



Frequently Asked Questions about Building Systems, including Heating, Ventilation and Air Conditioning (HVAC) Systems at ECU – *Updated 11/2/2020*

As preparations continue to welcome back faculty, staff and students to the campus, ECU Facilities Services has issued answers to frequently asked questions regarding HVAC systems in light of the COVID-19 pandemic. The FAQs address how HVAC systems work and the measures being taken to reduce COVID-19 transmission through those systems.

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Who is ASHRAE and why is their position important?

ASHRAE, founded in 1894, is a global society advancing human well-being through sustainable technology for the built environment. The Society and its members focus on building systems, energy efficiency, indoor air quality and sustainability within the industry. Through research, standards writing, publishing and continuing education, ASHRAE shapes tomorrow's built environment today. <https://www.ashrae.org/>

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Do I need to be concerned with recent reports of small virus particles traveling through the HVAC?

To date there have been no documented cases of room to room transmission of small particles through HVAC systems in the United States. The science regarding this novel coronavirus is constantly evolving and we are continuously monitoring the data around the suspension of smaller particles in the air and adjusting our operations accordingly. The CDC does provide recommendations related to indoor air quality, including fresh air ventilation and air filtration. The university is taking a layered approach to protection, with physical distancing, face mask requirements and enhanced cleaning protocols being the primary defenses but will also address campus HVAC systems to ensure they are operating as designed. Subject matter experts across campus continue to monitor reports in the news, guidance from federal and state agencies (such as the Centers for Disease Control and the Environmental Protection Agency), procedures from trade associations (such as the American Society of Heating, Refrigeration and Air Conditioning Engineers and the American National Standards Institute), and the medical

and scientific literature to assess risk and evaluate mitigation strategies. This information will be updated as necessary.

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What is the size of the COVID-19 virus?

Research (US National Library of Medicine, Nation Institutes of Health) has shown that the particle size of COVID-19 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 the droplet nuclei (dried respiratory droplets) that are predominantly 1 μm in size and larger.

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How do HVAC systems work in campus buildings?

Air is mechanically supplied to building spaces by air handler units (AHUs). Air Handling units control the amount of outside air that is brought into a building as well as the recirculation of air. The AHUs also contain numerous banks of filters that both filter the outside air as well as the air that is recirculated. Air handling units serving laboratory buildings provide 100 percent outside air. This means that all the air delivered to the space from the air handler comes directly from outside and is 100 percent exhausted, with no recirculation. Non-lab buildings recirculate a portion of the air from the space and mix it with a portion of outdoor air.

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What measures are being taken to reduce COVID-19 transmission through the university's HVAC systems?

Air handling units will maximize outside air to flush the building two hours prior to occupancy and again for two hours after scheduled occupancy. Air handlers will increase outdoor air volumes as much as possible given equipment and ambient temperature and humidity conditions. Facilities staff will continue to perform scheduled preventative maintenance on HVAC systems.

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Can ECU increase air-exchange rates in offices and other rooms?

Currently air exchange rates are governed by ASHRAE standards. Increasing airflow rates beyond these standards can disrupt airflow patterns and mixing within the room, and possibly encourage aerosols and small droplets to remain suspended in the air longer. ECU has evaluated and adjusted the settings for ventilation systems to ensure that the maximum amount of fresh air is introduced into all spaces in compliance with North Carolina Building code and ASHRAE standard 62.1 (Ventilation for Acceptable Air Quality) to optimize our building systems. This will improve general indoor air quality.

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How do I know if my building's HVAC systems provide enough ventilation or fresh air?

Most buildings on campus are supplied with fresh air through the ventilation system. Fresh air requirements are based on occupant density and space function, and campus buildings are designed to meet or exceed mechanical code and the ASHRAE recommendations. By design, all mechanical systems are required to provide enough ventilation for maximum occupancy of spaces. With reduced numbers of staff and students on campus, most building mechanical systems will prove higher than required amounts of fresh air. Also, schedules have been modified to provide additional flushing of the building air prior to and after occupancy.

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How do I know if enough ventilation is being provided in my building, which has had its mechanical system “set back” to save energy?

The ASHRAE position is that well-designed and well-maintained air-to-air energy recovery systems should remain operating in residences, commercial buildings and medical facilities during the COVID-19 pandemic. This is because maintaining at least normal Outdoor Air Ventilation rates, with proper temperature and humidity conditioning of the inside space, is important for maintaining health and combatting infectious bioaerosols.

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What filters are recommended for HVAC systems to prevent transmission?

ASHRAE currently recommends using a filter with a Minimum Efficiency Reporting Value (MERV) of 13, which is at least 85% efficient at capturing particles in 1 μm to 3 μm size range, where feasible. If a MERV 13 filter cannot be accommodated in the current equipment, they recommend using the highest MERV rating you can.

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Is the university going to install filters to capture particles within the HVAC system?

