

➤ 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

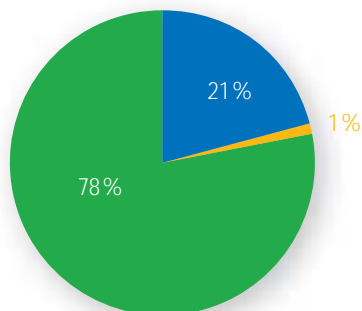


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Atmospheric Air

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 m³/h. However, because we also produce carbon dioxide our body requires about 5 m³/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 m³ 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

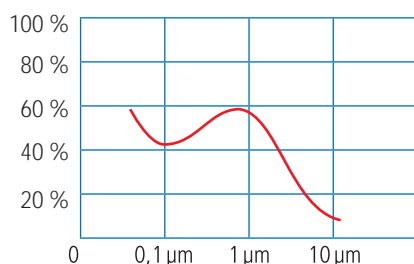
Necessity of Air Filtration

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 (μm) in size and such below 0.3 μm in size enter the respiratory system. Bigger substances remain in the upper part of the air pipes and do not enter the lungs. Unfortunately,



Percentage of particles entering and remaining in the human lung according to their size in μm

coarse dust filters hardly absorb particulate matter below 1 μm in size. Fine dust filter and pre-filter will absorb 95 to 100 percent of particles 1 μm 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.

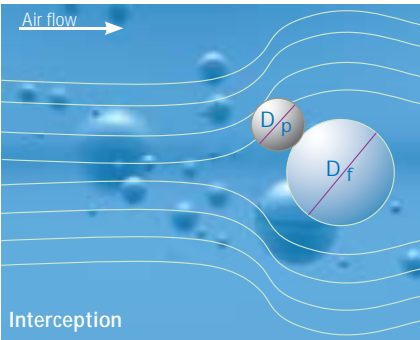
It is also proven that the quality of products made in the metal and mechanical engineering industry depends on the degree of dust in the air, since modern systems include delicate parts which only have a tolerance level as low as a hundredth millimeter or less. Even a single particle of dust may corrupt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



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.

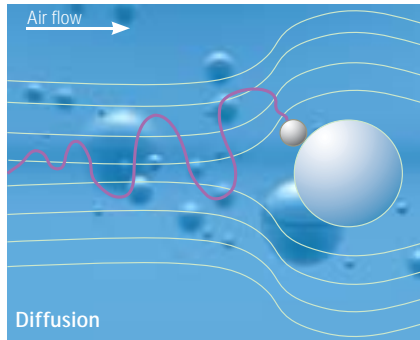
Interception



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.

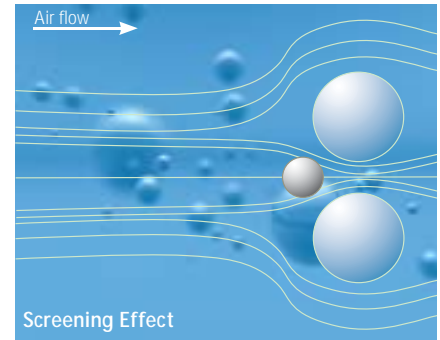
Diffusion



Particles below $1\ \mu\text{m}$ 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.

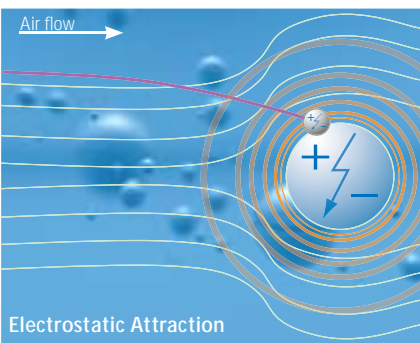
The possibility that these particles attach themselves to a fiber increases with a decreasing amount of speed and decreasing particle and fiber size.

Screening Effect



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

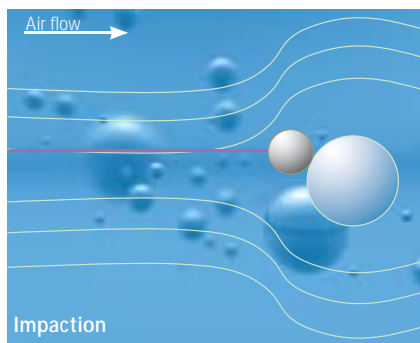
Electrostatic Attraction



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.

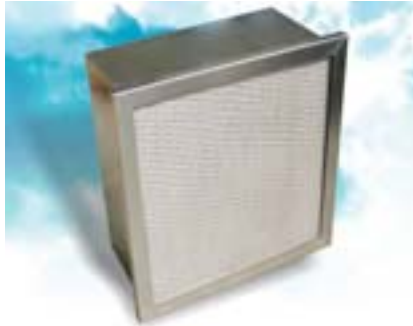
Coarse Dust Filter



Coarse Dust Filter are made of fiberglass or synthetic fibers (PP, PS, PTFE, etc.) with a fiber diameter between 30 and 50 μm and a gap between fibers ranging from 200 to 400 μm . 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 μm . If the particles have a size of less than 2 to 3 μm , 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 μm 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 μm and a spacing of 10 μm 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 μm 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 μm .

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 μm 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.

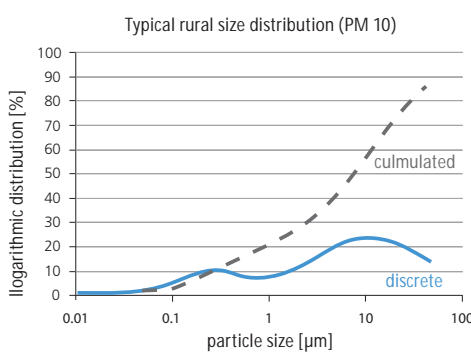
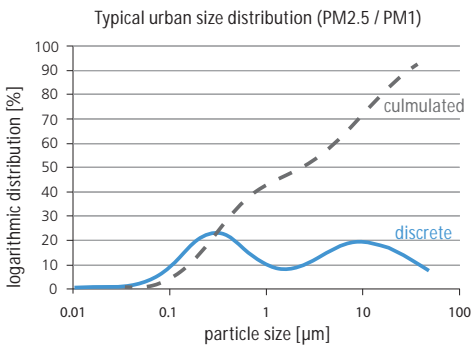
Atmospheric air holds diverse substances deriving from particulate matter, gases, or fibers. These particles in breathable air are called aerosols. The particles suspended in the air are called aerosols. Their number of concentrations and distribution is assumed to be the outdoor air size in ISO 16890. 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 microorganisms 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.



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

EN 779

The test standard EN 779 has been in force since 1994 and will be replaced by the new test standard ISO 16890. It is a destructive test method due to the fact that the filter will be fully loaded with test dust. The standard differentiates between three groups or 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 filter 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.).



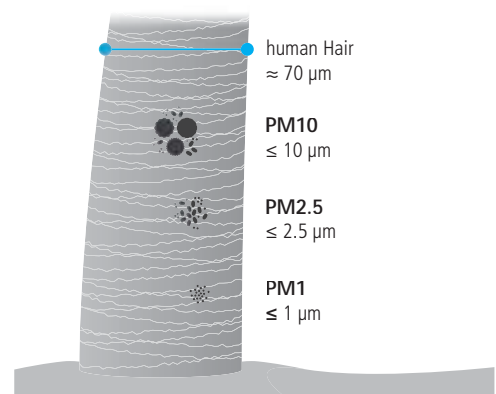
Group	Class	Final ΔP [Pa]	Average arrestance (Am) [%] against synthetic dust	Average efficiency (Em) @ 0.4µm particles [%]	Min. efficiency (M.E.) @ 0.4µm [%]
Coarse	G1	250	50 < Am < 65	-	-
	G2	250	65 < Am < 80	-	-
	G3	250	80 < Am < 90	-	-
	G4	250	90 < Am	-	-
Middle	M5	450	-	40 < Em < 60	-
	M6	450	-	60 < Em < 80	-
Fine	F7	450	-	80 < Em < 90	35
	F8	450	-	90 < Em < 95	55
	F9	450	-	95 < Em	75

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.

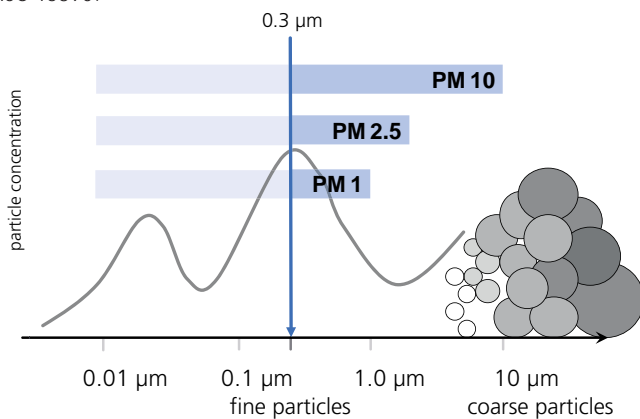


Size comparison of the fraction ranges

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



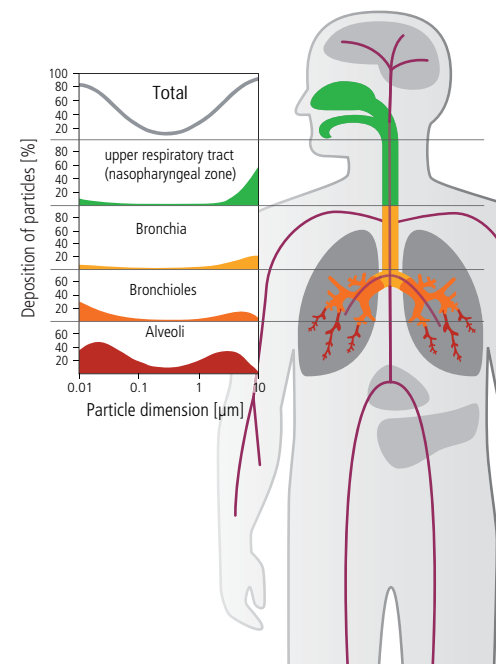
Chart: common particle distribution vs classification range of finedust classes according to ISO 16890:



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 %
AUL 2 (contaminated)	ISO ePM2,5 65 % +	ISO ePM10 50 % +	ISO ePM10 50 % +
AUL 3 (highly contaminated)	ISO ePM1 50 % +	ISO ePM2,5 65 % +	ISO ePM10 50 % +
	ISO ePM1 80 %	ISO ePM1 50 %	ISO ePM1 50 %



Deposition of airborne particles within the human body. Particles in the range of up to 0.1 µm may reach inner organs and cause damage over the lungs by blood circuit.

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

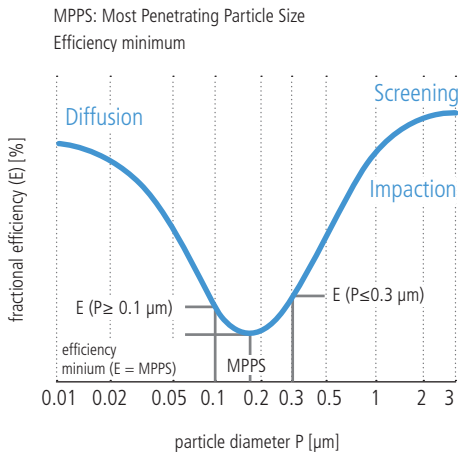
The EN1822 scantestprocedure requires to expose the test filter with test aerosol at the nominal air flow of the concerning filter. The average particle size of the aerosol must have its median particle size distribution in the range of the most penetrating particle size (MPPS). On the clean air side (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:

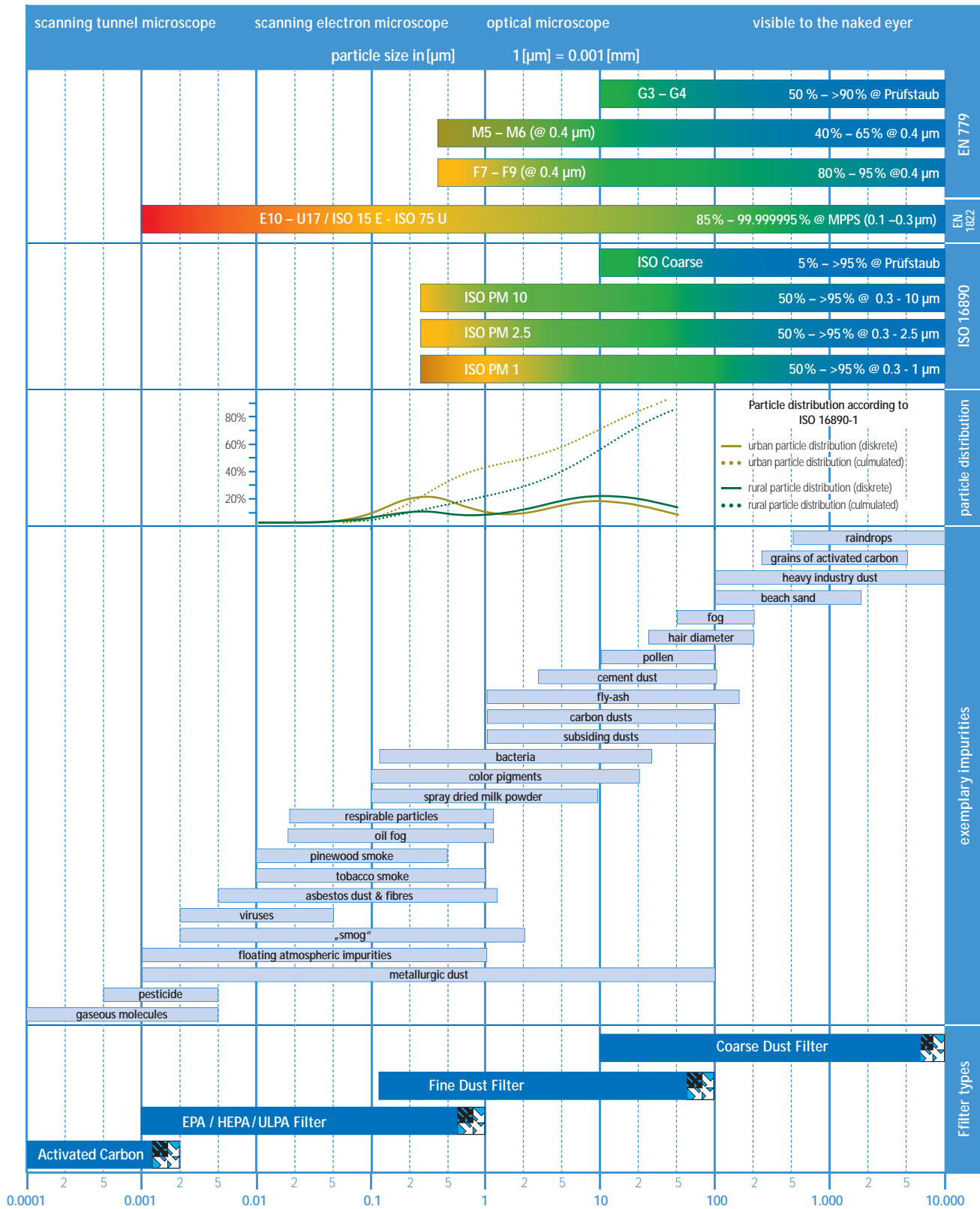


Typical efficiency curve of a fiber-based filter as a function of filter effects. Their interaction is worst in the MPPS range, so that particles in this spectrum have the highest penetration rate.

