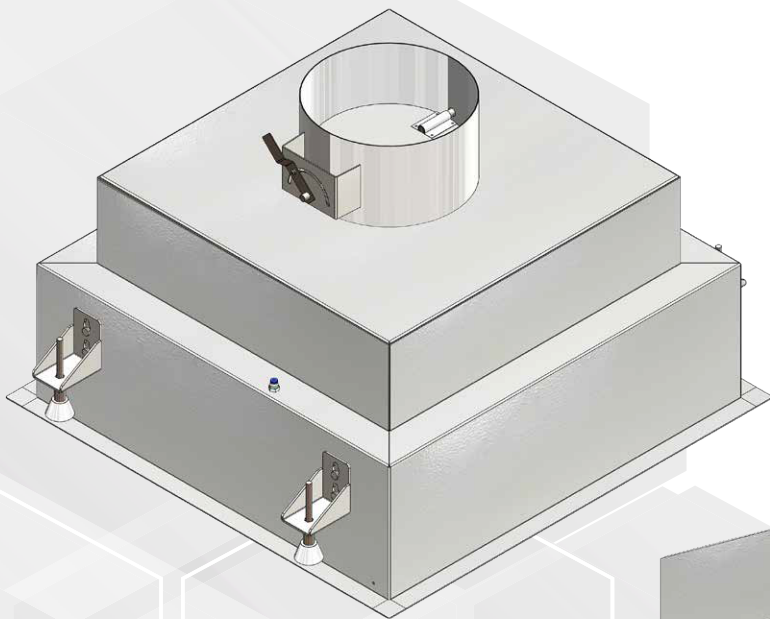




HEPA Filter Box - Tool Free

User Manual



"Advanced filtration for a better future!"

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1. Description

HEPA Filter Box (HFB), main demands of the clean room technology and especially in its pharmaceutical applications is the air-conditioning and accordingly the air quality.

Air distribution is generally made through the HEPA Filter installed to its housing. Therefore, selection and assembling the HEPA Filter to its housing without leakage is very important.

HEPA Filter Box consists of 3 main parts, which are the box, filter and the diffuser. HFB has an inlet duct connection port for air inlet at the top or at the sides.

Filters can be chosen according to the room Class from H13 to U17.

There are three different type of HEPA Filter Box's surface according to HEPA Filter gasket type which are surface with test groove system, flat surface, and knife edge surface

All HEPA Filter Box with test groove system are tested for leakages.

Test grooves that face the HEPA Filter gasket achieves air tightness according to DIN 1946-4 and ISO 14644. Inside of the housing can be easily disinfected and will not be affected from disinfection chemicals.

To track filter working conditions, HEPA Filter Boxes have ports for differential manometer connections. Test aerosol inlet nozzle is standard for DOP/EMERY Test.

Ulpatek R&D department work on safe, reliable, and user-friendly configurations. Our approach provides advantages to customer to reduce their total costs, to enhance system performance and to benefit human health.

The highest quality Ulpatek's products offer customers air filters with the longest life, the lowest operating costs.

1.1 Specifications

- Filter Seal-leak test (DIN 1946 and ISO 14644-3)
- Test ports for pressure drop test groove and aerosol injection (EMERY/DOP)
- Simplified maintenance and disinfection
- Easily removable air outlets
- Diffuser hanger pin and diffuser fastening magnet for diffuser assembling, and also central fixing is available.
- Inlet Duct Connection Type: Top, Side, Z.
- Measurement of pressure drop from room side
- Boxes weights is 12 kg – 47 kg.
- Partial flow adjustment from the ceiling in damper models
- Allows the HEPA filter to be replaced from the room

1.2 Field of Application

- **Industry;** Pharmaceutical, electronic, optical, food and chemical industries.
- **Hospitals;** Operating theatres and operating side rooms, intensive care, isolation solutions, sterile zones etc.
- **Laboratories;** Clean zones and working places, exhaust air filtration of toxic aerosols.

1.3 Alternative Specifications

- Available in various construction and dimensions.
- Available powder coated sheet metal or stainless steel.
- Available air flow adjustment damper fitted to the spigot.
- Special production with low construction height.
- Suitable for air distributors such as swirl diffusers, square anemostats, perforated diffusers, etc.
- Design according to any type of ceiling shape (clip-in, panel, drywall, T profile, etc.)
- Powder coated in any RAL Code.

2. Operation Principle

Air intake is provided from the inlet duct part of the HEPA Filter Box equipped with HEPA Filters. These HEPA Filters minimize the number of particles and microorganisms in the air entering the system according to EN 1822 efficiency class.

HEPA Filters are assembled inside the HEPA Filter Box as a completely leak-proof so that all the intake air is passed over the filter.

The conditioned air passing through the HEPA Filter is distributed into the room through the diffuser.

The filters with different depth are assembled with adjustable filter fastening clips into the HEPA Filter Box. Chosen the filter with higher pleat height provide the lower pressure drops depends on the HEPA Filter Box dimensions.

There are ports connected to the HEPA Filter Box to monitor the filter differential pressure drop and perform the leak (DOP) test.

There are two ports on top and bottom of filter for differential pressure drop of filter. Also another two ports for leak test as aerosol injection and 100% Sampling.

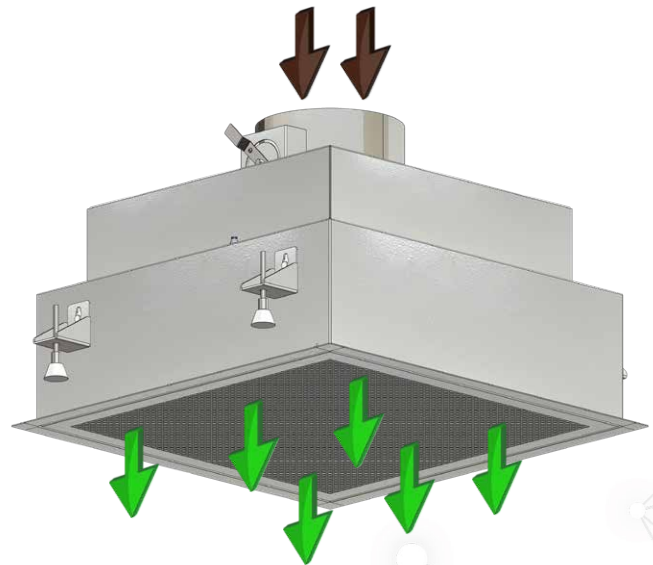


Figure 1 - The Operation Principle - Air Flow Direction

3. HEPA Filter Box Components

HEPA Filter Box consists of the following standard components, that can be designed and produced specially depends on customer request. Check the components detail before installation, operation, and maintenance for HEPA Filter Box.

