Fire-Resistance-Rated Construction Requirements of the 2021 IBC

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• "Recently" retired from UL after 43 years
• 29 years conducting and supervising investigations relating to reaction to fire, fire-resistance-rated construction, firestop systems, joint systems and perimeter fire containment systems
• Developed test method and test equipment for testing joint systems and perimeter fire containment systems
• 14 years in the UL Codes and Regulatory Services Department
• Member of ICC Fire Safety Committee during the 2018 and 2021 code development cycles
• Past member of NFPA 101/5000 Fire Protection Features Committee and NFPA 220/221/5000 Technical Committee
• Founded Creative Technology Inc. (CTI) after retiring from UL

Learning Objectives

At the end of this program, participants will be able to:
1. Understand the importance of achieving code compliance.
2. Understand the requirements of the 2021 IBC for fire-resistance-rated construction.
3. Understand the testing procedures for fire-resistance-rated construction
4. Understand the various resources available for demonstrating compliance with the requirements of Chapter 7 of the 2021 IBC.
5. Understand the plan review and inspection process for fire-resistance-rated construction.

Outline of Presentation

• Welcome and Introductions
• Importance
• Balanced Fire Protection
• Building Materials Demonstration
• IBC Requirements for Fire-Resistance-Rated Construction
• Fire Resistance Testing
• Methods of Showing Compliance with the IBC
• Permitted Changes to Tested Assemblies

Outline of Presentation Cont.

• Introduction to the Protection of Openings
• Navigating the UL Online Directory
• Navigating the Intertek Online Directory
• Engineering Judgments
• Plan Review and Inspection of Fire Resistant Construction
• Summary and Closing

Importance

• Mandated by codes and standards
• Protect the lives and property of those who live, work and play in your jurisdiction
• Protect you and your jurisdiction from liability
Importance Cont.

Balanced Fire Protection
An integrated system of fire and smoke protection elements in the construction environment composed of detection, suppression and containment features designed to provide an acceptable level of protection for people and property.

Fire Protection Triad

Detection
Suppression
Containment

What is the Function of a Balanced Fire Protection Design?

- Detectors are used to activate fire alarms and notify building occupants and emergency responders
- Sprinklers are designed to control small and medium fires and to prevent fire spread beyond the typical water supply design area of about 1,500 ft²
- Compartmentation mitigates the spread of more severe but less frequent fires by limiting building areas, subdividing building with fire-resistance-rated construction, based on hourly ratings

What is the Leading Killer in Fires?

Fire Statistics – Why We Must Contain Smoke and Toxic Gases

\[ \frac{3}{4} \text{ of all fire deaths are caused by smoke inhalation.} \]

Visibility: 47% of survivors caught in a fire could not see more than 12 feet

Approximately 57% of people killed in fires are not in the room of the fire's origin

Smoke travels 120-420 feet per minute under fire conditions

Source: Estimate based upon ceiling jet velocity calculations for typical ceiling height and heat release rates.
Unsealed or Improperly Sealed Openings Cost Lives and Property

Four Examples

MGM Grand, Las Vegas - 1980

- MGM Grand, Las Vegas, NV – Fire confined to 1st floor. Eighty-four fatalities, most on upper floors.

Hilton Hotel, Las Vegas

- Hilton Hotel, Las Vegas, NV – Fire spread from 8th to 23rd floor in 25 minutes at exterior of building. Eight fatalities.

One Meridian Plaza, Philadelphia

- One Meridian Plaza, Philadelphia – Fire spread from 22nd to 30th floor through improperly protected penetrations and through perimeter joint. Three fatalities. $100 million in direct property damage. $4 Billion in civil suits.

Grenfell Tower, London, June, 2017

- Grenfell Tower, London, June, 2017 – Fire started on 4th floor and spread to the top floor. Building was retrofitted with aluminum cladding over polyethylene insulation. Fire cause noted as a “faulty freezer”.

Containment in Construction

- Fire-resistance-rated assemblies
  - Fire Walls
  - Fire Barriers
  - Fire Partitions
  - Smoke Barriers
- Horizontal Assemblies
- Through- and membrane-penetrations
- Fire-resistant joint systems (i.e. construction joints and perimeter joints)
- Opening protectives (i.e. fire-rated doors and windows)
- Air ducts and air transfer openings (i.e. dampers)
Fire Event Timeline

Time Response by Listed Products

EVENT

RESPONSE

product

Overheated cord

Localized open flame

Fire propagates to second item

Fire propagates along interior surfaces

Flashover of room

Fire propagates to adjacent rooms

Structure is lost

Building Materials Demonstration

Building Materials Used for Fire-Resistance

• Materials and construction techniques must withstand the long term effects of fire
• Horizontal assemblies protected from fire exposure from underside
• Walls protected from fire exposure from both sides, unless otherwise noted

Building Materials Used for Fire-Resistance Cont.

• Types of Protection
  • Membrane protection
  • Gypsum board
  • Acoustical ceilings
  • Cement-fiber board
  • Etc.
  • Direct applied protection
  • Spray-applied fire-resistant materials
  • Mastic and intumescent materials
  • Etc.

Gypsum Board

• Gypsum is a soft mineral composed of calcium sulfate dihydrate
• CaSO₄–2H₂O
• 21% by weight of chemically combined water
• Gallons of water in one 4 ft by 8 ft piece of 5/8 in. thick gypsum board:
  5/8" = 2.3 psf x 32 sf = 73.6#/board
  73.6#/board x 21% = 15.5# of H₂O/board
  15.5#/board/8.34#/gal = 1.86 gal/board

Gypsum Board

When gypsum protected wood or steel structural members are exposed to fire, the chemically combined water molecules are driven off as steam which acts as a thermal barrier until the slow process of calcination is completed
Type X Gypsum Board

- Introduced in the 1950's
- Primary use is wall protection using 1-4 layers
- Used in some ceiling applications but typically can not be insulated
- Heat build-up along with effects of gravity accelerates degradation, limiting the performance of Type X

Type C Gypsum Board

- Introduced early 1960's by USG
- Contains a special core formulation that compensates for shrinkage during a fire
- Has become the norm for roof/ceiling and floor ceiling systems
- The most prevalent misapplication in fire resistive construction

What FRR Construction is Not

- Surface Burning Characteristics – UL 723
- Corner Testing – UL 1715, UL 1040, NFPA 286 or NFPA 265
- Flooring Testing – NFPA 253 or DOC FF-1
- Roofing Tests – UL 790

