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ENVIRONMENTAL HEALTH AND SAFETY

VENTILATION AND COVID-19

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Heating Ventilation and Air Conditioning (HVAC) Systems

EHS and Facilities Operations are monitoring guidance from the state, CDC, and other public health and HVAC standard setting organizations with regard to COVID-19 mitigation strategies in relation to HVAC systems. Currently, the view is that HVAC systems in most non-medical buildings play only a small role in infectious disease transmission, including COVID-19, however they provide the greater benefit of supplying filtered air to allow dilution and lower potential airborne concentration in a space (6). The current guidance from the state on reopening offices, is to "increase ventilation rates, and increase the percentage of outdoor air that circulates into the system where possible." So, the current focus is on leveraging dilution ventilation to help mitigate virus transmission, which Facilities is actively doing by optimizing outdoor air ventilation of the University's HVAC systems. Moreover, with reduced building occupancies in response to COVID-19, more outdoor air is available per person, furthering building air dilution.

Throughout the pandemic, Facilities continues to perform preventative maintenance (PM) on the University's HVAC systems, including completing PM cycles on ventilation equipment (i.e. fans, pumps, chillers, boilers, filters, automation system controls and their calibration), changing filters on a regular basis and increasing filter efficiencies where feasible.

What about adding UV lamps to existing ventilation systems?

Ultraviolet germicidal irradiation (UVGI) uses short-wave ultraviolet (UVC) energy to inactivate viral, bacterial, and fungal microorganisms. UVC energy disrupts the DNA of a wide range of microorganisms and renders them harmless - but only if given a high enough dose and duration of exposure, which varies from microorganism to microorganism. In-duct UVC air disinfection systems are intended to distribute UVC energy uniformly throughout a duct or air-handling unit (AHU) in order to deliver a high enough dose over a long enough duration to microorganisms suspended in air moving through at specific velocities. (8,9) Some studies suggest a properly designed and maintained UV system, in combination with filtration, humidity control, and airflow management, can reduce the viable virus load in indoor spaces (3,7). However, the design, installation, and maintenance of the system is critical (ex: design of fixtures, lamp type, lamp placement, airflow amount and mixing, etc.) and must be rigorously conserved.

Delivering a suitable UVC dose to target microorganisms requires the consideration and quantification of highly complex interactions between air temperature, velocity, duct surfaces, and lamp performance among other factors (8,9). Simply adding UV to an existing system without consideration of these factors has not been demonstrated to have any benefit (7). The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) reports that UVC system benefits are not easily quantified, are easily lost in poorly maintained systems, and there are no reliable methods for in-situ testing of in-duct system performance to monitor system effectiveness. (7,8,9) In-duct UVC systems are more often used to maintain effectiveness of cooling coils, rather than provide air disinfection.

Additionally, neither the CDC nor the Connecticut Department of Public Health have recommended the use of UVC in ventilation systems for air disinfection in typical spaces such as classrooms, dormitories or office spaces. Instead, they recommend leveraging the systems to maximize dilution ventilation and the introduction of outside air.

Based on current information and public health agency guidance, UConn EHS does not advise in-duct UVC air disinfection systems for general building use. EHS and Facilities Operations will continue to monitor guidance from health agencies on how to effectively utilize ventilation systems to assist in reducing disease transmission.

Special Considerations for Building Occupants

Use of air conditioners, unit ventilators and fans

For spaces with local ventilation control, occupants should adhere to the following best practices (3) to prevent person-to-person transmission of the virus:

For areas with window air conditioners and unit ventilators:

- *Whenever possible,* have blowers set on low and pointed away from occupants. This prevents air from blowing from a potentially infected person to another and minimizes the possibility for virus transmission.

Fan use (window and free-standing):

- Window fans should only be used when exhausting out of the space.
- Free standing fans or window fans blowing into the space can “push” air from one person to another and should not be used.

Use of stand-alone air filtration units

Requests have been made for purchases of stand-alone air filtration units. While they may provide some small benefit, they are not considered an effective means of room air filtration and, ultimately, they do little to prevent person-to-person transmission. They cannot be used to allow increased occupancy in a space or to remove the requirements for physical distancing or the use of face coverings. There is no requirement for these units, and they will not be centrally funded by the University.

If your department chooses to purchase stand-alone units, keep these requirements in mind:

- They must only utilize HEPA filters.
- No ionizers – these are marketed as able to remove odors and smoke, but they can produce ozone, a harmful respirator irritant.
- No UV – Can produce ozone and also has the potential for harmful UV exposure to eyes and skin.
- Portable units may also contribute to overload of electrical circuits in some locations.

Ultimately, the standard practices of physical distancing, reducing occupancy, required use of face coverings, monitoring symptoms, not reporting to work/class when sick, disinfecting surfaces, and handwashing provide the greatest benefit to the health and welfare of University faculty, staff and students. Face coverings, in particular, are considered source control and are used to reduce the release of respiratory droplets and aerosols into the environment. Source control is more effective than dilution ventilation in controlling exposures.

RESOURCES

- State of Connecticut Sector Rules and Certification for Reopen
- State of Connecticut COVID-19 FAQ Ventilation Systems
- CT DPH - Guidance for School Systems for the Operation of Central and non-Central Ventilation Systems during the COVID-19 Pandemic
- CDC General Business FAQs for COVID-19
- CDC Interim Guidance for Businesses and Employers
- Guidance for Building Operations during the COVID-19 Pandemic
- https://news.engineering.utoronto.ca/air-filtration-and-covid-19-indoor-air-quality-expert-explains-how-to-keep-you-and-your-building-safe/
- https://www.ashrae.org/file%20library/technical%20resources/covid-19/si_a19_ch62uvairandsurfacetreatment.pdf
- https://www.ashrae.org/technical-resources/filtration-disinfection
- https://ehs.umich.edu/wp-content/uploads/2020/06/COVID-19-HVAC-Guidance.pdf
- https://news.engineering.utoronto.ca/air-filtration-and-covid-19-indoor-air-quality-expert-explains-how-to-keep-you-and-your-building-safe/
- https://www.rehva.eu/fileadmin/user_upload/HVAC_COVID19_PROCEDURE.pdf