

UNDERSTANDING YOUR HEPA FILTER

A quick guide for choosing HEPA filters



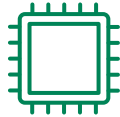
What is a HEPA filter?

A HEPA filter is a type of pleated air filter that is used in clean and controlled environments to reduce the number of particulates in the air. HEPA is an acronym for High Efficiency Particulate Air (filter). HEPA filters are used in applications where clean and controlled air is required to protect people, products and processes from even the smallest particulates, that can travel through the air stream.

Key industries using HEPA filters



Life Sciences



Microelectronics



Healthcare



Food and Beverage

Types of HEPA filters



Panel HEPA filters are used when low airflow requirements and a controlled air distribution is required. These can often be used in the ceilings of controlled environments (**Cleanroom class ISO 8 or better**), as well as specialist applications such as downflow booths.



High Airflow HEPAs, often referred to as Compact or V-Bank HEPA filters are used in applications with high airflow. You will often find these within your supply air application such as your air handling units or in safe change exhaust air applications.



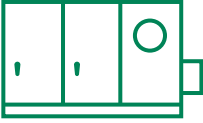
In some applications the high filtration efficiency (HEPA) is linked to a specific installation or requires other design of product. In a lot of cases the HEPA filter are in a cylindrical shape, but nevertheless you should insist on EN1822 classification.

Properties of a HEPA filter

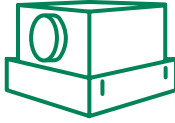
The primary function of a HEPA filter is to capture the particulates that are in the air stream and ensure that the air provided within the environment is optimal. **Not all HEPA filters are created equal** and for this reason, HEPA filters should be evaluated on a number of key properties.

PROPERTY	REASON OF IMPORTANCE
Particulate efficiency	A HEPA filter is characterised by how many particulates and microbes it can remove from the airstream. A tested and certified HEPA filter is key to guaranteeing filtration efficiency. Your HEPA filter should achieve its required efficiency when individually tested to EN1822 test standards.
Physical resistance	Mishandling is often the cause of filter failure during on-site testing. A strong physical resistance is important to help protect against damage of the HEPA filter during transport and installation.
Pressure drop	Pressure drop relates to the energy consumption attributed to the HEPA filter. A low initial pressure drop combined with a steady increase will ensure lower energy consumption.
Lifetime	A HEPA filter is a consumable product that needs to be replaced when it loses efficiency or reaches its final recommended pressure drop. Find out the operating lifetime of your HEPA filter from the filter manufacturer.
Efficiency stability	A HEPA filter should maintain its efficiency to guarantee performance. Ensure the filter maintains efficiency throughout its lifetime.
Solid particle loading	High dust holding capacity is a requirement for extended operational lifetime of your HEPA filter.
Oil particle loading	On-site testing of your HEPA filter is often done through the use of oil based aerosol. Ensuring reliability against oil based particulates will help improve operational lifetime.
Chemical resistance	Chemical products are often used for standard cleaning routines, ensure your filters performance will not be affected by these.

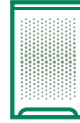
Where to install HEPA filters



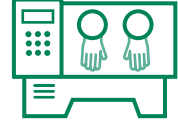
AHU/HVAC systems



Supply and exhaust air housings

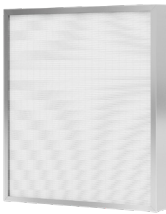


Air purifiers



OEM machinery

Components of a HEPA filter



Filter frame – The frames of HEPA filters can be made using a range of different material including aluminium, galvanised steel, plastic, stainless steel and wood. The frame construction can be determined by the application requirements.

Filter gasket – The filter gasket helps to seal your HEPA filter and to reduce and eliminate bypass by creating an air tight connection. Gaskets widely used are solid gaskets like PU, neoprene and silicone or gel type gasket.

Media separators – The media separators are used to open up the pleats to allow for higher dust holding capacity and less filter resistance. Aluminium, hot melt and glass fibre string are common media separators.

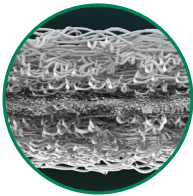
Filter sealant – The filter sealant is used to bind the filter media to the frame and seal up any bypasses. Polyurethane, silicone and ceramic sealants are all commonly used for HEPA filters.

Filter media

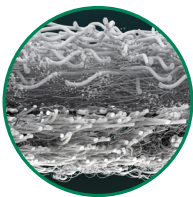
The HEPA filter media is the fundamental part of the final HEPA filter and its here where the filtration properties are most important. For HEPA filters there are three different materials used that can be summed up below:



Glass fibre is the traditional HEPA media that has been used since the 1950s. This media has been the preferred media as it maintains its filtration efficiency throughout its lifetime and has a high dust holding capacity to ensure an optimal performance and increased product lifetime. Fragility of the media requires very careful and experienced handling as a heavy touch can damage the media and allow for filter leakages.