IBC Requirements for Fire-Resistance-Rated Construction

- Building official charged with approval of all buildings based on the use of the building
- Certain uses (occupancies) have a higher inherent risk
- Fire resistive requirements not found here but are based on the occupancy of the building or space

IBC Chapter 3

Use and Occupancy
**IBC Chapter 5**

**General Building Heights and Areas**
- Basic allowable Building Heights and Areas
- Based on Occupancy and Type of Construction
- Tables 504.3 & 504.4 and 506.2
- Area Increases – Section 506
- Mixed Use and Occupancy – Table 508.4
- Incidental Uses – Table 509

**Allowable Height & Stories – Tables 504.3 & 504.4**

**IBC Chapter 6**

**Types of Construction**
- Established by Building Official
- Five Types – I, II, III, IV, V
- A – Commonly referred to as Protected
- B – Commonly referred to as Unprotected
- New for 2021 – Types IV-A, B, C
- Table 601 Rating Requirements

**IBC Chapter 4**

**Special Detailed Requirements Based on Use and Occupancy**
- Malls – tenant separation
- High Rise buildings
- Motor Vehicle related
- Parking Garage
- Repair Garage
- I-2 and I-3 Occupancies
- Stages and Platforms
- Aircraft related
- Haz-Mat H-1,2,3,4,5
- Flammable Finishes
- Live/Work Units
- I-1, R-1, R-2, R-3, R-4
- Ambulatory Care Facilities
- Storm Shelters
- Children’s Play structures
- Hyperbaric Facilities
- Combustible Dusts, Grain Processing & Storage
- Med gas systems
- Higher education labs
IBC Chapter 10
Means of Egress
- Stairways – 1011
- Corridors – Table 1020.1
- Interior Exit Stairways – 1023.2
- Exit Passageways – 1024.3
- Horizontal Exits – 1026.2
- Exterior Exit Stairways – 1027
- Exit Discharge – 1028

IBC Chapter 7
Fire and Smoke Protection Features
Definition – Fire-Resistance Rating
The period of time a building element, component or assembly maintains the ability to confine a fire, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests, prescribed in Section 703.

IBC Chapter 7 Cont.
- Fire Resistance Ratings range from 1/2 to 4 hours
- 702.1 – Multiple use fire assemblies must meet all of the requirements for each use
  - e.g. Fire partition that is also a fire barrier
- 703.2.1 – Building elements shall be tested to ASTM E119 or UL 263
  - 703.2.1.1 – Interior nonsymmetrical walls and partitions shall be tested from both faces

IBC Chapter 7 Cont.
- 703.2.1.3 – Restained Classification. Assemblies considered unrestrained unless registered design professional provides evidence satisfactory to AHJ that construction qualifies for restrained classification per ASTM E119 or UL 263

IBC Chapter 7 Cont.
- 703.2.2 – Methods for determining fire resistance shall be based on fire exposure and acceptance criteria of ASTM E119 or UL 263

IBC Chapter 7 Cont.
- 703.2.2 Cont. – Required fire resistance may be established based on any of the following:
  - Designs documented from approved sources
  - Prescriptive requirements from Section 721
  - Calculations in accordance with Section 722
  - Engineering analysis based on ASTM E119 or UL 263
  - Fire-resistance designs certified by an approved agency (added to the 2015 IBC)
  - 703.2.3 – Approved alternate methods per Section 104.11
IBC Chapter 7 Cont.  
703.7 Marking & Identification

- Where there is an accessible concealed floor, floor-ceiling or attic space, fire walls, fire barriers, fire partitions, smoke barriers, and smoke partitions, or any other wall required to have protected openings or penetrations shall be identified with sign or stencil.
  - 15 feet from ends
  - Maximum 30 foot intervals
  - Letters not less than 3 inches with 3/8 inch stroke
  - Contrasting color

IBC Chapter 7 Cont.  
Structural Members Section 704

- Tested to ASTM E119 or UL 263 (Full-Scale and Loaded)
- Rating determined using Table 601
- Rating of structural element not less than items being supported
- Columns (Section 704.2) and primary structural frame other than columns (Section 704.3) require individual encasement
- Columns shall be protected for their full height including attachment to beams
- Specific requirements for Sprayed Fire Resistive Materials

IBC Chapter 7 Cont.  
Exterior Walls Section 705

- Fire-Resistance Rating based on higher of Type of Construction Table 601 or Fire Separation Distance Table 705.4 (Was Table 602)
- Projections – Changes to Table 705.2
- Buildings on same lot
- Fire Resistance Rating
- Openings

### Table 705.5

| FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE (IN FEET) |
|---|---|---|---|---|---|
| FIRE SEPARATION DISTANCE | X | Y | X | Y | X | Y |
| 42” FSD | 2 | 1 | 2 | 1 | 2 | 1 |
| 48” FSD | 2 | 1 | 2 | 1 | 2 | 1 |
| 60” FSD | 2 | 1 | 2 | 1 | 2 | 1 |

### Example

42” FSD

Minimum distance to lot line required = 42” x 0.666 = 28” from projection to lot line required
IBC Chapter 7 Cont.
705.3 Buildings on the Same Lot

Assume Imaginary Line to determine FSD & Opening Protection

May be considered 1 building if within limits specified in Chapter 5

IBC Chapter 7 Cont.
705.5 Fire-Resistance Ratings

• Exterior walls with an FSD of 10 feet or less shall be rated for exposure to fire from both sides
• Exterior walls with an FSD greater than 10 feet shall be rated for exposure to fire from the inside - full required fire resistance rating must be established from the interior membrane and framing per Section 722.6.2.3. For exterior walls with FSD > 10 ft, the outside shall consist of sheathing, sheathing paper and siding as described in Table 722.6.2(3)

IBC Chapter 7 Cont.
705.8 Openings

Uses of the various rated assemblies:
• Fire Wall: Used to create separate buildings
• Fire Barrier: Shafts, stair enclosures, occupancy separations
• Fire Partition: Separate dwelling units, corridors, tenant spaces
• Smoke Barrier: Typically used in I2 for smoke compartments
• Smoke Partition: Not FRR
• Horizontal Assemblies: FRR Floors and ceilings

IBC Chapter 7 Cont.
Fire Walls Section 706

Definition of Fire Wall

• A fire-resistance-rated wall having protected openings, which restricts the spread of fire and extends continuously from the foundation to or through the roof, with sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall.

IBC Chapter 7 Cont.
Fire Walls Section 706 Cont.

