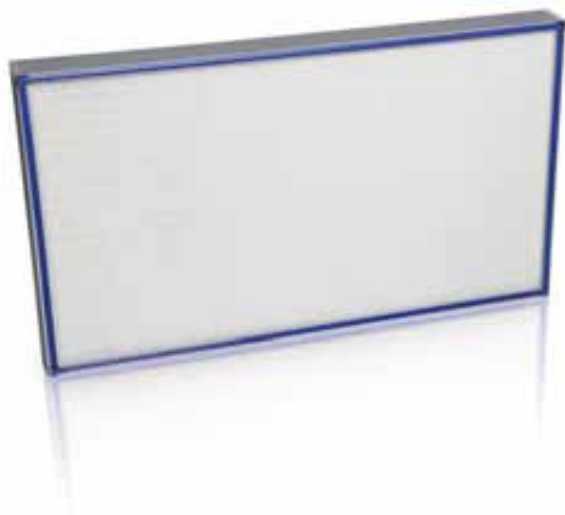
Width [mm]	Height [mm]	Depth [mm]	Nominal air flow [m³/h]
86,5	202	600	200

Please ask for other desired dimensions and designs.



Frame	polystyrene
Operational conditions	<ul style="list-style-type: none"> <li>max. rel. h. 100 [%]</li> <li>max. temp. 65 [°C]</li> </ul>
Spacers	thermoplastic (minipleat)
Filtermedia	<ul style="list-style-type: none"> <li>high quality glass fibre (standard), water repellent</li> <li>optional: PTFE membrane (up to -40% Initial-ΔP, water resistant)</li> </ul>
Combustible	Yes
Options	<ul style="list-style-type: none"> <li>protection grid (single side)</li> <li>gasket 6 mm (air entry)</li> </ul>
Sealing in the ductwork / installation	<ul style="list-style-type: none"> <li>with optional foamed gasket</li> <li>with silicone</li> <li>with special adhesive tape (1 roll is sufficient for ~100 elements)</li> </ul>





HS-Mikro SF-AL are high efficient HEPA and ULPA filters for submicron particle filtration (>20 nm). The filters are outfitted with sturdy extruded anodized aluminium profile frames which makes them corrosion resistant and due to the low weight allows easy handling. The filters are designed to work most efficiently in environments that require the highest cleanliness, such as in pharmaceutical, medical, electric, or nanotechnology industries. Such environment require a secure removal of dust, particles, microorganisms and viruses from supply air as a basic requirement for their function.

Clean room technologies aim to control the air inside facilities by removing dust and microorganisms and leading it to selected work places or operation rooms. HS-Mikro-SF AL are designed to serve as main filter stage for terminal filtration in filter ceilings, filter walls, clean benches, isolators, work cabins, air showers and air passages that require beside pure air a laminar air flow.



Designing HEPA filter and fine dust filters large flows, high dustloads loads or to perform with the best energy efficiency requires an uncompromising quality of the pleat geometry . Fine-dust, EPA, HEPA and ULPA Filter made by HS-Luftfilterbau always offer optimal filtersurface usage thanks to our technically advanced production methods, allowing perfectly straight folds up to 250 mm fold depths.

Our technologically advanced factory and strict quality regulations guarantees close limits of product variation and an unmatched quality level. Our flexible, order-related production ensures the production of all standard and odd sizes - no matter whether it is a single piece production or full scale JIT-Framework order). We supply the whole range of EN 1822 filter-classes from E10 to U16 (Class U17 upon request).

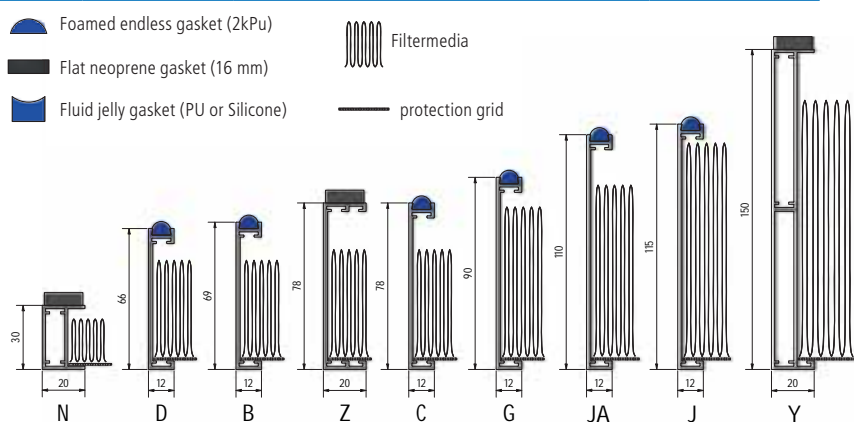
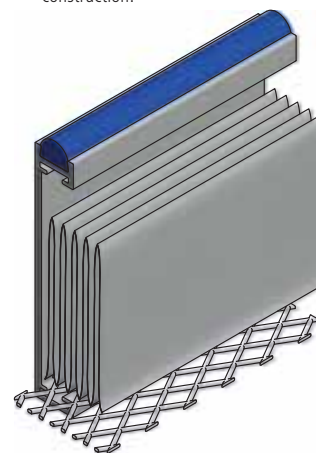


The filterframes are made from anodized, extruded aluminium profiles. The surface quality conforms class "B" according to EN 573-3. There are various profiles available. Beside our standard frames (Type B, Z, C, G, J, L, R and K) we offer diverse frame profiles for customer specific applications. The filter performance can be defined by the customer or process demands. The service lifetime, initial pressure drop and energy consumption can be adjusted to your demand by the different fold geometries we offer.

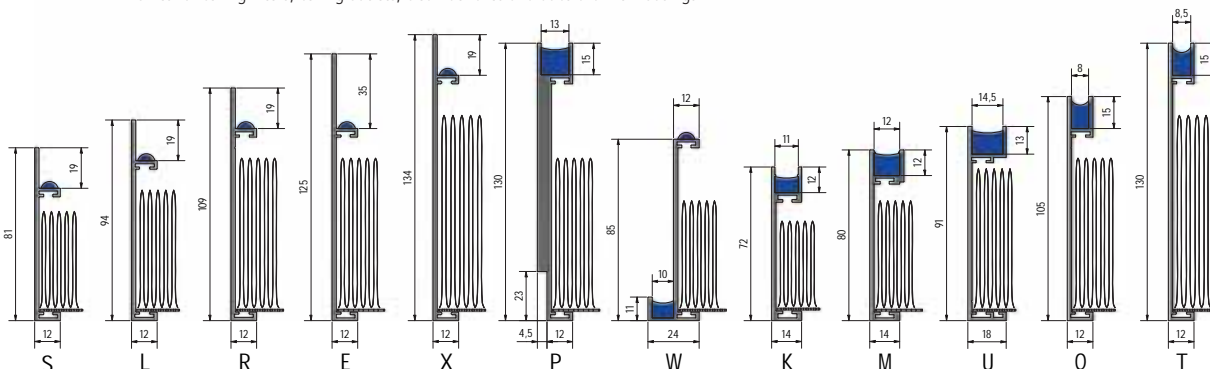
Filters using standard profiles have quite short lead times. For all non standard profiles the lead times may vary with the current stock availability of the profiles.

Type	Height [mm]	std. fold height [mm]	opt. fold heights [mm]	Standard profile
N	30	25	15, 20, 25	✓
D	66	45	34, 45	✓
B	69	45	34, 45, 50	✓
Z	78	55	45, 50, 55, (65)	✓
C / M	78 / 80	55	45, 50, 55, (-/65)	✓
G	90	70	45, 50, 65, 80	✓
JA / J	115	100	65, 80, 100	✓
Y	150	120	80, 120	✓
S	81	55	34, 50, 55	–
L	94	55	45, 50, 55, 65	✓
E / R	109 / 125	65	45, 50, 55, 65	– / ✓
X	134	65	55, 65, 80	–
W	85	50	34, 45, 65	–
K	72	45	34, 50	✓
U	91	55	45, 50	–
P / T	130	80	55, 65, 100	– / ✓

Cross section of the filter construction:



Profiles for ceiling filters, ceiling outlets, clean benches and duct-channel housings



Profiles for FFU's (fan filter units) and clean room ceilings

The diagram shows our most usual profiles, fitted with the most common standards in reference to the position of the protection grid, type and location of the gasket. The height of the filtermedia is not true to scale. Upon request we can offer more special profiles. Please contact our engineers .

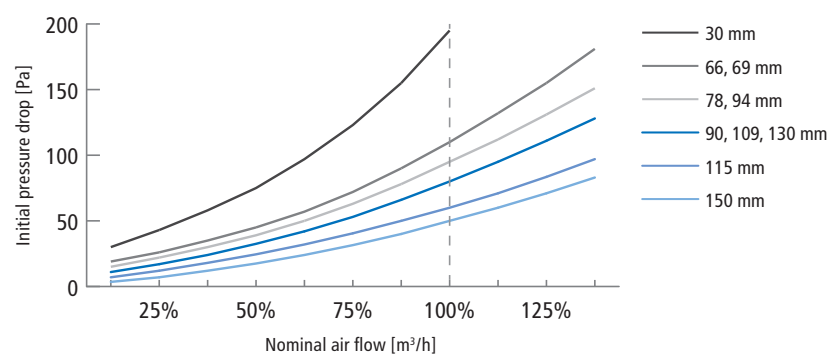
Class EN 1822	Profile Type	E11	H13	H14	U15	U16	H14 PTFE	U15 PTFE	U16 PTFE
Efficiency EN 1822 @ MPPS [%]		>98	>99,95	>99,995	>99,9995	>99,99995	>99,995	>99,9995	>99,99995
Nominal air flow [m/s]		0,45	0,45	0,45	0,45	0,45	0,45	0,45	0,45
Initial-ΔP [Pa] T=30mm	N	100	145	195	-	-	75	85	100
Initial-ΔP [Pa] T= 66/69 mm	D / B	55	95	110	130	-	50	60	80
Initial-ΔP [Pa] T=78 mm	Z / C	40	80	95	115	140	45	55	70
Initial-ΔP [Pa] T=90 mm	G	35	65	80	100	120	20	35	55
Initial-ΔP [Pa] T=94 mm	L	40	80	95	115	140	45	55	70
Initial-ΔP [Pa] T=109 mm	R	35	65	80	100	120	20	35	55
Initial-ΔP [Pa] T=115 mm	J	30	45	60	75	90	<20	25	45
Initial-ΔP [Pa] T=134 mm	X	35	65	80	100	120	20	35	55
Initial-ΔP [Pa] T=150mm	Y	25	45	50	70	85	upon request		

The given initial pressure drop is valid for filters with a single side protection grid on the air leaving side. Filters with protection grids on both sides may have higher values. Our flexible production is able to realize nearly any demand / specification.

Filters fulfilling class EN 1822 U17 will only be offered as customized product. The pressure drop underlies tolerances. Please contact our sales engineers for tolerances, further dimensions or options.

Dimension [mm]		Nominal air flow [m³/h]	Dimension [mm]		Nominal air flow [m³/h]
Width	Height		Width	Height	
305	305	150	762	762	940
457	457	340	915	762	1130
305	610	300	1220	762	1505
610	610	605	1525	762	1880
762	610	755	1830	762	2260
915	610	905	915	915	1355
1220	610	1205	1220	915	1805
1525	610	1505	1525	915	2260
1830	610	1810	1830	915	2710

Diagram of pressure drop EN 1822 H14



The validity of the diagram to the right is limited to filters with class EN 1822 H14, glass fibre, single side protection grid and standard pleat depth (filtersurface).

Operational conditions

- max. rel. h. 100 [%]
- max. temp. 65 [°C]  
optional bis max. 120 [°C] (glass media only)
- pressure drop may temporarily increase at high humidity levels

### Optional: Terminal Filter / Hooded Filter

We offer HS-Mikro SF-AL also as terminal filter. The design allows the connection of the filter to supply lines, ducting and hoses. For this the HS-Mikro SF-AL is mounted by a hood made from steel (either galvanized, painted or stainless) or aluminium on the filter frame. The hood is applied to the filter by special adhering sealing compounds. The tightness of the hood is approved during the EN 1822-4 testing. Optionally the hood can be fitted with damper flaps to allow a precise setting of the air speed through the filter. Also we can fit connections pins for measuring the pressure drop or to apply aerosols for in-situ testing of the filter efficiency.

The dimension of the hood and the spigot are manufactured according to the process- or customer requirements.



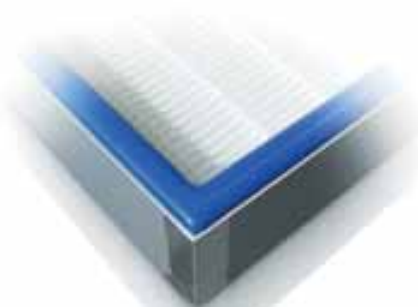
Example applications	▪ Clean room ceiling	▪ Clean benches
	▪ Isolators	▪ Fan-Filter-Units (FFU's)
	▪ Micro-Environment	▪ Air Showers
	▪ Clean room airlock	▪ Last barrier safety filters
	▪ Terminal filter	

By standard HS-Mikro SF-AL are fitted with a protection grid on the clean air side. We optionally fit the filters with grids on both sides - or no grid at all to reduce the pressure drop. You can choose between three different protection grids

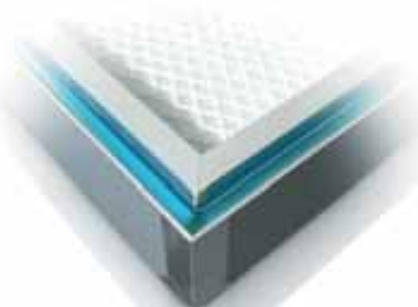
Powder coated aluminium [standard]	This protection grid is our standard. We exclusively use powder coated aluminium to ensure maximum corrosion resistance.
Polypropylen	Filters with dimensions of up to 610x610 mm may be fitted with this more cost effective alternative made from semi-transparent polypropylene. Thanks to the slightly wider mesh size this type of grid offers a lower pressure drop and thus contributes to energy efficient design.
Aluminium blank	This type of grid is needed for filters with antistatic features. Such filters that are fitted with a special version of NON-ANDROZIED profiles and are equipped with antistatic features for ATEX.

### HS-Mikro SF -AL can be fitted with various gaskets for different applications

Endless foamed polyurethane gasket	This seamless and closed-cell gasket is directly foamed on the frame as a single piece. It consists of two component polyurethane. The height of the gasket guided by a groove (i.e. profiles D, B, C, G, J) appx. 3 mm. For profiles without groove the height is 6 mm. HS-Mikro SF-AL are fitted by standard with a foamed gasket on the air entry side. Beside this, most profiles can be fitted with gaskets on both sides
Gel jelly gasket polyurethane	The profile types K, U, Q, and T are supplied with gel gaskets. By default this gel is made of polyurethane (blue-transparent). This gel type is guaranteed to be bubble-free to avoid any potential gas-exchange with the environment. Of course our gel-gasket is free from harmful plasticizers (phthalate free) and is fully REACH conform.
Gel jelly gasket silicone	The above listed profiles can be fitted with an alternative silicone gel (clear-transparent) on demand. This gel offers a slightly higher fluidity and is heat tolerant up to 160°C.
Flat gasket neoprene (Standard) or PTFE	The profiles N, Y and Z can optionally be fitted with a flat section gasket. This gasket is beneficial in applications where the filter is installed in ceiling outlets or mounting systems that offer a bypass-leak test according to DIN 1946-4 (1998) or KTA 3601. If a leak test groove is given in the mounting system we recommend to ensure that the filters are installed in a centered position before fixation to avoid damaging the gasket by shearing.



We're sealing the profile gear cuts with tape to exclude the very small risk of a particle diffusion through the gear cut seam.



100% free of any bubbles:  
our plasticizer free PU-GEL gasket



HS-Mikro SF-AL Filter with ePTFE membrane and PU-jelly gasket.



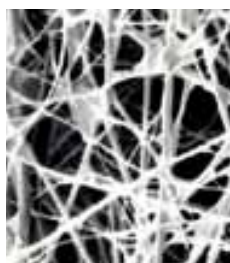
## Filtermedia

There are different filtermedia available for this filtertype.

Unless the process requirements do not demand something special, we offer high quality micro-glassfibre filterpaper with different efficiency grades as the standard filter media. The medias structure and composition fulfills the requirements for temperature and moisture. In case of boron sensitive processes we recommend to low-boron filter media also based on glass fibres. Boron can be emitted by usual filtermedia in molecular traces and may cause negative effects at some technical processes (i.e. microelectronics). We recommend the use of ePTFE membranes for applications that have highest demands for mechanical integrity or where boron must be excluded at all. Such membranes are very resilient and completely unaffected by moisture and chemicals that may harm glass media. Even highest filter efficiencies up to class U17 can be realized with ePTFE in much smaller dimensions than with usual glass media.

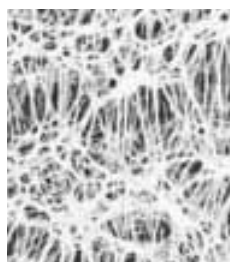
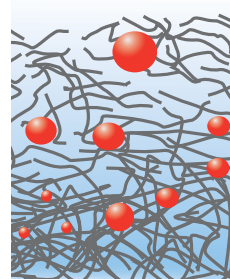
The filtermedia is pleated in close folds and thermoplastic spacers ensure a high mechanical stability and precise distance of the folds. This ensures an optimal laminar air flow.

Regular ePTFE Membranes are sensitive against oil mists and aerosols so we strongly recommend to avoid the usage of test-aerosols like DEHS, DOP or PAO while performing on site tests (i.e. ISO 14644). We advise to use PSL particles with a size spectrum of 0,1 - 0,2 µm. Alternatively we can offer special ePTFE Membranes that are **fully resistant against oily aerosols** used during qualification tests. Please inform our sales when asking for quotations.



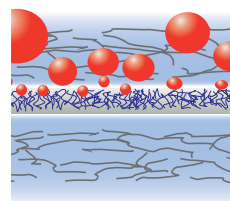
### Glasfibre

Glass fibre media provide a 3D fiber structure with limited progressive filter structure. Advantage: good dust holding capacity, since particles can penetrate deep into the media structure. Even at higher particle load a good service lifetime can be achieved.



### ePTFE Membranes

ePTFE membranes are usually surrounded by protective coatings with high penetration levels. The filter mechanism is highly surface-related. This allows a low pressure drop but makes the usual membrane filter sensitive to oily aerosols and high particle concentrations. A good pre-filtration is recommended. We can supply oil-resistant Membranes when required.



Characteristic	Glass fibre media	ePTFE media
Filterclass @ 0,45 m/s	E11 - U16	H13 - U17
Moisture resistance	up to 100% rel. h.	up to 100% rel. h.
▪ Tear resistance	100%	>800%
▪ Tear resistance @ 100% rel. H.	10 -20%	>800%
Boron emitting	Yes	No
Chemical resistance:		
▪ Oil-mist	good	very poor (optionally <b>good</b> ) <sup>1</sup>
▪ Hydrogen peroxide	good	good
▪ Hydrofluoric acid	very poor	good
▪ Formaldehyde	good	good
▪ Acetone	good	good
▪ Hydrochloric acid	poor	good
▪ Toluol, Hexan, Xylen	good	poor
▪ Isopropanol	good	good
Testaerosol acc. EN 1822	DEHS 0,1- 0,3 µm (oil / fluid)	PSL 0,15 µm (monodisperse solid)
Initial-ΔP(acc. to product design)	40 - 350 Pa	15 - 200 Pa

<sup>1)</sup> Valid only for qualifying and In-Situ tests. We don't recommend ePTFE for oil mist filtration.

Dok.-ID: 07/007

documents might be subject to change / issue April 2016



## Individual testing of HEPA- and ULPA-Filters

Each of our HEPA- and ULPA-filter will be tested in compliance with EN 1822 categorically. Every test is documented thoroughly. All the components used in our filters can be traced due to individual serial numbers. For this task HS-Luftfilterbau GmbH operates one of the most advanced test laboratories.

The Filters are efficiency tested by scanning with optical particle lasercounters for the local and integral efficiency against MPPS particle size (ranging from 0,1 - 0,3µm). Glass fibre media filters are tested with DEHS (Di-Ethy-Hexyl-Sebacat) whilst ePTFE membrane filters are solemnly tested with monodispersal solid aerosol (PSL). The maximum size we can scantest is 1830x1220 x 400 mm.

Optionally, you may ask for a test report of the obligatory oil fog test or an extensive scan test starting with class EN 1822 H13. We conduct scan tests for clean room panel filters as well as HEPA-filter that will be applied within pharmaceutical or demanding industrial environments. For any filters of class EN 1822:U15 or higher scantesting is mandatory.

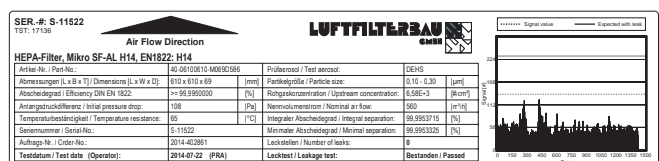
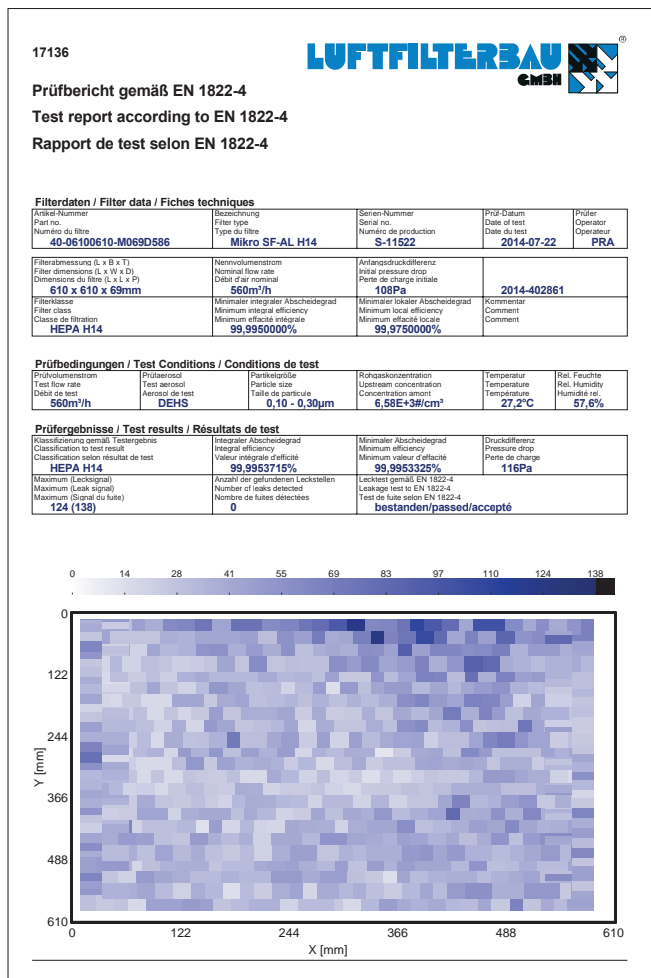
According to the demand of our customers we can tighten single test parameters like the leak detection value far stricter than the tolerances allowed by EN 1822. Upon request we can issue the resulting test report completely neutral (no company logo) or with your companies brand (OEM).

The surface scantest results are accurately recorded and will be displayed to scale in a easy to understand 2-D diagram. Also, a diagram with the complete measuring data will be present on the product label as a proof for a successful test and individual watermark. This allows a much better traceability of the test results by the end user if compared to usual test reports of other brands. When required we can perform air-flow-uniformity test as an additional test. The test is performed by measuring the air speed on a pre-defined grid of measuring points. By graphical diagram we can prove that the velocity variation is within your specification limit and thereby guarantee that the flow field is not exceeding your individual tolerance.



Upper-right:  
Our testrig is designed to meet all requirements of EN 1822. Our exclusive measuring equipment ensures isocinetic probing - even at variable air flows.

Left:  
The test report is generated by the test rig and contains all measured data. The test data are visualized by a 3D diagram.



The product label is automatically generated by the test system and contains the whole test data incl. a test diagram.



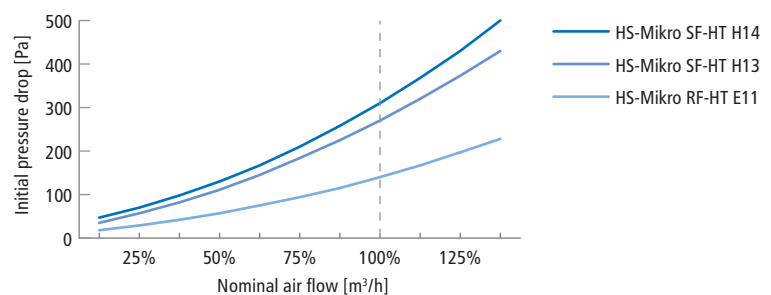
Please follow our on site tempering instruction prior operation. Please contact us for more informations!

These high-temperature EPA and HEPA filters are designed for supply and exhaust air purification at industrial processes. Typical fields of application are drying ovens, sterilisators, gas, smoke and fume exhaust systems. The glassfibre filtermedia is stabilized by glass fibre strings. The filtermedia is held between protection screens made of stainless steel and is additionally protected against shedding by glass fibre gauze. The compact design of HS-Mikro SF-HT allows continuous operational temperatures for up to 250°C. These filters can be produced in an ATEX conforming version. HS-Mikro SF-HT are sealed by a temperature and chemical resistant silicone. The gasket either consists of a glass fibre coor or FDA conforming rectangular silicone profile.

Type:	HS-Mikro RF-HT	HS-Mikro SF-HT	
Class EN 1822	E11	H13	H14
Efficiency EN 1822 @ MPPS [%]	> 95 %	> 99,95 %	> 99,995 %
Initial-ΔP [Pa] at nominal air flow	140	270	310
Silicone free?	No	No	No
Max. temp [°C]	250°	250°	250°

Dimension [mm]			Nominal air flow [m³/h]
Width	Height	Depth	
305	305	69	150
305	610	69	300
457	457	69	340
610	610	69	600
915	610	69	900
305	305	90	180
305	610	90	360
457	457	90	410
610	610	90	720
915	610	90	1100
305	305	150	520
305	610	150	1000
457	457	150	1200
610	610	150	2100
915	610	150	3100

Please ask for other desired dimensions and designs.



Frame	extruded aluminium profile, galv. steel, stainless
Spacers	glass fibre string
Filtermedia	high efficient glass fibre paper (water repellent, moisture resistant) with anti-shedding gauze
Gasket	silicone
Options	anti static EX-protected, double sided gasket

This product family allows maximal air flow rates at high temperature ranges. Typical fields of application are drying ovens, sterilisators, gas, smoke and fume exhaust systems. The glass-fibre filtermedia is stabilized by glass fibre strings. The filtermedia is held between protection screens made of stainless steel and is additionally protected against shedding by glass fibre gauze. Depending on the filters construction up to 10 mediapacks are installed in a filter and mounted in v-shaped to allow extended filtersurfaces. The design of HS-Mikro SF-HT allows continuous operational temperatures for up to 250°C. HS-Mikro SFV-HT are sealed by a temperature and chemical resistant silicone. The gasket either consists of a glass fibre cord or FDA conforming rectangular silicone profile.

