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Fire Rated Expansion Joint Assembly Requirements

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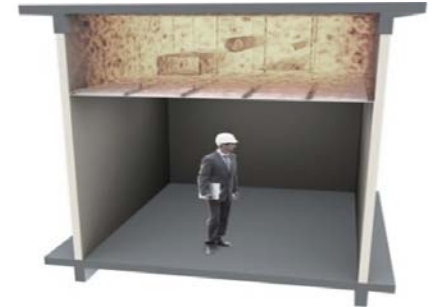
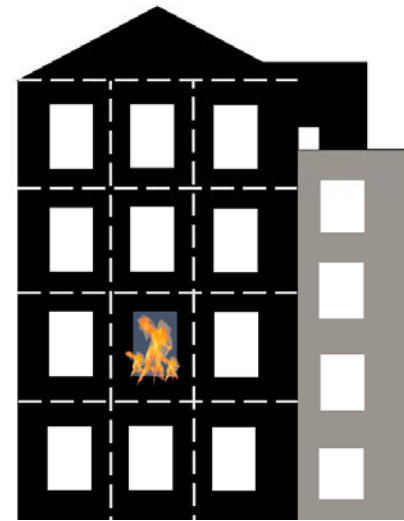
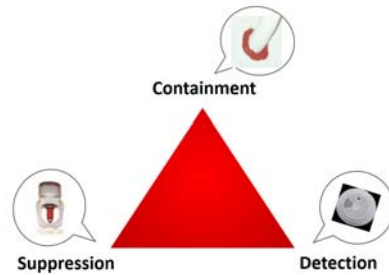


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Fire Barriers for Expansion Joints

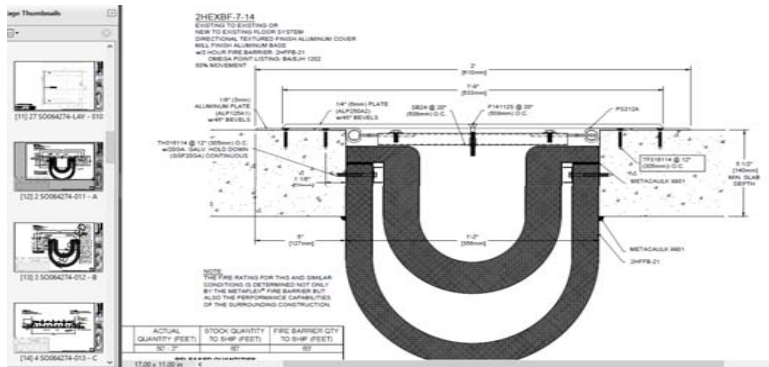


Balanced Fire Protection



The purpose of compartmentation is to contain the fire, smoke, and toxic gas in its area of origin as long as possible.

It's a globally applied principle for fire safety, life safety, and forms the fundamental principle of containment.



Learning Objectives

1. Learn from Building Code where Fire Barriers are required, and where they are not required in expansion joint assemblies.
2. Learn from Test Standards what the cover requirements are for fire barriers.
3. Learn from Specifications what types of fire barrier materials are available, and their applications.
4. Learn how to create a logical path to navigate the choices that are available.



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Learning from building Code where Fire Barriers are required, and where they are not required in expansion joint assemblies.

IBC Chapter 7 Fire and Smoke Protection Features. The provisions of Chapter 7 present the fundamental concepts of fire performance that all buildings are expected to achieve in some form. This chapter identifies...

IBC SECTION 715 FIRE-RESISTANT JOINT SYSTEMS

715.1 General.

Joints installed in or between fire-resistance rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies **shall be protected by an approved fire-resistant joint system designed to resist the passage of fire for a time period** not less than the required fire-resistance rating of the wall, floor or roof in or between which the system is installed.

Fire-resistant joint systems shall be tested in accordance with Section 715.3.