Finished HEPA Filter Box consist of products below:

- 1** HEPA Filter Box
- 2** HEPA Filter
- 3** Air Diffuser
- 4** HEPA Filter Hanging Parts

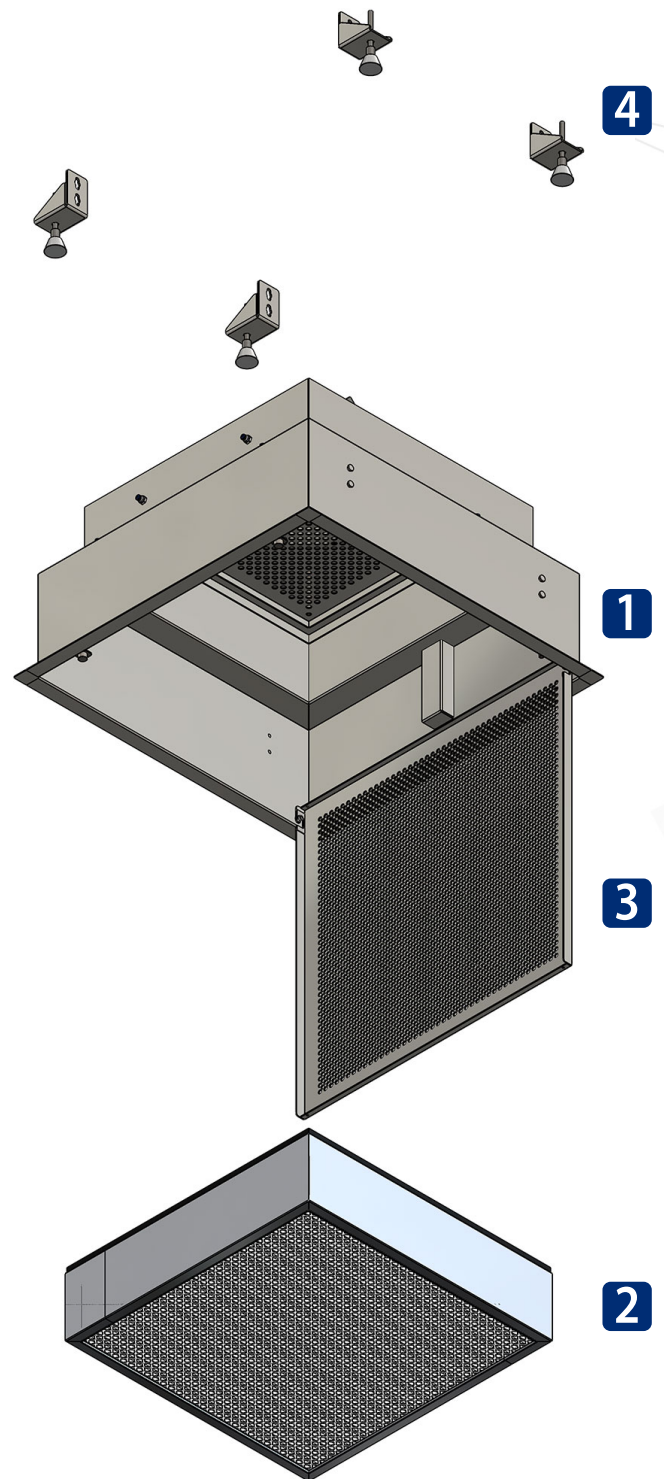


Figure 2 - HEPA Filter Box Components

3.1 HEPA Filter Box

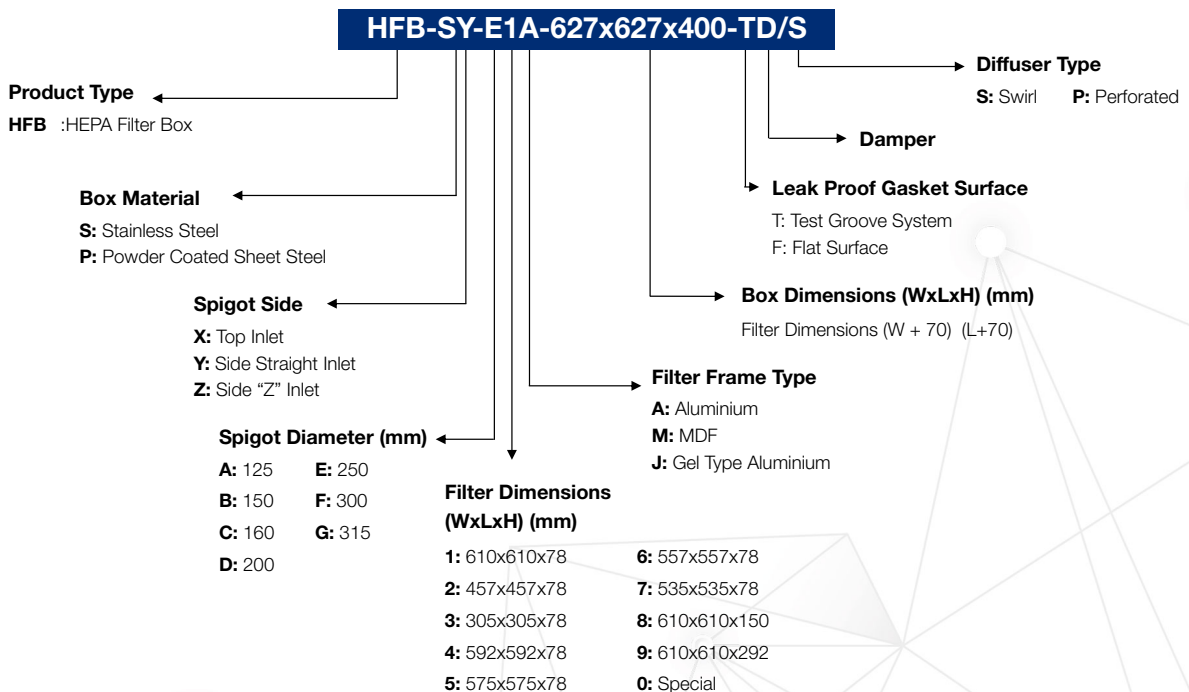
HEPA Filter Box are hanged or placed in different type of suspended ceiling (walkable panel, clip-in, plaster ceiling, etc.) for cleanroom application. Pay attention to tightness between HEPA Filter Box and ceiling type. HEPA filter and air diffuser are assembled into the HEPA Filter Box.

Accessible ports for leakage test and differential pressure drop of filter located on room side of the box.

Interconnection components such as springs, stamps, nut bolts, screws required for assembly are also used on this module.



Ulpatek HEPA Filter Box types produced as a standard



3.1 HEPA Filter Box

According to the standard dimensions and features produced by Ulpatek, it is stated below which HEPA Filter and diffuser are suitable for which box.

ULPATEK CODE (Standard)	Box Dimension			HEPA Filter Dimension			Diffuser Dimension	
	Width (mm)	Length (mm)	Height (mm)	Width (mm)	Length (mm)	Height (mm)	Width (mm)	Length (mm)
HFB-SY-E1A-627x627x400-T/S	627	627	400	610	610	78	650	650
HFB-SY-D2A-474x474x400-T/S	474	474	400	457	457	78	500	500
HFB-SY-C3A-322x322x400-T/S	322	322	400	305	305	78	350	350

Although the HEPA Filter Box can be applied to all types of suspended ceiling, the matching of the ceiling structure and the box model is important for ease of installation and tightness.

Ease of installation can be achieved by producing HEPA Filter Box with different spigot positions according to the suspended ceiling condition.

We recommend using perforated plate below the spigot for top inlet. Perforated plate is not necessary for side straight inlet and Z inlet.