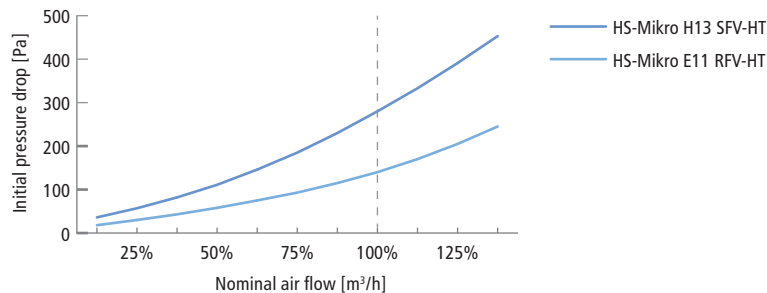


Please follow our on site tempering instruction prior operation. Please contact us for more informations!

Typ:	HS-Mikro RFV-HT	HS-Mikro SFV-HT
Class EN 1822	E11	H13
Efficiency EN 1822 @ MPPS [%]	>95 %	> 99,95 %
Initial-ΔP [Pa] at nominal air flow	150	280
Silicone free?	No	No
Max. temp. [°C]	250°	250°

Dimension [mm]			Nominal air flow [m³/h]	# of filterpacks
Width	Height	Depth		
592	287	292	1200	4
610	305	292	1800	4
592	592	292	2600	10
610	610	292	3000	10
592	287	400	1600	4
610	305	400	2000	4
592	592	400	3500	10
610	610	400	4000	10

Please ask for other desired dimensions and designs.



Frame	galv. steel, stainless,
Spacers	glass fibre string
Filtermedium	high efficient glass fibre paper (water repellent, moisture resistant) with anti-shedding gauze
Dichtung	silicone
Fertigungsoptionen	anti static EX-protected, double sided gasket

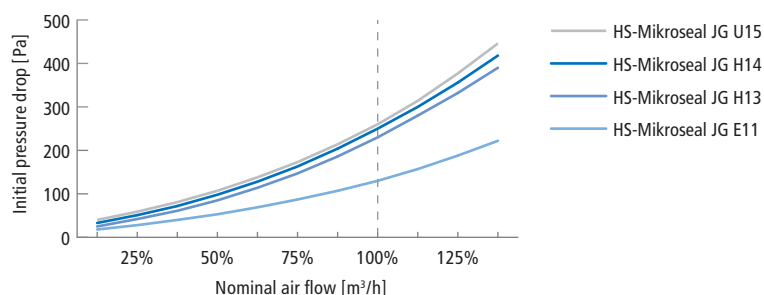
## Cartridge Filter – HS-Mikroseal JG



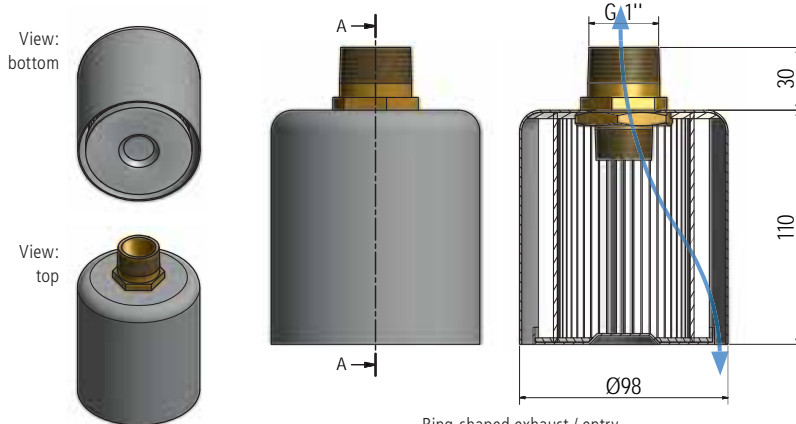
The HS-Mikroseal JG filter cartridge is designed for the removal of airborne particles such as viruses, bacteria and toxic, pathogenic or radioactive dusts. HS-Mikroseal JG can be applied anywhere in systems where small form factors are required at moderate volume flows. The filter cartridge does not require a separate housing and can host on/in the usual pipes and tanks. The standardized 1"-thread connector allows fast and simple fixation.

The filter medium is protected against environmental influences by a corrosion-resistant stainless steel frame. Among the numerous applications, these filters essentially serve as pressure relief filters at security relevant filter housings (eg HS-S041, HS-Securesorb) or to have controlled air exchange at in pipes and tanks. All HS-Mikroseal JG cartridges are tested according to EN 1822.

Type:	HS-Mikroseal JG			
Class EN 1822	E11	H13	H14	U15
Efficiency EN 1822 @ MPPS [%]	> 95 %	> 99,95 %	> 99,995 %	>99,9995 %
Nominal air flow [m³/h]	22	22	22	15
Initial-ΔP [Pa] at nominal air flow	130	230	250	260
Recc. final-ΔP [Pa]	3 x initial pressure drop max. 1000 Pa			
Max. temp. [°C]	65° / opt. 120°C			



Frame	<ul style="list-style-type: none"> <li>frame: stainless 1.4301 / AISI 304</li> <li>thread: 1" made from brass</li> </ul>
Operational conditions	<ul style="list-style-type: none"> <li>max. rel. h. 100 [%]</li> <li>max. temp. bis 65 [°C]</li> <li>opt. 65 [°C]</li> </ul>
Spacers	thermoplastic (minipleat)
Filtermedia	<ul style="list-style-type: none"> <li>high efficient glass fibre paper (water repellent, moisture resistant)</li> <li>optional: ePTFE-membrane</li> </ul>
Combustible	No



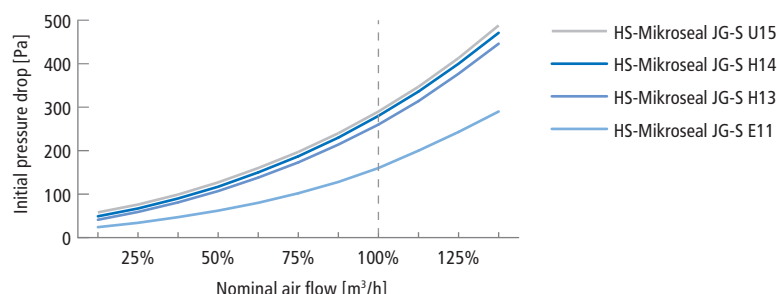
Ring-shaped exhaust / entry.  
The filter supports bidirectional air flow.

## Cartridge Filter –HS-Mikroseal JG-S

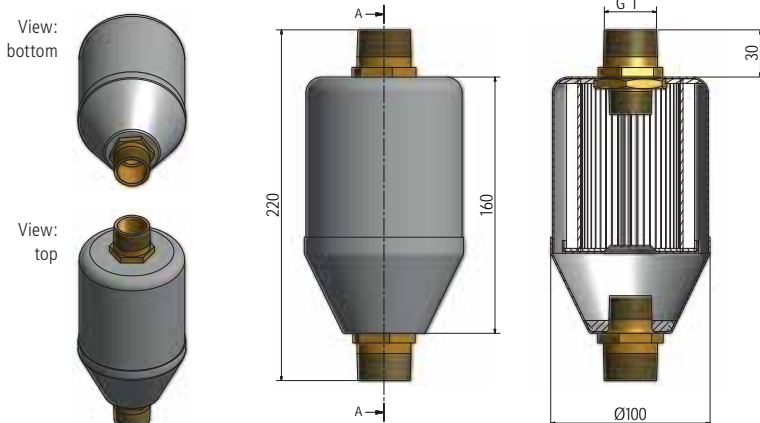
The HS-Mikroseal JG-S filter cartridge is designed for the removal of airborne particles such as viruses, bacteria and toxic, pathogenic or radioactive dusts. HS-Mikroseal JG-S can be applied anywhere in systems where small form factors are required at moderate volume flows. The filter cartridge does not require a separate housing and can host on/in the usual pipes and tanks. The standardized 1"-thread connector allows fast and simple fixation. The filtermedia is protected by a corrosion resistant stainless steel frame and thereby protected from external influences. The corpus is gastight sealed and allows operation within pressurized ductworks up to  $\pm 300$  mbar. Among the numerous applications, these filters essentially serve as pressure relief filters at security relevant filter housings (eg HS-S041, HS-Securesorb) or to have controlled air exchange with pipes and tanks. All HS-Mikroseal JG-S cartridges are tested according to EN 1822.



Type:	HS-Mikroseal JG-S			
Class EN 1822	E11	H13	H14	U15
Efficiency EN 1822 @ MPPS [%]	> 95 %	> 99,95 %	> 99,995 %	>99,9995 %
Nominal air flow [m³/h]	22	22	22	15
Initial-ΔP [Pa] at nominal air flow	160	260	280	290
Recc. final-ΔP [Pa]	3 x initial pressure drop max. 1000 Pa			
Max. temp. [°C]	65° / opt. 120°C			



Frame	<ul style="list-style-type: none"> <li>frame: stainless 1.4301 / AISI 304</li> <li>thread: 1" made from brass</li> </ul>
Operational conditions	<ul style="list-style-type: none"> <li>max. rel.h. 100 [%]</li> <li>max. temp. 65 [°C] opt. 120 [°C]</li> <li>over-/underpressure: <math>\pm 300</math> mbar</li> </ul>
Spacers	thermoplastic (miniplate)
Filtermedia	<ul style="list-style-type: none"> <li>high efficient glass fibre paper (water repellent, moisture resistant)</li> <li>optional: ePTFE-membrane</li> </ul>
Combustible	No



The filter supports bidirectional air flow.



Activated carbon proves to be useful for adsorbing gaseous and vaporous impurities, which are damaging to people, animals, and plants. It is therefore placed in air conditioning and ventilation systems to purify incoming and circulating air.

**HS-Luftfilterbau offers granulated carbon of 0.6 to 6.3 [mm] in size, as well as pulverized carbon of 0.075 [mm] in size or less.**

It is produced from organic matters such as peat, nut shells, or sugar, which are being heated and treated with special substances in order to broaden their "outer" and "inner" surface. Through this the grains form fine pores and capillary systems; the adsorbing area sums up to 1700 [m<sup>2</sup>] per gram. This extremely large surface has an excellent retention level as well as a storing capacity, and leads to a long lifespan.

The longer the time of contact between activated carbon and air, or the more activated carbon is used, the better is the carbon's utilization. For particular impurities impregnated and specially treated carbon is used.

The airflow's temperature should not exceed 50 [°C], because above this level volatile substances are desorbing and they need to be adsorbable (s. table). Activated carbon is sensible to dust. Therefore it is advised to install a high-quality dust filter as a pre-filtration element.

### Rule of thumb:

Those gases or vapours can be adsorbed well whose molecules contain more than three atoms that are not hydrogen.

Activated carbon is used to purify drinking water as well as to reprocess industrial and pool effluences in order to keep a water quality according to norm regulations. For reprocessing water, different types of activated carbon are available – depending on the water's impurity.

Reference Table for efficiency of activated carbon against air impurities (exemplary)		
Aceton	Butyric Acid	Carbon dioxide
Acetaldehyde	Chlorine	Solvents
Acrolein	Chloroform	Menthol
Alcohol	Oilic vapors	Methane
Anaesthetics	acetic acid	Methyl alcohol
Ether	Desinfectant	Mercapane
Ethric Oil	Formaldehyde	Ozone
Ethan	Fruit smells	Phenol
Ethylen	Kitchen odours	Phosgene
Ethyl acetate	Iodine	Propane
Amines	Kerosene	Perspiration
Ammonia	Body odours	Carbon tetrachloride
Fuel	Cosmetics	Turpentine
Benzole	Hospital odours	Tobacco smells & smoke
Butane	Cresole	Tuluol

■ very good adsorption
 ■ good adsorption
 ■ low adsorption
 ■ very poor adsorption

Please ask us for further data of adsorption parameters other gaseous air impurities.



## HS-Clean Pro for odour & gasfiltration (chemisorption)



HS-Clean Pro is a chemisorptive granulate which serves as replacement or as addition to HS-Activated Carbon. HS-Clean Pro offers favourable adsorption abilities against various organic gases. We recommend its use in addition to activated carbon at processes where H<sub>2</sub>S, SO<sub>2</sub> or other organic / smell intensive agents, i.e. aminoacids or formaldehyde must be removed from the air flow.

HS-Clean Pro is manufactured from high porosity activated alumina granules which are impregnated with potassium permanganate (KMnO<sub>4</sub>). The potassium permanganate serves as oxidizing agent to destroy, inactivate or converse the problematic gases and odours. It is not combustible and thus fulfills UL class 1.

HS-Clean Pro will change color by onwardly chemisorption / oxidation from purple (fresh media) to brown and black (used media).



Gaseous air impurity	formular	capacity HS-Clean Pro	capacity HS-Clean Pro II
Formaldehyde	CH <sub>2</sub> O	1,4 %	2,5 %
Hydrogen sulfide	H <sub>2</sub> S	8,0 %	14,0 %
Nitric oxides	div.	2,8 %	4,9 %
Sulphur dioxide	SO <sub>2</sub>	4,0 %	7,0 %
Ethylene	C <sub>2</sub> H <sub>4</sub>	1,0 %	1,75 %

Upon request we will send you performance and capacity data for other gases, agents, odours etc. The capacity in [%] determines the possible weight relative adsorption / chemisorption capacity.

The air flow should be adjusted to the applications requirement. We recommend an air velocity of 0,3 - 2,5 [m/s].

Examples	<ul style="list-style-type: none"> <li>100 kg HS-Clean Pro binds appx. 8 kg H<sub>2</sub>S</li> <li>200 kg HS-Clean Pro II binds appx. 14 kg SO<sub>2</sub>.</li> </ul>
Variants	<p>HS-Clean Pro is available with different grades of KMnO<sub>4</sub> impregnations:</p> <ul style="list-style-type: none"> <li><b>HS-Clean Pro</b> with 4 % KMnO<sub>4</sub> impregnation</li> <li><b>HS-Clean Pro II</b> with 8 % KMnO<sub>4</sub> impregnation</li> <li><b>HS-Clean Pro III</b> with 12 % KMnO<sub>4</sub> impregnation exclusive media for special tasks</li> </ul>
Operational conditions	<ul style="list-style-type: none"> <li>rel. h. 10 [%] - 95 [%]</li> <li>temperature range -20[°C] to 51 [°C]</li> </ul>
Applications	<ul style="list-style-type: none"> <li>HS-AKP 26 (cartridge filter filling)</li> <li>HS-A053 (replaceable filterbed cell)</li> <li>HS-Securesorb (deep bed filter system)</li> <li>HS-Combicel</li> <li>HS-Carbopad</li> </ul>



## HS-AKP-26 – Activated Carbon Cartridge

These activated carbon cartridges serve as adsorbent for gaseous pollutions and odours. They may be installed at the clean air or the exhaust air side of a system. A simple modular construction allows the assembly of a larger filtration unit by screwing the cartridges onto a base. If necessary, impure gas can be adsorbed through various filtering stages, which contain a required kind of impregnated carbon.

Cartridges filled with standard carbon are suitable for environments with up to 50 degrees Celsius and a relative humidity of 70 percent.

Activated carbon is sensible to dust. Therefore it is advised to install a high-quality dust filter as a pre-filtration element. For the use in ventilation systems the contact duration of carbon and airflow should take between 0,1 till 5 seconds.



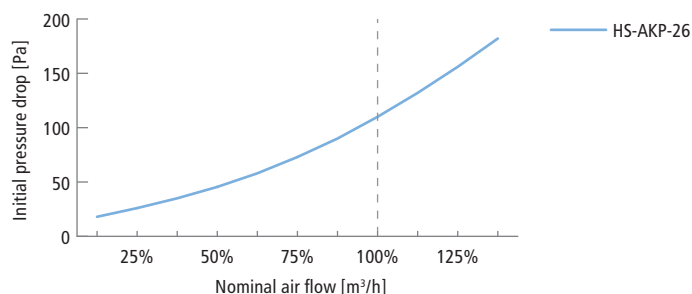
HS-AKP-26

Type of carbon	pellet carbon 3 [mm], coconutshell
Initial- $\Delta P$ [Pa] with std. carbon	110
Carbon layer thickness [mm]	26 mm
Gasket [mm]	3 mm, neoprene
Max. temp [°C]	40°

Dimensions [mm]		Nominal air flow per cartridge [m³/h]	Amount of activated carbon [ltr.]
Diameter	Length		
145	250	80	2,4
145	453	150	4,7
145	600	200	5,9

Holding frame for HS-AKP 26			
Width	Height	Depth	# of cartridges
610	610	70	Holder for 16 units
508	610	70	Holder for 2 units
305	610	70	Holder for 8 units

Please ask for other desired dimensions and designs.



Cartridge frame	<ul style="list-style-type: none"><li>galv. steel</li><li>stainless 1.4301</li><li>plastic</li></ul>
Sorbitive media	<ul style="list-style-type: none"><li>activated carbon (standard)</li><li>HS-Cleanpro (chemisorbtive)</li><li>special carbon types</li><li>zeolithe</li></ul>
Regenerateable	Yes (galv. steel and stainless frames)



Dok.-ID: 09/003

documents might be subject to change / Issue April 2015



## HS-AKP-35 – Activated Carbon Cartridge

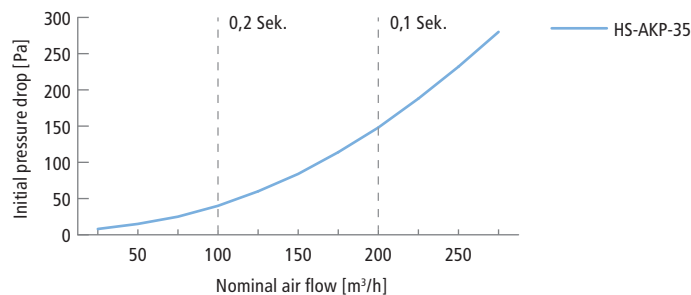
HS-AKP-35 is specifically designed for the odour removal for gastronomy exhaust air and fulfills the requirements for improved service lifetime. Depending on the tasks we also offer specific adsorbents for chemical and physical adsorption or various hazardous materials that need to be filtered from exhaust air. HS-AKP-35 smoothly fit as replacement existing filter at existing gastronomy filter systems.

Our simple modular array rack system allows the combination of great filter numbers to construct huge filterwalls and filtersystems. These may also be based on our reliable housing types HS-Solid CAT or HS-Vario CAT.

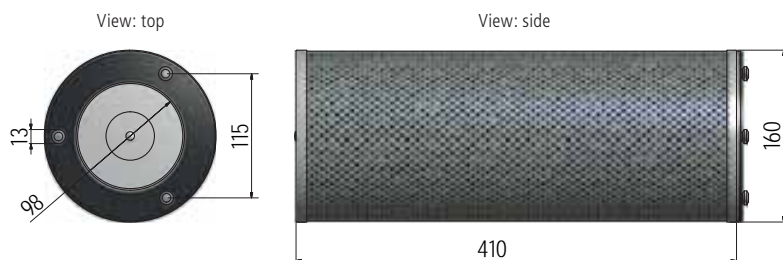
Various hazardous gases can be filtered by combining several filterstages with impregnated special carbons, zeolite or other sorptive matters.



HS-AKP-35				
Type of carbon		Formkohle 3 mm, Kokosnuss		
Initial-ΔP [Pa] A/B		45 / 148		
Carbon layer thickness [mm]		35 mm		
Gasket [mm]		3 mm, neoprene		
Max. temp. [°C]		40°		
Dimensions [mm]		Nennvolumenstrom [m³/h]		Amount of activated carbon [ltr.]
Diameter	Length	A: Odours	B: Haz.mat (i.e. VOC)	
160	410	200 m³/h @ 0,1 Sek.	< 100 m³/h @ 0,2 Sek.	5,1 ltr.



Cartridge frame	<ul style="list-style-type: none"><li>galv. steel</li><li>stainless 1.4301</li></ul>
Sorbitive media	<ul style="list-style-type: none"><li>activated carbon (standard)</li><li>HS-Cleanpro (chemisorptive)</li><li>special carbon types</li><li>zeolithe</li></ul>
Regeneratable	Yes





## HS-Carbo Pak – Compact molecular filter



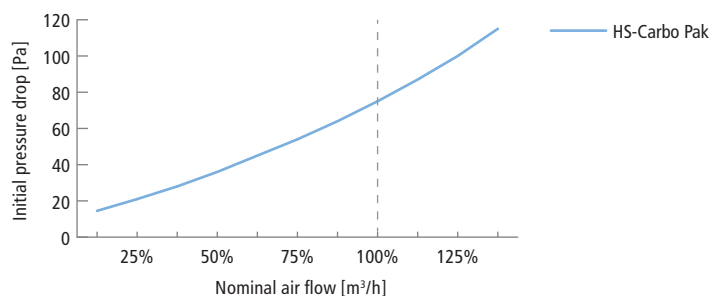
HS-Carbo Paks are suitable for adsorbing low amounts of organic contaminations such as ozone, nitric oxide, hydro-carbon, dioxin, or sulphur dioxide out of outside air inlets. Existing filtration systems can easily be combined with HS-Carbon Paks.

The filtration media consists of pads made from highly activated carbon foam.

The foam pads are placed into a durable, corrosion-free plastic frame. HS-Carbo Pak is completely metal-free, totally incinerable and therefore easy to dispose.

Alternatively, the filter can be equipped with a foam endless gasket on the surrounding 25-millimeter flange.

HS-Carbo Pak			
Filtermedia	activated carbon foam		
Initial- $\Delta P$ [Pa] standard configuration	30 - 75		
max. ambient temp. [°C]	40°		
Width	Dimension [mm] Height	Depth	Nominal air flow [m³/h]
592	592	292	1700 – 3400
592	490	292	1500 – 2900
592	287	292	850 – 1700
Filterclass acc. ISO 10121-3		1700 m³/h	3400 m³/h
Ozone		vLD 65	vLD 30
NO <sub>2</sub>		vLD 30	vLD 20
SO <sub>2</sub>		vLD 15	vLD 10
Toluene		vLD 75	vLD 60



### Areas / examples of use

- odour removal
- extracts pollution out of outside air inlets in cities (sulphur dioxide, nitric oxide, ozone, exhausts)
- cleans air from organic substances, such as solvents or traces of fuel

### Examples where HS-Carbo Pak are not recommended

- extraction of radio-active or toxic concentrations of gases
- adsorption of high amounts of organic substances
- adsorption of ammonia

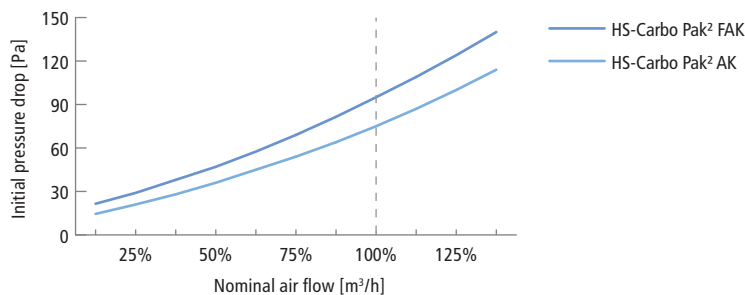
Gasket options	height [mm]	form
seamless foamed polyurethane gasket (standard)	6 or 8	
flat sectionized neoprene gasket	6 or 8	

## HS-Carbo Pak<sup>2</sup> AK, HS-Carbo Pak<sup>2</sup> FAK – Compact filter

HS-Carbo Pak<sup>2</sup> remove odours and improve the indoor air quality in air-conditioned buildings. These filters contribute to avoid „sick building syndrome“ and remove air impurities which causes symptoms like nausea or headaches. Gaseous or odourous contaminations may be fed to the indoor air by car, train, plane exhausts or by offgassing of indoor furniture, paints, carpet glues etc. Especially with untreated circulating air such compounds start to concentrate. HS-Carbo Pak<sup>2</sup> purifies the air from such compounds. The filtermedia consists of textile bound granules of microcarbon. Thanks to its structure it offers excellent adsorption ratings even at short contact times. HS-Carbo Pak<sup>2</sup> FAK is offering a combined filter media with an additional particle filtration layer. This type allows secure particle and finedust filtration together odours and gas filtration. HS-Carbo Pak<sup>2</sup> FAK allows the easy upgrade of existing ventilations systems to achieve a safe removal of gases and odours beside the usual fine dust filtration. Even single stage filterstags can thus be directly upgraded replacing a single stage particle or odour filter with the more effective combination unit. HS-Carbo Pak<sup>2</sup> AK and HS-Carbo Pak<sup>2</sup> FAK fulfill the requirements for the filtration of Class ODA3 outdoor air according to ISO 13779.



Type	HS-Carbo Pak <sup>2</sup> AK	HS-Carbo Pak <sup>2</sup> FAK
Filtermedia	PES / Microcarbon	PES-PP / Microcarbon, particle filter class: ISO 16890: ePM1 50%
Initial-ΔP [Pa]	75	95
Recc. final-ΔP [Pa]	no change of pressure	450
max. ambient temp. [°C]	40°	40°
Filterclass acc. to ISO 10121-3	HS-Carbo Pak <sup>2</sup> AK	HS-Carbo Pak <sup>2</sup> FAK
Ozone	MD 70	MD 70
NO <sub>3</sub>	vLD 60	vLD 60
SO <sub>3</sub>	VLD 30	VLD 30
Toluene	MD 80	MD 80
Dimension [mm]		
Width	Height	Depth
592	287	292
592	490	292
592	592	292
Nominal air flow [m <sup>3</sup> /h]		
1650		
2800		
3400		



**Frame** plastic (polystyrene) with 25 mm circulating flange, fitting for std. mounting frames (Dok.-ID: 10/D08)

**Operational conditions**

- max. rel. h. 75 [%],
- max. 40 °C ambient temperature

**Initial adsorption**

- CCL<sub>4</sub>: 50 - 60 %
- O<sub>3</sub>: >90%

Gasket options	height [mm]	form
seamless foamed polyurethane gasket (standard)	6 or 8	
flat sectionized neoprene gasket	6 or 8	



## HS-A053 – Activated Carbon Retainer Cell



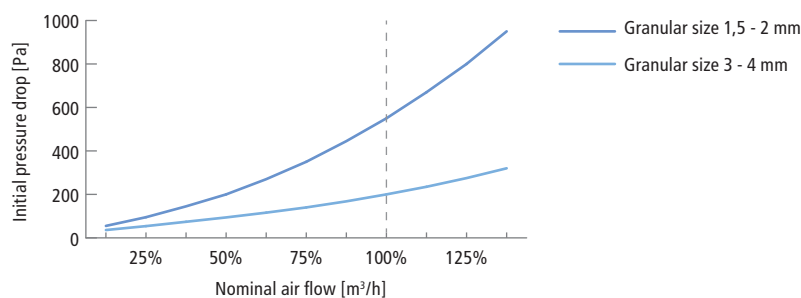
This exchangeable carbon cell is highly efficient within incoming air as well as exhaust air systems that hold high degrees of gases and odours. It is especially equipped to extract radioactive gases such as iodine, its compounds as well as war gases. It is originally designed to serve within nuclear facilities. The compact retainer cell is made from stainless steel (1.4301). Precisely welded perforated sheets plates fix the 50 mm thick layer of activated carbon into place.

The carbon is held in place by anti-tension-fade devices, which keep the carbon under permanent pressure to avoid leakages and bypasses. The carbon can be exchanged easily by removing the cover lid and pour out the carbon after the activity has decayed to a safe level. The whole system is laid out for easy decontamination and continuous re-use.

Typ	HS-A053 Grain size 1,5–2 mm	HS-A053 Grain size 3–4 mm
Type of carbon	coconut shell	coconut shell
Initial- $\Delta P$ [Pa]	550	200
Inner surface [m <sup>2</sup> /gr]	>1100	>1100
Max. ambient temp. [°C]	50°	50°

Width	Dimension [mm] Height	Depth	Nominal air flow [m <sup>3</sup> /h]	Activated carbon volume [litr.]
305	610	292	750	38
610	610	292	1500	75
762	610	292	1800	95

Please ask for other desired dimensions and designs.



