



fast facts

advancing safety, health, and workplace rights in the legislative branch

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Missing Ceiling Tiles

Properly installed ceiling systems allow smoke detectors, heat detectors, and fire sprinklers to operate correctly in the event of a fire. They also provide a barrier to the spread of smoke and fire. Breaking, displacing, or removing ceiling tiles enables hot gases and smoke from a fire to rise and accumulate above detectors and sprinklers. Doing so delays their activation, enabling fires to rapidly grow larger before an alarm and response occur.

Ceiling tile breakage, displacement, or removal often occurs as a result of mechanical system repair or maintenance. Because fires are unpredictable, intact tiles must be returned to their intended positions as soon as possible following such repairs. Office occupants also often move aside or remove ceiling tiles, typically to improve personal comfort by altering local air currents. The danger this creates impacts not only the person who moves the tile, but also endangers all building occupants. Moreover, older ceiling tiles may also contain asbestos, so disturbing them can cause yet another health hazard (See the Office of

Compliance's "Asbestos: Do Not Disturb" Fast Facts).

The smoke and hot gases from a fire decrease in concentration as height and horizontal distance from the center of the fire increase. Once the smoke and hot gases reach the ceiling, they travel horizontally, creating a "ceiling jet." This ceiling jet is what typically triggers smoke alarms, heat detectors, and sprinkler systems.

Removal of ceiling tiles can enable smoke and hot gases to rise above the remaining ceiling system, circumventing the fire protection systems located at or slightly below the level of the ceiling. If a fire starts in a room with a missing ceiling tile, the ceiling jet can travel to the hole created by the missing tile, and will rise into the space above the drop ceiling, which typically lacks monitoring devices. This may delay smoke detectors from receiving the smoke concentration needed to actuate them and to send an alarm signal. Most of the heat may also rise into the space above the ceiling, bypassing heat detectors and sprinklers completely. This



Figure 2: Removal of ceiling tiles may damage wiring to detectors mounted below them.

renders them ineffective until the smoke and heat fill the space above, greatly lengthening the time it takes for them to actuate. Because fires can double in size each minute, this delay enables a fire to grow much larger and become more difficult to extinguish.

Missing ceiling tiles are not just a risk to those in the area where the tiles were removed. Space above a drop ceiling system often provides a route for air to be drawn back to a conditioner ductwork and fan that re-circulates the air. Therefore, smoke that enters this space is often spread to other areas in the building, exposing other occupants to smoke and toxic gases.

Minimizing the number of unnecessary ceiling openings will make a building safer for all occupants. Employees should report any unnecessary ceiling openings to appropriate maintenance authorities.



Figure 1: Missing and damaged ceiling tiles

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- OSHA requires that safeguards designed to protect employees during an emergency—including displaced ceiling tiles—must be in proper working order at all times (29 CFR §1910.37(a)(4)).
- The NFPA requires that smoke barriers be provided to subdivide building spaces for the purpose of restricting the movement of smoke (NFPA 101 8.5.1).
- OSHA requires employee alarm systems to provide warning necessary for reaction time for safe escape of employees from the workplace or the immediate work area, or both. Missing ceiling tiles would delay the activation of detection and alarm systems, thereby decreasing the time for safe evacuation (29 CFR §1910.165(b)(1)).
- The Office of Compliance found nearly 200 locations where incomplete ceilings impacted the operation of fire protection systems during the biennial safety and health inspections conducted during the 109th Congress.

Definitions

- **Smoke Barrier:** A continuous membrane, or a membrane with discontinuities created by protected openings, where such membrane is designed and constructed to restrict the movement of smoke.
- **Ceiling Jet:** A stream of risen smoke and hot gases that travel horizontally along the bottom of an intact ceiling.



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