UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources

COVID-19 Ventilation Protocols

Studies have shown that COVID-19 is spread primarily through respiratory particles. Effective ventilation, along with other preventive measures, can be useful in preventing the virus' transmission through small aerosol particles. The following protocols present steps that should be taken at all ANR indoor workplaces to assess the ventilation systems, modify where feasible, or implement other measures to reduce aerosol transmission of COVID-19.

Maximize Outside Air

The quantity of outside air must be maximized to the extent feasible in all types of buildings, including buildings with either natural ventilation, mechanical ventilation, or both. An exception is when the US EPA Air Quality Index (AQI) is greater than 100 for any pollutant or if opening windows or maximizing outdoor air by other means would cause a hazard to employees, for instance from excessive heat or cold. The AQI at a location can be determined from https://www.airnow.gov/ or your local Air Quality Management District website.

Improving Natural Ventilation and Proper Use of Fans

Consider implementing any of the following steps to improve the supply of outside air into a space, using caution on days with poor air quality:

- When weather and air quality conditions allow, increase fresh outdoor air by opening windows and doors.
- Use fans to increase the effectiveness of open windows. Position fans so that air does not blow from one person to another. NOTE: For buildings with both operable windows and mechanical ventilation systems, the interactions between the two need to be carefully considered.
- Ceiling fans do not bring additional fresh air into an indoor space and are not considered to be equivalent to fresh air ventilation. Given this uncertainty about their effect, ceiling fans should be turned off unless necessary for the thermal comfort of building occupants. Ceiling fans may result in improved air mixing, provided outdoor air is being introduced into the space.

Improving Mechanical Ventilation

Consider making adjustments or improvements to mechanical ventilation systems to 1) increase the delivery of clean air and 2) remove or dilute concentrations of contaminants in the building air. The amount of outdoor air brought into the mechanical system should be maximized.

Building operators should consult with experienced HVAC professionals when considering changes to HVAC systems and equipment. Some of the recommendations below are based on ASHRAE's Guidance for Building Operations During the COVID-19 Pandemic. Not all steps are applicable for all scenarios.

- Fully open outdoor air dampers and close recirculation dampers to reduce or eliminate air recirculation. Set economizers at 100% outdoor air. In mild weather, this will not affect thermal comfort or humidity, but in cold, hot, or humid weather this may result in changes to indoor air, so expect a change in personnel comfort and a need for personal adjustments regarding clothing and/or space heaters.
- Improve central air filtration to as high as possible without significantly diminishing design airflow. Target air filtration should be MERV 13 or greater.
- Increase air filtration, if possible. MERV 13 or greater filtration is efficient at capturing airborne viruses and should be the target minimum level of filtration. If the air handling system cannot function with that level of filtration, increase the filtration as much as feasible for the system.
- Inspect filter housings and racks to ensure appropriate filter fit and check for ways that air could bypass the filter.
- Clean or replace filters and check filters to ensure they are appropriately installed, seated, functioning, and are not torn.

- Disable "demand controls" and occupancy sensors on ventilation systems so that fans operate continuously, independently of heating or cooling needs.
- If HVAC systems operate on day/night or other pre-programmed cycles, consider running the HVAC system at maximum outside airflow for 1-2 hours before the building opens and for 2-3 hours after the building is closed. Consider running HVAC fans 24/7.

Verify Mechanical System Function

- Small pieces of ribbon or tissue paper may be attached to ventilation supply registers throughout the workspace to verify that the system is operating.
- Ventilation systems should only be evaluated and adjusted by trained persons, such as Building Maintenance Staff, Mechanical (HVAC) Contractors, Indoor Air Quality or Industrial Hygiene Consultants, or other knowledgeable professionals.

Portable Air Cleaners ("HEPA Air Filters")

Portable Air Cleaners (PACs) should be considered in rooms and areas where mechanical and passive ventilation cannot be improved. PACs come in a range of sizes, features, and prices; higher-priced units may not necessarily provide greater improvements to air quality. Depending on the quantity, quality, and condition of existing ventilation, different sizes of PACs may be needed. At the minimum:

- Purchase PACs that are certified for ozone emissions and electrical safety by the California Air Resources Board (CARB).
- Ensure PACs are appropriately sized for the room or area they are deployed in. A standard for measuring an air cleaner's efficacy is the Clean Air Delivery Rate (CADR). It is recommended a PAC unit should have a CADR at least 2/3 of the room's floor area (in square feet). Some rooms may need more than one PAC. A list of all units with CADR ratings can be found on AHAM's "Verifide" website. *For UC ANR work locations, Risk & Safety Services recommends purchasing only PACs that can be found on this website*.
- Review the CDPH reference at the end of this document for more detailed information about selecting the appropriate PAC for a situation.
- Reducing fan speed may reduce the noise generated by the unit but will also decrease the amount of air filtration the unit will provide.
- For effective air cleaning, a PAC should be placed towards the center of where people sit or gather with the unit exhaust directed so that it will not blow air from person to person. PACs that exhaust straight up should be used to avoid blowing air from one person to another. Placing air filtration units in unused corners of rooms or beneath tables will not effectively clean the air.
- Industrial air cleaners that use high efficiency particulate air (HEPA) filtration can be used and are particularly well-suited for larger rooms and areas.

Additional Measures During COVID-19 Outbreaks

If there are multiple COVID-19 cases at a particular work location, additional assessment and adjustment of ventilation systems is required by Cal/OSHA to reduce the spread of COVID-19 at the worksite. Consult with Risk & Safety Services.

Resources:

CDPH Interim Guidance for Ventilation, Filtration, and Air Quality in Indoor Environments, Feb. 26, 2021: https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/COVID-19/Interim-Guidance-for-Ventilation-Filtration-and-Air-Quality-in-Indoor-Environments.aspx

Cal/OSHA COVID-19 Prevention Emergency Temporary Standards: https://www.dir.ca.gov/dosh/coronavirus/ETS.html