



ENCLOSURE SOLUTIONS TECHNICAL BULLETIN

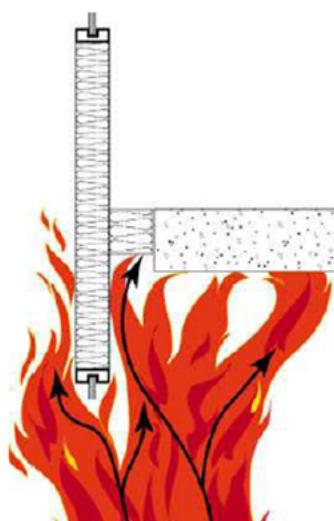
THERMAFIBER® IMPASSE® ZERO SPANDREL PERIMETER FIRE CONTAINMENT SYSTEM

PERIMETER FIRE CONTAINMENT

Perimeter fire containment systems are designed to prevent fire and hot gases from entering the room above the room of origin through voids that exist at the intersection of a rated floor assembly and a non-rated exterior wall. An unprotected void at the edge of the slab potentially creates a pathway for fire and/or smoke to spread from floor to floor in a building. Although such joints are often small, 2 to 3 inches wide, a building with a footprint size of 200 feet by 200 feet (800 lineal feet), of unprotected joint 3 inches wide, creates 200 square feet of open area along the perimeter that will allow smoke and hot gases to flow freely from floor to floor. Fire can also pass through voids or combustible materials in the curtain wall itself. Given that the condition exists at each floor, the potential for fire and smoke spread is significant. The Owens Corning® Enclosure Solutions Thermafiber® Impasse® Zero Spandrel Perimeter Fire Containment System, a patent-pending perimeter fire containment system, has all of the products and details necessary to design and construct aluminum-framed curtain wall perimeter fire containment systems in accordance with ASTM E2307 and the International Building Code (IBC)¹ to prevent fire from spreading from floor to floor.



Unprotected Perimeter Joint



Protected with a Perimeter Fire Containment System

INTERNATIONAL BUILDING CODE (IBC)

The 2021 IBC, Section 715.4, requires approved perimeter fire containment systems at the intersection of the non-rated exterior curtain wall and fire-resistance-rated floor assemblies. Although local codes may vary, generally, fire-resistance-rated floor/ceiling assemblies are required in construction types I-A, I-B, II-A, III-A, and V-A. Perimeter fire containment systems must be tested in accordance with ASTM E2307 and provide an “F-rating” for a time period at least equal to the fire resistance rating of the floor/ceiling assembly. The Owens Corning® Enclosure Solutions Thermafiber® Impasse® Zero Spandrel Perimeter Fire Containment System will serve any typical building situation with an F-rating of up to 3 hours.¹ Even when the floor/ceiling assembly is not required to be fire resistance rated, Section 715.5 still requires that the joint be sealed with an approved material or system, such as Owens Corning® Thermafiber® Safing and FireSpan® insulations, to retard the interior spread of fire and hot gases between stories.

There is an exception in IBC 715.4 that states:

Exception:

Voids created at the intersection of the exterior curtain wall assemblies and such floor assemblies **where the vision glass extends to the finished floor level shall be permitted to be sealed with an approved material designed to prevent the interior spread of fire**. Such material shall be securely installed and capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste where **subjected to ASTM E119 time-temperature fire conditions** under a minimum positive pressure differential of 0.01 inch (0.254 mm) of water column (2.5 Pa) **for the time period equal to the fire resistance rating of the floor assembly**.

DIFFERENCES BETWEEN TEST METHODOLOGIES

It is often thought that the exception can be used in lieu of a tested and listed system tested to ASTM E2307.

Curtain wall designs that feature either short spandrels or no spandrels at all (only vision glass) are becoming more popular. Until recently, these designs presented a special problem for firestopping. The E119 exception was used to address vision glass extending to the finished floor level. It provided a method for addressing the interior void by sealing it with an approved material tested to ASTM E119. However, materials have to be capable of staying in place and preventing fire spread through the safe-off area for the time period equal to the fire resistance rating of the floor assembly. The E119 test method hasn’t proven its ability to properly evaluate an interior joint when a non-rated exterior wall is part of the assembly.

