

COVID-19: Improving Ventilation

Information for School Administrators & Maintenance Staff, September 7, 2021

The virus causing COVID-19 is known to primarily spread through respiratory droplets and aerosols. COVID-19 can spread more easily through the air when there are a higher number of people indoors, for a longer period of time, with poor airflow or ventilation. Implement a layered approach to reduce the risk of transmission of COVID-19 in schools, including:

- Physical distancing
- Improving ventilation
- Use of masks indoors
- Environmental cleaning and disinfection
- Respiratory and hand hygiene
- Screening and testing
- Staying at home when sick
- Utilizing cohorts
- Vaccination of eligible students and staff

What is the role of ventilation in reducing the risk of COVID-19 transmission?

Ventilation is the process of mechanically or naturally supplying, diluting or removing air from a space for the purpose of controlling indoor air quality. Improving ventilation can contribute to reducing the risk of COVID-19 transmission in indoor settings by reducing the concentration of viral particles; however, ventilation alone cannot protect people from exposure to COVID-19.

Ventilation does not impact close-range transmission of COVID-19, particularly during close proximity without other protective measures. Occupancy, building type and the activities performed within the space can increase risk of COVID-19 transmission. Ventilation **must be combined with other public health measures** such as physical distancing, hand-hygiene, masks etc. Mechanical ventilation systems can be complex and it is recommended that an HVAC specialist be consulted.

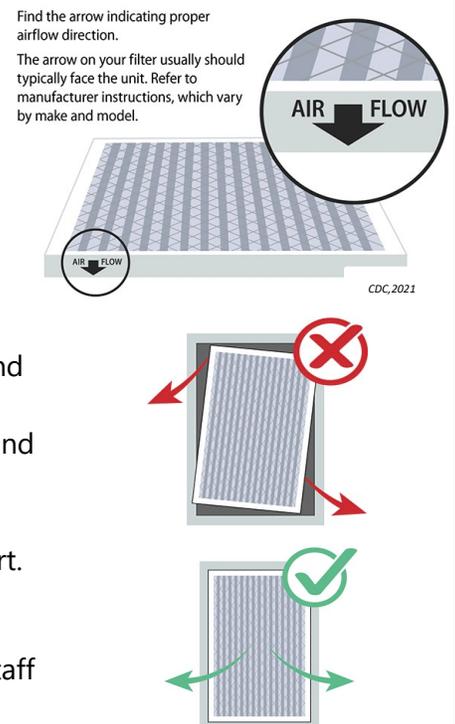
What can school staff do to ensure ventilation systems are operating well?

Most schools have mechanical ventilation systems such as heating, ventilation and air conditioning (HVAC). Typically, these systems are maintained by maintenance staff or HVAC professionals.

It is important to ensure that systems are operating properly and are well maintained. Ensure that:

- Filters are changed as recommended by the manufacturer.
- Filters are properly sized and installed correctly. Filters should fit in the housing rack properly and minimize air that flows around instead of through the filter.
- Air dampers are operating properly.
- Air supply and return grills are not blocked by furniture or equipment, and air handling units are accessible.
- Kitchen and washroom exhaust fans are functional, operating properly, and vented directly outdoors.
- There are no unventilated areas or areas with stale air.
- The HVAC system is balanced to optimize airflow and for thermal comfort.

Mechanical ventilation systems can be complex and it is recommended to consult with a HVAC specialist prior to making changes to the system or if staff are unfamiliar with how to operate and maintain the HVAC system.



What steps can be taken to improve ventilation?

While all mechanical ventilation systems follow the same principles, each system is designed specifically for the building occupancy and purpose. Not all of the following suggestions may apply. It is recommended to consult with a HVAC specialist for specifics related to your mechanical ventilation system and prior to making changes to the system.

Maximize ventilation:

- Disable demand-controlled ventilation that reduces air supply based on occupancy or temperature.
- Keep the system running by setting fan control to ON instead of AUTO to provide continuous air filtration and distribution
- Open outdoor air dampers beyond minimum settings to reduce or eliminate recirculation of indoor air, when weather and conditions permits (i.e. when outdoor air quality is not impacted by wildfire smoke, high allergens, etc.) and in consult with a HVAC specialist.
- Operate the kitchen and washroom exhaust continuously while the building is occupied.
- Flush in/Flush out: run the HVAC system two (2) hours before and after the building is occupied to refresh air before and remove remaining particles at the end of the day.

