

HEPA Filters for Sars-CoV-2 (Covid-19 Coronavirus)

(My note: HEPA 0.3 micron rating is effective for Covid-19 due to Brownian movement)

American Society for Healthcare Engineering (ASHE)

<https://www.ashe.org/covid-19-frequently-asked-questions>

About ASHE:

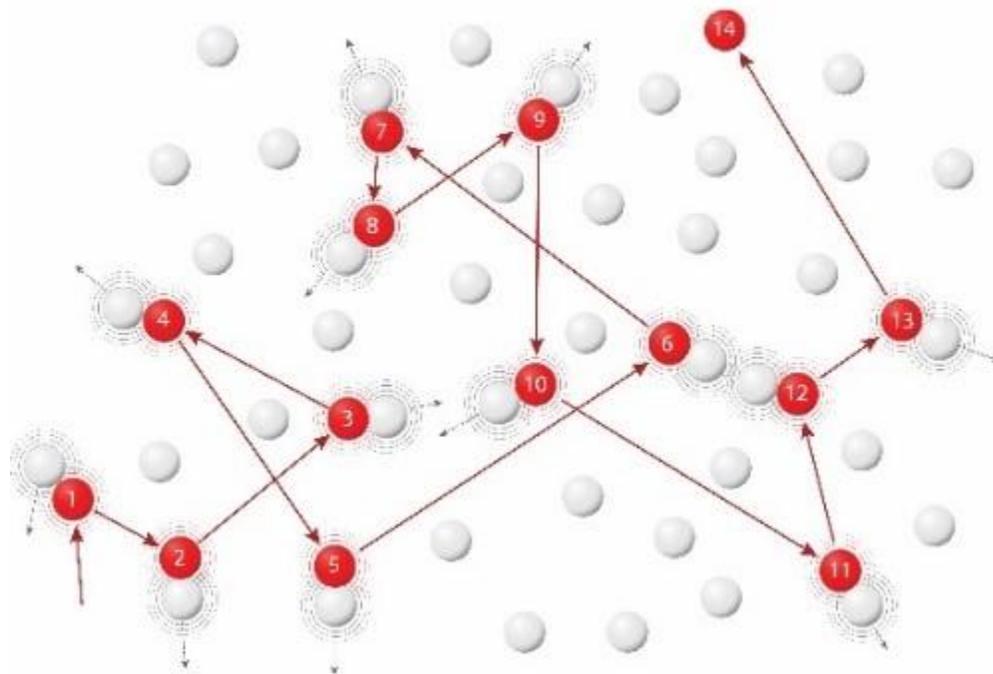
With more than 12,500 members, ASHE is the largest association devoted to professionals who design, build, maintain, and operate hospitals and other health care facilities. ASHE members include health care facility managers, engineers, architects, designers, constructors, infection control specialists, and others. While our membership is diverse, ASHE members share a dedication to optimizing health care facilities and creating and maintaining safe healing environments. ASHE, a professional membership group of the American Hospital Association, is a trusted industry resource that provides education, regulatory guidance, networking, advocacy representation, and professional development for our members. ASHE is committed to our members, the facilities they build and maintain, and the patients they serve.

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FILTRATION

Q: Since the SARS-CoV-2 virus is smaller than 0.3 microns, why are HEPA filters recommended for it?

Brownian motion



A: This is due to Brownian motion, which is the random motion of particles suspended in a fluid such as air. Particles smaller than 0.3 microns are subjected to Brownian motion, which causes them to flow in a zig-zag motion as indicated in the illustration. Even though the particles could fit through the fibers of the filter, the particles' motion and size causes them to come into contact with the fibers and are captured by the filter media due to diffusion. Since particles that are 0.3 microns and larger are not impacted by Brownian motion, HEPA filters are tested at the 0.3 micron size, which is the most difficult particle size to capture. Therefore, even though the SARS-CoV-2 virus is smaller than the tested micron size, HEPA filters are even more efficient at capturing particles of this size than particles at 0.3 microns.

Q: What MERV rating is effective in capturing the SARS-CoV-2 virus?

A: A MERV 16 rated filter is 95% or better efficiency for particles of 0.3 to 1.0 micron sizes. MERV stands for the *Minimum Efficiency Reporting Value* of a filter. It is a method of stating the filter's efficiency based on particle size and is determined by testing filter performance when exposed to particles of a known size in the air stream. Due to the Brownian motion particles smaller than 0.3 microns are trapped within filter media more efficiently than those of the 1.0 to 0.3 micron size thus the MERV 16 is the rating most effective in capturing the SARS-CoV-2 virus.

Q: At what efficiency rate do HEPA filters work against COVID-19?

A: While HEPA filter efficiency is not tested with individual viruses, filters are tested by manufacturers according to methodologies as outlined in Recommended Practices (RP) as published by the Institute of Environmental Sciences and Technologies (IEST) and filter test methods by the International Organization for Standardization (ISO). Filters are challenged with particles or aerosols of specific size and the penetration of each filter is recorded. HEPA filters are labeled based on their efficiency with various particle sizes.

Q: What safety and PPE measures should be taken when changing and transporting filters from air handlers serving COVID-19 patient areas?

A: Due to the air flow through the filter, the SARS-CoV-2 virus will quickly desiccate and die. Additionally, the virus should adhere pretty well to the filter unless the filter is beaten or dropped. If this is a concern, then the use of a fixate, such as hairspray, on the filters could be considered. Disposal should be performed by bagging the filters and disposing them in normal trash.

Q: How often do you need to change HEPA filters on a negative air machine?

A: Filters should be changed based on the facility's current policies and procedures and the negative air machine manufacturer's recommendation. After patient discharge the room should be left vacant long enough to allow sufficient number of air changes to remove potentially infectious particles per the [CDC Airborne Contaminant Removal Table](#). Due to the air flow through the filter, the SARS-CoV-2 virus will quickly desiccate and die and the filter change can be performed with normal maintenance PPE. Additionally, the virus should adhere pretty well to the filter unless the filter is beaten or dropped. If this is a concern, then the use of a fixate, such as hairspray, on the filters could be considered. Disposal should be performed by bagging the filters and disposing them in normal trash.