

A Strong and Healthy Year: Facilities and HVAC Considerations

Purpose

This guidance will assist district and school leadership, facilities managers and custodians reduce the risk of COVID-19 transmission through operational strategies and modifications to school buildings and heating, ventilation and air conditioning systems.

Building Considerations/Modifications

Guidance for operating and modifying school buildings:

- Hand sanitizing stations must be set up at the entrance of the facility, or the entrance process could be rerouted through a different entrance nearest the sink, so that students can sanitize/wash their hands before they enter, or immediately upon entry into the facility.
- Open additional entrances for drop-off and pick-up.
- Make hallways or entrances one-way, when possible.
- Water fountains and vending machines may be used with frequent cleaning and disinfecting. Touchless water bottle filler stations should be cleaned/disinfected regularly. Take care to remove any residues from water fountains that may be left by cleaning and disinfecting products and follow all label instructions on the product.
- Add signage to clearly mark all closed areas.
- Place (tape) markings at all entrances so distancing is easy to establish.
- All buildings must secure two separate areas (Clean and Isolation) to serve the school population.
 - A Health Office should serve as the school's Clean office space to accommodate medication administration, triage students, health screenings, etc.
 - The school must have a separate Isolation room structured with a door. The isolation space must allow for ventilation to the outside. This space serves as an extension of a Health Office to accommodate symptomatic students and staff.
 - Immediately isolate symptomatic people in the designated space at school and send them home as soon as possible.
 - If multiple symptomatic people must be placed in the same Isolation room, ensure that the symptomatic people are wearing masks and maintain at least 6 feet of distance between them.
 - Develop cleaning processes for the Clean and Isolation spaces between uses for high touch surfaces and as needed.
 - The Isolation room should be cleaned and disinfected following each use. This should happen as soon as practical—there is no need for delay.
 - Ensure that symptomatic students who are waiting to be picked up remain under the visual supervision of a staff member who is at least six (6) feet away.

- The symptomatic student(s) should wear a surgical mask unless there is a medical or behavioral indication not to do so. If the supervising adult is inside the Isolation room, they should be wearing a minimum of a surgical mask and face shield as PPE.
- Where feasible, the school nurse's office/Isolation room should have:
 - No air returned to a central air handling unit.
 - Exhaust directly outdoors.
 - Maintain negative pressure to adjoining spaces.
 - The ability to increase ventilation above standard levels when needed.
 - The ability to provide a total of ten (10) air changes per hour (ACH) when the room is occupied by a symptomatic individual.
 - A HEPA portable air cleaner in use when occupied by a symptomatic student.
 - A dedicated restroom.

Heating, Ventilation and Air Conditioning Recommendations

With regard to ventilation and heating ventilation and air conditioning (HVAC), follow these recommendations¹:

The primary performance targets for a school's HVAC system are:

- Indoor temperature should be maintained between 68-78°F and relative humidity should not exceed 60%^{2, 3}.
- Four to six ACH (return plus outside air) during occupancy

Ventilation

- Ensure that preventative maintenance is up to date on all heating and ventilation equipment.
 - Quarterly, ensure coils, pre-filters and outdoor air intake grills/screens/louvers are free of obstructions.
 - Annually, ensure ventilation systems operate properly and test the supply air flow rate by zone to determine ACH and ventilation rate.
- Provide the minimum volume of ventilation air as specified in ASHRAE Standard 62.1-2019. For classrooms this is 10 CFM per occupant plus 0.12 CFM per square foot of area.

¹ The CDC and ASHRAE guidelines provide general guidance as well as specific HVAC performance targets to maintain indoor air quality.

² Excessive outdoor air (e.g., opening windows in spaces with adequate mechanical ventilation) can drive down indoor humidity in winter, increasing the risk of air born viral transmission.

³ Relative Humidity (RH) is a measurement of the air's ability to hold water. As you raise the temperature of the air in a space, the RH will fall, and conversely as you lower the temperature of the air, the RH rise. Take a fall day when the outside air temperature is 50°F and it's raining the RH is close to 100%, in a well-ventilated building when you raise that air temperature up to 70°F, the RH will only be 50%. The same can occur in winter. If the room is at 75°F and 40%humidity, lowering the thermostat will raise the RH to about 55%.

When it is possible without negatively impacting the space temperature, increase the ventilation to 30%⁴, or more, than this minimum requirement. Operate the ventilation system 1-2 hours, based on the mechanical system, before and after building occupancy to flush the conditioned space.

- Keep bathroom exhaust fans operating 24/5 on school days (or 24/7 if there is weekend occupancy), as long as this does not adversely affect the space temperature.
- In under-ventilated spaces, windows can be open during occupancy when the outdoor air temperatures will not adversely affect the operation of the HVAC system or indoor space temperature set points. Leaving windows open in properly-ventilated classrooms may have an adverse effect on indoor air quality. Leaving windows open in unoccupied spaces (e.g., overnight) is not useful and wastes energy.
 - Natural ventilation through windows can be effective but is dependent on factors that drive pressure differentials between outdoors and indoors, like wind pressure and stack (or buoyancy) effects. Therefore, airflow into the building, even with open windows, is not guaranteed. To help address this, schools can consider using window fans or box fans positioned in open windows to blow fresh outdoor air into the classroom via one window and indoor air out of the classroom via another window. Note that devices that simply recirculate the same indoor air without filtering it or replacing it with fresh air are not helpful in reducing any airborne virus present in the room (including most window air conditioning units, fans used in rooms with closed windows, and fan coils and radiators).

Filtration

- Upgrade return air filters to MERV 13 (ASHRAE 2017b) or the highest level achievable. Change filters every 3-4 months, or as needed to avoid a reduction in air flow.
 - Portable air cleaner should be considered in spaces that are under ventilated, with low ACH and filtration lower than MERV 13. Portable air cleaners in classrooms should provide at least 2 ACH. Use ENERGY STAR certified HEPA or MERV 13 or higher filters with due consideration to the clean air delivery rate⁵ and sound.

Controls

- When there is a control platform in place, evaluate and modify the sequence to optimize the volume of outside air that can be brought into the space while maintaining space temperatures and avoiding driving the relative humidity too low. If there is a demand control sequence being applied to the OA dampers, this should be disabled to maximize the ventilation regardless of occupancy during the school day without negatively

⁴ WELL Building Standard v1 Q3 2020-Present

⁵ ANSI/AHAM PAC-1-2015 (Portable Air Conditioners)

impacting the space temperature. Annually confirm sensor calibration and verify controls are operating to achieve target metrics.

Other HVAC Considerations

- Continuously monitor indoor air quality (IAQ) using monitors for temperature, relative humidity, fine particulate matter (PM 2.5) and carbon dioxide. Look for IAQ trends over time (e.g., two-weeks of normal occupancy) to identify any areas that may be underperforming and require investigation by a HVAC professional.
- Encourage staff to provide additional outside time. Sufficient time outside, out of the classroom, can also allow air to turnover before re-occupancy.
- Educate staff on the importance of ventilation fans – the fans must run all day.
- Take appropriate precautions when servicing HVAC Systems and replacing filters (wear appropriate PPE, bag and dispose of filters in regular trash, immediately wash hands with soap and water or use an alcohol-based hand sanitizer).
- For more information see [ASHRAE Epidemic Taskforce Schools & Universities](#).