Group	Class		Integral Value		Local Value	
	EN 1822	ISO 29463	Efficiency @ MPPS [%]	Penetration @ MPPS [%]	Efficiency @ MPPS [%]	Penetration @ MPPS [%]
E ¹⁰ ₁₁ (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	-	-
H ¹³ ₁₄ (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
U ¹⁵ ₁₆ ₁₇ (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

■ µm = 1 Mikron or Micrometer ■ 1 µm = 0.001 mm
■ MPPS = Most Penetrating Particle Size (0.1 - 0.3µm)

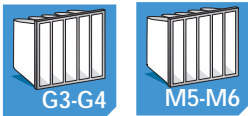
Particle Size & Filtration Systems



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]

Usage in hospitals

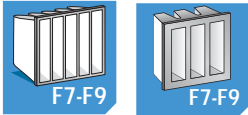
1 Pre-filter/Bag Filter (EN 779 G4/M5)



HS-Pak 35 HS-Pak 55

2 Main filter, roof unit

Bag Filter Compact Filter



HS-Pak 88 HS-Mikro Pak 85
 HS-Pak 95 HS-Mikro Pak 95
 HS-AirSynergy 88/95

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

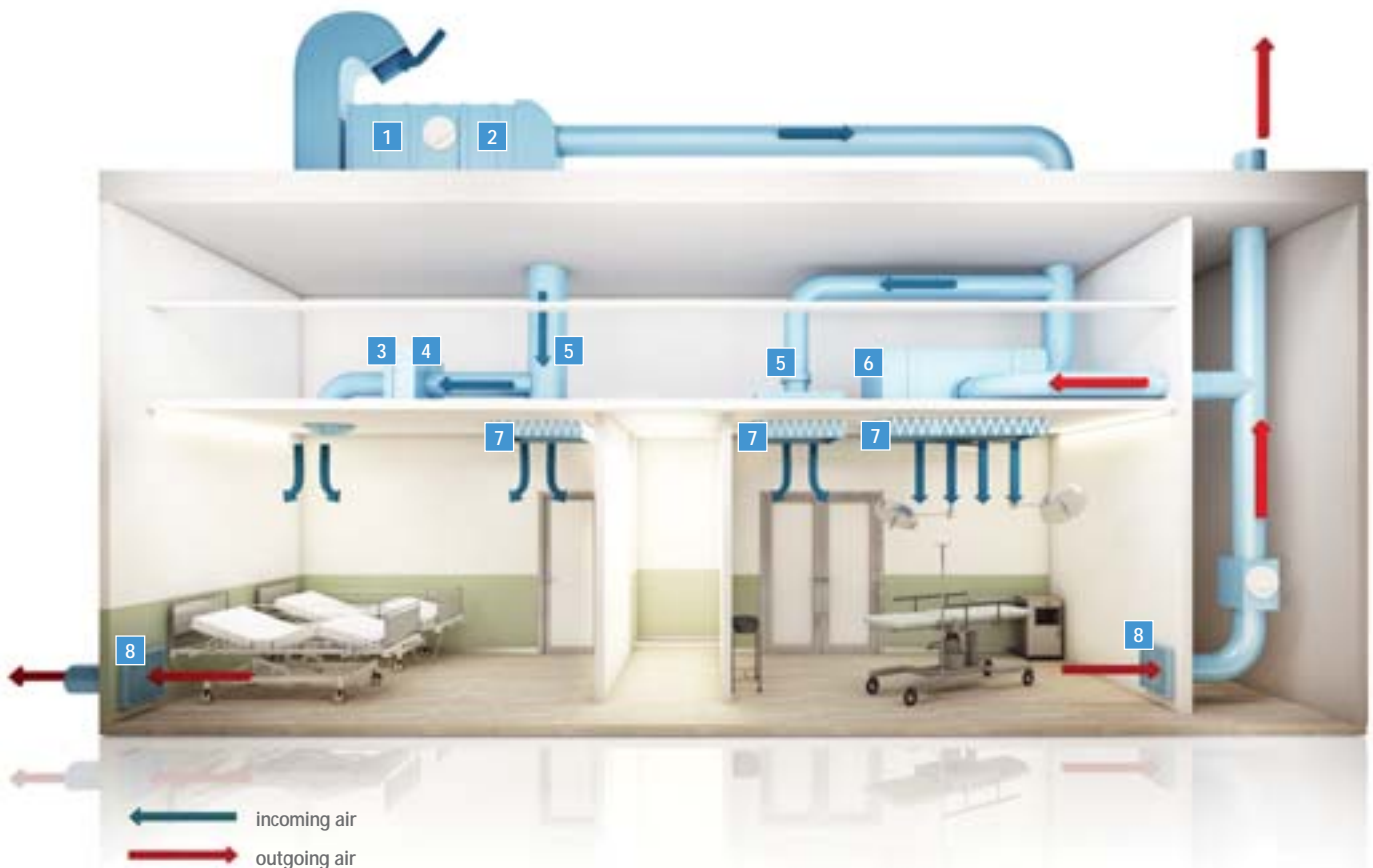


HS-Mikro SF-AL

8 Exhaust OP



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



← incoming air
 → outgoing air

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

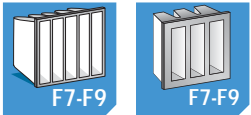
1 Pre-filter/Bag Filter (EN 779 G4/M5/F7)



HS-Pak 35 HS-Pak 55 HS-Pak 88
HS-AirSynErgy 88

2 Main filter, roof unit

Bagfilter Compact filter



HS-Pak 88 HS-Mikro Pak 85
HS-Pak 95 HS-Mikro Pak 95

3 Filter for switchboards and large-scale machines

Filter pads Filter cartridges



HS-B/290 HS-Z-Filter HS-Beta Pak 65
HS-15/500 HS-Beta Pak 85
HS-15/150 HS-Beta Pak 95
HS-E/360

4 Exhaust air in kitchens

Grease / Oil Filters Odour Filters



HS-Fett-fangfilter HS-Pak 55 PA HS-AKP 26



← incoming air
→ outgoing air

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.

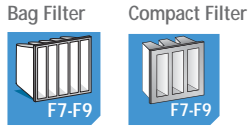
Usage in pharmaceutical production, laboratories, and research centers

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



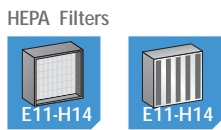
HS-Pak 35 HS-Pak 55

2 Main filter, roof unit



HS-AirSynergy HS-Mikro Pak 85
HS-Pak 88 / 95 HS-Mikro Pak 95

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



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

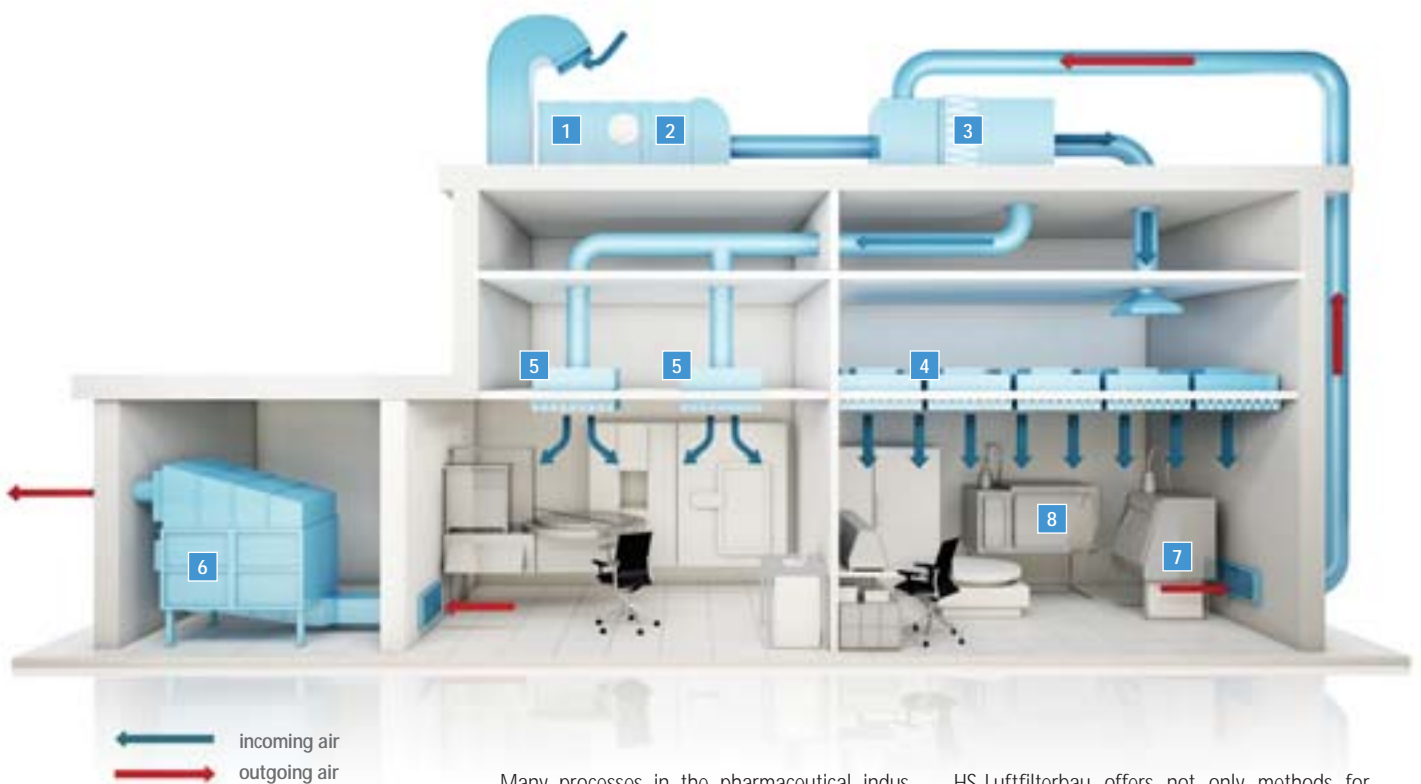


HS-ECO Pak 85
HS-ECO Pak 95

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.

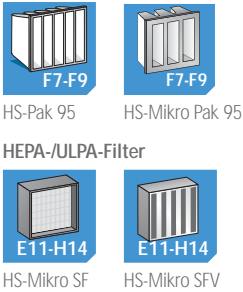
HS-Luftfilterbau offers not only methods for sterilizing incoming air, but also flexible solutions when it comes to safely treating exhaust air. Besides filtration systems with Ex-Protection we also offer optimized units for contamination free filter exchange due to the use of the bag-in, bag-out procedure.

Usage in microelectronics

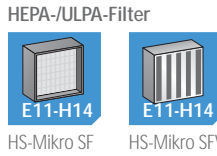
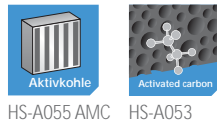
1 Pre-filter/Bag Filter (EN 779 M5-F7)



2 Main filter, roof unit



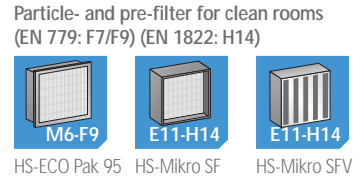
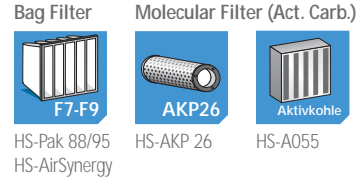
3 Circulating air system AMC Filtration (molecular filtration)



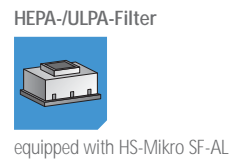
4 Laminar Flow Ceiling Unit (EN 1822: H14/U15)



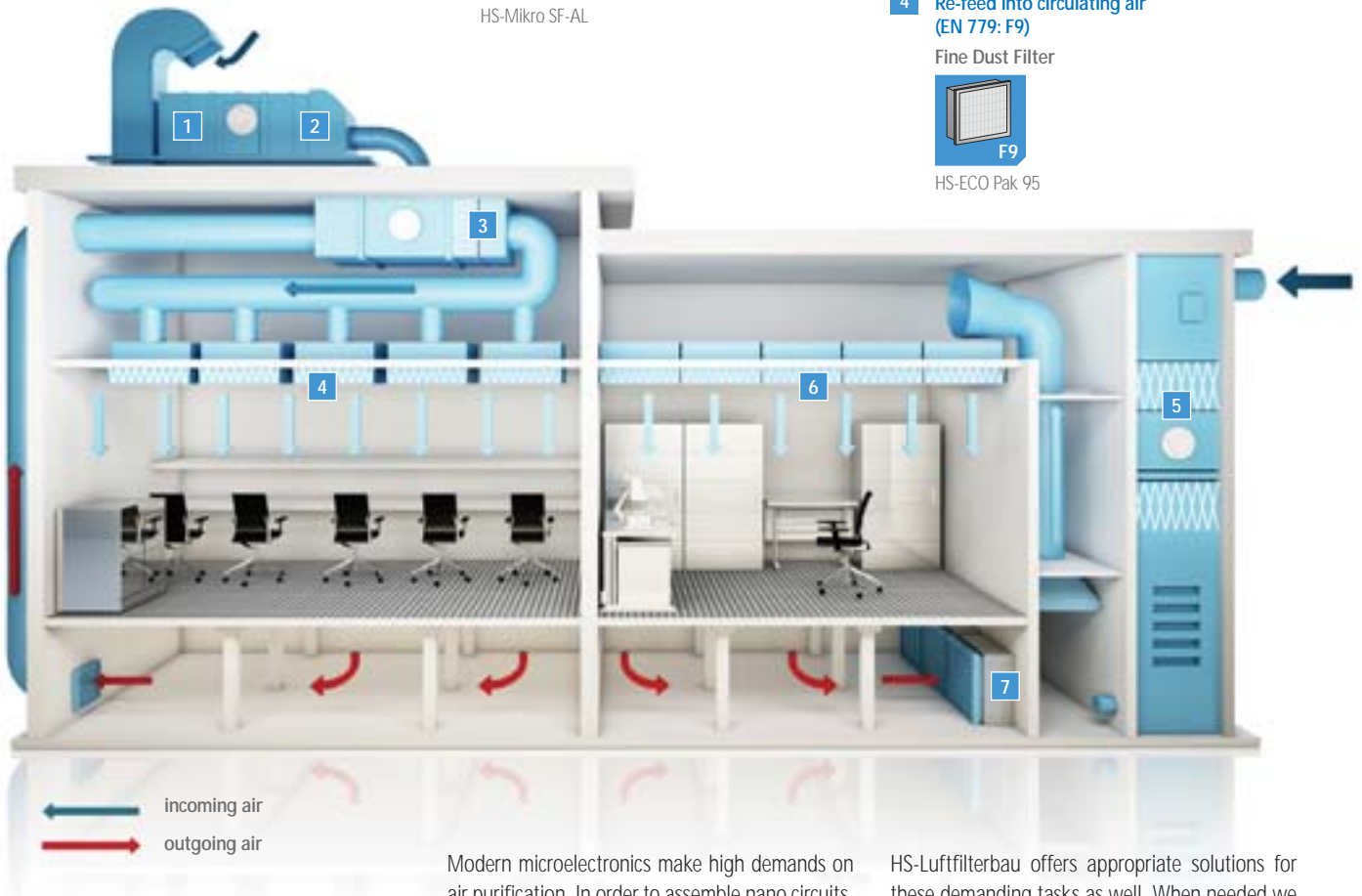
5 Air supply, pressure plenum clean room



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



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



← incoming air
→ outgoing air

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.

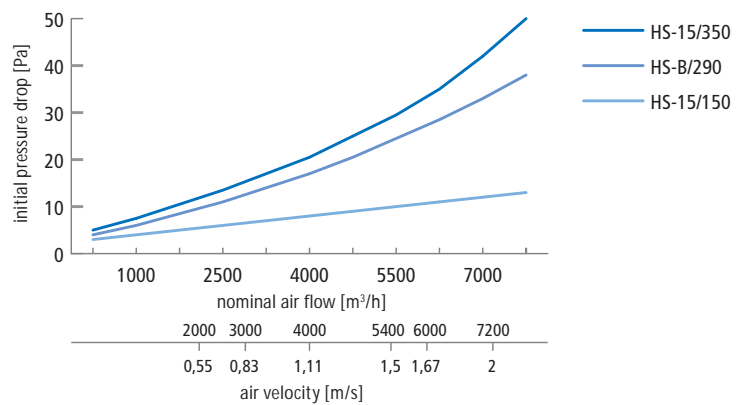
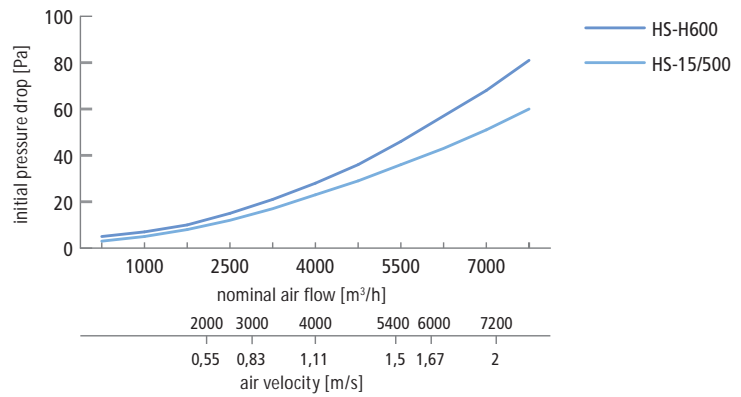
We are also able to design customized solutions in compliance with any requirements of your process.

