Circuit Integrity and Fuel-line Protection **AND** How to Avoid This Common Firestop Deficiency

Presented by;

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&

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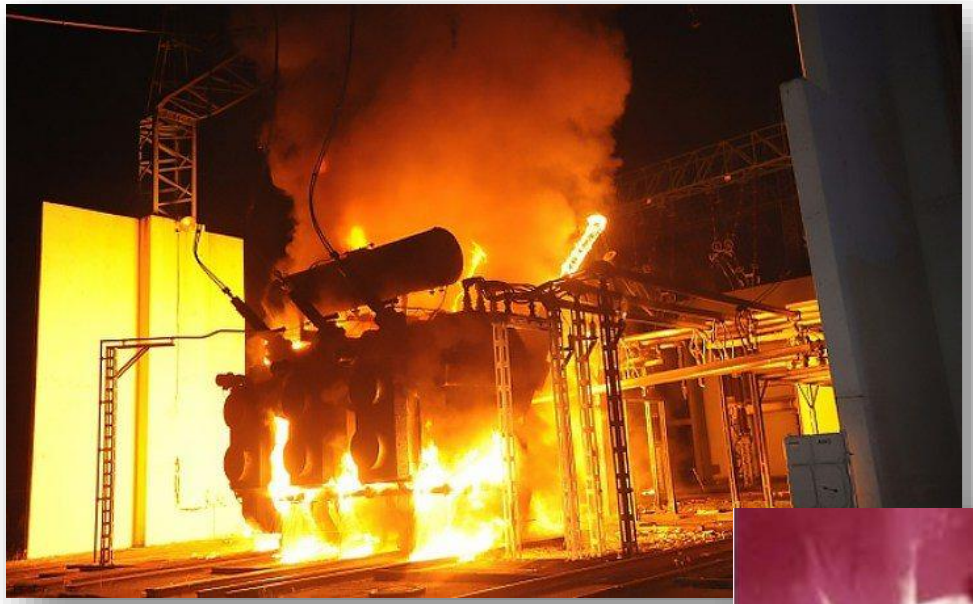

Circuit Integrity and Fuel-line Protection

What does it mean?

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Electrical circuit functionality during a fire

Electrical power is essential for the continued operation of various types of fire safety related equipment under fire conditions.

Fire safety equipment includes fire pumps, fire alarm signaling equipment, elevators, alarms and industrial process control equipment. The National Electrical Code addresses the importance of maintaining the circuit functionality by requiring protection from potential damage by fire, structural failure or operational accident in Article 695 for fire pumps, Article 700 for emergency systems and Article 760 for fire alarm systems.

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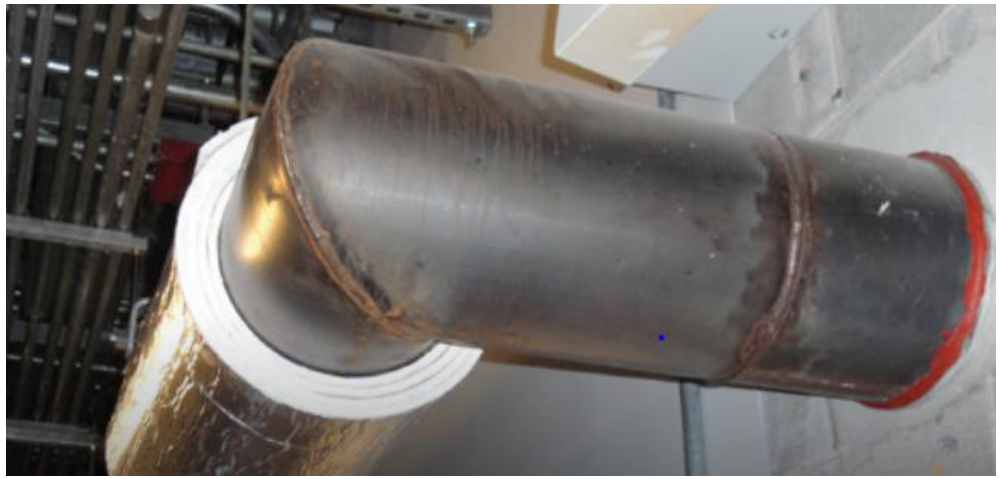
Protection Systems Carrying Combustible Liquids

Local building codes require fuel lines feeding emergency generators and fire pump drivers within buildings to be protected for 2 hours. This ensures the fuel pipe system will maintain its integrity in the event of fire.



