



Clark County Fire Prevention

Mission Statement: "To provide the highest level of fire protection and related services"

**TITLE: MECHANICAL SMOKE CONTROL SYSTEMS – IBC 909 SYSTEMS
FIREFIGHTER SMOKE CONTROL PANEL**

SCOPE: This guideline applies to Fire Department requirements regarding the design, installation, operation, and approval process for a Firefighter Smoke Control Panel for Mechanical Smoke Control Systems built in accordance with Section 909 of the International Building Code.

PURPOSE: To standardize Fire Department requirements relating to the design, installation, and operation of a Firefighter Smoke Control Panel used for IBC 909 systems.

SPECIFICATIONS AND REQUIREMENTS

At the time of permit application, three sets of plans drawn to an indicated scale and specifications must be submitted for review and approval. A Fire Department permit fee of \$75 will be collected upon submittal of plans. Plans may be expedited for an additional fee of \$85 per hour of plan review. For expedited submittals, the minimum fee of \$85 for the first hour will be collected at the time of submittal. Additional fees may apply and will be collected after review of plans. Once a permit has been approved, call 226-8991 and schedule a fire inspector to verify site and validate permit.

CODE REQUIREMENTS: The Building Department requires mechanical smoke control systems to comply with the International Building Code. Where a smoke control system is required, Section 909.16 of the International Building Code requires that a Firefighter Smoke Control Panel be provided in a Fire Command Center. The Fire Code indicates that the design of the Firefighter Smoke Control Panel shall be in accordance with the Clark County Fire Prevention's Guideline for Mechanical Smoke Control Systems. This guideline serves as the Clark County Fire Prevention's Guideline for Mechanical Smoke Control Systems for the design, installation, and operation of a Firefighter Smoke Control Panel for IBC 909 smoke control systems. Note: Where a project has unique and extraordinary smoke control system features not specifically addressed within this document, additional requirements may be applied during review of the associated Fire Protection Report.

LOCATION: The Firefighter Smoke Control Panel shall be located in the Fire Command Center.

CONTROL PANEL: The Firefighter Smoke Control Panel shall provide graphics depicting the facility protected and smoke control fan locations. Also, the panel shall provide control switches to allow manual override and control of smoke control systems within the facility. Light Emitting Diodes (LED) shall be provided on the panel for the purpose of annunciation of smoke control systems, smoke control fans, smoke control dampers, and additional items as described.

Graphics

Building layout must be graphically represented to clearly indicate location and boundaries of smoke zones with respect to adjacent areas. All walls and doors comprising the egress system for all smoke control zones must be shown on the graphics layout.

The majority of graphics will be shown on a plan view. An exception is allowed for high-rise buildings having common floor plans and one smoke zone per high-rise floor, where a section view of the tower can be allowed in conjunction with a plan view of typical tower floors. At a minimum, the panel must satisfy the following requirements:

- Show a north directional arrow

- Show a building layout at an indicated scale on a contrasting background; black and white are acceptable colors for the graphic outlines and for the panel background
- The maximum height of any portion of the panel shall be 7’-0” above finished floor, and the minimum height of any portion of the panel shall be 2’-6” from floor
- Include a panel title block, indicating the facility name and address, and the title “Firefighter Smoke Control Panel”
- Label each smoke zone area; the label shall include the floor level, i.e., SZ 16-1 shall be the first smoke zone on the 16th floor. Note: when the floor level above grade is different than the floor designation, provide both numbers; ie if the 3rd level above grade is designated as level 15 in the elevators; provide both designations on the panel.
- Designate between active and passive smoke zones by shading/background
- Show all floor and roof levels for all areas.
- Label the locations of the Fire Pump, Emergency Generators, elevators providing access to all floor and roof levels, stairs providing access to all floor and roof levels, and Secondary Response Point.
- Show the location of all fan units providing smoke control function (both automatic and mop-up fans) and clearly indicate the direction of airflow from each smoke zone to the fan unit protecting that zone. Labels must be provided for each fan and for each opening associated with a fan. Therefore, if there is a fan on the building roof that serves the first level by exhausting air through an opening on the first level, the fan unit, clearly labeled, must be shown on the roof graphic, and the exhaust opening must be shown on the first level, clearly labeled as an exhaust opening associated with the fan.
- Label fans with a Hand/Auto switch allowing for manual control at the unit
- Contain LED as required. LED annunciation is required for each smoke zone (including passive zones utilizing only dampers), each smoke control fan, each group of smoke control dampers/doors, each stair pressurization fan, each elevator pressurization fan, each mop-up system, for “Abnormal Switch Position”, and for power. For smoke fans and pressurization fans, the associated LED shall be close to the graphical representation of the fan.
- Contain switches for manual control/override of each smoke zone (including passive zones utilizing only dampers), each stair pressurization system, each elevator pressurization system, each mop-up system, and each elevator hoist way vent damper.
- Contain a button for lamp test.
- Provide a legend for all symbols, including fans, supply/exhaust openings, etc, and for LED provided on the panel

Control Switches and Buttons

Manual control switches must be provided at the panel. The switches shall allow for manual activation of smoke control sequences and override of active smoke control sequences. Control switches shall be provided for each individual active and passive smoke zone, for each stair and elevator pressurization system, for mop-up systems, and for elevator hoist way vents.

