RMW Architecture & Interiors

C505

Fireproofing I Firestopping

RMW T3FireProtection

Gloria Rasmussen AIA

May 4, 2017

Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

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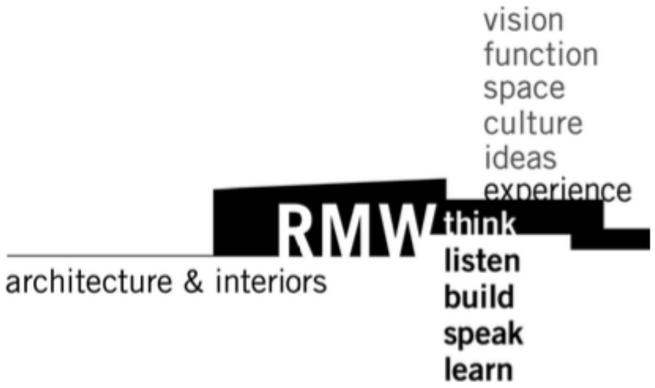

Course Description

The contents of the course are as follows:

- Fire Proofing and Firestopping: Definition and general requirements, testing, fire resistance designs, documentation, engineering judgements, certified installers, special inspections.
- Applied Fireproofing: Sprayed Fire Applied (SFRM) Materials and Intumescent Fireproofing; available products, “product beware,” installation procedures, code issues.
- Penetration Firestopping and Joint Firestopping: Uses, products, documentation, installation requirements, code issues.

Learning Objectives

At the end of the this course, participants will be able to:

1. Understand the terms “fireproofing” and “firestopping”.
2. Be aware of the fire protection testing requirements, conditions for use, technical characteristics, special inspections, use of certified installers, fire protection materials testings and designs, engineering judgements, quality management of the installations, and general documentation.
3. Be familiar with the two types of applied fireproofing materials: SFRMs and intumescent fireproofing, the available products, their specification and documentation.
4. Be familiar with the two types of fire toppling materials: penetration firestopping and joint firestopping, the available products, their specification and documentation.

FIREPROOFING I FIRESTOPPING

MODULE T3 - AIA Registered Presentation -

FIREPROOFING I FIRESTOPPING

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DEFINITIONS

- FIREPROOFING -Protection of structural members to ensure structural integrity in the event of fire.
- FIRESTOPPING - Stoping fire from moving from one side of a rated assembly to the other.

- These methods of protection are considered “PASSIVE”.
- Other methods like fire sprinklers and automatic doors are considered “ACTIVE”.

FIREPROOFING

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DEFINITION

FIREPROOFING -The use of fire-resistant materials for the protection of structural members to ensure structural integrity in the event of fire.

- FIREPROOFING TYPES:
  - Sprayed Fire-Resistive Materials (SFRM).
  - Intumescent Fireproofing.
  - Board Fireproofing.

- The purpose of delaying failure of the structural steel framing is to allow enough time for the occupants to evacuate the building.

Dictionary of Construction

FIREPROOFING I GENERAL

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THE FIRST THING TO DO: DETERMINE THE HOURLY FIRE RESISTANCES FOR THE PROJECT

- The length of time that the structural elements of a building have to remain protected from fire damage (hourly fire resistance) is mandated by the CBC and the AHJ for each project.
- The period of time required depends on different factors which vary with each projects.

FIREPROOFING I GENERAL

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THE SECOND THING TO DO: SELECT THE FIRE PROTECTION ASSEMBLIES

- Fireproofing manufacturers have developed assemblies to use in different conditions. These assemblies have been tested by UL and are published in the "*UL Fire Resistance Directory*" as "Fire-Resistance Designs".
    - Check out UL's "Ultimate Fire Wizard" to locate assemblies.

FIREPROOFING I GENERAL

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BXUV - Fire Resistance Ratings - ANSI/UL 263

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

Design No. S701

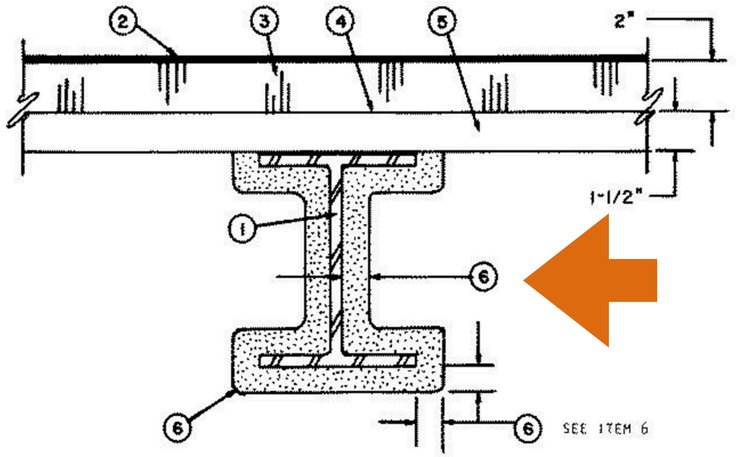
August 17, 2015

Restrained Beam Ratings — 1, 1-1/2, 2, 3 and 4 Hr.

Unrestrained Beam Ratings — 1 , 1-1/2, 2, 3 and 4 Hr.

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Steel Beam —** W6 x 16, W8 x 18 or W8 x 28 min size (see Item 6).

2. **Roof Covering* —** Consisting of hot mopped, cold application or single-ply materials, compatible with insulation(s) described herein which provide Class A, B or C coverings. See Roofing Materials and Systems Directory-Roof Covering Materials (TEVT).

3. **Mineral and Fiber Boards* —** 24 by 48 in. boards applied in single or multiple layers. Boards secured to steel roof deck units and previous layer of insulation, if multiple layers are used, with adhesive.

BMCA INSULATION PRODUCTS INC

JOHNS MANVILLE

4. **Adhesive* —** Applied to steel roof deck units in 6 in. wide ribbons approx 6 in. OC at 0.4 gal/100 sq ft.

See **Adhesives** (BYWR) category for names of manufacturers.

