FACILITIES & OPERATIONS
ENVIRONMENT, HEALTH & SAFETY
UNIVERSITY OF MICHIGAN

1239 KIPKE DRIVE
ANN ARBOR, MICHIGAN 48109-1010
(734) 647-1143 | FAX (734) 763-1185
WWW.EHS.UMICH.EDU

DANIELLE SHEEN, EXECUTIVE DIRECTOR

# COVID-19 HVAC Guidelines for University of Michigan Facilities

According to the CDC and public health experts, close person-to-person transmission of SARS-CoV-2 through respiratory droplets is thought to be the primary cause of infection. Basic principles of density reduction, physical distancing, face coverings, surface cleaning and disinfection, handwashing, conducting daily health checks and hazard assessments of the workplace result in the greatest risk reduction. However, changes to the operation of HVAC systems, may further reduce risks of transmission.

U-M Facilities & Operations has formed a cross-functional HVAC Task Force comprised of registered Professional Engineers, Certified Industrial Hygienists, building code officials, and operations managers to conduct ongoing reviews of CDC recommendations, best practices and standards for the design, maintenance, and operation of U-M's HVAC systems for the duration of the pandemic. U-M also has a building automation system (BAS) monitored 24/7 by technicians who ensure HVAC systems are operating as designed.

The Task Force reviewed current CDC recommendations for building ventilation systems. These include:

1. **Increase the percentage of outdoor air (e.g., using economizer modes of HVAC operations) potentially as high as 100% (first verify compatibility with HVAC system capabilities for both temperature and humidity control as well as compatibility with outdoor/indoor air quality considerations).**

   **U-M Response:** Where possible and while maintaining temperature and humidity control, U-M is doing this. In addition, U-M Design Guidelines already require labs to be 100% outside air.

2. **Increase total airflow supply to occupied spaces, if possible.**

   **U-M Response:** Our systems currently meet or exceed the Michigan Building Code (MBC) requirements for airflow at maximum occupancy of spaces. With reduced building occupancies due to COVID-19, airflow per person is further increased above MBC. When outside temperatures don't require excessive heating and cooling, return air systems are designed to open to 100% outside air, far exceeding the code requirements. Our lab systems are designed without any return air. Therefore, they use 100% outside air filtered, heated or cooled to the lab spaces; then the air is exhausted from the building.

3. **Disable demand-control ventilation (DCV) controls that reduce air supply based on temperature or occupancy.**

   **U-M Response:** Where our ventilation systems have demand-control options for occupied and unoccupied mode, Facilities & Operations (F&O) and other campus groups have changed the systems to stay in occupied operation.



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4. **Consider using natural ventilation (i.e., opening windows if possible and safe to do so) to increase outdoor air dilution of indoor air when environmental conditions and building requirements allow.**

**U-M Response:** This is not recommended. Without using the HVAC systems, outside air is not filtered and control of room temperature and humidity are lost when the windows are opened. In addition, it can create other risks such as fall hazards, pest control problems, and hazards for occupants with asthma, allergies, etc.

5. **Increase air filtration to as high as possible (Minimum Efficiency Reporting Value [MERV] 13 or 14) without significantly diminishing design airflow.**

**U-M Response:** U-M's current standard filters air twice. U-M uses a MERV 8 or MERV 10 pre-filter and a MERV 13 final filter in its air handling systems. U-M also utilizes MERV 14 final filters in more sensitive research areas where indoor air quality is essential to support research activity.

6. **Inspect filter housing and racks to ensure appropriate filter fit and check for ways to minimize filter bypass.**

**U-M Response:** U-M maintenance teams perform this routinely during preventive maintenance. F&O and other campus groups are also performing engineering audits as an additional step.

7. **Consider running the building ventilation system even during unoccupied times to maximize dilution ventilation.**

**U-M Response:** In active facilities, U-M has altered fan schedules to start 2 hours before building opening and run 2 hours after building closing. This balances energy costs and sustainability with air dilution recommendations. In inactive buildings, fans run 4-6 hours a day to maintain air quality.

8. **Generate clean-to-less-clean air movement by re-evaluating the positioning of supply and exhaust air diffusers and/or dampers and adjusting zone supply and exhaust flow rates to establish measurable pressure differentials. Have staff work in areas served by "clean" ventilation zones that do not include higher-risk areas such as visitor reception or exercise facilities (if open).**

**U-M Response:** Building designs already balance the building and the direction of airflow through the buildings.

9. **Consider using portable high-efficiency particulate air (HEPA) fan/filtration systems to help enhance air cleaning (especially in higher risk areas).**

**U-M Response:** This is unnecessary in most spaces because of the present air exchange rates already designed into the HVAC systems. Some possible exceptions include non-hospital clinical spaces that may conduct procedures that result in aerosols, such as dental procedure areas. U-M is evaluating these on a case-by-case basis at the request of the users of these facilities.
Considerations for the use of portable HEPA units include:
a) These units are typically used to capture aerosols at the source and not as general room air scrubbing devices.

b) Improper placement of the unit can cause greater mixing of aerosols due to airflow from the exhaust. Increased air movement can also make staff uncomfortable.
c) These units can be noisy and may make communication difficult.
d) These units require proper preventive maintenance, including filter changes. Maintenance will require personal protective equipment, trained staff and specialized procedures.

**10. Ensure exhaust fans in restroom facilities are functional and operating at full capacity when the building is occupied.**

**U-M Response:** U-M maintenance teams perform preventive maintenance on exhaust fans in these areas at prescribed intervals. Maintenance performs repairs as concerns are discovered.

**11. Consider using ultraviolet germicidal irradiation (UVGI) as a supplement to help inactivate the virus.**

**U-M Response:** This may be appropriate in some high risk, clinical care environments. Otherwise, it is an unnecessary measure and U-M does not advise it.