• 503.1: Fire Walls can be used to create separate buildings for purposes of height, area, or types of construction
• Table 706.4
• Horizontal Continuity
• Vertical Continuity
**IBC Chapter 7 Cont.**

**Table 706.4**

<table>
<thead>
<tr>
<th>GROUP</th>
<th>FIRE RESISTANCE RATING (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, E, H-4, I, R-1, R-2, U</td>
<td>3^2</td>
</tr>
<tr>
<td>F-1, H-3b, H-5, M, S-1</td>
<td>3</td>
</tr>
<tr>
<td>H-1, H-3</td>
<td>4^4</td>
</tr>
<tr>
<td>F-2, S-2, R-3, R-4</td>
<td>1</td>
</tr>
</tbody>
</table>

a. In Type II or V construction, walls shall be permitted to have a 2-hour fire-resistance rating.
b. For Group H-1, H-2 or H-3 buildings, also see Sections 415.7 and 415.8.

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**Definition of Fire Barrier**

• A fire-resistance-rated wall assembly of materials designed to restrict the spread of fire in which continuity is maintained.

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**IBC Chapter 7 Cont.**

**Fire Barriers Section 707 Cont.**

• Fire Barrier used to separate:
  • Exits, shafts, incidental use areas, hazardous material control areas and fire areas
  • Table 707.3.10
  • Continuity
  • Joints and Voids at intersections shall be comply with Section 707.8 and 707.9

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**Definition of Fire Partition**

• A vertical assembly of materials designed to restrict the spread of fire in which openings are protected.

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**IBC Chapter 7 Cont.**

**Fire Partitions Section 708 Cont.**

• Fire Partitions:
  • Separation walls as required by Section 420.2 for Group I-1 and R occupancies
  • Walls separating tenant spaces in open and closed malls (Section 402.4.2.1)
  • Corridor walls (Section 1020.1)
  • Elevator lobby separation (Section 3006.3)
  • Egress balcony (Section 1021.2)

• Fire rating not less than 1 hour

• Exceptions:
  • Group R corridors ½ hour (Table 1020.1) with NFPA 13 or 13R fire sprinkler system
  • Dwelling/Sleeping unit separation ½ hour with sprinklers (in Type IIB, IIIB and VB Construction)
  • Termination
    • Ceiling of rated assembly, or
    • Bottom of roof or floor deck above
**IBC Chapter 7 Cont.**
**Smoke Barriers Section 709**

**Definition Smoke Barrier**
- A continuous membrane, either vertical or horizontal, such as a wall, floor, or ceiling assembly that is designed and constructed to restrict the movement of smoke

**Smoke Barriers Section 709 Cont.**
- Commonly found in I-2 and I-3 Occupancies
- Allows evacuation to another part of building
- 1 Hour fire-resistance rating

**Smoke Barriers Section 709 Cont.**
- Continuity
  - Outside wall to outside wall
  - Top floor/ceiling to underside of floor or roof sheathing
  - Areas of refuge and elevator lobbies shall terminate at fire barrier wall of not less than 1-hour, another smoke barrier wall or an exterior wall
  - Protected Openings

**Smoke Partitions Section 710**

**Definition Smoke Partition**
- A wall assembly that extends from the top of the foundation or floor below to the underside of the floor or roof sheathing, deck or slab above or to the underside of the ceiling above where the ceiling membrane is constructed to limit the transfer of smoke

**Smoke Partitions Section 710 Cont.**
- Smoke Partition
  - Walls that limit the transfer of smoke for an unspecified time
  - Unless required by another section of the Code not required to have a fire-resistance rating
  - Continuity
  - Top of floor/ceiling to underside of floor or roof deck
  - May terminate at ceiling if ceiling constructed to limit transfer of smoke

**Horizontal Assemblies Section 711**

**Definition Horizontal Assembly**
- A fire-resistance-rated floor or roof assembly of materials designed to restrict the spread of fire in which continuity is maintained
Horizontal Assemblies Section 711 Cont.

- Tested to ASTM E119 or UL 263
- Fire-resistance rating
  - Table 601 is the minimum
- Applications
  - Mixed occupancies separation 508.4.4
  - Fire area separation 707.3.10
  - Dwelling and Sleeping unit separation 420.3
    - Exception: (711.2.4.3) can be ½ hour if IIB, IIIB or VB with sprinkler in compliance with 903.3.1.1

Applications Cont.

- Smoke compartment separation 709
- Incidental uses separation 509
- Where required by other sections of the code
- Continuity
  - Continuous without vertical openings except as provided in 712
- Ceiling panels require clips if less than 1 psf

Vertical Openings Section 712

- Provides laundry list 16 provisions where you can have Vertical Openings. Examples:
  - Vertical openings contained within a shaft
  - Dwelling Units
    - Must be unconcealed
    - Totally within individual unit
    - May connect 4 stories or less

2-Story Vertical Openings

- Can’t be in an I-2 or I-3
- Not used as one of applications listed in 712
- Must comply with all 6 listed requirements
  1. Does not connect more than 2-stories
  2. Does not penetrate a horizontal assembly that separates fire areas or smoke barriers that separate smoke compartments
  3. Not concealed within wall or floor/ceiling assembly
  4. Not open to corridor in Group I and R occupancies
  5. Not open to corridor of nonsprinklered floors
  6. Must be separated from floor openings and air transfer opening serving other floors by construction conforming to required shaft enclosures

Shaft Enclosures Section 713

Definition Shaft Enclosure

- The walls or construction forming the boundaries of a shaft.
• Continuity
  • Same as fire barriers 707 or horizontal assembly 711
  • Refuse & laundry chute access rooms
    • Fire barrier of same rating as shaft 713 or horizontal assembly 711
    • Opening protectives same rating as shaft
    • Doors shall be self or automatic closing upon smoke detection

• Bottom enclosure
  • Applies to shafts that do not extend to the bottom of building. Must comply with one of the following:
    • Enclosed on lowest level, same fire resistance rating as lowest floor but not less than the shaft
    • Terminate in a room having a related use to the purpose of shaft, room separated by fire barriers and/or horizontal assemblies, fire-resistance rating not less than shaft
    • Shaft shall be protected by approved fire damper at lowest floor level within enclosure

• Exceptions:
  • Room separation not required provided no openings or penetrations of shaft to interior except at the bottom, shaft must be draftstopped and contain fire sprinkler system
  • Waste or linen chute not used for any other purpose and shall discharge in room protected in 713.13.4
  • Room separation and bottom protection not required if no combustible and no openings to interior

