

HOSPITALITY OPERATIONS TO REDUCE RISKS OF AIRBORNE INFECTIOUS DISEASE TRANSMISSION

Review Space Types and Occupancies:

- ▶ Consider closing or limiting access to nonessential areas until the epidemic is over. Close fitness and indoor pool areas. Close off sections or floors of rooms not needed for guests. Set back temperature set points and reduce exhaust in isolated closed-off areas.
- ▶ Consider closing or controlling access to dining areas. Provide grab-and-go food and beverage options.
- ▶ Complete enhanced survey and cleaning of all spaces to ensure systems are cleaned and operating properly.
- ▶ Provide local exhaust or portable air filtration and cleaning appliances for small spaces with poor circulation.
- ▶ In public spaces such as lobbies and registration where there can be a large assembly of people, consider air treatment, e.g., portable air cleaners or upper-room ultraviolet germicidal irradiation (UVGI) lamps.

Heating, Ventilating and Air-Conditioning (HVAC) System Operations:

- ▶ Increase outside air for ventilation as much as the HVAC system can accommodate and still maintain acceptable indoor conditions during occupied hours and for flushing the building for two hours after occupancy. Systems may be operated at minimum ventilation during unoccupied hours.

ComStock analysis (analysis of the entire commercial building stock with DOE's ComStock tool) calculates that HVAC outdoor air flushing for 2 hours pre- and post-occupancy at 3 air changes per hour of outdoor air would increase energy consumption by 1.45%, increase electric consumption by 0.77%, increase gas consumption by 3.71% and increase peak electric by 5.37% in the aggregate total of all the hospitality buildings in the U.S. commercial building stock. Similarly, increasing the minimum outdoor air percentage to 100% during occupied hours would lead to a 10.39% energy consumption increase, 5.98% electric consumption increase, 25.01% gas consumption increase, and 21.87% peak electric demand increase in the aggregate total.

- ▶ Check outside air intake regularly for potential risks such as exhaust nearby and provide proper clearance for pedestrians, etc.
- ▶ Update or replace existing HVAC air filtration to MERV-13 (MERV-14 preferred) or the highest efficiency filter compatible with the filter rack and seal edges of the filter to limit bypass. Make sure the air handling fans can overcome additional pressure drop associated with new filters to maintain airflow at acceptable levels.

ComStock analysis calculates that upgrading to MERV-13 filters in all hospitality buildings in U.S. commercial building stock would increase energy consumption by 0.54%, increase electric consumption by 0.78%, decrease gas consumption by 0.24% and increase peak electric demand by 0.45%.

- ▶ Monitor fan motor health and consider more frequent replacement of filters due to longer runtimes.
- ▶ For package units that have the capability to operate with variable outside air, close return air dampers and open outdoor air dampers to 100% or to the maximum setting that the system can accommodate and still maintain acceptable indoor conditions.

ComStock analysis calculates that if 100% minimum outdoor air was enacted in all central air handling equipment across all hospitality buildings in the commercial buildings stock, the measure would lead to a 10.39% energy consumption increase, 5.98% electric consumption increase, 25.01% gas consumption increase, and 21.87% peak electric demand increase.

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- ▶ Heat or energy recovery wheels in HVAC systems that serve more than one space should be shut down if there is a potential of cross contamination between the intake and exhaust air stream. Heat wheels may continue operation if the unit serves only one space.
 - ▶ Consider adding air treatment and cleaning devices such as UVGI in duct, plenums, and packaged air conditioning units and on the face of coils.
 - ▶ When outside air thermal and humidity conditions and air quality are acceptable, open windows and doors where appropriate during occupied hours. If provided for in the building automation system (BAS), disable the interlock between opening windows and air conditioning system lockout or shut down. Exposure to seasonal and other outdoor allergens (pollen and mold spores) may occur with open windows.
 - ▶ Maintain relative humidity between 40%-60% if HVAC systems have this capability.
 - ▶ Positively pressurize the corridors relative to guest rooms and provide exhaust from guest rooms.
 - ▶ Maintain exhaust in kitchen areas.
 - ▶ Follow the requirements of ASHRAE Standard 180-2018 “Standard Practice for the Inspection and Maintenance of Commercial HVAC Systems.” Consider personal protective equipment (PPE) when maintaining ventilation materials including filters and condensate. Duct cleaning is not recommended. Consult your HVAC technician and ask them to check specifically:
 - ▶ Dampers, filters, and economizers seals and frames are intact, clean, functional, and responding to control signals.
 - ▶ Zone air temperature, humidity, and carbon dioxide (CO₂) system sensors are calibrated and accurately reporting environmental conditions to the BAS or local controllers.
 - ▶ Air handling systems are providing adequate airflow to each occupied space.
 - ▶ Exhaust fans are functional and venting to the outdoors.