5. **Steel Roof Deck —** (Unclassified) — Fluted, 24 MSG, galv, 1-1/2 in. deep with 3-1/2 in. wide flutes spaced 6 in. OC and 30 in. overall width. Ends overlapped at supports a min 1-1/2 in. and welded to supports, max 12 in. OC. Adjacent units button-punched or welded together at midspan along side joints.

6. **Sprayed Fireproofing —**

UL FIRE RESISTANCE DESIGNS

- The UL fire-resistance designs show the products used, the installation details, and the method of applications.

- These assemblies have to be installed EXACTLY as shown; any deviations have to be approved by the AHJ and the manufacturer’s certified engineer, who issues a document with the changes, signed and stamped, called an “Engineering Judgement.”

The designs can be generic or proprietary.

FIREPROOFING I GENERAL

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REDUCE RISK - MAKE IT EASY

- The best way to determine the correct fireproofing assemblies for your project is to call the manufacturer rep and ask.
- If possible, keep only one manufacturer throughout the project.
    - Our basis of design products are Monokote by Grace, and products by Cafco.

FIREPROOFING I GENERAL

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DOCUMENTING FIRE PROOFING

- If the permitting authority asks for UL designs or you need to know the thicknesses, ask the product manufacturer for this information, which can go in the Specs OR on the Drawings.

    - If you document thicknesses or UL designs on the Drawings, you can make a mistake, or you might need to change them in the future, so be very, very careful.

    - If the manufacturer is substituted, the representative of the new manufacturer has to provide you with the same type of info as applicable to the new products; the changes need to be documented.

FIREPROOFING I GENERAL

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CERTIFIED INSTALLERS

- The thickness and consistency of the applied material application is crucial to the performance of the fireproofing in case of fire. Therefore, the installers need to be qualified by UL (passed an examination) and approved by the product manufacturer.

    - Check that the documentation that certifies tact the applicator is submitted by the contractor.

FIREPROOFING I GENERAL

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SPECIAL INSPECTION

- Installations of fireproofing and firestopping require SPECIAL INSPECTIONS by code.

- DEFINITION: “Inspection of construction requiring the expertise of an approved special inspector in order to ensure compliance with the CBC and the approved construction documents” (CBC Chapter 2)
  - The special inspector can be present all the time or intermittently when and where the work is being performed.

FIREPROOFING I FIRESTOPPING

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WHAT ARE THEY

- These products (SFRM) are cementitious mixes applied directly to the structural steel components of the building, typically by spraying. Their thickness is measured in inches.

- They work by insulating the steel from fire for enough time to delay structural failure and allow the occupants to evacuate the building.

SFRM - SPRAYED FIRE -RESISTIVE MATERIALS

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HOW MUCH, WHERE, and HOW

- These products (SFRM) are expensive.
- How and where are used in the project depends on several things, including the location of the steel in the building (such as height), the size and shape of the steel, etc.
- Sustainability: SFRM have little or no VOCs.

SFRM - SPRAYED FIRE -RESISTIVE MATERIALS

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HOW MUCH, WHERE, and HOW

- When talking to the rep, discuss the location in the building where the fireproofing is needed (plenum spaces, under decks, at elevator shafts and mechanical rooms, etc.), so vibrations, air movement, adjacent construction, and others conditions that can affect the performance or durability of the material are considered.

    - Discuss steel primers and topcoats, and if they should be allowed.

SFRM - SPRAYED FIRE -RESISTIVE MATERIALS

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USING LATH

- If the thickness or the field conditions are such that the material is too heavy or the installation does not allow direct application over the steel, metal lath similar to the one used for stucco, is used to help support the fireproofing.

    - When necessary, fireproofing is applied with trowels or other tools.

SFRM - SPRAYED FIRE -RESISTIVE MATERIALS

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CAN SFRMs BE USED OUTSIDE?

- Intumescent coatings can be used ONLY inside the building (protected) unless the design is approved for exterior use (very rare).

CAN SFRMs BE PAINTED?

- Yes, provided both the SFRM manufacturer and the paint product manufacturer agree on the proposed paint product.

INTUMESCENT FIREPROOFING

MODULE T3 - AIA Registered Presentation

WHAT ARE THEY

- Intumescent fireproofing products are applied directly to the structural steel components of the building in layers much thiner that SFRM products. Their thickness is measured in mils, like paints, but they are thicker than paints.

- They work by swelling with heat to protect the steel from fire and delaying failure.

INTUMESCENT FIREPROOFING

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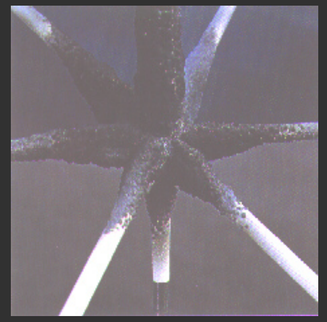

WHAT THEY ARE NOT

- There are two types of intumescent products: Fire-resistive and fire retardant coatings.

- **Fire-resistive coating** ARE FIREPROOFING. They are tested and they work as such.
- **Fire-retardant coatings** ARE NOT FIREPROOFING, and cannot be used as such. They are tested only for flame-spread and some-develop indexes.

Be very careful when selecting a product or talking to a representative!!!!!

INTUMESCENT FIREPROOFING

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INTERIOR AND EXTERIOR USES

- Intumescent coatings can be used outside or inside the building. They are intended to be left exposed.

INTUMESCENT COATINGS BE PAINTED?