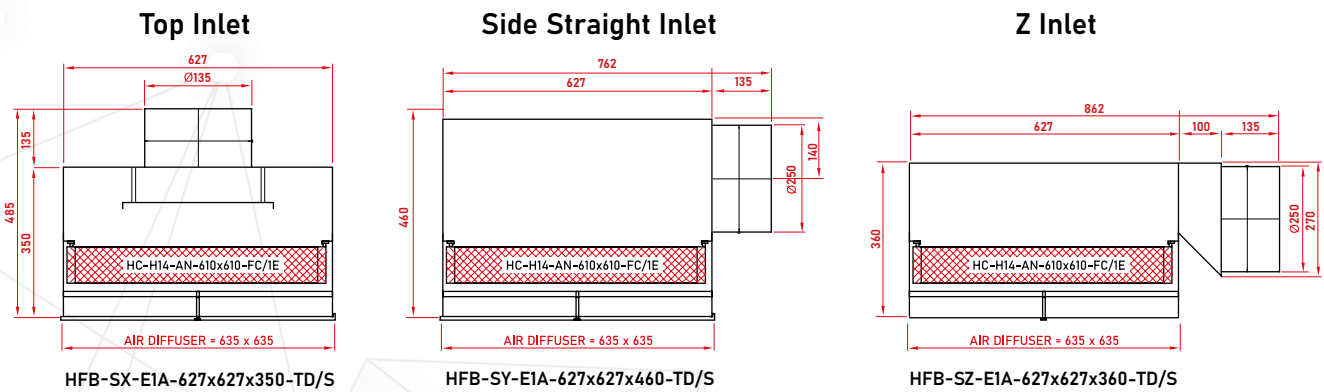


Figure 3 - HEPA Filter Box Inlet Duct Types

3.2 HEPA Filter

High-efficiency HEPA Ceiling filters protect people, equipment, and processes from airborne particulate contamination. They are designed for clean room ceilings and cleanroom worktables requiring high or very high levels of air purity to provide laminar flow.

Filtration area and pleat height designed with the optimum value are more important for performance of filters. The filters having high pleat height offer a good solution with lower operating costs and significantly reducing energy consumption.

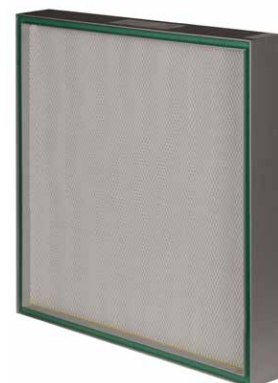
HEPA and ULPA filters are tested and certified individually according to EN1822

with the advanced technology. We would recommend using the higher grades of prefilters to increase the service life of the ceiling filters and taking care all the warnings about HEPA Filters.

Applications: Industrial processes like microelectronics, medicine, pharma, the food industry, microbiology, chemistry, laboratories, hospital and hospital operating theatres, laminar flow boxes, fan filter units, nuclear energy, and nuclear research.



Frame Code	AC	AS	AN	AD	AM	AF	AK	AL	AX
Frame Depth (mm)	66	69	78	90	100	110	117	125	150



Frame Code (Gel Type)	ANJ	AJ	AMJ	ALJ
Frame Depth (mm)	80	91	104	128

Specifications

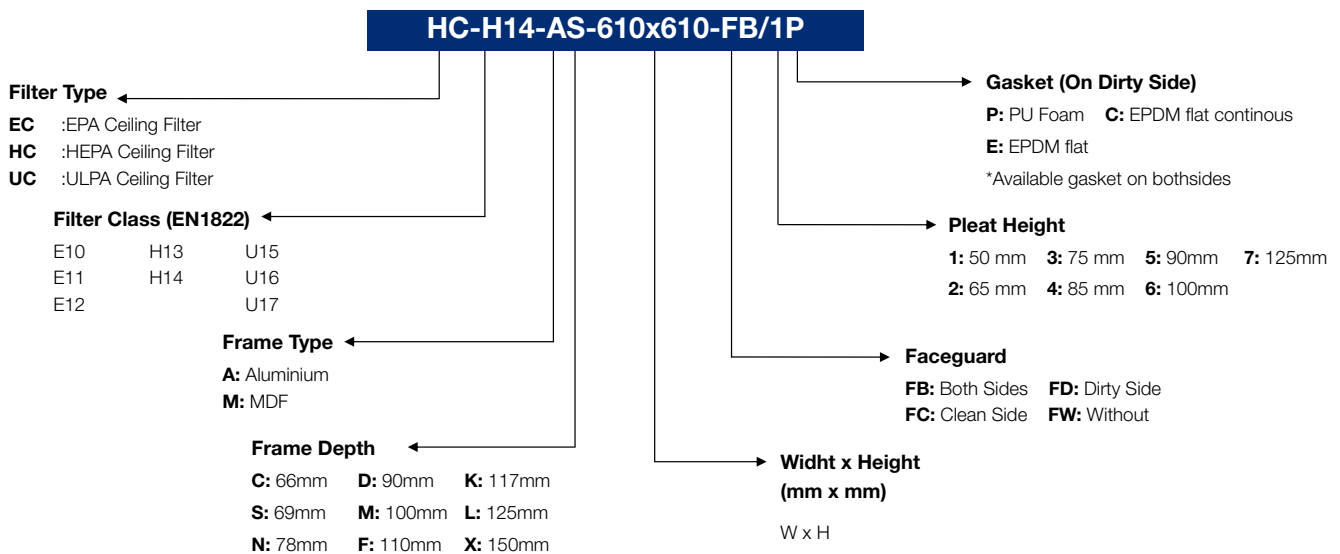
- Optimized velocity distribution
- Low pressure drop, less energy consumption
- Guaranteed leak-free
- Filter pleat heights is 50 mm - 125 mm
- Various frame sizes with any dimensions
- Available in all grades
- Polyurethane Gel gasket
- Suitable for knife edge frame systems
- Excellent sealing
- Available in MDF frame

3.2 HEPA Filter

Efficient air filters (EPA), high efficiency air filters (HEPA) and ultra-low penetration air filters (ULPA) are classified and tested according to EN 1822 standard for ventilation and air conditioning systems

such as cleanroom applications. New ISO 29463 standard formed as global standard with 5 sections, adapted from EN 1822 called "High-efficiency filters and filter media for removing particles in air".

Ulpathek EPA, HEPA, ULPA Ceiling Filter types produced as a standard



3.3 Filter Gasket

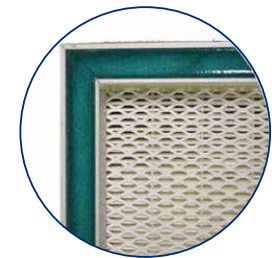
There are some gasket types for HEPA Filters that are used according to application and surface of housing. PU Foam, Gel (liquid), and EPDM gasket types are applied to HEPA Filter to provide air tightness between HEPA Filter and HEPA Filter Box.