Frame	Stainless (1.4301)
Filling	Sorbtion media (layer thickness: 50 mm)
Gasket	flat, leak-test gasket, silicone, viton, EPDM etc.
Options	<ul style="list-style-type: none"><li>▪ handle</li><li>▪ special sorbtive media (impregnated)</li><li>▪ other granular sizes (1,5-2 mm or 3-4 mm)</li></ul>





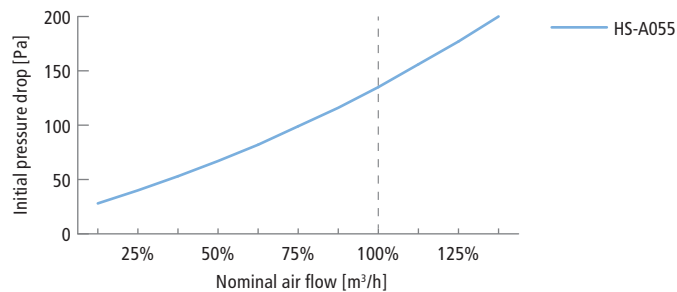
## HS-A055 – Activated Carbon Panel Cell

These filters are constructed to meet applications that call for the extraction of VOC's or tobacco odours as well as odours as they occur in kitchens, the cosmetic industry. They also extract vaporous impurities, primarily hydrocarbons. These filters are used in a variety of applications including supply air and exhaust air systems.

HS-A055 consist of a MDF-frame with incorporated plastic guides. As sorbent activated carbon discs are used, which are arranged in a V-shape. Due to this assembly an optimal air passage is guaranteed. Thus, even high flow rates can be excellently purified.



HS-A055				
Initial- $\Delta P$ [Pa] with std. carbon		135		
panel carbon layer thickness [mm]		16		
Max. ambient temperature [°C]		45°		
Width	Dimensions [mm] Height	Depth	Nominal air flow [m³/h]	Carbon panels [pcs.]
610	610	292	2000	18
Please ask for other desired dimensions and designs.				



Frame	<ul style="list-style-type: none"><li>galv. steel</li><li>Stainless</li><li>MDF</li></ul>
Gaskets	non-porous endless gasket, flat, leak-tested gasket, silicon, viton, EPDM
Options	<ul style="list-style-type: none"><li>flange (single or both sides)</li><li>Handle</li></ul>



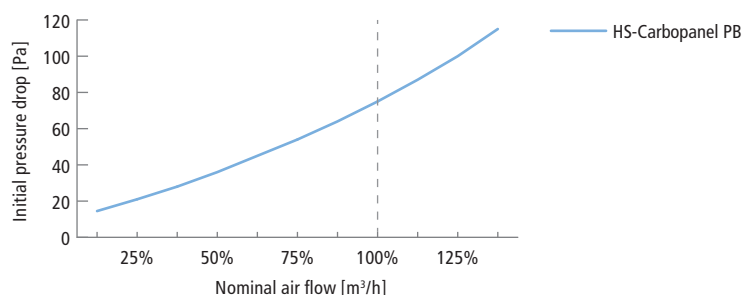
## HS-Carbopanel PB

HS-Carbopanel PB is used for the filtration of exhalation, hydrocarbon compounds or other gaseous or rather molecular atmospheric pollutions. The design unites the demand for small sizes with the advantage of the adsorptive capacity of not bonded carbon. The filter panels are filled with premium, asymmetric formed granulate of activated carbon (if required with other sorbent compositions).

This advantages a turbulent air flow through the bed of carbon and allows a better utilization of the capacity instead of common carbon. Since the small part of ash and the optimized structure of pores above-average rates of adsorption can be achieved. The frame (depth only 25 mm) encapsulates the activated carbon securely between two corrosion resistant metal grills in a safety fleece which is filter for abrasion, too. Flexible tensions in the filter housing keep the carbon under pressure that it cannot slip away. Bypasses in the active carbon are impossible.

HS-Carbopanel PB can be adapted to the individual need of your processes. The size is variable to a maximum edge length of 650 mm and the activated carbon can be chosen according to the contaminant spectrum for the optimal performance.

HS-Carbopanel PB				
Filtermedia		standard: activated carbon (> 1200 m <sup>2</sup> /g, CTC: >50%) optional: HS-Clean Pro, Silika Gel, Zeolithe		
Initial-ΔP [Pa] with std. carbon.		75		
Contact time @ nominal flow [sec]		0,1 sek.		
Adsorption capacity VOC [g]		> 380 g		
Max. ambient temperature [°C]		40°		
Width	Dimension [mm] Height	Depth	Nominal air flow [m <sup>3</sup> /h]	Activated carbon Volume [ltr.]
592	592	25	300	appx. 8,8
490	592	25	245	appx. 7,2
287	592	25	150	appx 4,2
Please ask for other desired dimensions and designs.				



### Example applications

- odour removal (kitchen exhaust air, workplace exhaustion)
- filter element for small exhaustion systems
- removal of kerosine odours at airports
- smell and restemission removal at smoke and oilfog extraction
- emission- and odour removal at printing machines or shops
- protective filter for electric control cabinets or switchboards against traces of corrosive / harmful gasses

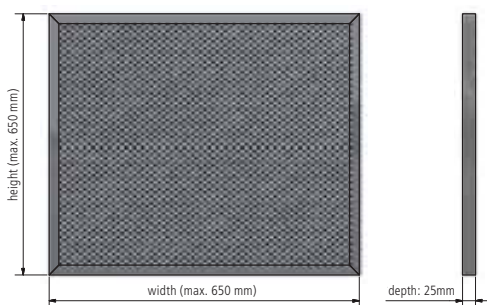
### Frame

- galv. steel, fitting for bag filter mounting frame (Dok.-ID: 10/D08)

### Operational conditions

- max. rel. h. up to 65 [%], max. temp. 40°C

Gasket options	height [mm]	form
seamless foamed polyurethane gasket (standard)	6 or 8	
flat sectionized neoprene gasket	6 or 8	



HS-Carbopad are used at special air handling units i.e. air treatment for museum. The filter-pads consists out of synthetic filterfleece that securely encases the activated carbon chambers.

The carbon chambers are tightened against each other whilst placing the HS-Carbo Pads into the mounting device of the air handling unit

HS-Carbopads can be fitted with various carbons or other sorbents (i.e. HS-Clean Pro) to achieve the maximum efficiency against odours or other gaseous air impurities.

Typically HS-Carbopads are filled with impregnated carbons for the adsorption of SO<sub>2</sub> concentrations of supply and exhaust air flows.



Width	Dimension [mm]		Carbon amount [g]
	Height	Depth	
610	600	25	3500 - 4000
Rahmen	filter fleece encapsulation		
Betriebsumgebung	<ul style="list-style-type: none"> <li>max. rel. humidity 70 [%]</li> <li>max. ambient temperature 50 [°C]</li> </ul>		
Filtermedium	<ul style="list-style-type: none"> <li>dust filter: sythetic fibre fleece class EN779:G4 / ISO coarse 60% or M5 / ISO ePM10 50%</li> <li>adsorbtive filter: according to carbon or ceolithe (adsorptive) or HS-Clean Pro (chemiesorptive)</li> </ul>		



## HS-Carbo Block – Packed bed filter



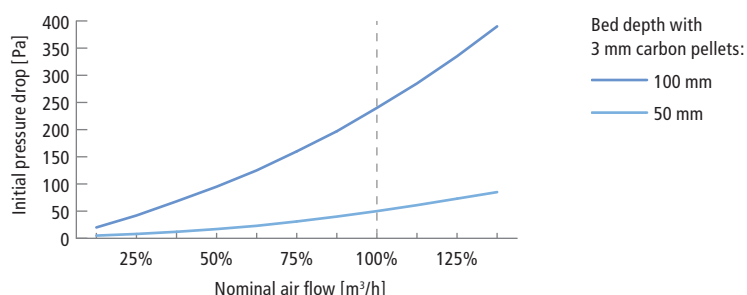
The packed bed cartridges HS-Carbo Block or HS-Clean Block are often being used within exhaust air and circulatory air systems in industrial environments. HS-Carbo Block has various areas of application such as for extracting odours, filtering solvent, welding smoke, or exhaust air in laboratories. These disposable magazines are compactly built. They offer contact times that can be adjusted to their specific purpose. The media will be fitted to its area of usage. HS-Carbo Block comes with various kinds of activated carbon; HS-Clean Block is equipped with oxidative and chemisorptive sorbents (HS-Clean Pro).

Depending on the overall size the frame is made from either MDF or plywood. The sorbent (Carbon or HS-Clean Pro) will be fixed bypass free by two rigid perforated sheets, which are equipped with a media that prevents trickle.

Type	HS-Carbo Block Bed depth 100 mm	HS-Carbo Block Bed depth 50 mm
Filtermedia	Standard: activated carbon (> 1200 m <sup>2</sup> /g, CTC: >50%) Optional: HS-Clean Pro, Silika Gel, Zeolithe	
Initial-ΔP [Pa] (standard carbon)	240	50
max. ambient temperature [°C]	40°	40°

Dimension [mm]			Bed depth	Nominal air flow [m <sup>3</sup> /h]	carbon volume [ltr.]
Width	Height	Depth			
305	305	150 – 292	100	120	7
305	610	150 – 292	100	240	15
610	610	150 – 292	100	520	32
305	305	78 – 150	50	60	3,5
305	610	78 – 150	50	120	7
610	610	78 – 150	50	260	16

Please ask for other desired dimensions and designs.



### Frame

- MDF
- galv. steel
- stainless steel 1.4301
- polystyrene

### Options

- activated carbon for special applications
- chemisorptive filling (i. e. HS-Clean Pro)

Gasket options	height [mm]	form
seamless foamed polyurethane gasket (standard)	6 or 8	
flat sectionized neoprene gasket	6 or 8	
leak test gasket	7,5	

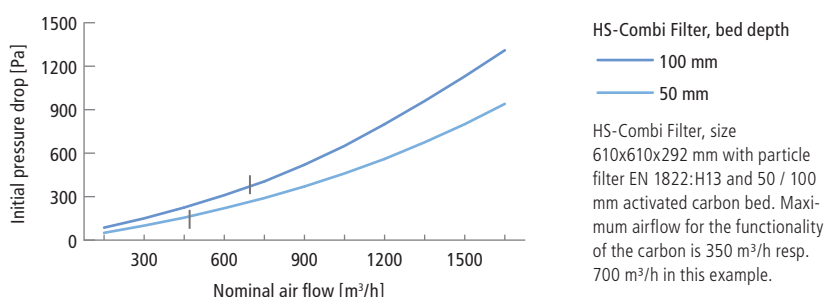
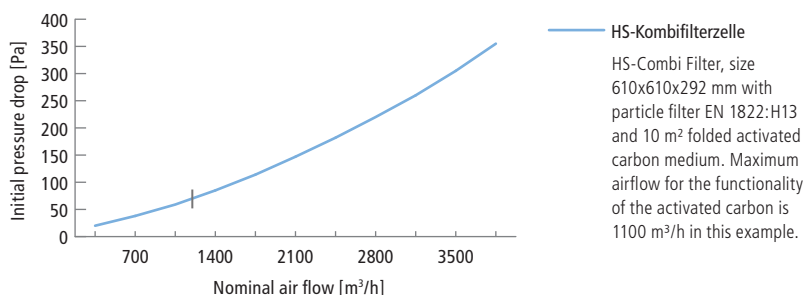
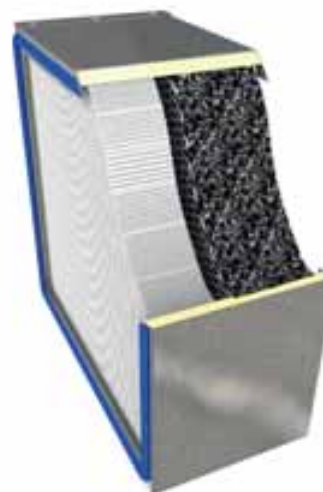
Dok.-ID: 09/011

documents might be subject to change / issue Sept. 2015

HS-Combi Filters are used for the filtration at exhaust air processes where gaseous and particular, also toxic air impurities have to be filtered securely. The compact combination of finedust / HEPA and activated carbon filterstages allows convinient solutions also for the most complex filtration problems in minium dimensions.

## Efficiency & Design

HS-Combi Filters are designed according to your demand. The parrticle filtration efficiency may range from class EN 779:M6 up to EN 1822:H14 (>99,995 % @ 0,1-0,3 µm particle size). The adsorbtion rate for gaseous air impurities depends on the design that we choose according to your specifications and demands. HS-Combi Filters are designed for the customers requirements for outmost fulfillment of individual process demands. Please contact our professional filtration engineers for further details.



### Application examples

- soldering- and weldingfume filtration i.e. for Purex™ or Wella™ exhauster systems
- cabin air filters for special vehicles or marine technology
- exhaust air filter for the medical range (i.e. for laser scalpel)
- combined smell and partilce filtration for air recirculation systems

### Frame

- MDF
- galv. steel
- stainless steel 1.4301
- polystyrene

### Operational conditions

- max. rel. h. 70 [%]
- max. ambient temperature 40 [°C]

### Filtermedia

- particle filter stage:  
pleated glass fibre media (water repellent, moisture resistant)  
class EN 779:M6 to F9, ISO 16890: ePM10 85% - ePM 1 >95%  
or EN 1822: E11 - H14
- adsorptive filter stage:  
according to requirements one can choose different forms like granular beds, carbon foam, plates or pleated media

Gasket options	height [mm]	form
seamless foamed polyurethane gasket (standard)	6 or 8	
flat sectionized neoprene gasket	6 or 8	
leak test gasket	7,5	



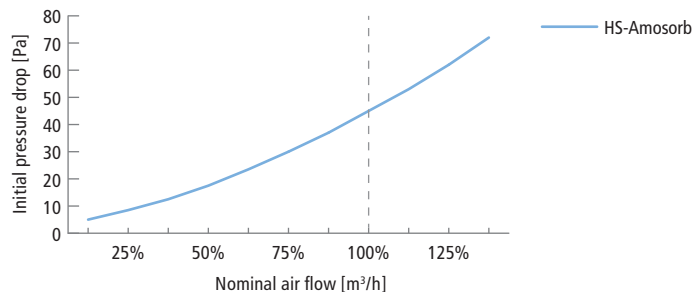
## HS-Amosorb



HS-Amosorb is developed specifically for the filtration of ammonia. Ammonia is perceptible for humans even in small concentrations above 5 ppm. Typically, a value of 50 ppm may not be exceeded at workplaces according to German regulations. The removal of ammonia from air flows usually requires relatively expensive means of molecular filtration filters or air scrubbers. Conventional activated carbon based ammonia filter, require a large amounts of sorption media and thus a high need for investment in order to achieve satisfactory filtration efficiency. Also activated carbon adsorbers typically operate with high differential pressures ( $> 400 \rightarrow 1500$  Pa) and subsequently cause quite high energy costs. HS-Amosorb offers a compact design that allows maximum efficiency at high flow rates even tolerant up to 145% overload with very low pressure differences. This is possible through the use of specific micro-ion exchangers, which remove in the course of a spontaneous chemical reaction, the gaseous ammonia almost entirely from the air flow. Due to the optimized design HS-Amosorb allows operation with very low pressure difference which leads to significant cost savings at ongoing operating costs. Compared to conventional activated carbon systems these costs can be reduced by up to 80% by using HS-Amosorb. Since Activated carbon filters work against a broad spectrum of pollutants and also trap humidity their durability and net efficiency against Ammonia is only lasting for a comparably short period.

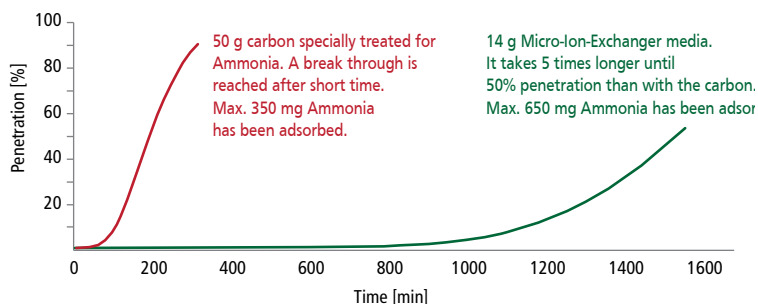
HS-Amosorb is only targeting for Ammonia and therefore offers a significantly higher net absorptive capacity with ammonia than any typical activated carbon filters.

HS-Amosorb				
Filtermedia		micro-Ion-exchanger on synthetic fleece		
Initial- $\Delta P$ [Pa] (static)		45		
Max. ambient temperature [°C]		65°		
Width	Dimension [mm] Height	Depth	Nominal air flow [m³/h]	sorptive capacity ammonia [g]
592	592	292	3400	550
592	490	292	1500	450
592	287	292	850	230

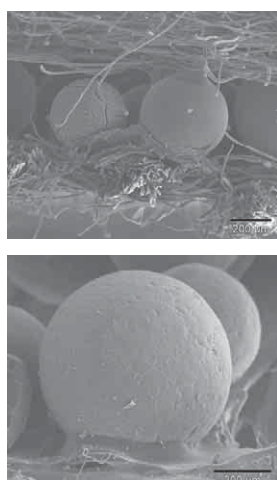


Frame	Polystyrene with 25 mm circulating flange, fitting for bag filter mounting frame (Dok.-ID: 10/D08)
Operational condition	rel. h. 10 to 95 [%]

Comparison of ammonia specific carbon vs. micro-ion exchanger at 10 ppm Ammonia concentration.



Gasket options	height [mm]	form
seamless foamed polyurethane gasket (standard)	6 or 8	
flat sectionized neoprene gasket	6 or 8	



Microscopic pictures of the micro-ion-exchangers @ 200 µm resolution.

Dok.-ID: 09/D13

documents might be subject to change / issue Sept. 2017





## HS-Tankadsorber

This product is specifically designed to be used for ventilating tanks. Volatile substances could be set free during this process. Since these gaseous impurities may cause environmental problems they have to be retained. For most applications, HS-AKP 26 activated carbon filter serve this purpose. When using the tank cap, activated carbon cartridges can be attached directly to the flange connection of revision as well as ventilation openings.

The system can also be attached to or inserted into conduits. The latter need the installation of intermediate casings. The tank cap can easily be refitted into existing systems and thus will ensure an even safer workspace.

Form of delivery	Tankaufsatz passend für Aktivkohle patrone HS-AK-26
Frame	stainless steel 1.4301
Re-useable	Yes
Filtermedia	Auswahl verschiedener Aktivkohlen für diverse Anwendungsfälle
Options	<ul style="list-style-type: none"><li>▪ flange and drilling, will be fitted to your requirements</li><li>▪ primary filtration shell for extending the service life</li><li>▪ product may be weather-proofed</li><li>▪ Optionaler particle protector (prevents that carbon particles are released into the tank)</li></ul>



## HS-Vario CAT – Modular Filterhousing



The HS-Vario CAT programme is the solution for your tasks in air filtration. The modular design allows adaption to meet the requirements of most different fields of application. Ranging from simple one-filter-stage supply or exhaust air filtration with bag filters to multi-stage filter solutions including regulateable fans.

HS-Vario CAT is manufactured by modular design and is made from extruded aluminium profiles where especially designed for HVAC applications and sturdy galvanized steel sheet walls. The extruded profiles offer a circulating 30 mm frame that allows direct connection to the ducting or the mounting of connecting pieces either with flanges or tube connectors.

You can choose individually the air-flow that should be handled, filter stages, auxillary equipment or installation position the required HS-Vario CAT should have. All integrated filter-mounting frames are fitting for filters from HS-Luftfilterbau as well as standard filters of various other manufacturers. Of course the design meets actual hygienic regulations such as the VDI 6022.

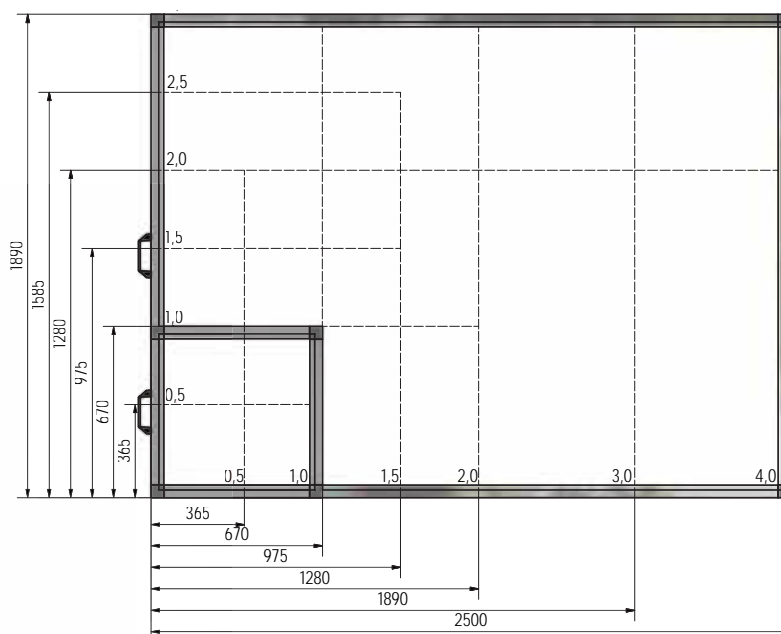
The housings are available in four standard lengths: 500, 800, 1000, 1200 [mm]. The single housing unit can be upgraded by further modules, filterstages or fans (i.e. axial, radial etc.) as required. HS-Vario CAT are shipped completely assembled. Only oversizes will be supplied partly assembled due to transport reasons. Such housings will be delivered as easy to join parts. The design of the connecting constructions guarantees, that the pre-assembled and precisely fitting parts can be mounted easily.

Height	Width [mm]	0,5 365	1,0 670	1,5 975	2,0 1280	3,0 1890	4,0 2500
0,5	365	X	O				
1,0	670	O	O		O		
1,5	975	X	X	X			
2,0	1280	X	O	X	O	X	X
2,5	1585		X	X	X		
3,0	1890		X		X	X	X

X = Standardgröße      O = Standardgröße, kurzfristig Lieferbar in Längen A bis D

standard module depth [mm]			
A = 500	B = 800	C = 1000	D = 1200

HS-Vario CAT can be constructed either as filterwall for wall-mounting or as duct-channel housing. Following module sized are available as standard. Please ask for special sizes when required.



Installable Filtertypes		Filterproperties
Panel filters:	HS-Z-50 & HS-Z 100 HS-Alpha Pak	G3 to M6 (EN 779) ISO coarse, ISO ePM 10, ISO ePM 2.5 (ISO 16890)
Bag Filters:	HS-Pak 25 [...] HS-Pak 95	G3 to F9 (EN 779) / ISO coarse bis ISO ePM1
Compact filters:	HS-ECO Pak HS-Mikro Pak HS-Beta Pak	M5 to F9 (EN779) ISO ePM10 to ISO ePM1 (ISO 16890)
Molecular Filters:	HS-AKP 26 HS-Carbo Pak HS-Carbo Block	asorption of gaseous air impurities (VOC's, odours, harmful exhaust gases)

Following should be noted for dimensioning:

- First evaluate the planned air flow, the allowed initial and final pressure drop as well as the amount of required filterstages
- this determines the sitze of the system:

$$\text{No. of filters} = \frac{\text{total air flow [m}^3/\text{h]}}{\text{airflow of single filter [m}^3/\text{h]}}$$

The "airflow of single filter" relates to the air flow of the chosen single filter type of full standard size ~592x592 mm. If several filterstages are required, the filtertype with the least stated air flow for a full size is used for dimensioning. The resulting value is rounded up. Recommended final pressure drop:

- filters classified EN 779 G1 - G4: 250 Pa.
- filters classified EN 779 M5 - F9 : 450 Pa.

<b>Dimensioning example</b>	total air flow 6800 [m³/h] Two-stage housing with bagfilter ISO ePM10 and compact filter ISO ePM2.5 75%
	<ul style="list-style-type: none"> <li>Stage 1: HS-Pak 55, 592x592x500 mm 3400 [m³/h] @ 45 Pa</li> <li>Stage 2: HS-ECO Pak 85, 592x592x150 mm 3600 [m³/h] @ 140 Pa</li> </ul>
	results in:
	$\frac{6800 \text{ [m}^3/\text{h]}}{3400 \text{ [m}^3/\text{h]}} = 2 \text{ filter instets} \Rightarrow 2,0 \text{ housing units (W=1,0 H=2,0)}$
	Housing dimensions: W= 670 mm, H=1.280 mm, D= 1000 mm
	Initial ΔP: appx.130 Pa @ 6800 [m³/h]
	Rec. final ΔP : 450 Pa @ 6800 [m³/h]

<b>Application examples</b>	<ul style="list-style-type: none"> <li>kitchen exhaust air</li> <li>waste bunker exhaust</li> <li>process air filtration</li> <li>airport supply air (finedust, fuel-fumes)</li> <li>workplace exhaustion (i.e. soldering smoke, solvent fumes, roasting processes, printing industry, etc.)</li> <li>circulating air filtration (i.e. tobacco smoke removal)</li> <li>supply air purification (finedust, odours, allergenics, pollen, etc.)</li> </ul>
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<b>Options</b>	<ul style="list-style-type: none"> <li>wire mesh guard (single / double sided)</li> <li>connecting pieces according to your demands and techincal requirements</li> <li>thermic insulation</li> <li>measuring equipment (manometer, pressure guards etc.)</li> <li>fans (axial, radial etc.)</li> <li>antistatic (EX-protection)</li> <li>(weather) louvres</li> <li>mobile units</li> </ul>
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## Beispiel Feinstaub & Geruchsfiltration

### HS-Vario Cat Typ 112

- Vorfilter: HS-Pak 35, EN 779:G4
- Partikelfilter: HS-ECO Pak 85, EN 779:F7
- Geruchsfilter: HS-AKP 26

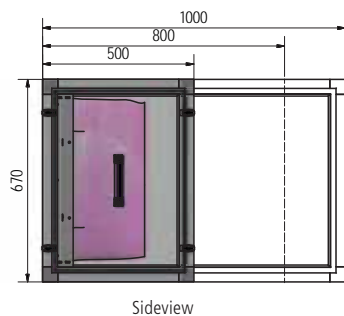


## Example for gastronomy (grease filter existing on site)

### HS-Vario Cat Typ 123:

- particle filter: HS-Pak 88, ISO ePM2.5 80%
- odour filter: HS-AKP 26
- fan: Fanboxmodule No.1

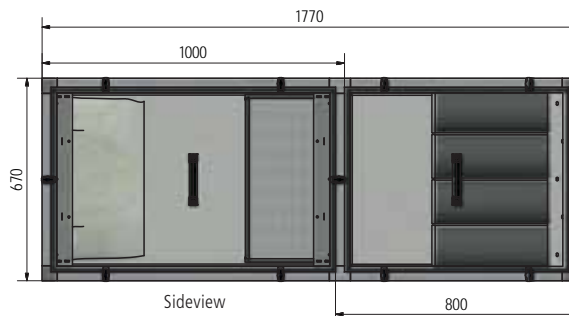
## Housing length's for single stage filtration



Fitting for dimensions width x height: 365 x 365 mm (0,5 x 0,5 Units) up to 2.500 x 1.890 mm (4 x 3 Units), with the given standard length dimensions

Odd length's, revision doors, stabilizing elements etc. are optionally available.

