SCHULTE & ASSOCIATES

Building Code Consultants
880D Forest Avenue
Evanston, IL 60202
fpeschulte@aol.com
504/220-7475

AN ANALYSIS OF SECTION 910 INTERNATIONAL BUILDING/FIRE CODE SMOKE AND HEAT VENTS IN BUILDINGS PROTECTED BY STANDARD SPRINKLERS

1. **Performance Criteria for Vents/Curtains As Specified.** The requirements for the ratio of minimum vent area/floor area ratio, minimum draft curtain depth and maximum curtained area are specification-oriented, rather than performance-oriented. The performance generated by compliance with the code requirements for vents and curtains contained in Table 910.3 is an unknown. In other words, compliance with the requirements contained in Table 910.3 may or may not be adequate to comply with the actual intent of the provisions for smoke/heat vents.

2. **Sprinkler Operation vs. Vent/Curtain Performance Criteria.** It is unclear whether or not the requirements for vent area/floor area ratio, minimum draft curtain depth and maximum curtained area contained in Table 910.3 are based upon the successful operation of the sprinkler system or the total failure of the sprinkler system. If the requirements for smoke/heat vents are based upon the successful operation of the sprinkler system, then the requirements would be inadequate for an operating sprinkler system which is deficient or the complete failure of the sprinkler system.

3. **Ceiling Heights.** Table 910.4 does not address ceiling heights for F-1 and S-1 occupancies. Table 910.4 does address the height and classification of storage for high-piled storage, but does not address ceiling heights. The ceiling height will have a significant impact on the requirements for vents and draft curtains. Hence, the requirements contained in Table 910.4 are incomplete. Given that section 910.4 does not contain a performance goal, building designers will be unable to properly design the vent/curtains in buildings with atypical high ceilings.

4. **Vents/Draft Curtains Interaction.** Draft curtains are required to be provided in order for the roof vents to operate properly. Table 910.4 permits the maximum curtained area to be 50,000 SF in F-1 and S-1 occupancies. (This limitation applies to buildings of all heights). A curtained area of 50,000 SF far exceeds the curtain area required for the vents to operate effectively. Based upon this, the effectiveness of the venting requirements provided for F-1 and S-1 occupancies is questionable.

The provisions which address high-piled storage contained in the Uniform Fire Code do not require draft curtains to be provided in buildings containing high-piled storage protected by a sprinkler system. The deletion of the requirement for draft curtains in buildings containing high-piled storage will have a deleterious effect on the operation of the smoke/heat vents.

Smoke/heat vents and draft curtains are "team". **The effectiveness of the smoke/heat vents is compromised by the deletion of the requirements for draft curtains in buildings containing high-piled storage and the large curtained area permitted for F-1 and S-1 occupancies.**

5. **Location of Draft Curtains With Respect to Storage.** The provisions contained in Section 910 do not address the location of draft curtains with respect to storage or to aisles. NFPA 204 recommends that draft curtains be located over aisles, however, this recommendation does not address the issue of "pre-wetting" which is necessary for standard sprinklers to control a fire in ordinary combustibles. The issue of "pre-wetting" has never been addressed by proponents of vents/curtains (other than by the deletion of the requirements for draft curtains).

6. **Location of Vents With Respect to Sprinklers.** NFPA 13 contains provisions which address the location of sprinklers with respect to one another (in order to prevent an operating sprinkler from wetting adjacent sprinklers). Section 910 does not address the issue of the location of vents with respect to sprinklers and the issue of operating sprinklers wetting the operating ("triggering") mechanism of vents located in close proximity to sprinklers.

7. **Conclusions.** The provisions contained in section 910 of the International Building Code and the International Fire Code fail to address many issues which are pertinent to the design of roof vent/draft curtain systems in buildings which are protected throughout by a sprinkler system utilizing standard sprinklers. Compliance with the provisions of section 910 could potentially result in a design which could be considered to be defective, both from the standpoint of the design of the sprinkler system, as well as the design of the vent/curtain system, or both.

   The provisions of section 910 of the IBC/IFC would be considered to be archaic based upon our present state of knowledge. The provisions contained in section 910 of the International Building Code and the International Fire Code should be thoroughly reviewed. Given the defects in the smoke/heat provisions noted above, consideration should be given to the deletion of these requirements until it can be demonstrated that the issues outlined above have been addressed.

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