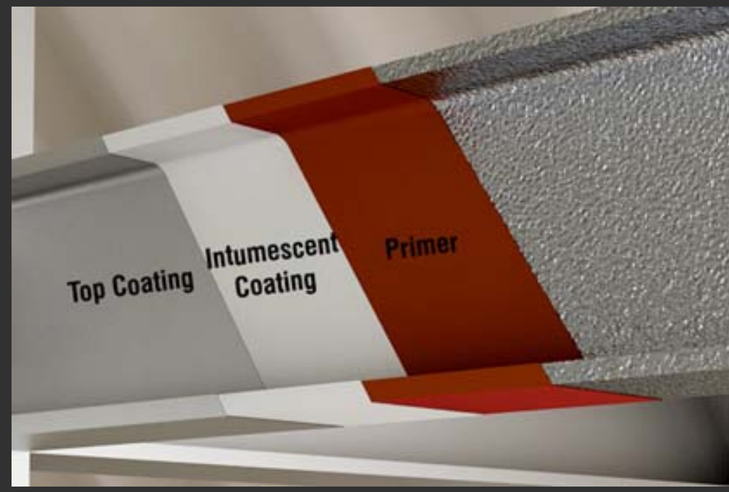
- Yes, provided both the intumescent coating manufacturer and the paint product manufacturer agree on the proposed paint product.

INTUMESCENT FIREPROOFING

MODULE T3 - AIA Registered Presentation

CONSIDERATIONS

- Because intumescent fireproofing works by expanding to protect the steel, you need to consider clearance around the protected item to accommodate for the expansion.
- Compatibility with top coats, steel primers, and surface preparation needs to be researched.
- Intumescent coatings can be applied by roller, spray, or brush.
- Intumescent coatings have a dried surface with orange-peel texture and they are more expensive than SFRMs.



INTUMESCENT FIREPROOFING

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- Our basis of design product for intumescent coatings is ALBI.
- The Moscone Center is all fireproofed with Albi.

FIRESTOPPING

MODULE T3 - AIA Registered Presentation

DEFINITION

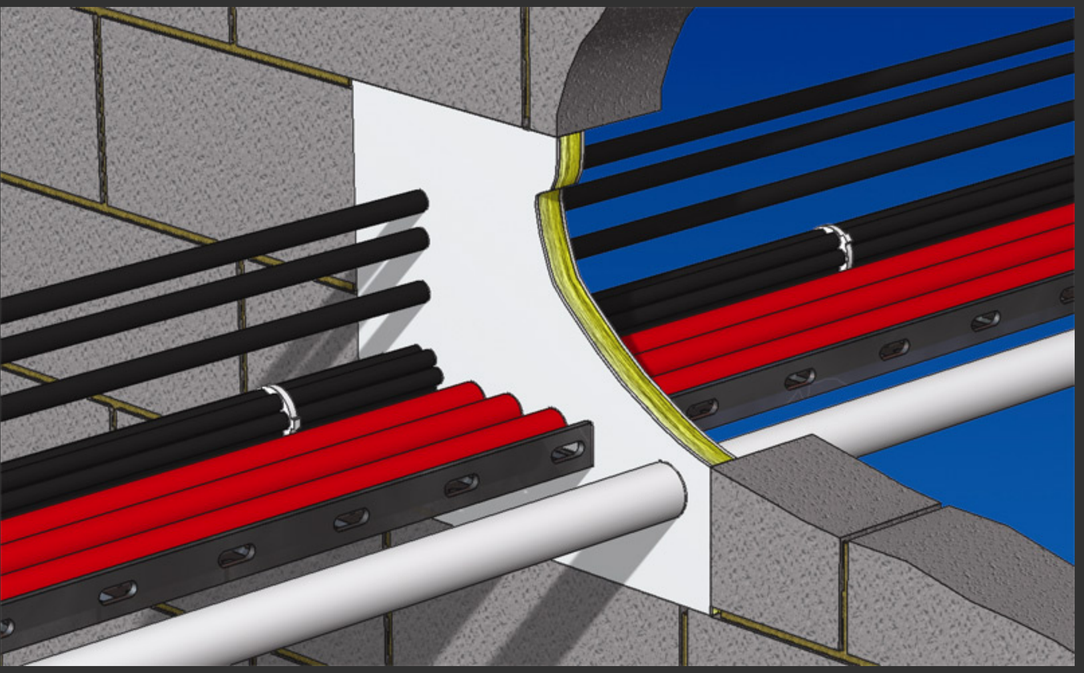
- FIRESTOPPING -The use of fire-resistant materials used to prevent fire from passing through, or by, fire-rated assemblies.
- FIRESTOPPING TYPES:
  - Penetration Firestopping.
  - Joint Firestopping.

- The purpose fire stopping is to contain fire within a space protected by rated assemblies.

Dictionary of Construction

PENETRATION FIRESTOPPING

MODULE T3 - AIA Registered Presentation



WHAT IS IT?

- PENETRATION FIRESTOPPING are systems for sealing penetrations in rated horizontal and vertical assemblies and smoke barriers.

- When pipes, cables, and other items penetrate fire rated assemblies, firestopping is required to fill-in the “annular space” which is the gap between the assembly and the penetrating items. Penetration firestopping is also used to seal empty openings.