• Breaches in fire-resistance-rated construction must be protected
  • Penetrations (Section 714)
  • Joints and Voids (Section 715)
  • Opening Protectives (Section 716)
  • Ducts and Air Transfer Openings (Section 717)

• Expressed as an Hourly Time Period
• Containment of Fire to Room or Floor of Origin, and Structural Fire Resistance
Standards

• ANSI / UL 263
• ASTM E119
• NFPA 251 (Withdrawn)

Building Components

• Columns
• Beams
• Floor/Ceilings or Roof/Ceilings
• Walls

Time - Temperature Curve

Columns

• Sample Size – Minimum 9 ft
• Tested Unloaded
Conditions of Acceptance

**COLUMNS**

- Maximum Temp of Steel: 1000°F/1200°F

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**Beams**

- Sample Size - Minimum 12 ft
- Load Applied - Per Design
**Conditions of Acceptance**

**Floor/Ceilings or Roof/Ceilings**

- Sample Size - 180 sq ft / 12 ft
- Load Applied - Per Design
Conditions of Acceptance

Floor/Ceilings or Roof/Ceilings

- Support Load
- Flame Passage
- 250°F / 325°F
- Support Temperatures
Walls

- Sample size - 100 sq ft / 9 ft
- Load applied - Per design

9 ft
100 sq ft
Conditions of Acceptance – Walls

- Flame passage
- 250°F / 325°F
- Support load
- Hose stream

Methods of Showing Compliance with the IBC

Methods of Showing Compliance with the Fire Resistance Requirements of the IBC

- 703.2 – Fire-resistance ratings shall be determined in accordance with ASTM E119 or UL 263
- 703.3 – Methods for determining fire resistance shall be based on fire exposure and acceptance criteria of ASTM E119 or UL 263

Methods of Showing Compliance with the Fire Resistance Requirements of the IBC

- 703.3 Cont. – Required fire resistance permitted to be established based on any of the following:
  - Designs documented from approved sources
  - Prescriptive requirements from Section 721
  - Calculations in accordance with Section 722
  - Engineering analysis based on ASTM E119 or UL 263
  - Alternative protection methods as allowed in Section 104.11
  - Fire-resistance designs certified by an approved agency
Designs Documented
From Approved Sources

- Gypsum Association – *Fire Resistance Design Manual*
- International Existing Building Code – *Resource A*
- BOCA – *Guidelines for Determining Fire Resistance Ratings of Building Elements*
- American Insurance Services Group, Inc. (210) 469 – 3922 – *Fire Resistance Ratings*

Designs Documented
From Approved Sources Cont.

- ASCE / SFPE 29 – *Standard Calculation Methods for Structural Fire Protection*
- ACI 261.1 / TMS 0216.1 – *Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies*

Prescriptive Fire Resistance
Section 721 of the IBC

Calculated Fire Resistance
Section 722 of the IBC

Engineering Analysis Based
on ASTM E119 or UL 263

- Engineering judgments
  - Product manufacturer
  - Testing laboratory
  - Fire protection engineer
  - Professional engineer

Alternate Materials, Design and
Methods of Construction and Equipment

- Allows authority having jurisdiction to accept other information to show compliance
  - Evaluation Services Reports
  - IAPMO Evaluation Services
  - ICC Evaluation Services
  - UL Evaluation Services
Designs Certified By
An Approved Agency

- Product Directories of Nationally Recognized Testing Laboratories
  - UL – Product iQ Online Directory
  - Intertek – Intertek Directories of Certified Products
  - FM Global – Factory Mutual Approval Guide

Fire Resistance-Rated Construction

Permitted Changes to Designs

Finish Rating

- Finish Ratings is defined as the time at which the wood stud or wood joist reaches an average temperature rise of 250°F or an individual temperature rise of 325°F as measured on the plane of the wood nearest the fire
- Not intended to represent a rating for a membrane ceiling or a wall membrane
- Used by select codes and for engineering information

Fasteners

- Cement coated box or cooler nails shall be used for securing gypsum board, unless otherwise specified in design
- Screws meeting ASTM C 1002 or C 954 may be substituted for nails providing head diameter and length are equal or larger than specified nail

Primers with SFRM

- May be applied to primed structural elements providing:
  - Beam flange width shall not exceed 12 inch
  - Column flange width shall not exceed 16 inch
  - Web depth shall not exceed 16 inch
  - Pipe diameter or tube width shall not exceed 12 inch
  - Bond tests conducted to ASTM E 736
    - Average > 80% of uncoated steel and individual > 50% of uncoated steel, or
    - Wrap member with metal lath

Concrete in Horizontal Assemblies

- Compressive strength specified may be reduced 500 psi
- Unit weight tolerance 3 pcf
- Do not substitute lightweight concrete if normal weight specified
- Do not substitute normal weight concrete if lightweight specified
Composite & Non-Composite Steel Deck

- Non-composite steel deck construction may be used when composite deck is specified in design

Outlet Boxes in Ceilings

- Metallic boxes may be installed in F/C and R/C assemblies incorporating gypsum board protection providing:
  - Clearance not to exceed 1/8 in.
  - Area of each box not to exceed 16 sq in.
  - Total area of boxes not to exceed 100 sq in. per 100 sq ft of ceiling area
  - Nonmetallic boxes tested and listed (CEYY)

Steel Joists

- Specified joist is minimum depth
- Specified joist is minimum weight/foot
- K-Series Joist may often substitute
- Spacing between joists may be increased to 4 ft OC providing:
  - Structural integrity of floor is maintained
  - Hanger wire spacing is not increased
  - Bridging bar size is minimum

Gypsum Board on Horizontal Assemblies

- Thickness may be increased providing fastener length is also increased
- Additional layers may be added
- Only those boards specified in the design may be utilized

Gypsum Ceiling Control Joints

- Ceiling suspended below floor assembly
- Guide describes control joints when gypsum board is parallel to wood joists
- Guide describes control joints when gypsum board is perpendicular to wood joists

Acoustical Ceilings

- Specific board and grid system is specified in Design
- Hold down clips required when ceiling panel weighs less than 1 psf
**Recessed (Can) Lighting**

- Generic recessed luminaires not permitted unless covered in design
- Luminaires specifically tested and Listed for use in fire resistive construction covered in “Luminaires, Luminaire Assemblies and Luminaire Enclosures Certified for Fire Resistance” (CDHW)