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Exception: Fire-resistant joint systems shall not be required for joints in all of the following locations:

1. Floors within a single dwelling unit.
2. Floors where the joint is protected by a shaft enclosure in accordance with Section 713.
3. Floors within atriums where the space adjacent to the atrium is included in the volume of the atrium for smoke control purposes.
4. Floors within malls.
5. **Floors and ramps within parking garages or structures constructed in accordance with Sections 406.5 and 406.6.**
 - a) **[406.5 Open parking garages.]**
 - b) **[406.6 Enclosed parking garages. 406.6.3 w/sprinkler system.]**
6. Mezzanine floors.
7. Walls that are permitted to have unprotected openings.
8. Roofs where openings are permitted.
9. Control joints not exceeding a maximum width of 0.625 inch (15.9 mm) and tested in accordance with ASTM E119 or UL 263.
10. The intersection of exterior curtain wall assemblies and the roof slab or roof deck.



EV firefighting is of particular interest in codes and standards committees, including fire test laboratories.

Learning from Test Standards what the cover requirements are for fire barriers.

System No. FF-D-1078
August 29, 2017

ANSI/UL2079	CAN/ULC 5115
Assembly Rating — 4 Hr	F Rating — 4 Hr
Nominal Joint Width — 2-1/2 in.	FT Rating — 4 Hr
Class II and III Movement Capabilities — 33% Compression and 66% Extension	FH Rating — 0 Hr
	FTH Rating — 0 Hr
	Nominal Joint Width — 64 mm
	Class II and III Movement Capabilities — 33% Compression and 66% Extension

- Floor Assembly** — Min 8 in. (203 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete.
- Joint System** — Max width of joint (at time of installation of joint system) is 2-1/2 in. (64 mm) The joint system is designed to accommodate a max 33 percent compression and 66 percent extension from it's installed width. The joint system shall consist of the following:
 - Mechanical Joint Assembly** — Flexible multiple layer mat and pillow installed in accordance with the installation instructions accompanying the units.

System No. FF-D-1116
September 30, 2013

ANSI/UL2079	CAN/ULC 5115
Assembly Rating — 2 Hr	
Nominal Joint Width — 2 - 4 in.	
Class II or III Movement Capabilities — 43 % Compression or 37 % Extension	
	Class II or III Movement Capabilities

Floor Assembly — Min 4-1/2- in. (152 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete.

Joint System — Nominal width of joint is 2 to 4 in. (50 to 102 mm). The joint system is designed to accommodate a max 43 percent compression or 37 percent extension from its installed width. The joint system shall consist of the following:

System No. WW-D-1019
February 04, 1999

Assembly Rating — 2 Hr
Nominal Joint Width — 6 in.

Class II and III Movement Capabilities — 50% Compression or Extension

1. Wall Assembly — The 2 hr fire rated framed gypsum wallboard wall assembly shall be constructed of the materials and in the manner specified in the individual U302 or U402 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:

intertek
Test Quality Assured

Division 07 - Thermal and Moisture Protection
07 95 00 Expansion Control

Balco Inc.
Design No. BA/TC 120-01
Floor Joint System
MetaFlex® Pro Fire Barrier and
MetaFlex® Pro Shear Fire Barrier
UL 2079, ASTM E1966
Rating: 2 Hour
UL 2079
I-Rating: +2 SFRM/UF
ASTM E1199
Cycling - Class IV

Figure 1. MetaFlex® Pro and MetaFlex® Pro Shear

Min. Joint Width	Max. Joint Width	Min. Joint Width	Max. Joint Width
3-1/2 in.	8 in.	5 in.	18 in.
5-1/2 in.	6 in.	6 in.	21 in.

