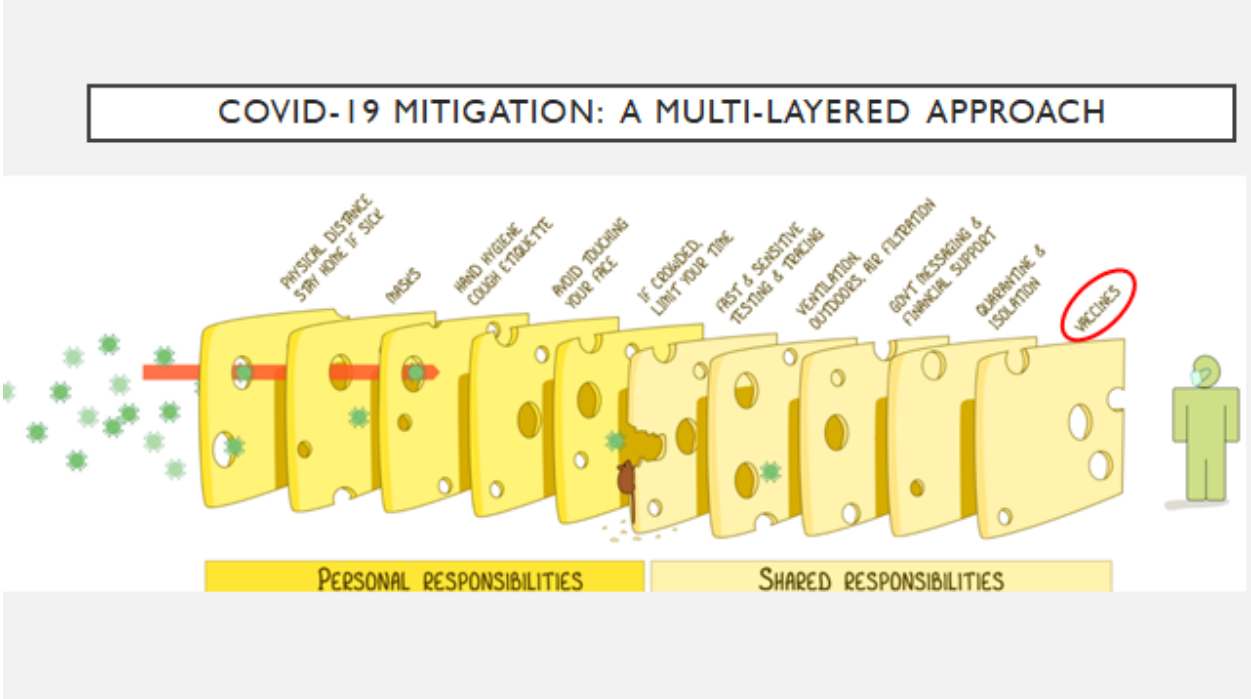
PORTLAND PUBLIC SCHOOLS

# Frequently Asked Questions
# Building Ventilation

Update: 07 29 2021

**Introduction**

The CDC recommends a layered strategy to reduce exposures to SARS-CoV-2, the virus that causes COVID-19. This includes using multiple mitigation strategies with several layers of safeguards to reduce the spread of disease and lower the risk of exposure. While it may not be necessary to apply every consideration to be protective, implementing multiple mitigation strategies is recommended, if possible, to improve effectiveness. In addition to ventilation, the layered approach includes efforts to improve social distancing, wearing face masks, and hand hygiene." The below graphic, utilized by PPS's Health Advisory Panel, illustrates this layered approach:




PPS has worked with outside consultants and public health experts to develop a building Ventilation Standard Operating Procedure (SOP) that applies to all buildings within the district. PPS operates approximately 80 schools totaling over 200 buildings. The style, age and condition of the ventilation systems in the buildings range significantly throughout the district and optimizing system performance is an individual school and individual system effort.

**Can building air filtration protect me from getting COVID-19?**

Filtration in building heating, ventilation, and air conditioning (HVAC) systems can be a part of an overall risk mitigation approach but is not generally regarded as a solution by itself. There is no direct scientific evidence of benefit, but some reduced exposure can reasonably be inferred based on the ability of some filters to remove particles that contain a SARS-CoV-2 virus.

