Frequently Asked Questions (for clients)

Public Services and Procurement Canada (PSPC) Heating, Ventilation and Air Conditioning (HVAC) Minimum Requirements – (COVID-19)

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Last Updated: December 16, 2020

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General

Q1. Can you discuss the link between ventilation systems and COVID-19? (return to top)

A1.

Heating, ventilation and air conditioning (HVAC) systems can help reduce risk and promote the wellness of building occupants by providing a comfortable indoor environment and minimizing the concentration of potentially infectious respiratory aerosols.

The Public Health Agency of Canada has indicated that "**there is no evidence at this time that the virus is able to transmit over long distances through the air, for example, from room to room through air ducts."** This is consistent with what has been reported by public health agencies from other international jurisdictions and the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).

As such, there is an important distinction to be made between the risk of someone getting infected in a space where an infector is present and someone getting infected via the HVAC system by an individual who is located in a different part of the building.

When developing return-to-workplace plans, it is important that employers apply the hierarchy of controls. HVAC systems play an important secondary role that can support or enhance employer measures (e.g. occupancy restrictions, masking, physical distancing) put in place for occupying a space (see Guidebook for departments on easing restrictions).

See the COVID-19: Main modes of transmission webpage for the latest information on how the virus is spread and how to reduce the risk of transmission.

Q2 What HVAC system measures has PSPC implemented in response to COVID-19? (return to top)

A2.

PSPC's Heating Ventilation and Air-Conditioning (HVAC) systems are designed, installed, operated and maintained to meet or exceed the requirements of the National Building Code of Canada and the Canadian Occupational Health and Safety Regulations.

In response to COVID-19, PSPC has been working diligently to implement the supplementary HVAC measures below that go beyond regular operation and maintenance activities to enhance occupant wellness in our buildings and to address the potential risks posed by respiratory aerosols. These measures are in accordance with advice and guidance from public health authorities such as the Public Health Agency of Canada and industry organizations such as the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

Supplementary measures include:

- increasing outdoor airflow into buildings to the maximum that can be sustained by building systems without affecting comfort and asset integrity
- increasing operating hours of ventilation systems to ensure good airflow and dilution
- installing the highest level of filtration that the HVAC system can accommodate while not impacting building airflow

- continuing to maintain appropriate temperature and humidity levels
- ensuring that there is no potential cross contamination between washroom exhaust air and ventilation airflow
- continuing to operate cooling towers to address *Legionella* risks
- continuing to perform scheduled maintenance activities

Q3. What is the recommended humidity range in PSPC buildings? (return to top)

A3.

PSPC maintains humidity levels in its buildings between 25% and 60% relative humidity. The humidity levels in a building will vary depending on the time of year, the performance of the building envelope (e.g. walls, roof, windows) and the capacity of building systems.

Control of humidity levels is important for several reasons, such as occupant wellness, asset integrity and virus survival in the air. However, the control of humidity is a balancing act between supporting occupant wellness while not creating conditions that cause new hazards for occupants and asset integrity.

Past research has shown that viruses tend to decay faster in the air when relative humidity is higher. Preliminary studies on the virus that causes COVID-19 appear to indicate a similar response. Humidity levels also influence how far respiratory droplets can travel through the air. Drier conditions promote more droplets becoming aerosols, which can travel farther in the air.

Our body's ability to fight infection is also influenced by humidity. Lower humidity levels during winter promote the drying of mucous membranes, which reduces the ability of the body to capture and remove particles in the respiratory tract. This leads to increased risk of infection.

Therefore, during the COVID-19 pandemic, PSPC strives to maintain the highest humidity level (up to a maximum of 60% relative humidity) that can be sustained by building systems while not causing condensation on a building envelope component or other building element that is not designed to manage the condensation.

These measures support occupant wellness while avoiding the creation of conditions that can lead to mold growth, which would negatively impact occupant health and cause damage to building components.

Q4. Can partitions stop respiratory aerosols? (return to top)

A4.

Partitions can help reduce larger droplet transmission, but they will not stop small respiratory aerosols. The use of partitions needs to be carefully considered.

