

Designing Hospitals for Wildfire Smoke: HVAC Strategies for Resilience and Readiness

Webinar Q&A

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1. Can we use a duct smoke detector to warn of wildfire conditions?

Traditional commercial duct smoke detectors were described as generally ineffective for wildfire smoke detection because they are designed to detect larger particulate sizes than those typically present in wildfire smoke. The discussion also noted that, while code-required duct smoke detectors have occasionally been triggered by wildfire smoke, they have not been intentionally or effectively used as a means of wildfire smoke detection.

2. When will the gas phase filtration requirements likely be added to the code?

Emerging research indicates that wildfire smoke contains ultrafine particles smaller than PM_{2.5}, including particles as small as PM_{0.1}. Future updates to guidance are expected to address these findings. It was also noted that gas-phase filtration is anticipated to be a future area of study and may be incorporated into subsequent guidance as research and industry consensus continue to develop.

3. What was the reason for not putting the PM 2.5 sensor in the outside air intake?

Current PM_{2.5} sensors are generally not suitable for duct-mounted applications because they are not rated for typical duct air velocities, which may allow particles to pass through the sensing area without being detected. However, future development of duct-mounted PM_{2.5} sensors designed specifically for HVAC applications was identified as a potential advancement.

4. How is filter load determined, pressure drop, visibility?

Filter replacement during wildfire smoke events should be based on filter loading and pressure drop rather than routine maintenance intervals. As filters accumulate particulate matter, both filtration effectiveness and system energy consumption are affected. While filter dust-loading capacity can be used to estimate replacement timing, this information is not commonly published by manufacturers. As a result, filters should be inspected more frequently during wildfire smoke events, as standard three- or six-month replacement schedules may no longer be appropriate.

5. Going back to the DSDs, has it been a problem that wildfire smoke trips them?

Yes. While traditional duct smoke detectors are not designed to detect wildfire smoke, it was noted that code-required duct smoke detectors have, in some cases, been inadvertently triggered by wildfire smoke rather than an actual building fire.

6. How about use of carbon filters for wildfire?

Activated carbon filtration has been successfully used in applications requiring odor control and is considered a potential option for reducing gaseous contaminants associated with wildfire smoke. However, limited testing has been performed to quantify its effectiveness for wildfire smoke specifically. Emerging technologies, such as photocatalytic oxidation (PCO), have also shown promising early results in reducing volatile organic compounds (VOCs), although additional independent validation is needed. It was further noted that existing filter rating methods, such as MERV, were not developed using wildfire smoke aerosols and may not accurately represent real-world performance. As a result, efforts are underway to develop test methods specifically for evaluating filtration performance under wildfire smoke conditions.

7. Is loading from fine say 2.5 micron particles visible on filter medium?

The visibility of wildfire smoke accumulation on filters depends largely on proximity to the fire. While PM_{2.5} particles themselves are generally not visible, they can adhere to larger ash particles, resulting in visible black soot on the filter. Facilities located closer to a wildfire may observe rapid filter discoloration, whereas those farther away may not see visible accumulation until the filter becomes heavily loaded.

8. Hospitals often have neg/pos pressure Isolation Rooms. If we want our whole facility in best case positive, what advice can you offer MEORs to design these delicate pressure relationship rooms.

Building pressurization strategies should primarily maintain a positive pressure relationship relative to the building exterior to minimize wildfire smoke infiltration through doors, windows, and other envelope openings. While maintaining required room pressure relationships remains important, the overall building-to-outdoor pressure differential should be the primary consideration. These recommendations are intended as guidance, and room-specific conditions, proximity to the building envelope, and competing risks should be evaluated on a case-by-case basis.