**Recessed (Can) Lighting Cont.**

- Generic recessed luminaires protected with enclosures specifically tested and Listed for use in fire resistive construction covered in “Luminaires, Luminaire Assemblies and Luminaire Enclosures Certified for Fire Resistance” (CDHW)

**Restrained & Unrestrained**

- Designer & AHJ must determine
- Unrestrained ratings may be used for either condition

**Restrained & Unrestrained Cont.**

1. Tread Bearing
   - Single span and simply supported end spans of multiple bays
   - Open-web steel joists or steel beams supporting con-into-steel, precast units, or metal decking
   - Concrete slabs, precast units, or metal decking

2. Interior spans in multi-story bays
   - Open-web steel joists, steel beams, or metal decking supporting continuous concrete slab or precast units
   - Concrete slabs, precast units, or metal decking
   - Unrestrained

3. Corridor above corridor slab systems
   - Unrestrained

4. Poured concrete when the potential thermal expansion in restrained by adjacent construction

5. Steel Framing
   - Steel beams welded, bolted, or bolted to the framing members

**HVAC Openings in Ceilings**

- Most acoustical ceilings are tested with generic hinged blade damper
- UL Classified Ceiling Damper, Ceiling Air Diffuser or Air Terminal Unit may be substituted for generic hinged blade damper
- Duct Protection Systems A and B may also be substituted per Guide Info
- Some assemblies with gypsum board ceilings have been tested with specific UL Classified Ceiling Dampers
- Damper may not be utilized if not specified in design

**Blanket Insulation in Horizontal Assemblies**

- May cause premature disruption of ceiling membrane
- For certain assemblies, fiberglass insulation can be used with additional layer of gypsum board
- Otherwise, only permitted as specified
Beam Size

- Larger beams may be substituted without restriction
- Larger is based on W/D ratio
- Larger W/D yields greater fire resistance

Composite & Non-Composite Beams

- Non-composite beam construction may be used when composite beam is specified in design

 Adjustment of Thickness of SFRM - Beams

- Not applicable to mastic and intumescent materials
- Coating material thickness on beams with lesser W/D requires adjustment and thickness on beams with greater W/D may be adjusted as follows:

\[ t_1 = \left( \frac{w_2}{d_2} + 0.6 \right) \left( \frac{w_1}{d_1} + 0.6 \right) t_2 \]

Column Size

- Larger columns may be substituted without restriction
- Based on W/D ratio
- Larger W/D yields greater fire resistance

Walls & Partitions

- Rating applies when either face exposed to fire, unless otherwise noted
- Unsymmetrical walls tested from both sides
- Exterior walls may only require rating from inside face
- Walls rated from the interior face only will be so noted
- Load bearing rating applies to non load bearing applications
Walls & Partitions Cont.

- Walls are intended for interior applications unless otherwise specified (e.g. exterior use is obvious or design states “Investigated for Exterior Use”)

- Size of studs specified is minimum
- Gauge of steel studs specified is minimum
- Fire-retardant-treated wood studs may used in lieu of specified non-treated wood studs
- Stud spacing specified is maximum
- Board orientation as specified in design

Walls & Partitions Cont.

- Metallic boxes may be installed in wall assemblies incorporating gypsum board protection providing:
  - Max 2 hr rated assemblies
  - Clearance not to exceed 1/8 in.
  - Area of each box not to exceed 16 sq in.

- Total area of boxes not to exceed 100 sq in. per 100 sq ft of wall surface
- Boxes on opposite sides of wall separated by min 24 in. or provided with protection (CLIV)
- Nonmetallic boxes tested and listed (CEYY)

Breaches in Fire-Resistance-Rated Construction

- Penetrations (Section 714)
- Joints and Voids (Section 715)
- Opening Protectives (Section 716)
- Ducts and Air Transfer Openings (Section 717)
Breaches in Fire-Resistance-Rated Construction Cont.

Do breaches really impact the performance of a fire-resistance-rated assembly?

Absolutely!!!

• Unsealed or improperly sealed openings cost lives and property!
  • MGM Grand, Las Vegas, NV – Fire confined to 1st floor. Eighty-four fatalities, most on upper floors.
  • Hilton Hotel, Las Vegas, NV – Fire spread from 8th to 23rd floor in 25 minutes at exterior of building. Eight fatalities.
  • First Interstate Bank, Los Angeles, CA – Fire spread from 12th to 16th floor through improperly protected penetrations and through unprotected perimeter joint. One fatality.
  • One Meridian Plaza, Philadelphia, PA – Fire spread from 22nd to 30th floor through improperly protected penetrations and through perimeter joint. Three fatalities.

Navigating the UL Online Directory

UL Product iQ

Guide Information

• Equipment, materials or systems included in the Category
• Intended use, restrictions or supplemental information that apply
• Standard(s) used to evaluate products under the Category
• Listing Mark information for the Category

Organization of Listing Information for Fire Resistance, and Firestop and Joint Systems

• Guide information
• Designs, systems or assemblies
• Product categories (indexed by manufacturer’s names)
Designs

- BXUV – Fire Resistance Ratings-ANSI/UL 263
  - Previously located in Volume 1 of UL’s Fire Resistance Directory
  - Includes approximately 2054 individual designs
  - Each design contains specific construction features
  - Many designs contain various options and various ratings, resulting in thousands of available constructions
  - Must be followed exactly for rating to apply

Product Categories

- Proprietary products specified in these designs are covered in 58 individual Product Categories
- Each Product Category describes some generic family of products (e.g. Acoustical Materials)
- Each Product Category covers products used in fire resistive designs
- Each Product Category contains manufacturers and designations of products tested and specified in the designs

Product iQ – UL’s New Online Directory

- Replaces the old Online Certifications Directory which was developed in 1999
- Identifies Certified products, designs, systems, assemblies and constructions
- Helps you achieve code compliance
- Is continuously updated
- Requires registration to create user account
- Basic Service – no charge for use

Product iQ – UL’s New Online Directory

- Paid Subscription Service provides more features
  - Save Searches
  - Tags and Groups
  - Confirmation Letters
- https://iq.ulprospector.com/en
- Vanity addresses
  - www.ProductIQ.UL.com
  - www.UL.com/ProductIQ
  - www.UL.com/PiQ

UL Product iQ – www.ul.com

Scroll to the bottom of the page
Smart Search for a design if design number is known
• Design No. L501
OR, Using an iQ Plus Search
UL Product iQ Cont.

iQ Plus Search under Building Materials and Systems for fire rated walls based on specific parameters

• Wood stud/gypsum board wall assembly
• 2 hour rating
• Gypsum board supplied by the United States Gypsum Company

UL Product iQ Cont.

