

## **Facilities Frequently Asked Questions HVAC and COVID-19**

### **Introduction:**

Throughout the pandemic, nearly all departments at EMU have had to develop response plans, react to the ever-changing nature of the pandemic, and shift their focus on new strategies to keep all faculty, staff and students safe. With a return to more frequent indoor activities, the focus on many people's minds is on air quality within our various facilities.

Numerous guidelines exist from federal agencies as well as organizations which develop standards that are included in building codes. Guidelines, developed directly in response to the pandemic and related to building ventilation, filtration and operations, are published by the Center for Disease Control (CDC), the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE), the Occupational Safety and Health Administration (OSHA), and state and local health departments. EMU Physical Plant, specifically those managing our Heating, Ventilation, and Air Conditioning (HVAC) are closely following the guidance from these organizations.

Properly run HVAC systems help reduce the risk of spread for COVID-19 and other viruses that travel from person to person through airborne particles. According to ASHRAE, HVAC systems that meet the ASHRAE 62.1 (Ventilation for Acceptable Indoor Air Quality) standard or mechanical code at the time of their design provide adequate ventilation to reduce the spread of viruses within buildings.

EMU Physical Plant staff, especially HVAC technicians, often hear questions about the systems which maintain comfort and indoor air quality in our facilities. This document is to summarize the most frequent questions and the steps EMU has taken related to HVAC:

### **Q: What about building ventilation? Has EMU done anything different in response to the pandemic?**

*A: Yes, absolutely. Recognizing the key importance of ventilation and following industry guidelines for ventilation during the pandemic, we have taken the following steps:*

- *Outside air intake screens have been cleaned and inspected. This ensures there are no restrictions to bringing in proper amounts of fresh outside air.*
- *Additionally, systems have been run with additional fresh air to the maximum possible that the system can handle.*
- *System operation schedules have been adjusted. We currently keep systems running longer hours, two hours before and two hours after scheduled occupancy.*
- *Room occupancy sensors that reduce air supply based on occupancy have been disabled.*
- *Most exhaust fans are in operation 24 hours a day.*
- *We ensure that doors with closers (automatically closing doors) do not get propped open to ensure exhaust systems operate as intended.*
- *When large events are planned, systems are programmed ahead of time to purge the space before and after the event. The increased ventilation measures described above will remain in place during the event.*

**Q: Will all of these ventilation changes affect the temperature and humidity control in the classrooms?**

*A: No. All measures undertaken for increased ventilation have been within the capacity allowed by the system design. Maintaining proper temperature and humidity control, within the constraints of the building itself, is also an important part of ensuring building indoor air quality.*



**Q: Are the HVAC system air filters appropriate, and do they get changed?**

*A: Yes. We have taken a number of steps and investments directly related to filtration:*

- *In buildings that can accommodate them, we have upgraded filters to a more efficient type. Buildings which had MERV-8 or MERV-10 filters now have MERV-13 filters.*
  - *The Village utilizes MERV-10 filtration for equipment performance, however each apartment unit has a filter, not just the entire building.*
- *For all systems, regardless of filter type, the frequency of filter replacement has increased. In most cases, the frequency has doubled from our previous schedule of twice per year. Current replacement is now 3 to 6 times per year, with most averaging 4 times per year. In all cases this meets the manufacturers requirements, and in most cases, it exceed that level.*
- *The increased operational time of the HVAC systems, as well as the increases in system airflow, results in building air passing through filters more frequently.*
- *In effect, we are filtering the air more often, for longer periods, and with a higher filtration rate than the systems were originally operated.*



**Q: How does EMU track and ensure our HVAC systems are functioning?**

*A: Here at EMU all building HVAC system are monitored remotely through two major central control systems. These central control systems perform important functions:*