Membrane media was developed in the late 1990s. The premises of the introduction of this media was to bring a lower initial pressure drop for low energy consumption. Efficiency stability and lifetime often come as concerns with this media. Due to its inconsistent oil and particulate loading capabilities the efficiency and pressure drop ratings can be compromised during routine on site testing.

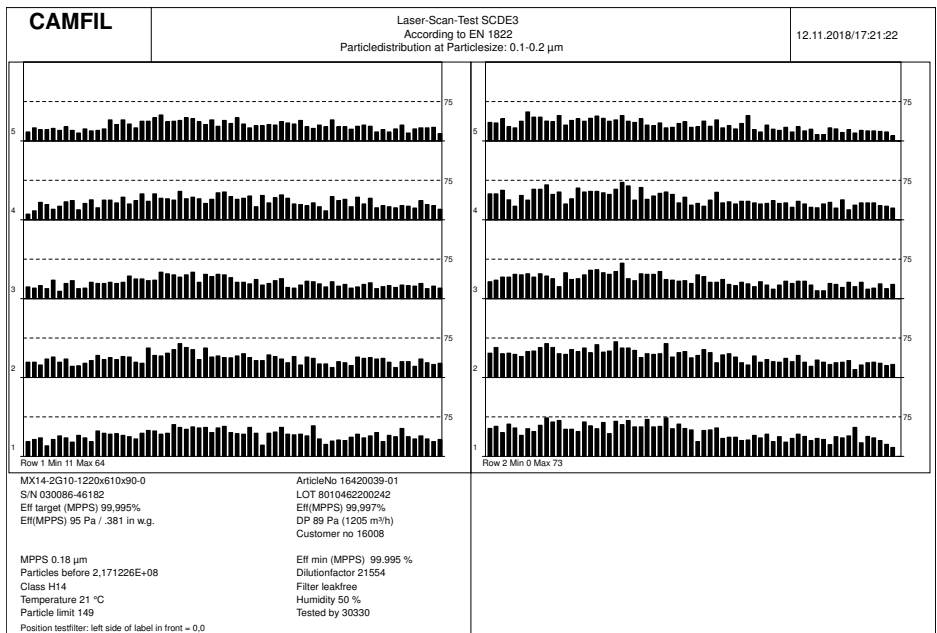


Multi fibre polymeric media is the most recently developed media on the market. The goal of this media is to combine the benefits of glass fibre and membrane media and have none of their faults. Multi fibre polymeric media is typified by its low energy consumption, long filter lifetime and durability.

Testing your HEPA filter

EN1822:2019 – Factory testing

To ensure your HEPA filter is fit for purpose, each HEPA filter should be individually tested and certified according to EN1822 standards. This is a test method to ensure your air filter achieves the performance that is expected and described by your filter manufacturer. This test is done on production sites with each HEPA filter receiving an individual test certificate as proof of efficiency and performance.



ISO 14644-3 – For on-site testing

In most facilities yearly testing and classifications are done within their cleanroom or controlled environment. ISO 14644-3 is the on-site testing protocol recommended for ensuring your HEPA filter is still reaching the desired performance levels. For on-site testing contact a local validation company or your local Camfil representative for advise.

Filtration efficiency chart

When your air filter is tested correctly it should be classified to a grade between E10 and U17. The below table illustrates the filtration efficiency achieved by your HEPA filter based on its classification. E classifications are referred to as EPA filters while U class are referred to as ULPA filters.

EN 1822 CLASSIFICATION			
		Global Value	Local Value
Filter Class	Particle Size for Testing	Collection Efficiency in %	Multiple of Global Efficiency %
E10		≥85	
E11		≥95	
E12		≥99,5	
H13	MPPS	≥99,95	5
H14	MPPS	≥99,995	5
U15	MPPS	≥99,9995	5
U16	MPPS	≥99,99995	5
U17	MPPS	≥99,999995	20

Tips for choosing your HEPA filter



Certified efficiency – Your HEPA filter should be tested and individually certified as per EN1822:2019 test standard. This certification will help to ensure that your sensitive process is as clean and safe as planned.



Individually serial numbered – As proof of performance check that the individual filter has been tested. This will ensure your filter is not “Batch Tested” and is fully traceable.



Low pressure drop – A high pressure drop in a HEPA filter can result in higher energy costs. Ensure your filter has a low pressure drop with a slow increase through its lifetime.



Long life – The overall efficiency is hard to test on-site. Ensure to choose a HEPA filter that maintains efficiency and performance throughout its lifetime so your valuable processes are always protected.

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