Exhaust Systems:

- ▶ Exhaust systems for restrooms should run 24/7. Keep restroom doors closed and do not open operable windows in restrooms.
- ▶ Garage exhaust systems should run two hours before occupancy, continuously during occupied hours, and two hours after the building becomes unoccupied. These measures may require disengaging the demand ventilation controlled by carbon monoxide.
- ▶ Other exhaust systems should run continuously to help provide additional air exchanges.
- ▶ If there are exhaust outlets located in pedestrian areas outside, provide warning signs and consider diverting or rearranging the exhaust air discharge locations so they pose no opportunity to cause harm.
- ▶ Consider installing temporary and special exhaust systems if there are rooms that may accommodate infected people, may result in close occupancy or confined spaces, or can generate and entrain harmful particulates in the air. Particulates or aerosols should be captured and filtered or disinfected as close to the source as possible. Particulates can possibly be a means where the virus can adhere and become aerosol.
- ▶ Check that exhaust fans discharge air directly to the outside away from entrances, loading docks, outdoor public gathering spaces, outdoor air intakes, and operable windows. Consider high-efficiency particulate air (HEPA) filters or UVGI lamps with exhaust fans if exhaust may cause harm to public.

Elevator Control:

- ▶ Turn on elevator cab (lift) ventilation fans where possible.
- ▶ Encourage occupants to take stairs where possible, especially when elevator lobbies are crowded.
- ▶ Allow elevators to run at high speed to minimize time in elevator.
- ▶ Close elevator lobby vestibule doors if available.
- ▶ Consider local air treatment devices in frequently used elevators.
- ▶ Require occupants to wear face masks.

Building Automation System and Access Control System:

- ▶ Create an “Epidemic Mode” operation that can be turned on, shut down, or overridden if needed by manual selection of the operator.
- ▶ Monitor the measures and set alerts and notification to provide real-time feedback to building operators and maintenance personnel where possible. Consider using local data loggers in high-occupancy spaces and spaces deemed critical for temperature and humidity if the BAS cannot.
- ▶ Disable demand-controlled ventilation for the duration of the crisis.

Analysis of the entire commercial building stock with ComStock shows that if demand control ventilation was disabled across the entire hospitality portfolio, the portfolio would see a 0.09% increase in energy consumption, a 0.05% increase in electric consumption, a 0.26% increase in gas consumption and a 0.14% increase in peak electric demand. Disabling existing DCV is applicable to buildings that constitute 3% of the total building stock by area, so only a small portion of buildings are impacted by this measure.

- ▶ Provide remote access to staff and trusted service providers who are responsible for operating and maintaining BAS, security, access control, information technology (IT), fire alarm, and life safety systems. Have written procedures and test remote access and secure access levels and permissions for all individuals prior to an emergency if possible.
- ▶ Regularly check battery and generator backup power supplies for BAS, security, fire alarm, life safety, lighting control, and IT systems and internet of things (IOT) devices that must remain in operation.

Resources:

- ▶ ASHRAE: [Covid-19 Resources](#)
- ▶ OSHA: [Guide for Preparing Workplaces](#)
- ▶ CDC: [Guidance for Businesses and Employers to Plan and Respond to Covid-19](#)
- ▶ National Air Filtration Association (NAFA): [Covid-19 Resources](#)
- ▶ American Hotel and Lodging Association (AHLA): [Resources](#) (members only)
- ▶ Asian American Hotel Owners Association (AAHOA): [Resources](#)
- ▶ National Restaurant Association: [Resources](#)
- ▶ Ecolab: [Cleaning Resources](#)
- ▶ World Health Organization (WHO): [Guidance for the Accommodation Sector](#)

Notes:

Developed by the National Renewable Energy Laboratory. This information is based on recommendations and guidance from ASHRAE and other sources. Energy implications are from ComStock (<https://comstock.nrel.gov>) analysis of ASHRAE COVID-19 mitigation strategies. Hospitality sector results include large hotel and small hotel DOE prototype building types. This is a quickly changing area of research and readers should review for any recent guidance. Each building in each climate type will differ and affect final implementation. Professional engineers who are familiar with each individual building should consider any changes as they impact a specific, unique building.