

HEALTH & SAFETY CODE SECTION 18930

SECTION 18930. APPROVAL OR ADOPTION OF BUILDING STANDARDS; ANALYSIS AND CRITERIA; REVIEW CONSIDERATIONS; FACTUAL DETERMINATIONS

- (a) Any building standard adopted or proposed by state agencies shall be submitted to, and approved or adopted by, the California Building Standards Commission prior to codification. Prior to submission to the commission, building standards shall be adopted in compliance with the procedures specified in Article 5 (commencing with Section 11346) of Chapter 3.5 of Part 1 of Division 3 of Title 2 of the Government Code. Building standards adopted by state agencies and submitted to the commission for approval shall be accompanied by an analysis written by the adopting agency or state agency that proposes the building standards which shall, to the satisfaction of the commission, justify the approval thereof in terms of the following criteria:
- (1) The proposed building standards do not conflict with, overlap, or duplicate other building standards.
 - (2) The proposed building standard is within the parameters established by enabling legislation and is not expressly within the exclusive jurisdiction of another agency.
 - (3) The public interest requires the adoption of the building standards.
 - (4) The proposed building standard is not unreasonable, arbitrary, unfair, or capricious, in whole or in part.
 - (5) The cost to the public is reasonable, based on the overall benefit to be derived from the building standards.
 - (6) The proposed building standard is not unnecessarily ambiguous or vague, in whole or in part.
 - (7) The applicable national specifications, published standards, and model codes have been incorporated therein as provided in this part, where appropriate.
 - (A) If a national specification, published standard, or model code does not adequately address the goals of the state agency, a statement defining the inadequacy shall accompany the proposed building standard when submitted to the commission.
 - (B) If there is no national specification, published standard, or model code that is relevant to the proposed building standard, the state agency shall prepare a statement informing the commission and submit that statement with the proposed building standard.
 - (8) The format of the proposed building standards is consistent with that adopted by the commission.
 - (9) The proposed building standard, if it promotes fire and panic safety as determined by the State Fire Marshal, has the written approval of the State Fire Marshal.

2007 California Mechanical Code

606.9 Smoke damper actuation methods.¹ The smoke damper shall close upon activation of a listed smoke detector or detectors installed in accordance with one of the following methods, a applicable:

1. Where a damper is installed within a duct, a smoke detector shall be installed in the duct within 5 feet (1524 mm) of the damper with no air outlets or inlets between the detector and the damper. The detector shall be listed for the air velocity temperature and humidity and anticipated at the point where it is installed and shall be installed in accordance with Section 610 of this code.
2. Where a damper is installed above smoke barrier doors in a smoke barrier, a spot-type detector listed for releasing service shall be installed in accordance with Section 610 of this code on either side of the smoke barrier door opening.
3. Where a damper is installed within an unducted opening in a wall, a spot-type detector listed for releasing service shall be installed in accordance with Section 610 of this code within 5 feet (1524 mm) horizontally of the damper.
4. When a damper is installed in a corridor wall or ceiling that is served by an area smoke-detection system complying with the California Fire Code such smoke detection system may be used to accomplish the required release service.
5. Where an area smoke detection system complying with the California Fire Code is provided within areas served by a heating, ventilation and air conditioning (HVAC) system, such smoke detection system may be used to accomplish the required release service.

Where fire-detection or alarm systems are provided for the building, the smoke detectors required by this section shall be supervised by such systems and installed in accordance with NFPA 72 and the California Building and Fire Codes.

609.0 Automatic Shutoffs. Air-moving systems supplying air in excess of 2,000 cubic feet per minute (944 L/s) to enclosed spaces within buildings shall be equipped with an automatic shutoff. Automatic shutoff shall be accomplished by interrupting the power source of the air-moving equipment upon detection of smoke in the main supply-air duct served by such equipment. Smoke detectors shall be labeled by an approved agency *approved and listed by California State Fire Marshal* for air duct installation and shall be installed in accordance with the manufacturer's approved *installation* instructions. Such devices shall be compatible with the operating velocities, pressures, temperatures, and humidities of the system *and shall be installed in accordance with Section 610 of this code*. Where fire-detection or alarm systems are provided for the building, the smoke detectors required by this section shall be supervised by such systems *and installed in accordance with NFPA 72 and the California Building and Fire Codes*.

