Novus air GmbH • Zur Alten Elektrowärme 9 • D-01689 Weinböhla

- General statement -

12-12-2020

Confirmation: SASOO effectively filters viruses

Dear Sir or Madam,

We hereby confirm that the "SASOO" filtration system effectively filters viruses, pollen and particles from the ambient air.

SASOO is equipped with tiered filter modules:

- H14-Filter compliant with Std. DIN EN 1822-1
- Activated carbon filter

Viruses are so small that they can be found in the air that infected people exhale. Influenza viruses can be up to 120 nanometers in size, coronaviruses up to 160 nanometers. It is important to know that viruses do not fly around in the air, but are always enclosed in larger droplets − so-called aerosols.

During breathing, every human being emits tiny droplets one micrometer in size. There can be 1,000 to 50,000 droplets per breath. When coughing, the droplets are ten times larger at over ten micrometers. This means that over 90 percent of the aerosols are held back in filters that have a mesh size of two micrometers.

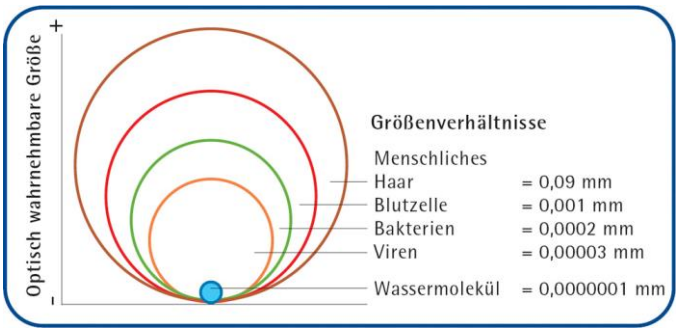

Figure 1: Proportions

With droplet infection, pathogens that settle in the throat or the respiratory tract get into the air when sneezing, coughing, or speaking through tiny droplets of saliva and are then inhaled by another person or ingested directly through the mucous membranes of the upper airways.

- Droplets with a diameter of more than 5 µm sink rapidly in the air and are thus only transmitted up to a good meter.
- Some pathogens can float in the air in droplets of very small size (<5 µm) for a long time and can thus be spread over great distances.

The functionality of a High Efficiency Particulate Arrestor (HEPA) filter is based on a close-meshed fiber network that filters particles effectively. However, HEPA filters do not work like a sieve, in which the mesh size determines the filtration effect. HEPA filters are also highly effective in removing particles from the air that are significantly smaller than the spaces between the fibers. The filtration takes place when the air flows past the fiber network. The following action modes are used:

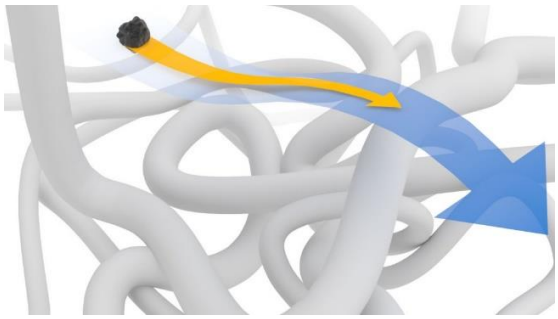

Figure 2: Blocking effect [4]

Blocking effect: Small particles move with the air flow due to their low mass. If the particles come too close to a fiber, they are attracted by adhesive forces and stick to the fiber.

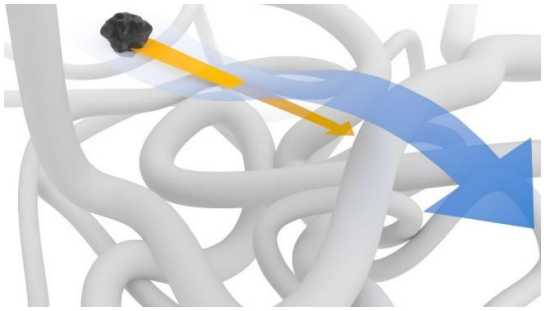

Figure 3: Inertia effect [4]

Inertia effect: Larger particles have increased inertia due to their higher mass. If the air flow suddenly changes its direction because it goes around a fiber, the inertia of the particle ensures that it maintains its direction almost unchanged and hits the fiber in the process. Here, adhesive forces ensure that the particle adheres, too.

