Tri-campus HVAC strategy for return to the University

Version 5.0, updated April 21, 2021

The University of Toronto is committed first and foremost to the health and safety of our entire community.

To ensure a thorough approach to maintaining a safe indoor environment, the role of HVAC (heating, ventilation, and air conditioning) systems and current maintenance practices are routinely assessed against emerging public health evidence and industry guidelines with regard to COVID-19. An assessment of practices in the context of the pandemic was also conducted by University Utilities and Operation, Environmental Health and Safety including external Professional Engineers with expertise in ventilation and all recommendations have been adopted. Public health authorities continue to advise that the virus causing COVID-19 is known to spread through droplets and aerosols, which represent a risk particularly to people who are in:

- enclosed spaces
- indoor situations where people are in close proximity

The most important elements in reducing the risk of COVID-19 are preventative measures, such as:

- minimizing the number of people in a place at the same time
- maintaining a physical distance of at least 2 metres
- using well-constructed, well-fitting masks
- practising good hand and respiratory hygiene

In addition to these practices, adequate ventilation can contribute to reducing the risk of COVID-19 transmission in indoor settings. It is important to remember that good indoor ventilation alone cannot protect people from exposure to the virus, particularly:

- during close unprotected contact
- in the absence of other protective measures

While aerosols may contribute to the spread of COVID-19, close contact transmission is still the most common and highest-risk route of infection. Most infections are still linked to person-to-person transmission through close direct contact with someone who was contagious, even if they are not presenting with symptoms. For this reason, it is importance to follow infection prevention and control measures such as self-screening, staying home when sick, mask wearing, frequent hand hygiene, and practicing physical distancing.

The University appreciates that there are numerous sources of information regarding ventilation and COVID-19 transmission, including independent research, international advisory bodies,
expert panels and media. The University will continue to abide by all applicable public health authority directives, guidelines and information and will update information accordingly.

Supporting the health and safety of our community

We expect improved public health conditions in 2021-2022 due to vaccine rollout in the coming months. In-person activities will continue to occur in accordance with public health guidance.

The University has implemented a series of measures, in keeping with public health directives, to reduce the risk of transmission:

- Practicing physical distancing (> 2 metres) throughout the campus by rearranging schedules, physical layouts, and task execution, where feasible.
- Requiring the proper use of a non-medical mask or face covering in indoor common use areas (and outdoors where physical distancing is a challenge), and additional personal protective equipment when physical distancing is not possible.
- Widely communicating COVID-19 precautions such as frequent hand hygiene
- Managing a self-screening program for all staff, faculty, students, and visitors that come to campus. For more, visit https://www.utoronto.ca/utogether/uchek.
- Advising employees and students to stay home if they are ill and to contact our occupational health nurse who will provide further direction and conduct contact tracing.
- Enhanced cleaning and disinfection of our facilities.

These remain the most effective measures against COVID-19. These same measures have also been implemented at U of T residences.

Implementing ventilation measures across our campuses

To support the protective measures and efforts above, building operations teams will continue maintaining the indoor environment through:

- Regularly reviewing ventilation measures as recommended by public health and HVAC industry guidelines.
- Regularly maintaining HVAC systems on all our campuses.
- Disabling demand control ventilation measures (typically in place to support energy conservation efforts), to avoid reductions in air flow.
- Replacing centralized HVAC system filters with enhanced MERV-13 filters or the highest compatible with the existing HVAC infrastructure.
- Performing air flushing two hours before occupancy every morning in every building to replace indoor air with outdoor air.

*The University is preparing a list, by building, containing information pertaining to general filtration type (e.g., MERV-13, etc.) levels for buildings which will be available here when ready. See below for information regarding classroom ventilation.

Classroom-specific additional control measures during the pandemic

The transient nature of the population using and passing through classrooms could result in greater numbers and density of people in these indoor spaces compared to others. As a result,
the following measures, which are also described in more detail here, are being implemented in classroom environments based on the recommendations provided by an external review of classrooms:

1. **Performing an HVAC assessment**, including conducting air surveys, to determine air flow rates in classrooms. Data related to classroom HVAC will be posted here when it is available.

2. **Setting a target ventilation rate** of six (6) equivalent air changes per hour (ACH) for classroom environments when they are in use. This is the same standard used in healthcare settings, such as patient examinations rooms.

3. **Enhancing ventilation measures in classrooms that do not meet the equivalent ACH target**. Classrooms that do not meet this ventilation target will undergo the following:
   a. Exploring and making changes to existing equipment and/or operations to meet the equivalent ACH target, if feasible, safe, and appropriate.
   b. If further measures are required to meet the equivalent ACH target in the space, installing one or multiple local air filtration units to supplement the air flow rate.