IQ Plus Search

UL Product iQ Cont.

Also added 2 hr as required rating

UL Product iQ Cont.

Smart Search for fire rated column design based on specific parameters

• Nullifire S605 intumescent fire-resistant material supplied by Carbolime
• Column application
OR, Using an iQ Plus Search
UL Product iQ Cont.

Confirmation Letter with 1 Click

UL Product iQ Cont.

iQ Plus Search under Building Materials and Systems based on specific code requirements

• Looking for a Smoke Alarm which complies with the requirements of the 2015 edition of the International Residential Code, Section R314.1.1

UL Product iQ Cont.

iQ Plus Search for a Smoke Alarm

UL Product iQ Cont.

Installation Code Search

UL Product iQ Cont.

Search for UL Certified products by installation code, search for your in a specific installation code, and then locate your product in the code-specific search.
Navigating the Intertek Online Directory

Intertek Directory of Building Products
Engineering Judgments

An Engineering Judgment is a letter or report issued by some knowledgeable party which evaluates the construction of some site-specific application which deviates from a tested design, system or assembly and concludes with a judgment of the applicable rating of that assembly.

Typically, an Engineering Judgment is used when a tested design, systems or assembly is unavailable. Most often applied to fire resistive construction.

Applications for an Engineering Judgment:
- Design and system concept where multiple components, some listed and some unlisted, are used to field construct the finished assembly (e.g. wall)
- Typically products are not required to be listed by code
- Individual issuing judgment must be acceptable to the Building Official or the AHJ

Who issues Engineering Judgments?
- Professional engineer
- Fire protection engineer
- Manufacturer
- Testing laboratory
- Individual issuing judgment must be acceptable to the Building Official or the AHJ
**IBC References Justifying Engineering Judgments**

- IBC 104.11 – Alternative materials, design and methods of construction and equipment
- IBC 703.2.2 – Analytical methods
- IBC 703.2.3 – Approved alternative method

**Important Points of an Engineering Judgment**

- No guidance from the International Code Council or the various I-Codes
- No guidance from UL
- Best documents available are from the International Firestop Council (IFC) – www.firestop.org

**IFC Guidelines**

- Four Documents
  - Recommended IFC Guidelines for Evaluating Firestop Systems in Engineering Judgments (EJs)
  - Covers firestops, joint systems and grease/air duct assemblies
  - Perimeter fire barrier systems
  - Fire resistant duct enclosure systems for commercial kitchen exhaust ducts
  - Fire resistant duct enclosure systems for ventilation ducts

**Summary of Engineering Judgments**

- Only used when a tested design, systems or assembly is unavailable
- Not a substitute for existing systems
- Should be issued only by those who know the components
- Based on sound engineering practices and knowledge of performance of system

**Summary of Engineering Judgments Cont.**

- Based on interpolation of previous testing
- Issued only for a specific jobsite
- EJ presented in clear detail

**Plan Review and Inspection of Fire Resistant Construction**
Building Department Submittals

107.2.1 - Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code.

Plan Review For Fire Resistive Construction

• Details showing compliance with the fire resistive requirements of the IBC should (shall?) be included on the plans and in the specifications
• Recommended (require?) that the designs be imported into the plans
• Importing designs into plans does NOT violate UL copyright requirements

For the Contractor

1) Evidence of compliance
2) A set of build-instructions

Designs serve two roles:

For the Building / Fire Official

1) Evidence of compliance
2) Document by which to inspect

Designs serve two roles:

Plan Review For Fire Resistive Construction

• Review proposed fire-resistance-rated assemblies for compliance with code
• Hourly rating requirement
• Type of Construction
• Details of assemblies proposed relative to actual construction
• Consider variations identified relative to permitted substitutions stated in the UL Guide Information or GA600 (latest edition is 22nd edition 2018)

Plan Review For Fire Resistive Construction

• All fire-resistance-rated designs need to be reproduced on the plans. If an engineering judgment is needed, it must be noted on the plans and this judgment must be approved by the Building Official.
• The above information will be needed by the field inspectors during construction as well as contractors to properly construct an assembly
Pre-Construction Meeting

• Review Approved Design Drawings Submittals
• Pre-Approved Engineering Judgments
• Establish inspection guidelines and expectations
• Develop a plan to inspect each assembly that requires additional inspections
• General Contractor should understand that you may require a ladder or lift

Pre Inspection of Fire Resistive Construction

• Require construction documents that detail all fire-resistance-rated assemblies
• Obtain copies of all fire-resistance-rated designs or have a laptop, tablet or phone available to access systems online
• Develop a plan to inspect each assembly that requires additional inspections

Inspection of Fire Resistive Construction

• Have your inspection tools such as a flashlight, coring device, depth gauge, calipers, tape measure, etc.
• Review the general layout of the assembly
• Verify the building materials being utilized match those described in the approved design
• Verify installation of proprietary materials

Inspection of Fire Resistive Construction

• For board products, verify the type, manufacturer, thickness and orientation match what is described in the approved design
• Verify fastener type, size and spacing for compliance with the approved design
• For insulation products, verify the type, manufacturer, thickness and density match what is described in the design

Inspection of Fire Resistive Construction

• What to do if Fire Resistive Assembly is not in accordance with approved plans
  • Notify ALL affected persons of deficiencies in a timely manner
  • Reinspections required to verify compliance
  • May need to Partially Approve or Stop Work on part of the project

When Inspecting Existing Buildings

You will walk past problems
Fire-rated corridor: The way you might find it
Fire-rated corridor: The way it should be
Reference Materials

• ASTM E605 – “Standard Test Methods for Thickness and Density of Sprayed Fire Resistive Material Applied to Structural Members”

Reference Materials Cont.

• Association of Wall and Ceilings Industry – Technical Manuals 12-A and 12-B
• International Firestop Council Video – Inspecting Firestop for Compliance

Reference Materials Cont.

• Online Directories from the Certification Organizations
  • FM Approvals – www.fmapprovals.com
  • Intertek Testing Services – www.interteck.com
  • UL Solutions – www.UL.com/PiQ

Available Resources

• Association of Wall and Ceilings Industry (AWCI) – www.awci.org
• Fire Safe North America (FSNA) – www.firesafena.org
• Firestop Contractors International Association (FCIA) – www.fcia.org
• National Fireproofing Contractors Association (NFCA) – www.nfca-online.org

Available Resources Cont.

