

# RISK SIMPLIFIED

## RESOURCES:

- [Title 8, Section 5141.1.](#)
- [EPA Filter Efficiency Ratings](#)
- [NAFA Best Practice Guidelines](#)
- [List of CARB-Certified Air Cleaning Devices](#)

## QUESTIONS:

[Email PRISM Risk Control](#)

or call 916.850.7300

## Wildfire Smoke: Ventilation and Preserving Indoor Air Quality

By John Nichols

### Wildfire Smoke Hazards

Wildfire smoke can adversely influence indoor air quality and put people's health at risk from exposure to particulate matter and other pollutants. Exposure to fine particles, a primary component of wildfire smoke, can cause respiratory symptoms and aggravate chronic heart and lung diseases. During a wildfire, smoke can make the outdoor air unhealthy to breathe, and local officials may advise citizens to stay indoors during a smoke event. Additionally, employers are responsible for protecting workers from wildfire smoke, and [Title 8, Section 5141.1](#) requires identification and control of harmful exposures to employees.

However, unless properly contained, smoke from outdoors can enter structures and reduce indoor air quality. In order to preserve healthy indoor air and prevent harmful exposures to employees, it is critical interior spaces are isolated from unhealthy smoke in outdoor air.

### Minimizing Ingress of Unfiltered Outside Air

An airtight building envelope is essential in preventing wildfire smoke from entering structures. Air that leaks through a building's envelope, the outer walls, windows, doors, and other openings, put people at risk from outdoor pollutants. Keep windows and doors closed and seal building penetrations, such as, gaps at windows and doors. To limit air inflow pathways, reduce ingress/egress locations, preferably to airlock-style vestibules, or create airlocks, without blocking emergency exits, in an effort to minimize outside air entering the building. At entry locations, utilize walk-off/sticky mats to capture contamination on occupant's feet as they enter the building and reduce the spread of particulate matter. Minimize elevator use, as elevators act like a piston and draw outside air into the facility.



Air-Lock Vestibule

Maintain positive air pressure within structure(s), however, to be effective, this must be accomplished with air filtered free of hazardous particulate. Positive air pressure means more air is pumped into a building than escapes via exhaust or openings in the building envelope. Ideally, positive air pressure will push air out through voids in the envelope and prevent smoky outdoor air from being drawn inside.

## Building Ventilation

Under normal circumstances, ventilation is key to maintaining healthy indoor environments and includes the building's mechanical ventilation system(s), which provides fresh air for occupants and establishes slightly positive air pressure within a structure. The amount of filtered outside air that should be pumped into the facility is dictated by the size, occupancy, use and design of each building. A starting point is to replace 20 percent of the structure's total interior air volume every hour with filtered outside air. However, conventional ventilation system filters are not capable of removing fine particulate hazards associated with wildfire smoke. Therefore, during wildfire events, building Heating, Ventilation, and Air Conditioning (HVAC) systems should operate in 100 percent recirculate mode (zero outside air brought into building through HVAC system) to reduce the amount of smoke drawn into the structure. Also, when operating in 100 percent recirculate mode, indoor air must be continually supplemented by filtered outside air to offset losses due to dedicated exhaust and building envelope voids, and to maintain positive air pressure. This can be accomplished through the use of a supplemental filtration system.

## HVAC System Filtration Limitations

To address the particulate hazard, only air that has passed through highly efficient filters should be allowed to enter the building. The Environmental Protection Agency (EPA) recommends a minimum of Minimum Efficiency Reporting Value (MERV) 13 filters for forced-air HVAC systems, and if possible, high efficiency particulate air-filters (HEPA). Click [here](#) for filter efficiency information from the EPA. Keep in mind that typical commercial HVAC systems cannot be equipped with the necessary high efficiency filtration, because it creates too big a restriction and can result in system failure. Consult with the facility's HVAC professionals to determine system filtration capabilities prior to any modifications to the ventilation system. Also, beware that activated carbon filters are useful in removing smoke odor from air, but they do not remove particulate matter and therefore should be used in conjunction with high efficiency filters. Change filters as needed to minimize load (strain) on mechanical equipment and prevent clogging high efficiency filters.

## Supplemental Filtration Systems



Portable High-Efficiency Air Filtration Units

When a building's existing mechanical system cannot be modified to accommodate high efficiency filtration, large portable/temporary high efficiency air filtration units should be used to supplement the system. These units are commonly used to manage airborne hazards in the construction/remediation industry and typically have an air movement capacity of 500 to 2,000 cubic feet per minute (CFM).

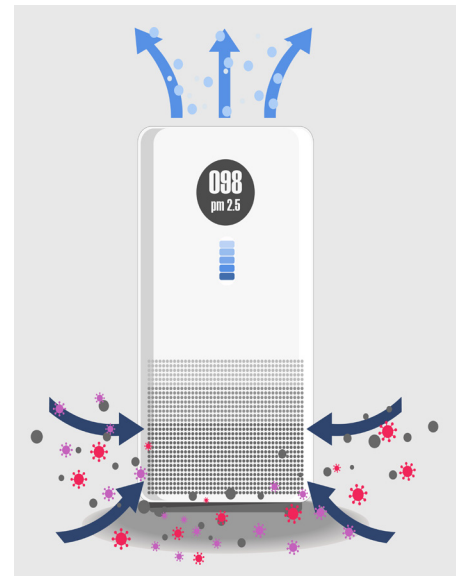
Ideally, filtered air is introduced directly into the building's mechanical ventilation system for comprehensive distribution. However, if that is not possible, place filtration units throughout structure and utilize exhaust manifolds and air ducts to discharge filtered air in multiple locations. Utilize air monitoring equipment, such as, oxygen, carbon dioxide and carbon monoxide detectors and particle counters to monitor indoor air quality and the effectiveness of portable/temporary high efficiency air filtration units.



Portable Air Scrubber

Portable air scrubbers with high efficiency air filtration and an air movement capacity of 500 cubic feet per minute (CFM) or greater are a means of removing particulate from building interior air. Place air scrubbers in areas with the worst air quality, such as, ingress locations and elevators. For best results, use fans to direct airflow toward air scrubber and utilize an air duct to discharge filtered air a minimum of 10 feet away from scrubber.

Small portable (desk top) air cleaners have a limited benefit and can be used for localized filtration. However, be aware, ozone is a respiratory irritant, and the use of ozone generators, personal air purifiers, or electrostatic precipitators and ionizers that produce ozone should be avoided.



Small Portable (Desktop) Air Cleaner

The [California Certified Air Cleaning Devices](#) portal can be utilized to determine if an air purifier is certified to avoid ozone exposure.

## Surface Cleaning

Frequent, routine and continual surface cleaning is a necessary component of healthy indoor air quality, and this is particularly true at ingress locations.

When cleaning, be sure to use damp/wet methods and HEPA vacuums, and avoid dry sweeping or dusting. Also, when building ventilation and fresh air intake are reduced during wildfire events, minimize use of chemicals that produce dangerous off gases, such as potentially toxic or irritating cleaning products.

For additional questions or assistance regarding healthy indoor air quality during wildfire smoke events, please contact [PRISM's Risk Control Department](#).