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Different fire protection methods can be used to address circuit integrity and fuel-like protection

1. Concrete encasement
    1. Not practical for conduits penetrating walls
    2. In some cases concrete prevents future access

2. Fire-rated gypsum enclosures
    1. Space constraints

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Endothermic Wrap Solutions – An Increasingly Popular Solution

These wrap systems provide a cooling effect.

1. Tested solution, provides up to 3 hour of protection.
2. Practical – when space is an issue OR in overhead applications.
3. Flexible material – easy to install, even on small diameter conduits.
4. May also be used to achieve equal F&T Ratings on Penetration Firestop Systems.

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Let’s review some examples of where fire protective wraps are commonly used;

- *Ventilation Air Ducts*
- *Life Safety Pressurization Air Ducts*
- *Trash & Linen Chutes*
- *Dryer Exhaust Ducts*
- *Welded Kitchen Grease Ducts*
- *Combustible Piping*
- *Fire-Stand Pipe Systems*
- *Steel Water supply, drain systems*
- *Emergency Generator Muffler*
- *Diesel fuel supply piping*
- *Boiler flue exhausts*
- *High-pressure and Low-pressure steam piping*
- *Structural beams and columns*
- *Electrical Circuits including cables, conduits, and cable trays*

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Here are some of the standard test methods covered by the previous applications;

CAN/ULC-S101 = Fire Endurance Tests of Building Construction and Materials

CAN/ULC-S102 = Surface Burning Characteristics of Building Materials

UL 1489 = Standard for Fire Tests of Fire-Resistant Pipe Protection Systems Carrying Combustible Liquids

UL 1887 = Fire Test of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics

UL 2196 = Standard for Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control, and Data Cables

ASTM E1725 = Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems for Electrical System Components

ASTM E2336 = Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems

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Insulating Materials

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Grease and air duct blankets, dryer wraps, kitchen exhaust wraps and, combustible piping wraps are all excellent insulators.

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Endothermic Materials

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Endothermic wraps do more than simply place a barrier between heat or fire and critical electrical and fire control systems.

These foil faced wraps are designed to release chemically bound water in the presence of extreme heat. The wrap dissipates heat by converting chemically bound water to steam, which helps reduce the rate of temperature rise to protect and delay failure of critical electrical and fire control systems.

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What is the most common endothermic product in construction?

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Today we're going to focus on circuit integrity and fuel-line protection

ASTM E1725 = Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems for Electrical System Components

UL 1489 = Standard for Fire Tests of Fire-Resistant Pipe Protection Systems Carrying Combustible Liquids

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ASTM E1725

Standard Test Methods for Fire-Resistive Barrier Systems for Electrical System Component

ASTM E1725 test methods evaluate the ability of a fire-resistive barrier to inhibit thermal transmission to the electrical system component within.

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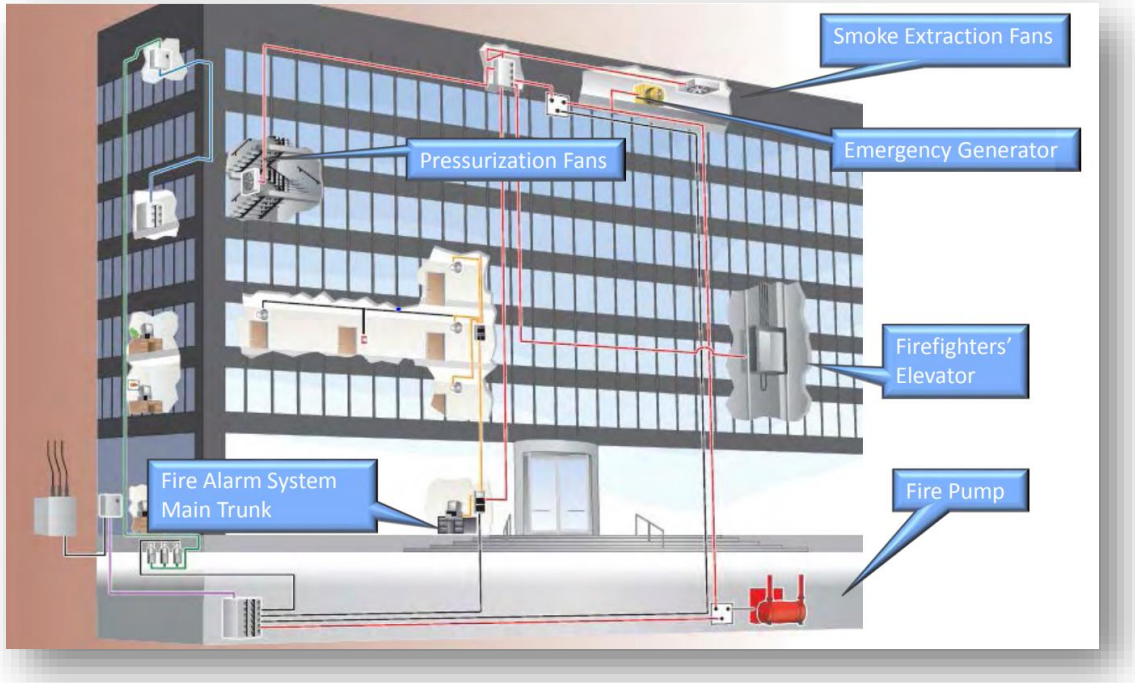
Some examples of applications that falls within the scope of **ASTM E1725**;