PENETRATION FIRESTOPPING

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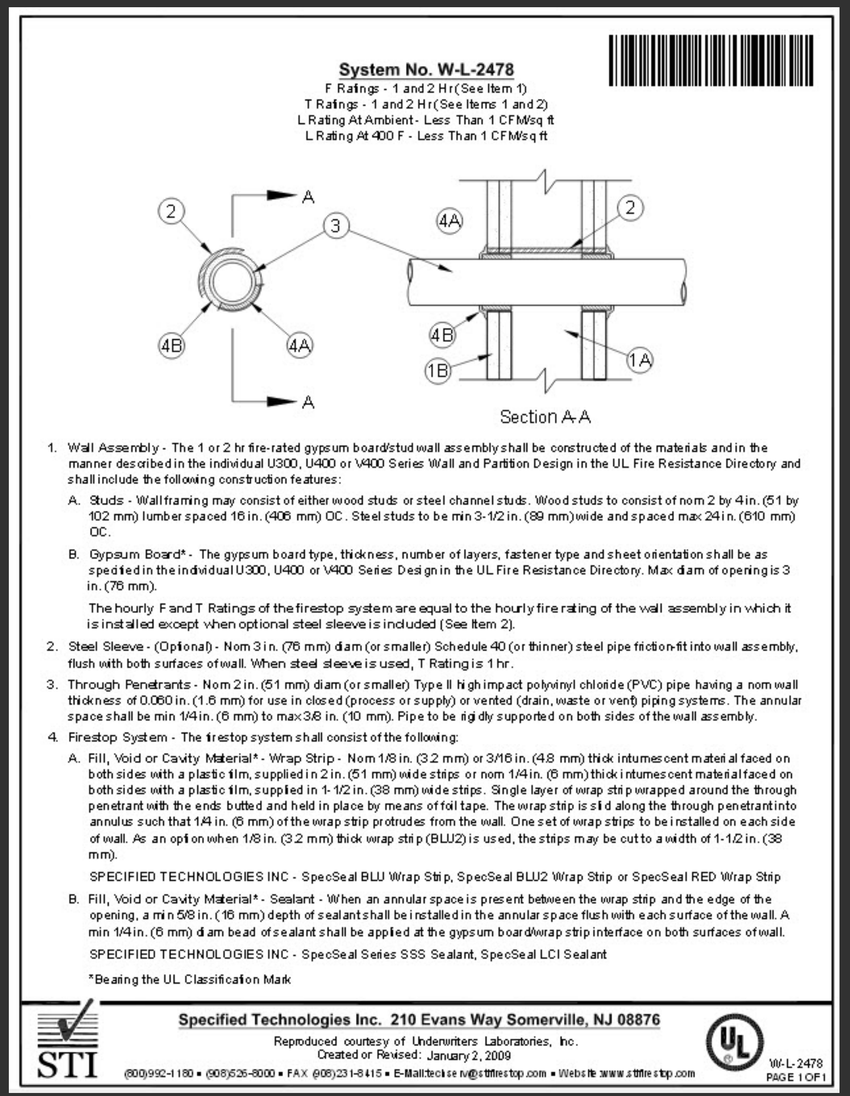

System No. W-L-2478

F Ratings - 1 and 2 Hr (See Item 1)
T Ratings - 1 and 2 Hr (See Items 1 and 2)
L Rating At Ambient - Less Than 1 CFM/sq ft
L Rating At 400 F - Less Than 1 CFM/sq ft

Section A-A

1. Wall Assembly - The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300, U400 or V400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

   A. Studs - Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC.

   B. Gypsum Board* - The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300, U400 or V400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 3 in. (76 mm).

   The hourly F and T Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed except when optional steel sleeve is included (See Item 2).

2. Steel Sleeve - (Optional) - Nom 3 in. (76 mm) diam (or smaller) Schedule 40 (or thinner) steel pipe friction-fit into wall assembly, flush with both surfaces of wall. When steel sleeve is used, T Rating is 1 hr.

3. Through Penetrants - Nom 2 in. (51 mm) diam (or smaller) Type II high impact polyvinyl chloride (PVC) pipe having a nom wall thickness of 0.060 in. (1.6 mm) for use in closed (process or supply) or vented (drain, waste or vent) piping systems. The annular space shall be min 1/4 in. (6 mm) to max 3/8 in. (10 mm). Pipe to be rigidly supported on both sides of the wall assembly.

4. Firestop System - The firestop system shall consist of the following:

   A. Fill, Void or Cavity Material* - Wrap Strip - Nom 1/8 in. (3.2 mm) or 3/16 in. (4.8 mm) thick intumescent material faced on both sides with a plastic film, supplied in 2 in. (51 mm) wide strips or nom 1/4 in. (6 mm) thick intumescent material faced on both sides with a plastic film, supplied in 1-1/2 in. (38 mm) wide strips. Single layer of wrap strip wrapped around the through penetrant with the ends butted and held in place by means of foil tape. The wrap strip is slid along the through penetrant into annulus such that 1/4 in. (6 mm) of the wrap strip protrudes from the wall. One set of wrap strips to be installed on each side of wall. As an option when 1/8 in. (3.2 mm) thick wrap strip (BLU2) is used, the strips may be cut to a width of 1-1/2 in. (38 mm).

   SPECIFIED TECHNOLOGIES INC - SpecSeal BLU Wrap Strip, SpecSeal BLU2 Wrap Strip or SpecSeal RED Wrap Strip

   B. Fill, Void or Cavity Material* - Sealant - When an annular space is present between the wrap strip and the edge of the opening, a min 5/8 in. (16 mm) depth of sealant shall be installed in the annular space flush with each surface of the wall. A min 1/4 in. (6 mm) diam bead of sealant shall be applied at the gypsum board/wrap strip interface on both surfaces of wall.

   SPECIFIED TECHNOLOGIES INC - SpecSeal Series SSS Sealant, SpecSeal LCI Sealant

   *Bearing the UL Classification Mark

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W-L-2478
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APPROVED ASSEMBLIES

- Manufacturers of penetration firestopping like the manufacturers of fireproofing test their assemblies, which have to be installed exactly as shown in the UL design.

PENETRATION FIRESTOPPING

MODULE T3 - AIA Registered Presentation

INSTALLATION

- Penetration fireproofing can be installed as an assembly for a group of penetrating items of for one item only.

PENETRATION FIRESTOPPING

MODULE T3 - AIA Registered Presentation

Products

- Literally hundreds for all kinds of applications.

This is Hilti, our basis of design manufacturer.