- *The HVAC systems have set operation instructions for building temperature and ventilation control. These operating points can be adjusted as the building conditions change.*
- *The Building Automation System (BAS) monitors inside air and the outside air and blends the two through the HVAC systems to deliver clean conditioned air to the building.*
- *Building and room conditions can be viewed and adjusted quickly.*
- *Alarm notifications “break through” the control system and information is immediately sent when the control system identifies failures or abnormal operating conditions.*



**Q: What can faculty, staff, or students do to help with indoor air quality?**

*A: All of the above measures are actions the EMU Physical Plant has taken as investments in our buildings to improve indoor air quality and reduce disease transmission. As users of these buildings, you also play a role to ensure systems operate as intended:*

- *Keep ventilation areas free of clutter (such as vents, grilles, etc.). Move desks and cabinets away from vents and grilles, allowing proper airflow.*
- *Identify where your thermostat is within the room. Move computers, lights, small appliances or equipment that may be near the thermostat. This heat source can cause the thermostat to not read the room temperature correctly which may improperly affect the air being delivered to the space.*
- *Buildings with central HVAC systems need the windows and doors closed to properly condition and maintain the indoor air quality. Do not prop open exterior doors and ensure windows remain shut.*
- *Let us know if there is an operational issue or concern. Use the Work Order system to report and request service for any HVAC problems. Include your name, phone number, room number, and description of problem.*



**Q: What's next? Are there other improvements planned in the future?**

*A: EMU has focused on meeting or exceeding the recommendations of the CDC, AHSRAE, OSHA, and other industry best practices. As we move toward the future, we are examining the potential for increased air quality as well as improved sustainability. Today, it is too early to tell what options may evolve, but we are exploring the following:*

- *Improved indoor air quality. Already providing maximum Ventilation and Filtration, we will also look into Disinfection opportunities. Ultraviolet lights (UV) have long been used in specialized health care functions, but are costly and difficult to retrofit into existing HVAC systems. We are looking into these, and other disinfection opportunities, for our facilities.*
- *Updating comfort standards like temperature and humidity control. Expanding these ranges even a nominal degree or two, as well as humidity levels at a slightly wider range, could reduce the impact of heating or cooling costs.*
- *Review of use and occupancy of spaces. Control of buildings during off-hours, or off-seasons could significantly reduce energy needs. Expansion of traditionally preferred class hours to maximize use during 'business hours' may also improve efficiencies.*
- *Continuing education, lessons learned, and best practice reviews. As this is an industry wide topic, there will be effort made to learn from our peers, research, and updated code requirements.*



**Summary:**

EMU Physical Plant continues to assess each facility for its most efficient and proper HVAC function. Through active and daily monitoring of central controls systems, as well as operational and maintenance care we continually work to keep these systems in proper operation. We conduct annual preventative maintenance programs as well as address system designs when there are opportunities for renovation, replacement, and construction of new facilities.

**References:**

ACHA Guidelines COVID-19 Considerations for Institutions of Higher Education, Fall 2022

Specifically page 3 for Indoor Air Quality

[Considerations for Reopening Institutions of Higher Education in the COVID-19 Era \(acha.org\)](https://www.acha.org/documents/2022-23/ACHA_Guidelines_COVID-19_Considerations_for_Institutions_of_Higher_Education_in_the_COVID-19_Era.pdf)

American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE)

<https://www.ashrae.org/technical-resources/resources>

Center for Disease Control (CDC)

<https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html>

Eastern Michigan University (EMU) – COVID reference material:

<https://www.emich.edu/emusafe/safe-return-to-campus/students/index.php#:~:text=Students%20may%20be%20required%20to,activities%20must%20undergo%20regular%20testing.>

Eastern Michigan University (EMU) – Physical Plant / Work Order Page:

[Eastern Michigan University: Physical Plant \(emich.edu\)](https://www.emich.edu/physical-plant/work-order/)

Environmental Protection Agency (EPA)