- *Building Alarms*
- *Fire Pump Feeders*
- *Signaling Equipment*
- *Egress Elevators*
- *Emergency Responder Communications Systems (ERCES)*
- *Distributed Antenna Systems (DAS)*
- *Life Safety Ventilation Fans*
- *Control Rooms & Process Control Equipment*
- *Other Required Safety Systems*



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What Alternative Methods Are Permitted?

CIRCUIT INTEGRITY PROTECTION METHOD	Must be tested to ASTM E1725	Should be tested to ASTM E1725
Embedding Conduits In Concrete	**No**	**Probably Not**
Enclosing Conduits In Gypsum Board Soffits Or Boxes	**No**	**Yes**
Traditional Protective Wrap Products (I.E. Ceramic Air And Grease Duct Blankets)	**Yes**	**Yes**
Endothermic Wrap Products	**Yes**	**Yes**

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UL 1489

Standard for Fire Tests of Fire-Resistant Pipe Protection Systems Carrying Combustible Liquids

Local building codes require fuel lines feeding emergency generators and fire pump drivers within buildings to be protected for 2 hours. This ensures the fuel pipe system will maintain its integrity in the event of fire. To address this, UL has published a new test to evaluate protection of materials and systems: UL 1489.

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Some examples of applications that falls within the scope of **UL 1489**;

- *Combustible liquids*
- *Diesel fuel supply piping*
- *Heating oil piping*

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Who manufacturers “Endothermic Wrap” ?

STI Firestop E-Wrap
Endothermic Wrap

3M™ Interam Endothermic Mat

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What does “Endothermic Wrap” look like ?

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Special considerations when installing or inspecting Endothermic Wrap applications

- Make sure the design meets the appropriate test standard & required rating

System No. 7 *continued*

A. **Electrical Circuit Protective Materials* – Mat Wrap** – Nominal 0.4 in. (10 mm) thick flexible sheet material supplied in 24 in. (610 mm) wide rolls. Each layer of mat wrap installed by cutting to size and wrapping around the conduit and itself such that a minimum 2 in. (51 mm) overlap is present along the longitudinal seam. With the exception of the final layer of mat wrap, adjacent lengths of mat wrap in each layer to be installed with tightly-butted end seams. Successive layers of mat wrap installed in same manner with butted end seams offset minimum 2 in. (51 mm) from butted end seams of preceding layer. For final layer of mat wrap, adjacent lengths of mat wrap to overlap the preceding length a minimum of 2 in. (51 mm). All seams in each layer of mat wrap to be sealed with foil tape (Item 5B). Mat wrap layers secured in place with stainless steel banding straps (Item 5D). The hourly fire rating of the electrical circuit protective system is dependent upon the nom diameter of the conduit system and the number of mat wrap layers installed, as shown in the following table:

Nom Conduit Diam In. (mm)	Min Layers Required	Hr Fire Rating
2 - 4-1/2 (51 - 114)	3	1
5 - 6 (127 - 152)	2	1
2 - 6 (51 - 152)	5	3

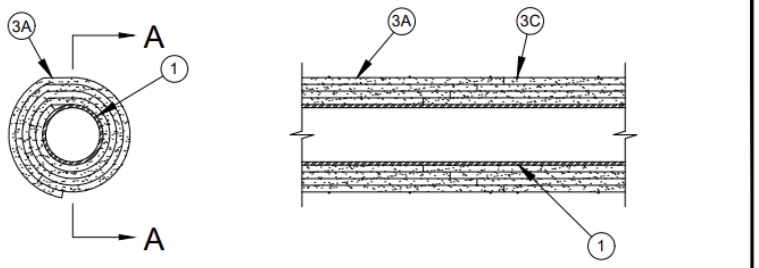
3M COMPANY – Types E-5A-4, E-54A, E-54C

B. **Foil Tape** – (Not Shown) – 4 in. (102 mm) wide min 3 mil (0.08 mm) thick pressure-sensitive aluminum foil tape or min 3 mil (0.08 mm) thick stainless steel foil tape, supplied in rolls. Used to secure seams of mat wrap (Item 5A).