Improve filtration:

- Increase filter efficiency to MERV 13 or highest efficiency suited for the system.

Increase fresh air:

- Open windows and doors, when weather and outdoor conditions permit and it is safe to do so. Promote cross-ventilation, by opening windows (or doors) at opposite sides.
- Ceiling and portable fans and window air conditioners recirculate air. If used, open windows to bring in fresh air.
- Safely secure child-safe fans in a window to blow potentially contaminated air out and draw fresh air in.

Minimize strong directional airflow

- Avoid using ceiling and portable fans and window air conditioners when possible, as they can strongly direct infectious air within the room from one person to another.
- Direct the air stream away from people when it is essential to use fans and window air conditioners for thermal comfort.
- Consult with an HVAC specialist to evaluate directional airflows.

Ensure thermal comfort and humidity levels are maintained when maximizing ventilation and increasing fresh air.

What steps can be taken for rooms or areas of a building with no mechanical ventilation system or insufficient ventilation?

- Bring in as much outdoor air as possible by opening windows and doors, when weather and conditions permit. Use a child-safe window fan to blow air out and pull fresh air in.
- Consult with a HVAC specialist for additional options for improving ventilation in these spaces.
- Consider the use of a portable HEPA air filtration unit.

What are portable HEPA air filtration units?

Portable air filtration units with high efficiency particulate air (HEPA) filters can be considered where ventilation is insufficient or when outdoor/fresh air introduction cannot be achieved by other means. HEPA air filtration devices can remove some pollutants from the indoor air; however to date, there is no direct evidence that portable HEPA air filtration devices are effective in reducing SARS-CoV-2 transmission in closed spaces. Any portable air filtration units and filters must be certified by an appropriate certification body i.e., CSA; Association of Home Appliance Manufacturers (AHAM).

HEPA air filtration units do not replace other public health measures, and should not be relied upon as the only mitigation measure.

If HEPA air filtration units are being considered, keep the following in mind:

- Select a unit with a Clean Air Delivery Rate (CADR) high enough for the size of room where it will be located. CADR measures an air cleaner's effectiveness based on room space and the volume of clean air produced per minute.

Portable Air Cleaner Sizing for Particle Removal						
Room area (sq feet)	100	200	300	400	500	600
Minimum CADR (cfm)	65	130	195	260	325	390

Note this chart is for estimation purposes. CADRs are calculated based on 8-foot ceilings.
For air filtration unit calculation visit:
<https://www.bchousing.org/publications/Air-Purifier-Sizing-Guide.pdf>
https://www.epa.gov/sites/default/files/2018-07/documents/guide_to_air_cleaners_in_the_home_2nd_edition.pdf

- HEPA air filtration units tend to perform best when they are positioned in a central space. Ensure unobstructed airflow from furniture, curtains and room corners.
- Do not block air intakes and discharge vents.
- Follow the manufacturer's recommendations for operating, maintaining and cleaning the unit.
- Replace filters according to the manufacturer's instructions.
- Ensure the unit is operating continuously while the room is occupied.
- Higher fan speeds and longer run times will increase the amount of air filtered. Operate the unit at highest fan setting.
- Direct air flow from the unit such that the air does not directly blow from one individual to another to reduce the potential spread of respiratory droplets. Consult with a HVAC specialist to ensure that the layout of the room and intake/exhaust of current air handling units are taken into account.
- HEPA air filtration units can be very noisy. Look for a unit that operates at lower decibels (dB). Noise levels from air filtration may result in occupants speaking louder and lead to more aerosol generation.
- Avoid units that include other technologies like Ultra-Violet (UV), Ionization or Ultra-Violet Photo Catalytic Oxidation (UV-PCO) as they may generate harmful by-products, and may cost more to operate and maintain.

For further guidance and support:

Public health guidance: contact your Environmental Public Health Officer.

HVAC technical guidance: contact an HVAC specialist.

Contact your regional ISC Regional Operations Education or Infrastructure Officer regarding funding support.

Adapted from: Public Health Agency of Canada, Public Health Ontario, U.S Centre for Disease Control and Prevention and U.S. Environmental Protection Agency.