## Housing length's for double stage filtration



Fitting for dimensions width x height: 365 x 670 mm (0,5 x 1,0 Units) up to 1.890 x 1.890 mm (3 x 3 Units), with the given standard length dimensions

There can be any line-up of filterstages by principle but we recommend not to exceed a maximum of 5 combined stages.

Odd length's, revision doors, stabilizing elements etc. are optionally available.

## Housing length's for double stage filtration



Seitenansicht

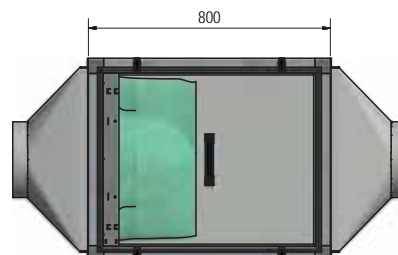
Fitting for dimensions width x height: 365 x 365 mm (0,5 x 0,5 Units) up to 2.500 x 1.890 mm (4 x 3 Units), with the given standard length dimensions.

Odd length's, revision doors, stabilizing elements etc. are optionally available.

## Housing with connecting piece



Frontansicht



Seitenansicht

All HS-Vario CAT module housings can be optionally fitted with connecting pieces (circular/ rectangular), flanges etc.. Please send us all given parameters on site in case of requirement.

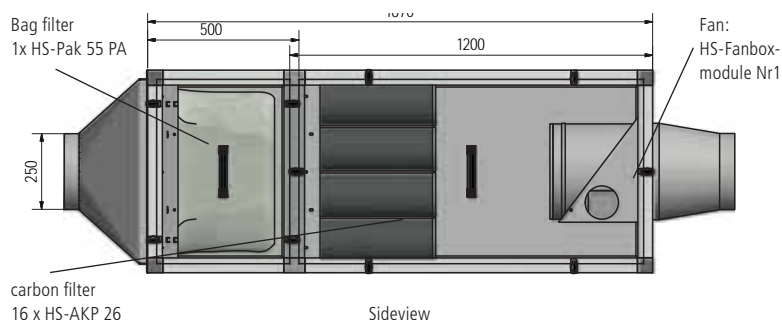
Also the fitting of weather louvres or isolations for outdoor installations is available - just ask our sales.

## Info

HS-Vario CAT can be manufactured according to your requirements.

If required we can also apply filters in the normative range of EN 1822 (HEPA). Please consult our filtration experts for further informations.

## Kitchen exhaust : ISO ePM 10 50% pre-filter, activated carbon, fanboxmodule No.1



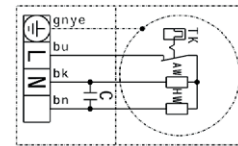
Sideview

The displayed modular housing Type HS-Vario CAT 123 offers 2 stage filtration, suitable for gastronomy application to eliminate smells and odours at a snack bar's kitchen exhaust air but can be used for any similar task.

The pre-filter can either be a grease filter like HS-PA55 or a particle filter Type HS-Pak 88 with high performance pre-filter layer. The system suits to filter fatty steams, dust and gaseous air impurities (i.e. odours). The attached HS-Fanbox No.1 allows an airflow of up to 1500 m³/h with the shown design.

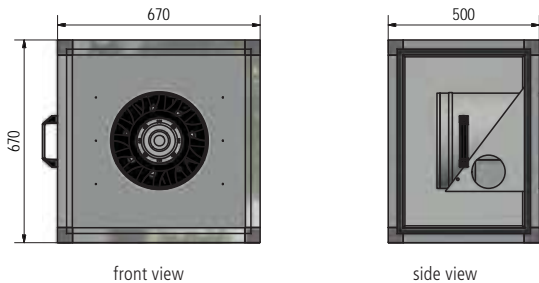
## HS-Fanboxmodule

HS-Fanboxmodules are the fan solutions for HS-Vario CAT Modular housings. The modules could be fitted with various other fan types if required. HS-Fanboxmodules are supplied as a section of a complete HS-Vario CAT system. The cable feedthrough and all electrical installation works have to be done on site. All modules are fitted with a continuously variable power controller that can be optionally substituted by a 5-stage controller.

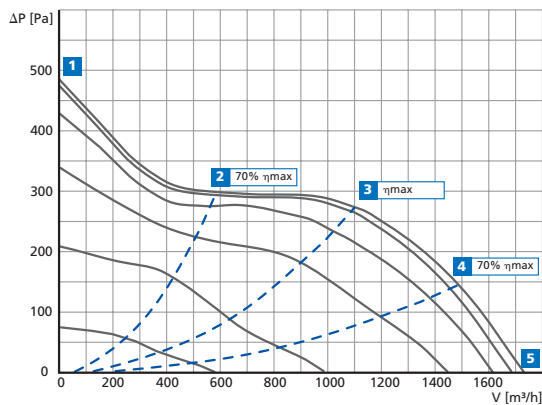


Circuit diagram for HS-Fanmodule No. 1 and 2.

### HS-Fanboxmodule No. 1



Designed as modular option for HS-Vario CAT with unit size 1x1 or 670x670 mm.  
Fan type: diagonal impeller with stator



#### HS-Fanboxmodule No. 1 No. 2 operating point 1: max. pressure increase

current I	0,75 [A]	0,68 [A]
power consumption P <sub>1</sub>	170 [W]	150 [W]
RPM n	2820 [1/min]	2780 [1/min]

#### operating point 2: 70% of most efficient duty point

current I	0,75 [A]	0,68 [A]
power consumption P <sub>1</sub>	170 [W]	150 [W]
RPM n	2820 [1/min]	2780 [1/min]

#### operating point 3: most efficient duty point

current I	0,75 [A]	0,68 [A]
power consumption P <sub>1</sub>	170 [W]	150 [W]
RPM n	2820 [1/min]	2780 [1/min]

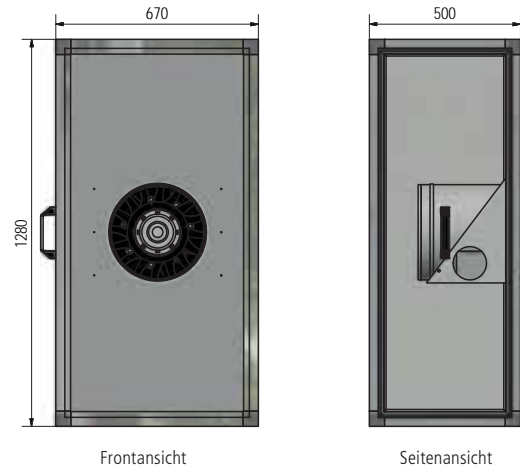
#### operating point 4: 70% of most efficient duty point

current I	0,75 [A]	0,68 [A]
power consumption P <sub>1</sub>	170 [W]	150 [W]
RPM n	2820 [1/min]	2780 [1/min]

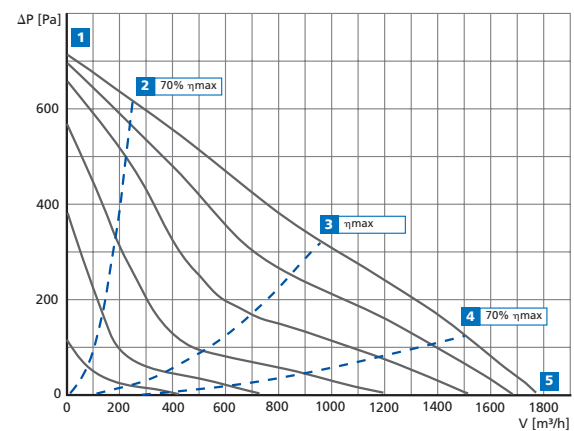
#### operating point 5: free blowing

current I	0,75 [A]	0,68 [A]
power consumption P <sub>1</sub>	170 [W]	150 [W]
RPM n	2820 [1/min]	2780 [1/min]

### HS-Fanboxmodule No. 2



Designed as modular option for HS-Vario CAT with unit size 1x2 or 670x1280 mm.  
Fan type: backward curved centrifugal fan.



HS-Fanboxmodul	No. 1	No. 2
voltage U <sub>N</sub>	230 V ~ 50 Hz	230 V ~ 50 Hz
current I <sub>N</sub>	0,8 A	1,3 A
current I <sub>Max</sub>	1,0 A	1,3 A
max. temp.	50 °C	55 °C
speed control	V	V
motor protection	TMI	TAI
capacitor	6 µF, 450 V	8 µF, 400 V
insulation class	F	F
poles	2	2



## HS-Solid CAT – Stainless Steel Duct Filter Housing



The HS-Solid CAT duct filter housing meets your performance needs of all ductworks requiring highest standards of air purity. The modular concept allows cost-effective adaptation to the needs of your process conditions. The housing outfit ranges from single filterstage air supply or exhaust air filtration either with finedust or HEPA filters up to multi-stage, security solution, including adjustable fans.

HS Solid CAT duct filter housings are made from welded stainless steel (1.4301 or 1.4404 alternatively 1.4571). HS-Solid CAT can hold combinations of coarse-, finedust- and / or HEPA Filters up to class EN 1822: H14. Even the inclusion of molecular filters for odour and gas adsorption is possible. The integrated filter mounts are suitable for filters either from the HS-Luftfilterbau filter program and of course for standard filters from other manufacturers as well.

The circumferential 30 mm flange can be provided with on-site drills in order to be easily connected to conventional ductworks. Furthermore optional transition pieces can be integrated i.e. from rectangular to the tube channel.

modulesize in relation to the filtertype Width x Height	outer dimension W x H [mm]	airflow class EN 779 G4 [m³/h]	airflow class EN 779 M5 - F9 [m³/h]	airflow class EN 1822 E11 - H14 [m³/h]	filter cartridge dimension (according to type) W x H [mm]
0,5 x 0,5	345 x 415	500 - 1000	240 - 1000	140 - 700	287 x 287 305 x 305
0,5 x 1	345 x 720	1000 - 2100	540 - 2100	300 - 2000	287 x 592 305 x 610
1 x 1	650 x 720	1800 - 4200	1100 - 4200	650 - 4000	592 x 592 610 x 610
1 x 2	650 x 1440	3600 - 8400	2200 - 8400	1300 - 8000	592 x 592 610 x 610
2 x 1	1300 x 720	3600 - 8400	2200 - 8400	1300 - 8000	592 x 592 610 x 610
2 x 2	1300 x 1440	7200-16800	4400 - 16800	2600 - 16000	592 x 592 610 x 610

### standard module length [mm]

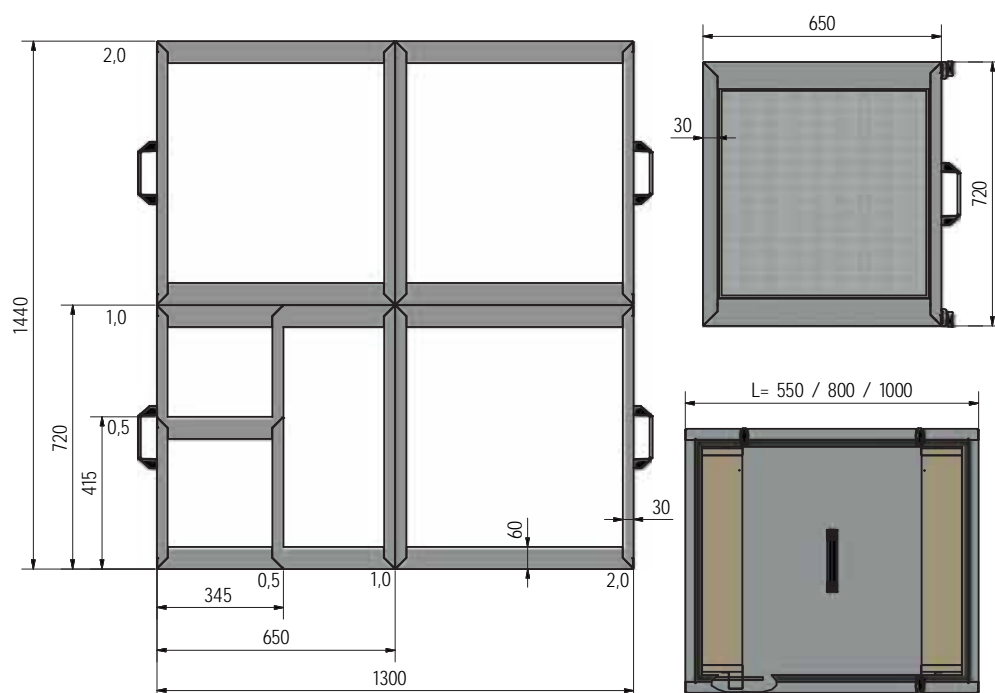
A = 550 mm

B = 800 mm

C = 1000 mm

### Standards

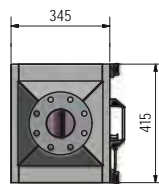
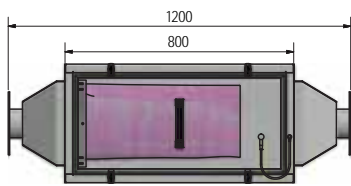
- each housing comes with 2 individually configurable filterstages
- inspection doors are related to Height x Length always positioned left or right
- sheet metal strength: 1,5 mm





Installable filters		Filterproperties
panel filters:	HS-Alpha Pak	G3 to M5 (EN 779) / ISO coarse to ePM10 (ISO 16890)
bag filters:	HS-Pak 25 bis HS-Pak 95 optional auch EX-Schutz	G3 to F9 (EN 779) ISO coarse to ISO ePM1 (ISO 16890)
compact filters:	HS-Beta Pak HS-Beta Pak Yellow HS-Makro (auch EX) HS-Makro F HS-Makro FV	M5 to F9 (EN 779) ISO coarse to ISO ePM1 (ISO 16890)
HEPA filters:	HS-Mikro S (auch EX) HS-Mikro SF HS-Mikro SFV	E11 to H14 (EN 1822)
molecular filters:	HS-AKP 26 (auch EX) HS-Carbo Pak HS-Carbo Block HS-A055	Adsorption of gaseous air impurities such as VOC's, Odours, harmful and corrosive gases such as H <sub>2</sub> S or SO <sub>2</sub>

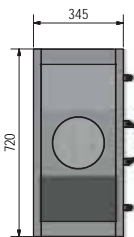
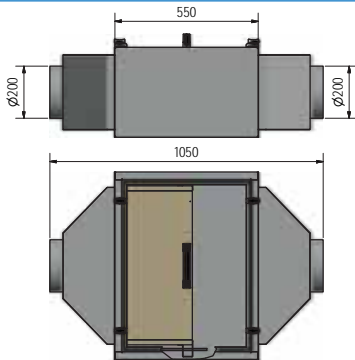
## Example: tube connected at 500 m³/h class F7 EX-protected



Duct housing with F7 particle filter for the application with potentially explosive gas / dust.

Housing with welded flange and EX-protection

## Example: tube connected at 1000 m³/h class H14



Duct housing for exhaust air purification Particle retention up to 99,995 %

The duct housing offers a conical connector and HEPA rapid clamping system.

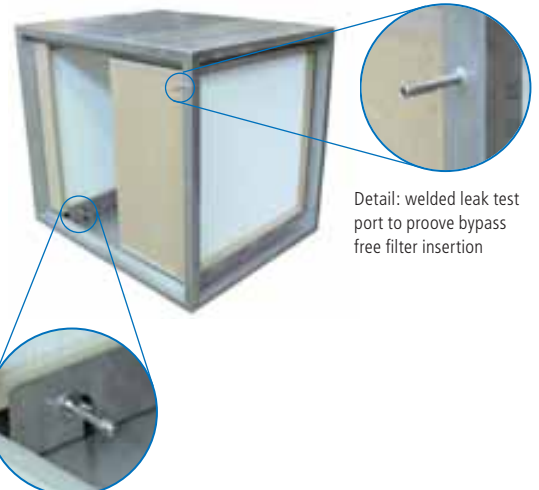
## Example applications

- sterile air supply in hospitals - also in combination with sterile air contributors
- supply air for clean work places in laboratories and industry such as pharmacy, food and electronics production
- process air filtration
- exhaust air filtration to stay compliant with emission limits or for odor removal
- circulating air processes
- exhaust air filtration in ATEX-Zones
- as assembly part of machinery and heavy equipment
- filtering tasks in off-shore areas (seawater resistant filter system)
- filtration of corrosive gases or aerosols

## Options

- connection pieces and flanges according to the requirements on site
- measuring equipments (pressure gauges, pressure sensors etc.)
- fans (axial, radial)
- EX protected
- mobile unit on rollers
- leak test port to ensure a bypass free filter insertion
- condensate drain port

## Example housing: 1 x 1 (650 x 720 mm)



Detail: welded leak test port to prove bypass free filter insertion

Detail: Filter Mounting with rapid clamping



## Example Housing: 0,5 x 1 (345 x 720 mm)

### HS-Solid CAT Typ 112

- prefilter: HS-Alpha Pak 35, ISO ePM10
- particle filter: HS-Mikro Pak 95, ISO ePM1
- VOC- filter: HS-AKP 26, Aktivkohle



HS-S041 - The gastight safetyhousing offers flexible modular design to be customized for the requirements on site and contamination free filterchange (aka. Safe change, Bi-Bo, Bag-In-Bag-Out).

HS-S041 duct filter housings consist by principle from welded stainless steel (1.4301 or better). Any damages of a paint coating that occurs during transport or handling with usual housings and the resulting risk of corrosion is avoided.

The sheet metal thickness is 2,5 mm by standard. It can be up to 4mm in case higher pressure levels are demanded. Further reinforcement such as spines and armouring is optionally available. All surfaces are glass blasted and all welding seams are carefully passivated. All HS-S041 duct filter housings are intensively tested for pressure and tightness according to the parameters of their application.

DIN 25 496; 6.2(4) is respected for all weldings, meaning that stabilizing steels are used with austenitic materials.

All concerning parts and welding seams are free of cracks and slits to ensure the ease of decontamination and to avoid cranny corrosion. Upon the customers request all welding seams can be tested such as for dye penetrant test or other methods.

HS-S041 can be shipped as single module or as fully welded ready to use housing. Single modules are supplied with hole patterns on the connection flanges according to the customers specification. Beside the usual documentations such as operational manuals and declaration of conformity we also offer added documents such as seismic stress simulations or approval documents. Welding qualification certificates and raw material certificates are part of our delivery and inspection documentation in case full documentation is required.

HS-S041 duct filter housings have proven in numerous applications. These housings fulfill maximum requirements in regards of safety and efficiency in the field of particle and gasfiltration. The HS-S041 series is especially designed for safetyrelevant processes i.e.:

#### Example applications

- supply- & exhaustair with pharmaceutical or biotechnological processes.
- air treatment (supply / exhaust) with medical facilities i.E. for safety environments at BSL 1 to 4 installations
- isolation wards and pandemic quarantine zones
- nuclear processes (fulfills KTA 3601)
- exhaust air treatment for chemical or pharmaceutical processes
- isotope laboratories
- other process air, requiring explosive protection according to ATEX standards
- sterile air generation
- warfare agent deconamination or destruction

#### Delivery and Installation

The filterhousings are supplied as complete unit along with the connectors already welded if the transport and handling situation allows this. Otherwise the housing is supplied in easy to mount and install sections - typically for units consisting of more than 4 - 5 units. The housings are fitted with welded lifting eyes when needed. Upon request we also support you for installation, inspection or final approval with our experienced staff on site.

#### Filter clamping / maintenance

The filter clamping construction is based on a uncomplicated mechanical clamping to ensure maximum safeguarding against failure. We therefore resign on pneumatic clamping or electronic controls with this particular housing type.

The filter clamping construcion consists from stainless steel clamping frame operated by ex-centers. Additional leafsprings generate constant pressure to the filter to negate effects like aging gaskets or production related tolerances of the filters.

The clamping construction is designed to ensure tightness even with maximum dust loading of the filters and aging gaskets to always fulfills tightness requirements according to DIN 25496, Tab. 3 at the seat of each filter element. A filter can only be clamped when placed in the correct position. The maintenance cover can only be fixed to the housing when a filter is set in correctly and is properly clamped. This ensures failsafe operation. Welded security barriers in the cover prevent a loosening of the clamping in case of seismic shocks. The maintenance covers can be made lockable to prevent unauthorized access to the filterbanks.



HS-S041 can be equipped with different filters in accordance to the demand of air purity, safety and airflow. The table on the right side dives an overview about typical filtersizes. All filters can be fitted with an EX-protection according to ATEX upon request.

Installable filtertypes	Filterproperties
prefilter - coarse dust: HS-Prefiltercell HS-Alpha Pak 55	G3 to M5 (EN 779) ISO coarse to ISO ePM10 (ISO 16890)
prefilter - finedust: HS-Makro to 120°C, conforms ATEX HS-Makro F to 65°C	M6 to F9 (EN 779) ISO ePM 10 to ISO ePM1 (ISO 16890)
mainfilter HEPA: HS-Mikro S to 120°C, conforms ATEX HS-Mikro SF to 65°C	E10 to H14 (EN 1822)
mainfilter molecular: HS-A053 HS-A055	high security filter (radioisotopes) VOC's odours, haz-mat

On safety critical processes we recommend the use of class E11 EPA filters for safety after carbon filters to remove possible abrasion of carbon particles from the airstream.

## Variants & Options

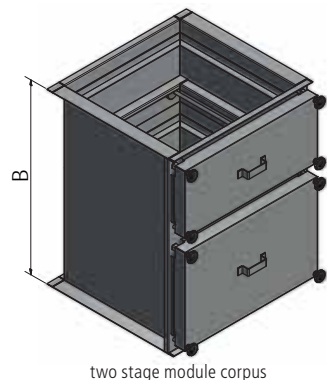
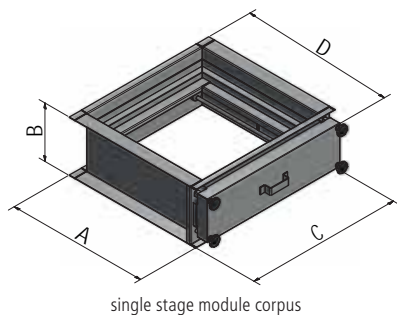
HS-S041 housings can be customized to meet your individual requirements. A broad range of options is available:

1. DEHS-Testport for injection and measurement of particles. The ports are gas tight sealed when the filter is in operation. The construction is either made from tri-clamp-port or gas tight ball cocks.
2. The two-groove maintenance board (bag-in-bag-out filterchange) is made of a welded profile. The profile is designed to firmly fix the O-Rings and maintenance bags. The special profile prevents that O-rings and bags accidentally flip away.
3. The optional maintenance table can be hooked simply to the matching eyes to provide more comfort during the Bag-In-Bag-Out filterchange.
4. On demand the housings can be fitted with gastight dampers. These will shut off the housing during revision and decontamination. All dampers come with a leak-test groove to perform in-situ tightness checks.
5. An optional pressure-discharge filter allows quick pressure equalisation before a filterchange. Contaminated air is lead over a gastight pressure valve to a HEPA or ULPA safety filter.
6. Connections and adapters to the air-channels are defined by the user i.e. square-to-round. The connectors are already gastightly welded to the corpus when feasible.
7. The arrangement of the filterbanks may be either horizontal or vertical. The maintenance covers can be made lockable to prevent unauthorized access.
8. Electric discharge connections are optionally installed explosion protection according to ATEX regulations.
9. Each particlefilterstage can be equipped with a pressure gauge to monitor the saturation of the filters.
10. Potential-free pressure switches can signal the saturation level to the main control of the air handling unit.
11. The base-rack is made from welded square profiles. The baseplates allow to fix the unit on the floors. By standard the Housing offers a grounding screw (M8) to discharge eventual electrical potentials.





## HS-S041 – HEPA Safety Housing (bag-in-bag-out)



### Dimensions of single modules

Up to six filterstages can be integrated in one module if required.

The height [B] is added with the combinations of several stages per corpus. The total height should not exceed 2400mm.

Dimension Filter [mm]			Dimension Housing [mm]				Weight [kg]	
B	H	T	A	B	C	D	w/o filter	with filter
610	610	50	680	270	749	720	30	50
610	610	150	680	380	749	720	50	70
610	610	292	680	525	749	720	65	85
305	610	50	380	270	749	430	20	35
305	610	150	380	380	749	430	35	50
305	610	292	380	525	749	430	50	65
305	305	50	380	270	444	430	10	20
305	305	150	380	380	444	430	20	30
305	305	292	380	525	444	430	35	45
610	762	150	832	380	749	892	55	80
610	762	292	832	525	749	892	70	95

HS-S041 can be designed according to the processes specific needs.

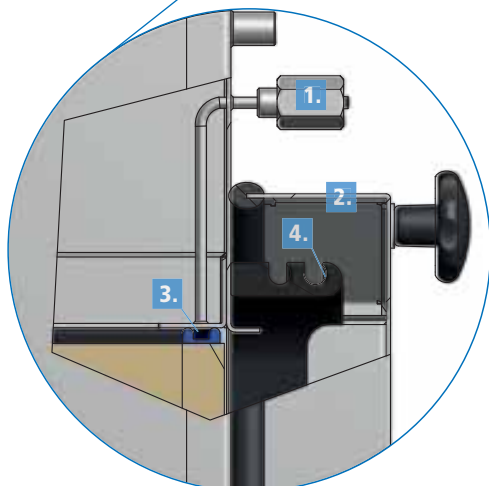
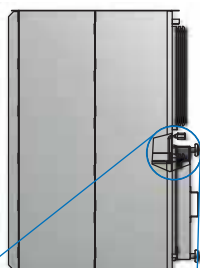
Please ask for other desired dimensions and designs.

### Key features

- filterhousing consists of stainless steel 1.4301, on demand higher classifications
- gastight welded construction. The housing comes fully welded and pressure tested if transport limitations allow it. All connectors are then gastight welded to the filterbanks
- standard pressure limit is up to +-100 mbar
- **optional:** pressure resistant up to +- 500 mBar
- the selfregulating safety clamping frame ensures all time for tightness between filters, gasket and housing.
- all surfaces are glass blasted and passivated for maximum corrosion resistance and easy decontamination
- the filter housing is made from modular design to be easily adapted to the requirements.
- loads of innovative special options are available
- bypass test facilities according to DIN 1946-4 and DIN 25414
- gastight DEHS-testports for particle measurement / In-Situ testing.
- mechanical installations ensure fail safe operation and filter change.
- temperature resistance is in accordance with additional options up to >120°C.
- more safety by filter-chambers that can be safe-locked to prevent unauthorized access.

### View from side / sectional view cover & gasket leak testing

1. Gastight vent bypass test vent, welded piping to the test outlet in the clamping frame.
2. Gastightly fixed cover with star-screw.
3. Leak test gasket on the filter. A possible loss of pressure in the reservoir indicates a bypass over the filter gasket.
4. Maintenance board with two grooves to securely fix o-rings and maintenance bags.



### Maintenance Cover and Filter-Bypass-Test

Each maintenance cover comes with a welded hand grip. The cover is gastightly fixed by four (with high pressure units: six) easy to handle star screws. The starscrews are undetachably connected to the cover. For safety the cover can only be mounted to the housing when the filter is correctly set in and properly clamped in the housing. The cover also serves as reservoir for the maintenance bag.