C. **Stainless Steel Mesh** – (Not Shown) – Woven stainless steel wire mesh, supplied in 42 in. (1.1 m) wide rolls. Stainless steel mesh tightly wrapped around outermost layer of mat wrap and secured in place with steel banding straps (Item 5D) spaced maximum 8 in. (203 mm) OC. Stainless steel mesh not required for 3 Hr rated system.

Classified by
Underwriters Laboratories, Inc.
to UL 1489

System No. FP-3
*Fire Resistance Rating - 2 Hr



Section A-A

1. **Fuel Pipe Assembly -** Nom 1 in. (25 mm) Max 4 in. (102 mm) diam Schedule 40 (or heavier) steel pipe. All fittings shall be welded.
2. **Pipe Supports -** (Not Shown) - Pipe shall be supported by steel pipe hangers in conjunction with min 3/8 in. (10 mm) diameter threaded steel rod. Refer to the manufacturer's installation instructions for additional details.
3. **Fire-resistant Pipe-protection System* -** The fire-resistant pipe-protection system consists of a wrap, foil tape, steel tie wire and caulk. The system shall be installed in accordance with the detailed installation instruction

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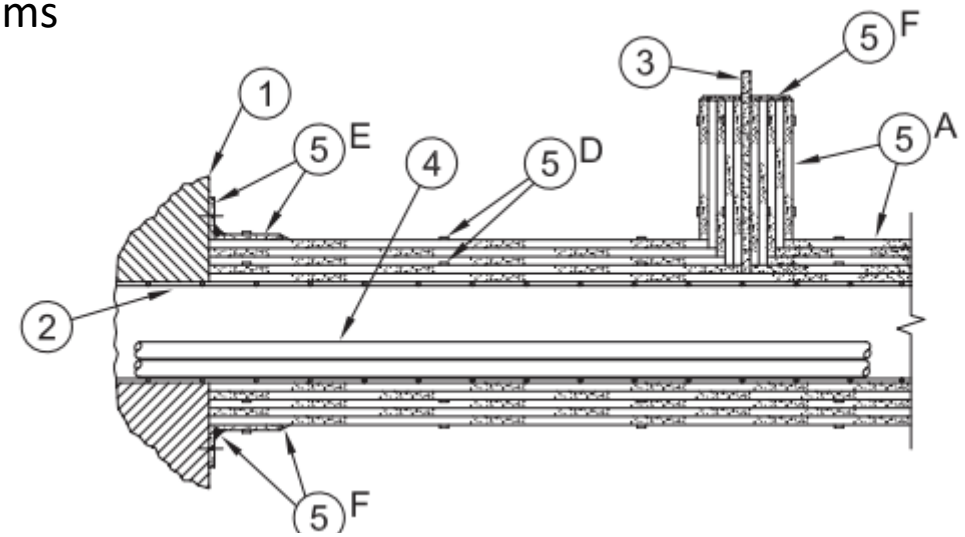
Special considerations when installing or inspecting Endothermic Wrap applications

- Supporting strut and rod protected as well
- Firestop Sealant applied at butted seams and support ends
- Some systems allow for telescoping overlaps, eliminating the need for sealant
- Some listings require stainless steel banding and others allow for steel tie wire



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Treating Head of Wall Applications

How to Avoid This Common Firestop Deficiency

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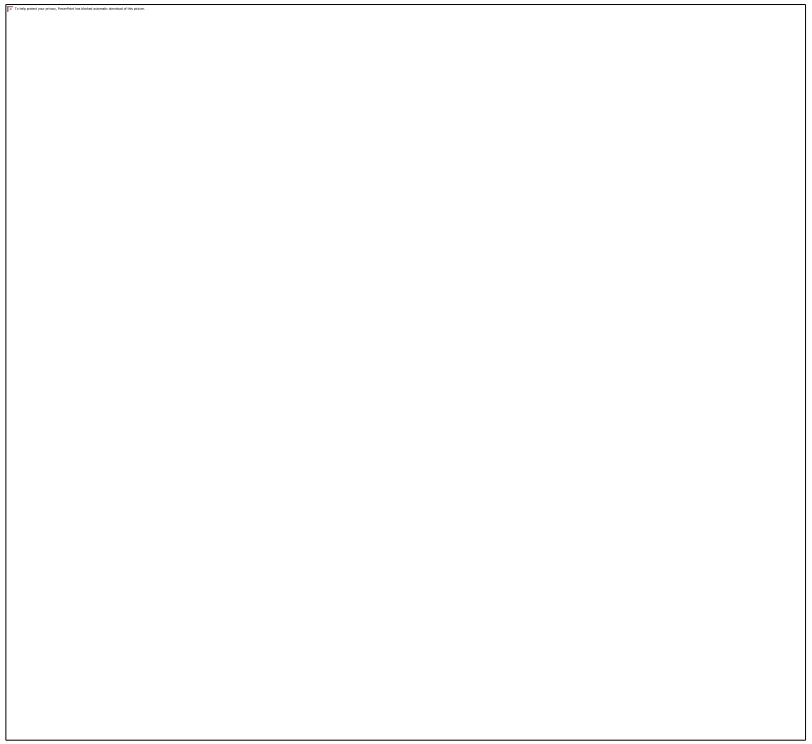
HW-D Applications