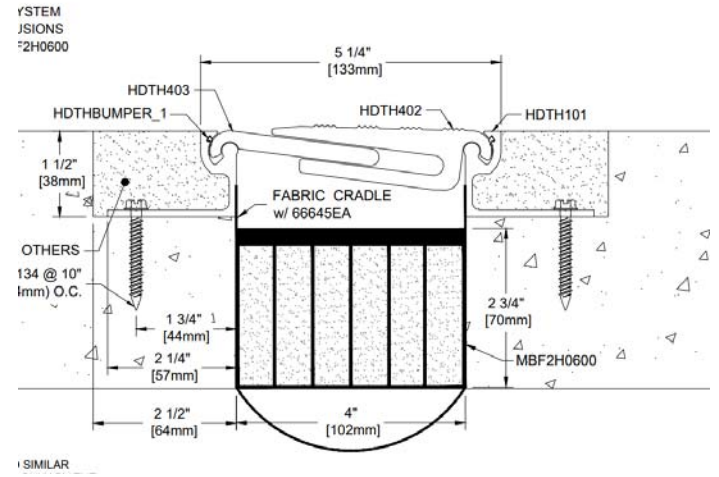
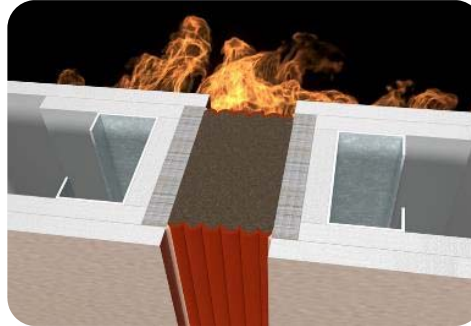
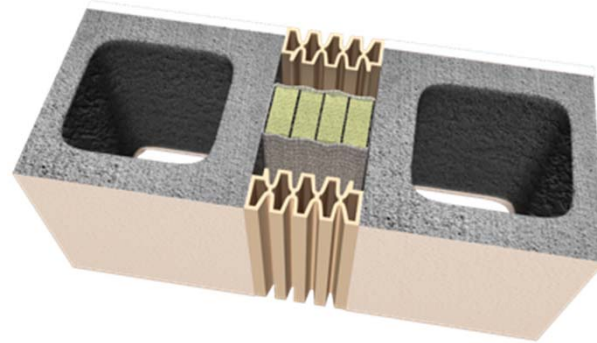
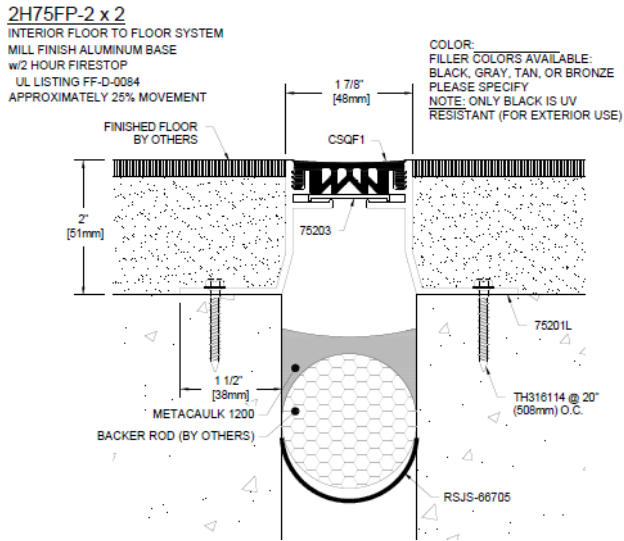
Fire test Listing Documents

Proof of compliance with standards



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Some Listings require covers, some are coverless designs, some have work-arounds like foil covers.



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IBC SECTION 715.3 FIRE-RESISTANT JOINT SYSTEMS

Fire-resistant joint systems shall be tested in accordance with the requirements of either ASTM

E1966 or UL 2079. Nonsymmetrical wall joint systems shall be tested with both faces exposed to the furnace, and the assigned fire-resistance rating shall be the shortest duration obtained from the two tests. Where evidence is furnished to show that the wall was tested with the least fire-resistant side exposed to the furnace, subject to acceptance of the building official, the wall need not be subjected to tests from the opposite side.

Movement Chart

Class I	500 cycles	1 c/min.
Class II	500 cycles	10 c/min.
Class III	100 cycles	30 c/min.
Class IV	100 cycles	30 c/min.
	400 cycles	10 c/min.



Ratings

F = Fire [Visible Flame]

T = Thermal [Temp Rise]

L = Air Leakage [Smoke / Fumes]



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715.6 Fire-resistant joint systems in smoke barriers.

Fire resistant joint systems in smoke barriers, and joints at the intersection of a horizontal smoke barrier and an exterior curtain wall, **shall be tested in accordance with the requirements of UL 2079 for air leakage. The L rating** of the joint system shall not exceed 5 cfm per linear foot (0.00775 m³ /s m) of joint at 0.30 inch (7.47 Pa) of water for both the ambient temperature and elevated temperature tests.

