

Workplaces, Schools and Other Indoor Spaces: Ventilation and COVID-19

Assessments and adjustments to a Heating, Ventilation and Air Conditioning (HVAC) system and implementation of other measures, such as portable air-cleaning devices, should be managed by a qualified professional, as there are usually building and/or room-specific issues to consider. Consult an HVAC professional for how to optimize ventilation in your building. The following presents general principles and guidance for ventilation in workplaces, schools, and other indoor spaces.

Key measures for reducing the risk of COVID-19 in workplaces and other indoor spaces

In workplaces, schools and other indoor settings, close, prolonged contact with an infected individual is the dominant way COVID-19 infection is transmitted. The risk of transmission from aerosols is possible when there are a higher number of people indoors, for a longer period of time, with poor airflow or ventilation.

Key measures to reduce the risk of transmission in workplaces and other indoor settings include:

- Limiting contacts between individuals and physical distancing
- Active screening
- Wearing a mask, whether you're vaccinated or not
- Immediate self-isolation of individuals with symptoms, cases and high-risk contacts
- Contact tracing
- Identification of cases with testing
- Hand hygiene
- Training and education on the appropriate use of personal protective equipment
- Environmental cleaning, e.g. surface disinfection
- Increase vaccination coverage in the workplace, school or organization
- Enhanced indoor air ventilation and consider activities or lunches outdoors when circumstances allow

Enhancing air ventilation is a critical preventive measure for respiratory infectious diseases

Good ventilation can help reduce spread of COVID-19 in indoor spaces by preventing the accumulation of droplets or aerosols indoors. Enhancing air ventilation and/or filtration and a well-functioning Heating, Ventilation and Air Conditioning (HVAC) system can complement other public health measures for reducing the risk of transmission of COVID-19. Consulting a professional to help workplaces and other organizations to ensure proper ventilation is essential.

Ventilation with outdoor air as far as practically possible and ensuring clean filters can help reduce the risk of COVID-19 transmission. Generally, good ventilation includes:

- Avoiding recirculating air
- Opening windows and doors (where possible and safe)
- Increasing indoor/outdoor air exchange, such as using a fan to blow air out and pull new air in through open windows and doors
- Air filtration, which involves the use of different types of fibrous media to remove particles from the airstream as it passes through the filter

Inspections and maintenance of your HVAC system

Regular inspection and maintenance per the manufacturer's guide and the help of HVAC professionals are essential for HVAC systems to function safely. There is a joint standard from the *American National Standards Institute (ANSI)*, *ASHRAE* and *Air Conditioning Contractors of America (ACCA)* that sets minimum HVAC inspection and maintenance requirements that preserve a system's ability to achieve acceptable thermal comfort, energy efficiency, and indoor air quality in commercial buildings.

Increasing outdoor air by opening windows

Some HVAC systems may not allow changes to outdoor air fractions, and opening windows can bring in outdoor air.

Ventilation via open windows may be improved by utilizing an exhaust fan. This will help draw outdoor air into the room via other open windows and doors without generating strong room air currents. Avoiding direct airflow around people's breathing zones will reduce respiratory droplets being dispersed from person to person. Rather than airflow at head level, options would be to direct the air upwards or to exhaust room air out of an open window while other open windows draw fresh air in.

Exhaust should be directed outdoors and away from the other windows and air intake systems of a building. Similar results can be established in larger facilities using other fan systems, such as gable fans and roof ventilators.

Air change standards

Various associations set standards for air changes for different types of buildings. *The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard* provides minimum ventilation rates for acceptable indoor air quality according to the type of setting (e.g., offices, schools and universities, hotels, food and beverage settings), occupancy and area. ASHRAE provides additional guidance for ventilation during the COVID-19 pandemic, which can be applied with the support of professionals who can assess buildings for the most appropriate and feasible measure. *The Canadian Standards Association (CSA) guidance* for workplaces during the pandemic reinforces that air exchange rates should be modified on a building-by-building basis with careful evaluation of the ventilation system by a professional.

ASHRAE recommends operating the HVAC system at maximum ventilation, in occupied mode when people are present in the building, whether in total or partial capacity. ASHRAE also recommends

continuing to run the HVAC system in the occupied mode for additional time pre and post-occupancy before switching to unoccupied mode and provides more detailed guidance on determining the duration. *Representatives of European Heating and Ventilating Associations (REHVA)* recommend increasing outdoor air supply and exhaust ventilation and starting ventilation at least two hours before the building is occupied, and running the ventilation for at least two hours after the building has been vacated. Most HVAC guidance recommends against a complete shutdown of the HVAC system, even during a building shutdown.

Portable air cleaning devices and fans

When a central HVAC system is unavailable, and a space is poorly ventilated, portable air-cleaning and ultraviolet air-purifier units can help to reduce concentrations of particles in the air. Portable air cleaners with a high-efficiency particulate air (HEPA) filter can remove small aerosol particles. These devices are available as large consoles and smaller tabletop devices and are intended for use in localized areas within a building, such as a single room. In addition, the use of portable air cleaners to complement existing HVAC filtration and ventilation in schools, offices, and commercial buildings may be considered, particularly in areas where sufficient ventilation is difficult to achieve. Directing airflow from a portable unit such that the air does not directly blow from one individual to another will help reduce the potential spread of respiratory droplets. When options for increasing room ventilation and filtration are limited ultraviolet air-purifier units can also be used in consultation with a professional.

The effectiveness of portable air cleaners depends on contaminant removal efficiency, airflow through the filter, filter design and filter maintenance. A perfectly efficient filter with very low airflow will have no impact on reducing indoor particle concentrations. The product of contaminant removal efficiency and airflow is the Clean Air Delivery Rate (CADR). To effectively filter particles, it is crucial to select a portable air cleaner with a CADR large enough for the size of the room or area in which it will be used. Portable air cleaners often achieve a high CADR by using a HEPA filter. If the area is larger than that specified for the available model, multiple air cleaners may be used. The CADR label on product packaging is typically the highest CADR achievable, which generally occurs at the highest airflow setting. Always consult a professional to ensure that the ventilation is sufficient. These devices produce noise. An air cleaner may have lower noise production at lower airflow settings, but it will also be less effective at pollutant removal. The frequency of air filter replacement should follow the manufacturer's recommendation. See [The Use of Portable Fans and Portable Air Conditioning Units during COVID-19 in Long-term Care and Retirement Homes \(publichealthontario.ca\)](#) for details on the placement of a portable device.

For more information visit:

[What We Know So Far: COVID-19 Transmission Through Large Respiratory Droplets and Aerosols \(publichealthontario.ca\)](#)

[Heating, Ventilation and Air Conditioning \(HVAC\) Systems in Buildings and COVID-19 \(publichealthontario.ca\)](#)

[Use of Portable Air Cleaners and Transmission of COVID-19 \(publichealthontario.ca\)](#)

[Workplaces and COVID-19: Occupational Health and Safety Considerations for Reopening and Operating During the Pandemic - CSA Group](#)