PENETRATION FIRESTOPPING

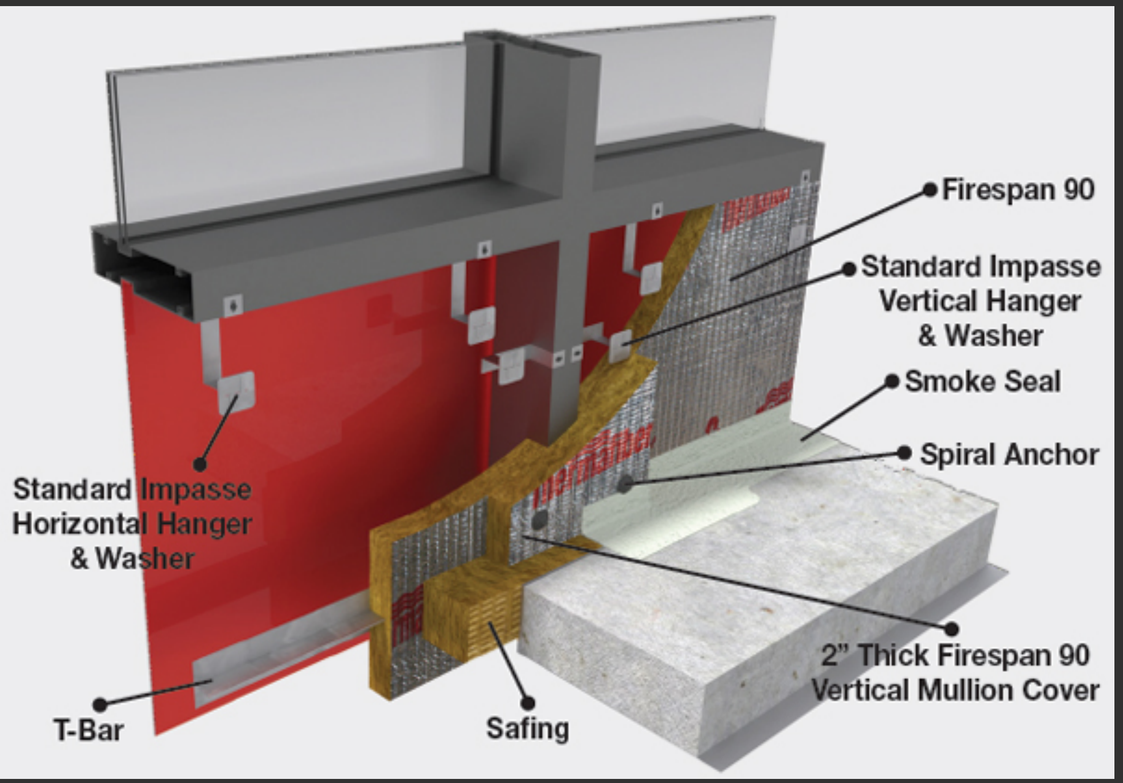
MODULE T3 - AIA Registered Presentation

WHAT TO DO

- Document only those penetrations that the permitting authority requires on the Drawings, such as the detail of the electrical boxes.
- The location of other penetrations is not know until the time of construction, so certified installers identify the penetrations, select the appropriate assemblies and install them.
- Fire stopping penetrations are always identified so that workers do not damage them accidentally.

JOINT FIRESTOPPING

MODULE T3 - AIA Registered Presentation



WHAT IS IT?

- JOINT FIRESTOPPING are systems for sealing penetrations in joints at rated and smoke barriers assemblies, for example:
  - Joints at heads of rated partitions.
  - Joints between edge of slab and building envelope.

JOINT FIRESTOPPING

MODULE T3 - AIA Registered Presentation

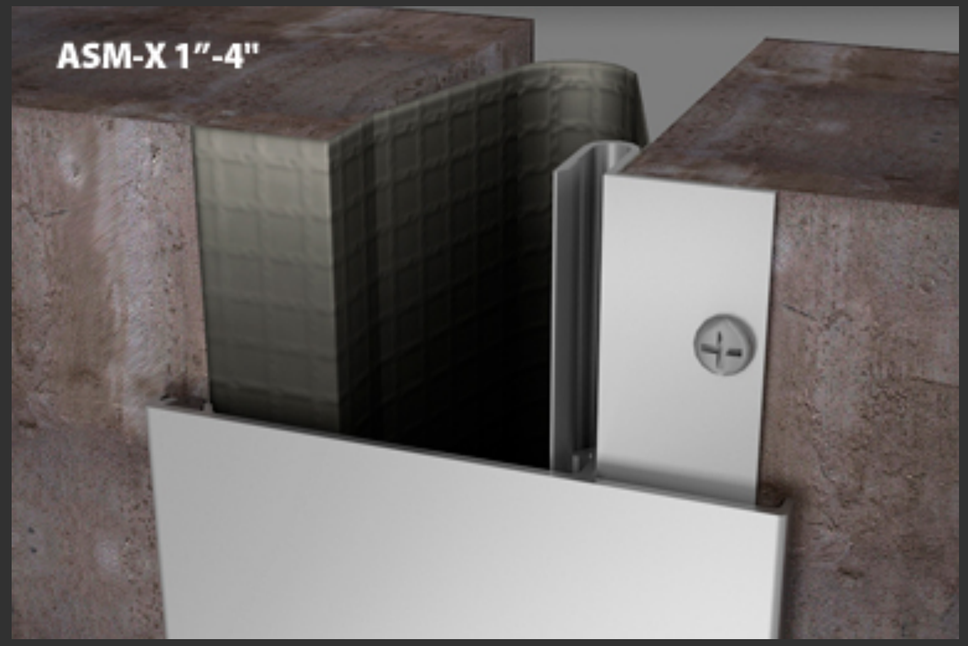
WHAT ARE THEY FOR?

JOINT FIRESTOPPING function is to stop fire from traveling where there is a joint between rated systems. Some examples are:

- Top of wall or partition and slab.
- Edge of slab at building envelope.
- Building to building.
- Rated units (tilt-up panels)
- Roof to roof or roof to wall.
- Shaft walls.