EPDM Gasket



PU Foam



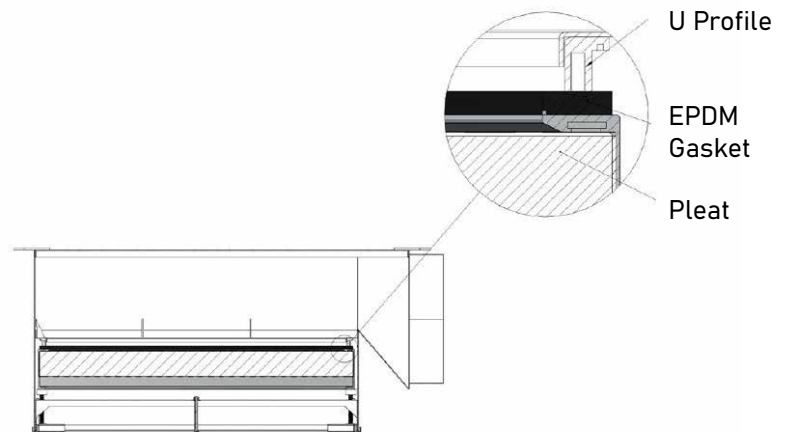
Gel Gasket

Leak arising from the filter-box interface are eliminated by selecting the appropriate gasket type. So, commissioning tests can be performed quickly without any leakage between filter and box.

EPDM

EPDM gasket is generally used in filter box which has test groove system (U profile). It could also be made suitable by increasing the U profile height for filters with gel gasket type.

EPDM gasket is also suitable for filter box with flat surface. Also, it can be easily repaired.

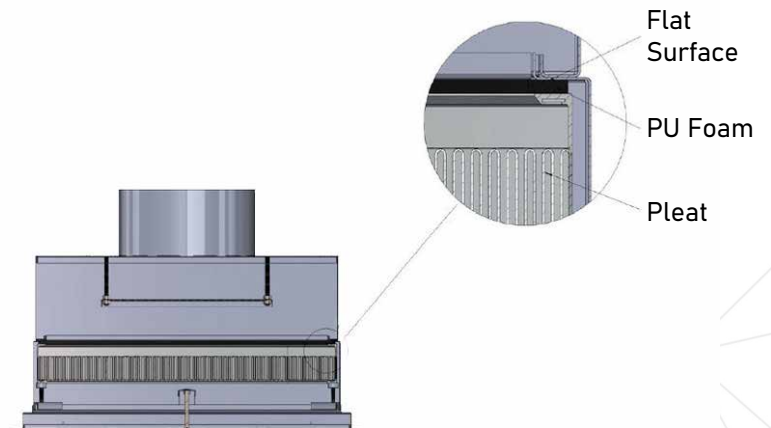


PU Foam

PU Foam gasket is the most popular gasket type for filter box with flat surface.

It is prepared in desired properties with two-component polyurethane and automatically applied by the machine.

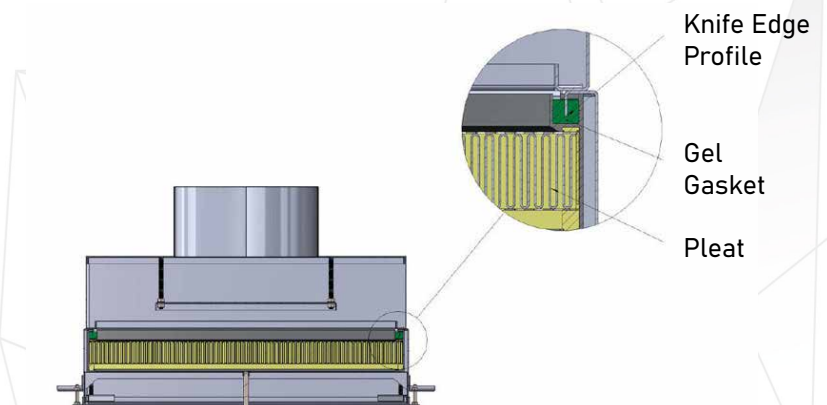
It is also endless and cannot be repaired on site, needs to be renewed at factory.



Gel Gasket

Filter box with knife edge frame system are manufactured for the filters with gel gasket. Sufficient amount of gel is filled into the special channel of the HEPA Filter frame by machine.

Compared to the other gasket types, it is the model with the least risk of leakage between filter and box.



3.4 Air Diffusers

The supply air is passed through the diffuser and is distributed throughout the room. The distribution of air can be turbulent or homogenous, depending on the diffuser models for HEPA Filter Box that are used according to suspended ceiling type and cleanroom application.

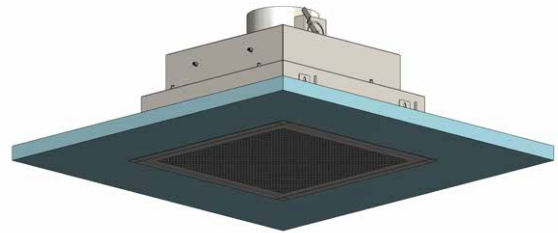
There are diffuser models such as perforated, swirl, square, turbulent etc.

The perforated and swirl diffuser that are mentioned in this document are the most popular models.

Diffusers are fixing from four corners or central with bolts that also can be assembled with a two hanger pins on one side and locked with two fixing magnets on the other side depends on customer request.

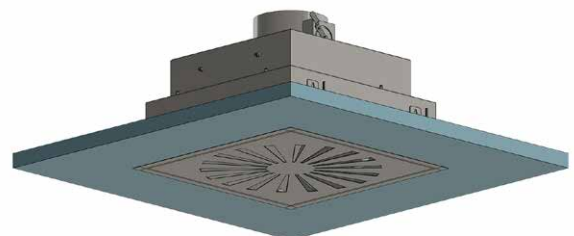
Perforated Diffuser

Perforated diffuser is designed to ensure that the conditioned air is distributed homogeneously.



Swirl Diffuser

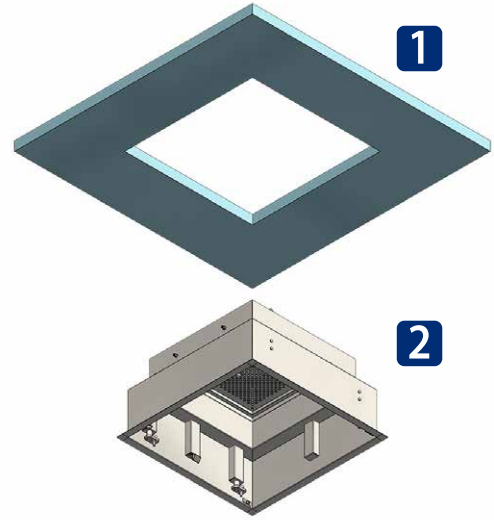
Swirl diffuser is designed to ensure that the conditioned air is distributed by means of the swirling effect.



4. Tool Free

This section consists of HEPA Filter Box, HEPA Filter and Air Diffuser that are designed according to Tool Free design.

- 1** Suspended Ceiling
- 2** HEPA Filter Box



4.1 HEPA Filter Box

HEPA Filter Box features of this project are as follows;

- Manufactured from 1,5mm sheet metal
- Painted min. 70µm epoxy and min. 70µm in RAL 9010.
- HEPA Filter Box hanging parts and height adapters.
- The diameter of support is 50mm.
- The box can be mounted on two different panel thicknesses 50mm and 100mm.
- The frame width of HEPA Filter Box is 30mm.

- Damper rod is made of aluminum material.

- All additional components such as springs, bolts, stamps, nut bolts, screws inside the box are made of stainless steel.