It is important to consider that additional panels in the workplace may affect air circulation and the effectiveness of the ventilation systems, and should therefore be implemented in consultation with facility operations and heating, ventilation and air conditioning experts.

It is important that employers apply the hierarchy of controls when developing return-to-workplace plans. The Guidance and practices for the safe return to workplaces in light of easing restrictions can be consulted for additional information.

Ventilation

Q5. Is PSPC considering modifying buildings in order to have the option of opening windows as an alternative source of internal air circulation? (return to top)

A5.

The ability to operate windows depends on the building and its ventilation systems. Modifications are not planned for buildings that do not currently have operable windows since the buildings have not been designed to function with operable windows. A variety of issues need to be evaluated regarding the use of operable windows, such as security, quality of outdoor air, building pressurization, airflow velocities, space temperature and humidity control, and potential for damage caused by rain or freezing conditions. For these reasons and others, the use of operable windows must be approved by facility management.

Q6. Why is PSPC operating HVAC systems for at least two hours before and after occupancy during the COVID-19 pandemic? (return to top)

A6.

This requirement is intended to add an additional layer of risk reduction beyond that associated with regular ventilation that is provided during normal operational hours. Operating the ventilation system before and after occupancy will reduce the concentration of potentially infectious aerosols in a space by bringing in more outdoor air to dilute those contaminants. Operating a system that is providing code minimum ventilation rates for four hours will reduce potentially infectious aerosol concentrations by at least 95% as indicated and recommended by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

Q7. What are the risks if my building's ventilation system is not capable of operating with more outdoor air than the code minimum requirements? (return to top)

A7.

A building's ventilation system provides a combination of outdoor air and recirculated air to the occupied space. The air is filtered and controlled for temperature and humidity. PSPC buildings have been designed and constructed to provide at least the applicable code minimum outdoor air ventilation rates to ensure acceptable indoor air quality.

Outdoor air ventilation rates also play a role in reducing the concentration of respiratory aerosols in the workplace. During the COVID-19 pandemic, PSPC is maximizing the amount of outdoor air that is provided by building ventilation systems to enhance occupant wellness and reduce the risks posed by potentially infectious aerosols. The maximum amount of outdoor air that can be handled by building systems will vary from building to building and at different times of the year depending on the capacity of the building systems to heat, cool, humidify or dehumidify the air.

Outdoor air ventilation rates are one element of risk reduction associated with Heating, Ventilation and Air-Conditioning (HVAC) operation that employers should consider when developing their occupancy plans.

When considering the level of risk reduction associated with outdoor ventilation rates provided during COVID-19, it is also important to consider the occupancy level in the space. The risks associated with potentially infectious aerosols in a workspace are reduced when the creation of potentially infectious respiratory aerosols is reduced. This is most effectively accomplished through measures such as screening for symptomatic employees, controlling occupancy levels, and using non-medical face coverings.

While a building is at a reduced occupancy, the effective outdoor air ventilation rate per person is higher than when the buildings are at full occupancy. This reduces risk by providing an added layer of ventilation effectiveness in controlling respiratory aerosol concentrations (e.g. a building with 25% occupancy with a ventilation system providing code minimum outdoor air is being provided four times more outdoor air per person than the code minimum requirement).

Filtration

Q8. What type of filter is required to filter SARS-CoV-2 virus? (return to top)

A8.

Research has shown that the particle size of the SARS-CoV-2 virus is around 0.1 µm (micrometer). However, the virus does not travel through the air by itself. Since it is human generated, the virus is trapped in respiratory droplets and droplet nuclei (dried respiratory droplets) that are predominantly 1 µm in size or larger. Also, individual particles may clump together over time to form larger particles. Thus, the virus can be removed from the air by mechanical filtration. The level of removal will depend on the size of the particle and the efficiency of the filter.

Filter performance can be compared based on the rating of the filter. Filters are classified based on their Minimum Efficiency Reporting Value (MERV). The higher the MERV number, the better the ability of the filter to remove particles ranging in size from 0.3 µm to 10 µm in diameter from the air.