SECTION 709 SMOKE BARRIERS

709.1 General. Vertical and horizontal smoke barriers shall comply with this section.

709.2 Materials. Smoke barriers shall be of materials permitted by the building type of construction.

709.3 Fire-resistance rating. **A 1-hour fire-resistance rating is required for smoke barriers.**

SECTION 710 SMOKE PARTITIONS

710.1 General. Smoke partitions installed as required elsewhere in the code shall comply with this section.

710.2 Materials. The walls shall be of materials permitted by the building type of construction.

710.3 Fire-resistance rating. Unless required elsewhere in the code, **smoke partitions are not required to have a fire resistance rating**



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Learning from Specifications what types of fire barrier materials are available, and their applications.

It is common industry practice for **architects, engineers and spec writers to reference Expansion Joint Cover assemblies in the Master CSI format 079500** or somewhere in that grouping of 079513, 16, 19...

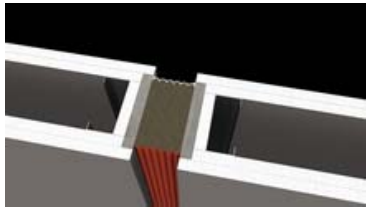
They typically reference the IBC Code 715.3 required test standards of UL2079 and/or ASTM E1966 which address the acceptable fire rated test standards.

The next step is to make some product choices that meet the construction design criteria of the project.