[https://www.epa.gov/system/files/documents/2022-03/508-cleanairbuildings\\_factsheet\\_v5\\_508.pdf](https://www.epa.gov/system/files/documents/2022-03/508-cleanairbuildings_factsheet_v5_508.pdf)

Occupational Safety and Health Administration (OSHA)

<https://www.osha.gov/sites/default/files/publications/OSHA4103.pdf>

*This document was prepared by and with the support of EMU Physical Plant Staff, as well as licensed Mechanical Engineers from Stantec Architecture, LLC and Granger Construction Company. July 29, 2022*

## **EMU Physical Plant Supplemental Information for the EPA Clean Air in Buildings Challenge**

*United States Environmental Protection Agency (EPA) document from March 2022*

**Introduction:**

In support of Eastern Michigan University (EMU) facilities, and all occupants of those facilities, this summary of information has been prepared as a companion document to the Environmental Protection Agency (EPA) Clean Air in Buildings Challenge (dated March 2022). EMU Physical Plant maintains a proactive approach to improved air flow, filtration, and indoor air quality (IAQ) even prior to the COVID-19 pandemic, and has made additional improvements outlined herein.

EMU Facilities designs, constructs, operates, and maintains facilities in compliance (meeting or exceeding) with regulatory requirements and industry best practices. Specific to Heating, Ventilation, and Air Conditioning (HVAC) and indoor air quality (IAQ), those standards include OSHA, Michigan Building Code and Mechanical Code (to the applicable year), ASHRAE 62.1, and recommendations such as the CDC and EPA guidance related to COVID-19.

Specific actions taken are identified in direct correlation to the EPA document:



- 1. Create an Action Plan for Clean Indoor Air in Your Building(s) that assess IAQ, plans for upgrades and improvement, and includes HVAC inspections and maintenance:**

<b>EPA Recommendation</b>	<b>EMU Actions / Response:</b>
Determine how clean outdoor air is brought into the building and distributed to all occupied spaces.	EMU utilizes a Building Automation System (BAS) functioning as building controls. This allows all HVAC units on campus to be monitored for airflow in real-time data 24 / 7 / 365.
Understand and document how HVAC systems work for your building.	All facilities documentation (drawings and specifications) is stored by the Physical Plant for reference as needed.
Work with an HVAC expert to assess and inspect systems for ventilation, filtration, and air cleaning. Verify through commissioning, testing, and balancing that building systems are functioning as designed.	Physical Plant HVAC technicians all work under the licensure of certified individuals in Heating, Ventilating, and Air Conditioning.  The BAS/controls system daily monitoring allows verification that systems are operating and efficient and achieving desired airflow per the system design. The BAS operates 24 / 7 / 365.
Implement other IAQ assessment approaches such as carbon dioxide (CO2) monitors as needed	CO2 monitors typically increase ventilation rates when the CO2 rises. EMU systems have been set to a full ventilation and filtration rate meeting, and in most cases, exceeding those monitors.

Determine how much clean air (outdoor air + filtered HVAC recirculation air) is needed and verify or measure air delivery for each room or space.

All HVAC systems have been reprogrammed to run at their full ventilation and filtration rates, and not based on a lesser quantity of outdoor air.

The BAS/controls system monitors those air flow rates to the maximum level per the system design.

Assess if you need to manage the direction of air flows in higher risk areas of your building (e.g., in a school nurse’s office.)

Because systems are running at maximum ventilation and filtration rates, the entire building is being managed at highest IAQ possible within the existing system design.

Create an IAQ action plan that includes regular inspections and maintenance, including filter replacements, and HVAC system upgrades or improvements, as needed.

The Physical Plant tracks a Preventative Maintenance list for campus facilities including HVAC equipment.

Further, the Physical Plant utilizes a third-party filter vendor to replace filters 3 to 6 times (averaging about 4 times) per year per unit.

Support the people who operate or help with building and air distribution systems by providing continuing education and training.