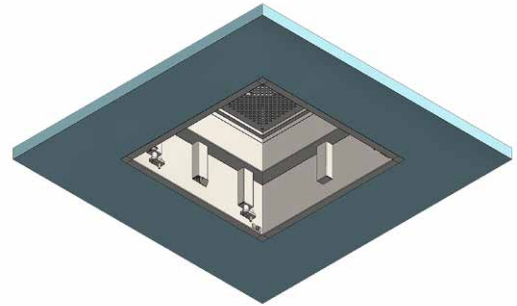


Figure 4 - Antibacterial Silicone - Four sides between HEPA Filter Box and ceiling floor

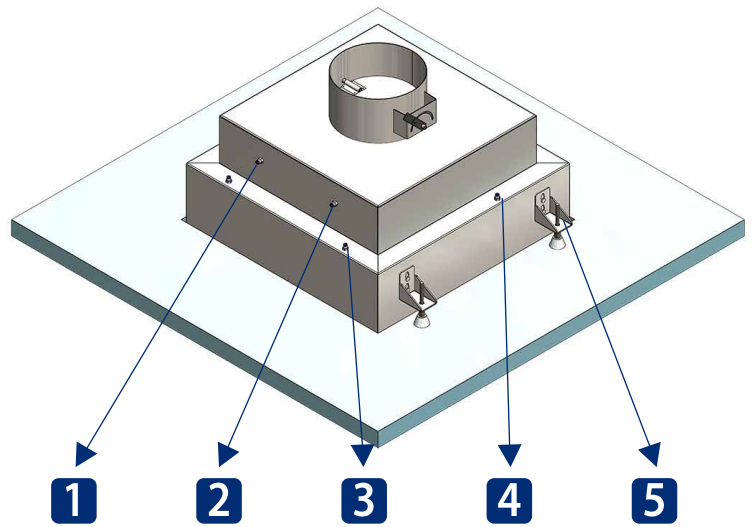
HEPA Filter Box dimensions produced within the scope of this project:

HEPA Filter Box Dimensions	HEPA Filter Dimensions	Cut-Out Dimensions	Spigot Diameter	Package Weight
(W+70)x(L+70) (mm)	WxLxD (mm)	(W+90)x(L+90) (mm)	(mm)	(kg)
605x605	535x535x150	625x625	250	28
645x645	575x575x150	665x665	250	29,5
680x680	610x610x150	700x700	250	31,5
680x680	610x610x150	700x700	315	32

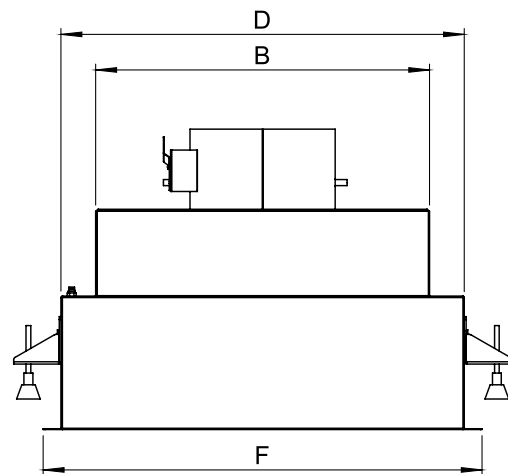
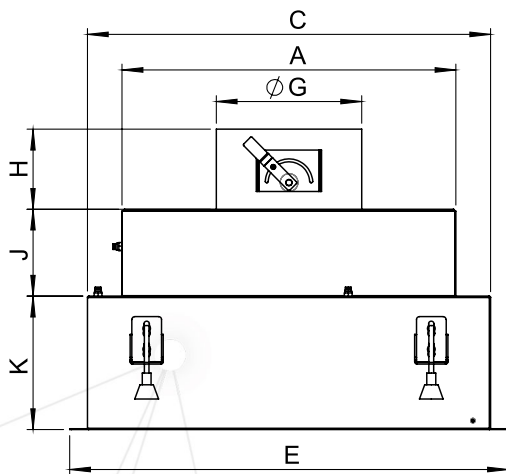
4.1 HEPA Filter Box

Top view of assembled HEPA Filter Box

- 1** 100% (DOP/Emery Sampling Port)
- 2** ΔP (+) Port
- 3** ΔP (-) Port
- 4** Aerosol Injection Port
- 5** HEPA Filter Box Mounting parts (4 pcs.)



Tool Free Design HEPA Filter Box dimensions



Box Model	A	B	C	D	E	F	G	H	J	K
HFB-PX-E7A-605x605x505-FD/P	488	488	605	605	665	665	250	135	145	225
HFB-PX-E5A-645x645x505-FD/P	528	528	645	645	705	705	250	135	145	225
HFB-PX-E1A-680x680x505-FD/P	563	563	680	680	740	740	250	135	145	225
HFB-PX-G1A-680x680x505-FD/S	563	563	680	680	740	740	315	135	170	225

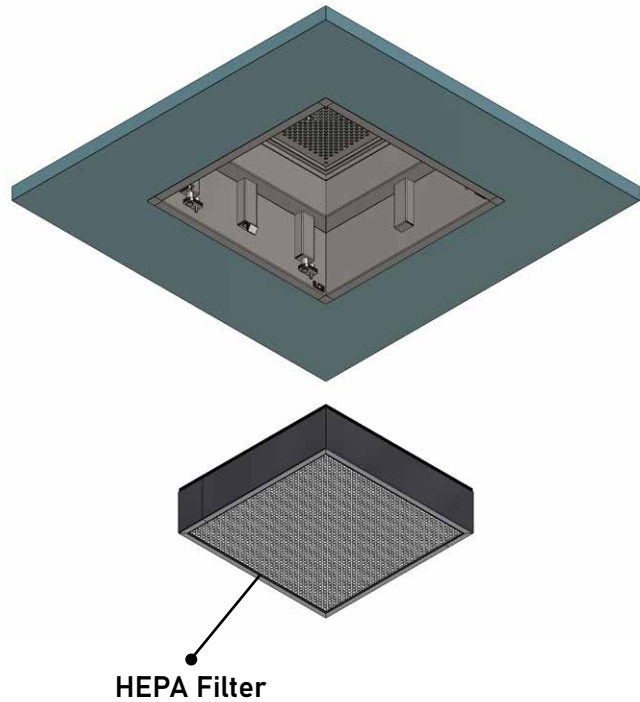
You can check the technical drawings of the HEPA Filter Box

4.2 HEPA Filter Model


Filter selected by considering criteria such as initial pressure drop, air flow etc. to decrease the energy consumption and ensure long service life.