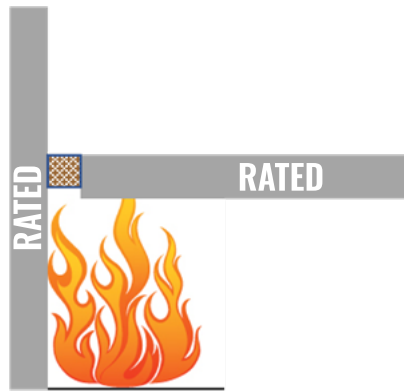
Designers and firestopping installers should always utilize a system that has been tested to ASTM E2307 since this test more closely represents the conditions of a real fire. ASTM E2307 exposes the assembly to fire on both sides at the same time for the 2- or 3-hour period of the fire test. In contrast, ASTM E119 exposes fire to only one side of the system and does not represent an expected fire scenario in a high-rise building.

During a fire, the exterior curtain wall is subjected to direct flame exposure and high temperatures that will trigger several failure points in the non-rated exterior wall assembly. During a fire, temperatures can exceed 1,800°F. At around 1,200°F, and nine minutes into a fire, aluminum framing and its components melt. If the ASTM E119 exception in the IBC is followed, installing mineral wool safing only, the assembly is afforded about nine minutes of fire protection at the joint.

If mineral wool safing is installed between the floor and spandrel or vision glass, this will afford you about five minutes of protection. These scenarios don't allow occupants the time they need to evacuate a burning building.

At the time this exception was adopted into the code, there were no tested and listed systems with either all vision glass or vision glass extending down to the floor level that had been tested to ASTM E2307. However, today there are zero spandrel systems tested and listed in the Intertek® Laboratory Fire Resistance Directory.

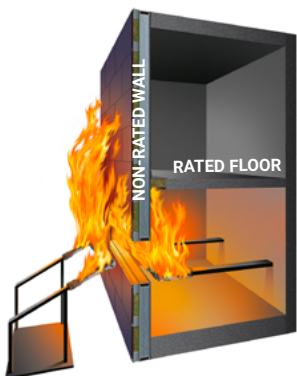
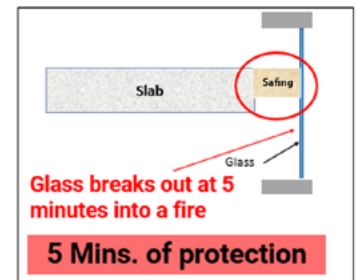
A short spandrel condition is typically a spandrel that is 20 inches or less in height. Exterior curtain wall designs have been trending away from spandrel walls to all vision glass, mostly for aesthetic purposes, to offer unobstructed views and increased natural lighting into the interior space. Typically, zero spandrel systems do not include an intermediate or lower horizontal transom; therefore, these all-vision glass designs create a challenging scenario when it comes to protecting a portion of the exterior wall and maintaining a fire barrier at the perimeter floor edge, as required by code. An all-vision glass design also presents challenges when it comes to camouflaging the insulation from exterior view. Often, opacified or tinted glass and even shadow boxes, which offer an enclosed space behind clear spandrel glass, can be used to hide the floor slab, insulation, and other construction components.



ASTM E119 exposes assembly to fire from one side only.



ASTM E119 Vertical Furnace



ASTM E2307 fire test with exposure on both sides.