Exceptions:

- ~~(1) When the space supplied by the air-moving equipment is served by a total coverage smoke detection system complying with the California Fire Code, interconnection to such system may be used to accomplish the required shutoff.~~
- ~~(2) Automatic shutoff is not required when all occupied rooms served by the air-handling equipment have direct exit to the exterior and the travel distance does not exceed 100 feet (30,480 mm).~~
- ~~(3) Automatic shutoff is not required for Group R, Division 3 and Group U Occupancies.~~
- ~~(4) Automatic shutoff is not required for approved smoke control systems or where analysis demonstrates shutoff would create a greater hazard, such as may be encountered in air-moving equipment supplying specialized portions of Group H Occupancies. Such equipment shall be required to have smoke detection with remote indication and manual shutoff capability at an approved location.~~
- ~~(5) Smoke detectors that are factory installed in listed air-moving equipment may be used in lieu of smoke detectors installed in the main supply-air duct served by such equipment.~~²

609.1 High-rise buildings. When required by other section of this code, California Building Code, or the California Fire Code, smoke detection shall be located in the main return air and exhaust air plenum of each air-conditioning system having a capacity of greater than 2,000 cubic feet per minute (cfm) (0.94 m³/s). Such detectors shall be located in a serviceable area down stream of the last duct inlet.³

609.2 Exceptions:

- (1) When the space supplied by the air-moving equipment is served by ~~a total coverage~~ an area smoke-detection⁴ system complying with the California Fire Code, interconnection to such system may be used to accomplish the required shutoff.
- (2) Automatic shutoff is not required when all normally⁵ occupied rooms served by the air-handling equipment have direct exit to the exterior and the travel distance does not exceed 100 feet (30,480 mm). For this Exception, a room such as restrooms, storage or supply rooms, etc that can reasonably be expect to be normally unoccupied more than it is occupied shall not be considered normally occupied.⁶
- (3) Automatic shutoff is not required for Group R, Division 3 and Group U Occupancies.
- (4) Automatic shutoff is not required for approved smoke-control systems or where analysis demonstrates shutoff would create a greater hazard, such as may be encountered in air-moving equipment supplying specialized portions of Group H Occupancies. Such equipment shall be required to have smoke detection with remote indication and manual shutoff capability at an approved location.
- (5) Smoke detectors that are factory installed in listed air-moving equipment may be used in lieu of smoke detectors installed in the main supply-air duct or main return-air duct served by such equipment.

610 Smoke Detectors.

610.0 *Smoke detectors installed in an air-moving duct system or air-moving system shall be labeled by an approved agency approved and listed by the California State Fire Marshal for air duct installation. Such devices shall be compatible with the operating velocities, pressures, temperatures, and humidities of the system as well as the environment where the detector is installed. Such installation shall be in accordance with the manufacturer's approved installation instructions installed, the California Building and California Fire Codes.*⁷

610.1 Installation. *The detector shall be installation at a location approved by the Enforcing Agency under the supervision of a qualified⁸ HVAC contractor.*

610.1.1 Location. *Each detector shall be have access to but which may first require the removal of an access panel, door, or similar obstruction allow easily access for periodic inspections, maintenance, testing, and replacement. The detector location shall not require the use of ladders or lifts that are not normally found at the building site to access the detector.*⁹

610.1.2 Duct design. *The duct system shall be designed and installed, subject to approval by the Enforcing Agency, so that each detector is readily accessible so that each detector can be readily accessed for inspection, maintenance, testing, and replacement. The detectors shall be capable of being reached safely and quickly for operation, repair, or inspection without requiring those to whom ready access is necessary to climb over or remove obstacles, or to resort to the use of portable access equipment, other than ladders or lifts normally found at the premise.*¹⁰

610.1.3 Access point. *An approved means of access large enough to permit the detector to be inspected, maintain, tested, and replaced shall be provided. The access point shall not require the use of tools, keys, or special knowledge. Access points shall be permanently identified on the exterior by a RED label with WHITE letters not less than 1/2 inch (12.7 mm) in height reading: DUCT DETECTOR.*¹¹

610.2 Status. *Each detector shall be provided with individual status signals in an approved location:*

(a) Detector actuation shall activate a visible and audible signal.