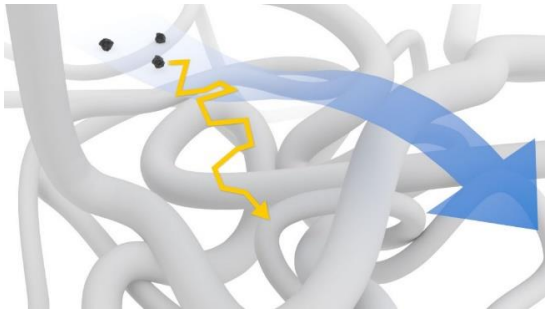

Figure 4: Diffusion effect [4]

Diffusion effect: The smallest particles (as well as very small breath aerosols with bacteria and viruses) are so small that their movement is influenced by colliding with other gas molecules. The constant collision and ricochet (Brownian movement) leads to the particles coming into contact with the filter material and stick to it.

Filters are standardized in Europe. HEPA filters fall into filter class 13 and 14. From filter class H13 on, an individual leak test including a test confirmation is executed for each filter. For filter class determination, each

HEPA filter is completely scanned on the clean gas side, i.e., tested for leakage. The measurement takes place at the particle size with the lowest separation rate, the Most Penetrating Particle Size (MPPS). MPPS is the particle size that can best pass the filter without being separated and is determined beforehand by the filter manufacturer or filter media supplier based on measurements. A typical curve is shown in figure 5.

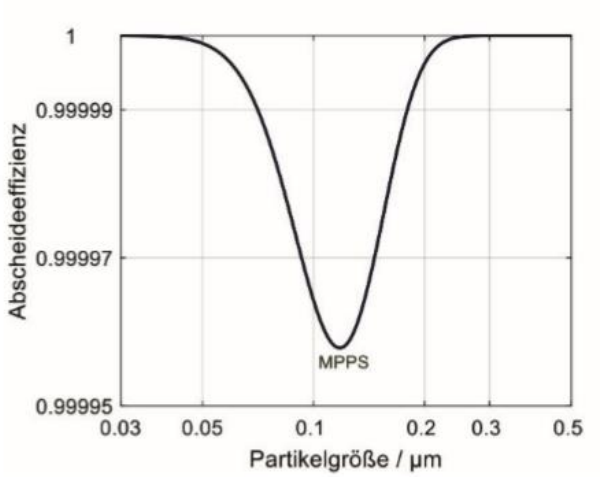

Figure 5: Typical course of the separation efficiency curve of a HEPA filter

The following table shows the required filter figures for HEPA H14 filters:

Filter class	Degree of separation	Transmittance
H14	99.995%	0.005%

Table 1: H14 filter separation rate

These data show that HEPA filters remove a large part of bacteria (0.6-1.0 micrometers) and fine aerosols (0.1-10 micrometers).

Out of 100,000 particles, only five particles pass through an H14 filter. These figures illustrate the advantages of using HEPA filters in terms of reducing air pollutants and aerosols.

This confirms that the SASOO with its H14 filter is suitable for the use of "separation of viruses in closed rooms".

Kind regards

Yours SASOO team

Sources:

[1] https://www.quarks.de/gesundheit/medizin/der-unterschied-zwischen-bakterien-und-viren/, abgerufen am 20.04.2020

[2] http://www.wasser-lebensenergie.de/umkehrosmose/, abgerufen am 20.04.2020

[4] http://www.luftreiniger-abc.de/ratgeber/hepa-filter/, abgerufen am 20.04.2020

[5] Dr.-Ing. Jürgen Hoferer, Einfluss der Filteranströmgeschwindigkeit auf die Abscheideleistung von HEPA-Filtern und das Erreichen der Reinheitsklasse in Reinräumen, September 2017; 1. Auflage