

Cal/OSHA Interim Guidance on Protecting Workers in Offices and Similar Indoor Workplaces from Wildfire Smoke (July 2008)

Windborne wildfire smoke can be a hazard for people who work in office and commercial buildings many miles from evacuation zones. Environmental and public health agencies have advised people that they should consider setting air conditioners in their homes to recirculation mode, if possible, in order to reduce the intake of pollutants. Subsequently, people have asked whether this advice to limit the introduction of outdoor air applies to office and commercial buildings. Cal/OSHA does not generally recommend eliminating or substantially reducing the outdoor air supply in office buildings and other indoor workplaces as a first step to reduce exposure to smoke.

The ventilation systems in office buildings and other commercial buildings are more complicated than home air-conditioning systems. Changing the outdoor air supply in public and commercial buildings can adversely affect other essential functions of the building. These buildings typically have heating, ventilating and air conditioning systems (HVAC systems) that bring outside air into the building through filters, blend it with building return air, and thermally condition the air before distributing it throughout the building. These buildings also have exhaust air systems for restrooms and kitchens, and may also have local exhaust systems for garages, laboratory fume hoods, or other operations. These exhaust systems require makeup air (outdoor air) in order to function properly. Also, 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/sewer vents, doors, windows, junctions between building surfaces, or cracks. In general, buildings should be operated at slight positive pressure in order to keep contaminants out, and to help exhaust air systems function properly.

Cal/OSHA regulations ([8 CCR 5142](#)) require that HVAC systems be operated continuously while occupied in order to provide the minimum quantity of outdoor air required by the state building code at the time the building permit was issued. (These regulations are currently found in the California Code of Regulations, Title 24, Section 121). For most buildings, this quantity is the largest of:

1. 15 cubic feet per minute (cfm) per person (it may be less in older buildings),
2. 0.15 cfm per square foot of conditioned floor space, or
3. The amount of air necessary to make up the air exhausted by exhaust ventilation systems in the building (such as restroom, kitchen, or local exhaust systems).

Using the HVAC System to Protect Building Occupants from Smoke

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 if necessary, 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 should 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.¹ 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 stand-alone High Efficiency Particulate Air (HEPA) filtering units. For more information on air cleaners, see the California Air Resources Board webpage at: <http://www.arb.ca.gov/research/indoor/particles.htm>.

Cal/OSHA recognizes that in some circumstances it may be helpful to reduce the amount of outdoor air in order to reduce smoke pollution inside the building, while still maintaining positive pressure in the building. Therefore, Cal/OSHA will not issue citations during smoke events for temporary reductions in outdoor air flow rates that are below the requirements of 8 CCR 5142 when all of the following conditions are met:

1. The local outdoor air quality for particulate matter meets the Environmental Protection Agency (EPA) Air Quality Index definition of Unhealthy, Very Unhealthy, or Hazardous due to wildfire smoke.
2. A qualified HVAC technician has inspected the HVAC system and ensured that the filters are functioning properly, that the filter bank is in good repair, and that the highest feasible level of filtration has been provided. This must be documented in writing.
3. A qualified HVAC technician or engineer has assessed the building mechanical systems and determined, in writing, the amount of outside air necessary to prevent negative pressurization of the building, and to sufficiently ventilate any hazardous processes in the building (such as enclosed parking garages or laboratory operations).
4. The HVAC system is operated continuously while the building is occupied to provide at least the minimum quantity of outdoor air needed, as determined by the HVAC technician or engineer in Item 3 above.
5. The employer or building operator ensures that the system is restored to maintain the outdoor air supply levels required by Section 5142 no later than 48 hours after the particulate matter levels fall below the levels designated by the EPA as Unhealthy.

Other Actions to Protect Employees 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, the

¹ The 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) [0] if the building occupants have respiratory or heart disease conditions, or if the building experiences frequent wildfire episodes.

employees may need to be relocated to a safer location. Employees with asthma, other respiratory diseases, or cardiovascular diseases, should be advised to consult their physician for appropriate measures to minimize health risks.

Respirators, such as N95's and other filtering facepiece respirators, may provide additional protection to some employees against environmental smoke. Employees whose work assignments require the use of respirators must be included in a respiratory protection program (including training, medical evaluations, and fit-testing). However, employers may provide filtering facepiece respirators to employees who voluntarily choose to use them to protect themselves against environmental smoke; in this situation employers are not required to provide a medical evaluation or fit-test. Employers should tell these employees that the respirator will provide some protection against the particles in smoke, but that it will not provide complete protection, and that a respirator that has not been fit-tested may not provide the maximum level of protection. Employees should be told that the respirator does not protect against gases or vapors. Although a medical evaluation is not required, the employer should advise employees 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. Employees should also be provided with a copy of Cal/OSHA Regulation, Title 8, Section 5144, Appendix D. (<http://www.dir.ca.gov/Title8/5144d.html>) The California Department of Public Health has prepared a fact sheet on the use of N95 respirators called "Protect Your Lungs From Wildfire Smoke," which can be found at: <http://bepreparedcalifornia.ca.gov/epo/>.

Additional Information

The Lawrence Berkeley National Laboratory has produced a multi-page summary of research results on the effectiveness, cost, and health benefits of filtration, which can be found at: http://eetd.lbl.gov/iepv/iaq/v_filtration_1.html.