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-H600
Class EN 779	G4	G3	G4	G4	G3
Class ISO 16890 ISO coarse	45%	30%	60%	75%	85%
Nominal air flow [m ³ /h*m ²]	5400	5400	5400	5400	7200
Nominal init. speed [m/s]	1.5	1.5	1.5	1.5	2
Initial-ΔP at nominal air flow [Pa]	25	10	30	35	70
Recommended final pressure drop [Pa]	250	250	250	250	250
Max. temp. [°C]	120	120	120	120	60
Thickness [mm]	18	11	20	22	20/30/40
Flameability	self extinguishing acc. to DIN 53 438			see remark*	

* 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 20m)
- bags
- shaped forms

Re-useable: Yes

Glass Fiber Media (pads & rolls)

HS-Glas 1", HS-Glas 2", HS-Glas 3"

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.



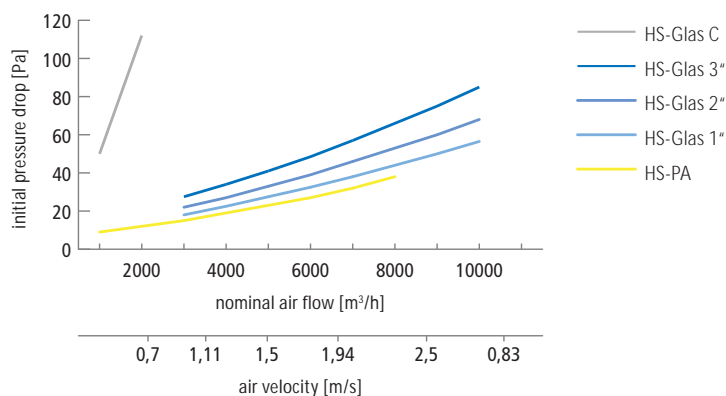
HS-Glas-C

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 m² media surface. The pad is nonflammable.

Type:	HS-Glas 1"	HS-Glas 2"	HS-Glas 3"	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 ³ /h*m ²]	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	70	20	140
Recommended final pressure drop [Pa]	200	200	200	80	400
Thickness [mm]	25	50	75	50	20
Flameability	-	-	-	non flameable acc. DIN 4102	



Form of delivery:
 ■ custom cut in various sizes
 ■ rolled media (e. g. 2 x 20m)

Re-useable: No

HS-Grease Collector



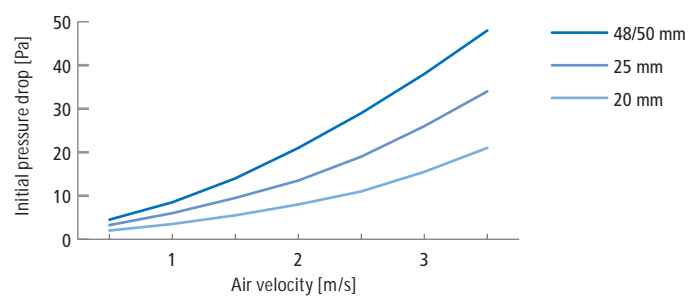
These filters are designed to meet requirements of kitchen applications. They may be applied to all environments where food is prepared and high amounts of oil, fat and other greases are common. Those particles are absorbed by steam, which will then be drawn off by our metallic filters.

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]			
Width	Height	Depth	Nominal air flow [m ³ /h]
287	592	20	610
290	595	20	620
305	610	20	670
490	592	20	1040
590	590	20	1250
592	592	20	1260
595	595	20	1270
605	605	20	1310
610	610	20	1340
350	500	20	-
400	400	20	-
450	400	20	-
500	250	20	-
500	300	20	-
500	350	20	-
500	400	20	-
500	500	20	-

* The actual operating range is at a face velocity of about 1.5 - achieved 2 [m/s].
Please ask for other desired dimensions and designs.



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-Prefilter Cell

Pre-filtration cells are used as air intake filter for standard demand of filtration degree. The filter has a rigid structure due to its aluminum sheet frame. The designed construction is suitable for variable air volume systems. The Filter media is needled and resin bonded with a progressive density structure and a distinctive hardened clean air surface to ensure a good depth filtration.

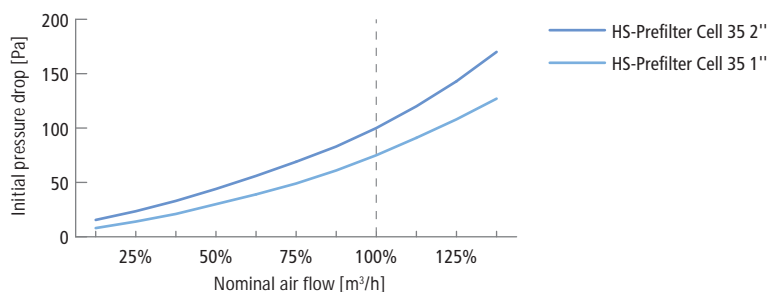
The media has a high wash resistance and low initial pressure drop. With a face velocity of 1.5 - 2.5 m/s and a high dust load, no media compression will take place with differential pressure not exceeding 250 Pa.



Type:	HS-Prefilter Cell 35 1"	HS-Prefilter Cell 35 2"
Class EN 779	G4	G4
Class ISO 16890	ISO coarse 65%	ISO coarse 65%
Initial-ΔP [Pa]	75	100
Recommended final ΔP [Pa]	250	250
Max. temp. [°C]	80°	80°

Dimensions [mm]			Nominal air flow [m ³ /h] HS-Prefilter Cell 35
Width	Height	Depth	
289	594	22	1700
495	495	22	2400
495	594	22	2800
594	594	22	3400
394	622	22	2500
289	594	47	1700
495	495	47	2400
495	594	47	2800
594	594	47	3400
394	622	47	2500

Please ask for other desired dimensions and designs.



Frame	Aluminum
Operational conditions	max. rel. h. 100%, max. temp. 80°C

HS-Panel Filter



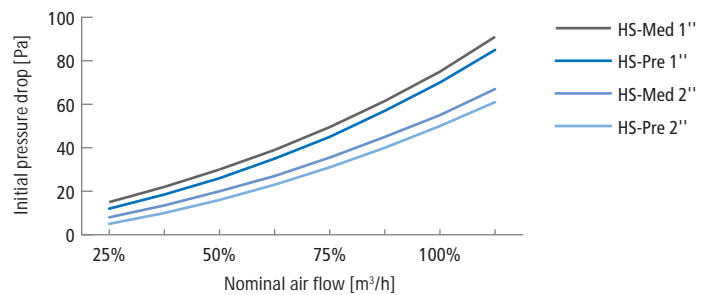
Coarse and medium dust panel filters are suitable for air conditioning and industrial applications. The filter is a compact and economical air filter that features low operating costs along with high dust capacity. Coarse dust panel filter Filter may be inserted into control units as well as HVACs and other ventilation systems. The filters consist of folded fleeces.

The filter media is encapsulated between a rigid card board. The Panel Filters are available in standard and customized sizes.

Type:	HS-Pre 2"	HS-Med 2"	HS-Pre 4"	HS-Med 4"
Class EN 779	G4	M5	G4	M5
Filterklasse ISO 16890	ISO coarse 60%	ISO ePM10 55%	ISO coarse 60%	ISO ePM10 55 %
Initial-ΔP [Pa]	65	70	50	55
Recommended final ΔP [Pa]	250	250	250	250
Temp. resistance [°C]	70°	70°	70°	70°

Dimensions [mm]			Nominal air flow [m³/h]
Width	Height	Depth	
289	594	44	1700
492	492	44	2400
492	594	44	2800
594	594	44	3400
289	594	96	1700
492	492	96	2400
492	594	96	2800
594	594	96	3400

Please ask for other desired dimensions and designs.



Optional gaskets	size [mm]	form
Foamed endless gasket, polyurethane	6 or 8	
Flat-gasket, neoprene, epdm, viton etc.	5 or 7	

HS-Panel Filter AL



The HS-Panel Filter with aluminum frame is used as an air intake filter where the demand on filtration degree is on average. The filter frame consists of high-grade aluminum with smooth surface, light weight and reusable substance.

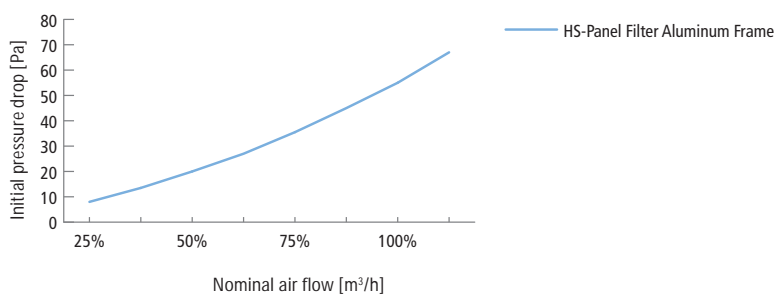
The Filter media is needled and resin bonded with a progressive density structure and a distinctive hardened clean air surface to ensure a good depth filtration. The media has a high wash resistance and low initial pressure drop. With a face velocity of 1.5 - 2.5 m/s and a high dust load, no media compression will take place with differential pressure not exceeding 250 Pa.



Typ:	HS-Prefilter Cell 35
Class EN 779	G4
Filterklasse ISO 16890	ISO coarse 60%
Initial- ΔP [Pa]	55
Recommended final ΔP [Pa]	250
Max. temp. [°C]	80°

Width	Dimensions [mm]		Nominal air flow [m ³ /h] HS-Prefilter Cell 35
	Height	Depth	
289	594	48	1700
492	492	48	2500
492	594	48	2800
594	594	48	3400
394	622	48	2500

Please ask for other desired dimensions and designs.



Frame	Aluminum
Operational conditions	max. rel. h. 100%, max. temp. 80°C
Options	<ul style="list-style-type: none"> foamed gasket onto front frame bio-static treatment to prevent growth of microorganisms, fungi and bacteria

Optional gaskets	size [mm]	form
Foamed endless gasket, polyurethane	6 or 8	
Flat-gasket, neoprene, epdm, viton etc.	5 or 7	

Dok. ID: 10/008

documents might be subject to change / issue July 2018

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 synthetic filter media. Due to the use of modern filtration media these panel filters don't need any supporting metal grids and can thus completely incinerated, which makes disposal easier.

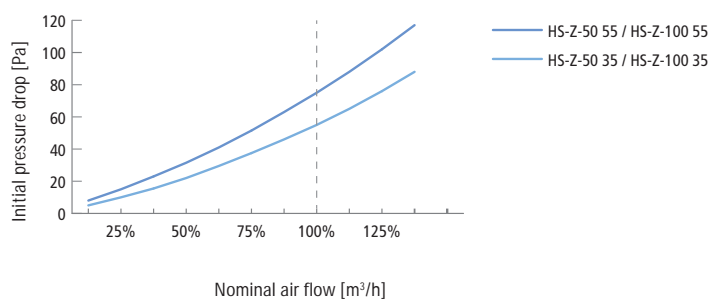
The filter media is encapsulated between a rigid card board or a robust extruded plastic frame (PP or PE). HS-Z Panel Filters are available in standard and customized sizes. Due to reasons of stability, lateral length of one single side should not exceed 610 millimeter.

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 60%	ISO ePM10 55%	ISO coarse 60%	ISO ePM10 55 %
Nominal air flow [m ³ /h*m ²]	9500	9500	15500	15500
Initial-ΔP [Pa]	55	65	40	50
Recommended final ΔP [Pa]	250	400	250	400
Temp. resistance [°C]	70°	70°	70°	70°

Dimensions [mm]			Nominal air flow [m ³ /h]
Width	Height	Depth	
289	594	44	1700
492	492	44	2400
492	594	44	2800
594	594	44	3400
289	594	96	1700
492	492	96	2400
492	594	96	2800
594	594	96	3400

Please ask for other desired dimensions and designs.



Frame types	cardboard, extruded polystyrene, galv. steel
Options	foamed gasket

These compact filter cells serve as pre filters 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. HS-Alpha Pak are available in two different filter classes (EN 779: G4 and M5). 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.

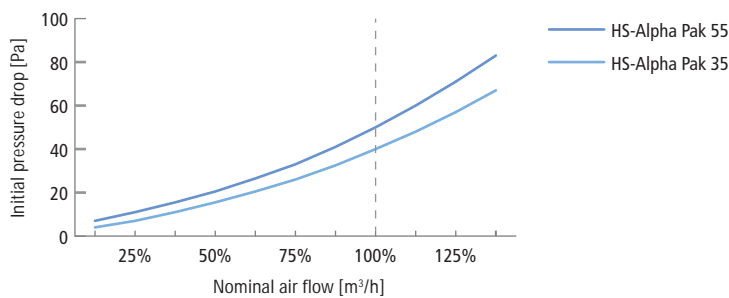


Type:	HS-Alpha Pak 35	HS-Alpha Pak 55
Class EN 779	G4	M5
Class ISO 16890	ISO coarse 85%	ISO ePM10 65%
initial-ΔP [Pa]	40	50
Temp. resistance [°C]	70°	70°

Width	Dimensions [mm]		Nominal air flow [m³/h]
	Height	Depth	
245	450	48	1200
287	592	48	1750
450	550	48	2500
490	592	48	2800
550	550	48	3000
592	592	48	3500
245	450	96	1700
287	592	96	2600
450	550	96	3800
490	592	96	4500
550	550	96	4600
592	592	96	5400

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. 70°C
Filtermedia	synthetic fiber composit (polypropylene)
Combustible	YES
Options	<ul style="list-style-type: none"> ▪ foamed gasket (single- & double side) ▪ special gaskets (EPDM etc.) ▪ hook-and-lop tape (to attach filters directly to rigid bag filters) ▪ protection screen (aluminium, plastic) ▪ handle

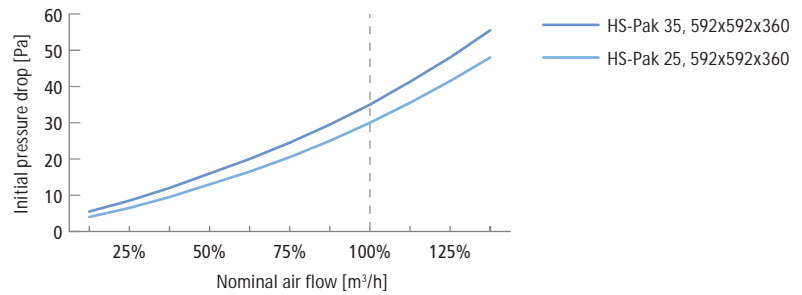
Bag Filter – Coarse Dust



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 can be completely incinerated, 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			
Filterklasse ISO 16890		ISO coarse 45%	ISO coarse 65%			
Class EN 779	Dimensions [mm]		Initial- ΔP [Pa]		Air flow [m ³ /h]	# of pockets
	Width	Height	Depth 360 mm	Depth 500 mm		
G3	592	592	30	25	3400	6
G3	490	592	30	25	2800	5
G3	287	592	30	25	1700	3
G3	287	287	30	25	850	3
G4	592	592	35	30	3400	6
G4	490	592	35	30	2800	5
G4	287	592	35	30	1700	3
G4	287	287	35	30	850	3

Please ask for other desired dimensions and designs.



Frame	<ul style="list-style-type: none"> polystyrene 25 [mm] (combustible) galv. steel 25 [mm] polystyrene 20 [mm] (combustible)
Operational conditions	max. rel. h. 100 %, max. temp. 70°C
Filtermedia	progressive synthetic fiber
Combustible	Yes (Frame: plastic)
Options	<ul style="list-style-type: none"> various sizes and shapes (e. g. slanted filter bags) foamed gasket onto front frame antistatic construction for EX protected areas: i.e. ϵ_x II 2GD IIA

Bag Filter – Medium / Finedust



HS-Pak 55 and HS-Pak 65 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, 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 can be completely incinerated, which makes disposal easier.