• Gypsum Association (GA) – www.gypsum.org
• International Firestop Council (IFC) – www.firestop.org
• Underwriters Laboratories (UL) – www.ul.com

Thank You for Attending!!!

Rich Walke
Technical Director
Creative Technology Inc.

RichWalke61@gmail.com
(847) 274-0283
### UL’S NUMBERING SYSTEM FOR FIRE-RESISTANCE-RATED DESIGNS

<table>
<thead>
<tr>
<th>Types of Protection</th>
<th>Membrane Protection</th>
<th>Direct-applied Protection</th>
<th>Unprotected</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Groups of Construction</strong></td>
<td><strong>Membrane Protection</strong></td>
<td><strong>Direct-applied Protection</strong></td>
<td><strong>Unprotected</strong></td>
</tr>
<tr>
<td><strong>Fires—Ceilings:</strong> A or B* Concrete and Cellular Steel Floor</td>
<td>Concealed Grid System</td>
<td>Metal Lath</td>
<td>Misc. Spray-applied Fire-resistant Material</td>
</tr>
<tr>
<td><strong>C—Glazing Systems</strong></td>
<td>(Reserved)</td>
<td>(Reserved)</td>
<td>(Reserved)</td>
</tr>
<tr>
<td><strong>E</strong> or <strong>F</strong> Concrete and Steel Floor Units</td>
<td>Concealed Grid System</td>
<td>Exposed Grid System</td>
<td>Mineral and Fiber Boards</td>
</tr>
<tr>
<td><strong>G</strong> or <strong>K</strong> Concrete and Steel Joists</td>
<td>Concealed Grid System</td>
<td>(Reserved)</td>
<td>(Reserved)</td>
</tr>
<tr>
<td><strong>I—Non-load-bearing Horizontal Barrier</strong></td>
<td>(Reserved)</td>
<td>(Reserved)</td>
<td>(Reserved)</td>
</tr>
<tr>
<td><strong>J—Concrete</strong></td>
<td>Concealed Grid System</td>
<td>Exposed Grid System</td>
<td>Mineral and Fiber Boards</td>
</tr>
<tr>
<td><strong>L—Wood Joist or Combination Wood and Steel Assemblies</strong></td>
<td>Concealed Grid System</td>
<td>(Reserved)</td>
<td>(Reserved)</td>
</tr>
<tr>
<td><strong>Beams:</strong> N or O* for Floor-Ceiling</td>
<td>Concealed Grid System</td>
<td>Exposed Grid System</td>
<td>Blatts and Blankets or Mineral and Fiber Boards</td>
</tr>
<tr>
<td><strong>Roof-Ceiling:</strong> P, Q*, or R*</td>
<td>Concealed Grid System</td>
<td>Exposed Grid System</td>
<td>Mineral and Fiber Boards</td>
</tr>
<tr>
<td><strong>Beams:</strong> S or T* for Roof-Ceiling</td>
<td>Building Units</td>
<td>Exposed Grid System</td>
<td>Mineral and Fiber Boards</td>
</tr>
<tr>
<td><strong>Wall and Partition:</strong> U, V, or W</td>
<td>Building Units</td>
<td>Insulating and Precast Concrete</td>
<td>Wood Stud, Gypsum Board, Lath and/or plaster</td>
</tr>
<tr>
<td><strong>Columns:</strong> X, Y, or Z*</td>
<td>Building Units</td>
<td>Pre-fabricated</td>
<td>Blatts and Blankets or Mineral and Fiber Boards</td>
</tr>
</tbody>
</table>
UL Product iQ™
The next generation of UL’s online certification directory

*Product iQ enables you to access the same trusted UL certification information you’re used to receiving via the original Online Certification Directory (OCD). You can quickly and efficiently explore content in the modern search engine powered by an intelligent algorithm that yields accurate results.*

**Top 5 Things to Know About Product iQ**

1. **Access the same trusted UL certification data.**
   Product iQ gives you access to same trusted UL certifications information as the OCD so you can research a UL listing, classification, or recognition. You can also verify the use of a UL listed/recognized product or component, or confirm a product safety standard.

2. **Experience a clean interface with superior usability.**
   Product iQ offers a modern platform, specifically designed for the exchange of technical information. The intuitive design and well-organized navigation allow efficient and productive searches. You can access the platform on your mobile device anywhere you have an internet connection.

3. **Pinpoint the exact content you need.**
   Product iQ’s intelligent algorithm and powerful search tools help you locate exactly what you need. Start with guided keyword search or build custom, complex queries of the properties most important to you. Multiple search refinement filters hone your results to an even more relevant set.

4. **Personalize your account.**
   Product iQ opens to a personalized dashboard that displays your search history for quick and convenient reference. The Power Search feature allows you to build searches using the exact parameters you need.

   **BUILD YOUR REFERENCE LIBRARY**
   Tag content with your custom phrases to facilitate and simplify content organization.

5. **Get a confirmation letter of UL compliance in one click.**
   Any user at the Product iQ basic subscription level has one-click access to a UL Confirmation Letter that verifies compliance to requirements for any company or product on official UL letterhead.

For more information visit productiq.ul.com
About the IFC
The International Firestop Council (IFC) is a not-for-profit association of manufacturers, inspectors, and users of fire protective materials and systems. IFC is THE Source of Firestop Expertise that provides impartial and authoritative information, knowledge, resources, affiliation, techniques, and testing, to key stakeholders with an interest in passive fire protection (e.g. AHJ’s, contractors, manufacturers, other associations, fire services, owners, engineers, architects) because of our commitment and investment in industry research, development, testing, codes and standards advocacy, and manufacturing and unbiased and broad-based knowledge and representation. These recommended guidelines are presented as part of IFC’s educational information program. They are intended for informational and educational purposes.