JOINT FIRESTOPPING

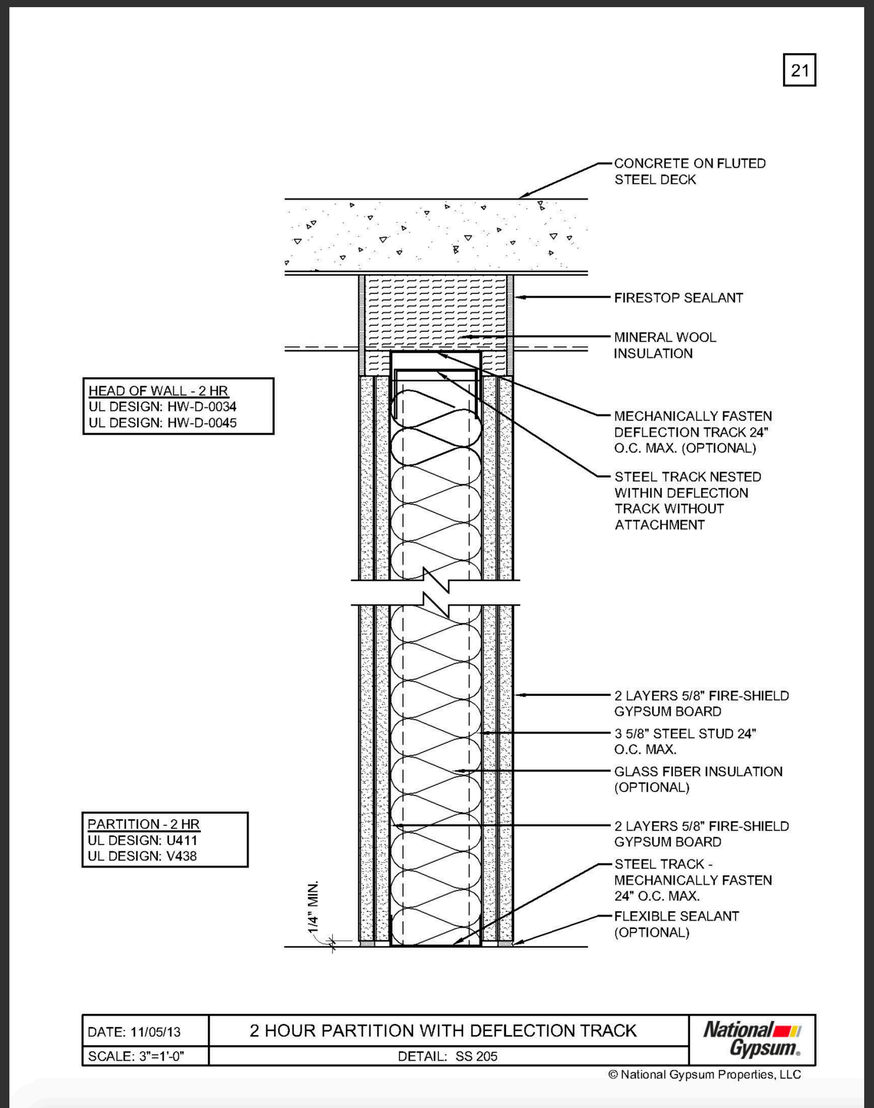
MODULE T3 - AIA Registered Presentation



- There are many products to seal fire joints, either firestopping joints that are put together in the field, or pre-fabricated units.

JOINT FIRESTOPPING

MODULE T3 - AIA Registered Presentation

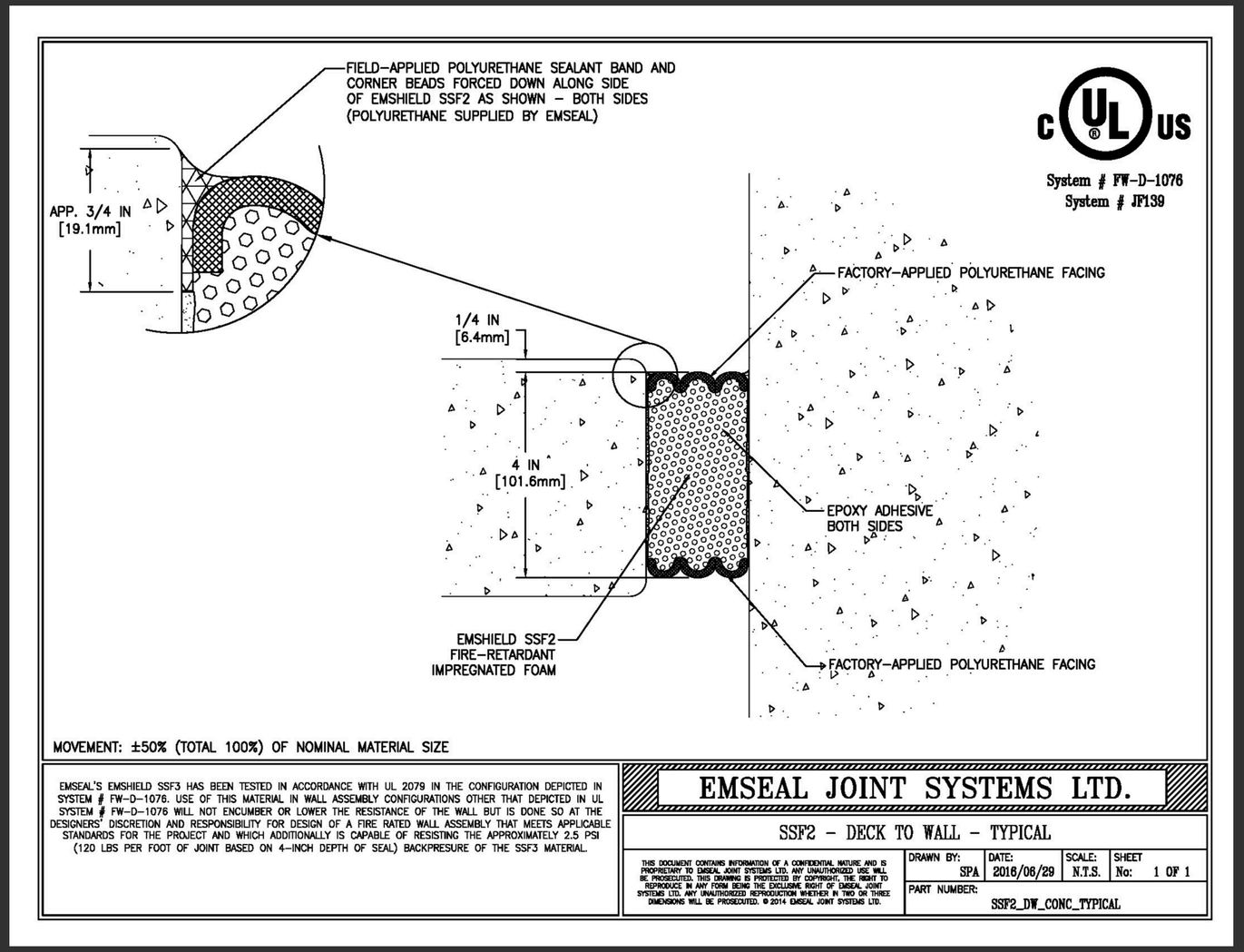


TOP OF PARTITION

- Manufacturers of joint firestopping or other products test and list their assemblies, which have to be installed exactly as shown in the UL design.
- Rated partition head. Proprietary.