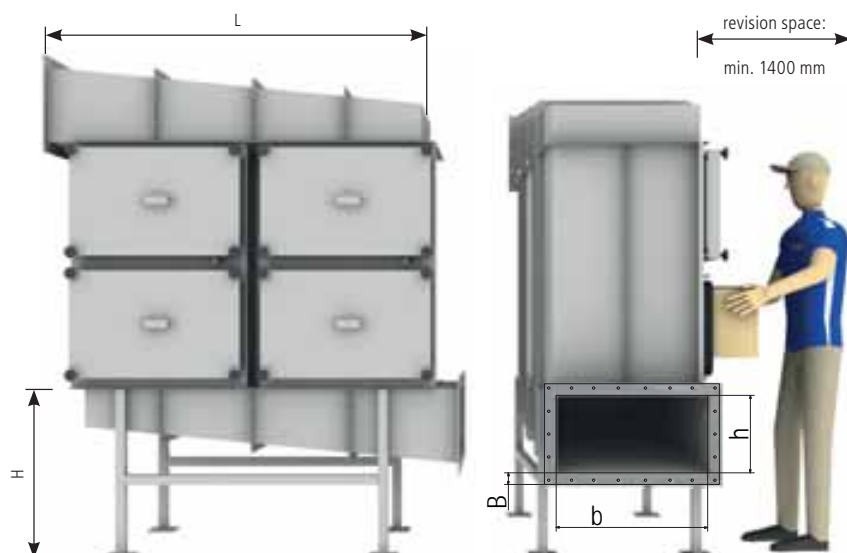
HS-S041 filterunits can offer a leak test groove for bypass testing in the housing but we prefer to fit the filter with a groove gasket. This helps to prevent malfunctions caused by damages and false measure readings caused by dirt on the hardware.

The test pressure is led to a test groove gasket over a gastight stainless tube. The proof of a bypass free filter clamping is detected by using a leak test device. Alternatively a hardware testgroove can be welded to the housing. Then the filters are fitted with a flat gasket that forms a reservoir when pressed against the groove.

The mounting and fixing of the covers is eased by guidance plates.



Module combinations	1/1	1/2	1/3	1/4	1/5	1/6	2/2	2/4	2/6	2/8	2/10	2/12
Filtermodule fitting for filtersize: # of units	1	2	3	4	5	6	2	4	6	8	10	12
Connector pair (in / out) for Filtersize 610 x 610 [mm]	Filter unit single line						Filter unit double line					
Total length, L [mm]	810	1565	2320	3075	3830	4585	810	1565	2320	3075	3830	4585
Clear connector width, b [mm]	615	615	615	615	615	615	1325	1325	1325	1325	1325	1325
Clear connector height, h [mm]	200	315	400	500	630	710	200	315	400	500	630	710
Weight of the connectors, [kg]	30	45	65	105	130	155	40	65	90	140	175	210
Connector pair (in / out) for Filtersize 762 x 610 [mm]	Filter unit single line						Filter unit double line					
Total length, L [mm]	810	1565	2320	3075	3830	4585	810	1565	2320	3075	3830	4585
Clear connector width, b [mm]	767	767	767	767	767	767	1629	1629	1629	1629	1629	1629
Clear connector height, h [mm]	200	315	400	500	630	710	200	315	400	500	630	710
Weight of the connectors, [kg]	35	50	70	110	140	170	45	75	105	155	200	135



HS-S041 can be installed either horizontal or vertical.

With higher air flow rates we recommend to construct the complete housing in two lines. This may be necessary even in unfavorable structural relations. The height of the base rack [H] can be adapted to your needs. If nothing is specified we assume a height of 800 mm..

## Connector arrangement & Dimensions

The typical flow direction is horizontal. Typical connector arrangements result like following:

single / double line:  
right in / left out



single / double line:  
right in / right out



single / double line:  
left out / right in



single / double line:  
left in / left out



Individual designed connectors and other options like bypasses can be realized.



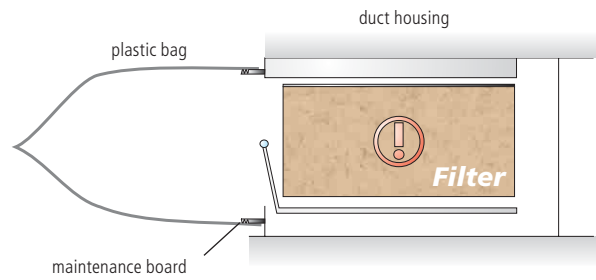
Small, but safe like a big one.  
Example: Housing for  
filtersize 305x305x292 mm.



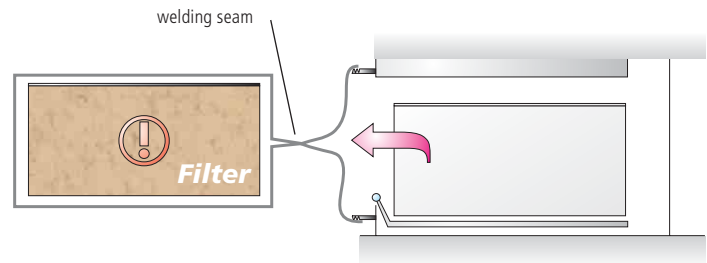


## Safechange - Bag-In-Bag-Out Filterchange

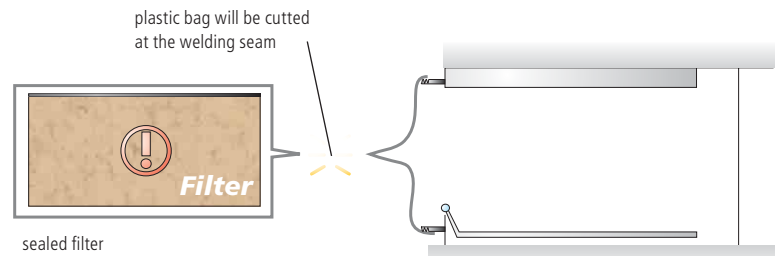
Step 1



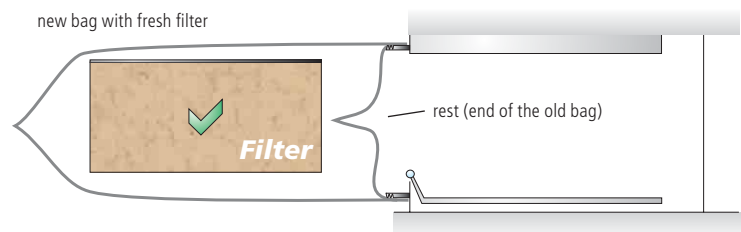
Step 2



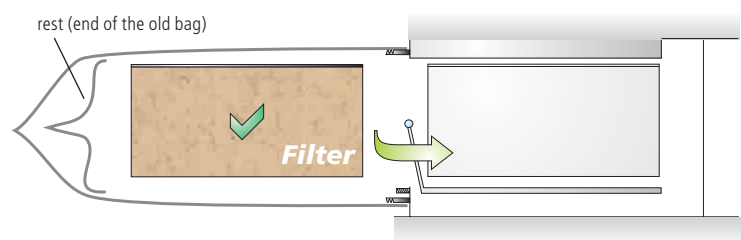
Step 3



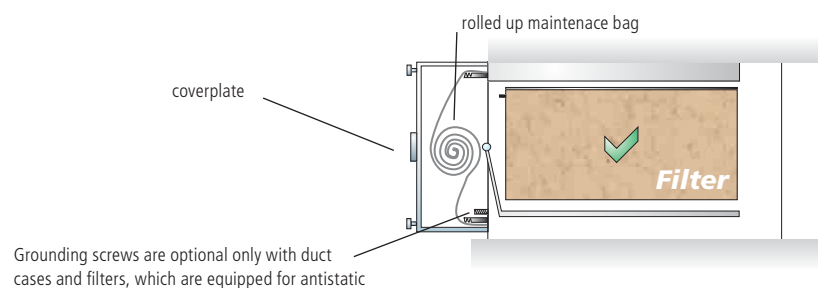
Step 4



Step 5



Step 6



Grounding screws are optional only with duct cases and filters, which are equipped for antistatic





## Sealing Tool for Safe-Change Bags

When the recommended final pressure drop is reached, the filter should be renewed at the latest. Problematic and hazardous filtrate call for an absolutely contamination-free replacement process. Using cable strrips for sealing hazardous contaminants in a plastic bag is not secure enough!

Therefore we suggest the use of this sealing tool to weld Bi-Bo-Bags particle tight. A mobile HS-maintenance-wagon, which can be adjusted in height according to individual needs is recommended for every filterchange.

The tool is useful for

- contamination-free filter replacement
- secure handling of hazardous filtration media
- simple operation and easy handling of the used filter
- absolute particle tight welding seams

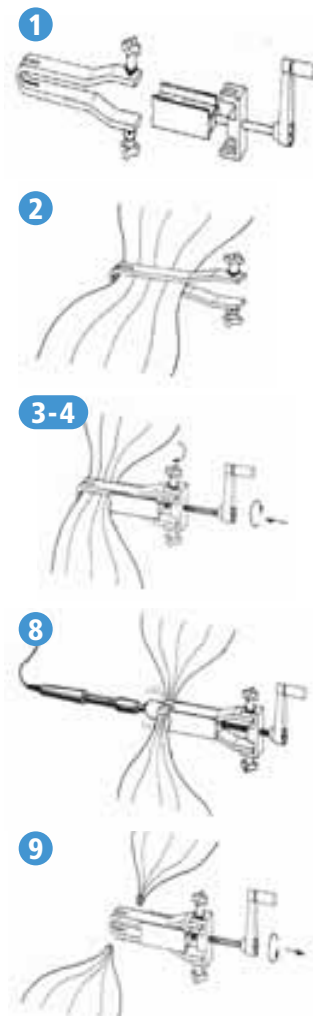
### Sealing tool

power	250	[W]
time to heat up	appx. 5-7	[min]
voltage	220	[V]
temperature at the blade	appx. 460	[°C]
weight	appx. 0,75	[kg]
power cord length	appx. 1,5	[m]



### How to use the sealing tool

- 1.) Loosen star-headed screw clamp and pull out guiding mechanism.
- 2.) Select the position for cutting the foil-bag and cross wisely place clip over the same.
- 3.) Press bag tightly into clip and insert guiding mechanism.
- 4.) Press on bag even tighter by fastening screw clamp (turn right).
- 5.) Check data for voltage with label on tool and power source.
- 6.) Plug in sealing tool.
- 7.) Wait for tool to heat up (approx. 7 minutes).
- 8.) Slip the tool's hot knife into the 3 [mm] wide lower slot; cut the foil and heat-seal the ends
- 9.) Open the screw clamps by turning the heads counterclockwise and loosen guiding rib; pull out both ends of the foil-bag; put sealing tool back in its stand.
- 10.) When done, unplug the tool and clean the blade. Place it somewhere safe to let it cool down.



Clamping device: weight appx. 2 kg  
material: chromium-plated steel



## HS-Mobile Safety Filtration Unit



This product is a mobile, ready to plug-in safety filter system for exhaust or supply air filtration. It can be shut off securely by gas-tight dampers and offers contamination free filter exchange (safe change, Bi-Bo, Bag-In-Bag-Out). It contains a vent, air heater, and efficient filter elements for extracting gases and (toxic) dust particles. HS-Mobile Filter Units function as a mobile ventilation system for filtering radioactive, toxic, or pathological particles and gases in applications where systems are unavailable or insufficient. The entire standard unit is constructed to fit through any office door. The units are also ideal for part time use where appropriate ventilation systems are not available or for decontamination works. HS-Mobile Filter units should be on hand at fire departments or other emergency services.

They are of versatile use:

- ventilation of rooms and containers prior to or while maintenance work,
- environment-friendly cleansing of tanks, e.g. for extracting aerosols or odours,
- in laboratories,
- in facilities of chemical industries,
- in nuclear facilities,
- and in any applications where harmful contaminants are potentially set free unmonitored.

### Layout

The Mobile Filtrations Unit's duct and case are made of stainless steel (1.4301), that is welded gas-tight and glass-blasted on the surface. If requested the unit can also be fabricated out of superior grades of stainless steel or powder coated galvanised steel.

Type	F1	F2	F3	F4
air flow [m³/h]	1500	3000	3000	6000
prefilter cells [qty.] 610 x 610 x 50 mm	1	2	1	2
rec. pressure drop initial /final [Pa]	10/200	10/200	15/200	15/200
HEPA filter [qty.] Class E11 - H14 610 x 610 x 292 mm	1	2	1	2
rec. pressure drop initial /final [Pa]	200/750	200/750	250/750	250/750
Molecular filter [qty.] 610 x 610 x 292 mm	1	2	-	-
pressure drop (static) depending on carbon type [Pa]	200-550	200-550	-	-
fan performance [kW]	4	5,6	4	5,6
heater performance [kW]	3	6	-	-
voltage [V]	3 x 380 [V] – 50Hz			
base with wheels [qty.]	1	2	1	2
weight appx. [kg]	depening upon options & equipment			
Erfragen Sie bitte bei Bedarf weitere Abmessungen und Ausführungen.				

<b>Mobile Base Rack</b>	consisting of welded and painted steel profiles. Four load ring screws are fixed to the base frame. It is arranged with handles, and two guide rollers. The later consist of steel which are PU-covered, and are equipped with breaks / fasteners.
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<b>Accessories</b>	flexible hose NNW300, made from neoprene coated nylon fabric, will resist temperatures between -10 up to +140 degree Celsius length: five meter including quick-release coupling.
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# HS-Mobile Safety Filtration Unit

## Filterstages

Housing combinations may hold filters in accordance to the filtration task: prefilters, HEPA and molecular resp. gas filters.

Installable filtertypes	Filterproperties
prefilter - coarse dust:	<div> <div>HS-Prefiltercell</div> <div>HS-Alpha Pak 55</div> </div> <div> <div>G3 to M5 (EN 779)</div> <div>ISO coarse to ISO ePM10 (ISO 16890)</div> </div>
mainfilter HEPA:	<div> <div>HS-Mikro S max. 120°C, conforms ATEX</div> <div>HS-Mikro SF max. 65°C</div> </div> <div> <div>E10 to H14</div> <div>(EN 1822)</div> </div>
mainfilter molecular:	<div> <div>HS-A053</div> <div>HS-A055</div> </div> <div> <div>high security filter (radioisotopes)</div> <div>VOC's odours, haz-mat</div> </div>

The single units feature durable maintenance cover with profiled gasket and four star-headed screws. A guide bar helps to close the covers tightly and fixes the screws evenly. All openings are equipped with a two-groove maintenance board made out of aluminium, which ensures a contamination-free (Safe Change, Bi-Bo, Bag-In-Bag-Out) filter replacement.

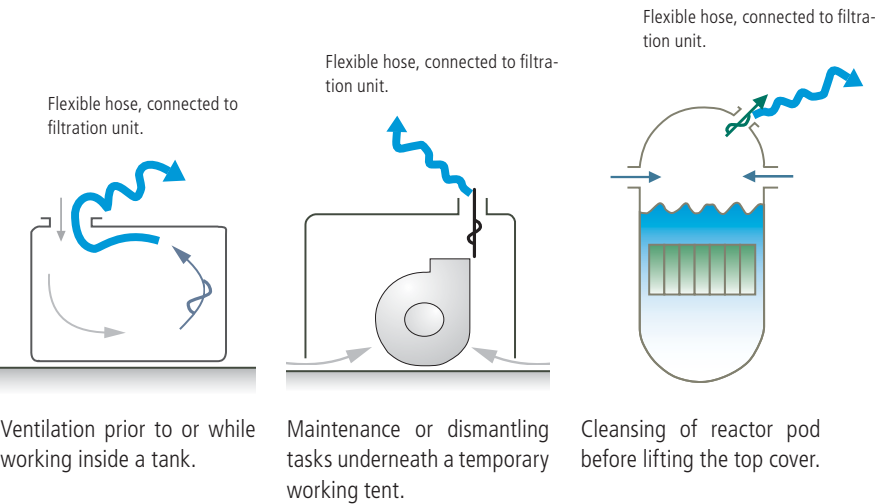
Due to the covers size it can also serve as placement area for replacement bags.

A heavy-duty stainless steel frame, outfitted with cam and flat spring, enables the filters to securely fasten themselves into place. That way, product-related differences in thickness as well as the gasket's decreasing resilience will automatically be evened out. This system can only work with exact fit of the filter. Due to reasons of security the maintenance covers may only be installed while the filters are fastened. Mistakes in mounting the covers are therefore impossible.

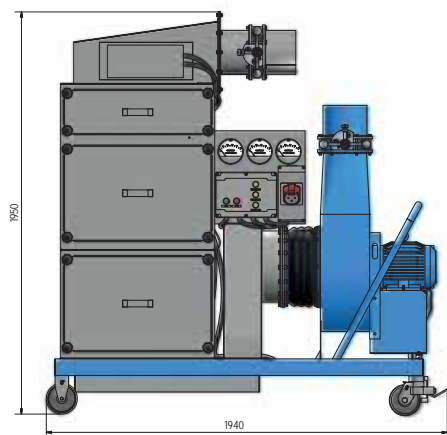
Since security plates are welded onto the unit's body, it is shockproof. In addition, the units for HEPA and activated carbon filters are fitted with an extra leak-tested gasket, according to DIN-1946/Part 4. This allows the operator to test the filters' gasket while operating the system. An inclined-tube manometer made of acryl (or any other preferred pressure guard) shows the filters' exact pressure drop. Stainless steel-tubes serve as instrument leads.



Safe Change, Bag-In-Bag-Out filter chamber with double-groove service board



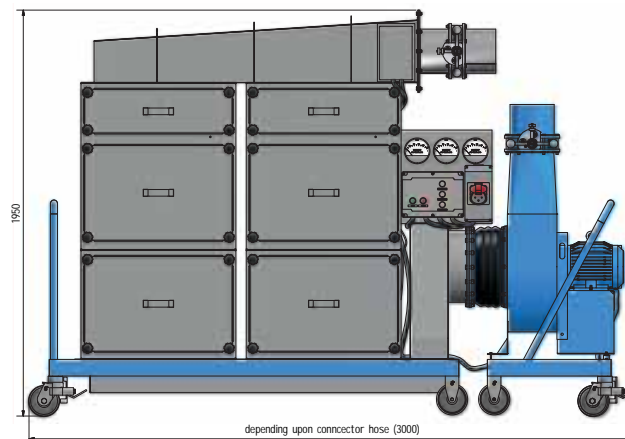
## Mobile Filtration Unit – Type 1



Flow velocity max. 1500 m<sup>3</sup>/h - adsorbs (radioactive) gaseous impurities and filters particles.

Equipped with two gas-tight dampers, an air heater, pre-filtration unit, HEPA filter as well as activated carbon filter. Dimensions: (including vent) 1.800 x 850 millimeter.

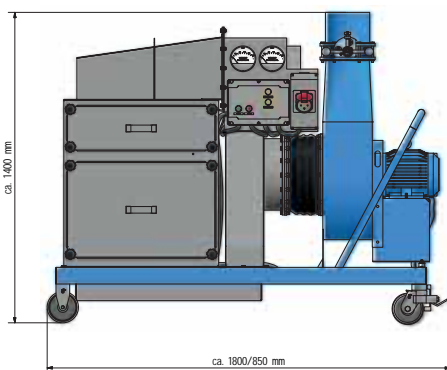
## Mobile Filtration Unit – Type



Flow velocity max. 3000 m<sup>3</sup>/h - adsorbs (radioactive) gaseous impurities and filters particles.

Equipped with two of each gas-tight dampers, air heater, pre-filtration unit, HEPA filter and activated carbon filter. Dimensions: 2.100 x 850 millimeter, plus separate vent 850 x 850 millimeter.

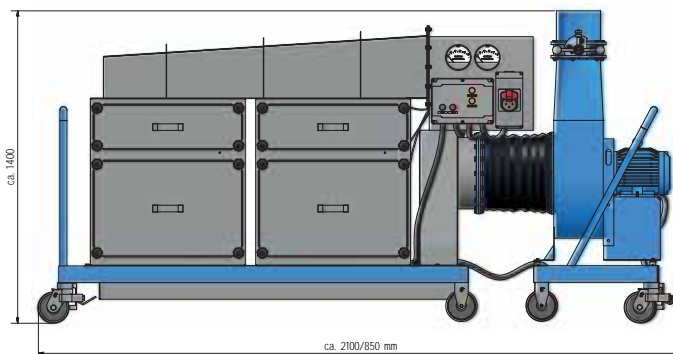
## Mobile Filtration Unit - Type 3



Flow velocity max. 3000 m<sup>3</sup>/h - extracts particles only.

Equipped with two gas-tight dampers, pre-filtration unit and HEPA filter. Dimensions: (including vent) 1.800 x 850 millimeter..

## Mobile Filtration Unit - Type 4



Flow velocity max. 6000 m<sup>3</sup>/h - extracts particles only.

Equipped with two of each gas-tight dampers, pre-filtration unit and HEPA filter. Dimensions: 2.100 x 850 millimeter, plus separate vent 850 x 850 millimeter.



Type: HS-Filtermobile F1



Type: HS-Filtermobile F2

## Air heater and fan



### Air heater

The air heater has a performance of 3 kW, a voltage of 3 x 380 V – 50 Hz, and is equipped with an excess temperature protection, safety thermostat and an integrated thermostat. This ensures that the heater switches itself on/off if the temperature falls below or exceeds a given mark. Its case is made from stainless steel. The heater is able to handle airflows above 500 m³/h.

### Fan

The body is made of steel and covered with a decontaminable paint. For direct drive, the vent sucks in air at one side only. It features a blade wheel with backwards bend blades, which are statically and dynamically balanced according to VDI 2060 – grade Q6.3. A three-phase motor powers the vent and is gland sealed with a GACO-ring. The closed model also comes with an IEC-norm protective grid.

IP-class: IP44  
voltage: 3x380 Volt - 50 Hz  
power: 5,6 kW for Typ F2 & F4  
4,0 kW for Typ F1 & F3



Type: HS-Mobile Filter F2  
Special Variant with 100 mm carbon bed.

## Shut-off Dampers



### Shut-off dampers NW 300

The gas-tight dampers are placed at the air inlet and outlet. It may be locked manually with a handlebar. The gasket is fixed onto the dampers' disk. A leak-test device is also standard. The dampers may also be used for regulating the airflow.

## Switchboard



The box holds switches for vent and air heaters as well as indication lights for malfunction and flow of operation. The switchboard is connected to all switches and security elements. Terminal clamps for external malfunctions, mountings plugs and clutch CEE 5-poled with a performance oM5 x 63 [A] are also available. The unit is ready to use when picked up.

IP-class: IP55





HS-Securesorb is designed to handle and filter high airflows (5.000 to 15.000 m³/h) which contain gaseous or toxic impurities. The highly efficient System contains an air heater, particle and adsorption filter as well as a final filter stage to securely trap any contaminated carbon abrasion dusts.

For the carbon to work most efficiently, the relative air humidity should be relatively low. In order to accomplish this status, an air heater can be installed at the air intake side. As pre-filtration elements the following filters may be offered: fine dust filter, filtration class ISO ePM10 - ISO ePM1 (e.g. HS-Makro 95), HEPA Filter, filtration class EN 1822: H13 or H14 (e.g. HS-Mikro S). Particulate matter filters protect the adsorption layer of dust, aerosols, and particles. The filtration units can be changed without contamination (Safe Change, refer to page 1/D11). The adsorption layer, which adsorbs gaseous impurities, is fabricated out of activated carbon.

Its charging depth as well as the type of carbon depends on the requirements (e.g. necessary time of contact, volume of air stream, or differential pressure).

The adsorption range includes the filtration of odours as well as hazardous substances (for example solvent, or phosphate), gaseous radionuclide, and warfare agents.

The carbon packed bed (PB) is filled via a spacious aerial platform, which also serves as reservoir for follow-ups. In order to eliminate bypasses the activated carbon should be compressed through a vibrator after being placed inside the PB. Used up carbon can be discharged contamination by safe change (aka. Bi-Bo, Bag-In-Bag-Out).

The final stage in this system is a security filtration element, containing a HEPA Filter of filter class EN 1822: E11 or better. This stage makes sure that none of the carbon particles will pollute the air, which may escape while filling the PB.

Pressure relief units at various parts of the case ensure a safe contamination-free pressure equalization prior to maintenance. The flow of any gas while opening the maintenance covers will therefore be controlled. The case is fabricated from stainless steel (grade 1.4301) or better. The surface was bead blasted, and therefore can easily be decontaminated.

HS-Luftfilterbau will take the system apart for transportation. It can be put back together easily at your facility. Any connectors to channels and ductwork will be designed according to your specifications.

## Technical data according to the design

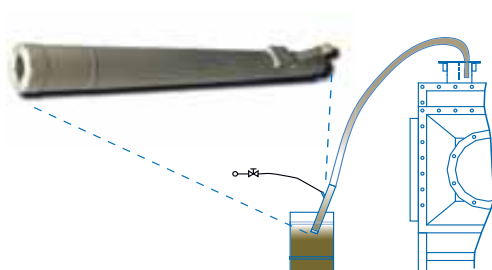
nominal air flow	5.000- 15.000	[m³/h]
pressure drop	500 - 2500	[Pa]
carbon volume	500 - 1000	[Ltr.]
depth of the packed bed	100 - 300	[mm]
height of the hopper	100 - 300	[mm]
weight (stainless steel 1.4301)	900 - 1600	[kg]
performance of the air heater	10 - 20	[kW]
sample taking system	sample taking lance, bottle rack, fixed bypassprobe (3 - 5 Samples)	

## Evaluating the carbon condition

In order to check the carbon's adsorption capacity, one has to either determine the weight or analyze a sample. HS-Luftfilterbau offers various systems for taking samples:

<b>Sample taking lance</b>	This instrument can be plunged into the packed bed (PB) through an inspection flap. Through a closable opening the carbon is directly taken from the carbon bed.
<b>Bottle rack</b>	Gas-tight bottles and a ball stop-cock enable service personnel to take the sample directly from the packed bed (PB).
<b>Bypassprobes</b>	A fixed amount of probes are aligned with the filtered airflow. Single samples can be taken and tested for their efficiency. The amount of inspections is limited to the amount of bypass samples (appx. 3 to 5).

With the taking of samples with the sample lance and bottle rack carbon will move up from the hopper reservoir.



## Filling of Activated Carbon Packed bed (PB)

The PB will usually be filled with the HS-injector system. A circular nozzle venturi injector, made from standard carbon bins or Big-Bags, sucks the carbon directly into the PB. Different from common worm/snail type feeders this injector system delivers the carbon into its encasement without crushing the granules.



# HS-Securesorb Activated Carbon Adsorber

## Exemplary design

HS-Securesorb Filter will be designed according to your specifications and environments. The example design reflects a modular system which is split in a series of separate modules for better transport and installation. All single parts are gastight welded by our certified welders on the installation site.

1. air heater

2. aerosol filter stage

3. pressure relief filter

4. carbon probing port
5. diverse probe ports (aerosol, pressure drop etc.)

6. passage to adsorption filter

7. adsorption filter stage
8. hopper / reservoir

9. discharger (gas tight ball-stop-cock)

10. abrasion filter stage



Air heater	To facilitate the most favorable efficiency, the carbon is not supposed to be placed in environments with more than 70 percent humidity. Therefore air heater can be placed at the air ingress sides upon request.
Measure points	Measuring points and sensors for checking the pressure difference may also be equipped upon request.
Pressure relief filters	By integrating a pressure relief equipment the system can be operated even with negative pressure to avoid contamination while maintenance. Any system pressure difference can be safely equalized with the ambient atmosphere before taking off the maintenance covers.
Vibrators	Pneumatic vibrators can optionally be placed at the case to avoid bypasses when filling the PB. The controlled vibrations ensure an equally compressed carbon PB.
Gastight dampers	We recommend our proven gas-tight dampers to securely shut off the filtersystem while not in operation or for maintenance. The tightness of the shut damper can be proven through various test methods.



