

Life Safety Dampers Are Essential Components of HVAC Systems

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Based on an examination of NFPA data in the 1930s, the National Board of Fire Underwriters in 1939 recommended that dampers be installed in the HVAC system to interrupt the passage of smoke, flame and heat during a fire. Since that time, the effectiveness of automatic closing fire and/or smoke dampers and automatic fan shutdown of the HVAC system in preventing the migration of smoke, flame and heat to areas of a building remote from the area of origin has been substantiated by numerous experts in the field of the fire sciences. Throughout the world, fire protection engineers and mechanical engineers continue to incorporate fire and/or smoke dampers into the fire protection design of many types of modern buildings. Most of the buildings in the 1930s were not equipped with automatic sprinkler systems. A question has arisen, however, as to the usefulness of life safety dampers in today's sprinklered buildings.

AMCA Research

In 2008, the [Air Movement and Control Association International Inc.](#) (AMCA) contracted with Koffel Associates, Inc. to conduct a literature search to identify credible work on this subject, and to use the research findings (if any) as the basis for additional computer modeling. The literature search and the follow-up computer modeling identified two interesting findings:

One, there were no documents found that could form the basis for any substantiation that would support the removal of smoke dampers in shaft penetrations in sprinklered or non-sprinklered buildings. On the contrary, the literature search provided a sampling of fires from the past 25 years where smoke spread was an issue for occupant life safety.

Two, the literature search identified a relatively recent modeling effort and some full scale fire tests that looked at the vertical spread of smoke in buildings via shafts. The additional modeling research that was completed by Koffel Associates, Inc. expands on these two studies in an attempt to determine the benefit of smoke dampers at duct penetrations of vertical shafts in sprinklered buildings. The findings from the modeling and the analysis of a simple air handling system indicates that smoke dampers are effective at limiting the spread of smoke throughout a building via mechanical ventilation, even while the mechanical ventilation system continues to be operational. This analysis also takes into account the effects of smoke movement by stack effect through open shafts in tall buildings. Life safety dampers can significantly limit smoke spread through mechanical ventilation systems and substantially mitigate smoke spread by stack effect, especially in conjunction with sprinkler systems, which significantly lower the smoke production of fires, significantly reducing the likelihood of property damage and reducing the threat to life safety. When used in conjunction with sprinkler protection or other passive smoke control methods such as effective building compartmentalization, [smoke dampers can provide an effective](#) means of limiting smoke exposure in parts of a building away from fire.

2012 ICC Code Development Hearings

The 2012 ICC Fire Safety Code Development Committee upheld these findings for the 5th consecutive code cycle, voting against proposals to reduce or remove altogether the requirements for life safety dampers from the 2015 International Building Code.

Source:

Lovell, Vickie, President/Building Code Consultant, InterCode Incorporated. May, 2012.

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Mullholland, G. W. 1995. Quote smoke production and properties." SFPE Handbook of Fire Protection Engineering, Quincy, Massachusetts: NFPA