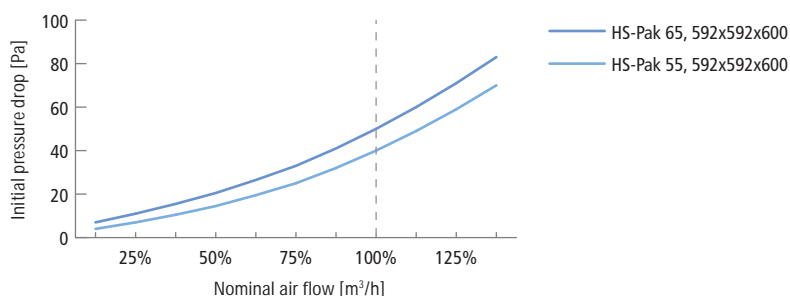


Type:	HS-Pak 55	HS-Pak 65
Class EN 779	M5	M6
Filterklasse ISO 16890	ISO ePM10 75%	ISO ePM2.5 65%

Performance data HS-Pak 55						
Class EN 779	Dimensions [mm]		Initial-ΔP [Pa]		Air flow [m³/h]	# of pockets
	Width	Height	Depth 500 mm	Depth 600 mm		
M5	592	592	45	40	3400	6
M5	490	592	45	40	2800	5
M5	287	592	45	40	1700	3
M5	287	287	45	40	850	3

Performance data HS-Pak 65						
Class EN 779	Dimensions [mm]		Initial-ΔP [Pa]		Air flow [m³/h]	# of pockets
	Width	Height	Depth 500 mm	Depth 600 mm		
M6	592	592	60	50	3400	8
M6	490	592	60	50	2800	6
M6	287	592	60	50	1700	4
M6	287	287	60	50	850	4

Please ask for other desired dimensions and designs.



Frame	<ul style="list-style-type: none"> polystyrene 25 [mm] (combustible) galv. steel 25 [mm] polystyrene 20 [mm] (combustible)
Operational conditions	max. rel. h. 100 %, max. temp. 70°C
Filtermedia	<ul style="list-style-type: none"> progressive synthetic fiber microfiber meltblown (HS-Pak 65: green color)
Combustible	Yes (Frame: plastic)
Options	<ul style="list-style-type: none"> various sizes and shapes (e. g. slanted filter bags) foamed gasket onto front frame antistatic construction for EX protected areas: i.e. II 2GD IIA A high performance microfiber-pre-filter layer for increased lifetime (HS-Pak 65) bio-static treatment to prevent growth of microorganisms, fungi and bacteria

Dok. ID: 05/002

documents might be subject to change / Issue July 2018

Bag Filter – Finedust

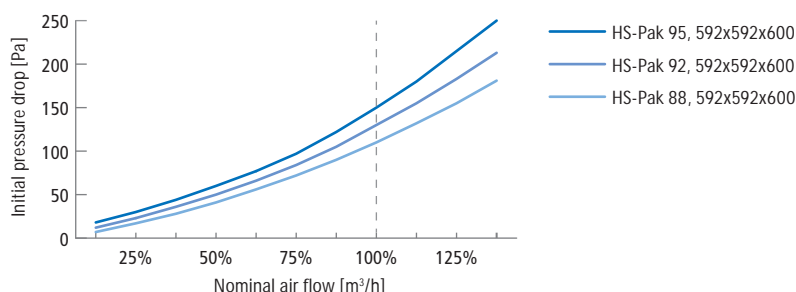


HS-Pak 88 and HS-Pak 92 serve as main filters for fine dust filtration in HVAC systems. These types serve as cost-effective filters for indoor air quality and other applications such as technical assembly rooms or for air purification in the food industry. They may also be used as pre filters for clean rooms within the pharmaceutical industry. Their use is recommended in applications where the fulfillment of EN 779:2012 is obligatory but the higher costs of energy saving filters can not amortize due to the technical or hygienic conditions and requirements (i.e. short changing intervals, no frequency controlled fans).

These products constructed of high-quality synthetic filter media comply with the highest hygienic standards. 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] deep galvanized steel or plastic as well as 20 [mm] plastic profiles. The ones with plastic frames can be completely incinerated, which makes disposal easier. All standard sized filters are fitted with our patented air entry guide profiles.

Type:	HS-Pak 88	HS-Pak 92	HS-Pak 95					
Class EN 779	F7	F8	F9					
Class ISO 16890	ISO ePM2.5 80% (ISO ePM1 50%)	ISO ePM1 60%	ISO ePM1 70%					
Class EN 779	Dimension [mm]			Initial-ΔP [Pa]			Air flow [m³/h]	# of pockets
	Width	Height	Depth 380	Depth 550	Depth 600			
F7	592	592	170	115	105	3400	8	
F7	490	592	170	115	105	2800	6	
F7	287	592	170	115	105	1700	4	
F8	592	592	180	120	110	3400	8	
F8	490	592	180	120	110	2800	6	
F8	287	592	180	120	110	1700	4	
F9	592	592	205	135	125	3400	8	
F9	490	592	205	135	125	2800	6	
F9	287	592	205	135	125	1700	4	

Please ask for other desired dimensions and designs.



Frame	<ul style="list-style-type: none"> polystyrene 25 [mm] (combustible) galv. steel 25 [mm] polystyrene 20 [mm] (combustible)
Operational conditions	max. rel. h. 100%, max. temp. 70°C
Filter media	synthetic filter media with enhanced micro nano fiber structure color: F7 = pink, F8 = yellow, F9 = white
Combustible	Yes (Frame: plastic)
Options	<ul style="list-style-type: none"> various sizes and shapes (e.g. slanted filter bags) foamed gasket onto front frame antistatic construction for EX protected areas: i.e. Ex II 2GD IIA A high performance micro fiber pre filter layer for increased lifetime bio static treatment to prevent growth of microorganisms, fungi and bacteria

Energy saving Bag Filters – Finedust

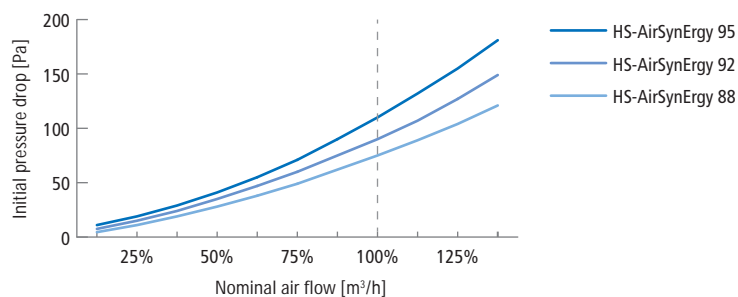
HS-AirSynErgy bag filters offer a unique fully synthetic filter media with a special wave form structure providing virtually the double filter surface with the same construction dimensions as usual bag filters. Due to the increased inner surface the pressure drop of HS-AirSynErgy filters is up to 30% lower in comparison to standard bag filters. The added surface also offers a dramatically increased dust holding capacity which increases the filters life time 30 - 60%.

The efficiency of HS-AirSynErgy filters depends only on mechanical filter effects and hence fulfills the requirements of EN 779:2012. HS-AirSynErgy serves as ultra high capacity pre-filters for following filter stages or a 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 is further used with process air systems i.e. for combustion engines or sensitive machinery.



Type:		HS-AirSynErgy					
		88	92	95			
Class EN 779		F7	F8	F9			
Class ISO 16890		ISO ePM1 60%	ISO ePM1 70%	ISO ePM1 80%			
Class EN 779	Dimensions [mm]			Initial-ΔP [Pa]	Air flow [m³/h]	# of pockets	Energy class acc. to Eurovent 4/21
Width	Height	Depth					
F7	592	592	650	95	4250	8	A+
F7	490	592	650	95	3250	6	A
F7	287	592	650	95	2100	4	B
F7	287	287	650	95	1050	4	C
F7	287	287	650	95	1050	4	D
F7	287	287	650	95	1050	4	E
F8	592	592	650	115	4250	8	A+
F8	490	592	650	115	3250	6	A
F8	287	592	650	115	2100	4	B
F8	287	287	650	115	1050	4	C
F8	287	287	650	115	1050	4	D
F8	287	287	650	115	1050	4	E
F9	592	592	650	140	4250	8	A+
F9	490	592	650	140	3250	6	A
F9	287	592	650	140	2100	4	B
F9	287	287	650	140	1050	4	C
F9	287	287	650	140	1050	4	D
F9	287	287	650	140	1050	4	E

Please ask for other desired dimensions and designs.



Frame	<ul style="list-style-type: none"> polystyrene 25 [mm] (combustible) galv. steel 25 [mm] polystyrene 20 [mm] (combustible)
Operational conditions	max. rel. h. 100%, max. temp. 70°C
Filtermedia	<ul style="list-style-type: none"> synthetic composit media with inner wave structure, offers appx. factor 2.5 more filtersurface than standard bag filter media. color: pure white with class id print. fulfills EN 779:2012.
Combustible	Yes (Frame: plastic)
Options	<ul style="list-style-type: none"> various sizes and shapes (e. g. slanted filter bags) foamed gasket onto front frame



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-ECO Pak



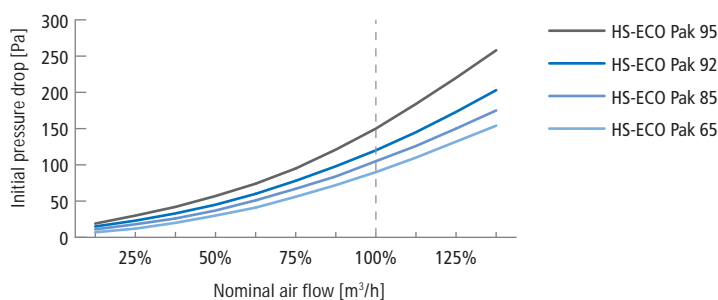
This production line serves as pre- or main-filter for fine dust in air-conditioning and ventilation systems. The filter can be installed where pocket or compact filters won't fit due to space limitations. Also HS-ECO Pak offer a much higher initial efficiency (up to +25%) than common bag filters. Thermoplastic threads are used as spacers between the densely packed media folds to achieve even spacing. The frames are made from polystyrene. Therefore the filter can be completely incinerated, it is 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 filter media, 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	85	92	95
Class EN 779	M6	F7	F8	F9
Class ISO 16890	ePM10 75%	ePM1 60%	ePM1 65%	ePM1 70%
Temp. resistance [°C]	70°	70°	70°	70°

Class EN 779	Dimensions [mm]		Initial-ΔP [Pa]			Air flow [m³/h]
	Width	Height	Depth 78	Depth 100	Depth 150	
M6	592	592	135	90	75	3400
M6	490	592	135	90	75	2800
M6	287	592	145	100	85	1700
F7	592	592	160	105	90	3400
F7	490	592	160	105	90	2800
F7	287	592	170	115	100	1700
F8	592	592	180	130	110	3400
F8	490	592	180	130	110	2800
F8	287	592	190	140	120	1700
F9	592	592	225	150	130	3400
F9	490	592	225	150	130	2800
F9	287	592	235	160	140	1700

Please ask for other desired dimensions and designs.



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

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 frame systems 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.

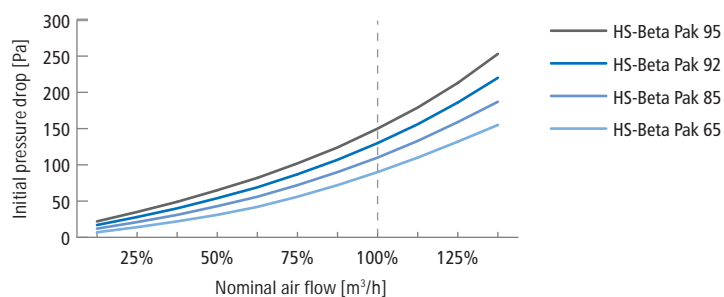
Due to their small depth HS-Beta Pak filters save space in new constructed ventilation systems. These filters are also great space savers when existing ventilation systems need to be rigged up for higher filter classes. The sturdy plastic frame fulfills the demands for high rigidity and hygiene combined with the ease of disposal since the filters are completely metalfree and thus fully incinreable.



Type:	HS-Beta Pak			
	65	85	92	95
Class EN 779	M6	F7	F8	F9
Class ISO 16890	ePM10 75%	ePM1 60%	ePM1 65%	ePM1 70%
Temp. resistance [°C]	70°	70°	70°	70°

Class EN 779	Dimensions [mm]		Initial-ΔP [Pa]		Nominal air flow [m³/h]
	Width	Height	Depth 48	Depth 96	
M6	592	592	125	90	3400
M6	490	592	125	90	2800
M6	287	592	125	90	1700
F7	592	592	160	110	3400
F7	490	592	160	110	2800
F7	287	592	160	110	1700
F8	592	592	200	130	3400
F8	490	592	200	130	2800
F8	287	592	200	130	1550
F9	592	592	235	150	3400
F9	490	592	235	150	2800
F9	287	592	235	150	1700

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"> high quality glass fiber paper (water resistant) optional: fully synthetic (more rigid, higher moisture resistance)
Combustible	Yes
Options	<ul style="list-style-type: none"> foamed gasket (single & both sides) special gaskets (Viton, EPDM etc.) protection screen (single & both sides)

Compact Filter – HS-Mikro Pak 3V

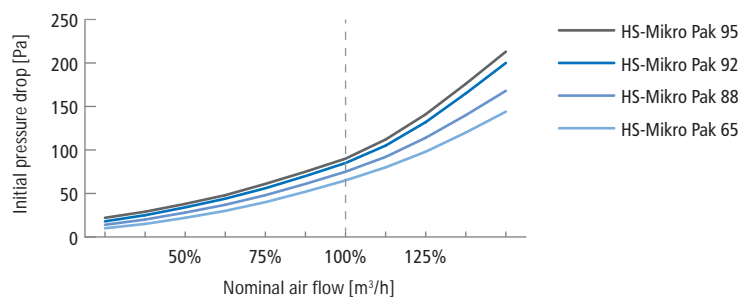


These filters serve as pre- or main-filtration elements for environments with voluminous air-streams and/or when long lifespan is necessary. HS-Mikro Pak can be used as fine dust filtration in air-conditioning, ventilation or turbine systems. The filters serve both as pre- and main-filters for adsorbing 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. 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 details informations on this topic. HS-Mikro Pak fit to mounting frames of all major brands.

Typ:	HS-Mikro Pak 3V				Energy class acc. to Eurovent 4/21
	65	85	92	95	
Class EN 779	M6	F7	F8	F9	
Class ISO 16890	ePM10 75%	ePM1 60%	ePM1 65%	ePM1 70%	
Recc. final ΔP	600	600	600	600	
Max. temp. [°C]	70°	70°	70°	70°	

Class EN 779	Dimensions [mm]			Initial ΔP [Pa]	Air flow [m³/h]	Weight [kg]	Media Area [m²]
	Height	Width	Depth				
M6	592	592	292	65	3400	7 kg	19 m²
M6	490	592	292	65	2800	5 kg	14.1 m²
M6	287	592	292	65	1700	3 kg	8.2 m²
F7	592	592	292	75	3400	7 kg	19 m²
F7	490	592	292	75	2800	5 kg	14.1 m²
F7	287	592	292	75	1700	3 kg	8.2 m²
F8	592	592	292	85	3400	7 kg	19 m²
F8	490	592	292	85	2800	5 kg	14.1 m²
F8	287	592	292	85	1700	3 kg	8.2 m²
F9	592	592	292	90	3400	7 kg	19 m²
F9	490	592	292	90	2800	5 kg	14.1 m²
F9	287	592	292	90	1700	3 kg	8.2 m²

Please ask for other desired designs.



Frame	corrosion resistant plastic
Operational conditions	<ul style="list-style-type: none"> max.rel. h. 100 [%]
Spacers	thermoplastic (minipleat)
Filtermedia	<ul style="list-style-type: none"> high quality glass fiber paper (water resistant), pressure drop may temporarily increase at high humidity levels Optional: fully synthetic filtermedia for maximum rigidity, higher mechanical stress tolerance
Combustible	YES
Options	<ol style="list-style-type: none"> burst protector / protection screen gasket on the clean air side of the flange +14% more filtersurface

Compact Filter – HS-Mikro Pak 4V



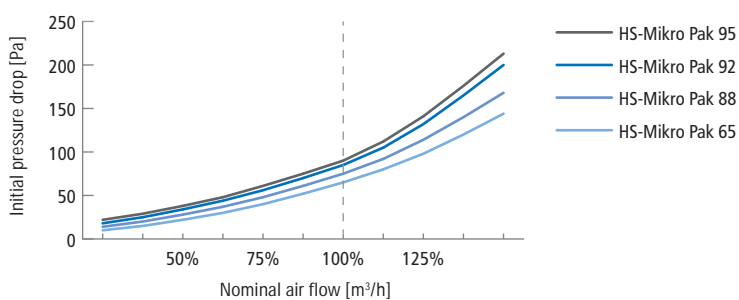
These filters serve as pre- or main-filtration elements for environments with voluminous air-streams and/or when long lifespan is necessary. HS-Mikro Pak can be used as fine dust filtration in air-conditioning, ventilation or turbine systems. The filters serve both as pre- and main-filters for adsorbing 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. 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 details informations on this topic. HS-Mikro Pak fit to mounting frames of all major brands.



