5.15 Use of Passive Method for Required Smoke Control Systems (2025)

Reference: The requirements of this bulletin are referenced from the San Francisco Building Code (SFBC) Section 909, San Francisco Department of Building Inspection (SFDBI) Administrative Bulletin No.47, and 2024 NFPA 92. Although, not adopted by the City of San Francisco as a referenced standard, the Handbook of Smoke Control Engineering[1] is utilized for additional guidance regarding smoke control design.

Purpose: The purpose of this bulletin is to provide clarification of the requirements for use and application of the passive (non-mechanical) method for smoke control in buildings where a smoke control system is required per SFBC Section 909. It is the intent that any smoke control systems utilizing the passive method of smoke control comply with this administrative bulletin as well as all of the requirements of SFDBI Administrative Bulletin No.47 and 2025 SFBC Section 909. If a conflict is noted between this administrative bulletin and the above-noted references or any other applicable code or standard, the designer of record shall immediately notify the San Francisco Fire Department (SFFD) Bureau of Fire Prevention – Plan Check Division and SFDBI for resolution of the conflict. All designs are subject to review and approval by SFFD and SFDBI.

Definitions:

1. **Smoke Control (Passive Method).** Any smoke control system design that utilizes smoke barriers or partitions with opening protection or natural ventilation in lieu of mechanical forced-air systems designed in accordance with the pressurization method, airflow method, or exhaust method as outlined under SFBC Sections 909.6, 909.7, and 909.8

I. GENERAL REQUIREMENTS

SFBC Section 909.12.3.2 states that passive smoke control systems activated by approved spot-type detectors listed for releasing service shall be permitted. The noted requirements in this bulletin shall apply to any of the following:

1. All new buildings that require smoke control.
2. Any existing buildings with elements requiring smoke control where a change in use or occupancy triggers compliance with current building code requirements.

The passive method of smoke control may be used under the following conditions:

1. **Condition #1 - Small Unoccupied Areas.** In buildings required to be protected by a smoke control system complying with SFBC Section 909, small isolated and normally unoccupied areas shall be permitted to utilize passive methods of smoke control (such as mechanical rooms, boiler rooms, trash chute rooms, or other utility rooms). The following items shall apply for this method:

    A. **Enclosure.** Such methods shall include enclosure by smoke barriers/partitions, provision of fire-smoke dampers, and automatically closing smoke and draft door assemblies.

[1] Klote, J.H., Milke, J.A., Turnbull, P.G., Kashef, A., Ferreira, M.J., "Tenability Analysis" in *Handbook of Smoke Control Engineering*, Alanta, GA: ASHRAE, 2012, ch.19, pp.387-403.

B. **Monitored.** Fire-smoke dampers shall be monitored per SFBC 909.12.1.

C. **Opening Protection.** Magnetically held-open doors, fire-smoke shutters, or other approved means of opening protection shall comply with SFBC Section 909.12 for automatic control and monitoring of status.

D. **Tenability Analysis Not Required.** A tenability analysis will not be required for such spaces.

2. **Condition #2 - Pressurization Method.** In buildings where a smoke control system utilizing the pressurization method per SFBC Section 909.6 would be required, the use of the passive method by compartmentation or natural ventilation shall be supported by a tenability analysis utilizing appropriate calculation methods and/or scale model testing (such as high-rise buildings, underground buildings, and other occupancies). The following items shall apply for this method:

   A. **Calculation Methods.** Appropriate calculation methods may include Computational Fluid Dynamics (CFD) modelling using a validated model such as Fire Dynamics Simulator (FDS), and/or the two-field approach utilizing a combination of a zone fire model such as the Consolidated Model of Fire and Smoke Transport (CFAST) in the near-field and a network model such as CONTAM in the far-field.

   B. **Tenability Analysis.** The following items shall apply for the tenability analysis:

      (1) **In Smoke Control Report.** The tenability analysis shall be included in the Smoke Control Report and rational analysis and shall evaluate visibility and toxicity in rooms/zones both immediately adjacent to and remote from the zone of fire origin, and shall consider environmental factors including, but not limited to, stack effect, ambient temperature, wind, climate, continuously running HVAC systems (such as sub-ducted toilet exhaust), and other factors.

      (2) **Required Safe Egress Time.** The tenability analysis shall demonstrate that tenability is maintained for a period of 20 minutes or 1.5 times the Required Safe Egress Time (RSET).

      (3) **Additional Information and Reference.** Chapter 19 of the Handbook of Smoke Control Engineering[2] provides additional information regarding the procedure for performing a tenability analysis.

[2] Klote, J.H., Milke, J.A., Turnbull, P.G., Kashef, A., Ferreira, M.J., "Tenability Analysis" in *Handbook of Smoke Control Engineering*, Alanta, GA: ASHRAE, 2012, ch.19, pp.387-403.

C. **Smoke-Proof Enclosures.** Where the use of the passive method requires that smoke barriers and smoke partitions used for compartmentation have leakage area ratios more restrictive than the leakage area ratios required under SFBC Section 909.5, the smoke control report and testing program shall include provision to field test such barriers using door-fan testing or other approved methods to verify that leakage does not exceed the maximum allowable as determined by calculations. In such buildings, the passive method may not be utilized for required smoke-proof enclosures. Smoke-proof enclosures shall comply with SFBC Section 909.20.

Exceptions: The following exceptions apply to Condition #2:

(1) **Residential Buildings.** In residential buildings, dwelling units and/or hotel guest rooms may be designated as passive zones provided that the common exit access corridor leading to the smoke-proof exit stair enclosures is designated as an active smoke control zone and is pressurized in accordance with SFBC Section 909.6.

(2) **Areas on the Ground Floor.** Areas on the ground floor (level of exit discharge) and/or areas on the floors above or below that are atmospherically connected to the ground floor by vertical openings that are permitted by code, other than atriums connecting more than two stories (see Condition #3 below), shall be permitted to be designated as passive zones.

3. **Condition #3 - Exhaust Method.** Buildings where a smoke control system utilizing the exhaust method per SFBC Section 909.8 would be required, the use of natural ventilation and/or compartmentation in lieu of mechanical forced-air systems shall be permitted only where supported by CFD modelling and tenability analysis as outlined under Condition #2 above (such as atriums, covered-malls, smoke-protected assembly seating or other large spaces).

Note for Tenability Analysis and/or Testing: Except for Condition #1 and the exceptions to Conditions #2 noted above, the passive method of smoke control shall not be used unless validated by a tenability analysis and/or testing. Use of the passive method of smoke control does not excuse the designer(s) of record from satisfying all applicable requirements of SFDBI Administrative Bulletin No.47 and SFBC Section 909.