Control switches shall be adjacent to LED associated with each switch. Switches shall be three-position, even for dual-mode smoke zones. Each physical position of the control switch shall be labeled, utilizing “smoke mode– auto – off” labels for smoke zones, “press-auto-off” labels for pressurization systems, “manual purge – auto – off” labels for mop-up systems, and “open - auto - close” labels for elevator hoist way vents.

Control switches shall be provided for:

- Each Smoke Zone: The switch for the smoke zone is required to have “smoke mode – auto – off” positions labeled. In “smoke mode” the switch is required to activate all smoke control components, including fans, dampers, and doors, that are required to automatically activate to provide the smoke control function, as dictated on the smoke control diagrams. In the “off” position, the switch is required to move all fans and dampers to a “passive” mode by shutting down all fans and closing all dampers serving that zone. This switch in the “off” position shall not inhibit any stair pressurization or elevator pressurization systems from activating again under a separate scenario. In the “auto” position, the FACP function is allowed to dictate the status of the smoke control system.
- Each Pressurization System: A switch is required to provide manual control of the fan(s) providing air supply to pressurize an enclosure, such as an egress stair and an elevator machine room. The switch for each pressurization system is required to have “press – auto – off” positions labeled. In “press” the switch will activate all pressurization fans required for the pressurized enclosure. This switch in “press” will override automatic controls, including duct detector shut down of the fan. In the “off” position, the fan must be released from all initiation

commands from the FACP; no other activation of a smoke control system by the FACP will override the “off” position and turn the fan back on. In the “auto” position, the FACP function will dictate the fan function.

- Each Mop-Up System: The switch for each mop-up system that is only manually activated for mop-up purpose is required to have “manual purge – auto” positions labeled. In “manual purge” the switch will activate fans and dampers that are required to configure to achieve the exhaust mode. In the “auto” position, the normal building function will dictate the functioning of all fans and dampers.
- Each Elevator Hoist Way Vent: The switch for each elevator hoist way vent is required to have “open – auto” positions labeled. In “open” the switch will open the elevator hoist way vent dampers. In the “auto” position, the FACP will dictate the status of the vent dampers, with respect to the lobby smoke detectors associated with the hoist way.

Switches shall be located on the Firefighter Smoke Control Panel reasonably close to the graphical depiction of the associated area/component. There is no requirement for a separate control switch for a smoke control fan or fire dampers that are part of an automatic sequence.

Annunciation

Status of smoke control systems and components is required to be indicated on the Firefighter Smoke Control Panel. Status shall be provided for general conditions, each individual smoke zone, each smoke control fan, each pressurization fan, and all dampers/doors. Status shall be indicated using LED. Acceptable LED colors are red, yellow, green, and blue. Red-yellow-green LED sets shall be provided for each smoke zone, smoke control fan (including mop-up fans), damper/group of dampers, and each pressurization fan. Dual-mode zones and fans shall be provided with red-yellow-green-blue LED sets.

LED OPERATION

General

There are general panel status situations that are required to be indicated by LED. These include whether there is power to the panel, and whether any switch on the panel has been moved from “auto” to another position.

General, Yellow: There shall be a yellow indicator light that will illuminate when any switch on the fire-fighter’s smoke control panel has been turned from “auto” or set to any position that will override automatic function of a smoke control system or component. The label adjacent to the yellow LED shall state “Abnormal Switch Position.”

General, Green: There shall be a green indicator light that will illuminate to indicate that the Firefighter’s Smoke Control Panel is powered. The label adjacent to this green LED shall state “Power On.”

LED Legend: A legend of LED shall be provided. The legend LED shall continuously be lit. The legend shall indicate the following colors and labels:

- Red LED – Smoke Mode
- Yellow LED – Trouble
- Green LED – Normal
- Blue LED – Ancillary Smoke Mode (only for dual mode fans and zones)

Smoke Control Components

LED are required to indicate status of the smoke control system components. LED shall be provided for:

- Smoke Zones
- Smoke Control Fans
- Mop-Up Systems
- Smoke Zone Dampers/Doors
- Elevator Hoist Way Vents
- Pressurization Systems

All of the above shall have red-yellow-green LED sets; dual-mode zones and fans shall add a blue LED for indication of the ancillary smoke mode. The various LED shall operate as follows:

Red Only: Shall be illuminated when the FACP or the associated manual switch is activating the smoke control zone and/or components and all components required to activate have been monitored to be in the required position/operation for that scenario.

