WILDFIRE SMOKE

Protecting Indoor Workplaces from Wildfire Smoke with Building Ventilation Systems

Source: Cal/OSHA

Wildfire smoke can be carried by wind and become a hazard for employees working in indoor workplaces, even those located many miles from evacuation zones. Employers with indoor workplaces should consider reducing employee exposure to wildfire smoke by taking appropriate steps, such as ensuring ventilation systems are properly maintained and functioning.

Employers should usually avoid eliminating or substantially reducing the outdoor air supply in office buildings and other indoor workplaces. This differs from advice given to members of the public by environmental and public health agencies when affected by wildfire smoke indoors. Members of the public are encouraged to set their air conditioners in their homes to 'recirculation mode', if possible, to reduce the intake of pollutants.

How Building Ventilation Systems Function

The ventilation systems in office and other commercial buildings are more complicated than home air conditioning systems. Changing the outdoor air supply in commercial buildings can adversely affect other essential functions of the building.

These buildings typically have heating, ventilating, and air conditioning (HVAC) systems that bring outside air into the building through filters, blend it with recirculated indoor air, and heat or cool the air before distributing it throughout the building. Office and commercial buildings also have air vented out of the building for restrooms and kitchens and may have local exhaust systems for garages, laboratory fume hoods, or other operations.

To function properly, the exhaust systems require outdoor air. In addition, without an adequate supply of outdoor air, these systems may create negative pressure in the building. This negative pressure will increase the movement of unfiltered air into the building through any openings, such as plumbing and sewer vents, doors, windows, seams between building surfaces, or cracks. In general, buildings should be operated at slight positive pressure to keep contaminants out and allow exhaust air systems to function properly.

Other undesirable consequences of reducing outdoor air include the buildup of common indoor pollutants such as carbon dioxide, odors, and increases in temperature and humidity.

Employer Responsibilities

Employers are required to ensure that HVAC systems are maintained and operated to provide the minimum quantity of outdoor air required by the State Building Standards Code in effect at the time the building permit was issued (California Code of Regulations, title 8, section 5142). For most buildings, this quantity is the greater of:

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- Fifteen (15) cubic feet per minute (cfm) per person (this may be less in older buildings);
- Fifteen hundredths (0.15) cfm per square foot of conditioned floor space; or
- The amount of air necessary to operate exhaust ventilation systems in the building such as restroom, kitchen, and local exhaust systems.

Using the HVAC System to Protect Building Occupants from Wildfire Smoke

Section 5141.1, *Protection from Wildfire Smoke*, only exempts workplaces or operations within enclosed buildings or structures in which the air is filtered by a mechanical ventilation system and the employer ensures that windows, doors, loading dock doors, and other openings are kept closed to minimize contamination by outdoor or unfiltered air.

As a first step to protect building occupants from outdoor air pollution, including the hazardous conditions resulting from wildfire smoke, building managers and employers should ensure that the HVAC system filters are not dirty, damaged, dislodged, or leaking around the edges. Before the wildfire season or during smoke events, employers and building operators should ensure that a qualified technician inspects the HVAC system, makes necessary repairs, and conducts appropriate maintenance. Filters should fit snugly in their frames and have gaskets or sealants on all perimeter edges to ensure that air does not leak around the filters.

Building operators should consider installation of the highest efficiency filters that do not exceed the static pressure limits of the HVAC system, as specified by the manufacturer or system designer.***** Pressure gauges should be installed across the filter to indicate when the filter needs replacing, especially in very smoky or dusty areas. Indoor contaminants can be further reduced by using standalone High Efficiency Particulate Air (HEPA) air cleaners inside the building. The California Air Resources Board provides additional information on air cleaners.

> *****California Air Resources Board staff have advised that most HVAC systems should be able to accommodate a pleated, medium-efficiency filter with particle removal ratings of MERV 6 to 11 and some may be able to use filters with ratings of MERV 13 or more. Consider a low-pressure HEPA filter (MERV 17 plus) if the building occupants have respiratory or heart disease conditions, or if the building experiences frequent wildfire episodes.

Methods Other Than HVAC System to Protect Building Occupants from Wildfire Smoke

In addition to assessing and, if necessary, modifying the function of the HVAC system, employers are encouraged to take other reasonable steps to reduce employee exposure to smoke, including alternate work assignments or relocation and telecommuting. Some buildings rely on open windows, doors, and vents for outdoor air and some may have mechanical ventilation systems that lack a functioning filtration system to remove airborne particles. In these cases, Section 5141.1 may be applicable unless the employer can demonstrate indoor air quality to be less than a current AQI for PM2.5 of 151. Employees may need to be relocated to a safer location depending on factors such as the level of outdoor smoke and local air quality index. Employees with asthma, other respiratory diseases, or cardiovascular diseases should be advised to consult their physician for appropriate measures to minimize health risks.

Respirators may provide additional protection to some employees against wildfire smoke hazards. Employees whose work assignments require the use of respirators must be included in a respiratory protection program that includes training, medical evaluations, and fit testing.

Employers may provide filtering facepiece respirators (disposable dust masks) to employees who voluntarily choose to use them to protect themselves against smoke hazards. If the use of the mask is voluntary, employers are not required to provide a medical evaluation or fit test.

Employers must tell these employees that:

- The respirator will provide some protection against the particles in smoke, but it will not provide complete protection.
- A respirator that has not been fit-tested does not provide the maximum level of protection.
- Disposable dust masks respirators marked N95, N-99, N-100, R-95, P-95, P-99, or P-100 do not protect against gases or vapors.
- Although a medical evaluation is not required, employees are advised to consult their doctor about potential exposures to smoke and respirator use, particularly if they have certain health problems such as respiratory or heart conditions.

Employers must also provide employees with the information in California Code of Regulations, Title 8, Section 5144, Appendix D *Information for Employees Using Respirators When Not Required Under the Standard.*

See the following publications on the use of N95 respirators:

- "N95 Mask Commonly Asked Questions," prepared by Cal/OSHA and the Governor's Office of Emergency Services.
- "Protect Your Lungs from Wildfire Smoke," prepared by the California Department of Public Health.

Additional information

The Lawrence Berkeley National Laboratory has produced a multi-page summary of research results on the effectiveness, cost, and health benefits of air filtration.