Expansion Joint
FIRE BARRIERS
PRINCIPLES, PRACTICES & PROBLEMS

FCIA
Firestop Contractors International Association

inpro
Presentation Objectives

- High level understanding of fire barriers as related to expansion joints.

- Overview of standard industry expansion joint fire barrier types, applicable codes, and testing standards/protocols.

- Distinguish consistent fire barrier installations from those that leave the building vulnerable.
INTRODUCTION TO FIRE BARRIER SYSTEMS
Expansion Joint Fire Barrier Origins
Introduction to Fire Barriers

Definition:

A passive continuous assembly used to prevent fire, smoke, and temperature rise from penetrating thru an expansion joint into adjacent spaces. This protection is required for a specified amount of time while simultaneously matching the movement requirements.
Introduction to Fire Barriers

**Purpose:**

Joints openings inherently create a pathway for fire, smoke, and heat to spread throughout the structure.

Expansion joint fire barriers exist to keep the threat contained with products that match the hourly rating of the adjacent rated construction elements. These provide for life safety through a means of egress by compartmentalizing building elements and allow the fire department time to arrive and address the fire.
Types of Fire Barriers

• **SEALANT BARRIERS**
  – Typically for 75mm (3”) and smaller expansion gap widths with little movement

• **HYBRID BARRIERS**
  – For 100mm (4”) and smaller expansion gap widths with larger movement

• **FIRE RATED FOAMS**
  – For 150mm (6”) and smaller conditions where abuse is not likely

• **FIRE BLANKETS**
  – 100-900mm (4”-36”) joint ranges with high rates of seismic movement
Types of Fire Barriers

**SEALANT BARRIER SYSTEMS**

- **Mineral Wool and Sealant**
  - Oversized Mineral wool strips held in place through compression.
  - Topped with firestop sealant to secure the wool in place and protect from water and smoke infiltration.
  - Movement capability is less than mechanical joints.
  - For 25-75mm (1”-3”) nominal joint gaps or size as tested.

*Pros > Cost-effective, non-invasive, and easy to install for small width joints.*

*Cons > Limited movement ability and joint size.*
HYBRID FIRE BARRIERS

- Often made from a combination of fireproof textiles such as: Intumescent sheet goods, woven ceramics and a variety of attachment options
- Allow up to 50%+ movement
- 50-100mm nominal joint widths meeting the majority of building needs in moderately active regions

Traits > These are thinner walled systems easing the fit within the joint for a more consistent and easy installation.
Types of Fire Barriers

**FIRE-RATED FOAMS**

- Open-cell polyurethane foam impregnated with a fire-retardant material with a 50%+ movement capability
- Can be faced with colored silicone
- Addresses Acoustic and R-Values in some cases as well
- Applicable to 25-150mm (1”-6”) nom. joint widths
- Tested in concrete decks and plasterboard walls with cement-board in the throat of the joint

**Pros** > Anchored through use of epoxy. Great application for projects where minimal environmental interruption is required.

**Cons** > These come in 2m (6.5’) lengths, so seams are numerous

![SOUND ABSORBING THERMAL PROPERTIES X, Y, Z AXIS MOVEMENT]
Types of Fire Barriers

FIRE BLANKETS
- Wide variety of blankets available and most appear the same, but not all are created equal
- Blankets typically meet 50%+ movement although 100%+- compression and expansion options exist
- Some models are able to retain their Hour Rating throughout lateral shear if required
- Ability to address nominal joints from 100-900m (4”-36”)
- Tested in concrete and gypsum wall partitions

Traits > Highly versatile system that can meet many project conditions. Multiple mounting options available however all options are mechanically fastened.
LIFE SAFETY TESTING
Code Requirements

- International Building Code (IBC)

  Section: IBC 715.3 – Fire Resistant Joint Systems

- Fire Rated Expansion Joint Test Standard that meet IBC code:

I. IDENTIFY RATING REQUIREMENTS
- Products available in 1-4 Hour Ratings
- Must match the Deck or Wall Rated Assembly they are installed into
- 2 Hour requirements are most common throughout the world, including the Middle East

II. MOVEMENT CRITERIA
- Fire Barrier solution must match the project’s structural movement requirements.
- Ensure the fire rated solution aligns with project movement requirements as specified.
  - +/-25% of nominal joint width = Thermal
  - +/-50% - +/-100% of nominal joint width = Seismic or Wind Sway
III. TESTING STANDARDS/COMPLIANCE

- Official products carry with them 3rd Party Certification (Listings) specific to the installed condition/substrate, movement capability, and hourly rating.

- 3rd Party Testing Agencies must be accredited to test and certify to the UL2079 standard.
3rd Party Testing Process

**Horizontal Oven Testing**

- Fire Barrier mounted to cycling apparatus

**Vertical Oven Testing**

- Fire Barrier mounted to cycling apparatus
Fire Rating Standards


Related Building Standards:

- **ASTM E119 – Adjacent Building Elements**

- **ASTM E1966 – Specific to Expansion Joints**
  Standard Test Method for Fire-Resistive Joint Systems (*heat transfer*)

- **ASTM E1399 – Specific to Building Expansion/Contraction**
Engineering Judgements for Fire Rated Expansion Joint Assemblies

Engineering Judgements (EJ’s) are Permissible

**Things to Watch For:**

- *Product Movement*
- *Product Hourly Rating*
- *Referenced Test Standard*
A Word on Cover plates
Case Study – The Good

Properly spaced hardware holding flanges tight to substrate

Clean chasewall installation
Case Study – The Good

Corridor wrap horizontal to vertical transitions
Case Study – The Bad

Incomplete installations
Case Study – The Bad

Flanges not properly securing blanket in place
Case Study – The Ugly
Case Study – The Ugly
Key Factors to Successful Fire Barrier Installation

1. A solid, intact fire rated substrate is critical for securing the fire barrier in place. This substrate MUST be of a rated construction type.

2. Expansion joints to be field measured prior to ordering fire barrier material. Often times the specified/detailed expansion joint width is different than the expansion joint width onsite.
Key Factors to Successful Fire Barrier Installation

3. Review Fire Barrier Product Data and Listings to ensure the product meets the project demands. Pay careful attention to movement capability and hourly rating to ensure the product is fit for purpose.

4. Review the Manufacturer’s Installation Instructions to familiarize yourself with the product installation procedures.
Questions?

Ben Stys – JointMaster® Product Manager