Typ:	HS-Mikro Pak 4V				Energy class acc. to Eurovent 4/21
	65	85	92	95	
Class EN 779	M6	F7	F8	F9	
Class ISO 16890	ePM10 75% ePM1 60% ePM1 65% ePM1 70%				
Recc. final ΔP	600	600	600	600	
Max. temp. [°C]	70°	70°	70°	70°	

Class EN 779	Dimensions [mm]			Initial ΔP [Pa]	Air flow [m³/h]	Weight [kg]	Media Area [m²]
	Height	Width	Depth				
M6	592	592	292	65	3400	8 kg	19.3 m²
M6	490	592	292	65	2800	5.5 kg	14.3 m²
M6	287	592	292	65	1700	3.5 kg	8.4 m²
F7	592	592	292	75	3400	8 kg	19.3 m²
F7	490	592	292	75	2800	5.5 kg	14.3 m²
F7	287	592	292	75	1700	3.5 kg	8.4 m²
F8	592	592	292	85	3400	8 kg	19.3 m²
F8	490	592	292	85	2800	5.5 kg	14.3 m²
F8	287	592	292	85	1700	3.5 kg	8.4 m²
F9	592	592	292	90	3400	8 kg	19.3 m²
F9	490	592	292	90	2800	5.5 kg	14.3 m²
F9	287	592	292	90	1700	3.5 kg	8.4 m²

Please ask for other desired designs.



Frame	corrosion resistant plastic
Operational conditions	<ul style="list-style-type: none"> max.rel. h. 100 [%]
Spacers	thermoplastic (minipleat)
Filtermedia	<ul style="list-style-type: none"> high quality glass fiber paper (water resistant), pressure drop may temporarily increase at high humidity levels Optional: fully synthetic filtermedia for maximum rigidity, higher mechanical stress tolerance
Combustible	YES
Options	<ol style="list-style-type: none"> burst protector / protection screen gasket on the clean air side of the flange +14% more filtersurface

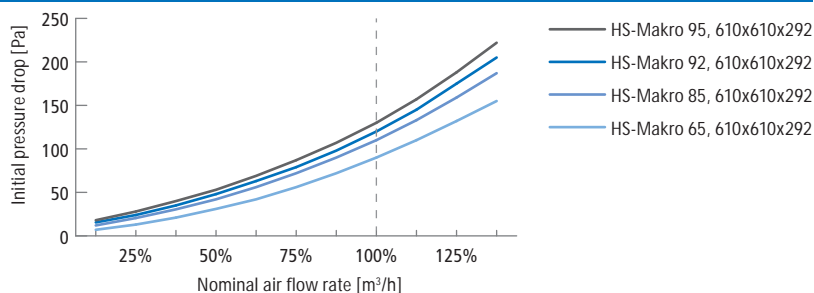


This durable fine dust filter is suitable as pre- or main-filtration element in systems where relatively high air volumes as well as variable airflows is typical. Areas of use include pre-filtration of airborne particles, as filter for industrial processes, food production or turbo machinery. The high-quality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

Type:	HS-Makro			
	65	85	92	95
Class EN 779	M6	F7	F8	F9
Class ISO 16890	ePM10 75%	ePM1 60%	ePM1 65%	ePM1 70%
Max. temp. [°C]	120° / 350°	120° / 350°	120° / 350°	120° / 350°

Class EN 779	Width	Dimensions [mm]		Initial ΔP [Pa]	air flow [m³/h]	Weight [kg]
		Height	Depth			
M6	305	610	292	90	1700	10 kg
M6	287	592	292	120	1700	8 kg
M6	610	610	292	90	3400	20 kg
M6	592	592	292	120	3400	16 kg
F7	305	610	292	110	1700	10 kg
F7	287	592	292	150	1700	8 kg
F7	610	610	292	110	3400	20 kg
F7	592	592	292	150	3400	16 kg
F8	305	610	292	120	1700	10 kg
F8	287	592	292	170	1700	8 kg
F8	610	610	292	120	3400	20 kg
F8	592	592	292	170	3400	16 kg
F9	305	610	292	130	1700	10 kg
F9	287	592	292	185	1700	8 kg
F9	610	610	292	130	3400	20 kg
F9	592	592	292	185	3400	16 kg

Please ask for other desired dimensions and designs.



Frame	<ul style="list-style-type: none"> galv. steel stainless aluminium
Operational conditions	<ul style="list-style-type: none"> max. rel. h. 100 [%] temperature resistance max. 120 [°C] optional up to max. 350 [°C] (HS-Makro HT)
Spacers	corrugated aluminium, optional: stainless
Filtermedia	high quality glass fiber paper (water resistant)
Options	<ul style="list-style-type: none"> burst- and protection screens (single or both sides) more filtermedia for higher airflows flanges (i.e. 25 [mm]); handles antistatic filter for EX areas i.e. : Ex II 2GD IIA FDA compliant design

Compact Filter – HS-Makro FV



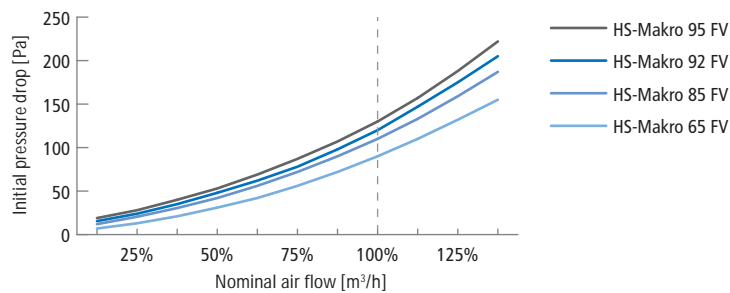
This durable fine dust filter is suitable as pre- or main-filtration element in systems where relatively high volumes as well as variable airflows are typical. Areas of use include pre-filtration of airborne particles, as filter for industrial or food processing, in hospitals or any other high-flow application. Due to our flexible manufacturing process we can fit the filter into mounting frames by all major brands. The media is laid in narrow pleats, 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 FV			
	65	85	92	95
Class EN 779	M6	F7	F8	F9
Class ISO 16890	ePM10 75%	ePM1 60%	ePM1 65%	ePM1 70%
Max. temp. [°C]	70°	70°	70°	70°

Class EN 779	Dimension [mm]			Initial ΔP [Pa]	air flow [m³/h]	Media Area [m²]	No. of filterpacks
	Width	Height	Depth				
M6	305	610	292	90	2000	13.4 m²	4
M6	610	610	292	90	5000	27 m²	8
M6	762	610	292	90	6000	33.5 m²	10
F7	305	610	292	110	2000	13.4 m²	4
F7	610	610	292	110	5000	27 m²	8
F7	762	610	292	110	6000	33.5 m²	10
F8	305	610	292	120	2000	13.4 m²	4
F8	610	610	292	120	5000	27 m²	8
F8	762	610	292	120	6000	33.5 m²	10
F9	305	610	292	130	2000	13.4 m²	4
F9	610	610	292	130	5000	27 m²	8
F9	762	610	292	130	6000	33.5 m²	10

Please ask for other desired dimensions and designs.



Frame	<ul style="list-style-type: none"> ▪ MDF / medium density fiber board (standard) ▪ galv. steel ▪ stainless ▪ polystyrene
Operational conditions	<ul style="list-style-type: none"> ▪ max. rel. h. 100 [%] ▪ max. temp. 70 [°C] (standard) optional: HS-Makro FV-T max. 120°C
Spacers	thermoplastic (Minipleat)
Filtermedia	high quality glass fiber paper (water resistant)
Combustible	Yes (frame: MDF, plywood, polystyrene)
Options	<ul style="list-style-type: none"> ▪ burst- & protection screens [Attention! Initial-ΔP will be much higher] ▪ handle ▪ gasket on both sides ▪ customized gaskets (epdm, viton, ptfе or other customer specific) ▪ antistatic filter for EX areas i.e. : II 2GD IIA ▪ customizations i.e.: grooves, guide-rails, boxed filter etc.

Dok. ID: 06/009

documents might be subject to change / issue July 2018

Compact Filter – HS-Makro F



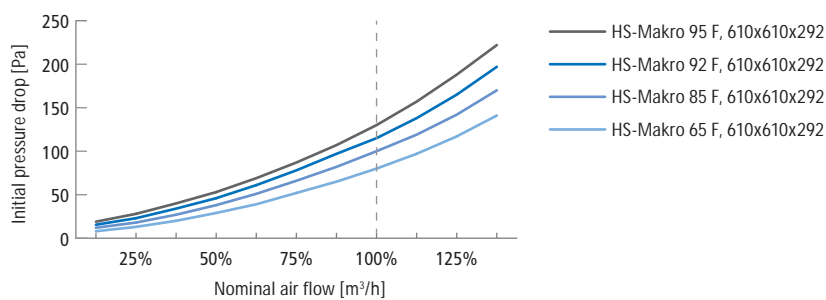
This durable fine dust filter is suitable as pre- or main-filtration element in systems where relatively high amounts of volumes as well as variable airflows are typical. Areas of use include pre-filtration of airborne particles, as filter for industrial processing, or in hospitals, computing centres, offshore or power generating systems. The filter media by standard is high quality glass fiber paper. A temporary rise of the pressure drop on high moisture levels is perfectly normal. 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 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 F					
		65	85	92	95		
Class EN 779		M6	F7	F8	F9		
Class ISO 16890		ePM10 75%	ePM1 60%	ePM1 65%	ePM1 70%		
Max. Temperature [°C]		70°	70°	70°	70°		
Class EN 779	Dimensions [mm]			Initial-ΔP @ filter surface		air flow	Weight
	Width	Height	Depth	standard	extended	[m³/h]	[kg]
M6	305	610	78	170	-	1700	2.5 kg
M6	610	610	78	170	-	3400	6.0 kg
M6	762	610	78	170	-	4250	7.2 kg
M6	305	610	150	170	95	1700	5.2 kg
M6	610	610	150	170	95	3400	8.1 kg
M6	762	610	150	170	95	4250	9.6 kg
M6	305	610	292	80	60	1700	8.9 kg
M6	610	610	292	80	60	3400	14.4 kg
F7	305	610	78	190	-	1700	2.5 kg
F7	610	610	78	190	-	3400	6.0 kg
F7	762	610	78	190	-	4250	7.2 kg
F7	305	610	150	190	120	1700	5.2 kg
F7	610	610	150	190	120	3400	8.1 kg
F7	762	610	150	190	120	4250	9.6 kg
F7	305	610	292	100	80	1700	8.9 kg
F7	610	610	292	100	80	3400	14.4 kg
F8	305	610	78	215	-	1700	2.5 kg
F8	610	610	78	215	-	3400	6.0 kg
F8	762	610	78	215	-	4250	7.2 kg
F8	305	610	150	215	135	1700	5.2 kg
F8	610	610	150	215	135	3400	8.1 kg
F8	762	610	150	215	135	4250	9.6 kg
F8	305	610	292	115	90	1700	8.9 kg
F8	610	610	292	115	90	3400	14.4 kg
F8	762	610	292	115	90	4250	16.0 kg
F9	305	610	78	240	-	1700	2.5 kg
F9	610	610	78	240	-	3400	6.0 kg
F9	762	610	78	240	-	4250	7.2 kg
F9	305	610	150	240	150	1700	5.2 kg
F9	610	610	150	240	150	3400	8.1 kg
F9	762	610	150	240	150	4250	9.6 kg
F9	305	610	292	130	100	1700	8.9 kg
F9	610	610	292	130	100	3400	14.4 kg
F9	762	610	292	130	100	4250	16.0 kg

Please ask for other desired dimensions and designs.



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



Frame	<ul style="list-style-type: none"> ▪ MDF / medium density fiber board (standard) ▪ polystyrene (depth = 78, 150 and 292 mm) ▪ plywood ▪ galv. steel ▪ stainless ▪ aluminium
Operational conditions	<ul style="list-style-type: none"> ▪ max. rel. h. 100 [%] ▪ max. temp. 70 [°C] (standard) optional: HS-Makro F-T max. 120°C
Spacers	thermoplastic (Minipleat)
Filtermedia	high quality glass fiber paper (water resistant)
Combustible	Yes (frame: MDF, plywood, polystyrene)
Options	<ul style="list-style-type: none"> ▪ burst- and protection screens (single or both sides) [affects ΔP] ▪ more filtermedia for higher airflows ▪ handle ▪ gasket on both sides ▪ customized gaskets (epdm, viton, ptfе or other customer specific) ▪ FDA compliant design ▪ Special design customizations i.e.: grooves, guide rails, boxed versions etc.

Gasket options	height [mm]	form
seamless foamed polyurethane gasket	6 or 8	
flat sectionized neoprene gasket	5 or 7	
leak test gasket	7.5	

Dok. ID: 06/008
documents might be subject to change / issue July 2018



HS-Mikro S are HEPA Filters 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 filter media 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	250	260
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

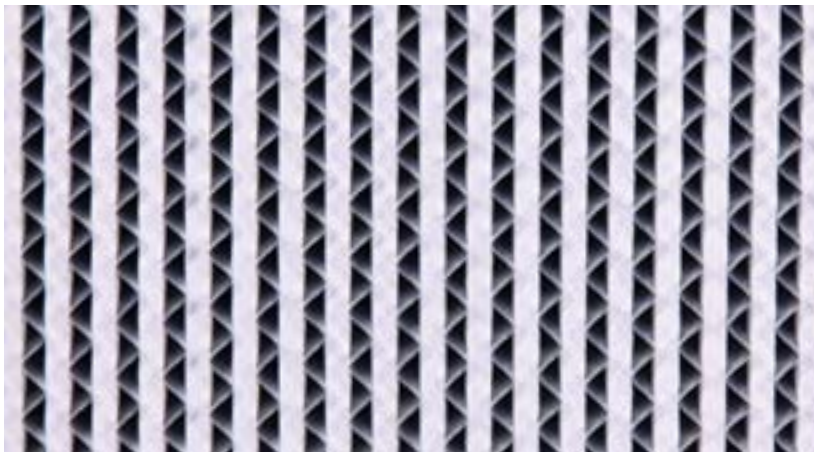
Please ask for other desired dimensions and designs.

High air flow rate option

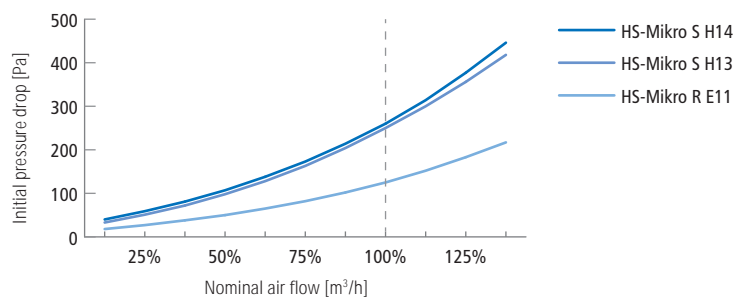
Filters with this option offer more than +30 % filtersurface than equivalent standard variants and thus offer following benefits:


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

Gasket options	height [mm]	form
seamless foamed polyurethane gasket	6 or 8	
flat sectionized neoprene gasket	5 or 7	
leak test gasket	7.5	
fiber glass cord gasket	Ø = 7	



Aluminium-spacer technology ranges back to the beginnings of fine dust 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"> ▪ MDF / medium density fiber board (Standard) ▪ plywood ▪ galv. steel ▪ stainless ▪ aluminium
Operational conditions	<ul style="list-style-type: none"> ▪ max. rel. h 100 [%] up to 120[°C] ▪ optional with silicone seal up to max. 250 [°C] (HS-Mikro S-HT), high temp filters cant be dedustable!
Spacers	<ul style="list-style-type: none"> ▪ aluminium ▪ stainless
Filtermedia	high quality glass fiber paper (water resistant)
Combustible	NO
Options	<ul style="list-style-type: none"> ▪ burst- and protection screens (single or both sides) ▪ more filtermedia for higher airflows ▪ flanges (i.e. 25 [mm]); handles ▪ gasket on both sides ▪ dedustable filtermedia (for in-line / off-line dedusting systems) ▪ antistatic filter for EX areas i.e. :  II 2GD IIA ▪ FDA conforming desgin ▪ many more customer specific options (i.e. such as rounded edges)

Dok. ID: 07/001

documents might be subject to change / issue July 2018

EPA / HEPA Filter – HS-Mikro SF



HS-Mikro SF is the filter of choice for removal of particulate air impurities and can be titled as 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 safely 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 filters with aluminium spacers. They can be manufactured completely free of metal and thus are completely combustible to ease problematic filtrate disposal. The filters can be installed for air purification supply 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 are referred to with the product 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	250	260
Max. temp. [°C]	70° / opt.120°	70° / opt.120°	70° / opt.120°

Dimensions [mm]			Nominal air flow [m³/h]		Weight [kg]
Width	Height	Depth	standard	opt. high flow	
305	305	78	250	-	1.5 kg
305	610	78	540	-	2.5 kg
457	457	78	600	-	2.5 kg
575	575	78	970	-	3.4 kg
610	610	78	1100	-	6.0 kg
762	610	78	1400	-	7.2 kg
305	305	150	250	330	3.4 kg
305	610	150	540	700	5.2 kg
457	457	150	600	810	5.6 kg
575	575	150	970	1330	7.6 kg
610	610	150	1150	1500	8.1 kg
762	610	150	1450	1900	9.6 kg
915	610	150	1750	2300	11.0 kg
1220	610	150	2300	3100	14.0 kg
1525	610	150	2900	3850	16.9 kg
1830	610	150	3500	4650	21.0 kg
305	305	292	520	750*	6.3 kg
305	610	292	1050	1500*	8.9 kg
457	457	292	1180	1700*	10.4 kg
575	575	292	1970	2500*	13.6 kg
610	610	292	2100	3000*	14.4 kg
762	610	292	2630	3500*	16.0 kg

Please ask for other desired dimensions and designs.

