



## Combining the best in electrostatic and mechanical filtration technology

The HEPASilent™ particle filtration technology consists of two steps (fig. 1):

- 1 Charging section for incoming particles.
- 2 Trapping section for charged particles.

In the first step, an ionizer (a high voltage module) fills a chamber with negative ions. Incoming particles will then collide with the ions that will transmit their energy to the particles, giving the particles a negative electrostatic charge.

In the second stage, a gradient structured synthetic filter traps the charged particles. The filtration effect in the media is a combination of mechanical forces and electrostatic forces.

Bigger particles (>1 micron) are trapped mainly due to mechanical forces, while smaller particles (<1 micron) are mainly trapped with electrostatic forces.

A traditional filtration media is good at capturing big particles such as dust and pollen. Pollen are in the size of 10-100 micron and dust about 1-10 micron. These large particles are easily trapped by the filter media fibers like mosquitoes are trapped in a mosquito net and give a

filtration efficiency of up to 100%. Smaller particles, less than 1 micron, penetrate the filter media because they are so small that they can follow the airflow around the filter fibers and get out on the back side of the filter. The result is a low filtration efficiency.

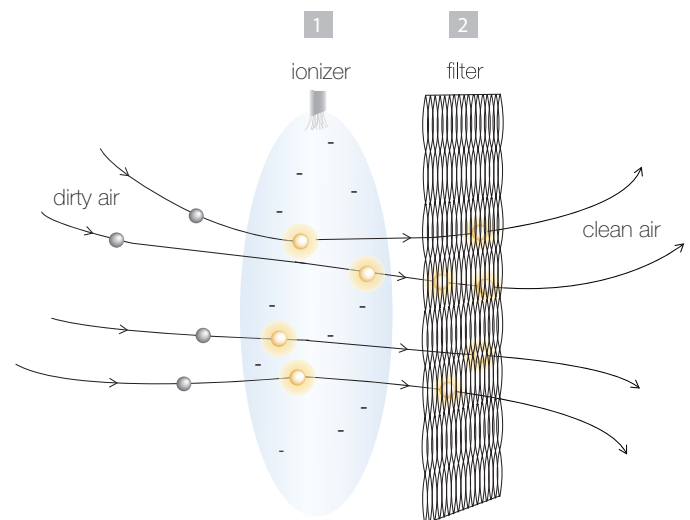


Fig. 1 In the first step, the charging section, incoming particles enter the ionizer where they are negatively charged. The charged particles are then trapped in the second step, mechanical filtration, by the gradient structured filtration media while the clean air effortlessly goes through the filter free from particles.

By giving the particles an electrostatic charge, the filtration efficiency for small particles increases. When the charged particles come near a filter fiber, an attraction force emerges between the particles and the fiber, making the particles move towards the fiber and stick to its surface, instead of following the airflow stream around the fiber and through the filter, fig. 2.

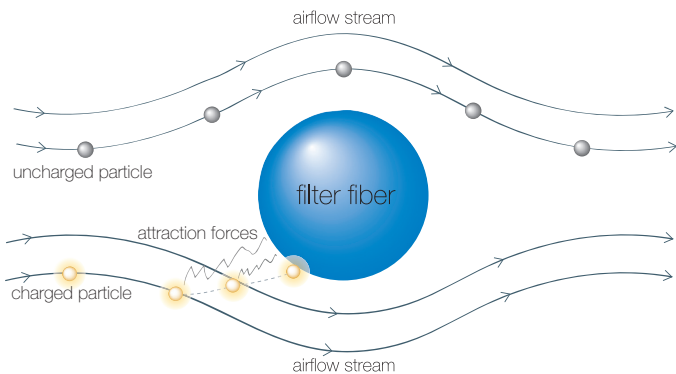


Fig. 2 Uncharged particles follow the airflow stream pass the filter fiber while charged particles are forced from the airflow path by attraction forces.

An example of the effect of the HEPASilent™ filtration system is shown in fig. 3. When the electrostatic force is added to the mechanical filtration the filtration efficiency for smaller particles will increase. It is possible to use different combinations of charging sections and filter media to get desired filtration efficiency and fig. 1 shows one of the possible options.

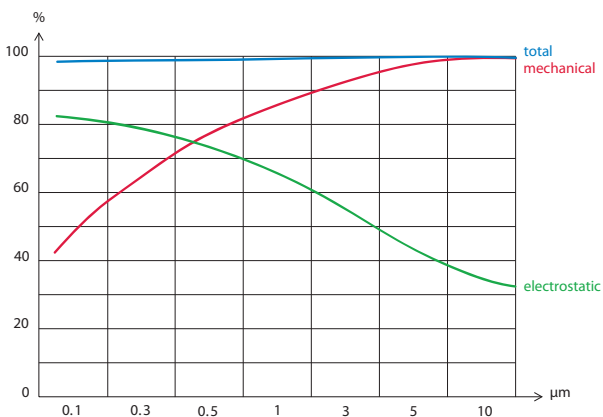


Fig. 3 The mechanical filtration efficiency (red) increases with the particle size while the electrostatic (green) decreases and has higher efficiency in capturing small particles. A combination of both mechanical and electrostatic filtration systems make a total efficiency of 99-100% of all particle sizes.

## Benefits

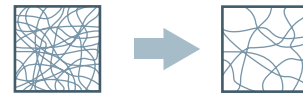
Traditional HEPA filters have very high filtration efficiency but also very high airflow resistance. This makes it difficult to move air through the filter. A media with lower efficiency, where the fibers are not so densely packed, has lower airflow resistance and allows more air to pass the filter.

The HEPASilent™ technology allows Blueair to use less dense filter media and still achieve the same or even better efficiency than air purifiers using traditional HEPA filters. With high airflow combined with high efficiency, HEPASilent™ delivers more clean air and gives a better indoor air quality.

Additionally, the HEPASilent™ technology also gives lower noise and lower energy consumption due to that the fan doesn't need to work so hard to push the air through the filter.

The benefits of the Blueair HEPASilent™ technology can be summarized as in fig. 4 below.

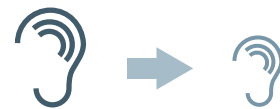
### HEPASilent™ technology allows...



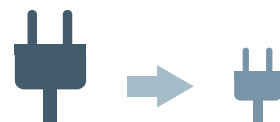
Less dense filter media, which means...



Lower air pressure through the filter, which gives...



Lower noise levels and...



Less energy consumption.

Fig. 4 The HEPASilent™ technology allows less dense filter media which gives lower air pressure, lower noise levels and less energy consumption.