

## RETAIL 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.
- ▶ Provide local exhaust or portable air filtration for small spaces with poor circulation.
- ▶ In public spaces 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.
- ▶ Add automated doors, automated water faucets, and autopay options to minimize common touch points.
- ▶ Consider adding barriers in checkout areas to separate customers from checkers.
- ▶ Minimize occupancy and time spent in common enclosed spaces such as break rooms.

### 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, a U.S. DOE platform that analyzes energy use for the entire U.S. building stock, was used to determine the impact of increasing outdoor air to 100% in all central air handling units. The aggregate impact on U.S. retail is a 50.41% increase in energy consumption, a 17.52% increase in electric consumption, a 186.24% increase in gas consumption and a 35.52% increase in peak electric demand. The aggregate impact on U.S. retail for flushing the building pre- and post-occupancy for a period of 2 hours at rate of at least 3 air changes per hour would increase energy consumption by 13.33%, increase electric consumption by 6.77%, increase gas consumption by 40.45%, and increase peak electric demand by 26.89%.

- ▶ Check outside air intake regularly for potential risks such as exhaust nearby and provide proper clearance for pedestrians, etc.
- ▶ Consider updating or replacing 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 concludes that upgrading to MERV-13 filters in all retail buildings in the U.S. commercial building stock would increase energy consumption by 1.27%, increase electric consumption by 2.15%, decrease gas consumption by 2.40% and increase peak electric by 1.01%.

- ▶ 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.

If 100% minimum outdoor air measure was enacted for all central air handling units across all retail buildings in the commercial buildings stock, the measure would lead to a 50.41% energy consumption increase, 17.52% electric consumption increase, 186.24% gas consumption increase, and 35.52% peak electric demand increase in aggregate.

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- ▶ Heat or energy recovery wheels 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.
  - ▶ 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 specifically check:
    - ▶ Dampers, filters, and economizers seals and frames are intact, clean, functional, and responding to control signals.
    - ▶ Zone air temperature, humidity, and carbon dioxide (CO<sub>2</sub>) 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 doors and windows closed.
- ▶ 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 disengage 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.

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- ▶ 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 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.
- ▶ 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.
- ▶ 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](#)
- ▶ Retail Industry Leaders Association (RILA): [Covid-19 Resources](#)

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### **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. Retail sector results include retail and strip mall 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.