**Discharging of the activated carbon packed bed**  
The carbon's encasement is being emptied through a gas tight ball stop-cock at the reservoir at the bottom of the case. Optional the discharging can be done through an automatic system (e.g. gas-tight worm type feeder or mobile extraction system with injector mechanism). If required a maintenance board for Safe-Change Bags can also be equipped..



## HS-Mounting Frames



HS-Luftfilterbau offers torsion-resistant, corrosion-free mounting frames made of galvanized steel or stainless steel with flat or non-porous endlessly foamed gasket. The following filters can be mounted to the frames:

- Panel filters (HS-Z-50) 48-50 mm depth
- Bag filters (HS-Pak 35 to HS-Pak 95)
- Compact filters (HS-Mikro Pak, HS-ECO Pak)
- Compact V-Bank carbon filters (HS-Carbo Pak)

The filters are centered and fixed by a bracing springs. All frames are pre-equipped with mounting drill holes and may therefore easily be assembled into a filter wall. Its stability is guaranteed through reinforcement plates.

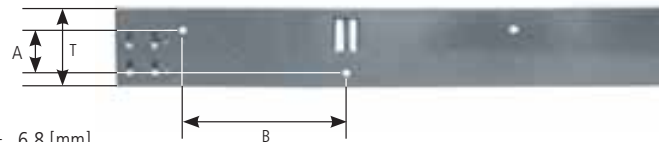
HS-Mounting Frames: Dimensions [mm]				
Frame		Filterinsert		
Width	Height	Width	Height	
610	610	592	592	
508	610	490	592	
305	610	287	592	
305	305	287	287	
610	910	592	892	
508	910	490	892	
305	910	287	892	

Please ask for other desired dimensions and designs.

Form of delivery	▪ mounting frame w/o filter or filtermedia
Options	▪ base material: galv. steel, stainless ▪ gasket: foamed gasket, flat-section gasket, FDA approved gaskets ▪ odd sizes

### Side view

T = 72 [mm]  
A = 38 [mm]  
B = 125 [mm]

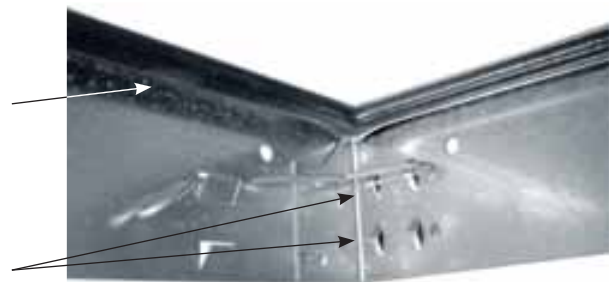


diameter of bore = 6,8 [mm]

### Inner view

endlessly foamed, non porous polyurethane gasket

adjustable clamps for framedepth's of 25 mm and 50 mm



HS-4N frames ideally suit for building filterwalls for highly efficient particle filtration. Single mounting frames can be fitted like modules to establish a wall installation. HS-4N frames may also be installed in ductings.

Clamping elements in each corner of the mounting frame ensure an even pressure on the installed filter. Each mounting frame comes with 4 clamping elements. All weld seams are treated for corrosion protection.

HS-4N-Frames can be optionally equipped with a leaktest pipe to ensure tight seat of the filter by putting the groove gasket (gasket with tight seat test ability) of the filter under pressure. The tight seat of the filter is validated by monitoring the leak rate over the gasket. The holding frame supports worldwide standard HEPA sizes.

Following HS-Filters can be installed:

- HS-Makro
- HS-Makro F
- HS-Makro FV
- HS-Mikro R oder S
- HS-Mikro RF oder SF
- HS-Mikro RFV oder SFV



Type	Dim. frame [mm]	Dim filter [mm]	Freight volume [m³]	Weight [kg]
HS-4N-Frame - 110 galvanized steel	325×325×238	305×305×150	0,02	3,35
HS-4N-Frame - 200 galvanized steel	325×325×350	305×305×292	0,04	5,45
HS-4N-Frame - 220 galvanized steel	325×630×238	305×610×150	0,04	4,95
HS-4N-Frame - 300 galvanized steel	477×477×238	457×457×150	0,05	4,95
HS-4N-Frame - 450 galvanized steel	325×630×350	305×610×292	0,08	8,1
HS-4N-Frame - 600 galvanized steel	630×630×238	610×610×150	0,08	6,6
HS-4N-Frame - 1000 galvanized steel	630×630×350	610×610×292	0,14	10,75
HS-4N-Frame - 1250 galvanized steel	782×630×350	762×610×292	0,17	12,05
HS-4N-Frame -110 stainless steel 1.4301	325×325×136	305×305×78	0,01	1,55
HS-4N-Frame - 220 stainless steel 1.4301	325×630×238	305×610×150	0,04	4,95
HS-4N-Frame - 450 stainless steel 1.4301	325×630×350	305×610×292	0,08	8,1
HS-4N-Frame - 600 stainless steel 1.4301	630×630×238	610×610×150	0,08	6,6
HS-4N-Frame - 830 stainless steel 1.4301	782×630×238	762×610×150	0,10	7,4
HS-4N-Frame - 1000 stainless steel 1.4301	630×630×350	610×610×292	0,14	10,75

Please ask for other desired dimensions and designs.

**Form of delivery**      ▪ individual mounting frames that can be assembled to filter walls

**Options**      ▪ frame alloy: galv. steel, epoxy painted steel, stainless  
                       ▪ leak test pipe for gasket bypass test \*

\* Frames with the leaktest pipe option for testing against gasket bypasses have bended a pipe welded in on the clean air side. Please add +30 mm on the total frame depth when choosing this option.



## HS-Ceiling Outlet Filter



This product serves as device for supplying sterile air free of particle and germs. This diffuser outlet for turbulent air supply is used within laboratories, hospitals, or cleanrooms.

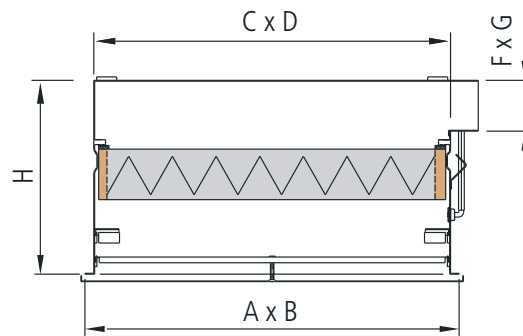
A circulatory closed false ceiling-connection will be customarily designed. The dimensions are also customizable. The absolute airtight manufactured housing is non-corrosive and easy to decontaminate. Welded retaining plates make installation easy. The outlet will be securely fastened by centred brackets, which are easily removed for filter exchange or surface scanning.

The Ceiling Outlet meets requirements according to DIN 196, VDI 2083, EN 14644-1 as well as cleanroom regulations according to 91/536/EWG-GMP.

Due to the fact the casing is entirely welded, no sealing compound is needed.

Dimension Outlet [mm]			Height [mm]	Size of filter [mm]	Size of outlet [mm]	Nominal air flow [m³/h]
A x B	C x D	F x G				
341 x 341	322 x 322	55 x 322	250	305 x 305	350 x 350	160
322 x 322	474 x 474	80 x 474	275	457 x 457	500 x 500	390
593 x 593	574 x 574	100 x 574	280	557 x 557	625 x 625	580
611 x 611	592 x 592	105 x 292	300	575 x 575	625 x 625	620
646 x 646	627 x 627	110 x 627	305	610 x 610	655 x 655	705

Please ask for other desired dimensions and designs.



### Form of delivery

- filter housing outlet ready for plug in

### Options

- expanded test connection for easy direct access from side facing room
- housing serves as exhaust unit with integrated fine dust filter
- housing includes cleanable, lint extracting filter frame
- painted can be offered in various RAL-colors

Dok.-ID: 10/D13

documents might be subject to change / issue Sept. 2017

## HS-S045 – HEPA Wall Filter System



For stabile placement at a wall the unit consists of a durable frame, which is made of gas-tightly welded aluminium sections. The outer angle sections form a surrounding mounting frame with a broad contact surface for easy and tight installation onto the wall. This wall filter also features aluminium supporting angles as well as a spindle-type tightening device made out of chromium-plated parts, which guarantee exact fit and leak-proofness between filter cells and the frames' contact area.

**For filter sizes: 610x610x292 mm, 610x610x150 mm, 610x610x78 mm**

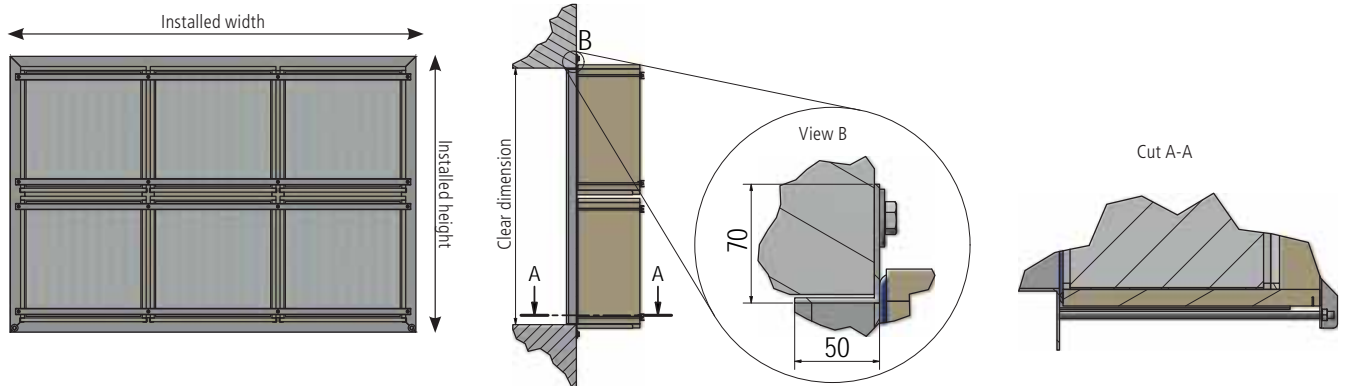
Abmessungen			Width [mm]	710	1340	1970	2600	3230	3860
clear			Clear Width [mm]	600	1210	1840	2470	3100	3730
Height [mm]	Height [mm]	Filters on top of each other	Filters - beside to each other						
				1	2	3	4	5	6
710	600	1	Filter qty.:	1	2	3	4	5	6
			Weight [kg]:	5	8	11	14	16	19
1340	1210	2	Filter qty.:	2	4	6	8	10	12
			Weight [kg]:	8	13	18	23	28	33
1970	1840	3	Filter qty.:	3	6	9	12	15	18
			Weight [kg]:	11	18	25	32	39	46
2600	2470	4	Filter qty.:	4	8	12	16	20	24
			Weight [kg]:	11	23	32	41	50	65
3230	3100	5	Filter qty.:	5	10	15	20		
			Weight [kg]:	16	28	40	50		
3860	3730	6	Filter qty.:	6	12	18	24		
			Weight [kg]:	20	33	46	65		

Please ask for other desired dimensions and designs.

Installable filtertypes		Filterproperties
Compact filters:	HS-Beta Pak	M6 to F9
	HS-Beta Pak Yellow	(EN 779)
	HS-Makro (also EX)	
	HS-Makro F	ISO ePM 10 to ISO ePM1
	HS-Makro FV	(ISO 16890)
HEPA Filters:	HS-Mikro S (also EX)	E10 to H14
	HS-Mikro SF	(EN 1822)
	HS-Mikro SFV	
Molecular filters:	HS-Carbo Block	adsorption of molecular and gaseous
	HS-A053	air impurities
	HS-A055	(VOC's, odours, haz-mat.)

**Form of delivery**      ■ complete filterwall or as as easy to assemble single components

**Options**                      ■ frame alloy: aluminium, stainless steel  
   ■ leak test pipe for gasket bypass test





## HS-S044 – HEPA Duct Filter Housing



This robust duct housing made of stainless steel 1.4301 or 1.4401 or 1.4571 with side service door for filter change. Arrangement of the door optionally on the left or right, in relation to the air direction. The housing frame with the wide sealing surfaces is also the connection frame for connection devices and air ducts. In addition to the sizes available as standard, the duct housings can be manufactured in any housing dimension for optimum adaptation to the conditions at the installation site. Support brackets for the filter cells and the functional rail contact pressure ensure an exact fit and a perfect seal between the sealing surface of the housing and the filter cells. The duct housings are supplied fully assembled in all system sizes. For larger volume flows, several units are combined next to each other.

The service doors for filter replacement are then arranged on the right and left. The surrounding 30, 40 or 50 mm connection flange can be drilled on site for easy connection to common ducts. Any transition pieces, e.g. to pipe ducts, are possible.

Dim. inkl. 50 mm flange	Width [mm]	804	1428	2052	2676
Height [mm]	Filters on top of each other	Filters - beside to each other			
		1	2	3	4
804	1	Filter qty.: 1 Weight [kg]: 40	Filter qty.: 2 Weight [kg]: 55	Filter qty.: 3 Weight [kg]: 70	Filter qty.: 4 Weight [kg]: 85
1428	2	Filter qty.: 2 Weight [kg]: 55	Filter qty.: 4 Weight [kg]: 70	Filter qty.: 6 Weight [kg]: 90	Filter qty.: 8 Weight [kg]: 110
2052	3	Filter qty.: 3 Weight [kg]: 70	Filter qty.: 6 Weight [kg]: 90	Filter qty.: 9 Weight [kg]: 110	Filter qty.: 12 Weight [kg]: 135
2676	4	Filter qty.: 4 Weight [kg]: 85	Filter qty.: 8 Weight [kg]: 110	Filter qty.: 12 Weight [kg]: 135	Filter qty.: 16 Weight [kg]: 160

Please ask for other desired dimensions and designs.

Installable filtertypes		Filterproperties
Compact filters:	HS-Beta Pak HS-Beta Pak Yellow HS-Makro (auch EX) HS-Makro F HS-Makro FV	M5 to F9 (EN 779)  ISO ePM10 to ISO ePM1 (ISO 16890)
HEPA filters:	HS-Mikro S (auch EX) HS-Mikro SF HS-Mikro SFV	E10 to H14 (EN 1822)
Molecular filters:	HS-Carbo Block HS-A053 HS-A055	adsorption of gaseous air impurities such as VOC's, Odours, harmful and corrosive gases such as H <sub>2</sub> S or SO <sub>2</sub>

### Form of delivery

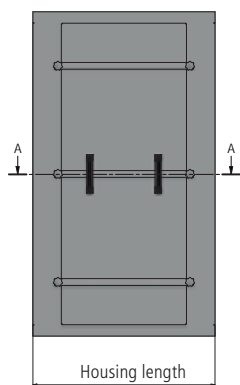
- complete duct housing or as as easy to assemble single components

### Options

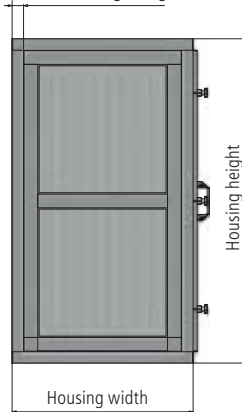
- base material: galv. steel, painted steel, stainless
- combination of multiple filter stages within one housing possible
- pressure gauge
- pressure switch
- painted in various RAL-colors
- decontamination-proof varnish
- gasket bypass / leak test port
- antistatic for EX-protection



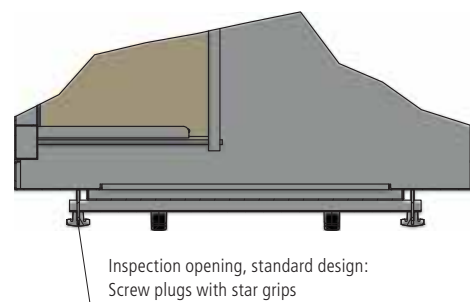
Side view



Front view  
(connecting) flange



Cut A-A



Inspection opening, standard design:  
Screw plugs with star grips





## HS-T022 – Duct Filter Housing

Sturdy duct housing made of 1.5 mm galvanised sheet steel with side service door for filter replacement. The door can be arranged either on the left or right, in relation to the direction of air flow. The housing frame with the wide sealing surfaces is also the connection frame for connection units and air ducts. In addition to the sizes available as standard, the duct housings can be manufactured in any housing dimension for optimum adaptation to the conditions at the installation location. The filters are mounted and fastened using mounting frames. The duct housings are supplied completely assembled in all unit sizes. For larger volume flows, two units are combined next to each other. The service doors for the filter change are then arranged on the right and left. The circumferential 30, 40 or 50 mm connection flange can be drilled on site to allow easy connection to common ducts. In addition, any transition pieces, e.g. to rectangular or round ducts, can be offered.



Dim. inkl 50 mm flange		Width [mm]	715	1325	1935
Height [mm]	Filters on top of each other		Filters - beside to each other		
			1	2	3
715	1	Filter qty.:	1	2	6
		Weight [kg]:	5	8	19
1325	2	Filter qty.:	2	4	12
		Weight [kg]:	8	13	33
1935	3	Filter qty.:	6	12	
		Weight [kg]:	20	33	

Please ask for other desired dimensions and designs.

Bestückung		Filterwirkung
panel filters:	HS-Alpha Pak HS-Z-50 & HS-Z-100	G3 to M5 (EN 779) / ISO coarse to ePM10 (ISO 16890)
bag filters:	HS-Pak 25 bis HS-Pak 95 optional auch EX-Schutz	G3 to F9 (EN 779) ISO coarse to ISO ePM1 (ISO 16890)
Compact filters::	HS-Beta Pak HS-Beta Pak Yellow HS-ECO Pak HS-Mikro Pak HS-Deka Pak	M5 bis F9 (EN 779)  ISO coarse bis ISO ePM1 (ISO 16890)
Molecular filters::	HS-Carbo Pak <sup>2</sup> HS-Carbo Pak <sup>2</sup> FAK	Adsorption of gaseous air impurities such as VOC's FAK = additional particle filtration layer: ISO ePM2,5 bis ISO ePM1 (ISO 16890)

Form of delivery	<ul style="list-style-type: none"> <li>complete duct housing or as as easy to assemble single components</li> </ul>
Options	<ul style="list-style-type: none"> <li>base material: stainless steel</li> <li>combination of multiple filter stages within one housing possible</li> <li>pressure gauge</li> <li>pressure switch</li> <li>antistatic for EX-protection</li> <li>lifting eyes</li> </ul>



## HS-T021 – Filter Wall (planar)

The HS filter wall consists of individual mounting frames (size 610x0610 mm), the surrounding wall mount frame frame and, if necessary, stiffening plates, which are easily screwed together to form walls of any size. All components are made of galvanised steel and are supplied in parts for on site assembly.

Installation can be provided for both air entry and exhaust air operation. Filter inserts with different efficiency levels can be used for optimum adaptation to the respective requirements of the ventilation and air conditioning systems.

Installable filtertypes		Filterproperties
Filterpads:	z.B. HS-E/360	G3 to M5 (EN 779) ISO coarse to ISO ePM10 (ISO 16890)
Panel filters:	HS-Z-50 & HS-Z 100 HS-Alpha Pak HS-Beta Pak	G3 to F9 (EN 779) ISO coarse to ISO ePM1 (ISO 16890)
Grease collectors:	HS-Grease collectorss	G1 to G2 (EN 779) / ISO coarse (ISO 16890)
<b>Form of delivery</b>		
		▪ complete filterwall or as as easy to assemble single components
<b>Options</b>		
		▪ other base material: stainless

Dimensions		Width [mm]	610	1220	1830	2440	3050	3660	4270	4880	5490	6100
Height [mm]		Mounting frames - beside of each other										
		1	2	3	4	5	6	7	8	9	10	
610	Mounting frames on top of each other	Air velocity [m/s]	Nominal air flow [m³/h]									
		0,7	900	1800	2700	3600	4500	5400	6300	7200	8100	9000
		2,0	2500	5000	7500	10000	12500	15000	17500	20000	22500	25000
		2,5	3200	6400	9600	12800	16000	19200	22400	25600	28800	32000
	Qty. of mounting frames		1	2	3	4	5	6	7	8	9	10
1220	2	Weight [kg]	4	8	12	16	20	24	28	32	36	40
		0,7	1800	3600	5400	7200	9000	10800	12600	14400	16200	18000
		2,0	5000	10000	15000	20000	25000	30000	35000	40000	45000	50000
		2,5	6400	12800	19200	25600	32000	38400	44800	51200	57600	64000
	Qty. of mounting frames		2	4	6	8	10	12	14	16	18	20
1830	3	Weight [kg]	8	16	24	32	40	48	56	64	72	80
		0,7	2700	5400	8100	10800	13500	16200	18900	21600	24300	27000
		2,0	7500	15000	22500	30000	37500	45000	52500	60000	67500	75000
		2,5	9600	19200	28800	38400	48000	57600	67200	76800	86400	96000
	Qty. of mounting frames		3	6	9	12	15	18	21	24	27	30
2440	4	Weight [kg]	12	24	36	48	60	72	84	96	108	120
		0,7	3600	7200	10800	14400	18000	21600	25200	28800	32400	36000
		2,0	10000	20000	30000	40000	50000	60000	70000	80000	90000	100000
		2,5	12800	25600	38400	51200	64000	76800	89600	102400	115200	128000
	Qty. of mounting frames		4	8	12	16	20	24	28	32	36	40
3050	5	Weight [kg]	16	32	48	64	80	96	112	128	144	160
		0,7	4500	9000	13500	18000	22500	27000	31500	36000	40500	45000
		2,0	12500	25000	37500	50000	62500	75000	87500	100000	112500	125000
		2,5	16000	32000	48000	64000	80000	96000	112000	128000	144000	160000
	Qty. of mounting frames		5	10	15	20	25	30	35	40	45	50
Qty. of reinforcement profiles		20	40	60	80	100	120	140	160	180	200	
		-	-	1	1	2	2	3	3	4	4	

Please ask for other desired dimensions and designs.

## HS-Z034 – Panel Filter Wall (v-form design)



HS-Z034 consists of HS-Mounting frames with the a size of 610 x 610 mm. Vertical supporting stands, top- and bottom-plates made out of galvanized steel plates are part of the frame. This wall can be adjusted according to environmental needs, for the filters can be adjusted variably: Both width and height depend on the filter's height, 610 mm, as well as on the width of the entire unit (450 mm).

The unit will be delivered as compact, arranged in ready-to-assemble packages. The construction is easy and fast due to prepared plug connections. A few bolts and screws at the corner joints hold the unit tightly together.

All parts are equipped with gaskets. Plenty of further sealing material as well as assembly and fixation matter are included in the delivery. The wall is ideal for various tasks. Due to its V-shape it is able to hold larger volumes of airflow even when build into small environments..



Installable filtertypes		Filterproperties
Filterpads:	z.B. HS-E/360	G3 to M5 (EN 779) / ISO coarse (ISO 16890)
Panel filters:	HS-Z-50 & HS-Z 100 HS-Alpha Pak HS-Beta Pak	G3 to F9 (EN 779) ISO coarse to ISO ePM1 (ISO 16890)
Grease collectors:	HS-Grease collectorss	G1 to G2 (EN 779), ISO coarse (ISO 16890)

**Form of delivery**      ■ complete filterwall or as as easy to assemble single components

**Options**                      ■ other base material: stainless steel

Dimensions		Width [mm]	450	900	1350	1800	2250	2700	3150	3600	4050	4500
Height [mm]		Mounting frames - beside of each other										
		2	4	6	8	10	12	14	14	18	20	
610	Mounting frames on top of each other	Air velocity [m/s]	Nennvolumenstrom [m³/h]									
		0,7	1800	3600	5400	7200	9000	10800	12600	14400	16200	18000
		2,0	5000	10000	15000	20000	25000	30000	35000	40000	45000	50000
	2,5	6400	12800	19200	25600	32000	38400	44800	51200	51200	64000	
	1	Sizetype	11	12	13	14	15	16	17	18	19	20
Qty. of mounting frames		2	4	6	8	10	12	14	16	18	20	
Weight [kg]		22	44	66	88	110	131	153	175	196	218	
1220	2	0,7	3600	7200	10800	14400	18000	21600	25200	28800	32400	36000
		2,0	10000	20000	30000	40000	50000	60000	70000	80000	90000	100000
		2,5	12800	25600	38400	51200	64000	76800	89600	102400	115200	128000
	Qty. of mounting frames	Sizetype	21	22	23	24	25	26	27	28	29	30
		Weight [kg]	4	4	12	16	20	24	28	32	36	40
Weight [kg]		34	67	99	132	164	196	229	261	294	327	
1830	3	0,7	5400	10800	16200	21600	27000	34200	37800	43200	48600	54000
		2,0	15000	30000	45000	60000	75000	90000	105000	120000	135000	150000
		2,5	19200	38400	57600	76800	96000	115200	134400	153600	172800	192000
	Qty. of mounting frames	Sizetype	31	32	33	34	35	36	37	38	39	40
		Weight [kg]	6	12	18	24	30	36	42	48	54	60
Weight [kg]		46	89	132	176	220	262	305	348	392	436	
2440	4	0,7	7200	14400	21600	28800	36000	43200	50400	57600	64800	72000
		2,0	20000	40000	60000	80000	100000	120000	140000	160000	180000	200000
		2,5	25600	51200	76800	102400	128000	153600	179200	204800	230400	256000
	Qty. of mounting frames	Sizetype	41	42	43	44	45	46	47	48	49	50
		Weight [kg]	8	12	24	32	40	48	56	64	72	80
Weight [kg]		58	112	165	255	275	329	382	436	491	546	
3050	5	0,7	9000	18000	27000	36000	45000	54000	63000	72000	81000	90000
		2,0	25000	50000	75000	100000	125000	150000	175000	200000	225000	250000
		2,5	32000	64000	96000	128000	160000	192000	224000	256000	288000	320000
	Qty. of mounting frames	Sizetype	51	52	53	54	55	56	57	58	59	60
		Weight [kg]	10	20	40	40	50	60	70	80	90	100
Weight [kg]		70	134	265	320	355	395	495	523	590	655	
Qty. of reinforcement profiles		-	-	1	1	2	2	3	3	4	4	



## HS-Z035 – Panel Filter Duct Housing (planar)



The cellular duct filter type HS-Z035 (flat) consists of housing with inspection cover and the slide-in quick-change frame with support grid and pressure clamp. The housing is made of galvanized sheet steel. Optionally, the units can also be made of stainless steel. The circumferential connecting flange, which can be either 30, 40 or 50 mm, can be provided with holes on site for easy connection to common ducts. In addition, any transition pieces, e.g. to pipe ducts, are possible.

The inserted filter medium is fixed between the support grid and the pressure clamp, so that fluttering or slipping can be excluded. On request, the filter housings can be supplied with a pressure gauge for reading off the pressure.