All centralized HVAC air systems are filtered and are monitored and maintained on a regular basis. All HVAC systems currently utilize filtration that is designed to ASHRAE standards at the time of construction and filters are changed in accordance with the filter manufacturer's recommendations. The university currently maintains the highest rated filters available for each building system. Most buildings at ECU with centralized HVAC systems employ two sets of filter banks with the final filter bank being MERV 13. Adding higher rated filters to an HVAC system may impair airflow, exceeding design static pressures, reducing the ability of the system to maintain ASHRAE standard operation and may result in a breakdown of building air supply equipment or a reduction in air flow.

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Are high containment or HEPA (high-efficiency particulate air) filters used in campus buildings?

Specialty-use areas on campus, such as labs, animal care areas, or patient isolation rooms may require high containment or HEPA filters and the HVAC systems in these areas are designed to work with these filter types. Other campus spaces do not require high containment filters and the systems are not designed for that filter type. The university is currently accelerating its filter replacement program and evaluating filter types across the campus to determine if increased filtration is an option.

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What temperature and humidity set points are needed to reduce the risk of COVID-19?

The scientific literature generally reflects the environment most unfavorable survival for microorganisms is when the relative humidity RH is between 40% and 60%. Temperatures should be maintained at levels to maintain thermal comfort which are generally 68°-78° Fahrenheit (20-25 Celsius).

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What considerations has ASHRAE provided for mechanical systems at institutions of higher education?

ASHRAE's reopening guidance provides practical information to help our HVAC system mitigate the transmission of SARS-CoV-2. A list of the measures that ECU has implemented are noted below:

- Ensure ventilation systems operate properly and provide acceptable indoor air quality for the current occupancy level for each space
- Increase total air flow to occupied spaces, when possible
- Disable demand-controlled ventilation controls that reduce air supply based on occupancy or temperature during occupied hours
- Further open minimum air dampers to reduce or eliminate HVAC recirculation, in mild weather
- Inspect filter housing and racks to ensure appropriate filter fit and check for ways to minimize bypass
- Running the HVAC system and maximum outside airflow for 2 hours before and after building is occupied
- Ensure restroom exhaust fans are functional and operating at full capacity when buildings are occupied
- Verify HVAC systems function per design intent using ASHRAE Standard 180-2018, Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems, or equivalent. Ensure that energy recovery devices can be operated safely

- ☑ Focus on removing bio-burden pre-or post-occupancy of the building. Flush building for a time required to achieve three air changes of outdoor air (or equivalent, including effect of outdoor air, particulate filtration, and air cleaners)
- ☑ Operate in Occupied Mode when people are present in the building, including times when the building is occupied by a small fraction of its allowable capacity

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Does my building need an ultraviolet (UV-C) light disinfection system?

The design and sizing of effective ultraviolet disinfection systems can be a complex process because of the need to determine the dose delivered to a moving air stream or to an irradiated region of a room. In-duct systems are further complicated by the air handling unit and ductwork configuration and reflections from surfaces that can help achieve higher irradiance levels. Upper-air systems require adequate air mixing to work properly while paying close attention to reflective surfaces that could result in room occupants being overexposed to UV energy. Application of UV-C is recommended more for high-risk environments such as an infectious disease healthcare unit or where HVAC systems cannot provide the recommended levels of fresh air or filtration. The university is currently evaluating this technology for application in high risk areas.

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Is it ok for me to bring portable air filtration appliances to use in my office?

Please do not bring portable fans or filtration appliances from home. If you feel you have an indoor air quality issue related to the COVID pandemic, we ask that you contact Facilities Services or Environmental Health and Safety with your concern. Portable appliances like HEPA filters or space heaters should only be used on a temporary basis and only in the cases where Facilities Services has determined that the building systems cannot provide the recommended levels of filtration or fresh air.

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Will someone be monitoring changes in CDC and industry recommendations for managing HVAC/mechanical systems in response to the coronavirus pandemic?

ECU Campus Operations is conducting ongoing reviews of CDC recommendations and industry best practices and standards concerning the design, maintenance, and operation of building HVAC systems for the duration of the pandemic. Facilities will continue to monitor recommendations from CDC, ASHRAE and other expert agencies and adjust controls accordingly.

- ASHRAE Frequently Asked Questions (FAQ) web site:
<https://www.ashrae.org/technical-resources/frequently-asked-questions-faq>.

- Center for Disease Control and prevention FAQ web site:
<https://www.cdc.gov/coronavirus/2019-ncov/faq.html>

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Should I open my windows (if they do open)?

Please do not open windows for ventilation. Buildings on the ECU campus are slightly pressurized, meaning we bring in more fresh air from outside than is exhausted. This ensures that any air leakage (doors, windows, etc.) is outward and that all outdoor air coming into the building passes through air filters and is heated or cooled. This results in improved indoor air quality, increased comfort and keeps the building cleaner.

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Who should I contact if I have a question about my building systems (HVAC, plumbing, electrical, etc.)?

Questions about campus building systems should be directed to Griffin Avin, Director of Facilities Services for the Health Sciences Campus at aving@ecu.edu or Ricky Hill, Director of Facilities Services for the Main Campus at HillR@ecu.edu.

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