



ENCLOSURE SOLUTIONS TECHNICAL BULLETIN — SS-04 STEEL STUD PERIMETER FIRE CONTAINMENT SYSTEM

ASTM E2307

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, consider that, for a building with a floor plate size of 200 by 200 feet, 800 lineal feet, an 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 for Steel Stud Perimeter Fire Containment System with Thermafiber® has all of the products and details necessary to design and construct steel stud perimeter fire containment systems in accordance with ASTM E2307 and the International Building Code¹ (IBC) to prevent fire from spreading from floor to floor.

INTERNATIONAL BUILDING CODE (IBC)

The 2018 or 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 when the floor/ceiling assembly is required to be fire resistance rated. 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 or determined via an engineering judgment 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. Perimeter fire containment systems will serve any typical building situation with an F-rating of up to two hours.

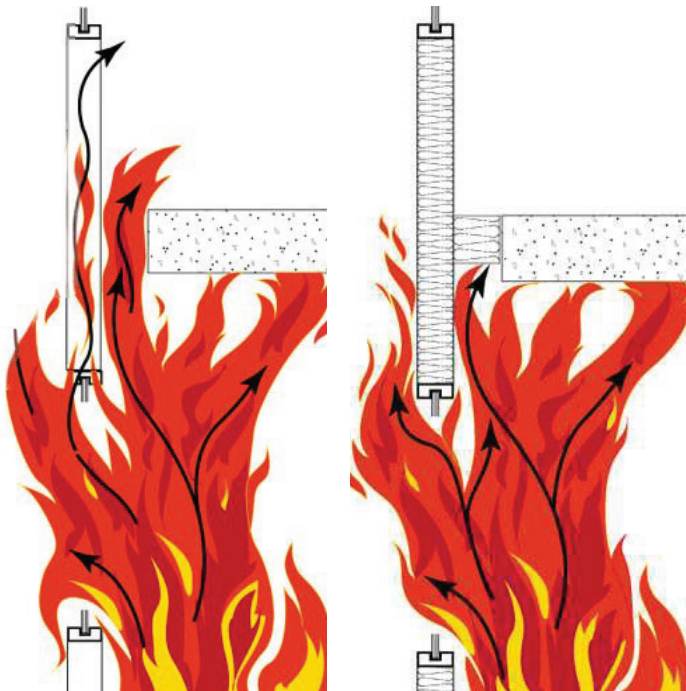
Even when the floor/ceiling assembly is not required to be fire resistance rated, Section 715.5 still requires that the joint be sealed with an approved material or system such as Owens Corning® Thermafiber® Safing and FireSpan® insulations to retard the interior spread of fire and hot gases between stories.

ASTM E2307

ASTM E2307² measures the ability of perimeter fire barrier systems to maintain a seal and prevent interior fire spread as the exterior wall assembly deflects/deforms during fire exposure. The ASTM E2307 test exposes the joint to fire from the room of fire origin, and the exterior wall to fire from both interior and the exterior as the fire plume exits the room of fire origin through a window opening. The fire exposure conditions used are outlined in the ASTM test methods for the first 30 minutes and then essentially parallel the ASTM E119³ time-temperature relationship for fire resistance. ASTM E2307 determines the period of time that the perimeter fire containment system will limit flame penetration through the opening between the exterior wall assembly and the floor assembly.

PERIMETER FIRE CONTAINMENT SYSTEM DESIGN

Section 715.4 of the 2021 IBC requires approved perimeter fire containment systems. Section 715.4.1 states that perimeter fire containment systems shall be tested in accordance with the requirements in ASTM E2307. Although exterior wall system designs vary significantly, the Owens Corning® Enclosure Solutions for Steel Stud Perimeter Fire Containment System with Thermafiber® is specific in its construction and has all of the products and details necessary to design and construct steel stud perimeter fire containment systems in accordance with ASTM E2307 and the International Building Code (IBC) when they are required. For complete details, see wall section Detail ES-SS-12.



Unprotected Perimeter Joint

Protected with a Perimeter Fire Containment System

OWENS CORNING® THERMAFIBER® STEEL-FRAMED PERIMETER FIRE CONTAINMENT SYSTEM



OWENS CORNING® THERMAFIBER®
FireSpan® 40 or 90 Insulation
(Refer to specific UL® design for
type of FireSpan® insulation)



OWENS CORNING® FOAMULAR® NGX
FOAMULAR® 250 Extruded Polystyrene
(XPS) Rigid Foam Insulation

