Indoor Environmental Quality Best Practices – Summary
Approved by WACTC Capital, February 23, 2023

The Facilities and Operations Council (OFC) generally recommends following the established guidance from the Environmental Protection Agency (EPA), the Center for Disease Control and Prevention (CDC), and State and local health departments regarding administrative and engineering controls, indoor environmental quality measures, cleaning and disinfecting protocol, and other practices directly related to occupant health and particularly COVID-19. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) is considered the best source of technical information specific to heating, ventilation, and air conditioning (HVAC) systems. The following recommendations and considerations are a summary of information provided by these organizations.

Ensure Heating, Ventilation, and Air Conditioning (HVAC) settings are maximizing ventilation

- **Make sure your ventilation systems are serviced and meeting code requirements**. They should provide acceptable indoor air quality, as defined by ASHRAE Standard 62.1external icon, for the current occupancy level for each space.
- **Set HVAC systems to bring in as much outdoor air as your system will safely allow.** Reduce or eliminate HVAC air recirculation, when practical and with expert HVAC consultation.
- **Increase the HVAC system's total airflow supply to occupied spaces** when you can. More air flow encourages air mixing and ensures any recirculated air passes through the filter more frequently.
- **Disable demand-controlled ventilation (DCV) controls** that reduce air supply based on occupancy or temperature. This way the air supply will remain constant throughout the day.
- **For simple HVAC systems controlled by a thermostat,** setting the fan control switch from "Auto" to "On" will ensure the HVAC system provides continuous air filtration and distribution.
- **Consider running the HVAC system at maximum outside airflow for 2 hours before and after the building is occupied** to flush space and refresh air before arrival and remove remaining particles at the end of the day.
- **Improve the level of air filtration as much as possible** without significantly reducing airflow.
- **Make sure the filters are sized, installed, and replaced according to manufacturer's instructions.**
- **Ensure restroom and kitchen exhaust fans** are on and operating at full capacity while the school or childcare program is occupied and for 2 hours afterward.

Ways to improve ventilation

- **Increase the introduction of outdoor air:**
  - Open outdoor air dampers beyond minimum settings to reduce or eliminate HVAC air recirculation. In mild weather, this will not affect thermal comfort or humidity. However, this may be difficult to do in cold, hot, or humid weather, and may require consultation with an experienced HVAC professional.
  - Open windows and doors, when weather conditions allow, to increase outdoor air flow. Do not open windows and doors if doing so poses a safety or health risk (e.g., risk of falling, triggering asthma symptoms) to occupants in the building. Even a slightly open window can introduce beneficial outdoor air.
- **Use fans to increase the effectiveness of open windows:**
  - To safely achieve this, fan placement is important and will vary based on room configuration. Avoid placing fans in a way that could potentially cause contaminated air to flow directly from one person to another (see CDC guidance on indoor use of fans). One helpful strategy is to use a window fan, placed safely and securely in a window, to exhaust room air to the outdoors. This will help draw outdoor air into the room via other open windows and doors without generating strong room air currents. Similar results can be established in larger facilities using other fan systems, such as gable fans, roof ventilators, and building exhaust fans.
- **Ensure ventilation systems operate properly** and provide acceptable indoor air quality for the current occupancy level for each space.
- **Rebalance or adjust HVAC systems** to increase total airflow to occupied spaces when possible**.** Rebalancing may also be required to maintain proper building or room static pressure due to increased supply, return, and exhaust air.
- **Turn off any demand-controlled ventilation (DCV)** controls that reduce air supply based on occupancy or temperature during occupied hours**.**
- **Improve central air filtration:**
  - Increase air filtration to as high as possible without significantly reducing design airflow. Increased filtration efficiency is especially helpful when enhanced outdoor air delivery options are limited.
  - Make sure air filters are properly sized and within their recommended service life.
  - Inspect filter housing and racks to ensure appropriate filter fit and minimize air that flows around, instead of through, the filter.

- **Ensure restroom exhaust fans are functional** and operating at full capacity when the building is occupied.
- **Inspect and maintain exhaust ventilation systems in areas such as kitchens, cooking areas, etc**. Operate these systems any time these spaces are occupied. Operating them even when the specific space is not occupied will increase overall ventilation within the occupied building.

