

Los Rios CCD – Facilities Management

Making our Buildings Resilient during COVID-19

This webpage provides information about the heating, ventilation and air conditioning (HVAC) systems on our campuses, centers and other District sites, and how we are adjusting them in response to the COVID-19 pandemic in accordance with the Centers for Disease Control (CDC) and the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) recommendations.

Los Rios Community College District, Facilities Management (LRCCD-FM) is taking key steps to ensure campus ventilation and filtration systems provide appropriate COVID-19 risk mitigation based on CDC and ASHRAE recommendations. While buildings occupancy rates are currently lower than normal, our campuses continue to provide limited essential services for first responder class spaces, healthcare related class and lab spaces and some administrative spaces.

Because most of our buildings are connected to a centrally controlled HVAC system, building occupants and campus operations have limited ability to modify their systems, including increasing ventilation or filtration. ***Prior to our students, faculty and staff return to campus, Facilities Management will evaluate the performance and capabilities of each building's HVAC system.*** This evaluation process has already been performed in the buildings currently occupied with further evaluations being planned, prioritized and performed prior to additional buildings being re-occupied.

ASHRAE, states there are two key factors that mitigate COVID-19 related infections in HVAC systems by 95%:

- ***Improved Filtration***
- ***Increased Ventilation***

COVID-19 and HVAC Systems

HVAC systems cannot prevent the spread of the coronavirus, but they can significantly mitigate the risk of infection in the following ways:

- **Air Exchange Rates and Room Ventilation**

Over time, respiratory aerosols can build up in rooms. The time aerosols spend in a given room is largely controlled by a room's air exchange rate, typically characterized as the number of air changes per hour. Currently, in a typical room on a Los Rios CCD campus, the number of air changes per hour varies based on space type but is typically a minimum of four (4) air changes per hour for offices and classroom and six (6) air changes per hour for laboratories as recommended in CDC and ASHRAE COVID-19 guidelines. Ventilation is the intentional introduction of outside air into a space to control indoor air quality (IAQ). Many of the District's HVAC systems recirculate some indoor air to save energy, and mix in outdoor air based on the code requirements for the space type and its designed occupancy (number of people in a space). In these systems, both the outdoor air and the recirculated indoor air are filtered by the HVAC system.

Additionally, as part of the District's COVID-19 mitigation measures, all District building HVAC systems are now programmed to "flush" a building's indoor during air pre-occupancy (early morning) and post-occupancy (late evening) periods. This includes operating the exhaust fans as well as opening the outside air dampers, weather permitting. Building flushing is the CDC and ASHRAE recommended alternative to opening outside air dampers to 100%, which is only recommended in laboratory spaces due to safety considerations and code requirements.

Concurrently with ventilation systems and to further mitigation the risk of COVID-19 in our buildings, the District uses a HVAC system control strategy called Demand Control Ventilation (DCV) that increases IAQ by adjusting the amount of outside air based on monitored CO₂ levels and occupancy rates. For example, as the CO₂ levels increase as a result of the number of people in a space, the system adjusts the amount of outside air to keep CO₂ levels down. CO₂ concentrations for occupied indoor spaces with good air exchanges typically range between 400-1000 parts per million (ppm). Once CO₂ levels reach 1000ppm, the outside air dampers will start to open to introduce additional fresh outdoor air into the space. When the CO₂ level is low, the outside air dampers are in the minimum open position.

- **Filtration**

Based on CDC and ASHRAE guidelines, we also maintain air conditioning and ventilation systems by replacing air filters on regularly scheduled intervals throughout the year. This interval is generally every four to six months depending on the building type and the spaces it contains. Filtration further mitigates the risk of transmission in buildings with recirculated air. As air moves through a building's HVAC system, air filters trap and collect large and small particles such as dust, allergens and microorganisms.

Up until recently, most of our buildings were typically fitted with MERV-8 or higher rated filters depending on the age of the building. However, recently Los Rios CCD facilities have been evaluated for upgrade to CDC and ASHRAE recommended MERV-13 filters. Upgrading HVAC system filters is not always feasible in some instances because higher rated filters can impair system performance or require costly modifications, or simply will not fit. In the event MERV-13 filters cannot be used, ASHRAE recommends longer building flushing periods be performed to ensure the necessary movement of clean outdoor air throughout a building.