MERV 13 or higher rated filters have generally been recommended during the COVID-19 pandemic (e.g. by ASHRAE) because of their higher efficiencies at removing particles in the 0.3 µm to 1 µm diameter range. Lower MERV rated filters, like MERV 11, can also remove particles in the 0.3 µm to 1 µm size range but at lower efficiencies. For details on MERV efficiency ratings, please consult the following webpage: Understanding MERV | NAFA – User's Guide to ANSI/ASHRAE 52.2.

During the COVID-19 pandemic, PSPC is using the highest rated filter that is compatible with a building's system while not reducing airflow to the space, with an emphasis on ensuring filters are properly fitted to prevent airflow bypass and changed before they reach the end of their useful life. Filtration is just one method of reducing the concentration of particles in the air. Employer measures such as screening infected individuals, limiting occupancy levels and requiring non-medical masks are of more importance when controlling the concentration of potentially infectious aerosols in the workplace.

Dilution is another Heating, Ventilation and Air-Conditioning (HVAC) method being used by PSPC to reduce the concentration of particles in the air. Dilution can be accomplished by mixing air that has a contaminant in it with air that does not. PSPC is maximizing outdoor air ventilation rates to promote improved dilution to reduce the concentration of potentially infectious aerosols. The Department is also performing daily building flushing before and after occupancy to reduce potentially infectious aerosol concentrations by at least 95%.

Q9. What are the risks if my building's ventilation system is not capable of operating with at least MERV 13 filters? (return to top)

A9.

PSPC is actively engaged in assessing which filters to use in our building Heating, Ventilation and Air-Conditioning (HVAC) systems. Research has shown that MERV 13 and higher rated filters will be more effective at removing respiratory aerosols than lower rated filters.

However, there is an important balance to be maintained between airflow and filtration: the higher rated the filter, the greater the resistance to airflow, which in turn impedes air circulation. Like other potential enhancements to HVAC systems in buildings managed by PSPC, the choice of filter is very much a function of system design and capacity particular to each building. As such, the PSPC requirements include using the highest rated filter that is compatible with the system while not reducing airflow to the space, with an emphasis on ensuring that filters are properly fitted to prevent airflow bypass and changed before they reach the end of their useful life.

Additionally, public health agencies and American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) have indicated that ventilation systems are not known to spread COVID-19 through a building, which means that infectious aerosols are either not currently travelling through ventilation systems from one area to another or their concentrations are being reduced to the point where they are no longer at an infectious dose. This reduction in aerosol concentration can be affected by the level of filtration, by dilution (mixing air that has a contaminant in it with air that does not), and by controlling temperature and humidity levels.

It is important to note that respiratory droplets (small and large) are produced by building occupants. Therefore, for COVID-19, it is the employees themselves who are the source of the hazard in the workplace. Thus, it is important to first target measures that reduce the creation and spread of respiratory droplets in the workplace before proceeding to other types of secondary controls such ventilation or filtration.

The most effective means of reducing the risk of accumulation or spread of potentially infectious aerosols in the workplace is by having an occupancy plan that keeps sick employees out of the workplace and reduces the amount of respiratory droplets. The amount of respiratory droplets generated in a workplace can be controlled primarily by reducing occupancy levels and through wearing non-medical facial coverings. Building filtration levels play a secondary role.

Q10. Do I need to install portable high efficiency particulate air (HEPA) filtration units in my workspace? (return to top)

A10.

The use of portable HEPA filtration units may be an additional tool that departments can evaluate as part of their occupancy plans for their specific spaces during the COVID-19 pandemic. Such an evaluation should take into consideration the level of occupancy, the type of work functions, the use of non-medical face coverings, the performance of the base building ventilation systems, the level of virus transmission in the local community, and guidance from public health agencies.