Installable filtertypes		Filterproperties
Filter pads:	i.e. HS-E/360,	G3 to M5 (EN 779) ISO Coarse to ISO ePM 10 (ISO 16890)
Panel filters:	HS-Z-50 & HS-Z 100 HS-Alpha Pak HS-Beta Pak	G3 to F7 (EN 779) ISO Coarse to ISO ePM 2.5 (ISO 16890)
Grease collectors:	HS-Grease collector	G1 to G2 (EN 779), ISO coarse (ISO 16890)

### Options

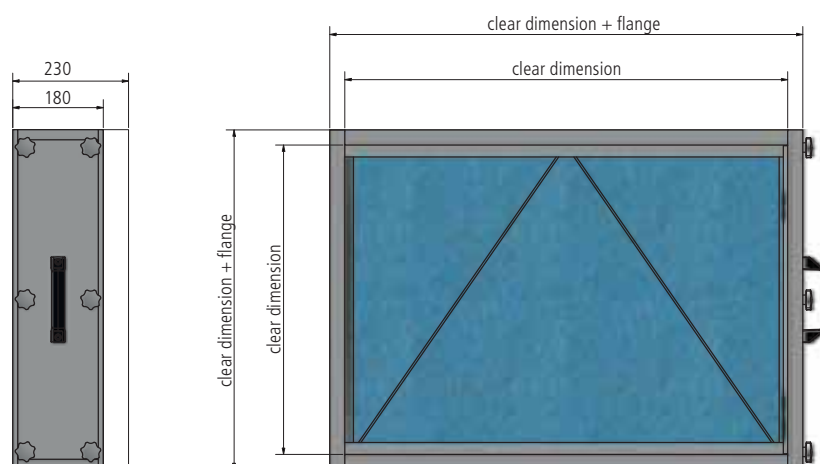
- base material: stainless steel
- flanges
- combination of several filterstages in one housing
- pressure gauges
- pressure switches

Clear dim.	Width [mm]	305	610	1220	1830
Height [mm]	Anströmgeschwindigkeit 2,0 [m/s]				
	Höhen- Nr.	V [m³/h]	V [m³/h]	V [m³/h]	V [m³/h]
310	01	480	950	1890	2780
615	02	950	1800	3750	5560
1230	03	1890	3750	7500	11150
1815	04	2770	5540	11100	1660
2460	05	3750	7530	15000	2250
2200	05	3750	7530	15000	22500

Please ask for other desired dimensions and designs.

180 mm depth:  
230 mm depth:

filterdepth up to 50 mm (i.e. 48 mm HS-Z50)  
filterdepth up to 100 mm (i.e. 96 mm HS-Beta Pak)



## HS-Z036 – Panel Filter Duct Housing (V-form)



This duct housing consists of a robust case and slider-mount frames arranged in V-Form. The former is made from galvanised steel with circulating angle flanges, and maintenance doors at the sides. Quick-release fastener allow easy access and simplifies service works.

The media replacement can be carried out in line with the door's position either from the left or right. If two units are placed beside each other replacements are made from the right as well as from the left side.

Foam sealing media at the sides and doors tightly seal the frames contact areas. Tracks and mounting frames form a robust labyrinth by locking into each other. When applying fine dust filters the mounting slides are also equipped with a gasket. The circumferential connecting flange, which can be either 30, 40 or 50 mm, can be provided with holes on site for easy connection to common ducts. in addition, any transition pieces, e.g. to pipe ducts, are possible.

HS-Z036 may be fitted with diverse filters from our production.



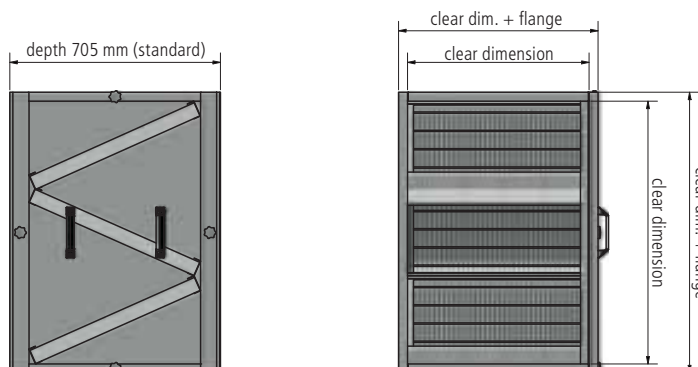
Installable filtertypes		Filterproperties
Filter pads:	i.e. HS-E/360,	G3 to M5 (EN 779) ISO Coarse to ISO ePM 10 (ISO 16890)
Panel filters:	HS-Z-50 & HS-Z 100 HS-Alpha Pak HS-Beta Pak	G3 to F7 (EN 779) ISO Coarse to ISO ePM 1 (ISO 16890)
Grease collectors:	HS-Grease collector	G1 to G2 (EN 779) / ISO Coarse (ISO 16890)

### Options

- base material: stainless steel
- flanges
- combination of several filterstages in one housing
- pressure gauges
- pressure switches
- painting in RAL-color of your choice

Clear dim. Height [mm]	Width [mm]	610	610	610		
		Air speed [m/s]				
		0,7	2,0	2,5		
	Height- No.	V [m³/h]	V [m³/h]	V [m³/h]	Weight [kg]	# of mounting frames
220	01	900	2500	3200	20 kg	1
440	02	1800	5000	6400	30 kg	2
660	03	2700	7500	9600	39 kg	3
880	04	3600	10000	12800	48 kg	4
1100	05	4500	12500	16000	57 kg	5
1320	06	5400	15000	19200	66 kg	6
1540	07	6300	17500	22400	76 kg	7
1760	08	7200	20000	25600	85 kg	8
1980	09	8100	22500	28800	95 kg	9
2200	10	9000	25000	32000	104 kg	10

Please ask for other desired dimensions and designs.





## HS-Sand Trap, Sandstorm Filter



HS-Sand Trap is designed to separate and settle out sand and granulated coarse dust prior to filtration and air filtration systems. The filters are equipped to meet demands for filtration units in deserts and regions with high winds. They prevent coarse particles from entering the ventilation system and eliminate premature depletion of other static filters. Sand and coarse particle are discharged into a chamber at the lower side of the grid. During assembly, observe the correct fitting position of the filtration unit.

### Filter efficiency

- 80 % of particles and sand grains with a size of 20 to 50  $\mu\text{m}$
- 65 % of particles and sand grains with a size of 1 to 70  $\mu\text{m}$

The geometrical construction of the precipitation grid is perfectly suited to meet demanding applications by using computational fluid dynamics (CFD). The grid is made from either aluminum or stainless steel; the frame is constructed from galvanized steel sheets and extruded aluminum profiles.

The separation grid is always followed by static filters as a second stage, which may either contain pocket filter, panel filters or metal mesh filters.

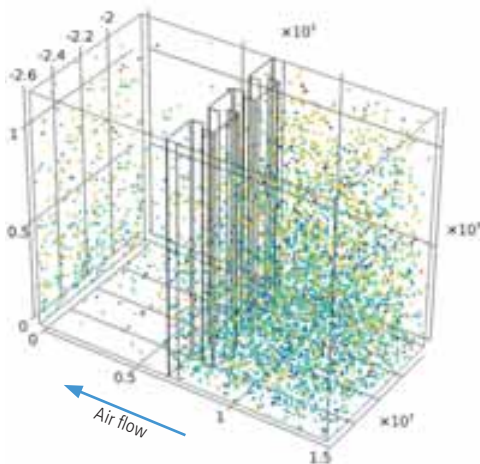
HS-Sand Trap Filters are designed related to their individual requirements.

Installable filtertypes		Filterproperties
Bag filters:	HS-Pak 35 PA	G4 to M5 (EN 779)
	HS-Pak 55 PA	ISO coarse to ISO ePM10 (ISO 16890)
Panel filters:	HS-Alpha Pak	M5 to F7 (EN 779)
	HS-Beta Pak	ISO coarse to ISO ePM1 (ISO 16890)
Grease collectors: (metal mesh)	HS-Grease collector	G1 to G2 (EN 779) ISO coarse (ISO 16890)

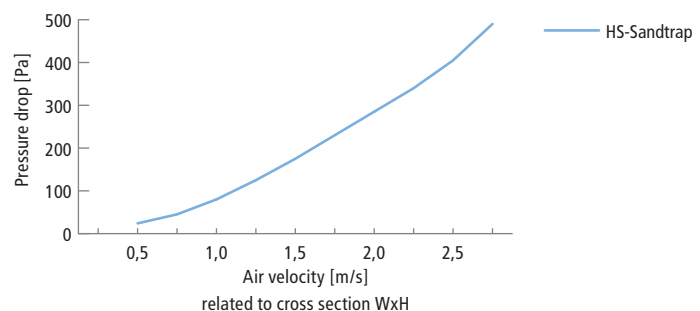
### Dimensions &

### operational conditions

- dimension depends on process requirements
- can be used as initial stage for air ducts
- mandatory inflow velocity > 0.5 m/s



Visualization of the excellent separation performance by means of flow and particle distribution simulation of an HS-Sand Trap with a grain size of 25  $\mu\text{m}$  and a flow velocity of 1.7 m / s.



### Form of delivery

- as complete filter unit or as as easy to assemble single components

### Options

- design: profiles made from stainless steel 1.4301
- connection flange according to demand
- additional filtration stages for fine dust collection and odor control
- monitoring station for differential pressure
- pressure switch
- weather protection hood





## HS-Pipefilter

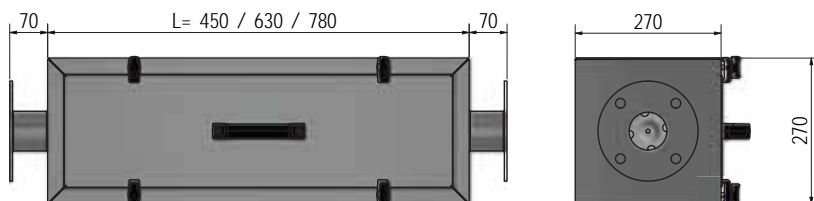
HS-Pipefilters are particularly suitable for low air flows at limited space conditions. They are used for the filtration of dusts, particles, odours and harmful gases. This housing type consists of 1.5 mm welded stainless steel (1.4301 optionally also 1.4404 or 1.4571). The special housings can be equipped with activated carbon cartridges HS-AKP 26 from 250 to 600 mm (HS-AKP intermediate tube adapter) as well as HS-V-Pak (HS-V-P intermediate tube adapter) in various filter classes from fine dust and particulate air filters up to class EN 1822 H14.

The system can be equipped with flange connections or welding pipe sockets in existing systems and ensures effective elimination of odours and pollutants either for the supply and/or exhaust air. A laterally mounted inspection cover allows the filter to be changed without loosening the flange or pipe connections.



Installable filters		Filterproperties
molecular filters:	HS-AKP 26 HS-AKP 35	Adsorption of gaseous air impurities such as VOC's, Odours, harmful and corrosive gases such as H <sub>2</sub> S or SO <sub>2</sub>
compact filters:	HS-V-Pak	M6 to F9 (EN 779) ISO ePM10 to ISO ePM1 (ISO 16890)
HEPA filters:	HS-V-Pak RFV HS-V-Pak SFV	E11 (EN 1822) H13, H14 (EN 1822)

HS-Pipefilter			
Width x Height [mm]	Duct housing Depth [mm]	Air flow [m³/h]	
		HS-AKP 26	HS-V-Pak (RFV/SFV)
270 x 270	450	60	-
	630	125	-
	780	175	200 (bis ePM1) 130 (bis H14)
Please ask for other desired dimensions and designs.			



Form of delivery	<ul style="list-style-type: none"> <li>complete filter housing with connecting flange according to the customer's individual specifications</li> </ul>
Options	<ul style="list-style-type: none"> <li>nominal pipe sizes, flanges and borings acc. to customer requirements</li> <li>optionale base material: stainless steel 1.4404 or 1.4571</li> <li>pressure gauges</li> <li>pressure switches</li> <li>antistatic for EX-protection</li> <li>thermic insulation</li> </ul>





## HS-Differential Pressure Transmitter



The HS-Differential Pressure Transmitter (HS-DPT) detects the differential, positive and negative pressure between the two pressure inputs and converts the measured value into a linear or square-root output signal of 0(4)...20 mA or 0...10 V. In this way, an statement can be made about the degree of loading of filters and transmitted, for example, to a control system or control station. The converter is offered in three variants (see below).

Thanks to ATEX approval, use in dust-laden and potentially explosive environments is possible without any problems.

Technical data		
Sitze	113x80x60 (W x H x D)	[mm]
Weight	ca. 0,5	[kg]
Power supply	DC 24	[V]
Measuring range	-10 bis 10	[mbar]
Analog output	0(4)bis 20 mA, 0 bis 10 V	
Druckanschluss	Schott-Steckverschraubungen für 6 mm Schlauch-Außendurchmesser	
Pressure connector	1 × M 16 × 1,5 N für Kabeldurchmesser von 4 bis 8 mm	
Temperature	-20°C bis 55°C (in Ex Zone - 20°C bis 40°C)	
Certificates	EX II 3D EX tc IIIC T135°C Dc (Zone 22), CE	
Electric protection class	IP 65	

The HS-DPT can be purchased as an optional equipment feature for all HS-Filter Housings or purchased individually to upgrade equipment already installed.

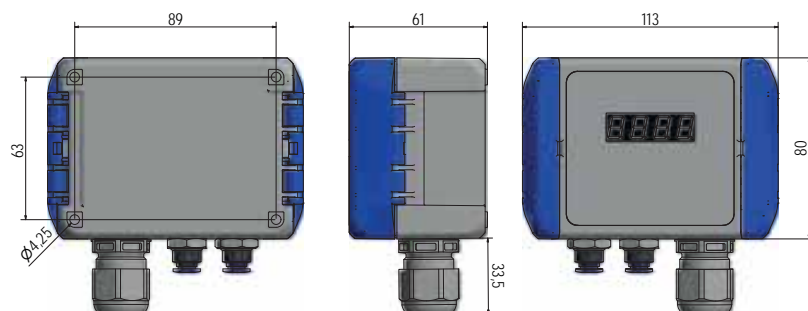
### Measurement according to DIN 1946-4 and VDI 3803

According to DIN 1946-4 and VDI 3803, ventilation and air-conditioning systems must be equipped with differential pressure manometers without sealing liquid. The measured value must be displayed locally and the limit value must be visible. This is the only way to ensure that air filters are maintained by the operator in accordance with regulations..

Depending on requirements and application, the HS-DPT is available with further features available in the following variants:

Range of functions per type:	LITE	BASIC	PREMIUM
4-digit differential pressure display	-	✓	✓
LED limit value message	-	-	✓
Limit value contact (drop-out and pick-up delayed)	-	-	✓
Tastenbedienung	-	-	✓
ATEX-Zulassung	Zone 2 + 22	Zone 22	Zone 22

ÜBeyond the standard measuring range of  $\pm 10$  mbar, optional variants with  $\pm 25$  mbar,  $\pm 50$  mbar and  $\pm 100$  mbar are available.



Dok.-ID: 10/022

documents might be subject to change / issue May 2019

## HS-Gasket Bypass Test Device



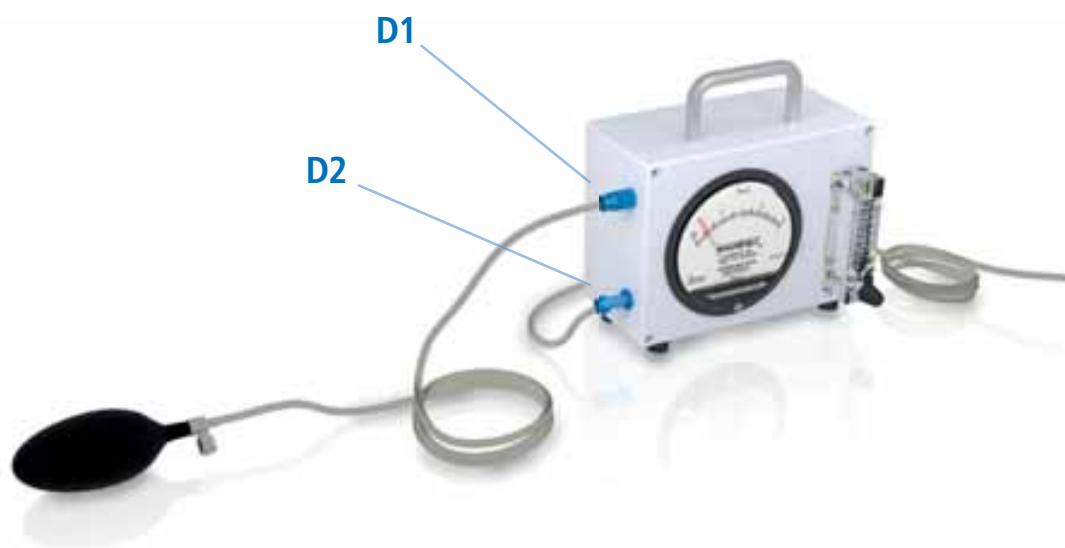
Using the leak-test device guarantees additional security when replacing a filter. Units and filters that are equipped with the according prequisitions (e.g. leak test grooves, leak test gaskets) can therefore easily be tested for a bypass-free and exact fitting fixation of the filters. This device is mainly used for filter systems that fall into the normative range of DIN 1946-4 (1998) or KTA 3610 where filter gasket bypass tests are an obligation.

### Technical data

Pressure metering scale	0 - 3,0	[kPa]
Flowmeter metering range	0,1 - 0,5	[l/min]
Optional metering range	0,1 - 1	[l/min]
Flowmeter with vent		
Pressure reservoir with a volume of 0,5 lr.		
D1: pressure port for hand pump (included)		
D2: pressure port for bulkhead coupling for 4 x 8 mm hose		
Device Dimensions (W x H x D)	200x150x100	[mm]

### The Usage

Connect the bulkhead coupling (D2) and the connection of the HEPA-filter with a hose. Hook up a hand pump to D1. Open the flow measuring device's valve counter clockwise. The pump will now apply pressure (2 kPa) to the system. If the gasket is intact and is fixed correctly, the flow-measuring device will know acknowledge any noticeable losses in air volume. If bypasses occur, the vanishing air will be indicated. Always maintain a level of about 2 kPa – if necessary pump additional air into system.





HS-HomeAir is a standardized, easy-to-install upgrade solution for residential ventilation that provides maximum air quality through a multi-stage filter system.

Due to the structural conditions, many ventilation systems for residential buildings are not always able to ensure a satisfactory filter performance. The following problems or demands frequently arise in connection with classic MVHR systems:

- odour emissions in passive houses, e.g. from chimney heating systems in neighbours, odours from spreading liquid manure, burning of garden waste, flue gases from fire-works and road traffic
- Entry of pollutants such as pesticides from agriculture, allergens, etc.
- insufficient effect on fine dust in ePM1 and ePM2.5 spectrum
- no Bio-Shielding, e.g. safe filtration of airborne germs, viruses and bacteria
- no accident protection, e.g. in the event of chemical accidents, etc.
- no protection against gases from road traffic, e.g. ozone, SO<sub>2</sub> or NOx

This is usually due to the following weaknesses in the ventilation systems:

- weak filter performance, e.g. due to the use of simple filter pads or low-class supply air filter of classes ISO Coarse or ISO ePM10 (prev. EN 779 G3 - M5)F
- Filter whose specification does not correspond to actual performance
- Weaknesses in the sealing of the filter holder, e.g. missing sealing of the filters against the filter holder by means of seals, use insert rails instead of professional clamping
- filters are „overrun“, i.e. the specified filter class is not reached for the control volume flows, since the filters are sometimes dimensioned far too small
- Overflow effects, as the filters filter treat supply and exhaust air simultaneously
- short service life, as the filter surfaces are usually of small dimensions
- no possibility to use activated carbon filters and if so, then only those with such a small design constructions that a real effect is doubtful

Our laboratory tests have shown that many systems with a high level of diffusion improve air quality, but not to the extent that users would expect. The installation of filter upgrades for existing systems can be difficult because the fans of the MVHR units do not usually allow every customer request. The MVHR performance is usually only designed for the existing filters.

HS-HomeAir has an intelligent pressure control which supports existing systems in overcoming the filter resistances. This allows even filters with the highest separation performance to be operated without any problems. HS-HomeAir only supplies as much air as the existing MVHR system requires. This means that, as a rule, no changes need to be made to the settings of the existing system during installation.

HS-HomeAir can be equipped with different filter types to provide perfect protection against pollen, odours, smokes, pesticides, chemical or even radiological air pollution. The pressure and sealing of the filters comply with the appropriate standards for protection against hazardous substances. Due to the larger filter areas, the design of the filters allows a much longer service life than with stock filters.

If there is enough space, the supply air pipe to the existing system is simply cut and the HS-HomeAir is installed between the air inlet and the intake of the existing system. We offer a suitable wall bracket for this purpose. A measuring line is installed at the inlet of the inventory system and connected to a household socket. After the filters are installed and both systems are turned on again, the HS-HomeAir is calibrated with a simple action on the existing system.

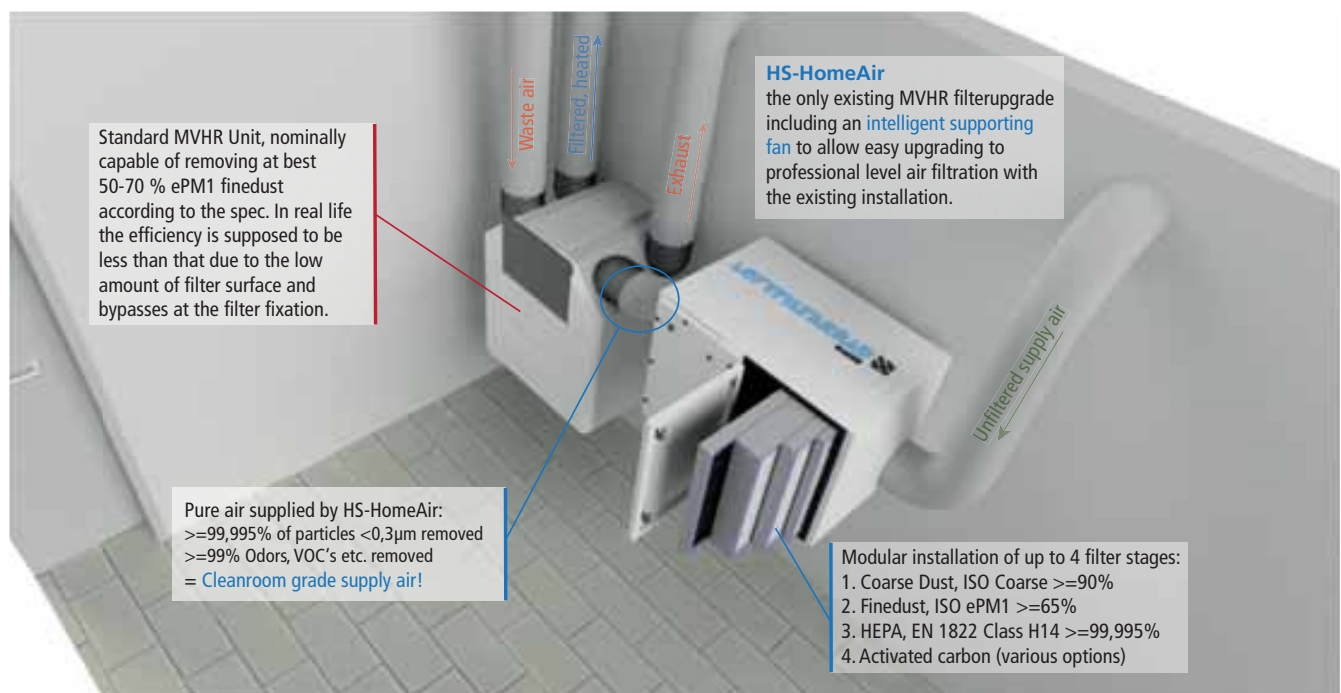


The following filter stages can be installed in the professional filter holder as required:

Installable filtertypes		Filterproperties	
pre-filter coarse dust:	HS-Metalmesh HS-Alpha Pak 55	ISO Coarse 55 - 95% ISO Coarse >80% bis ISO ePM10 65%	Metal mesh filters can be regenerated in the dishwasher
pre-filter fine dust:	HS-Beta Pak HS-Makro F	ISO ePM1 65 - 95% ISO ePM1 65 - 95%	perfect protection against fine dust, pollen and many allergens
main filter HEPA:	HS-Mikro SF H13 HS-Mikro SF H14	E10 to H14	smoke gases, viruses and bacteria, harmful aerosols such as pesticides or other chemicals in form of aerosols
main filter activated carbon, gas filtration:	HS-Kombizelle HS-Carbo Block HS-Carbo Panel	VOC's, Gerüche, Schadgase, gasförmige Gefahrstoffe.  Bei Bedarf nach individueller Anforderung	Activated carbon filters with reasonable dimensioning against odours, e.g. agricu- lture, solvents, chemicals, pesticides and other gaseous impurities such as ozone, sulphur dioxides and other harmful gases resulting from road traffic. Special filters for disaster ope- ration with activated carbon, e.g. against radiological gases such as iodine 131.

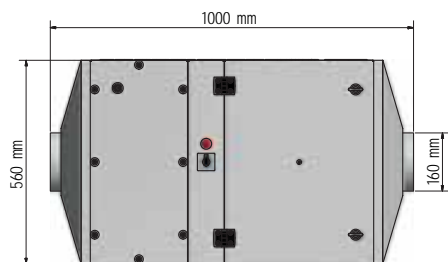


## Installation example HS-HomeAir 500

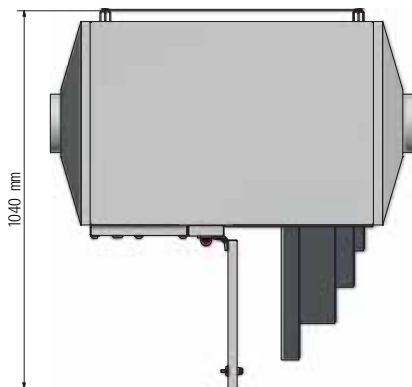




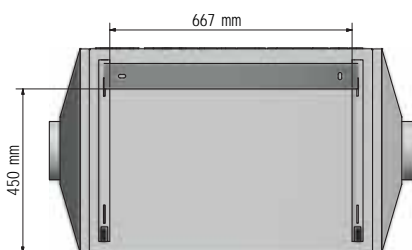
## HS-HomeAir



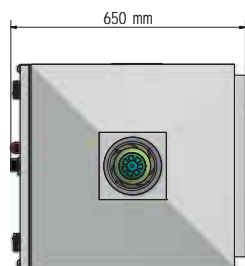
Front view  
Direction of flow: right to left



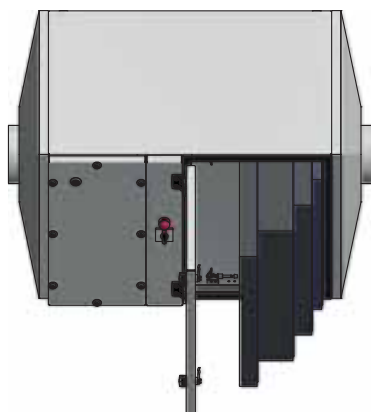
Top view, with maintenance door open



Rear view, wall bracket



View air inlet



View diagonally above, open maintenance door

### Filterunit

HS-HomeAir 500 is manufactured in two versions with left or right flow direction. If required, it is also possible to define other widths for the air inlet and outlet. As an option, we also offer transition pieces on request.

Part numbers: HS-HomeAir	Description
51-HOMEAIR500-RL-001	HS-HomeAir support unit vor MVHR systems Air flow direction: right to left max. airflow: 500 m³/h
51-HOMEAIR500-LR-001	HS-HomeAir support unit vor MVHR systems Air flow direction: left to right max. airflow: 500 m³/h

### Filters

Various filter types are available for HS-HomeAir, which can be combined as required. Up to 4 stages are provided. Pre-filters, fine dust filters, particle filters and molecular filters (against gases and odours).