Facilities Management has already replaced MERV-8 filters with MERV-13 filters where possible at currently occupied buildings and will continue adding more as campus occupancy increases. As a point of reference, MERV-13 filters are equivalent to N95 masks in their ability to filter out contaminants.

Before any building is scheduled to re-open, a full HVAC system check is performed and existing filters are upgraded to MERV-13 filters where possible. As previously mentioned, there are some locations where the existing HVAC equipment cannot physically accept the size difference of a MERV-13 filter. In those cases, we follow CDC and ASHRAE recommendations and replace existing air filters with new filters, in addition to operating the HVAC system for a minimum of two hours before occupancy and two hours after occupancy to flush out the entire air volume of the building. Since most systems operate at approximately four air changes per hour depending on space type, this means, for example, if the HVAC system is operated for two hours, the building's air volume will have changed about 8 times during the 2 hours prior to occupancy, and again eight (8) times after occupancy. In an abundance of caution, we

now perform a 2-hour flush in all occupied buildings pre-occupancy and post-occupancy regardless of filter ratings.

Learn more about MERV Filter Ratings

- MERV stands for Minimum Efficiency Reporting Value (MERV) and the rating number is a measure of how effectively the filter stops dust and other contaminants from passing through the filter and into the air stream. Filters with higher MERV ratings are denser and trap small particles more effectively than filters with lower MERV ratings. The MERV-13 filters employed by the District capture lint, pollen, dust, mold, dust mites, bacteria, smoke and viruses.
- **HVAC System Evaluation**
Facilities Management can adjust HVAC systems to supply higher ventilation (outside air) rates. We are evaluating the capabilities of individual systems (e.g., control systems, heating/cooling capacity) to ensure the proper amount of outdoor air is supplied to indoor spaces. We are prioritizing higher-occupancy spaces, and buildings scheduled to open sooner than the rest of the campus. Employees with indoor air quality concerns can contact your Campus Operations to ensure HVAC systems are working as designed.

Things that DO NOT help mitigate the spread of COVID-19

- **Desk and Floor Fan Use**
Although fans can increase ventilation if installed where they bring in outside air, **fan use is not recommended anywhere multiple people may be present in an indoor environment.** A fan blowing across a sick person can spread particles around a room and increase risk of the coronavirus spread.
- **Opening Windows**
This may be possible depending on your space, but you are encouraged to consider that:
 - Opening a window may not necessarily improve air circulation (e.g., it depends on outdoor winds, whether there's cross-draft achieved by opening windows on opposite side of room)
 - Opening windows presents other security and cleanliness issues (e.g., dust, particulates)

- If an open window affects a thermostat, the outdoor temperature could cause other spaces served by that system to be overcooled or overheated.
- **Propping Open Doors**
For fire prevention and life safety reasons, **do not** prop open:
 - Entry doors
 - Security access doors
 - Fire doors
 - Laboratory doors

And Remember...

The coronavirus spreads through respiratory and droplets produced through breathing, speaking, coughing and sneezing, in addition to physical contact with contaminated surfaces. The risk of transmission by droplets and aerosols generally decreases as the distance between people increases, as large droplets and aerosols are diluted with distance. While occupying District facilities, the following steps further help reduce the risk:

- Wearing masks, face coverings or both
- Maintaining physical distance helps to decrease the risk of direct person-to-person transmission
- Washing hands frequently and using hand sanitizers
- Disinfecting high touch points

References and Additional Information:

<https://files.covid19.ca.gov/pdf/guidance-higher-education--en.pdf>

<https://www.ashrae.org/about/news/2020/ashrae-offers-covid-19-building-readiness-reopening-guidance>

<https://www.ashrae.org/file%20library/technical%20resources/covid-19/ashrae-building-readiness.pdf>

<https://www.dir.ca.gov/dosh/coronavirus/Guidance-by-Industry.html>