*(b) Detector trouble conditions shall activate a visible or audible signal and shall be identified as air duct detector trouble.*¹²

610.2.1 *In addition, when a building fire-detection or alarm system has been provided, detectors installed under this section shall be supervised by such system in accordance with the California Building and Fire Codes and NFPA 72.*¹³

610.3 Function. *The detector shall, upon activation, perform the intended function.*

610.3.1 *In buildings not equipped with a fire alarm system, the detector shall be powered by normal electrical service and, upon activation, shall perform the intended function.*¹⁴

610.3.2 *In buildings equipped with a fire alarm system the detector shall be monitored for integrity in accordance with NFPA 72. Where the detector's function is solely for stopping air-moving fans and/or releasing damper motors, and the detector is not part of a mechanical smoke control system, the detector may be powered separately from the fire alarm system.*¹⁵

610.4 Acceptance testing. *The installing contractor shall be responsible for demonstrate to the Enforcing Agency, in accordance with the detector's manufacturer's testing instruction and the applicable codes, that each detector has been correctly installed and will activate and perform the intended function(s).*¹⁶

610.4.1 *Acceptance testing shall include the use of an approved smoke agent while the HVAC system is operating under normal conditions to demonstrate that the detector functions as intended when activate even when the detector is installed inside an air-moving unit.*¹⁷

610.4.2 *After acceptance by the Enforcing Agency, subsequent detector function testing may be preformed by activation with a Remote Test device listed for such use by the detector's manufacturer.*

610.5 Maintenance, inspection and testing. *The owner shall be responsible for ensuring that the detector is maintained in an operable condition and tested periodically in accordance with this section, California Building and Fire Codes, and NFPA 72. A written record shall be maintained and shall be made available to the Enforcing Agency official upon request.*

610.5 *This section shall not prohibit a fire alarm service company from servicing, testing, and/or repairing the detector for the owner.*

2007 California Building Code

716.3.2.1 Smoke damper actuation methods.

1. Where a damper is installed within a duct, a smoke detector shall be installed in the duct within 5 feet (1524 mm) of the damper with no air outlets or inlets between the detector and the damper. The detector shall be listed for the air velocity temperature and humidity and anticipated at the point where it is installed and shall be installed in accordance with Section 610 of the California Mechanical Code. ~~Other than in mechanical smoke control systems, dampers shall be closed upon shutdown where local smoke detectors require a minimum velocity to operate.~~¹⁸
2. Where a damper is installed above smoke barrier doors in a smoke barrier, a spot-type detector listed for releasing service shall be installed in accordance with Section 610 of the California Mechanical Code on either side of the smoke barrier door opening.
3. Where a damper is installed within an unducted opening in a wall, a spot-type detector listed for releasing service shall be installed in accordance with Section 610 of the California Mechanical Code within 5 feet (1524 mm) horizontally of the damper.
4. When a damper is installed in a corridor wall or ceiling, ~~the damper shall be permitted to be controlled by a smoke detection system installed in the corridor that is served by an area smoke-detection system complying with the California Fire Code~~ such smoke detection system shall be permitted to accomplish the required release service.
5. ~~Where a total coverage an area~~¹⁹ smoke detection system complying with the California Fire Code is provided within areas served by a heating, ventilation and air conditioning (HVAC) system, ~~dampers shall be permitted to be controlled by the smoke detection system~~ such smoked detection system shall be permitted to accomplish the required release service.

- **The reason for the request**

Smoke detection for mechanical air-handling systems, including smoke dampers, the installation and service of such are easier said than done. Detectors are regularly installed in un-servable locations as well as being incorrectly installed making it, in many cases, virtually impossible to maintain the detection in working order and in many cases are not maintained.

Mechanical systems require smoke detection even when a fire alarm system is not installed. The smoke detection, address here, is required to be installed specifically for control of the mechanical air-moving ducts and system and is NOT intended for detecting fire. In situations where fire alarm smoke detection has been installed, the fire alarm system's smoke detection can be utilized to provide control signals for the air-moving duct devices and systems.

The proper installation and future testing, service, maintenance, and repair of the mechanical smoke detection device have become a major problem for most installations. Overseeing and regulating the installation has been hampered by a lack of coordination between the given code parts rendering, from a practical point of view, the (California Fire, Building, and Mechanical) Codes ineffective. Mechanical systems that require smoke detection are generally designed by mechanical engineers and normally installed by mechanical contractors; not the fire alarm service companies. The fire alarm service companies have no control over where and how the mechanical contractor installs smoke detectors; so detectors end up 15 feet above a 40 foot free hanging ceiling.