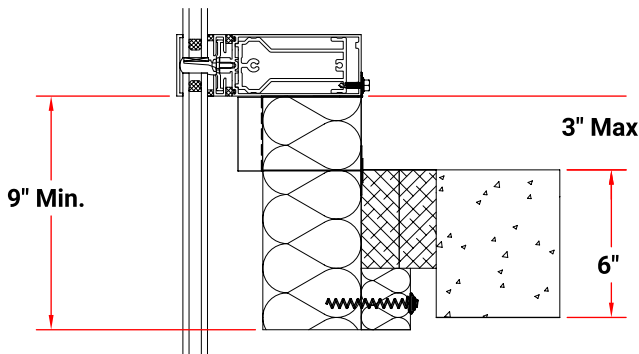
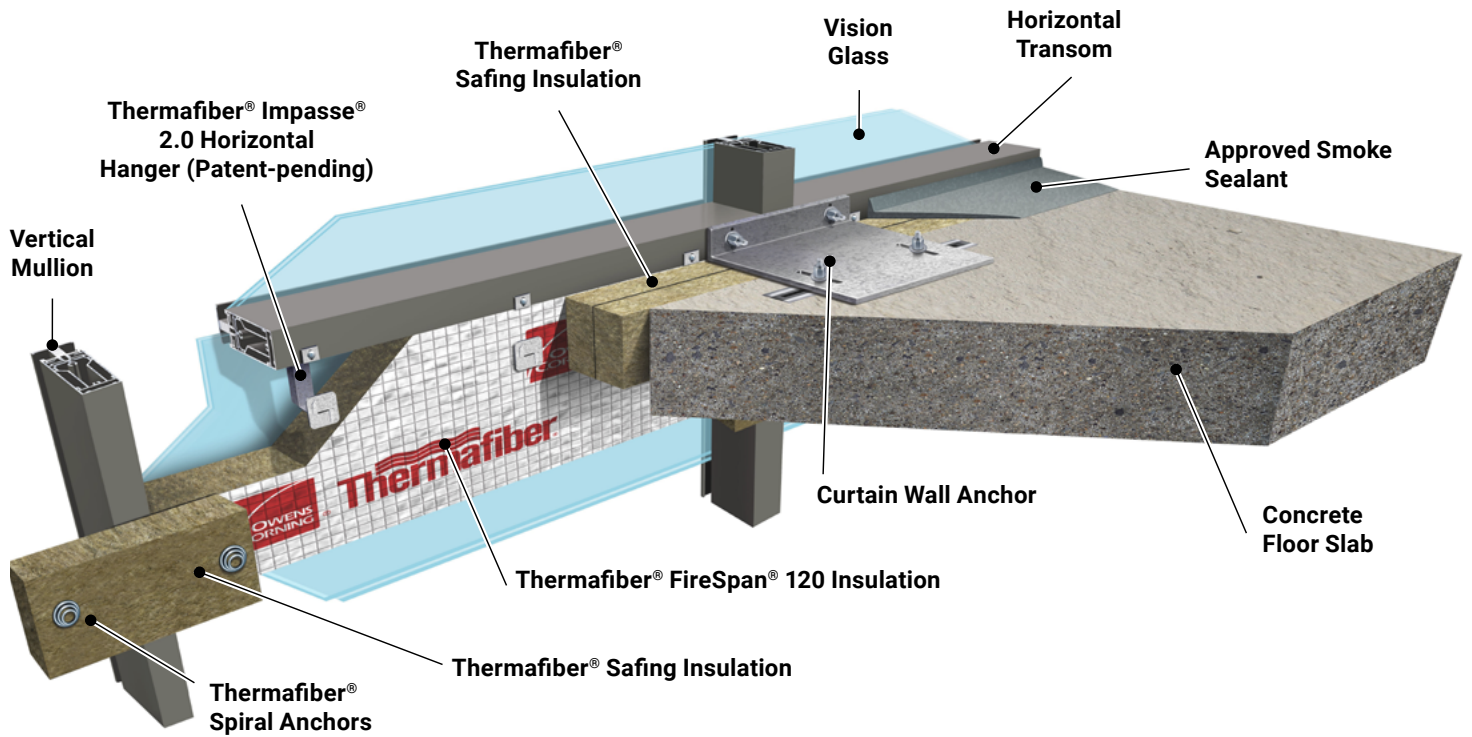


ASTM E2307 intermediate scale, multi-story, test furnace, and the test wall frame used to hold the test wall and perimeter fire containment system.



ASTM E2307 room and exterior window burner fire exposure.

