

STATE OF CALIFORNIA
STATE AND CONSUMER SERVICES AGENCY
CALIFORNIA BUILDING STANDARDS COMMISSION
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Office Use Item No. _____

PARTICIPATION COMMENTS FOR THE NOTICES DATED NOVEMBER 25, 2009
Written comments are to be sent to the above address.

WRITTEN COMMENT DEADLINE: DECEMBER 9, 2009

Date: December 2, 2009

From:

John A. Lee, P.E.
Name (Print or type)


(Signature)

Hughes Associates, Inc.

Agency, jurisdiction, chapter, company, association, individual, etc.

2551 San Ramon Valley Blvd., Suite 209, San Ramon, CA 94583

Street

City

State

Zip

I/We **DO NOT** agree with:

The Agency proposed modifications As Submitted on Section No. 909.12, Detection and Control Systems

and request that this section or reference provision be recommended:

Approved **Disapproved** Held for Further Study Approved as Amended

Suggested Revisions to the Text of the Regulations:

The existing (2007 CBC) section 909.12 should remain unchanged.

Reasons: [The reason should be concise if the request is for "Disapproval," "Further Study," or "Approve As Amend" and identify at least one of the 9-point criteria (following) of Health and Safety Code §18930.]

The proposed modification to the existing (2007 CBC) Section 909.12 wording should NOT be approved for the following reasons:

1. Use of a single limit switch to monitor the position of grouped dampers is totally inconsistent with the CURRENT REQUIREMENT for "Confirmation of Actuation." The single limit switch fails to satisfy this requirement because multiple dampers are susceptible to linkage failures and actuator failures, which cannot be detected by a single limit switch.

Hughes Associates, Inc. experience in commissioning smoke control systems is that linkage slippage and

actuator failure is very common in grouped damper assemblies. This failure cannot be detected unless limit/proximity switches are installed on each individual damper.

2. The proposed modification to 909.12 is in direct conflict with published ICC guidance because it fails to detect linkage or actuator failure.

The ICC/SFPE publication "A Guide to Smoke Control in the 2006 IBC," (excerpt attached, see highlighted paragraph on page 9-5) provides excellent guidance for monitoring damper status. In that document, the guidance is:

"Damper supervision must be able to indicate failure of the actuator, linkage and damper itself. As such, limit switches or proximity sensors are typically placed on the damper blades, and not the actuator, to indicate open and/or closed status of the dampers."

3. The proposed modification should therefore be DISAPPROVED because there is already good published ICC guidance AND the modification will CONFLICT with that guidance.

Additionally, the proposed modification is tailored to relieve the damper manufactures from the responsibility of supplying adequate limit/proximity switches to properly SUPERVISE their dampers.

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.

A GUIDE TO SMOKE CONTROL IN THE 2006 IBC®

Dr. John H. Klote, P.E. | Douglas H. Evans, P.E.



may not adequately compensate for the decrease in pressure caused by wind effects. When the design team feels it is necessary to use propeller fans, a roof-mounted, hooded propeller fan may be able to achieve its design intent.

The last sentence in Section 909.10.5 specifies that **fan motors are to have a minimum service factor of 1.15. This requirement is intended as a 15-percent factor of safety.** This design constraint must not be taken advantage of for proper operation of the system.

All the items in Section 909.10.5 must be **analyzed by the mechanical engineer** and submitted to the special inspection agency. Field verification will be performed by the special inspection agency or AHJ. This information will be part of the final report addressed in Section 909.18.8.3.

POWER SYSTEMS

[F] 909.11 Power systems. The smoke control system shall be supplied with two sources of power. Primary power shall be the normal building power systems. Secondary power shall be from an approved standby source complying with the International Code Council Electrical Code—Administrative Provisions. The standby power source and its transfer switches shall be in a separate room from the normal power transformers and switch gear and shall be enclosed in a room constructed of not less than 1-hour fire barriers ventilated directly to and from the exterior. Power distribution from the two sources shall be by independent routes. Transfer to full standby power shall be automatic and within 60 seconds of failure of the primary power. The systems shall comply with this code or the International Code Council Electrical Code—Administrative Provisions.