Specified Fire rated assembly applications

Small Joints Up to 6" Max



Fire Rated
Foam

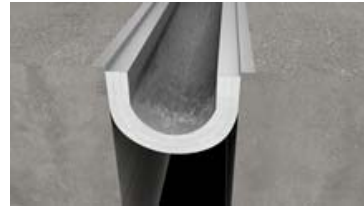


Intumescent
Composite

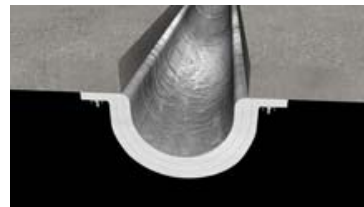


Intumescent
Sheet and
Firestop

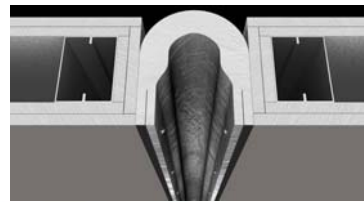
Mid Sized Joints Up to 24" Max



Blanket
Floor

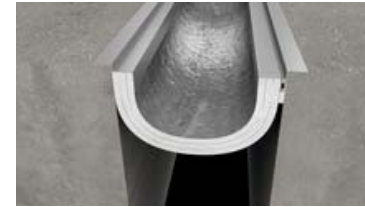


Under-slab
Blanket

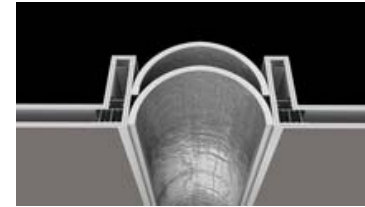


Single/ Double
Package Wall

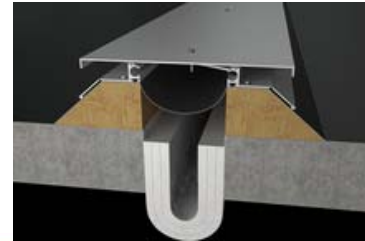
Large Joints Up to 72" Max



Seismic
Shear
Floor

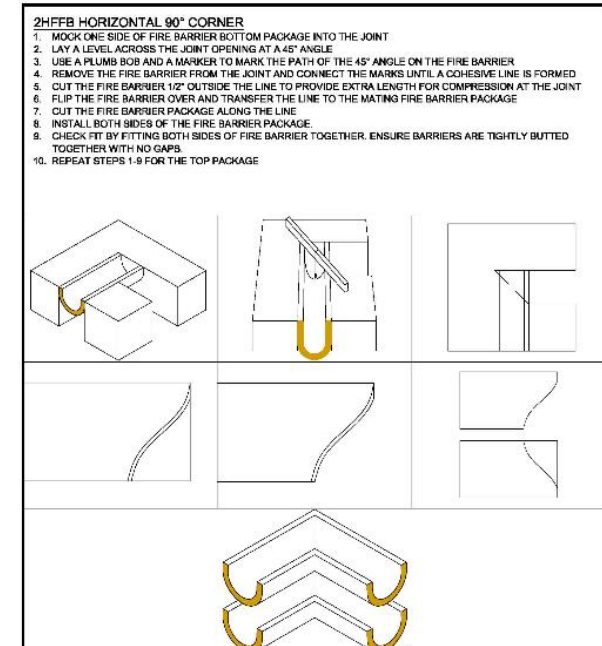
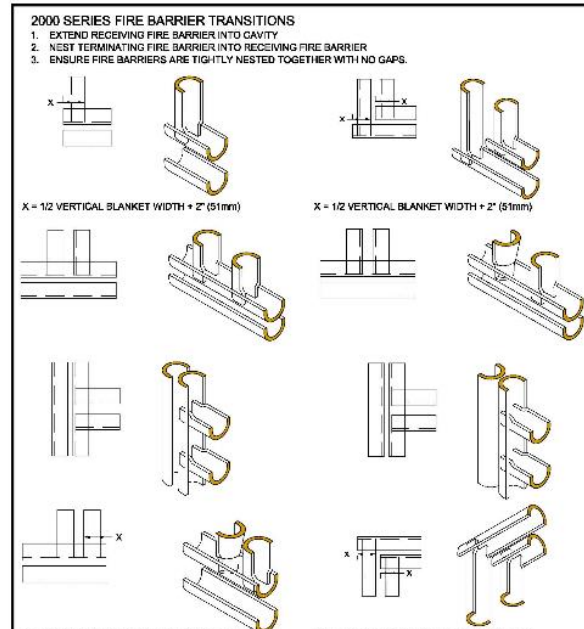
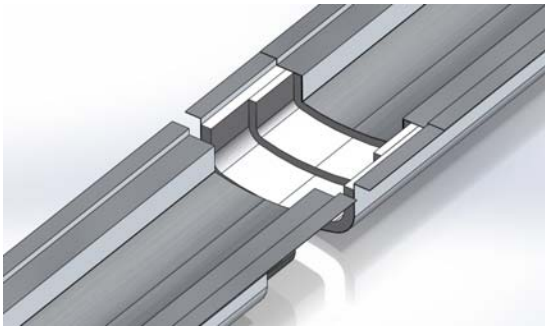


Seismic
Shear
Wall



Cover
Requirements

What are the installation requirements and how do you handle the transitioning of materials?



Learning how to create a logical path to navigate the choices that are available.

Joint Width (Max)	2 Hour Floor	2 Hour Floor Shear	2 Hour Floor Under Mount	3 Hour Floor	2 Hour Wall	3 Hour Wall
1"-6"						
8"-18"						
20"-36"						
36"-72"						

Create a Selection Chart to help guide choices. Actually, let the manufacturer help you with this one

Consider:

- Application Floor or Wall
- Hourly Ratings
- Covers or no Covers
- Construction constraints and access
- Ease of installation
- Credentials like Laboratory Listings

How do you know which Fire Barrier Assembly is right for you?

1. Consider the application:
 1. Horizontal or Vertical orientation
 2. Load Bearing or not, may require a cover plate, regardless of Listing.
2. What about areas that are not visible? Do they still need a cover?
3. Hourly Rating 1 Hour, 2 hours, 3 hours, 4 hours or maybe just a Smoke Partition with an L Rating.
4. How Much movement do I need?
 - a) Is it a multi-directional movement?



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Summary

1. Fire Resistive Joint Codes = IBC 715.
 - a) Meet the time rating of construction.
 - b) L Rating for smoke Barriers, which also require a min 1 hour fire rating.
 - c) Smoke Partitions are only an L Rating.
2. Specifications = 079500, 079513, 16, 19...
3. Standards for testing = UL2079 or ASTM E1966.
 - a) Fire testing and movement requirements.
4. Choose fire rated products based on the best fit for the application.



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