When updates to the building codes, ASHRAE, or other standards occur, these are reviewed by appropriate staff. Certified staff maintain their licenses through continuing training where appropriate.

**2. Optimize Fresh Air Ventilation by bringing in and circulating clean outdoor air indoors:**

EPA Recommendation	EMU Actions / Response:
Ensure outdoor air is acceptably clean or is adequately filtered as it is brought into the building.	<p>EMU generally monitors fresh air intake based on quantity, temperature, and humidity.</p> <p>Outdoor air passes through screens, wells and filters prior to conditioning and distribution. Each goes through regular maintenance.</p>
Properly use economizers, which are devices that supplement mechanical cooling with fresh air, to efficiently and cost effectively increase fresh air ventilation.	<p>Most facilities currently have economizers, and in all cases where they exist, they are monitored through our BAS/controls. Systems have been running at full ventilation rates, even when not required.</p>

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Run HVAC systems during all occupied hours to ensure clean air enters and is distributed throughout the building.

EMU has been running HVAC systems at full ventilation and filtration rates at least 2 hours prior to occupancy, during scheduled occupancy hours, and at least two (2) hours post occupancy.

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Ensure that exhaust fans in bathrooms are functioning, and set fans to run during occupied hours.

Most exhaust fans already run 24 hours per day. Exhaust fans are part of the annual maintenance / preventative maintenance tracking.

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Increase volume of clean, outdoor air at times of higher risk (e.g., at times of elevated risk of COVID-19):

- Adjust HVAC settings while considering thermal comfort, humidity, outdoor air quality, and energy use.
- Consider running the HVAC system to refresh air before arrival and/or remove remaining particles at the end of the day (e.g., 1-2 hours before/after the building is occupied), as needed.
- Check with an HVAC expert to understand the maximum outdoor air your system can support.

EMU has defaulted HVAC systems to highest ventilation and filtration levels at all occupancy times, regardless of risk level.

The BAS / controls for HVAC at each facility have been set to run at least 2 hours prior to occupancy, and 2 hours after occupancy.

Licensed and certified staff have set the HVAC systems to provide full ventilation and filtration rates as allowed by the system.

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Open operable windows, as weather, outdoor air quality, occupant safety, and HVAC systems permit. To the extent possible, enable cross ventilation by opening windows and doors at opposite sides of the room or building. (Note: Opening windows while running HVAC systems may increase energy costs or introduce other air contaminants.)

EMU provides the highest ventilation and filtration levels within the system design. Because of this, EMU discourages use of open windows in most facilities because it introduces less comfort control and allows introduction of other contaminants (odors, allergens, etc.).

All academic facilities on campus, except for Briggs and King Halls, have HVAC systems providing fresh air. At Briggs, during warmer months, a temporary A/C system, complete with filtration, is installed. Briggs, King, and most Residence Halls, do rely on exterior windows for fresh air. While open window air is not filtered, temperature, or humidity controlled with a HVAC unit, it will not spread contaminants through the HVAC system to other rooms.