Cleaning and Disinfecting

- **Promote Handwashing to reduce transmission source** through signage and other campus communication sources.
- **Expand hand sanitizer stations access** to increase easy and convenient access. Focus placement at main building entrances and areas of high occupancy
- **Develop a clear plan** to clearly communicate to cleaning staff and building occupants protocols and expectations along with identifying site specific areas on campus that are considered high traffic, high touch areas.
- **Daily cleaning of high-touch and high traffic areas** to focus resources on areas of higher exposure potential. Electing to clean more frequently or to disinfect should be guided by continued monitoring of local infection rates and space use/occupancy. Using products from the EPA List N when disinfecting will ensure products have been evaluated to kill SARS-CoV-2
- **Ensure proper product use and PPE** is implemented by comprehensive training and regular safety meetings to reintegrate the importance.
- **Disinfect space where there is a confirmed illness** by following CDC guidance using EPA List N products. Priorities should focus and maintaining maximum air changes, proper product use, HEPA filtered vacuums, proper PPE, waiting as long as possible to clean the space (at least several hours) since the space was occupied by the ill person before beginning cleaning and disinfecting work.
- **Implement enhanced cleaning practices in all spaces** to reduce soil loads on surfaces. Maintaining all campus space at a high standard will reduce oil and soil loads on surfaces to maximize the effectiveness of cleaners and disinfectants when used. Regular quality audits should be performed by supervisors and/or leads to ensure cleaning standards are being maintained.
- **Educate workers to recognize symptoms** who clean, wash laundry, and pick up trash to reduce possible exposure. Education should also include review of SDS sheets for new and existing products, blood borne pathogen standards, product safety labels, and proper use and disposal of PPE.

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Building Water Systems

- **Ensure water systems are flushed** by including in daily/weekly check list and assigning responsibility to staff. Task custodians to run water in sinks, showers, and toilets daily. EPA guidelines
- **Clean water features** to remove visible slime and biofilm.
- **Ensure cooling towers are cleaned,** disinfected, and maintained according to manufacturer's instructions. A water treatment plan and review is best practice. Some campuses use 3rd party for all campus systems that require water treatment and monitoring.
- **Consider testing** for legionella in water systems

Additional Considerations for Existing Facilities

Note: These considerations can be costly, can be situation specific with variable effectiveness, and may present long-term maintenance challenges and additional M&O costs.

- **Consider portable air cleaners that use high-efficiency particulate air (HEPA) filters** to enhance air cleaning wherever possible, especially in higher-risk areas such as a health clinics, workout rooms, and waiting areas. These units can help provide filtered air exchanges to spaces with higher occupancy or with lower outdoor air exchanges by the existing HVAC system. UW information mentioned use of this in areas they could not achieve 4 air exchanges an hour.
- **Consider using ultraviolet germicidal irradiation (UVGI)** in schools and non-home-based childcare programs as a supplemental treatment to inactivate the virus that causes COVID-19, especially if options for increasing ventilation and filtration are limited. Consult a qualified professional to help design and install any UVGI system.
- **Consider installing Needlepoint Bipolar Ionization (NPBI)** units in existing HVAC equipment to increase filter efficiency without restricting air flow.

Additional Considerations for New Construction

- **Specify HVAC systems which allow for MERV 13 filtration or higher**.
- **Consider the use of Dedicated Outdoor Air Systems (DOAS)** to increase outdoor air ventilation, reduce the need to filter recirculated air, control humidity, and reduce energy use.
- **Reconsider the use of Demand Control Ventilation (DCV)** or provide control option to turn DCV off if needed.
- **Size and design equipment appropriately** to allow for increased heating, cooling, and ventilation demands during pandemic.
- **Follow LEED guidance** for building materials, products, and finishes that limit VOCs and off-gassing.
- **Consider options for natural ventilation** to supplement mechanical HVAC systems.
- **Design water systems to be easily flushed** during times of low use to minimize risk of legionella.
- **Commissioning plan** that puts equal emphasis on IAQ and energy conservation.
- **Consider Cost impacts** to new construction related to scheduling, limited bid pools, reduction in labor force, supply chain issues, and contractor vaccination declaration requirements due to COVID-19.

Resources

CDC Guidance for Cleaning, Disinfecting, and Ventilation

ASHREA Indoor Air Quality Guide

US EPA Indoor Air Quality Guide

UW Novel Coronavirus & COVID-19

UW Building Readiness Guidelines

ASHRAE Epidemic Task Force

Cost Reference

Below are estimated cost ranges for some of the technologies mentioned in these best practices (as of March 2022). It is important to note that costs could vary significantly from campus to campus and building to building throughout the system.

- **Needle Point Bi-polar Ionization (NPBI) –** Cost range, $1.03-$2.89/sq. ft.
- **Variable Ionization with indoor air sensors/dash board –** Cost range $1.08-$1.50/sq. ft.
- **Ultraviolet Germicidal Irradiation (UVGI) –** Cost range $0.18 to $.44/sq. ft. (equipment only), $.36 to $.44/sq. ft. (equipment plus installation).

Note: Ultra Violet has a lower initial installation cost in most cases but has a higher maintenance cost as well as energy cost for operations.