

TIP No. 98-113-0420

MEASURES TO MODIFY BUILDING HVAC FOR OCCUPANT HEALTH AND COMFORT DURING THE COVID-19 PANDEMIC

INTRODUCTION

The Centers for Disease Control and Prevention (CDC) Interim Guidance for Businesses and Employers to Plan and Respond to Coronavirus Disease 2019 (COVID-19)¹ recommends looking at building ventilation system controls to maintain a healthy work environment, including potentially increasing ventilation rates and increasing the quantity of outdoor air provided to occupants. Heating, ventilating, and air-conditioning (HVAC) systems for occupied facilities, where provided, should continue to be run with the following considerations. Note: always consult Facilities Management for information on individual systems.

The virus that causes COVID-19 is mainly transmitted through droplets generated when an infected person coughs, sneezes, or speaks. These droplets can land in the mouths or noses of people nearby or possibly be inhaled into the lungs. Spread is more likely when people are in close contact with one another (within about 6 feet). You may also be infected by touching a contaminated surface and then touching your eyes, nose, or mouth before washing your hands (<https://www.cdc.gov/coronavirus/2019-ncov/faq.html#Spread>).

VENTILATION RATES

Blueprints for the facility can be used to determine if the total airflow provided to occupied areas of the building from the existing ventilation unit(s) meets the design. Ensure that the amount of total airflow meets the designed quantity², or provide additional total airflow volume, if necessary^{1,3}, in occupied areas. Increasing the total airflow volume may involve damper adjustment or increasing the fan speed or both. Consult with Facilities Engineering staff to ensure any additional airflow volume can be supported by the ventilation system, fans, building air balance and thermal and humidity control systems.

OUTDOOR AIR

Increasing outdoor air must be carefully coordinated with Facilities Management as there are considerations such as thermal control, demand control ventilation* (where used), economizer control,** and humidity and/or dew point control that must be maintained in occupied areas to comply with the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 62.1⁴ and ASHRAE 55⁵ as well as any other local code requirements². Ensure that the minimum outdoor air requirements are met for the given occupancy,^{2,4} or increase the opening of outdoor air dampers to allow for at least the minimum outdoor air required. It is recommended that dilution ventilation be increased, when possible, with additional outdoor air as appropriate for the HVAC system design and occupant population^{1,6}. The ASHRAE 62.1⁴ can be used to determine outdoor air-flow rates based upon occupancy. Outdoor air quantities are based, in part, on the number of occupants; reduced occupancy may, in and of itself, be sufficient to increase effective dilution ventilation⁶.

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Note: *Demand Control Ventilation adjusts the outdoor air flow rate based upon the number of occupants (using carbon dioxide concentration or occupant-sensing controls generally). A smaller occupant population or desire for increased outdoor air may require adjustment to this system control⁶.

Note: **Economizer systems allow for "free cooling" by outdoor air when the outdoor air temperature, enthalpy conditions, or return air to outdoor air temperature difference is acceptable. A desire for increased outdoor air may require adjustment to this system control.

DEDICATED OUTDOOR AIR SYSTEM (DOAS)

Leadership in Energy and Environmental Design (LEED) or newer buildings may have air handling units (AHUs) with a DOAS. The AHU provides 100% outdoor air supply to the building (each room has a supply vent that provides 100% outdoor air at a designed volume based on ASHRAE 62.1⁴ requirements at a minimum) and exhaust is 100% dedicated to the outside. The ductwork for the supply and exhaust passes through an energy recovery device, such as an enthalpy wheel heat exchanger,^{***} that transfers energy (heat/cool depending on season) between the supply and exhaust ducts. The drawing for the HVAC controls for the building showing the Sequence of Operations can be consulted to determine how the DOAS operates (e.g., bypass dampers that open when the heat wheel is disabled). Providing 100% outdoor air increases dilution for building occupants.

Note: ***Energy wheel-type heat exchangers have the potential for some cross-leakage between supply and exhaust ducts depending on their age, maintenance, and system pressures; the manufacturer would need to be contacted to determine this potential in consultation with facilities engineering staff. See ASHRAE 62.1⁴ for specifics on energy recovery device operations and allowances.

FILTRATION

Ensure the HVAC system filtration meets design requirements for the occupied area. Provide the highest level and efficiency of filtration that can be accommodated by the existing ventilation system^{3,6}. Consult Facilities Management and the ventilation unit manufacturer for advice on filtration or increasing the filtration efficiency as higher efficiency filtration affects system pressure. Ensure the proper size, fit, and seal of the ventilation system filters to avoid bypass.

ULTRAVIOLET GERMICIDAL IRRADIATION (UVGI)

The UV or polar ionization systems serving the AHU are generally for coil/drain pan sanitizing and are not intended as an air purification system. The UVGI system may be used as a supplemental engineering control and should not replace sufficient ventilation or filtration^{2,6}. The CDC states that UVGI can be used as an adjunct air-cleaning measure, but it cannot replace HEPA filtration⁷). There are safety considerations with the use of UVGI. See the U.S. Army Public Health Center (APHC) Fact Sheet Nos. 24-016-0316 (*Hazard Alert for Upper Room Ultraviolet Germicidal Lamps⁸*), 24-013-0316 (*Hazard Alert for Ultraviolet Germicidal Lamps Used in Air Handling Units⁹*), and the APHC Technical information Paper No. 24-103-0320

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(Effectiveness and Safety of Ultraviolet Germicidal Irradiation Lamps Used for Air and Surface Disinfection¹⁰) for additional information.

CONTROLS

The run time of the ventilation system in the occupied area may need to be increased to ensure good dilution for occupants (e.g., put on system 2 hours earlier than usual)⁶. Consult Facilities Engineering to determine the lead/lag and stop/start times for the ventilation systems; if these should be adjusted based on occupant load and schedules, outdoor air requirements, and effective dilution for the occupant space.

FACILITIES WITHOUT MECHANICAL VENTILATION

Consult Facilities Management for individual facility guidance. It is best to have a ventilated space. Opening windows will allow for increased air exchanges in rooms without mechanical HVAC, when necessary, but will not provide filtered air, temperature control, or directional airflow. It is not recommended that bathroom windows be opened if they are provided with an exhaust fan.¹¹

DOCUMENTATION

Note carefully any adjustments made to the system beyond the design or standard, so that once normal operation is resumed the building settings can be returned to normal.

WORKER PROTECTION

Ensure appropriate personal protective equipment for technicians and maintenance personnel working with the HVAC system.

APPENDIX A

REFERENCES

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11. Federation of European Heating, Ventilation and Air Conditioning Association (REHVA). 2020.
<https://www.rehva.eu/activities/covid-19-guidance>