



No Smoking

Passive fire protection techniques for buildings.

By Gregg Stahl

Having properly installed fire-stops between rooms and throughout corridors in commercial structures and multi-family residential buildings is critical—these systems capture and contain fire and smoke locally, allowing extra time for occupants to escape a building fire. As such, specification and correct installation of the most effective system of firestop products is a crucial component of building design.

Fire-stopping involves using certain fire-resistant building materials—some of them specially manufactured—to contain the spread of fire and smoke through penetrations in fire-rated wall, floor and floor/ceiling assemblies. When penetrations are made through fire-rated wall assemblies for switches and power outlets, they must be sealed appropriately with fire-stop materials, such as mineral wool or specified caulking to maintain fire-compartment integrity. Joints in or between fire-resistant assemblies also should be sealed to halt the passage of fire, smoke and combustion byproducts. The group of fire-stopping products used to accomplish this goal is typically referred to as a “passive firestop system.”

PASSIVE FIRESTOP SYSTEM

Total fire protection cannot be achieved with the use of a singular

product. It is the use of many products designed for specific applications that comprise a complete passive fire protection system. When installed properly, these products work in concert to create effective barriers against the passage of flames, smoke and toxic gases. Used in conjunction with other fire protection methods, properly installed passive fire protection saves lives, protects property and minimizes business losses.

Installation of passive fire protection systems is of the utmost importance, as fire protection and life safety is possible only if the firestop materials are installed correctly. It is not uncommon for general contractors to take responsibility for installing the firestop with their team of sub-contractors, but sometimes projects require all firestop systems be installed by contractors whose primary business is firestop installation.

Traditional firestopping products featured in passive firestop systems include sealants, sprays, mechanical devices, foam blocks or pillows. These products are installed primarily in two applications:

- Around penetrations that are made in fire-resistive construction

for the passage of pipes, cables or HVAC systems

- Where two assemblies meet, forming a perimeter joint such as the top of a wall, curtainwall or floor-to-floor joints

It is recommended that contractors only use products with fire-resistance properties and performance verified by an accredited third-party testing agency. Now, let's take a closer look at two important components of passive firestop systems: sealants and intumescent materials.

SEALANTS

Simple mastics or sealants commonly are used to seal penetration firestopping as well as construction joint firestop applications. These sealants are available in various forms and chemical formulations, but the one thing they all have in common is their performance is solely dependent on the system in which they are tested.

Firestop sealants in caulk, self-leveling and spray grade are readily available in silicone, latex and solvent-based products. They often require the addition of a backing material in the system for support.

◀ In this application, the product provides a clean transition from wall to substrate while exposed joints are both fire and sound rated. With no overlapping spray or caulking required, fatigue and/or dislodging of the fireproofing substrate is eliminated during the assembly's life cycle.

Sealants are the most recognized group of firestop products due to the versatility of firestop caulk—it can be used for several different applications on construction projects.

INTUMESCENT MATERIALS

Intumescent materials are firestop products that expand in volume when exposed to heat or flames exceeding a specified temperature. They are one of the primary groups of products utilized in applications where one of the assembly components will deteriorate or burn away during fire exposure. The expansion of the material closes the void that is created when the item melts or burns away, thus maintaining the integrity of the fire-rated assembly. Intumescent firestop materials come in many forms, from caulks to metallic collars with intumescent strip linings, with each product designed for a specific purpose.

For large commercial and institutional projects, contractors have increasingly turned to steel tracks that come factory-made with intumescent materials already attached. These products, such as BlazeFrame from ClarkDietrich Building Systems, are gaining traction with walls and ceilings contractors because they provide a one-step track and fire protection installation. Other advantages to these types of fire-stopping products include:

- Strong unencumbered movement of up to 3 inch
- Eliminates reliance of adhesion and bond-strength caulk
- Eliminates sprays over mineral wool in flutes



Fire Stop Deflection Track – BlazeFrame is a deflection track that includes a factory-installed intumescent strip affixed to steel profiles. When exposed to heat, the intumescent expands and forms a barrier to seal off joints (gap), preventing passage of flames, temperature pass through, and hot gases.

- No fatigue for the life of the assembly
- Faster installation; saves time and labor
- STC ratings tested in the same range as acoustic caulks
- Cured intumescent materials are odor-free
- Unaffected by wet, freezing, humid or hot (below 300 degrees Fahrenheit) conditions
- Offers more UL tested assemblies than those that require a sealant

When choosing products for a fire-stopping system, it is important to select products that have been appropriately tested to meet applicable safety standards. ASTM E 1966 is a common standard for testing fire resistive joint systems and covers sealants, coatings and materials used in joints. ASTM E 814 covers testing of wall and floor penetrations, which are sealed with fire-stop materials.

CONCLUSION

Fire protection is an important decision that should be carefully considered at an early design stage. While passive fire protection can successfully prevent the spread of fire, redundancy is key for total fire protection. New technologies, such as steel studs with intumescent materials already attached, save contractors time and money and help ensure the confinement of smoke and fire throughout commercial buildings. When combined with active fire protection systems, such as fire-sprinklers, alarms and detection systems and occupant education, these materials offer a safer, more balanced approach to protecting a building and its occupants. **W&C**



Greg Stahl is product development director for ClarkDietrich Building Systems.

FIRE STATISTICS SHOW SAFETY AND COST FIGURES

According to the most recent National Fire Protection Association data, in 2010 U.S. fire departments responded to an estimated 1,331,500 fires. These fires resulted in 3,120 civilian fire fatalities, 17,720 civilian fire injuries and an estimated \$11,593,000,000 in direct property loss.

Of these fires, 482,000 occurred in commercial or municipal buildings. Of the more than \$11 billion in property damage, more than \$9.7 billion took place in these non-residential structures.

This represents an average loss per reported incident in non-residential/commercial structures of over \$20,000.

- Three-quarters of all fire deaths are caused by smoke inhalation
- Fifty-seven percent of all people killed in fire are not in the room of the fire origin
- Forty-seven percent of survivors caught in a fire could not see more than 12 feet
- Smoke travels 120 to 420 feet per minute under fire conditions