HEPA filtration units are most beneficial when one or more of the following situations exist:

- small enclosed spaces
- high occupancy levels
- occupants are not wearing face coverings
- outdoor air ventilation rates from the current American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 62.1 Standard are not being provided
- occupants have compromised immune systems

However, the installation of such units may offer occupants a false sense of security and do not remove the need for other protective measures recommended by health authorities. These units also need to be carefully placed to allow unobstructed airflow into the unit and so as not to negatively affect airflow patterns in the space. A building's electrical system may also limit the potential use of this type of equipment.

Operation and Maintenance

Q11. What changes have been made to system maintenance schedules as a result of increased HVAC operation? (return to top)

A11.

PSPC Heating, Ventilation and Air-Conditioning (HVAC) systems are designed, installed, operated and maintained to meet or exceed the requirements of the National Building Code of Canada and the Canadian Occupational Health and Safety Regulations. During the COVID-19 pandemic, PSPC continues to ensure that these systems are properly operated and maintained to promote healthy work environments.

As recommended by American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), filters have been checked to ensure that they have a proper fit and are sealed properly. Filters are checked on their regular schedule (at least quarterly or when building sensors indicate that they are approaching the end of their useful life) so that they can be changed before they reach the end of their useful life.

Testing

Q12. Is indoor air quality testing required prior to a return to the workplace? (return to top)

A12.

Indoor air quality testing is not recommended as part of re-occupancy measures. Indoor air quality testing is a snapshot in time and, as such, its use is most appropriate when there is an identified hazard to be measured and validated testing methods are available.

To ensure the continued integrity and safety of spaces in our buildings, PSPC has continued to operate Heating, Ventilation and Air Conditioning (HVAC) systems to maintain acceptable ventilation, temperature and humidity levels while buildings have been at reduced or no occupancy. PSPC has also continued to perform scheduled maintenance activities on buildings systems including HVAC (e.g. replacing dirty filters, ensuring proper fit to prevent airflow bypass).

In response to COVID-19, PSPC has also implemented supplementary HVAC measures to enhance occupant wellness in PSPC buildings. If there is an issue or complaint associated with indoor air quality, then a timely investigation will be performed in accordance with prescribed requirements to identify the cause of the problem and to determine an appropriate course of action. An investigation may identify a need for indoor air quality testing of select parameters of concern.

Other technologies

Q13. Should ultraviolet light be added into office building ventilation systems? (return to top)

A13.

There are a variety of ultraviolet germicidal irradiation (UVGI) products available in the market. Some are intended for use in Heating, Ventilation and Air Conditioning systems while others are intended for disinfecting surfaces.

UVGI is a technology that is being marketed for use during the current COVID-19 pandemic. However, due to the novelty of the SARS-CoV-2 virus, scientific data demonstrating the specific efficacy of these technologies for this virus is still under development. It is currently not well established what dose (intensity and duration) of exposure would be required to inactivate the virus that causes COVID-19 in different settings. The use of these types of technologies can also introduce new hazards (damage to eyes and skin) into the workplace and therefore require careful design and application.

Given that COVID-19 has not yet been shown to spread through ventilation systems, that an effective dose in different settings has not been established, and that these systems can pose additional health hazards, the use of these types of technologies in office-type environments is premature and not currently recommended by Health Canada.

These types of technologies are not a replacement for traditional approaches to contaminant control (dilution, filtration, cleaning and disinfection) but may be appropriate in areas with high-risk populations or where infectious people congregate (e.g. hospitals).

Leases

Q14. How does the PSPC Heating, Ventilation and Air Conditioning (HVAC) Minimum Requirements – (COVID-19) document apply to leased space? (return to top)

A14.

The PSPC Heating, Ventilation and Air Conditioning (HVAC) Minimum Requirements – (COVID-19) document establishes mandatory minimum requirements that apply to Crown-owned buildings under the custodianship of PSPC. For leases, PSPC is in communication with landlords to ensure that similar measures are being implemented in accordance with industry best practices. Landlords are also required to implement any local public health requirements that have been established.

Additional information

Q15. What should I do if I have additional concerns or questions related to HVAC systems in my building? (return to top)

A15.

Please contact your accommodations team for additional information or to discuss questions related to your specific situation. PSPC is committed to working with clients to support them in their plans for a safe return to the workplace.