* The University has focused on classrooms and has not measured the equivalent ACH rate for other occupied areas of buildings (e.g. offices, entry ways, common spaces, etc.) as these areas do not pose elevated transmission risk to the general occupant due to the protective measures in place (e.g. reduced occupancy, collection of contact tracing information, consistent physical distancing, enhanced caretaking, etc.). Some other spaces, such as teaching labs, research labs, and clinics, are regularly held to more vigorous ventilation standards due to the nature of the space and activities.

**Frequently asked questions**

1. **How does transmission of COVID-19 occur?**
   Public Health Ontario actively monitors, reviews and assesses relevant information related to COVID-19 and continues to emphasize that most cases are linked to person-to-person transmission through direct close contact with someone who is positive for COVID-19, and that is mainly due to contact with large aerosol droplets or indirect contact with contaminated surfaces. Toronto Public Health has indicated that airborne spread has not been a dominant or common mode of transmission in community settings, ventilation systems or through water.

2. **Is exposure to aerosol droplets the same as airborne transmission?**
   Aerosols are liquid droplets which can travel through the air. COVID-19 forms predominately large aerosol droplets (droplet transmission), which are unlikely to travel beyond two metres. Aerosols can be generated by coughs and sneezes, and in healthcare settings by certain aerosol generating medical procedures, however, the presence of aerosols does not constitute airborne transmission. Reports of outbreaks in settings with poor ventilation have occurred. However, when you look closely at these situations, these outbreaks are also associated with crowding in an enclosed space, close-range conversations and higher risk activities (e.g., singing, shouting, dancing or exercise, especially without precautions such
as wearing a mask or keeping a physical distance). The risk of transmission increases when these factors overlap. The HVAC system plays only a small part in infectious disease transmissions. Other measures such as self-screening/staying home when you are sick, physical distancing/de-densification and finding alternatives to these higher risk activities (e.g., virtual participation in events), use of masks, enhanced disinfection of high-touch points and increased hand hygiene continue to be emphasized by public health authorities.

3. What role do buildings’ HVAC systems play?
The standard, basic COVID-19 preventative measures, including self-screening, physical distancing, use of non-medical mask or face covering, surface cleaning, and disinfection and hand washing are key to prevention and mitigation. There is not one public health measure that can guarantee protection from COVID-19; multiple strategies are needed.

HVAC systems in most non-medical buildings play only a small role in infectious disease transmission, including the transmission of COVID-19. Health Canada states that there is no evidence currently that the virus can transmit over long distances through the air, e.g., from room to room through air ducts.

COVID-19 has not changed code or regulatory requirements for ventilation in workplaces. Consistent with the hierarchy of health and safety controls and the precautionary principle, public health agencies and industry organizations have developed guidelines for building ventilation during the pandemic.

4. How is U of T implementing guidelines for building ventilation?
This tri-campus HVAC strategy includes several measures (listed above under ‘implementing ventilation measures across our campuses’ and ‘classroom-specific additional control measures during the pandemic’), that are being implemented by professional engineering and technical staff with the expertise required to interpret guidelines in relation to the variety and complexity of buildings and systems on our campuses. These guidelines have also been applied to U of T residences.

The HVAC strategy focuses on verifying that systems are being properly maintained and operating accordingly, adjusting controls for parameters such as the amounts of total air and outdoor air where feasible, and upgrading filtration where feasible with the existing infrastructure.

Like many other large educational institutions, we have a variety of buildings and systems. Modifications and upgrades depend on the building and system under consideration. For example, in heritage buildings, renovations and system changes may not be allowed.

Where central HVAC systems can't be upgraded and in workspaces where there is no mechanical ventilation, other practicable solutions may be considered. Following guidelines and measures to increase natural ventilation, such as using windows and doors, may be recommended.
It is important to note that a space not having mechanical ventilation does not necessarily mean that there is elevated risk for COVID-19. Most work performed at U of T is classified as low risk. For example, office workers who do not have frequent close contact with coworkers, customers, or the public are classified as low risk for COVID-19. Using a non-medical mask, reductions in onsite staffing levels and applying maximum occupancies based on public health guidelines significantly reduces transmission risk in addition to any other applicable recommendations by public health. Other measures such as self-screening (UCheck), staying home when you are sick, physical distancing, de-densification and finding alternatives to higher risk activities (e.g., virtual participation in events), use of masks, enhanced disinfection of high-touch points and increased hand hygiene continue to be emphasized by public health authorities.