JOINT FIRESTOPPING

MODULE T3 - AIA Registered Presentation



EDGE SLAB

- Deck to wall joint sealed using a pre-fabricated joint firestopping seal. Proprietary.

JOINT FIRESTOPPING

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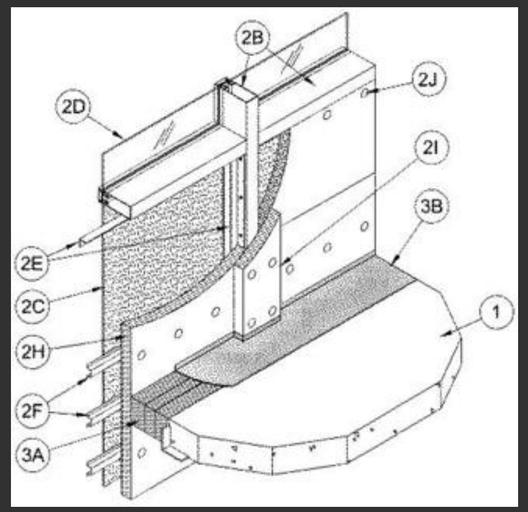
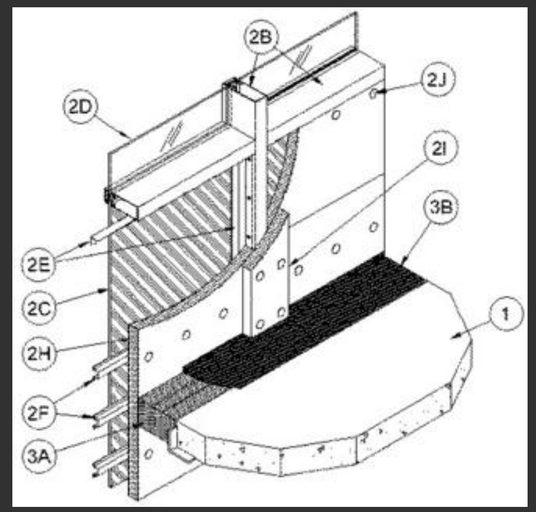
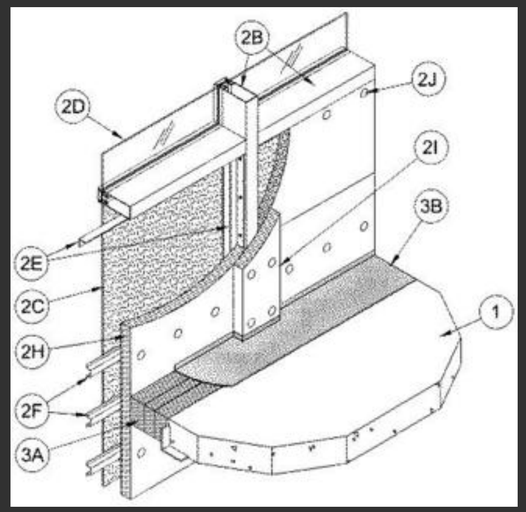
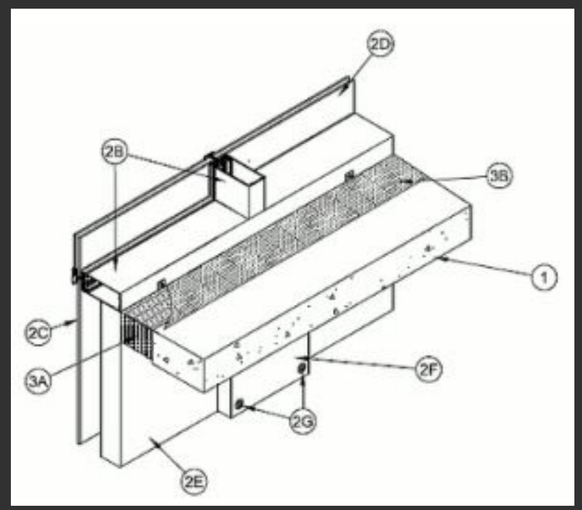