The Premise of Firestop Systems
Firestop systems deter the passage of fire, hot gases and toxic smoke through openings in walls, floors and floor/ceiling assemblies for through penetrations, membrane penetrations, joints, blanks, gaps, voids and ducts. These systems are required by building codes to be tested and rated as part of an assembly in accordance with an approved test standard. Some of these are tabulated below:

<table>
<thead>
<tr>
<th>Application</th>
<th>Test Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service penetrations (e.g. pipes, cables, ducts)</td>
<td>ASTM E814, UL1479, CAN/ULC-S115, EN1366-3, EN 1366-5, ISO 10295-1</td>
</tr>
<tr>
<td>Joint System</td>
<td>ASTM E1966, UL2079, CAN/ULC-S115, EN1366-4, ISO 10295-2, BS 476 Part 20</td>
</tr>
<tr>
<td>Perimeter Joint Firestops (e.g. exterior wall/floor intersections)</td>
<td>ASTM E2307, EN 1366-4</td>
</tr>
<tr>
<td>Continuity Head-of-Wall Joints (e.g. rated wall to non-rated floor/roof intersections)</td>
<td>ASTM E2837</td>
</tr>
<tr>
<td>Grease Ducts</td>
<td>ASTM E2336, UL2221, CAN/ULC-S144, EN1366-1, AS1530.4</td>
</tr>
<tr>
<td>Ventilation Ducts</td>
<td>ASTM E2816 (AC179), ISO 6944, EN1366-1, EN1366-8, AS1530.4</td>
</tr>
</tbody>
</table>
All elements of a tested and rated firestop system, including the assembly into which the system is installed, constitute a specific and inseparable engineered unit that must be utilized as such. Firestop system designs are tested and listed by independent testing agencies such as Underwriters Laboratories, Inc. (UL), Underwriters Laboratories of Canada (ULC), and Intertek. The specific elements of each design become integral to the listing.

When field conditions differ from original design or unanticipated construction hindrances are encountered and the field conditions cannot be easily or cost effectively redesigned, design recommendations are typically made to propose alternative methods that ensure performance of the firestop system is not compromised. These are sometimes referred to as “Engineering Judgments or EJs”, although other terms may apply dependent upon local practice. Since these recommendations are not based upon identical designs as that which were fire tested, it is important that they be developed using sound engineering principles and good judgment.

Construction industry professionals, building officials, fire officials, firestop contractors and other stakeholders need appropriate guidelines for evaluating and using such judgments. As such, IFC developed Recommended IFC Guidelines for Evaluating Firestop Systems Engineering Judgments (EJs).

**IFC EJ Guidelines**

EJs for firestop systems should:

1. Not be used in lieu of tested systems when available;

2. Be issued only by a firestop manufacturer's qualified technical personnel or in concert with the manufacturer by a knowledgeable registered Professional Engineer, Fire Protection Engineer, or an independent testing agency that provides listing services for firestop systems;

3. Be based upon interpolation or extension of previously tested firestop systems that are either sufficiently similar in nature or clearly bracket the conditions upon which the judgment is to be given. Additional knowledge and technical interpretations based upon accepted engineering principles, fire science and fire testing guidelines (e.g. ASTM E 2032 – Standard Guide for Extension of Data From Fire Resistance Tests Conducted in Accordance with ASTM E 119, ULC Subject C263E – Criteria for Use in Extension of Data from Fire Endurance Tests, or ASTM E2750 – Standard Guide for Extension of Data from Penetration Firestop System Tests Conducted in Accordance with ASTM E814) may also be used as further support data;

4. Be based upon full knowledge of the elements of the construction to be protected and the understanding of the probable behavior of that construction and the recommended firestop system protecting that construction if it was subjected to the appropriate Standard Fire Test method for firestops for the rating indicated on the EJ;
5. Be limited only to specific conditions and configurations upon which the EJ was rendered and should be based upon reasonable performance expectations for the recommended firestop system under those conditions;

6. Be accepted only for a single, specific job and project location and should not be transferred to any other job or project location without thorough and appropriate review of all aspects of the next job or location’s circumstances.

**Basic Presentation Requirements**
Proper EJs should:
1. Be presented in appropriately descriptive written form with or without detail drawings where appropriate;
2. Clearly indicate that the recommended firestop system is an EJ;
3. Include clear directions for the installation of the recommended firestop system;
4. Include dates of issue and authorization signature as well as the issuer’s name, address and telephone number;
5. Reference tested system(s) upon which design (EJ) is based on;
6. Identify the job name, project location and firm EJ is issued to along with the non-standard conditions and rating supported by the EJ;
7. Have proper justification (i.e. UL, ULC, Intertek, SWRI or other independent laboratory system(s) and or opinions);
8. Provide complete descriptions of critical elements for the firestop configuration. These should include, but not be limited to the following:
   a. Basic, Common
      - Type(s) of assembly used or being penetrated;
      - Rating supported by the EJ.
   b. Through Penetrations
      - Penetrating item(s) (type, size, etc.);
      - Annular space requirements, (minimum, maximum, actual, nominal, etc.)
      - Opening size;
      - Firestop product(s) to be used, type and amount (thickness if applicable);
      - Accessory item(s) (i.e. anchors, backing material, etc.)
   c. Joints
      - Joint Width (installed width, nominal)
      - Movement Capability;
      - Movement Class (thermal, wind sway, seismic);
      - Accessory item(s) (i.e. insulation type, thickness and compression, etc.)
   d. Duct Enclosure Systems
      - Duct System Type (i.e. kitchen exhaust, hazardous material exhaust, ventilation, supply/return, etc.);
• Duct Construction – dimensions, material, gauge, reinforcement, connections, orientation (horizontal, vertical or both);
• Enclosure System – brand name designation, description, fire resistance rating;
• Thickness, density, number of layers, fire rating, clearance to combustibles, material joints, mechanical attachment to duct, duct support system, access door construction.
• Firestop System – annular space dimensions, floor/wall construction, design number, components, installed thickness.

e. Perimeter Fire Barrier Systems
  • Type(s) of assembly used (i.e. Glass, Aluminum, Granite, Concrete, etc.)
  • Hourly rating required
  • Closest Listed System upon which the EJ is based.
  • Joint Width
  • Static or Dynamic
  • Safing Insulation Type(s), thickness and compression, etc.
  • Curtain Wall Insulation Type(s), thickness (if required).
  • Five Basic Principles
    1. Mechanical Attachment of the Spandrel Insulation
    2. Protection of the Mullions
    3. Compression fitting and orientation of the Safing Insulation
    4. Installation of a Reinforcement Member(s), stiffener, at the safe-off area behind the spandrel insulation.
    5. Firestop Coating, type, thickness

f. Continuity Head-of-Wall Joints
  • Joint Width (installed width, nominal)
  • Movement Capability;
  • Movement Class (thermal, wind sway, seismic);
  • Accessory item(s) (i.e. insulation type, thickness and compression, etc.)

IFC recommends that these guidelines be considered when evaluating whether any firestop system EJ meets minimal requirements. Questions concerning the EJ request should be addressed to the initiator of the design recommendation.