Selected HEPA Filters;

- H14 class according to EN 1822 standard
- Minimum efficiency value of the filters is %99.995 according to MPPS
- Filter frame depth 150mm
- Filter with PU Foam gasket
- Faceguard on both sides



Pleat Features of Used H14 HEPA Filter

Filter Pleat	Pleat Height (PH-...) (mm)	Pleat Code	Filtration area per m ² face area	Filter Class (EN1822)	Pack resistance @ nominal air velocity (0,45m/s) (Pa)	Available Frame Code for pleat	Available Frame Depth for pleat (mm)
	125	7	63,2	H14	70	AX	150

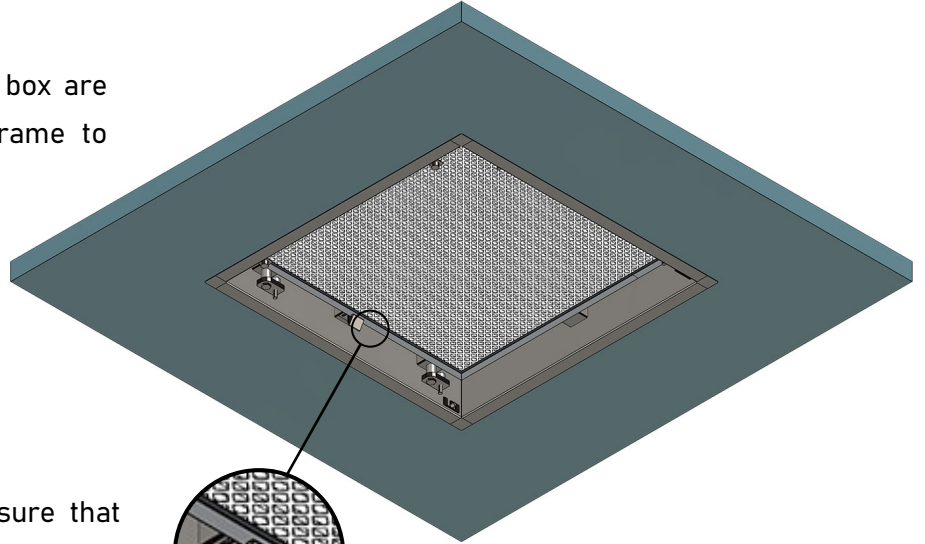
Used HEPA Filter Model and Features

HEPA Filter Model	Filter Class	Dimensions WxLxD (mm)	Nominal Airflow (m ³ /h)	Initial Pressure Drop (Pa)	Faceguard	Gasket
HC-H14-AX-610x610x150-FB/7P	H14	610x610x150	600	70	Both Side	PU Foam
HC-H14-AX-610x610x150-FB/7P	H14	610x610x150	600	70	Both Side	PU Foam
HC-H14-AX-575x575x150-FB/7P	H14	575x575x150	535	70	Both Side	PU Foam
HC-H14-AX-535x535x150-FB/7P	H14	535x535x150	465	70	Both Side	PU Foam

4.2 HEPA Filter Model

About HEPA Filter Assembling

The filter fastening clips in the box are turned to be parallel to the frame to place HEPA Filter.

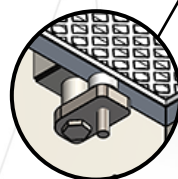
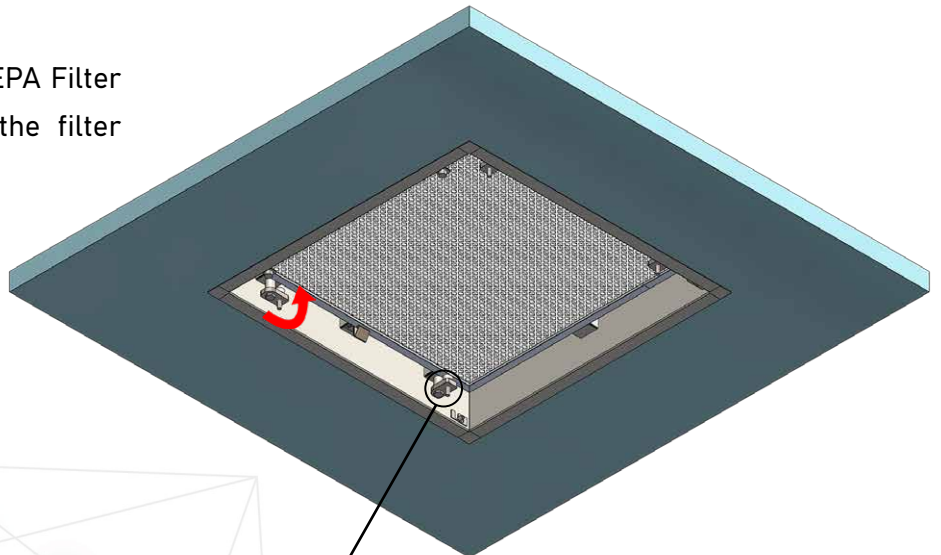


The filter mounting springs ensure that the filter hangs in the HEPA Filter Box.



Filter Mounting Spring

Fixing the HEPA Filter in the HEPA Filter Box is completed by turning the filter fastening clips 90°.



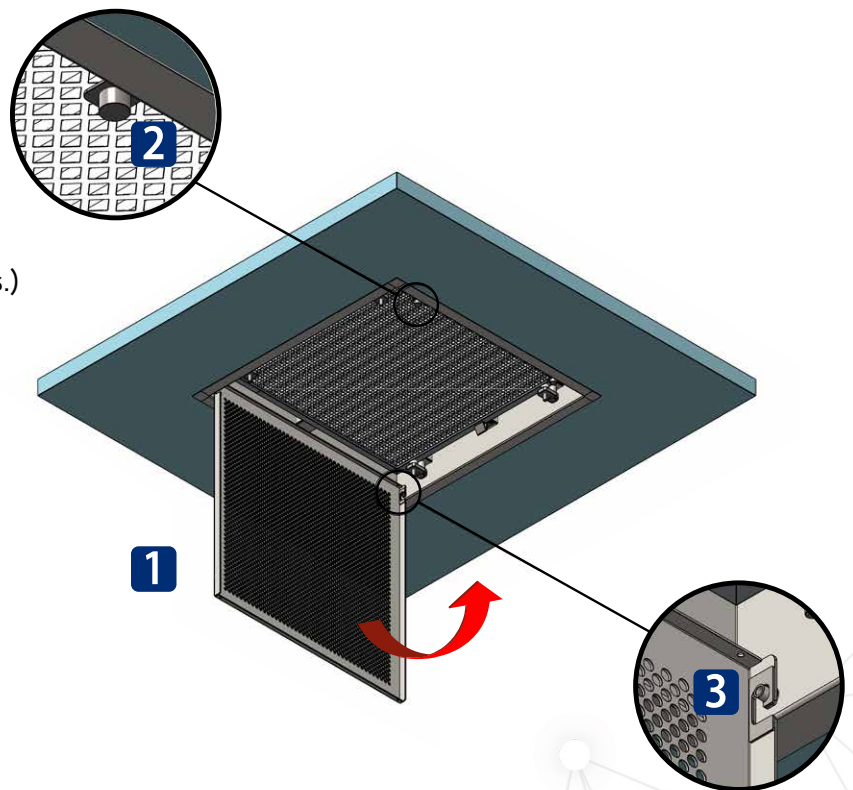
Filter Fastening Clips (4 pcs.)

4.3 Air Diffusers

Within the scope of this project, diffusers are assembled with a two hanger pins on one side and locked with two fixing magnets on the other side.

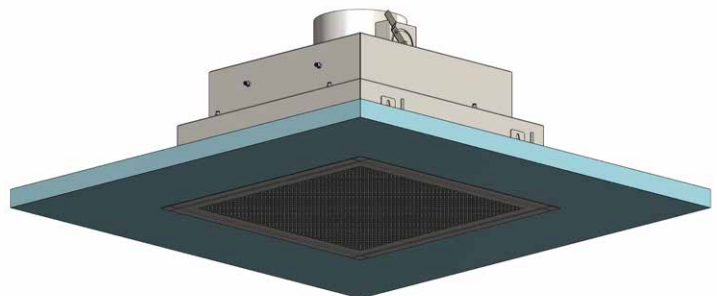
Perforated Diffuser

- 1** Perforated Diffuser
- 2** Diffuser Fastening Magnet (2 pcs.)
- 3** Diffuser Hanger Pin (2 pcs.)