Thus, it only makes sense to make to amend the codes and standards so they can be effective and efficient by:

- a) Addressing the Mechanical issues in the California Mechanical Code rather than having them spread throughout the Building Code and Fire Code.
- b) To clarify the basic minimum requirements needed to prevent smoke from being moved by mechanical means into a smoke compartment and removing conflicts between the different sections and installation (NFPA 72) standards. Should it be deemed that more smoke control is needed, than a mechanically engineered smoke control system can be designed under the existing applicable codes. And if additional fire detection is needed than the fire alarm code sections can be amended.
- c) And where providing new section in the California Mechanical Code as needed.

-
- ¹ New CMC section based on CBC 716.3.2.1 Smoke damper actuation methods.
 - ² Move and re-write the “*Exception*” section to a separate sub-section heading.
 - ³ Ref: CBC 907.2.12 High-rise Buildings / 907.2.12.1 Automatic fire detection sub-section 2
 - ⁴ Per NFPA 72 5.14.4.1 Area smoke detection within smoke compartments shall be permitted to be used to control the spread of smoke by imitating operation of doors, dampers and other equipment. ... **Complete area smoke detection is not necessary to provide for such (smoke) control features...** Total Smoke Detection, which includes under-floor spaces and above-ceiling spaces, is not necessary when they are not used as HVAC plenums and goes beyond the intent of mechanically controlling smoke within the HVAC smoke compartment.
 - ⁵ Smoke Detection should not be required just for a room where one would normally not be occupied such as, but not limited to, janitors closets, electrical or mechanical rooms. The fan-shutoff is intended to turn of the mechanical fans from pushing smoke into a compartment to allow the occupants time to exit.
 - ⁶ This is to allow an Exception that workable so that the duct smoke detectors are not being added just because there is a restroom and/or a janitor’s closet that is generally not occupied such as in a small industrial unit or strip mall.
 - ⁷ Ref: CMC 609.0 Automatic Shutoff
 - ⁸ Ref: CMS 219.0 Qualified – a competent and capable person or company that has met the requirements and training for a given field acceptable to the Authority Having Jurisdiction.
 - ⁹ Ref: CMC 203.0 ‘Accessible’, CBC 907.12 Access, NFAP 72-5.14.5.3,
 - ¹⁰ Ref: CMC 203.0 ‘Accessible, Readily’, CBC 907.12 Access, CFC 907.13 Access
 - ¹¹ Ref: CMC 606.5 Access and Identification, CBC 716.4 Access and identification.
 - ¹² Ref: CBC 907.11 Duct smoke detectors, CFC 907.12 Duct smoke detectors, NFPS 72 6.15.5 HVAC Systems.
 - ¹³ Ref: CMC 609.0 Automatic Shutoff, CBC 907.10 Fire safety function, CBC 907.11 Duct smoked detectors.
 - ¹⁴ Ref: CBC 907.10 Fire safety function, CFC 970.11 Fire safety function
 - ¹⁵ Ref: CBC 907.10 Fire safety function, CFC 907.11 Fire safety function, NFPA 72 6.15.5.2 HVAC Systems
 - ¹⁶ Ref: CBC 907.10 Fire safety function, CBC 907.16 Acceptance tests, CFC 907.11 Fire safety function, CFC 907.16 Acceptance tests
 - ¹⁷ Ref: CBC 907.10 Fire safety function, CBC 907.11 Fire safety function, CFC 907.11 Fire safety function, CFC 907.16 Acceptance tests, NFPA 72-10.4.2.2 Testing methods
 - ¹⁸ The requirement to shut the dampers when the fan shutdown is impractical as it requires that the dampers shut every time the air-moving unit’s fan stops / cycles. Per NFPA 72 5.14.5.6 the detectors shall be listed for operation over the complete range of air velocities, temperature, and humidity expected at the detector when the air-handling system is operating. If smoke is present when air is not moving, there are more serious problems that this section does not address.
 - ¹⁹ Per NFPA 72 5.14.4.1 Area smoke detection within smoke compartments shall be permitted to be used to control the spread of smoke by imitating operation of doors, dampers and other equipment. ... **Complete area smoke detection is not necessary to provide for such (smoke) control features...** Total Smoke Detection, which includes under-floor spaces and above-ceiling spaces, is not necessary when they are not used as HVAC plenums and goes beyond the intent of mechanically controlling smoke within the HVAC smoke compartment.