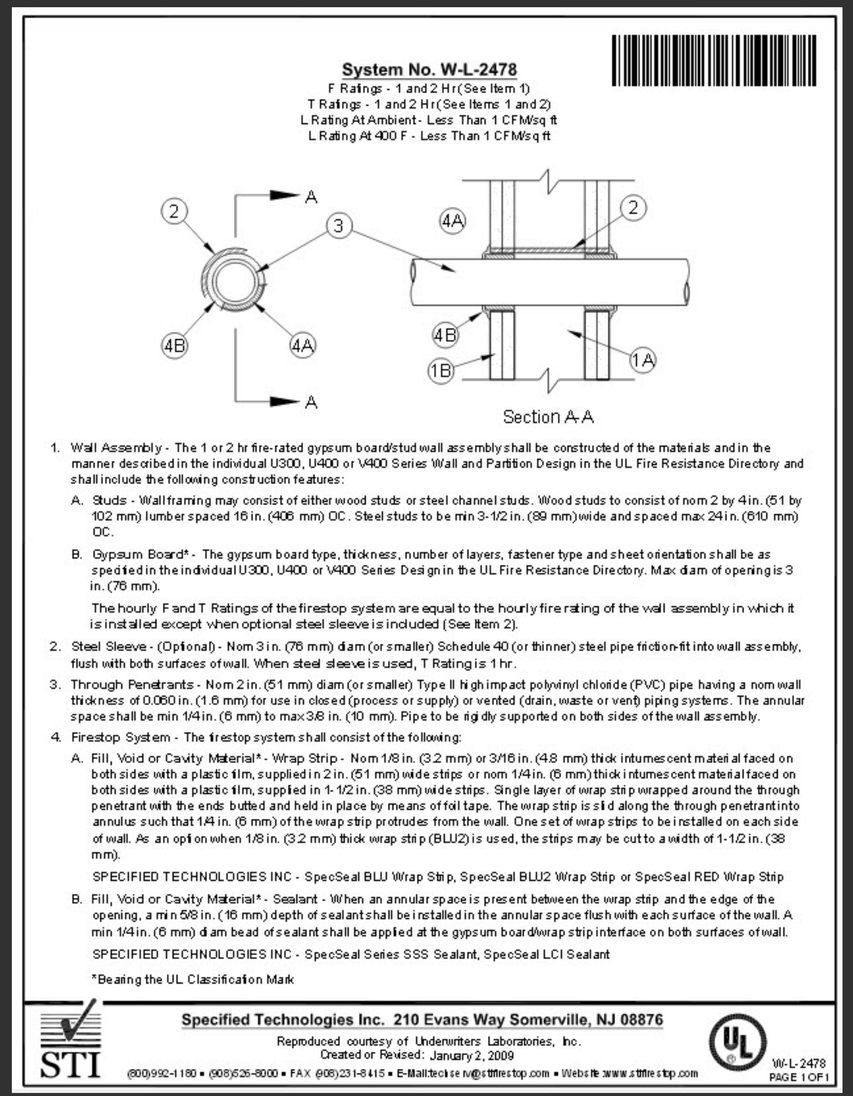


EDGE SLAB

- The design variables are:
  - Exterior finish.
  - Slab construction.
  - Joint width.
  - Hourly rating.

JOINT FIRESTOPPING

MODULE T3 - AIA Registered Presentation



System No. W-L-2478

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Section A-A

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3. Through Penetrants - Nom 2 in. (51 mm) diam (or smaller) Type II high impact polyvinyl chloride (PVC) pipe having a nom wall thickness of 0.060 in. (1.6 mm) for use in closed (process or supply) or vented (drain, waste or vent) piping systems. The annular space shall be min 1/4 in. (6 mm) to max 3/8 in. (10 mm). Pipe to be rigidly supported on both sides of the wall assembly.
4. Firestop System - The firestop system shall consist of the following:
   A. Fill, Void or Cavity Material* - Wrap Strip - Nom 1/8 in. (3.2 mm) or 3/16 in. (4.8 mm) thick intumescent material faced on both sides with a plastic film, supplied in 2 in. (51 mm) wide strips or nom 1/4 in. (6 mm) thick intumescent material faced on both sides with a plastic film, supplied in 1-1/2 in. (38 mm) wide strips. Single layer of wrap strip wrapped around the through penetrant with the ends butted and held in place by means of foil tape. The wrap strip is slid along the through penetrant into annulus such that 1/4 in. (6 mm) of the wrap strip protrudes from the wall. One set of wrap strips to be installed on each side of wall. As an option when 1/8 in. (3.2 mm) thick wrap strip (BLW2) is used, the strips may be cut to a width of 1-1/2 in. (38 mm).

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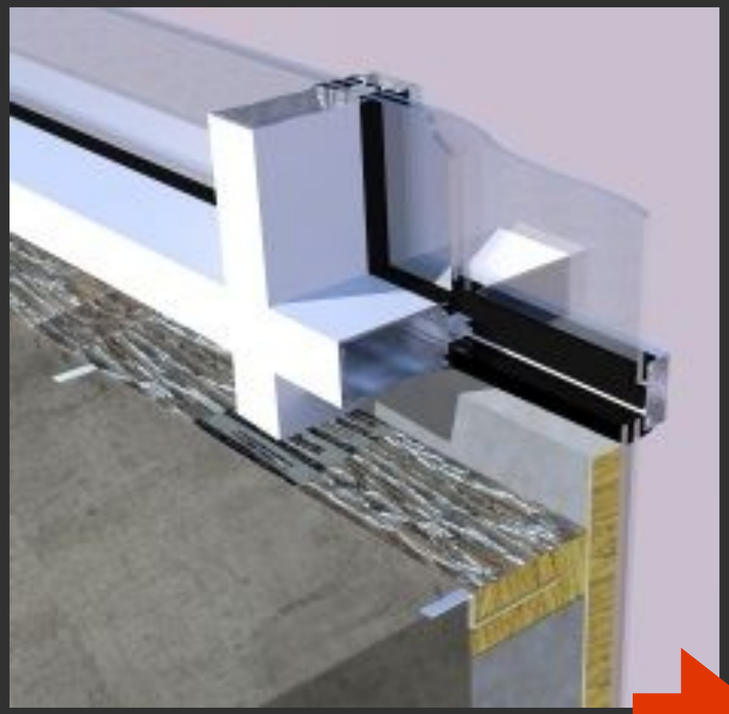
APPROVED ASSEMBLIES

- Manufacturers of joint firestopping also test and list their assemblies, which have to be installed exactly as shown in the UL design.
- These designs are included in the Specs and are selected by the manufacturer’s engineer for each project. Please do not draw them; it is best to show the location only and schedule them, so they can be referenced in the specs.

JOINT FIRESTOPPING

MODULE T3 - AIA Registered Presentation



documenting WHAT TO DO

- Document only joint fireproofing that the permitting authority requires on the Drawings.
- Preferably, do not draw joint fireproofing, too risky. Show location (for example using a rectangle) and schedule the joint so they can be referenced in the specs.
- To select the applicable joint fireproofing assembly, call Dante at Tremco or Anje at Hilti. They will send you the design, or if necessary, the engineering judgement.

THANK YOU!