OWENS CORNING® THERMAFIBER® ZERO SPANDREL PERIMETER FIRE CONTAINMENT SYSTEM



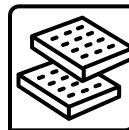
Key Features



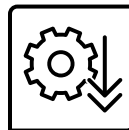
Provides up to 3 hours¹ of fire containment in curtain wall systems.



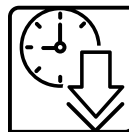
ASTM E2307 tested and listed system through Intertek®.



Thermafiber® FireSpan® 120 insulation can be easily fabricated to fit around various types of curtain wall anchors and provides the same reinforcement characteristics as a steel back pan at a lesser cost.²



Patented Thermafiber® Impasse® 2.0 Hangers are heavier-duty³ and enable easier attachment around various curtain wall anchors as compared to existing zero spandrel systems.²



Easier installation for both field and shop installed curtain walls over current available zero spandrel systems.²

¹ As tested to ASTM E2307. Reference Intertek® design listings: TFI/BPF 180-07 (3-hour F rating) and TFI/BPF 120-15 (2-hour F rating).

² Based on comparison done with available competitive zero spandrel systems.

³ Heavier gauge steel than standard Thermafiber® Impasse® Hangers.

Design Notes:

1. Perimeter fire containment systems are specific constructions consisting of a floor with an hourly fire endurance rating and an exterior wall typically with no hourly rating. The perimeter fire containment system consists of protecting the spandrel area and joint material installed in the void between the floor and the wall. The hourly rating applies only to the complete system. Individual components are not assigned a rating and are not to be interchanged between systems.
2. Section 715.4 of the 2021 IBC requires an “approved” perimeter fire containment system tested in accordance with ASTM E2307. Every building has unique design details that may not exactly match the system details published. The IBC recognizes that there may be variations per individual buildings that may require adjustment via engineering judgments. Engineering judgments are based on testing, data from similar perimeter fire containment system tests, or other evidence and third-party engineering judgments that the proposed system meets the basic design principles necessary for providing a perimeter fire containment system. These basic design principles include:
 - Mechanical attachment of minimum 3-inch-thick Owens Corning® Thermafiber® FireSpan® 120 Curtain Wall Insulation with patented Owens Corning® Thermafiber® Impasse® 2.0 Hangers, attached per the requirements of the specific tested design.
 - Typically, a backer/reinforcement member (min. 20 gauge, galvanized steel T-Bar, hat channel, or L-angle, depending on the requirements of the tested design) is required at the floor line behind the curtain wall insulation to keep it from bowing due to the compression-fit of the safing insulation. However, the Owens Corning® Thermafiber® Impasse® Zero Spandrel Perimeter Fire Containment System does not require a backer reinforcement member since the location of the horizontal transom, in combination with the Owens Corning® Thermafiber® Impasse® 2.0 Horizontal Hangers, provides the support necessary to keep the Owens Corning® Thermafiber® FireSpan® 120 insulation from bowing. Refer to the specific Intertek® design for details regarding the system requirements.
 - Compression-fit Owens Corning® Thermafiber® Safing Insulation within the safe-off void to create a tight seal that maintains its integrity, preventing the propagation of flame and hot gasses through the safe-off joint. Refer to the specific Intertek® design for the proper safing insulation installation method and compression requirements.
3. Protect exposed vertical aluminum mullions with Owens Corning® Thermafiber® Safing Mullion Protection. Thickness and width of mullion protection are outlined in the specific Intertek® design. Safing insulation to be 2.5 inches thick by 12 inches wide by a length that extends to the bottom of the FireSpan® 120. Mullion protection is attached with 3/4-inch spiral anchors every 12 inches o.c. max. This detail is required to protect the aluminum vertical framing. If left unprotected, the flame and temperature exposure of a fire will cause the framing to melt and cause the system to fail.
4. Apply any Intertek® certified sealant or tape that has been certified as a fill, void, or cavity material for perimeter fire barrier systems certified to ASTM E2307. If there are construction details required for use of smoke sealant materials, please contact Thermafiber Insolutions® for installation details at ThermafiberInsolutions@owenscorning.com.

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