Part numbers: Filters	Description	Function
27-HomeAir5-2025-714	HS-Z-Panel Filter, frame: polystyrene, gasket: endless foamed ISO 16890: ISO Coarse 60% EN 779:2012: G4	pre-filter, high dust holding capacity
33-HomeAir5-025-2-00	HS-Rapid-Change filterholder for filter pads, with support grid and pressure clasp, gasket: endless foamed, suitable for HS-Synthetic or HS-Glassfibre filter pads ISO Coarse / ePM10 (available separately)	pre-filter, replaceable filter mats, the filter class depends on the prefilter mat.
30-HomeAir5-4025-1-C	HS-Metalmesh filter, frame and filtermedia : Aluminium, gasket: foamed ISO 16890: ISO Coarse 35% EN 779:2012: G2	pre-filter, for coarse soiling, can be cleaned in the dishwasher
27-HomeAir5-B048-P17	HS-Beta Pak 85 frame: polystyrene, gasket: endless foamed ISO 16890: ISO ePM1 60% EN 779:2012: F7	fine dust filter
27-HomeAir5-C150J980	HS-Makro F 85, fine dust filter (LONGLIFE, because of the depth no HEPA filter can be installed downstream), frame: polystyrene, gasket: endless foamed ISO 16890: ISO ePM1 60% EN 779:2012: F7	fine dust filter, for long operating times and low energy consumption, cannot be combined with HEPA filters
40-HomeAir5-L096G980	HS-Mikro SF, HEPA Filter frame: polystyrene, gasket: endless foamed KI. EN 1822: H13, 99,95% MPPS efficiency	particle filter / HEPA Filter
40-HomeAir5-M096G980	HS-Mikro SF, HEPA Filter frame: polystyrene, gasket: endless foamed KI. EN 1822: H14, 99,995% MPPS Effizienz	particle filter / HEPA filter with higher efficiency
55HomAir5G3G000D2C03	HS-Carbo Block, activated carbon filter for the ad- sorption / chemisorption of harmful gases, VOC's and radiological contaminants, frame: Polystyrene, gasket: foamed, filter: filled with impregnated broad band activated carbon granulate (filters radioactive iodine, mercury compounds, fluorine compounds, benzene and a variety of other inorga- nic substances)	activated carbon bed filter, effective against harmful gases and odours
55-HomeAir5G000D2D86	HS-Carbo Panel, activated carbon filter for the adsorption of unpleasant odours, ozone and VOC's frame: polystyrene, gasket: endless foamed filter: activated carbon plates	activated carbon plate filter, effective against odours (e.g. chimney smokes, manure)

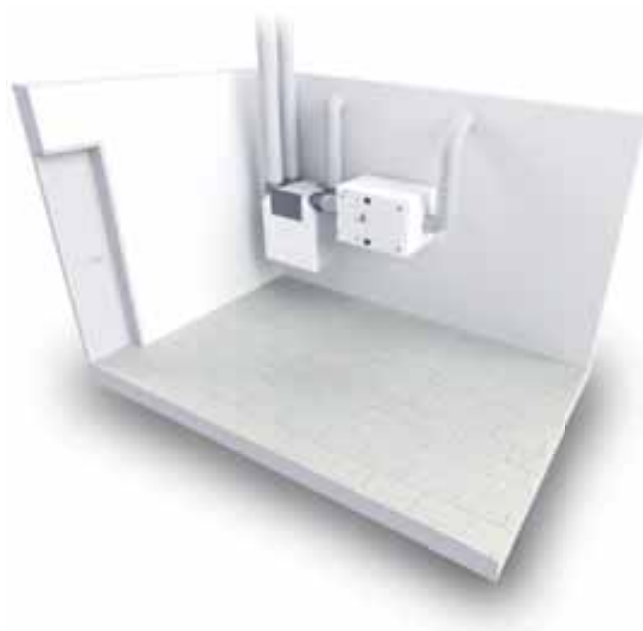
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documents might be subject to change / issue Dec. 2018



## Technical Data

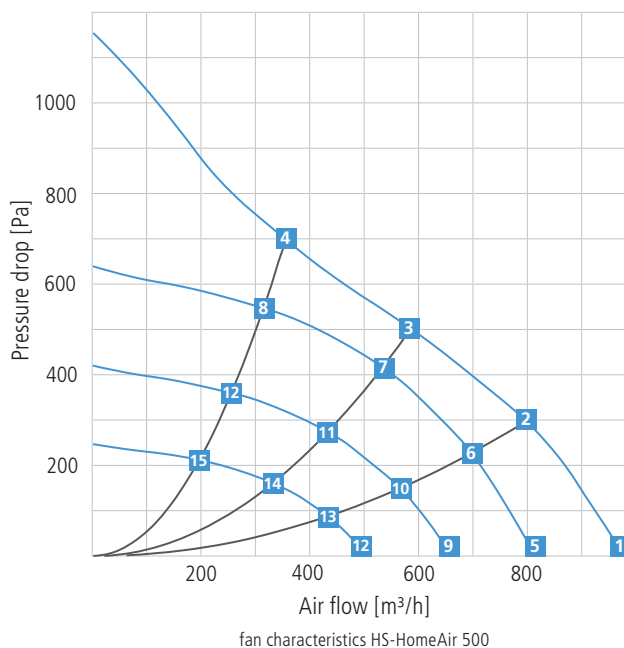
HS-HomeAir 500	
Luftleistung max.	up to 500 m³/h
Types	direction of inflow right / direction of inflow left
Number of filter stages	up to 4 (ISO Coarse to H14 resp. Aktivkohle)
Filter fixation	quick-release clamp, four-point contact pressure
Particle filter class max.	EN 1822 H14
Height	560 mm
Width	650 mm
Length	1000 mm
Nominal size Duct connection	160 mm
Space req. for maintenance	1600 mm
Weight	45 kg
Montage	wall-hung
Housing	powder-coated, steel-sheet
Insulation	thermic and noise
Voltage	230V, 50 Hz
Protection class	IP 40
Electrical efficiency $\eta_{es}$	56% (default EU327/2011: 43,1%)
Efficiency category	static
Efficiency class N	74,9 (default EU327/2011: 62)
Nominal rot. speed n	4070 min <sup>-1</sup>
Measurement of filter lifetime	pressure drop
Indication of req. filterchange	multifunctional light (yellow / red)
as-received condition	ready for connection
operational limit	0°C to 40°C in the installation room



## Fan

HS-HomeAir 500 has an advanced fan technology. The intelligent control only supplies as much air as the already installed MVHR unit requires. It's sole purpose is to overcome the additional filter resistances of the HS-HomeAir. It supplies only as much air as the existing MVHR system needs. The fan characteristic shows the potential and the power values.

Measure-point	n min-1	Ped W	I A	LpAin dB(A)	LwAin dB(A)	qV m³/h	pfs Pa
1	4440	161	1,35	72	81	975	0
2	4230	165	1,35	67	75	795	300
3	4120	169	1,35	63	71	585	500
4	4180	160	1,35	67	75	355	700
5	3700	93	0,8	68	77	815	0
6	3700	110	0,94	63	72	695	230
7	3700	126	1,07	60	69	535	417
8	3700	111	0,95	64	72	315	548
9	3000	50	0,43	63	71	660	0
10	3000	59	0,5	58	67	565	152
11	3000	67	0,57	55	64	430	274
12	3000	59	0,51	58	66	255	360
13	2300	22	0,19	56	65	505	0
14	2300	27	0,22	51	60	435	89
15	2300	30	0,26	48	57	330	161
16	2300	27	0,23	52	60	195	212





## HS-Airifyre 6000 High Performance Air Purifier




HS-Airifyre 6000 is a mobile high performance air purifier for effective separation of aerosols, particles, dusts and microorganisms (e.g. Sars-Cov-2). HS-Airifyre 6000 is designed to drastically minimize microbial contamination (mold spores, bacteria or viruses) in food processing operations to protect health and products. Likewise, HS-Airifyre 6000 can be used in industrial areas to reduce fine dust (e.g. construction dust, asbestos, pigments, packaging, paper, wood & plastic processing) and particle fractions from smoking (e.g. welding fumes, tobacco) as well as to filter oily aerosols.

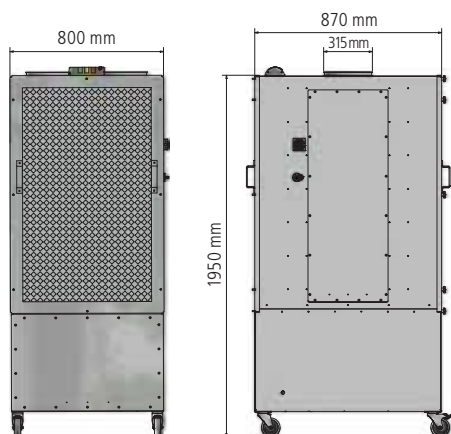
The easy-to-disinfect housing is made of either powder-coated sheet steel or stainless steel 1.4301. It provides space for two filter stages each (ISO ePM1 70% and EN 1822 H14) via the two inlet zones. In addition, the design meets the hygiene requirements for room air conditioning systems in accordance with VDI 6022. The LED signal display shows the operating status and the degree of loading of the filters. The two controllable EC fans deliver a total air flow up to >6000 m³/h with a filter performance >99.995% @ MPPS (most penetrating particle size: approx. 0.1 - 0.3 µm). This means that particles <0.1 µm and >0.3 µm are separated with much higher efficiencies also including Sars-Cov-2 viruses. The system provides two Ø315 mm Jacob flanged closable ports to easily integrate the unit into the local air distribution system. All components are free of problematic substances such as EDC's (Bisphenol-A), DEHP, DINP, DIBP and other phthalates as well as formaldehyde.

HS-Airifyre 6000 is delivered ready to plug in and is ready for immediate use. The internal silencers allow comparatively quiet operation even at high airflow rates.

Filter types		Filter class, efficiency
prefilter:	2 x HS-Beta Pak	ISO ePM1 70%
mainfilter:	2 x HS-Mikro SF-AL	EN 1822 H14 / >99,995% @ MPPS

The EC fans offer a diagonal impeller with three-dimensional guide vane. The operating points can be selected via a 5-step switch. Optionally, the fans can also be controlled via a frequency controller.

Housing	<ul style="list-style-type: none"><li>size W:800 x H:1950 x D: 870 mm</li><li>mobile or stationary (floor- or wallmount)</li><li>robust, corrosion- &amp; humidity resistant</li></ul>	
Operational conditions	<ul style="list-style-type: none"><li>max. r.h. 90 %</li><li>operational temperature -10°C up to +45°C</li></ul>	
Power	<ul style="list-style-type: none"><li>rated voltage</li><li>rated frequency</li><li>rated amperage</li><li>nominal power</li></ul>	<div>230 V</div> <div>50 Hz</div> <div>6 A</div> <div>1400 W</div>
Air flow	<ul style="list-style-type: none"><li>up to &gt;6000 m³/h</li></ul>	
Status indicator	<ul style="list-style-type: none"><li>signal light (operation, malfunction, filter change)</li></ul>	
Connectors	<ul style="list-style-type: none"><li>2 x Ø 315 mm Jacob flange</li></ul>	
Form of delivery	<ul style="list-style-type: none"><li>ready to plug in, palletized</li></ul>	
Options	<ul style="list-style-type: none"><li>housing made from stainless 1.4301</li><li>UV-C air sterilization (for added safety)</li><li>activated carbon VOC filterstage</li><li>antistatic filter for EX areas </li></ul>	



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## Other products and accessories

### Pressure gauges & -switches



Also available from HS-Luftfilterbau: inclined tube and U-tube manometer stations as well as analogue and digital gauges and pressure switches.

### Maintenance bags / O-Rings



Our rugged maintenance bags made from PE are essentially required for the contamination-free filter change (Bag-In-Bag-Out Change System). We also offer fitting O-rings in different sizes for a secure tightening. Optionally, we can also offer autoclaveable maintenance bags with arm sleeves or antistatic for EX protected areas.

### Filter maintenance & measures



We carry out filter changes and qualification measurements for your filtration systems and clean rooms. For this we have trained hygiene technicians and qualified partners at hand.

### Drive belts



We make sure you'll have the right „drive“. HS-Luftfilterbau also offers drive-belts for ventilation systems of all kinds.

### Measuring liquids & hoses



We also offer: refillable measuring liquids for inclined and U-tube manometer, polyethylene, PU, and neoprene tubes that connect to various measuring devices.

### Rapid Prototyping



If necessary, we can rapid prototype new filter models, and offer pilot production. Our custom made designs are available in very short time from PLM or ABS plastic.

### Development & Design



Our daily routine involves the development of new filter elements and filtration systems for a variety of customer requirements. We offer the full service range from design modification up to a fully documented development incl. case studies.

### MVHR Filtration



We produce filters for most MVHR (Mechanical Ventilation with Heat Recovery) systems and often offer improved quality in comparison with the original manufacturer or supplier. We also develop exclusive filter solutions for MVHR system manufacturers.

### Laser cutted filter pads



Using our textile lasers, we can produce special geometries from most of our filter media. Even with small quantities, filigree contours can be produced cost-effectively.

## Individual packing & commissioning

Just one of many examples of our useful additional services is our free of cost, positional order picking:

### „Where should I install this filter?“

Do you know this problem? A question that maintenance technicians and service teams ask themselves quite often - especially when not familiar with the facility. Luftfilterbau solves this problem for you. Especially at high volume maintenance in facilities management or in a variety of decentralized ventilation systems as at universities, hospitals, large office complexes, chemical parks, etc. our labeling system helps in maintaining a good view to save valuable time and minimize costs.

How it works:

Once you submit positional reference, Commission information or internal item numbers with your order, we accept them automatically in our manufacturing and contract documents. This ensures that not only the package label but also each filter is provided with your commission information, part numbers or system information. This facilitates not only the goods and stock control, but also the distribution site and the briefing of your maintenance team.

**AB: 2019-405977**

Pos.	Bezeichnung / Description	Kommission / Commission	Menge / Parts
1	Alpha Pak 55, K1 M5 / ISO ePM10 85% Gr: 582x582x96 mm	Anlage 1 - Zuluft	12
2	Alpha Pak 55, K1 M5 / ISO ePM10 85% Gr: 582x582x96 mm	Anlage 1 - Zuluft	10
3	Alpha Pak 55, K1 M5 / ISO ePM10 85% Gr: 287x287x96 mm	Raum 3 - Abluft	2

Free Delivery / your Order No.: 10225224/A202 10.06.23 15.12.2019

pallet & box label

Your information can always be found at our delivery notes, on the packaging AND the product!

<b>LUFTFILTERBAU</b> 405-Luftfilterbau GmbH Bismarckstrasse 31 D-68163 Kiel / Germany	
405-Alpha Pak 55, K1 M5 / ISO ePM10 85% Gr: 582x582x96 mm Artikel: 21-00600542-4059-P02 Material: Polypropyl Anlage 1 - Zuluft	
Auftr. Nr: 2019-405977 P 1 Prod. Datum: 10-2019 Tel: +49-(0)431-71853-0 Fax: +49-(0)431-71853-30 www.luftfilterbau.de	

individual product label



## Your benefit: Certified Quality & Advanced Service

### Quality

It is our ambition to exceed your expectation. You can rely on our integrated environmental and quality management on the one hand and our team with more than 40 years experience in air filtration on the other. HS-Luftfilterbau GmbH is certified according to ISO 9001, ISO 14001 and KTA 1401.



### Consulting & Service

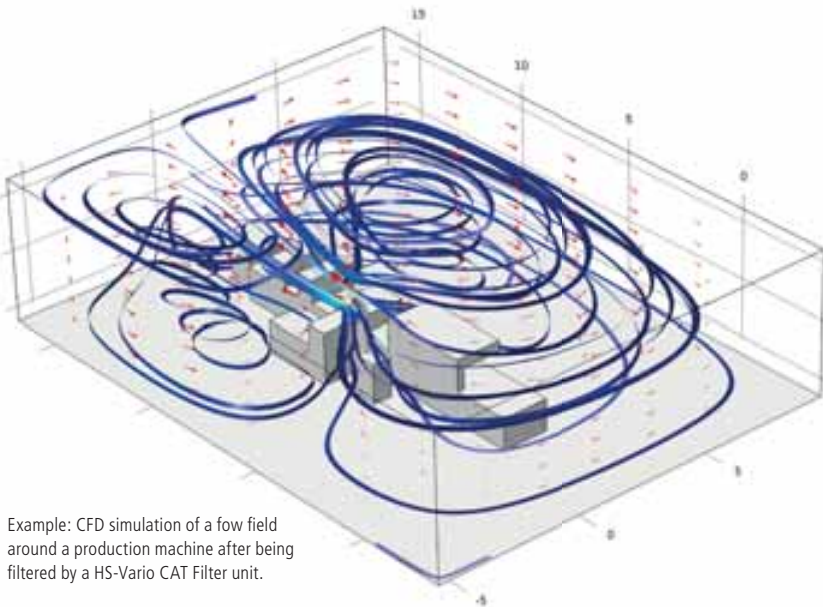
Beside air filters HS-Luftfilterbau offers a great variety of services around the air filtration process such as:

#### Customized Filtration

The product requirements in the field of air filters for HVAC and process air systems are extremely diverse - many filtration problems require individual solutions. We have recognized the need for scalable product solutions as our target. Therefore, we are constantly developing targeted approaches to customer specifications. We serve the complete range starting with from cost point solutions by rapid prototyping, small series up to mass production.

#### Development / Simulation

Short development cycles and ever-increasing demands require fast and reliable planning and design processes. HS-Luftfilterbau GmbH offers you also the possibility, if necessary, to optimize products in development by CFD and structure analyzing simulations.



Example: CFD simulation of a flow field around a production machine after being filtered by a HS-Vario CAT Filter unit.



## Energy Efficiency

The issue of energy efficiency remains permanently a topic which everyone has to face increasingly. The field of building optimization offers a wide range of options to save energy. The necessity becomes more evident and prominent with every step of the steadily rising energy costs.

The operational costs for filters (electric power for fans) takes mostly 60-90% of the overall costs of air filtrations. Thus the actual cost of a filter is significantly lower compared to its operational costs.

The power consumption of a ventilation system depends among other things on the air resistance and the design of the ventilation system. Filters offer a variable resistance and thus offer a great potential for energetic and cost optimization of the filtration process.

In the filter industry the issue of „energy-efficient filter“ is not new and is a recurrent theme since the late 60s of the last century. Energy costs of filters can indeed be sufficiently calculated under laboratory conditions. Filter can be classified in energy classes (i.e. A+, A, B, C, ...) when applying a fitting model for determination.

Eurovent 4/21 is such a proprietary model but no ISO standard for energy classification. In simplistic terms this model calculates the energy consumption of a filter during a fictive lifetime and relates this with the ISO 16890 filterclass.

The energy consumption of a filter according to this model is calculated according to the following formula. The variables like operating time and efficiency are set with generally accepted mean values as defined for the model.

The energy consumption of a filter is calculated as follows::

$$W = \frac{q_v \times \Delta p}{3600 \times 1000 \times \eta} \times t$$

W = energy requirement in kWh

$q_v$  = 3400 m³/h

$\Delta p$  = the absolute value of the pressure drop during the filters lifetime. It is determined by the pressure rise over the lifetime by reviewing the initial and the final pressure drop over the service life with the EN 779 defined final pressure drop of 450 Pa. A more detail description would go beyond the framework of this document.

t = 6000 operating hours (assumed filter change interval)

$\eta$  = 0,5 - This corresponds to a notional 50% efficiency of the fan. The range of fans is actually in use at <25% up to 80%. The guideline is based on an average of 50%.

Our bag filter HS-AirSynErgy 88 calculates up for a absolute pressure drop of 83 Pa during its lifetime according the Eurovent 4/11 model.

Used in the above formula, this results in an energy consumption of W = 940 kWh. Which results in class „A2 according to the Eurovent calculation model and according to the table below. Only products which fulfill energyclass „A“ or „A+“ in compareable to Eurovent 4/21 standard are marked in our documentation. Others won't be classified / marked. We are not certified according to Eurovent 4/21 because we do not share their policy for proprietary standards. As there is no independent ISO or EN energy standard for filters (and thanks to Eurovent there will be none) we have to cite 'compareable' to Eurovent 4/21.

However, an energy classification for air filter is in our opinion not in any case useful because current models lead the unexperienced user to the often false assumption to always have a benefit when using „low energy“ products.

In many applications, the model data just only provides only an indication on the potential energy savings. A filter is not a complete system and the energetic efficiency of the installation is depending on many more factors and influences than just the filter itself. Therefore it is not a good decision to rely just on energy classifications - especially when the concerned ventilation system is not offering frequency controlled fans or filters have to be changed often due to hygienic regulations.

We recommend to better get in contact with our expert advisors before you rely solely on energy classes. We can develop cost-saving solutions for you.

Energy efficiency classes according to the energy consumption @ filterclasses acc. ISO 16890 tested @ 3400 m³/h @ 6000 h operating time:

for epM1	A+	A	B	C	D	E
AEC in kWh/a ePM <sub>1</sub> and ePM <sub>10 min</sub> ≥50%, M <sub>x</sub> = 200 g (AC fine)						
50 & 55%	800	900	1050	1400	2000	>2000
60 & 65%	850	950	1100	1450	2050	>2050
70 & 75%	950	1100	1250	1550	2150	>2150
80 & 85%	1050	1250	1450	1800	2400	>2400
>90%	1200	1400	1550	1900	2500	>2500

for epM2.5	A+	A	B	C	D	E
AEC in kWh/a ePM <sub>2.5</sub> and ePM <sub>2.5 min</sub> ≥50%, M <sub>x</sub> = 250 g (AC fine)						
50 & 55%	700	800	950	1300	1900	>1900
60 & 65%	750	850	1000	1350	1950	>1950
70 & 75%	800	900	1050	1400	2000	>2000
80 & 85%	900	1000	1200	1500	2100	>2100
>90%	1000	1100	1300	1600	2200	>2200

for epM10	A+	A	B	C	D	E
AEC in kWh/a ePM <sub>10</sub> and ePM <sub>10 min</sub> ≥50%, M <sub>x</sub> = 400 g (AC fine)						
50 & 55%	450	550	650	750	1100	>1100
60 & 65%	500	600	700	850	1200	>1200
70 & 75%	600	700	800	900	1300	>1300
80 & 85%	700	800	900	1000	1400	>1400
>90%	800	900	1050	1400	1500	>1500

The figures are related to products with the facing dimensions of 592x592 mm in accordance to EN 15805.

The value M<sub>x</sub> indicates the amount of test dust which is fed to the filter during the test procedure to form the average values. "AC fine" is the specified test dust.



## Did you know ...

### ... how the usual particle size distribution is in „natural air“?

The air that is surrounding us is containing a wide spectrum of particles coming from various sources. So called primary particles (aitken cores) arise by natural processes like condensation, ablation or erosion or unnatural ones like combustion of fuel in engines. Such particles agglomerate to bigger secondary particles. Coarse dusts and „mega particles“ arise through erosion, volcanism, decay, rot, abrasion etc.

The range of the expected particle number concentrations in the ambient air can be determined by using the generalized distribution diagram (Junge Diagram) below.

There is a concentration peak in the range of 0,4  $\mu\text{m}$ . The no longer valid EN 799 classified medium and finedust filters according to their effectiveness against particles of this particular size.

ISO 16890 contains particle distribution curves. These curves are basis for the classification and weighting factor of particle fractions for the definition of the filters efficiency in its classification range (see page 8).

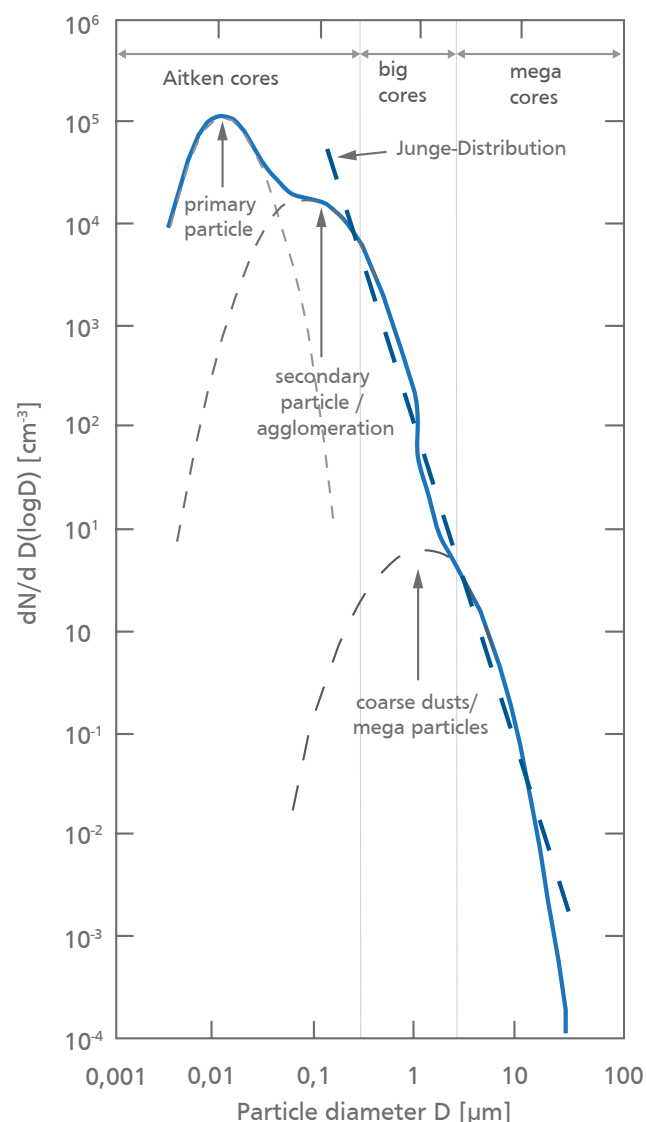


Diagram: particle concentration in the ambient air (statistical mean)

### ... how many particles are generated by a human being?

The human body is a true particle generator. Various amounts of particles are generated depending on the activity. The diagram below is an example and applies to ordinary textile clothing. The results are e.g. strongly influenced by the wearing of cleanroom clothing.

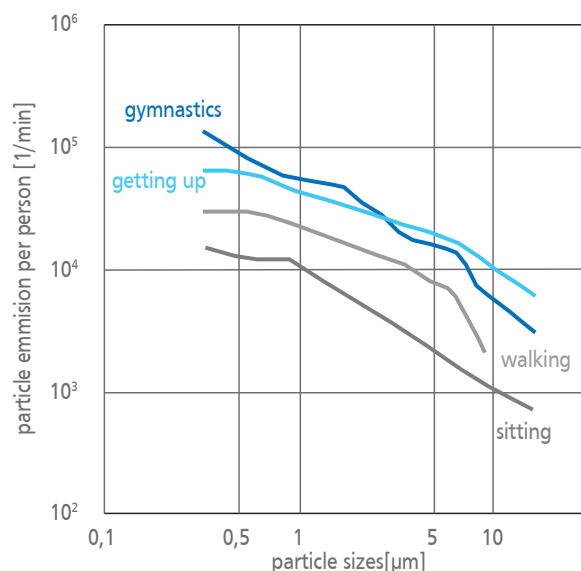


Diagram: Particle generation of humans during different activities  
(Source: VDI 2083, sheet 15).

### ... what kind of air pollutions you have to expect?

Environment	Particle type	Concentration [mg/m³]	Particle size [μm]
rural	insects, pollen, dust blown from the soil	0,01 – 0,1	0,01 – 3
urban	soot, dusts (i.e. brake or tire abrasion), insects	0,03 – 600	0,01 – 10
industrial	VOC's, metallurgic or plastic dusts	0, 1 – 500	0,01 – 50
arctic	snow, ice	0,01 – 0,2	0,01 – 10
maritime	salt, ice, dust	0,01 – 10	0,01 – 5

Environment	absolute particle qty. / [litr.]
cleanroom	1
arctic air	10.000
maritime air	100.000
rural	1.000.000
small town	100.000.000
mega city	1.000.000.000
smoke / heavy smog	>1.000.000.000.000

... that [www.luftfilterbau.com](http://www.luftfilterbau.com) always provides you with the latest informations about innovative air filtration?



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