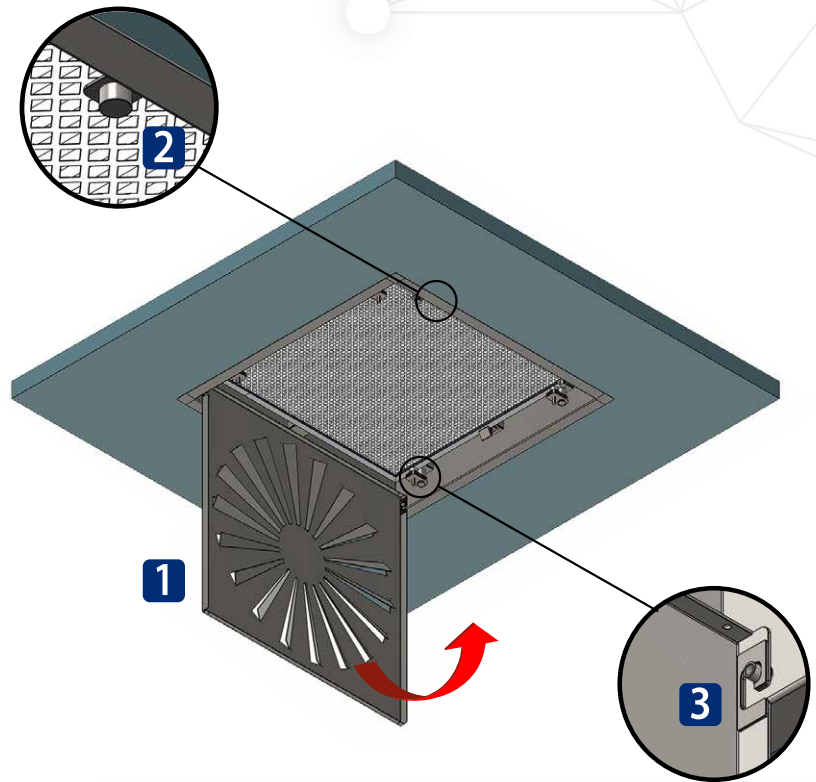
Ulpatek Codes of HEPA Filter Boxes produced with perforated diffuser:

- HFB-PX-E7A-605x605x505-FD/P
- HFB-PX-E5A-645x645x505-FD/P
- HFB-PX-E1A-680x680x505-FD/P



Swirl Diffuser

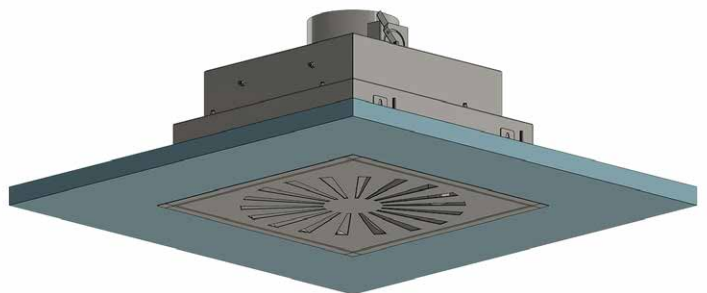
- 1 Swirl Diffuser
- 2 Diffuser Fastening Magnet (2 pcs.)
- 3 Diffuser Hanger Pin (2 pcs.)



Ul patek codes of HEPA Filter Box produced with swirl diffuser:

- HFB-PX-G1A-680x680x505-FD/S

Note: Some dimensions are different in the HEPA Filter Box with swirl diffuser and perforated diffuser. Check the dimension table at section 4.1.



4.4 Label Information

The ports indicated in the figure will be provided for pressure monitoring and DOP testing:

All the quick connections will be for hose size D 6/8 mm tubing (Black for 100% sampling, blue for aerosol injection).

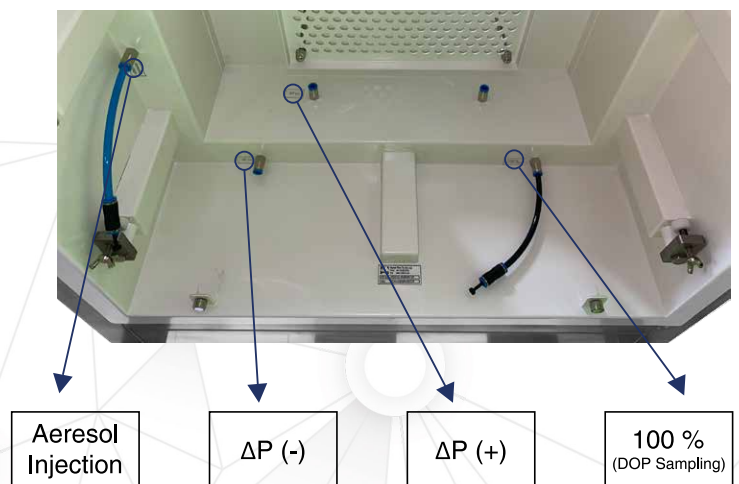


Figure 5 - Label Information of HEPA Filter Box

5. Assembling

1

The packaged cardboard box is opened. The foam plate at the top is removed.

The diffuser is taken out from the HEPA Filter Box and so that it is ready to take out of the cardboard box by two technicians.



3

HEPA Filter Box fixed in the place on the suspended ceiling from loft by a technician by tightening the hanging parts.

The process is completed when there is no gap between the HEPA Filter Box and the suspended ceiling.



2

HEPA Filter Box is located on the suspended ceiling by two technicians until others fix it from loft (technical area).



4

The filter fastening clips in the box are turned to be parallel to the frame to place HEPA Filter.



5. Assembling

5

The HEPA Filter is placed in the HEPA Filter Box.



6

The filter is seated on the filter mounting springs. These springs ensure that the filter hangs in the HEPA Filter Box before the thumb screws on the fastening clips are tightened.



7

The filter fastening clips are rotated 90° to fit the filter into the HEPA Filter Box.



8

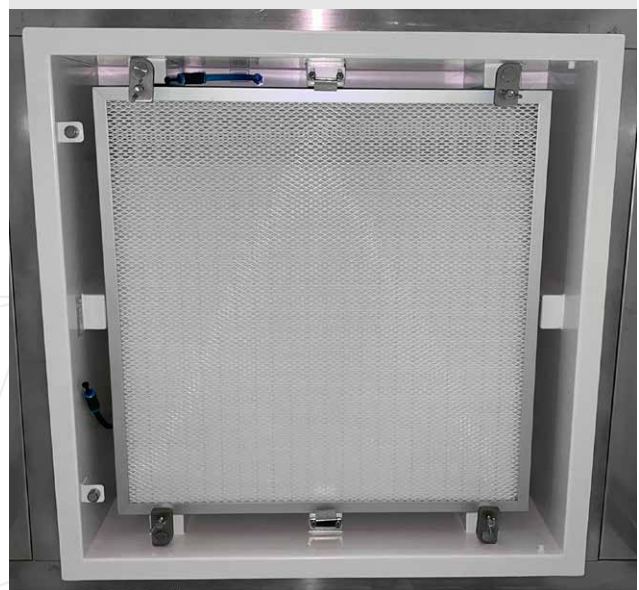
The thumb screws are tightened.