In order for filters to have any impact on infectious disease transmission, transmission has to occur through the airborne route, filters have to be properly installed and maintained in appropriate systems to treat recirculated air, and filters have to be appropriately designed for the building in which they are used. More importantly, in most buildings and in most situations, filters may be considerably less effective than other infection control measures including social distancing, wearing a face mask, isolation of known cases, and hand-washing.

**What filter should I use to protect those in my building from COVID-19?**

There is no obvious answer to this question, given unknowns about the nature of SARS-CoV-2 containing particles and droplets, as well as the broader issues raised above. We do know that low-efficiency filters (e.g., less than MERV 8 according to ASHRAE Standard 52.2 or less than ePM2.5 20% according to ISO 16890-1:2016) are very unlikely to make a difference. Properly installed higher efficiency filters can remove particles of a relevant size depending on their installed capture efficiency, but current information does not allow for specific recommendations.

PPS is in the process of Increasing the building filter level from MERV8 to MERV13 in buildings that are able to accommodate MERV13 (note: not all buildings will have MERV13, but all have a minimum of MERV8).

**Why shouldn't I just use the highest-efficiency filter that I can find?**

High-efficiency filters may be appropriate for your building, but they can also be counterproductive. A high-efficiency filter may have a high initial pressure drop and/or load with dust and particles very quickly, thus requiring frequent filter changes. A high-pressure drop filter (either because it is that way when it is new or because it loads quickly) can also cause more air to bypass the filter if it is not properly installed and well-sealed. Depending on the design of your system, a high-pressure drop filter can also diminish the amount of air supplied into the environment, making the filter less effective as well as causing other problems with other parts of the HVAC system.

**Why didn't the District upgrade air filters at the beginning of the pandemic?**

When the pandemic first began**,** little was known about how air filtration related to the spread of COVID-19. As health experts began to learn more about how the disease was transmitted, it became clear that filtration was an integral part of any successful mitigation strategy. The District began the process of upgrading its filters to MERV 13 in late 2020 in an attempt to be proactive in its filtration strategy. New products became available that mitigated the pressure issues that traditional MERV 13 filters caused on existing systems, and as supply chain issues subsided the District was able to begin this effort.

**I know that hospitals have good filtration, why don't we all just use systems like these?**

Hospitals (and many healthcare facilities) have specially designed mechanical systems that can accommodate the levels of filtration that they need. They often rely on other systems and control strategies (e.g., UV lamps, humidity control, airflow management) to maximize the benefit from filtration. Most importantly, they have dedicated staff who operate and maintain this equipment so that it provides maximal benefit.

**What about ultraviolet (UV) lamps, do they work?**

A properly designed and maintained UV system, often in concert with filtration, humidity control, and airflow management, has been shown to reduce infections from other viruses. The details of the system are very important (e.g., design of fixtures, lamp type, lamp placement airflow amount and mixing, etc.). Simply adding UV to an existing system without consideration of these factors has not been demonstrated to have a benefit.

**What about ionizers, ozone generators, plasma, and other air cleaning technologies?**

None of these technologies have been proven to reduce infection in real buildings, even if they have promise based on tests in a laboratory or idealized setting. Some of them have substantial concerns about secondary issues (such as ozone production).

**What about portable air cleaners?**

Similar to building filtration, there is no direct clinical evidence of the benefit of portable air cleaners for reducing infectious disease risk, but some benefits can be reasonably inferred for appropriately sized (e.g., their removal rate is appropriate for the room), maintained, and operated portable HEPA filters. As with building filtration, the details are important (e.g., 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) and appropriate portable filtration is only likely to be effective in concert with other measures.

Every PPS classroom and symptom space, regardless of building filter type, will receive a portable HEPA air purifier. HEPA filtration removes 99.97% of particles at 0.3 microns and is the standard filter used to capture virus aerosols.