5. **What role do supplemental air filtration units play, e.g., High-Efficiency Particulate Air (HEPA), standard air purifiers?**

   There are no specific public health or other requirements regarding supplemental air filtration. There is no reliable evidence that supplemental air filtration units on their own are effective in reducing transmission risk of COVID-19, but public health authorities recommend adding them as one more layer of protection. Supplemental air cleaners or air purifiers may be useful as a supplement to HVAC ventilation or if there is no outdoor air exchange.

   The transient nature of the population using and passing through classrooms results in greater numbers and density of people indoors compared to other spaces. As a result, an HVAC assessment of classrooms is being conducted with a target ventilation rate of six (6) equivalent air changes per hour (ACH). Supplemental air filtration with HEPA filters will be installed in classrooms that cannot meet the target of equivalent 6 ACH. These HEPA filters are capable of removing at least 99.97% of airborne particles as small as 0.3 microns and will be used to supplement the equivalent air change rate required to meet the target. The units will be managed and maintained by facilities and appropriate operational staff.

6. **How has U of T prepared HVAC systems for the resumption of increased on-campus activities?**

   Despite significantly reduced building occupancy since the start of the pandemic, most of the HVAC systems were not completely shut off and have remained in operation. Filters have been regularly replaced based on best practices.

   In preparation for a gradual and safe re-entry to each building, building operators have been performing the following inspections and maintenance:

   - Ensuring filters have been replaced based on best practices.
   - Ensuring all setbacks and setup modes are set to normal.
   - Ensuring that fans are working, and that air is moving in and out of the building.
• Ensuring that dampers (outside and return) are working properly to help ensure the flow of fresh air to the building.
• Ensuring that filters are operating appropriately.
• Conducting an HVAC assessment on classrooms
• Installing air purifiers with HEPA filters in classrooms with less than 6 equivalent air changes per hour. Disabling demand-control ventilation to increase the amount of fresh air.
• Performing air flushing two hours before occupancy every morning in every building to replace indoor air with outdoor air.

7. How is U of T addressing the suggestions of some research papers that we should increase ventilation and air change rates, increase fresh air flow and/or run air change 24/7?
The University’s HVAC Strategy was based on a review of and alignment with relevant legislative requirements and credible industry guidelines, including Public Health Ontario, the Ontario Building Code, Centre for Disease Control and Prevention (CDC) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

ASHRAE is the CDC’s and Ontario’s primary authority on HVAC and it has published COVID-19 guidelines for the industry. ASHRAE does not consider increased ventilation rate (ACH) and percentage of outdoor air circulation as processes that clearly reduce risk of transmission in non-health care facilities. U of T’s facilities groups have also worked with units to align HVAC operating hours with occupancy. In the event of an emergency, ASHRAE recommends flushing of a space with as much outside air as possible for extended amounts of time. The University defines an emergency in the context of COVID-19 as an outbreak on campus. In the event of an outbreak on campus, the University will follow the recommendations of ASHRAE and local public health authorities.

8. Some resources suggest we should have MERV 13 filters installed on all centralized HVAC? What is U of T doing?
In the event of an emergency, ASHRAE recommends upgrading central air filtration to MERV-13 or the highest compatible with the filter rack. Having a compatible filter in-place is critical to ensure that filter edges are sealed to limit air bypass.

All newer buildings and HVAC systems on-campus already utilize MERV-13 filters as the minimal standard for central air handling units. As a proactive measure, the University has replaced existing MERV-8 to MERV-13 filters, wherever MERV-13 filters are compatible with the existing infrastructure. In all cases, building operators are ensuring that filters are in good operating condition, clean and with sealed edges.

9. I use the stairs and there is no ventilation. Should I be concerned?
Stairwells are common use spaces, and all users are expected to wear a non-medical mask or face covering as outlined in the U of T policy on non-medical masks and face coverings and provincial regulations. Brief interactions such as passing someone on the stairwell does not confer a material risk in the transmission of COVID-19. In addition, as outlined in the Tri-
Campus Caretaking Strategy, high touch surfaces such as railings and door handles will be disinfected twice daily. Physical distancing signage has also been posted and depending on the building, yield signage or designated stairwells are used to reduce traffic.

If you have concerns regarding your workspace, please contact your supervisor who can work with Property Management on specific concerns as applicable.

1 The Minimum Efficiency Reporting Value (MERV) scale measures the effectiveness of air filters. Filters with higher MERV values capture a greater percentage of smaller particles from the air that passes through the filters.