**3. Enhance Air Filtration and Cleaning using the central HVAC system and in-room air cleaning devices:**

EPA Recommendation	EMU Actions / Response:
<p>Install properly sized MERV-13 air filters or the highest rated MERV filters that the HVAC system can accommodate</p>	<p>Prior to COVID-19, EMU standard was MERV-8 or MERV-10 filtration. Our current standard is MERV-13 filters. In some locations the HVAC equipment utilizes 'bag' style filters which meet or exceed MERV-13. The Village uses MERV-10 for to equipment performance, however filters exist for each apartment unit, not just the building.</p>
<p>Close off any gaps around air filters to minimize air moving around them instead of through them.</p>	<p>Enclosure gaps are closed off as part of the system design and proper installation. These gaps are inspected and monitored as part of filter replacement and adjusted if necessary.</p>
<p>Use portable air cleaners to increase air cleaning rates in areas where air flow and central filtration are insufficient:</p> <ul style="list-style-type: none"> <li>• Select devices that are appropriately sized for the space in which they will be used. Consider ENERGY STAR certified products. If noise is a consideration, look for a product with lowest perceived sound levels.</li> <li>• As a temporary measure, do-it-yourself air cleaners can also be built from HVAC filters and box fans.</li> </ul>	<p>EMU provides the highest ventilation and filtration levels within the system design. Because of this, EMU discourages use of individual or portable air cleaners for the following reasons:</p> <ul style="list-style-type: none"> <li>• Unknown performance criteria and function</li> <li>• Unknown electrical use / requirements</li> <li>• Lack of appropriate maintenance</li> <li>• Proper filter selection and replacement(s)</li> <li>• Interference with HVAC system performance</li> <li>• Needing EHS approval(s)</li> </ul>
<p>Increase ventilation and/or filtration in areas with higher emission of airborne particles and aerosols (e.g., gyms, cafeterias, or choir/music rooms at schools). You can make adjustments for these areas by:</p> <ul style="list-style-type: none"> <li>• Increasing the volume of clean, outdoor air delivery.</li> <li>• Using portable air cleaners.</li> <li>• Setting up extra exhaust ventilation to move air directly to the outside.</li> </ul>	<p>EMU has defaulted HVAC systems to highest ventilation and filtration levels at all occupancy times, regardless of locations of higher emission of airborne particles and aerosols.</p> <p>The BAS / controls for HVAC at each facility have been set to run at least 2 hours prior to occupancy, and 2 hours after occupancy.</p>
<p>Consider an upper-room Ultraviolet Germicidal Irradiation (UVGI) system to clean the air. (UVGI systems require professional design and installation, in consultation with experts.)</p>	<p>Based on maximizing ventilation and filtration rates, EMU is not pursuing UVGI systems due to installation and maintenance costs. Our priority has focused on ventilation and filtration, but we are researching potential for disinfection systems similar to or including UVGI.</p>

**4. Get Your Community Engaged in Your Action Plan** by communicating with building occupants to increase awareness, commitment, and participation in improving indoor air quality and health outcomes:

EPA Recommendation	EMU Actions / Response:
Communicate to affected people (e.g., building occupants, workers, students, teachers, and parents) about how the action steps you are taking will improve indoor air quality and reduce disease transmission in your building.	EMU has prepared a facility based Frequently Asked Questions (FAQ) document, as well as this EPA supplemental companion document describing HVAC functions, maintenance, ventilation and filtration efforts.
Show your work by hosting building walkthroughs, posting descriptive signage, or communicating on social media. Demonstrate the importance of individual actions to ensure facility operations are optimal (e.g., keeping ventilation systems clear of clutter).	<p>In addition to recommendations and University policy support, the EMU Physical Plant encourages individual actions to:</p> <ul style="list-style-type: none"> <li>• Keep computer or similar equipment away from thermostats</li> <li>• Eliminate clutter and furniture in front of vents or radiators</li> </ul>
Provide feedback mechanisms such as maintenance requests to identify repair issues and surveys to gather perspectives from your community.	The University Work Order system allows for notification and confirmation of completed work, as well as feedback.
Remember individual actions and layered prevention strategies remain important measures for reducing the spread of viruses like COVID-19	EMU Physical Plant, in addition to supporting proper space use for optimizing HVAC systems (as outlined above), supports individual professional conduct and self-care (e.g. hand washing, staying home when ill, masking, etc. according to industry best practices).

**Summary:**

As noted by the EPA, *“None of these actions will eliminate risk completely, and building owners and operators may not need or be able to take all actions listed {above}. The best combination of actions for a building will vary by space and location.”* EMU Physical Plant continues to assess each facility for its most efficient and proper HVAC function during its annual maintenance programs as well as each opportunity for renovation, replacement, and construction of new facilities.

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