**How did PPS select the Intellipure portable air purifiers?**

Several factors were considered in the selection of the Intellipure air purifiers, see first link below. These units are manufactured by Healthway and distributed by Delos. Delos markets the Intellipure Ultrafine 468 units (see second link) as "The Intellipure Ultrafine 468 system is capable of 99.99% aggregate removal of particles down to 0.007 microns in size."

PPS requested third-party filter testing data from Healthway prior to purchasing these units. The definition of a HEPA filter is a filter that provides 99.97% removal of particles 0.3 um (microns) in size. The test results we were provided by the manufacturer confirmed that level of efficiency. We have attached the testing data in the third link, see test results at 0.300 um (microns) in the second table on page three entitled Data - Particle Removal Efficiency. At 0.300 um the efficiency is 99.9702%.

https://docs.google.com/document/d/1nYV4qOmWNMUziKzhocYmCG1wa4u9YlcVhcwOVpsJAcw/edit

https://docs.google.com/document/d/1230yiE83jkC65TP_NE1wBhWFXdLiuApabdVEN_D8ubg/edit

https://drive.google.com/file/d/1-4UgY68HAvgEX5GigudN1cfCKyFNPbaU/view?usp=sharing

**Doesn't filtration require that the droplets that cause COVID-19 be airborne? I have heard that it is large droplets.**

Yes, most public health guidance suggests that COVID-19 transmission is predominantly associated with

large droplets. This is why air filtration is only a small part of a solution as it does not generally address transmission from surface contact or from close contact between individuals. However, the distinction between droplet and airborne is particle size. We know that a) droplets can stay airborne for long periods of time (e.g., hours under some conditions) b) droplets change in size based on a number of factors including their composition and the relative humidity of the air around them (low relative humidity will generally cause droplets and particles to become smaller). Further, DNA and RNA from other viruses that are generally associated with droplets have been found on used filters.

**What steps has PPS taken to improve air ventilation in schools?**

With the goal of improving ventilation systems during the pandemic, PPS staff reached out to Multnomah County Public Health officials for guidance. Multnomah County recommended engaging a certified industrial hygienist (CIH) to help develop a ventilation system protocol. To develop PPS's ventilation system protocol, PPS hired a CIH with PBS Engineering and Environmental Inc (PBS).

The CIH with PBS created a Ventilation Standard Operating Procedure (SOP). A copy of the Ventilation SOP can be found here: LINK

**What is a Certified Industrial Hygienist?**

A Certified Industrial Hygienist (CIH) is an individual who has met the CIH requirements for education, experience and passed the CIH exam. By doing so has demonstrated a minimum level of knowledge and skills in the following subject matter areas:

- Air Sampling & Instrumentation
- Analytical Chemistry
- Basic Science
- Biohazards
- Biostatistics & Epidemiology
- Community Exposure
- Engineering Controls/Ventilation
- Ergonomics
- Health Risk Analysis & Hazard Communication
- IH Program Management
- Noise
- Non-Engineering Controls
- Radiation – Ionizing and Non-ionizing
- Thermal Stressors
- Toxicology
- Work Environments & Industrial Processes

**What guidance or standards does PPS's ventilation system protocol follow?**

PPS and PBS looked at many applicable ventilation best practices and all regulatory requirements. The ventilation procedure meets the requirements of:

- The Center for Disease Control and Prevention
- The Environmental Protection Agency
- The American Society of Heating, Refrigerating and Air-Conditioning Engineers
- Oregon Occupational Safety and Health Administration

- Oregon Department of Education
- Multnomah County Public Health

PPS staff reviewed the developed ventilation procedure with Multnomah County Public Health and PPS's Health Advisory Panel.