AIR AND WATER BARRIER

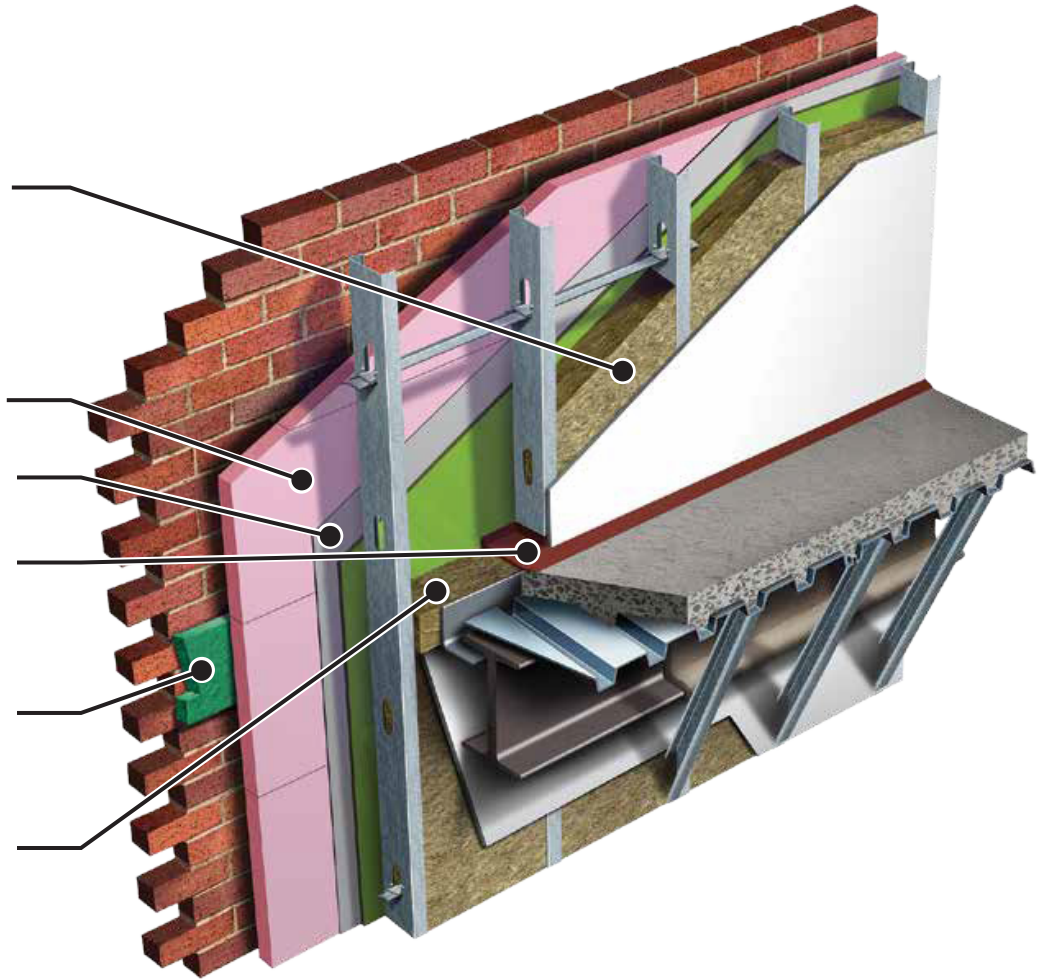
APPROVED SMOKE SEALANT



MORTAR DROPPINGS COLLECTION
DEVICE

(At each floorline)

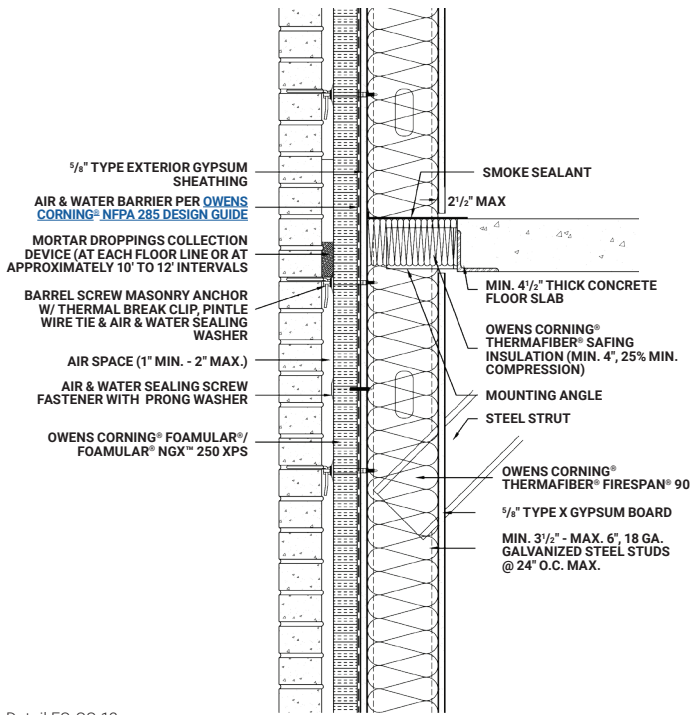
OWENS CORNING® THERMAFIBER®
Safing Insulation