Treating Head of Wall applications using spray applied coatings for gypsum walls is one of the most common applications for fire rated construction joints.

Elastomeric Spray can make fast work of this process and cover a lot of ground quickly as well as provide excellent movement capabilities.



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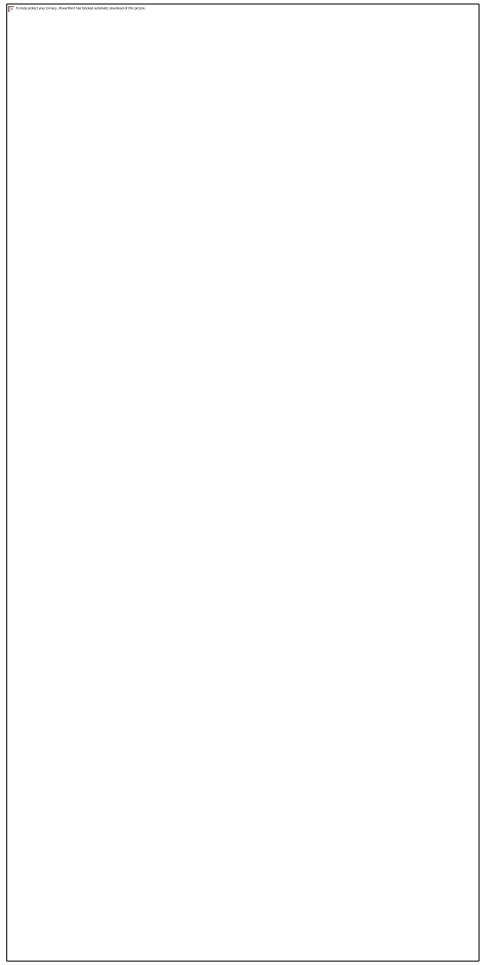
HW-D Applications

The typical installation of the framing is the top track is mechanically attached to the underside of the deck, then the studs are typically cut 1/2” to 3/4" short and are nested in the top track or slotted track and the gypsum is held down from the bottom of the deck.

This allows clearance for the top track and gypsum to compress and extend as the floor moves.



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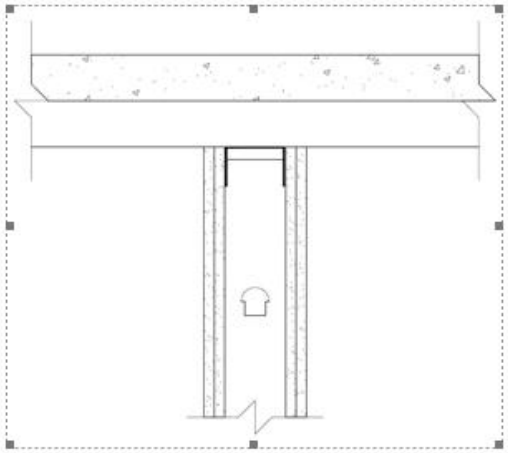
HW-D Applications

Maintaining the proper joint area when installing the gypsum board is important to allow proper installation of mineral wool or pre-formed mineral wool strips (Ex:1) as well as allowing for movement.

Installing the gypsum board with a very small joint or even tight to the deck (Ex:2) makes it almost impossible to install mineral wool correctly in the joint and does not allow for the required movement.

(Ex:1)



(Ex:2)

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HW-D Applications

When the mineral wool filler strips are not installed or improperly installed, the installer will correct the deficit by filling up the joint with additional firestop spray resulting in a condition which doesn't allow for movement.

Applying more material and trying to fix the issue in this manner will not result in a compliant firestop system.

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Questions?

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