

Air Filtration and HEPA Air Purifiers

Montana Schools

During the pandemic, the best way to protect ourselves, our children, and our schools is with evidence-based information. Filtration in building heating, ventilation, and air conditioning (HVAC) systems can play a role in a school's overall risk mitigation approach but is not generally regarded as a solution by itself. Likewise, portable High-Efficiency Particulate Air (HEPA) air purifiers are only likely to be effective alongside other measures.

The EPA and many health organizations categorize particulate matter (PM) by size because the size of a particle influences the associated health effects. The size of the Coronavirus is 0.125 microns. As officially defined by the U.S. Department of Energy, HEPA filters are required to have a minimum removal efficiency of 99.97% on particles 0.3 micron in size. Particles larger than 0.3 microns are more easily trapped or intercepted, while smaller particles often lack sufficient mass to penetrate the media. Knowledge of HEPA filter functionality suggests theoretical efficacy for HEPA filters to remove airborne SARS-CoV 2, although direct studies for SARS-CoV-2 have not been performed.

For filters to have any impact on infectious disease transmission, transmission must occur by an airborne route. Filters must be properly installed, maintained and designed for the building and system in which they are used.

If you decide to upgrade or use higher efficiency filters in your HVAC system, choose a filter with at least a Minimum Efficiency Reporting Value (MERV) 13 rating, or as high a rating as your system fan and filter slot can accommodate. MERV ratings are on a scale of 1 to 16 depending on the minimum size of the particles a filter can be expected to capture. You may need to consult a professional HVAC technician to determine the highest efficiency filter that will work best for your system. If MERV 13 filters cannot be installed, the [American Society of Heating, Refrigerating and Air-Conditioning Engineers](#) (ASHRAE) offers several strategies for addressing risk in schools.¹

HEPA filters work mechanically to force (using a fan) air through the filter. There are three levels of air purifiers based on room size - compact styles rooms measuring less than 150 ft², rooms measuring 170-400 ft² and rooms of at least 500 ft². There are also powerful air purifiers designed for open areas over 1,000 square feet. ASHRAE guidelines recommend using HEPA air purifiers/UV machines that can provide a minimum of 2 air rotations per hour. Schools should ensure air flow patterns are adjusted to minimize occupant exposure to particles.¹

When considering portable HEPA air purifiers, the following details are important:

- efficiency and airflow rate of the air cleaner
- sizing and placement within the space
- maintenance and filter change
- nature of space that is being cleaned
- noise level



CDC outlines [strategies](#) for maintaining healthy school environments, including the use of portable HEPA fan/filtration systems to enhance air cleaning, particularly in higher risk areas such as the nurses office or special education classrooms.^{2,3} When used correctly, portable HEPA filters can enhance the school's overall COVID-19 risk mitigation strategy and can also keep indoor air clean when confronting poor outdoor air quality conditions due to wildfire smoke or other potential pollution events. Air purifiers with an ionizing feature can produce ozone, which has been shown to trigger asthma attacks. Avoid purifiers with an ionizing feature or consider shutting this feature off. Before purchasing air purifiers for use in the school setting, carefully review all product specifications and consider how they fit within the larger plan.⁴

Air cleaning may be useful to increase air flow when used with source control and ventilation, but it is not a substitute for either method. The use of air cleaners alone cannot ensure adequate air quality, particularly where ventilation is insufficient. More importantly, in most buildings and in most situations, filters may be considerably less effective than other infection control measures including social distancing, use of face coverings, isolation of known cases, and hand-washing.

School Specific Resources

¹ASHRAE [Reopening of Schools and Universities](https://www.ashrae.org/technical-resources/reopening-of-schools-and-universities) <https://www.ashrae.org/technical-resources/reopening-of-schools-and-universities>

²CDC [Operating schools during COVID-19: CDC Considerations](https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/schools.html) <https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/schools.html>

³CDC [Strategies for Protecting K-12 School Staff from COVID-19](https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/k-12-staff.html). <https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/k-12-staff.html>

⁴Environmental Protection Agency [Air Cleaners, HVAC Filters, and Coronavirus \(COVID-19\)](https://www.epa.gov/coronavirus/air-cleaners-hvac-filters-and-coronavirus-covid-19) <https://www.epa.gov/coronavirus/air-cleaners-hvac-filters-and-coronavirus-covid-19>