* Option „high flow rate“ at depth 292 mm: can only be temperature resistant **up to 70° C**.

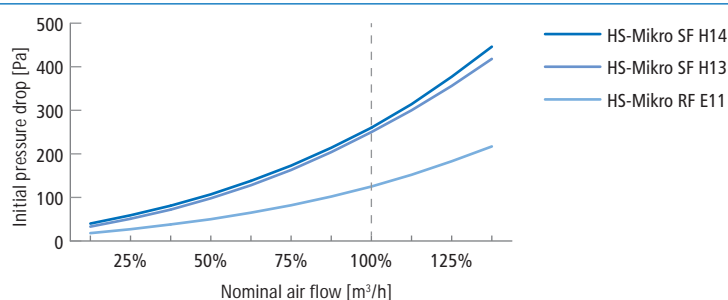
High air flow rate option

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



Frame	<ul style="list-style-type: none"> ▪ MDF / medium density fiber board (standard) ▪ polystyrene (depth = 78, 150 and 292 mm) ▪ plywood ▪ galv. steel ▪ stainless ▪ aluminium
Operational conditions	<ul style="list-style-type: none"> ▪ max rel. h. 100 [%] ▪ max. temp. 70 [°C] ▪ optional: HS-Mikro SF-T up to max. 120 [°C] with glassfiber media only
Spacers	thermoplastic (Minipleat)
Filtermedia	<ul style="list-style-type: none"> ▪ high quality glass fiber (standard): moisture resistant ▪ ePTFE (optional): 100% boron free, reduced Initial-ΔP: -45 %, water resistant, resistant against disinfectant, highly mechanical & chemical resistance
Combustible	Yes (frames: MDF, plywood, polystyrene)
Options	<ul style="list-style-type: none"> ▪ burst- and protection screens (single or both sides) [affects ΔP] ▪ more filtermedia for higher airflows ▪ handle ▪ gasket on both sides ▪ customized gaskets (epdm, viton, ptfe or other customer specific) ▪ Special design customizations i.e.: grooves, guide rails, boxed versions etc.

Gasket options	height [mm]	form
seamless foamed polyurethane gasket	6 or 8	
flat sectionized neoprene gasket	5 or 7	
leak test gasket	7.5	

EPA / HEPA Filter – HS-Mikro SFV

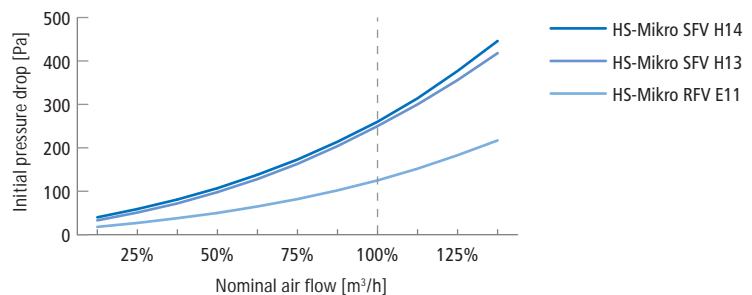






HS-Mikro SFV may be used as primary or main filter in environments requiring large or fluctuating air flow rates as well as low pressure differences. Its elements are made up of pleated micro fiber glass media and are equipped with thermoplastic separators. Single filter packages are fitted into the 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. If ordered with a plastic frame this product is metal free and thus can be completely incinerated. 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-ΔP [Pa] at nominal air flow	125	250	260
Max. temp. [°C]	70° / opt.120°	70° / opt.120°	70° / opt.120°

Dimensions [mm]			Nominal air flow [m³/h]	Media Area [m²]	# of filterpacks
Width	Height	Depth			
305	610	292	1300	16 m²	4
305	610	292	1700	20 m²	5 ⁽¹⁾
575	575	292	2260	25.4 m²	7
610	610	292	3000	32.1 m²	8
610	610	292	4000	40.1 m²	10 ⁽¹⁾
762	610	292	4000	40.1 m²	10

⁽¹⁾ special high air flow version
Please ask for other desired dimensions and designs.



Frame	<ul style="list-style-type: none"> ▪ MDF ▪ plywood ▪ stainless ▪ polystyrene plastic ▪ galv. steel ▪ aluminium 	
Operational conditions	<ul style="list-style-type: none"> ▪ max rel. h. 100 [%], max. temp. 70 [°C] ▪ optional: HS-Mikro SF-T up to max. 120 [°C] with glassfiber media only 	
Spacers	thermoplastic (minipleat)	
Filtermedia	<ul style="list-style-type: none"> ▪ high quality glass fiber (standard), water repellent ▪ ePTFE (optional) reduced Initial-ΔP: -45 %, water resistant, resistant against disinfectant, highly mechanical & chemical resistance 	
Combustible	Yes (frame: MDF, plywood, plastic)	
Options	<ul style="list-style-type: none"> ▪ burst- & protection screens [Initial-ΔP will be higher] ▪ handles ▪ gasket on both sides ▪ customized gaskets (epdm, viton, ptfе or other customer specific) ▪ antistatic filter for EX areas i.e. :  II 2GD IIA ▪ customizations i.e. : grooves, guide-rails, boxed filter etc. 	
Gasket options	height [mm]	form
seamless foamed polyurethane gasket	6 or 8	
flat sectionized neoprene gasket	5 or 7	
leak test gasket	7.5	

EPA / HEPA Filter – HS-Mikro SFV-HT

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 fiber filter media is stabilized by glass fibre strings. The filter media 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 media packs are installed in a filter and mounted in v-shaped to allow extended filter surfaces.

The design of HS-Mikro SFV-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.

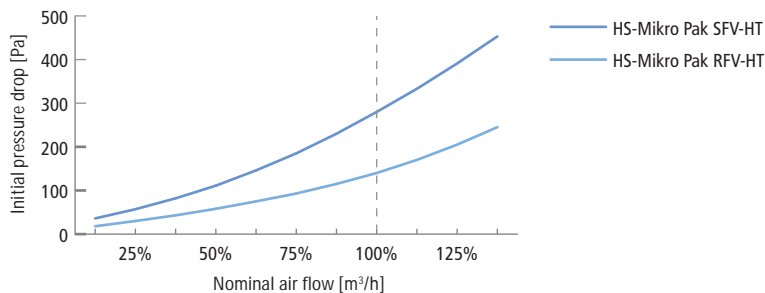


Please follow our on site tempering instruction prior operation. Please contact us for more informations!

Typ:	HS-Mikro RFV-HT	HS-Mikro SFV-HT
Class EN 1822	E11	H13
Efficiency EN 1822 @ MPPS [%]	> 65 %	> 95 %
Initial-ΔP [Pa] at nominal air flow	150	280
Silicone free	No	No
Max. temp. [°C]	250°	250°

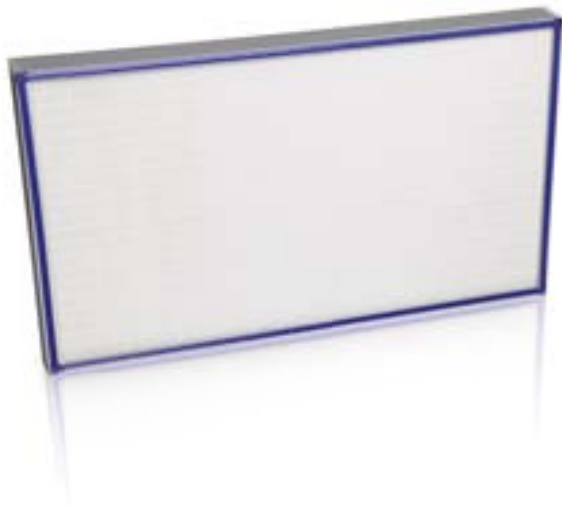
Width	Dimension [mm]		Nominal air flow [m³/h]	# of filterpacks
	Height	Depth		
592	287	292	1200	4
610	305	292	1800	4
592	592	292	2600	10
610	610	292	3000	10
592	287	400	1600	4
610	305	400	2000	4
592	592	400	3500	10
610	610	400	4000	10

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

EPA / HEPA / ULPA – HS-Mikro SF-AL



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 environments 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 a laminar air flow beside pure air.



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

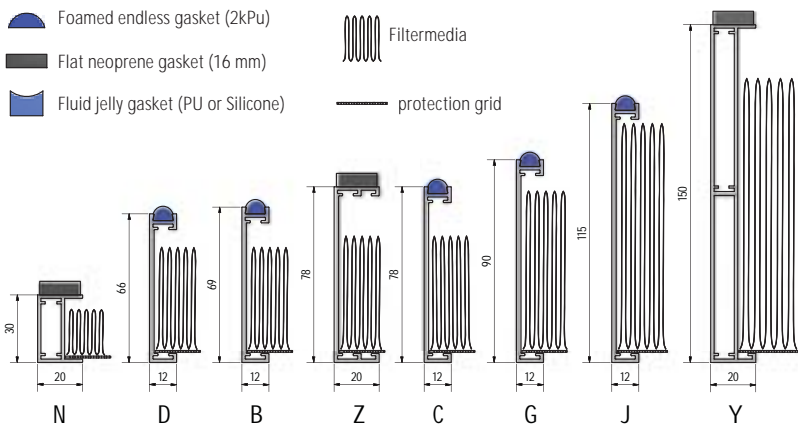
Our technologically advanced factory and strict quality regulations guarantees close limits of product variation and an unmatched quality level. Our flexible, order-related production ensures the production of all standard and odd sizes - no matter whether it is a single piece production or full scale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



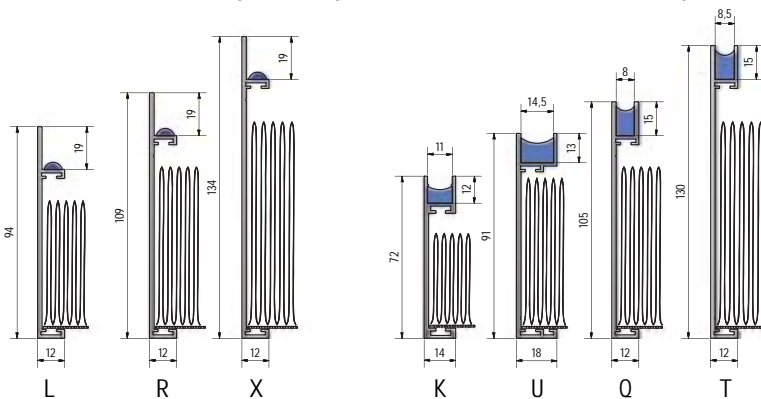
The filterframes are made from anodized, extruded aluminiumprofiles. The surface quality conforms class "B" according to EN 573-3. There are various profiles available. Beside our standard frames (Type B, Z, C, G, J, L, R and K) we offer diverse frame profiles for customer specific applications. The 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	X
K	72	45	34, 50	X
Z	78	55	45, 50, 55, (65)	X
C	78	55	45, 50, 55, (65)	X
G	90	80	45, 50, 65, 80	X
U	91	55	45, 50	
L	94	55	45, 50, 55, 65	X
R	109	80	45, 50, 55, 65, 80	X
J	115	100	65, 80, 100	X
X	134	80	55, 65, 80	
Y	150	120	55, 65, 100	X

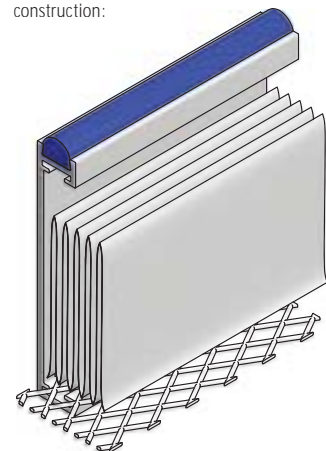


Profiles for ceiling filters, ceiling outlets, clean benches and duct-channel housings



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

Cross section of the filter construction:



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 ist not true to scale. Upon request we can offer more special profiles. Please contact our engineers .

Dok. ID: 07/007 documents might be subject to change / Issue July 2018

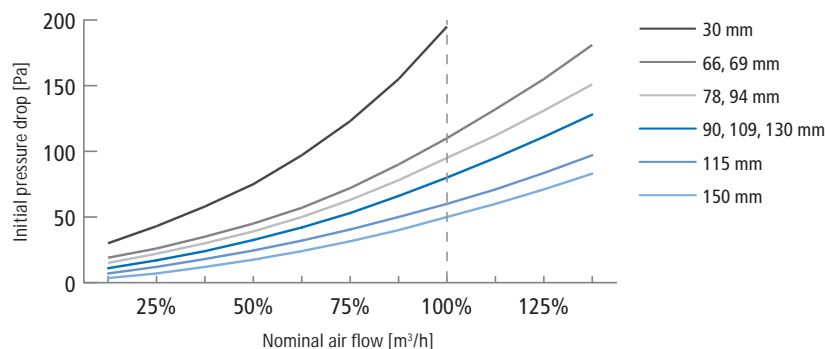
Frame Thickness [mm]	Media Pack Depth [mm]	Efficiency EN 1822 @ MPPS [%]	Filter Class EN 1822						
			H13	H14	U15	U16	H14 PTFE	U15 PTFE	U16 PTFE
			>99.95	>99.995	>99.9995	>99.99995	>99.995	>99.9995	>99.99995
		Nominal air flow [m/s]	0.45	0.45	0.45	0.45	0.45	0.45	0.45
30 mm	25 mm	Initial-ΔP [Pa]	145	195	-	-	75	85	100
66/69 mm	45 mm	Initial-ΔP [Pa]	95	110	130	-	50	60	80
78 mm	55 mm	Initial-ΔP [Pa]	80	95	115	140	45	55	70
90 mm	80 mm	Initial-ΔP [Pa]	65	80	100	120	20	35	55
94 mm	55 mm	Initial-ΔP [Pa]	80	95	115	140	45	55	70
109 mm	80 mm	Initial-ΔP [Pa]	65	80	100	120	20	35	55
115 mm	100 mm	Initial-ΔP [Pa]	45	60	75	90	<20	25	45
150 mm	80 mm	Initial-ΔP [Pa]	65	80	100	120	20	35	55
150 mm	120 mm	Initial-ΔP [Pa]	45	55	70	85	on request		

The given initial pressure drop is valid for filters with a single side protection grid on the air outlet 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 a 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	550	550	490
300	550	270	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 fiber, single side protection grid and standard pleat depth (filtersurface).

- Operational conditions
- max. rel. h. 100 [%]
 - max. temp. 70 [°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 as terminal filter as well. 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. On request we can fit connection 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 process- or customer requirements.