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

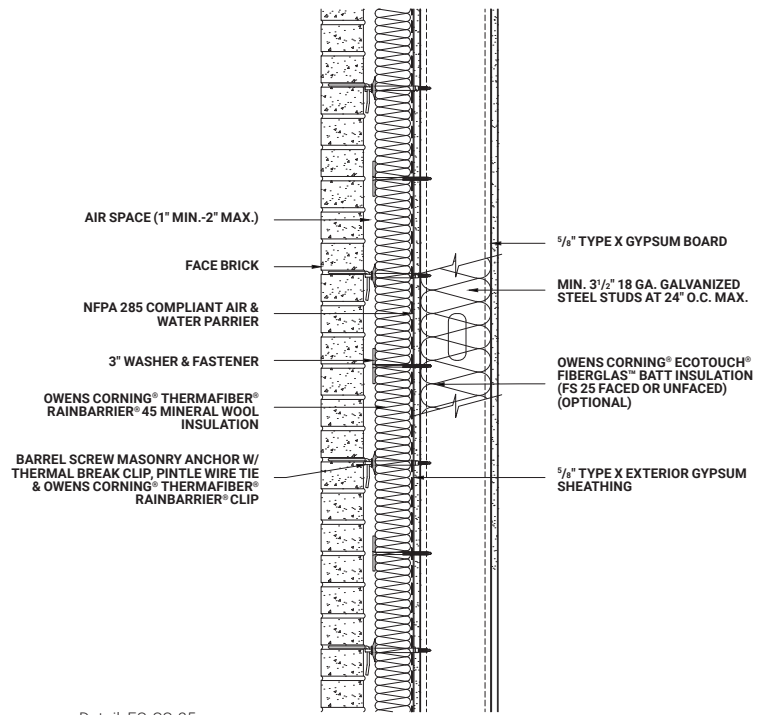


ASTM E2307 room and exterior window burner fire exposure.



Detail ES-SS-12

Owens Corning® Enclosure Solutions for Steel Stud Perimeter Fire Containment System with Thermafiber® and FOAMULAR® & FOAMULAR® NGX™



Detail: ES-SS-25

Owens Corning® Enclosure Solutions Steel Stud Perimeter Fire Containment System with Thermafiber® Rainbarrier® & Thermafiber® Safing

For additional job-specific details and accessory materials necessary to complete the Perimeter Fire Containment System and acceptable façades, please refer to the specific UL® design listing.

Design Notes:

1. Perimeter fire containment systems are specific constructions consisting of a floor with an hourly fire endurance rating, an exterior wall typically with no hourly rating, and joint material installed in the void between the floor and the wall. The hourly F rating applies only to the complete system. The perimeter fire containment system consists of protecting the exterior wall as well. The individual components are not assigned a rating and are not to be interchanged between systems (i.e., manufacturer's components from one system being used to replace another manufacturer's components in a separate system).
2. Section 715.4 of the 2021 IBC requires an "approved" perimeter fire containment system tested in accordance to 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 judgments⁴ and therefore enables "approval acceptable to the building official." Engineering judgments are typically 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 principles necessary for perimeter fire containment systems.
3. Install a reinforcing steel strut mounting angle from the floor edge to the stud framing in the safing area. Although that is a typical structural detail commonly used to secure the framing to the building structure, the stiffener in conjunction with the angled steel strut also reinforces the studs against bowing during fire exposure, and ensures that the compression fit of the Owens Corning® Thermafiber® Safing Insulation will be secure.
4. Owens Corning® Thermafiber® Safing Insulation is compression fit between the slab edge and the wall system. Compression of the Safing Insulation creates a tight seal that maintains its integrity, preventing flame and hot gases from breaching through to the floor above. Refer to the specific UL® design for depth, orientation, and compression requirements. Compression of the safing insulation creates a tight seal that maintains its integrity, preventing flame and hot gases from breaching through to the floor above.
5. Apply an approved smoke sealant to the top surface of the Safing Insulation to provide a smoke barrier. The smoke sealant is commonly spray applied to the top of the safing insulation (non-fire exposure side). Typically a 1-inch over spray is specified, extending the smoke seal onto the floor slab one side, and the gypsum board surface on the other, to create a continuous seal that impedes the passage of smoke.

References:

1. International Building Code; International Code Council, Inc.; 4051 West Flossmoor Road, Country Club Hills, IL 60478-5795.
2. ASTM E2307, Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-Story Test Apparatus; ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959.
3. ASTM E119-12a, Standard Test Methods for Fire Tests of Building Construction and Materials; ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959.
4. Engineering Analysis of Perimeter Fire Barrier System in the Owens Corning® Enclosure Solutions 19428-2959 Wall Assembly, Hai Project IAJP00135.000, June 2014, Hughes Associates, 3610 Commerce Drive, Suite 817, Baltimore, MD 21227.

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