

# OPERATIONAL CHANGES TO SCHOOL VENTILATION SYSTEM TO LIMIT EXPOSURE TO COVID-19

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This document outlines operational changes of Heating Ventilation and Air Conditioning (HVAC) systems for the 2020/2021 school year, in response to the Covid-19 pandemic. These strategies may be updated from time to time as new evidence becomes available.

The following recommendations for operation were compiled primarily from guidance published by The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Epidemic Task Force on July 22, 2020. ([www.ashrae.org/covid19](http://www.ashrae.org/covid19)).

The intent is to reduce the airborne concentration of SARS-CoV-2 and thus the risk of transmission through the air. The following strategies will be employed:

- 1. Increase outdoor (fresh) air delivered to rooms**
- 2. Improve filtration/treatment of return air**
- 3. Increase duration of system operation beyond occupied hours.**

How this will be achieved will vary based on the HVAC equipment installed at each facility.

## Before School Starts

Prior to the return of students to schools, the following activities will be completed by facilities staff:

- Review condition of air distribution equipment in all spaces.
- Determine appropriate strategies based on equipment configuration (single zone vs multi-zone etc).
- Review system operating schedules
  - Upgrade air filters on a space-by-space basis as feasible.
  - Increase filter granularity to MERV (Minimum Efficiency Reporting Value) 13 where possible.
  - Consider adding UV/C light to central AHU systems and/or space mounted in Classrooms.
- Where possible, operate HVAC systems in occupied mode for one week prior to occupancy.

## After School Starts

### Classrooms with Unit Ventilators:

- **Level 1 Operation Changes**
  - Change filters to MERV 13
  - Increase minimum outdoor air damper position. Add a new programming point, so user can set based on climate.
    - Consideration to be given to a minimum allowable mixed air temperature that eliminates possibility of heating coil freeze-up, and
    - Coil capacity such that occupant comfort is maintained
    - Classroom size and occupancy should also be considered. (If lower occupancy is anticipated).
  - Disable motion control sequence portion from DDC logic and allow fans to run continuously, with damper open to new minimum position or greater
  - Change CO2 setpoint to operate with outdoor air damper at new minimum position, either by:
    - Revise carbon dioxide (CO2) setpoint from 1000 PPM to 800 PPM, which is recommended by ASHRAE, or
    - Pre-determined outdoor air minimum position. This is climate dependent (see above)
    - Also allow CO2 demand ventilation control logic to push damper to 100% open or a maximum value that will not let mixed air temperature at the heating coil drop below 4°C.
  - Change schedule hours and COVID minimum damper position to achieve building pre and post occupancy flushes.
    - to start 2 hours before occupancy, (recommended by ASHRAE), and
    - consider also flushing for 1 hour after occupancy
- **Level 2 Operation Changes**
  - Increase min outside air setting to 100% but limit damper position to max value that will not let mixed air temperature at the heating coil drop below 4°C. (Note: heating plants are not designed for all units in any school to be at 100% OA on cold days)

## Central AHU's

### - Level 1 Operations

- Change filters to MERV 13 and add UV-C Light
  - If possible, inside AHU or ductwork, keeping in mind potential deterioration of filter media and internal duct liner from UV exposure. Locating UV lights in an area of only metal surfaces is preferable. (for example, between the heating coil and fan sections of the AHU if the unit walls are lined with metal)
  - ASHRAE also recommends self-contained, space mounted UV purifiers, providing 2 air changes per hour. For a standard 80m<sup>2</sup> Classroom with a 3 m high ceiling, 2 air changes is 135 L/s (290 CFM) of airflow.
- Increase minimum outdoor air damper position. Add a new programming point, so user can set based on climate.
  - Consideration to be given to a minimum allowable mixed air temperature that eliminates possibility of heating coil freeze-up, and
  - Coil capacity such that occupant comfort is maintained
  - Classroom size and occupancy should also be considered. (If lower occupancy is anticipated).
- Disable motion control sequence portion from DDC logic and allow fans to run continuously, with damper open to new minimum position or greater
- Change CO<sub>2</sub> setpoint to operate with outdoor air damper at new minimum position, either by:
  - Revise carbon dioxide (CO<sub>2</sub>) setpoint from 1000 PPM to 800 PPM, which is recommended by ASHRAE, or
  - Pre-determined outdoor air minimum position. This is climate dependent (see above)
  - Also allow CO<sub>2</sub> demand ventilation control logic to push damper to 100% open or a maximum value that will not let mixed air temperature at the heating coil drop below 4°C.
  - Note that some AHU's have RA CO<sub>2</sub> sensors to be considered
- Change schedule hours and COVID minimum damper position to achieve building pre and post occupancy flushes.
  - to start 2 hours before occupancy, (recommended by ASHRAE), and
  - consider also flushing for 1 hour after occupancy

- **Level 2 Operation**

- Increase min outside air setting to 100% but limit damper position to max value that will not let mixed air temperature at the heating coil drop below 4°C. (Note: heating plants are not designed for all units in any school to be at 100% OA on cold days)

## **Classrooms with Heat Pumps or Dedicated Outdoor Air Systems (DOAS)**

**These classrooms are more challenging as they reduced ability to deliver outdoor air. (These systems are not designed to be able to deliver increased volumes of outdoor air for free cooling. They are designed to provide only the ASHRAE stipulated minimum amount of outdoor air, but no more)**

- **Level 1 Operation**

- Install MERV 13 filters. For heat pumps these will likely need to be 25-mm (1-inch) thick media
- Check filter status monthly
- Monitor filter status through DDC by looking for high or low discharge temperatures, which will be indicative of reduced airflow due to the filters. This could result in compressor failures
- Disable demand ventilation and open fresh air dampers to 100% based on schedule
- If climate allows, instruct staff to open windows where available
- Provide portable UV-C filters
- Change schedule hours to achieve building pre and post occupancy flushes.
  - to start 2 hours before occupancy, (recommended by ASHRAE), and
  - consider also flushing for 1 hour after occupancy