Green Only: Shall be illuminated to indicate normal mode when there is no initiation by the FACP or associated manual switch for the smoke zone and components and all required status for smoke control components indicate that the components are ready for operation.

Blue Only: Shall be illuminated when the FACP or the associated manual switch is initiating the smoke control zone and/or components into its ancillary smoke control mode and the monitoring for the fan and dampers required to achieve the ancillary smoke control mode indicates that the system is operating in its required mode. An ancillary smoke control mode means that the smoke zone served by the smoke control system is not in alarm, but the system must configure to support smoke control for another smoke zone that is in alarm.

Yellow Only: There shall be no situation where only a yellow LED is illuminated. The yellow LED shall only illuminate in conjunction with a blue LED, red LED or green LED.

Red and Yellow: A combination of the red and yellow LED shall illuminate to indicate that the smoke zone and/or component is being initiated by the FACP or the associated manual switch, and positive status indicating proper configuration of smoke zone components has not been received.

Green and Yellow: A combination of green and yellow LED shall illuminate when a smoke zone is not initiated and the smoke control components do not report normal operating status. For instance, this may occur when a damper is closed due to loss of power, or there is a loss of power required for a smoke control fan.

Blue and Yellow: A combination of the blue and yellow LED shall illuminate to indicate that an auxiliary smoke control sequence is being initiated by the FACP or the associated manual switch, and positive status indicating proper configuration of components for the ancillary smoke control mode has not been received.

SEQUENCE OF OPERATIONS

Smoke control sequences shall be programmed such that operation of fans and dampers associated with the smoke control system does not result in physical damage in any smoke control system components.

In no case is the smoke control system required to configure for more than one smoke zone at the same time. Upon automatic activation of a device programmed to initiate a smoke control system, the smoke control system shall automatically configure all smoke control components in a manner to avoid damage to components. All components shall be configured to smoke control status and annunciation of status shall be indicated on the Firefighter Smoke Control Panel within 60 seconds of the initiating alarm being received at the FACP.

Under automatic-only activation, the smoke control system shall configure components in the zone where the first device that initiates smoke control is activated. For example, if smoke control is automatically initiated for the 17th floor of a high-rise hotel building, the smoke control system is required to initiate the smoke control sequence for the 17th floor. If a later alarm is received from a device on the 18th floor that would normally activate the smoke control sequence for the 18th floor, the proper response is to continue smoke control operation on the 17th floor and not initiate smoke control on the 18th floor. Essentially, all alarms received after the first alarm are ignored by the smoke control system, and the sequence responding to the first alarm is maintained.

Under manual-only activation, which is to say that there is no automatic sequence being called by the FACP, the smoke control system shall configure components to their proper smoke mode operation in the zone associated with the manual switch. For example, if the manual switch associated with the 17th floor of a high-rise hotel building is turned to the “on” position, then the smoke control system is required to initiate the smoke control sequence for the 17th floor. If, without resetting the switch for the 17th floor to the “auto” position, the switch for the 18th floor is set to “on”, the proper response is to continue smoke control

operation on the 17th floor and not initiate smoke control on the 18th floor. Essentially, all switches activated after the first switch are ignored by the smoke control system, and the sequence responding to the first switch is maintained. The only way to initiate smoke control on the 18th floor is to set the 17th floor switch to “auto” or “off”, then turn the 18th floor switch to “on”.

For stacking of automatic and manual switch activation, the manual switch shall have override capability over the automatic sequence. Therefore, if the 17th floor is automatically activated to smoke mode, setting the switch for the 17th floor to “off” will return all smoke control components associated with the 17th floor smoke control system to a passive mode

Switches for pressurization fans shall not override manual or automatic function for smoke control systems covering areas or zones. Similarly, switches for a smoke zone shall not override manual or automatic function for pressurization fans.

APPROVAL REQUIREMENTS

The Fire Department requires a minimum of three copies of plans for all proposed smoke control graphic panels, three copies of narrative describing the sequence and operation for all LED’s and switches, and a copy of the approved smoke control diagrams for review. Plans shall be drawn to an indicated scale. Panel drawings must indicate location of switches and LED’s against the panel outline. The narrative shall indicate compliance with this guideline, and describe the initial and override sequence for all buttons and switches shown on the graphic panel. The narrative shall be formatted as an instruction sheet. Copies of the approved narrative shall be laminated and attached to the Firefighter Smoke Control Panel for use by the Fire Department in an emergency. The narrative must describe:

- General operation of smoke control systems
- LED operation for automatic and manual switch sequence of each smoke zone and/or component
- Override of control switch for each smoke zone and smoke control component

Testing of the smoke control panel operation must be included in the third-party testing of the smoke control system. Final acceptance by the Fire Department includes approval of the third-party test report and testing of the LED and control switches at the final All-Systems test.