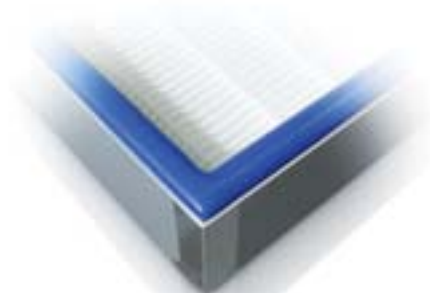
Example applications	▪ Clean room ceiling	▪ Clean benches
	▪ Isolators	▪ Fan-Filter-Units (FFU's)
	▪ Micro-Environment	▪ Air Showers
	▪ Clean room airlock	▪ Last barrier safety filters
	▪ Terminal filter	

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

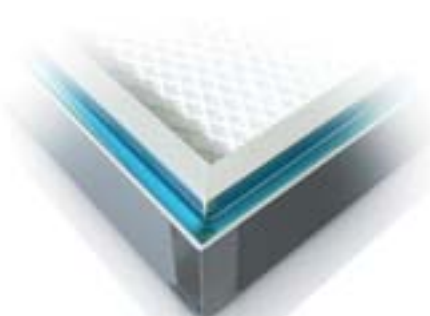
Powder coated aluminium [standard]	This protection grid is our standard. We use powder coated aluminium exclusively to ensure maximum corrosion resistance.
Polypropylen	Filters with dimensions of up to 610x610 mm may be fitted with this more cost effective alternative made from semi-transparent polypropylene. 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-ANDOZIED 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 ist 6 mm. HS-Mikro SF-AL are fitted with a foamed gasket on the air entry side by standard. 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 of 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 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 grove 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 taping the profile gearcuts 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.



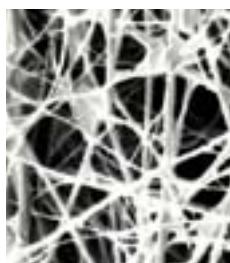
Filtermedia

There are different types filter media available for this filter type.

Unless the process requirements do not demand something special, we offer high quality micro glass fiber filter paper with different efficiency grades as the standard filter media. The medias structure and composition fulfils the requirements for temperature and moisture. In case of boron sensitive processes we recommend to low-boron filter media also based on glass fibers. Boron can emit out of usual filter media 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 fiber media. Even highest filter efficiencies up to class U17 can be realized with ePTFE in much smaller dimensions than with usual glass media.

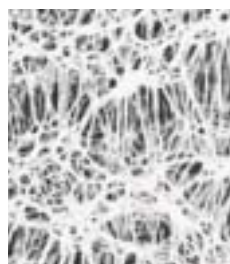
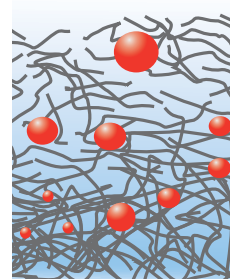
The filtermedia is pleated in close folds and thermoplastic spacers ensure a high mechanical stability and precise distance of the folds. This ensures an optimal laminar air flow.

Due to the sensitivity of ePTFE Membranes against oil mists and oily aerosols we strongly recommend to avoid the usage of test-aerosols like DEHS, DOP or PAO while performing on site tests (i.e. ISO 14644). Especially the high concentrations generated when measuring with photometers will cause a severe increase of the initial pressure drop. Therefore we advise to use PSL particles with a size spectrum of 0.1 - 0.2 µm.



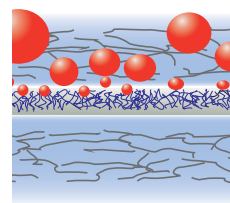
Glasfiber

Glass fiber 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 membrane filter sensitive to oily aerosols and high particle concentrations. A good pre-filtration is recommended.



Characteristic	Glass fiber 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
▪ Hydrogen peroxide	good	good
▪ Hydrofluoric acid	very poor	good
▪ Formaldehyde	good	good
▪ Acetone	good	good
▪ Hydrochloric acid	poor	good
▪ Tuloool, 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

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 Filter efficiency is tested by scanning with an optical particle laser counters for the local and integral efficiency against MPPS particle size (ranging from 0.1 - 0.3µm). Glass fiber media filters are tested with DEHS (Di-Ethy-Hexyl-Sebacat) whilst ePTFE membrane filters are solemnly tested with mono dispersal solid aerosol (PSL). The maximum size we can scantest is 1830 x 1220 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 filters that will be applied within pharmaceutical or demanding industrial environments. For any filters of class EN 1822:U15 or higher scan testing 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 predefined 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 test rig 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.

17136
Prüfbericht gemäß EN 1822-4
Test report according to EN 1822-4
Rapport de test selon EN 1822-4

Filterdaten / Filter data / Fiches techniques				
Filter-Nummer Part no. Numero du filtre 40-06100610-M069D586	Beschreibung Filter type Type de filtre Mikro SF-AL H14	Serien-Nummer Serial no. Numero de production S-11522	Prüf-Datum Date of test Date du test 2014-07-22	Prüfer Operator Opérateur PRA
Filterabmessung (L x B x T) Filter dimensions (L x W x D) Dimensions du filtre (L x L x P) 610 x 610 x 69mm	Nennvolumenstrom Nominal flow rate Débit d'air nominal 560m³/h	Anfangsdruckdifferenz Initial pressure drop Perte de charge initiale 108Pa	2014-402861	
Filterklasse Filter class Classe de filtration HEPA H14	Minimale integrale Abscheidegrad Minimum integral efficiency Minimum efficacité integrale 99.9950000%	Minimale lokale Abscheidegrad Minimum local efficiency Minimum efficacité locale 99.9750000%	Kommentar Comment Comment	

Prüfbedingungen / Test Conditions / Conditions de test				
Prüfstrom Test flow rate Débit de test 560m³/h	Prüfaerosol Test aerosol Aérosol de test DEHS	Partikelgröße Particle size Taille de particule 0,10 - 0,30µm	Rohgaskonzentration Upstream concentration Concentration amont 6.58E+3#/cm³	Temperatur Temperature Température 27.2°C
Rel. Feuchte Rel. Humidity Humidité rel. 57.6%				

Prüfergebnisse / Test results / Résultats de test			
Prüfungsergebnis Classification to test result Classification selon résultat de test HEPA H14	Integrierte Abscheidegrad Integral efficiency Valeur d'efficacité globale 99.9953715%	Minimale Abscheidegrad Minimum efficiency Minimum valeur d'efficacité 99.9953325%	Druckdifferenz Pressure drop Perte de charge 116Pa
Maximum (Leak signal) Maximum (Signal du fuite) 124 (138)	Anzahl der gefundenen Leckstellen Number of leaks detected Nombre de fuites détectées 0	Lecktest gemäß EN 1822-4 Leakage test to EN 1822-4 Test de fuite selon EN 1822-4 bestanden/passed/accepté	

SER.-#: S-11522
TST: 17136

Air Flow Direction

LUFTFILTERBAU GMBH

HEPA-Filter: Mikro SF-AL H14, EN1822- H14

Arbeits-Nr. / Part No.:	40-06100610-M069D586	Prüfaerosol / Test aerosol:	DEHS
Abmessungen [L x B x T] / Dimensions [L x W x D]:	610 x 610 x 69	Partikelgröße / Particle size:	0.10 - 0.30 [µm]
Abscheidegrad / Efficiency DIN EN 1822:	=> 99.9950000	[%] Rohgaskonzentration / Upstream concentration:	6.58E+3 [#/cm³]
Anfangsdruckdifferenz / Initial pressure drop:	108	[Pa] Nennvolumenstrom / Nominal air flow:	560 [m³/h]
Temperaturunterschied / Temperature resistance:	65	[°C] Integrierte Abscheidegrad / Integral separation:	99.9953715 [%]
Seriennummer / Serial No.:	S-11522	Minimale Abscheidegrad / Minimal separation:	99.9953325 [%]
Auftrags-Nr. / Order No.:	2014-402861	Leckstellen / Number of leaks:	0
Testdatum / Test date (Operator):	2014-07-22 (PRA)	Lecktest / Leakage test:	Bestanden / Passed

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

Dok. ID: 07/D07 documents might be subject to change / issue July 2018



Activated Carbon for molecular & gasfiltration (adsorption)



Activated carbon proves to be useful for adsorbing gaseous and vaporous impurities, which are harmful 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 matter 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 extends to 1700 [m²] per gram. This extremely large surface has an excellent retention level as well as a storing capacity, and leads to a long life span.

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 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 H₂S, SO₂ 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 (KMNO₄). 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 ₂ O	1.4 %	2.5 %
Hydrogen sulfide	H ₂ S	8.0 %	14.0 %
Nitric oxides	div.	2.8 %	4.9 %
Sulphur dioxide	SO ₂	4.0 %	7.0 %
Ethylene	C ₂ H ₄	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"> ▪ 100 kg HS-Clean Pro binds appx. 8 kg H₂S ▪ 200 kg HS-Clean Pro II binds appx.14 kg SO₂.
Variants	<p>HS-Clean Prois available with different grades of KMNO₄ impregnations:</p> <ul style="list-style-type: none"> ▪ HS-Clean Pro with 4 % KMNO₄ impregnation ▪ HS-Clean Pro II with 8 % KMNO₄ impregnation ▪ HS-Clean Pro III with 12 % KMNO₄ impregnation <p>exclusive media for special tasks</p>
Operational conditions	<ul style="list-style-type: none"> ▪ rel. h. 10 [%] - 95 [%] ▪ temperature range -20[°C] to 51 [°C]
Applications	<ul style="list-style-type: none"> ▪ HS-AKP 26 (cartridge filter filling) ▪ HS-A053 (replaceable filterbed cell) ▪ HS-Securesorb (deep bed filter system) ▪ HS-Combicel ▪ HS-Carbopad



HS-AKP-26 – Activated Carbon Cartridge



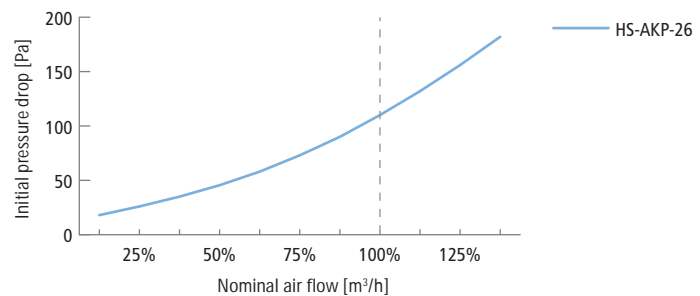
These activated carbon cartridges serve as adsorbent for gaseous pollutions and odours. They may be installed at the clean air or the exhaust air side of a system. A simple modular construction allows the assembly of a larger filtration unit by screwing the cartridges onto a base. If necessary, impure 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- ΔP [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 [m ³ /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 12 units
305	610	70	Holder for 8 units

Please ask for other desired dimensions and designs.



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



HS-Combipanel removes odours and improves indoor air quality. These filters contribute to avoid "sick building syndrome" and remove air impurities, which may cause symptoms like nausea or headaches. It is widely used with painting booths and air purifiers to remove dust, foul smell and volatile organic compounds like benzene and formaldehyde.

Gaseous or odorous contaminations may be fed to the indoor air by car, train, plane exhausts or by off gassing of indoor furniture, paints, carpet glues etc. Such compounds accumulate with untreated circulating air. HS-Combipanel purifies the air from such compounds. The filter media consists of synthetic fibers and micro carbon powder. Thanks to its structure it offers excellent adsorption ratings even at short contact times.

HS-Combipanel is made of a combined filter media including a particle filtration layer. Secure particle and dust filtration as well as filtration of odours and gaseous can hence be achieved by the use of just one filter.

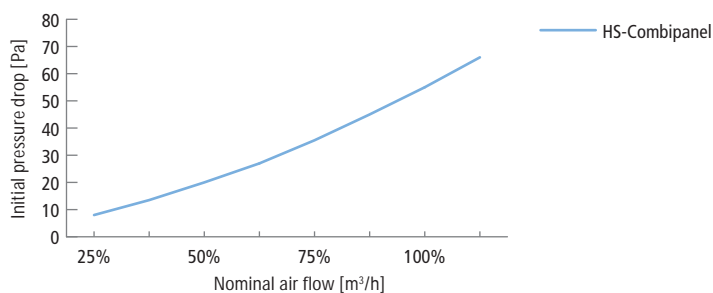
HS-Combipanel allows an easy upgrade of existing ventilations systems to achieve a safe removal of gases and odours beside the usual dust filtration. Even single stage filter stages can thus be directly upgraded replacing a single stage particle or odour filter with this more effective combination unit.



HS-Combipanel	
Filter media	particle filter with micro carbon powder
Class EN 779	G4
Efficiency against synthetic dust [%]	91 %
Recommended final ΔP [Pa]	250
max. ambient temp. [°C]	45°

Width	Dimensions [mm]		Initial ΔP [Pa]	Air flow [m ³ /h] HS-Combipanel
	Height	Depth		
289	594	44	55	1700
495	495	44	55	2500
594	594	44	55	3400
289	594	96	40	1700
495	495	96	40	2500
594	594	96	40	3400

Please ask for other desired dimensions and designs.



Frame	Cardboard, Aluminum, Plastic
Operational conditions	max. rel. h. 75%
Initial absorption	<ul style="list-style-type: none"> ■ O₃: > 90% ■ C₆H₆: > 22%



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 design 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]

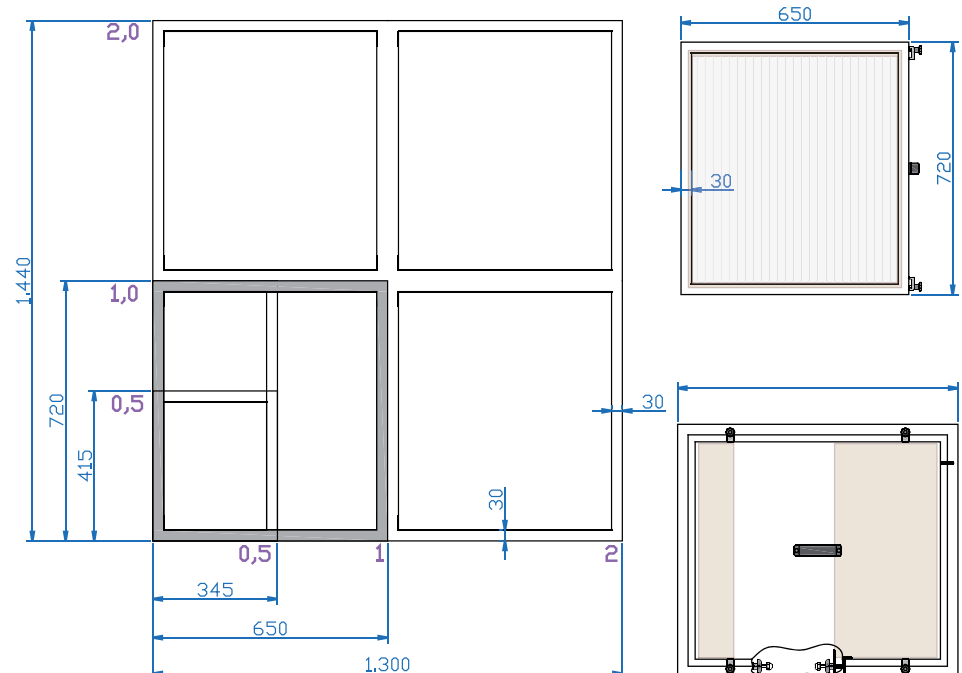
A = 550 mm

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

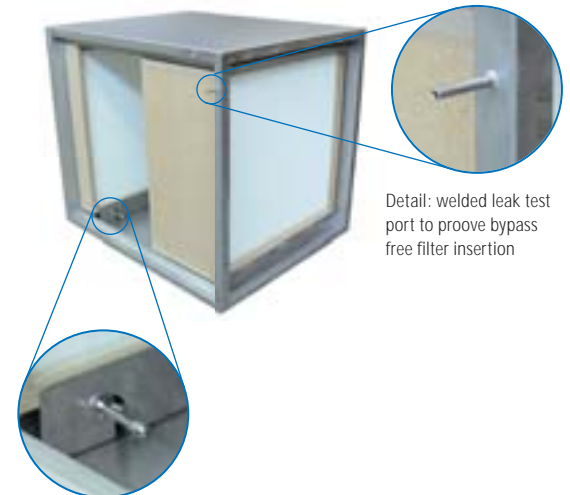


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documents might be subject to change / issue July 2018

Installable filters	Filter properties
panel filters:	HS-Alpha Pak G3 to M5 (EN 779)
bag filters:	HS-Pak 25 bis HS-Pak 95 optional auch EX-Schutz G3 to F9 (EN 779)
compact filters:	HS-Beta Pak HS-Beta Pak Yellow HS-Makro (auch EX) HS-Makro F HS-Makro FV M5 to F9 (EN 779)
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 ₂ S or SO ₂

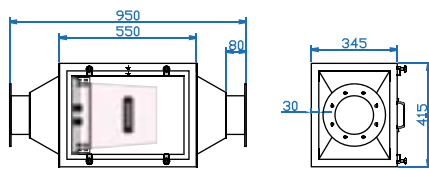
Example housing 1 x 1 (650 x 720 mm)



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

Detail: Filter Mounting with rapid clamping

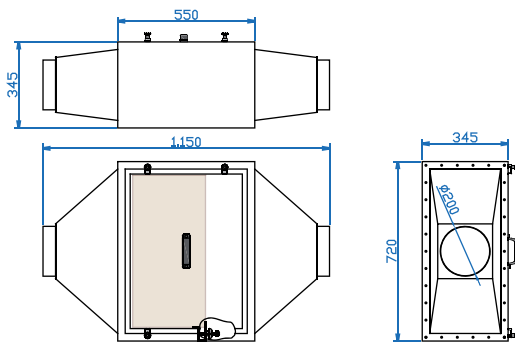
Example: tube connected at 500 m³/h class F7 EX-protected



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)
- anti electrostatics (EX-protection)
- mobile unit on rollers
- leak test port to ensure a bypass free filter insertion
- condensate drain port



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



HS-S041 - The gastight safetyhousing offers flexible modular design to be customized for the requirements on site and bag-in-bag-out filterchange - contamination free.