The technician who assemble the device should be very careful at this stage. If the screws are tightened too much, the filter may be damaged.



9

Fixed the HEPA Filter into the HEPA Filter Box.



5. Assembling

10

The diffuser is placed on the diffuser hanger pin in the HEPA Filter Box.



12

Assembled the HEPA Filter Box.



11

The diffuser is closed. Lock system is made with two diffuser fastening magnets hidden inside the HEPA Filter Box.



6. Filter Change

1

The diffuser, which is locked with a diffuser fastening magnet, is opened.



3

The thumb screws on the filter fastening clips are loosened.



4

The filter fastening clips in the box are turned to be parallel to the frame.



2

The diffuser can be removed from the diffuser hanger pin. This is optional. Normally, not need to do it for removing filter.



5

The filter mounting springs are pressed to unlock filter and remove.



6

The HEPA Filter is removed from its place in the HEPA Filter Box.



After these procedures, the contaminated HEPA filter is replaced with a new HEPA Filters. The new HEPA filter is assembled as described in section 5.

7. Packing

1

Each cardboard box are prepared one by one in accordance with the dimensions of the HEPA Filter Box.

Four pieces of foam in the shape of rectangular prism are placed into the cardboard box according to the inlet duct of the HEPA Filter Box.



2

The HEPA Filter Box is properly placed in the cardboard box.



3

The diffuser is placed on the HEPA Filter Box.



4

A foam plate is placed on top of the diffuser to protect the HEPA Filter Box from possible impacts.



5

The cardboard box is closed with packing tape and is ready to be loaded on pallets.



7. Packing

After the packing process is completed, the cardboard boxes are placed on pallets as 8 boxes in 1 pallet (2 of them are side by side and 4 of them on top of each other).

While packed cardboard boxes of HEPA Filter Box are placed on the pallets, plywood with thickness 5 mm is placed between the boxes at each floor.

Additional cardboard corner is also placed at the corner of each pallet to protect products against crushing and impacts. Each pallet is finally wrapped with stretch.



Product	Ulpathek Code	Cardboard Box Dimensions (cm)			Pallet Dimensions (cm)	
		W	L	H	W	L
HEPA Filter	HC-H14-AX-610x610x150-FB/7P	33	63	63	100	130
	HC-H14-AX-610x610x150-FB/7P	33	63	63	100	130
	HC-H14-AX-575x575x150-FB/7P	33	63	63	100	130
	HC-H14-AX-535x535x150-FB/7P	33	63	63	100	130
HEPA Filter Box	HFB-PX-G1A-680x680x505-FD/S	745	745	745	800	1600
	HFB-PX-E1A-680x680x505-FD/P	745	745	745	800	1600
	HFB-PX-E5A-645x645x505-FD/P	710	710	710	800	1600
	HFB-PX-E7A-605x605x505-FD/P	670	670	670	800	1600

Note: The HEPA Filters are packaged as 2 filters in a cardboard box. Each packed cardboard box of HEPA Filter is placed on pallets and pallets are finally wrapped with stretch.

8. Warnings



Observe the following warnings to prevent malfunctions or danger to persons.

This document may be duplicated and distributed to inform about potential dangers and their prevention.

Basic Safety Rules



The applicable industrial safety regulations are always to be observed when working.



The more whole system is kept clean, the more fault risk is reduced. So, requested operating conditions are provided.



Do not perform any modifications, additions, or conversions on the product.

Staff Qualifications



The products may only be transported, unpacked, operated, maintained, and assembled by suitably qualified, trained, and authorized technical staff.



Only authorized specialists are permitted to make the integrity test periodically.



Company is responsible for all kind of faults, accidents and damages are occurred because of neglecting and inattention.

Assembling



Use all screw. Secure the screws against unintentional loosening.

Make sure that the product is securely positioned at its place of installation until all fastening screws have been tightened.



During the HEPA Filter assembling, the filter should not be over tightened while fixing. If the screws are tightened too much, the filter may be damaged.

Make sure the HEPA Filter Box is completely leak-proof and that all screws have been properly tightened.

If the device slips during installation, leakage can result.

Do not push the HEPA Filters on the faceguards.

Do not hammer the HEPA filters

Any further assembling information required can be taken from the product drawing or Section 5

Maintenance

Emery (DOP) test should be carried out at certain intervals your company decided.

Differential pressure drop of HEPA Filters should be monitored by analog/digital gauge and/or automation.



It is recommended to replace the HEPA Filter when final pressure drop has reached double its initial value.



Differential pressure drop of pre-filters that are in AHU should be checked by gauges and changed at final pressure drop to increase HEPA Filter service life.

Improper Use



The product is exclusively designed for cleanroom according to its technical data.



Using the products in the following ways is prohibited and could be hazardous:

- in an unbalanced position on the ceiling,
- when connections (e.g. screws) coming loose,
- when close to flammable materials or components.

Transport



Injuries may occur due to tipping or slipping during transporting the cardboard boxes.



The HEPA Filter Box is always to be transported with care and in its original packing.

If set down too hard or at an angle, it may cause the HEPA Filter Box to deform.

Carry the HEPA Filters vertically while walking.

Put down the HEPA Filters vertically.

Check the cardboard box and pallet when arrived for transport damage. Damaged products are not to be installed.

Storage



Store the products, in a dry and clean place, protected against the weather in the original packing.



5°C - 40 °C Storage



Do not wet



Protect the device against environmental effects and dirt until final installation.

We recommend storing the filters for no longer than 5 years to guarantee trouble-free operation and the longest possible service life.

Unpacking



Risk of impact and crushing when removing the product from package.

Wear safety shoes and cut-resistant safety gloves.

Some box weighs over 25 kg! Risk of physical injury.



Carefully remove the product from the cardboard box.



Do not drop down any product.



Do not use sharp object.

Do not step on the product.

You can keep in touch with ULPATEK authorized employees about system assembling, operation and maintenance.

9. Abbreviations

HFB	HEPA Filter Box
DOP	Dispersed Oil Particulate
EMERY	4cSt Polyalphaolefin
HEPA	High Efficiency Particulate Air
EN	European Norm
ISO	International Organization for Standardization
RAL	Reichs-Ausschuß für Lieferbedingungen
EPDM	EthylenePropylene Diene Monomer
PU FOAM	Polyurethane Foam
MPPS	Most Penetrating Particle Size
PM	Particulate Matter

ULPALAB

ULPATEK Filtre Test Laboratuvarı



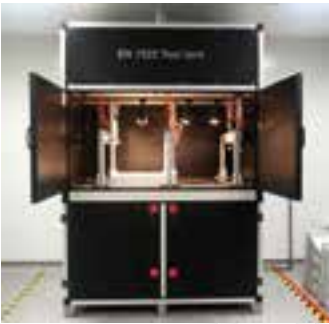
ISO 16890 Test Sistemi - FTS 3401



HEPA / ULPA Filtre Test Sistemi - HUF-SCAN 4002



HEPA / ULPA Filtre Test Sistemi - HF-SCAN 3004



HEPA / ULPA Filtre Test Sistemi
HF-OIL MIST 1200



Filtre Medya Test Sistemi
FMT 102



Performans Test Sistemi - PTS 5002



AIR FILTER TECHNOLOGY



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