**What specific actions has PPS taken in the school buildings?**

The standards noted above emphasize maximizing the efficiency of current ventilation systems. PPS operates approximately 80 schools totaling over 200 buildings. The style, age and condition of the ventilation systems in the buildings range significantly throughout the district; the steps to optimize system performance are specific to an individual school. Current efforts underway include:

- Over the past several months a third party contractor has assessed all PPS buildings and identified ventilation deficiencies.
- An additional outside HVAC contractor has been tasked with addressing the deficiencies found in the assessment.
- Routine assessments will continue quarterly to ensure systems are functioning properly.
- All ventilation systems have been reprogrammed to run about 4 hours longer each day (starting approximately 2 hours before staff enter the building and remaining on for 2 hours after) and run continuously throughout the day.
- All fresh air intakes have been recently cleaned and are on a routine schedule to maintain clean intakes.
- Thousands of portable HEPA air purification units have been ordered and will be placed in classrooms and symptom space rooms.
- PPS is in the process of completing indoor air quality measurements at all schools. Results will be made available as results are completed.
- Staff continues to actively pursue other options to optimize maintenance, filtration, and ventilation.

**Should staff open windows?**

As noted in the SOP: Ventilation for each unique school will be optimized on a case-by-case basis. School administrators will also utilize non-mechanical methods such as opening doors and windows where reasonable to increase air circulation. Do not prop open doors that can pose a safety or security risk to students and staff (e.g., exterior doors and fire doors that must remain closed).

**Should staff use fans in their rooms?**

As noted in the SOP: Use of portable fans or space heaters is prohibited where they pose a safety or health risk, such as increasing exposure to pollen/allergens or exacerbating asthma symptoms.

**If my building is having trouble providing adequate heating or cooling, does that mean the ventilation is not working?**

Issues with being able to properly heat or cool a space are HVAC related issues, but not necessarily ventilation problems. In other words, even when an HVAC system is not providing adequate heating/cooling, air flow may still be flowing through the system. In fact, some of the temperature issues could be in part due to the additional amount of outside air coming into the building and the system having trouble keeping up with conditioning (heating or cooling) the air. When a staff member experiences heating/cooling issues, it is important to alert the head custodian right away so an HVAC Technician can assess.

**What indoor air quality or air exchange measurements has PPS completed?**

Indoor air quality testing is a common activity in schools every year. PPS has an Environmental Health & Safety Department that investigates air quality concerns and resolves identified issues.

Public health agencies do not prioritize large scale air quality or airflow measurements as a necessary step for reopenings schools. For example, the CDC does not require any air quality testing nor identify any airflow standards related to COVID or schools. Instead, public health guidance emphasizes that school districts should:

1. Utilize a multi-layered health and safety strategy that includes airborne transmission reduction efforts including wearing masks and physical distancing;
2. Assess and maintain building ventilation systems;
3. Increase airflow in buildings; and
4. Increase filtration in buildings.

Now that PPS has made significant improvements in the above prioritized work, consultants are completing air quality sampling throughout the district. All reports will be made publicly available.

**Where are the Portable Air Purifiers going to be placed?**

Portable HEPA filters will be placed in the following locations:

1. Symptom Spaces
2. Rooms that have been identified with no ventilation
3. Classrooms
4. Other spaces where students are designated to meet with professional educators
5. School Main Offices
6. Other spaces where students and staff regularly meet (ie: counselors offices, principal's offices)

**When are the air purifiers going to be delivered and set up?**

As of March 19, 2021, air purifiers have already been delivered to all schools with Symptom Spaces, and rooms that had been identified as having no ventilation. Purifiers are now being delivered to the classrooms that will be opening in hybrid first, which is Pre-K thru 5. Middle Schools and High Schools will be next to have units distributed. All units will be delivered before hybrid begins. Instructions for air purifier set up

**What size space are the Intellipure and Medify Air purifiers designed to filter?**

The Intellipure HEPA air purifiers are designed to filter 1125 SF spaces w/8' ceilings or 9,000 cubic feet. If the space is larger than 1125 SF, the units still continue to filter the air, it just takes longer to filter the volume of air in the larger room. The Medify AIr HEPA purifiers are designed to filter larger room spaces. Keep in mind that the air purifiers are just one of several strategies that PPS uses to reduce the risk of COVID-19 infection. This includes wearing masks, hand hygiene, physical distancing, cohorting, surface disinfection and increasing the run-time of the building ventilation system.