If loss of power causes loss of memory, even for the time necessary to reboot, then the memory is considered volatile within the intent of this section and an uninterruptible power supply is required. Power surges may occur from both the municipal supply and upon transfer to secondary power.

DETECTION AND CONTROL

[F] 909.12 Detection and control systems. Fire detection systems providing control input or output signals to mechanical smoke control systems or elements thereof shall comply with the requirements of Section 907. Such systems shall be equipped with a control unit complying with UL 864 and listed as smoke control equipment.

Control systems for mechanical smoke control systems shall include provisions for verification. Verification shall include positive confirmation of actuation, testing, manual override, the presence of power downstream of all disconnects and, through a preprogrammed weekly test sequence, report abnormal conditions audibly, visually and by printed report.

Underwriters Laboratories (UL) 864 was originally developed as a standard for confirming the integrity of fire alarm control panels (FACPs) and was later modified to include UUKL as a subcategory for smoke control system equipment.

The primary intent of UL 864 is to focus on the integrity of the overall system. When a FACP transfers alarm signals to a building management system (BMS), a listing in accordance with UL 864 (and UUKL when transferring smoke control commands) is required for the BMS.

Section 909.12 clearly specifies that control units used for activation and control of smoke control systems be listed under this classification.

The fire detection system is expected to be installed by a fire alarm or electrical contractor licensed in the respective jurisdiction. For proper interfacing with the smoke control system, smoke detectors for magnetic hold-open devices on automatic-closing doors, as well as smoke detectors that may configure nondedicated fans or smoke dampers, must be properly coordinated and should be the responsibility of the same contractor. Thereby, all required portions of the fire detection system will be supervised as specified by this section.

In order to satisfy the requirement for verification, it seems reasonable to allow any sensor that can be calibrated to distinguish the difference between proper operation and a fault condition. For fans, proper operation means that the fan is moving air within the intent of its design. Fault conditions include power failure, broken fan belts, adverse wind effects, a locked rotor condition and/or filters or large ducts that are blocked, causing significantly reduced airflow. In addition to differential pressure transmitters and sail switches, this can be accomplished by the present state-of-the-art current sensors. All these sensors have advantages and disadvantages. Pressure sensors are more susceptible to wind effects. Sail switches are susceptible to breaking. Current sensors may only provide an indication that current is flowing and not accurately detect all fault conditions.

Damper supervision must be able to indicate failure of the actuator, linkage and damper itself. As such, limit switches or proximity sensors are typically placed on the damper blades, and not the actuator, to indicate open and/or closed status of dampers.

Automatic-closing doors, which are part of smoke barriers where the smoke zone is served by a mechanical smoke control system, and doors that automatically open for make-up air supply may be required by the AHJ to have similar status indicators to verify that the doors are properly positioned for smoke control. Large doors that could adversely impact the mechanical system should be monitored to confirm an open/closed position.

For fans, dampers, and automatic-opening/closing doors, these status sensors and position indicators constitute supervision and the presence of power within the intent of this code requirement. This is especially true with the required weekly diagnostic. If fan status verifies that pressure or flow in the duct or electrical demand are within the expected tolerances, then proper functioning is indicated. Similarly, damper limit switches or proximity sensors confirm proper positioning. This indication of proper functioning provides an equivalent level of confirmation at a remote location as does monitoring the electrical conductors for continuity, which is minimally mandated for fire alarm systems. Recognition of either of these approaches for monitoring fans, dampers and doors is listed in Section A6.4.6 of NFPA 92A and Section A7.3.6 of NFPA 92B. Status indication of these devices will be on the fire-fighter's smoke control panel as addressed in Section 909.16.

[F] 909.12.1 Wiring. *In addition to meeting requirements of the International Code Council Electrical Code Administrative Provisions, all wiring, regardless of voltage, shall be fully enclosed within continuous raceways.*

[F] 909.12.2 Activation. *Smoke control systems shall be activated in accordance with this section.*

[F] 909.12.2.1 Pressurization, airflow or exhaust method. *Mechanical smoke control systems using the pressurization, airflow or exhaust method shall have completely automatic control.*