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 constructon 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)
prefilter - finedust: HS-Makro to 120°C, conforms ATEX HS-Makro F to 70°C	M6 to F9 (EN 779)
mainfilter HEPA: HS-Mikro S to 120°C, conformsATEX HS-Mikro SF to 70°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 UPLPA 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.



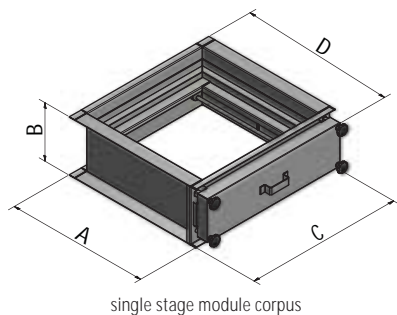


HS-S041 – HEPA Safety Housing (bag-in-bag-out)

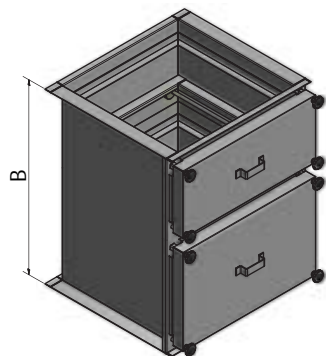
Dimensions of single modules

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.



single stage module corpus



two stage module corpus

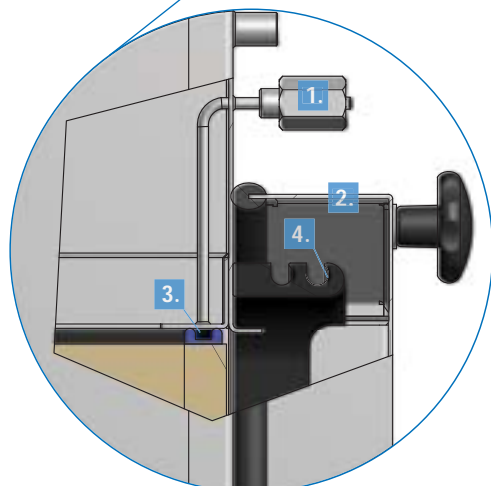
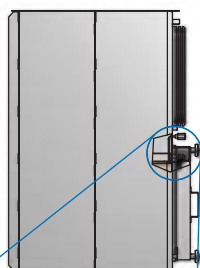
Dimension Filter [mm]			Dimension Housing [mm]				Weight [kg]	
B	H	T	A	B	C	D	w/o filter	with filter
610	610	50	675	270	745	720	30	50
610	610	150	675	380	745	720	50	70
610	610	292	675	525	745	720	65	85
305	610	50	385	270	745	430	20	35
305	610	150	385	380	745	430	35	50
305	610	292	385	525	745	430	50	65
305	305	50	385	270	440	430	10	20
305	305	150	385	380	440	430	20	30
305	305	292	385	525	440	430	35	45
610	762	150	847	380	745	892	55	80
610	762	292	847	525	745	892	70	95

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

Please ask for other desired dimensions and designs.

Seiten- / Innenansicht Deckel & Dichtsitzprüfung

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.



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.

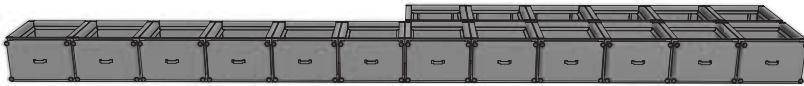
Maintenance Cover and Filter-Bypass-Test

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.

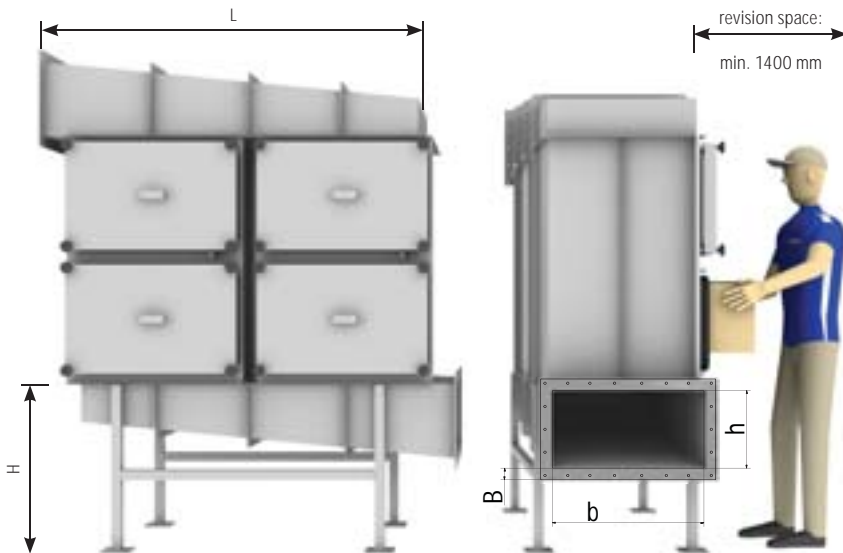
HS-S041 filterunits can offer a leak test groove for bypass testing in the housing but we prefer to fit the filter with a groove gasket. This helps to prevent malfunctions caused by damages and false measure readings caused by dirt on the hardware.

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



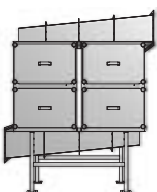
HS-S041 can be installed either horizontal or vertical.

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:

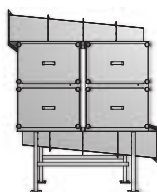
single / double line:
right in / left out



single / double line:
right in / right out



single / double line:
left out / right in



single / double line:
left in / left out



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

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



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. Their stability is guaranteed through reinforcement plates.

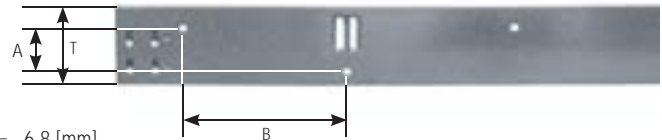
HS-Mounting Frames: Dimensions [mm]				
	Frame		Filterinsert	
	Width	Height	Width	Height
	610	610	592	592
	508	610	490	592
	305	610	287	592
	305	305	287	287
	610	910	592	892
	508	910	490	892
	305	910	287	892

Please ask for other desired dimensions and designs.

Form of delivery	▪ mounting frame w/o filter or filtermedia
Options	<ul style="list-style-type: none"> ▪ 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]

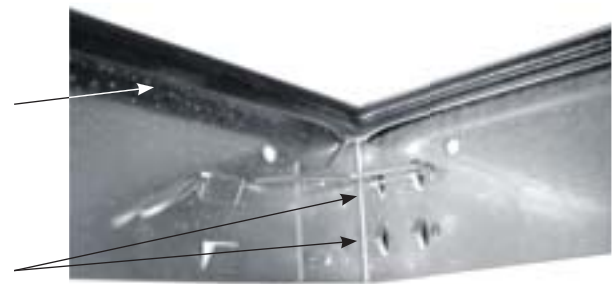


Lochdurchmesser = 6.8 [mm]

Inner view

endlessly foamed, non porous polyurethane gasket

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





HS-4N HEPA & Finedustfilter holding frame

HS-4N frames ideally suit for building filter walls 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 welded 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 or S
- HS-Mikro RF or SF
- HS-Mikro RFV or 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 ▪ Single frames which can be mounted easily into filter walls

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

* Frames with the leak test 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-Fan Filter Unit



HS-Fan Filter Units are designed to supply highly filtered air to all kind of clean room classes and sizes. Applications of fan filter units range from single modules for enclosures to large size clean rooms with or without an integrated ceiling grid.

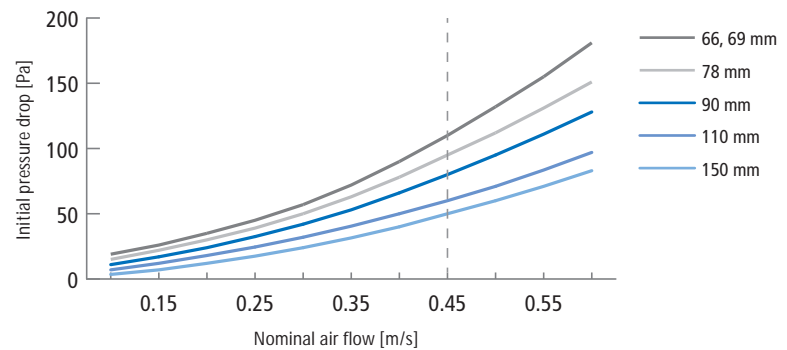
Each unit delivers ultra clean air with low energy consumption and low heat gain. The FFUs are designed to provide low noise levels and little vibration to the environment. Our unique design of buffer system allows excellent air distribution from the filter face, providing uniformity of laminar air flow.

The construction of each unit is designed to fit in either an AC or EC motor to meet any electrical requirements. Our self-powered unit can be fitted with any option of HEPA and ULPA filters. Finishing materials of the casing are available with different choices such as stainless steel, galvanized steel, zinc aluminum and coated metal. FFUs of various sizes and dimensions can be customized upon request.

EC Motor Type	FM-RR-2.0/1.0	FM-RR-2.0/1.5	FM-RR-2.5/1.25	FM-RR-2.0/2.0
Module Size [mm]	600 x 1200	900 x 1200	750 x 1500	1200 x 1200
Air quantity [m ³ /h]	900	1350	1420	1800
Airflow velocity [m/s]	0.25 / 0.3 / 0.35 / 0.4 / 0.45			
Fan specification	Airfoil turbo fan runner (Compound Engineering Plastics)			
Power source	1 Φ 200–240 V, 50 / 60 Hz			
Electric Power cosump. [W]	80	150	150	150
Weight [kg]	24 kg	37 kg	34 kg	41 kg
Noise (dist.1.5 m) [dB(A)]	52	57	57	57

Please ask for other desired dimensions and designs.

Pressure drop for application with HEPA Filter Mikro SF-AL H14



Body material	<ul style="list-style-type: none"> stainless steel (SUS430) galvanized steel AL-ZN alloy sheet coated metal sheet
Options	<ul style="list-style-type: none"> Pre Filter power plug and cable duct flange for suction air
Control System	OS: Windows XP / 7 / 8 max. controlled Units: 37800 communication Interface: RS485 speed setting: step less / 5 speeds setting inkl. group control

Dok.-ID.: 11/001

documents might be subject to change / issue July 2018



HS-Ceiling Outlet

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.

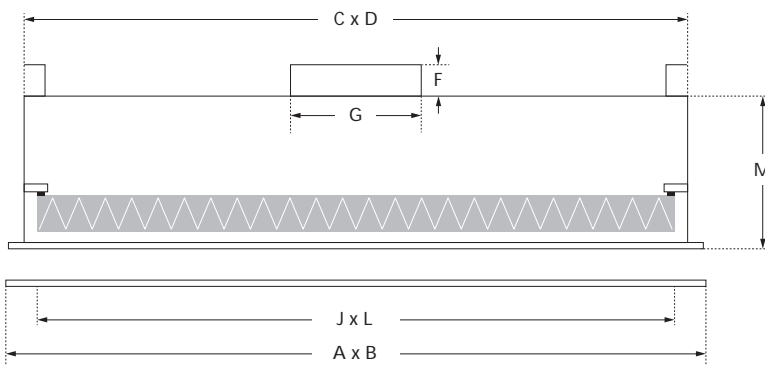
The Ceiling Outlet meets requirements according to DIN 196, VDI 2083, EN 14644-1 as well as cleanroom regulations according to 91/536/EWG-GMP.

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



A x B	Dimension Outlet [mm]			J x L	Size of filter [mm]
	C x D	F x G	M		
425 x 730	355 x 660	60 x 250	280	305 x 610	305 x 610 x 69
425 x 730	355 x 660	60 x 250	365	305 x 610	305 x 610 x 150
730 x 730	660 x 660	60 x 250	280	610 x 610	610 x 610 x 69
730 x 730	660 x 660	60 x 250	365	610 x 610	610 x 610 x 150
1035 x 730	965 x 660	60 x 250	280	915 x 610	915 x 610 x 69
1035 x 730	965 x 660	60 x 250	365	915 x 610	915 x 610 x 150
1340 x 730	1270 x 660	60 x 250	280	1220 x 610	1220 x 610 x 69
1340 x 730	1270 x 660	60 x 250	365	1220 x 610	1220 x 610 x 150

Please ask for other desired dimensions and designs.



Form of delivery	<ul style="list-style-type: none"> filter housing outlet ready for plug in
Options	<ul style="list-style-type: none"> 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

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 labelling 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.



Your information can always be found at our delivery notes on the packaging AND the product!



AB: 2009-403815	
Pos. Kommission/Commission: Bezeichnung/Description Menge/Qty	
1	Tauchfilter Pat 35, Metallrahmen 300x300x60 mm, 4 ET, H: 80/75, G4
2	Tauchfilter Pat 35, Metallrahmen 300x300x60 mm, 4 ET, H: 80/75, G4
3	Tauchfilter Pat 35, Metallrahmen 300x300x60 mm, 4 ET, H: 80/75, G4
4	Tauchfilter Pat 35, Metallrahmen 300x300x60 mm, 4 ET, H: 80/75, G4
5	Tauchfilter Pat 35, Metallrahmen 300x300x60 mm, 4 ET, H: 80/75, G4
6	Tauchfilter Pat 35, Metallrahmen 300x300x60 mm, 4 ET, H: 80/75, G4
7	Tauchfilter Pat 35, Metallrahmen 300x300x60 mm, 4 ET, H: 80/75, G4
8	Tauchfilter Pat 35, Metallrahmen 300x300x60 mm, 4 ET, H: 80/75, G4
9	Tauchfilter Pat 35, Metallrahmen 300x300x60 mm, 4 ET, H: 80/75, G4
100 Stück in je 10er Pack LT/07/058	

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, KTA 1401 and GOST.



Consulting & Service

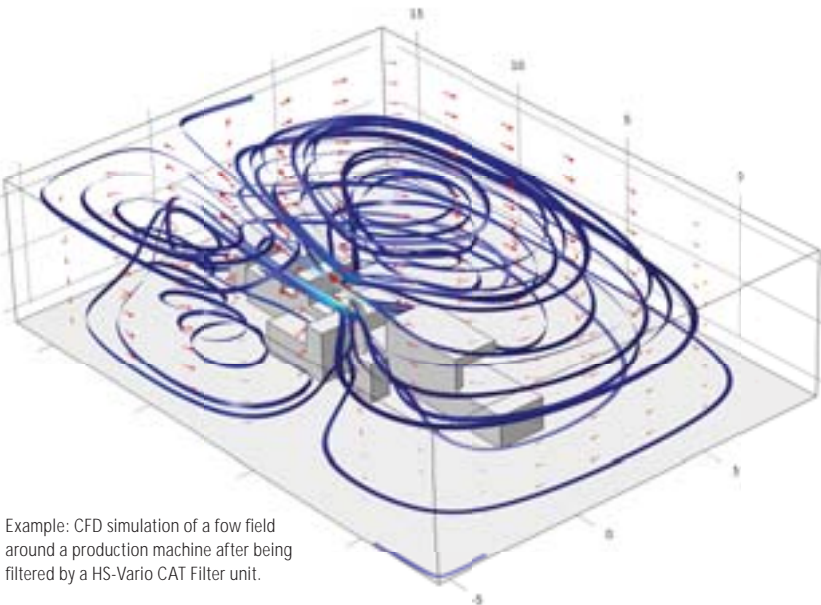
Beside air filters HS-Luftfilterbau offers a great variety of services around the air filtration process such as:

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.

LUFTFILTERBAU



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