



Firestop Contractors International Association

FCIA's DIIM™ Webinar

January 29, 2025

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FCIA – Firestop Contractors International Association

- **Fire Exits??**
- **Thanks – FCIA & NFCA Members**
 - Contractors
 - Manufacturers, Consultants
 - Firestop Distributors, Reps, Friends

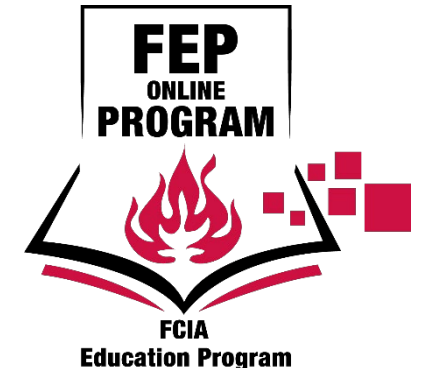
FCIA's DIIM™ Worldwide

- UL/ULC, FM 4991 Contractor Programs
- UL Qualified Fireproofing Contractor Pgm.
- ASTM Inspection Standards
- IAS AC 291 Inspection Agency Accreditation Program
- Firestop Education Program
 - Contractor, Inspection Agency, AHJ, Others
- **Specs, etc.** for Specifiers, AHJ's, Building Owners, Firestop Contractors & Inspection Agencies



FCIA's DIIM™ Worldwide

- FCIA's --
 - Life Safety Digest
 - Firestop Manual of Practice
 - **Firestop Education Program**
 - **\$1000/company/year...UNLIMITED USE**
 - Education for FM & UL Firestop Exams
 - Code Development
 - Standards Development
 - Much more...



Firestopping & Compartmentation for Safety

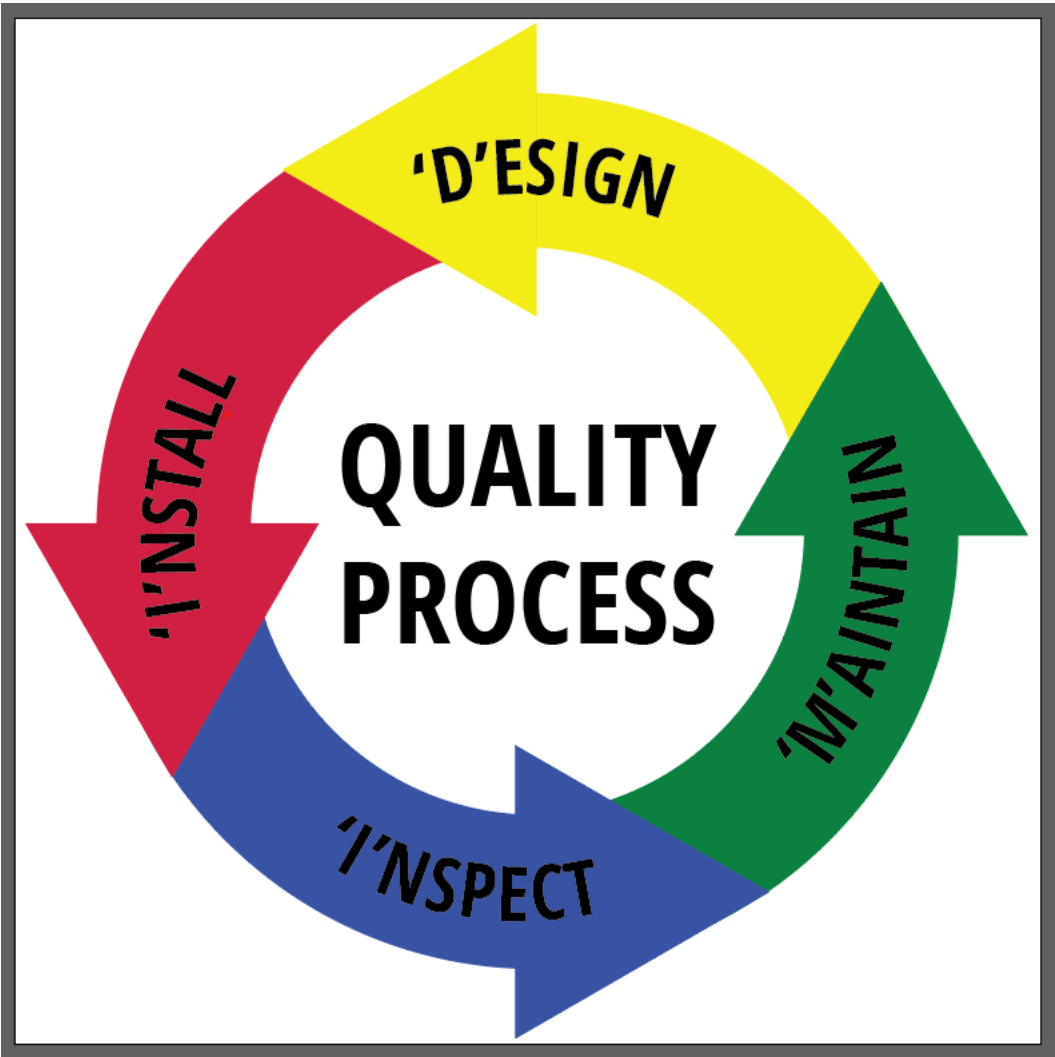
- **Building Stats...*North America***
- ***Approx. 11,000+ 20 story+ Tall Buildings,***
- ***70% in NY, SF, LA, CHI, HI, Toronto...***
- ***Fire Resistance & Compartmentation Primary...***
 - ***Older Designs = Fire-Resistance/Compartmentation***
 - ***Sprinklers, Detection/Alarms added later***
 - ***Earthquakes***

• *Source, Emporis.com*

Specs, Code

FCIA's DIIM™

FM 4991/UL QFCP
Programs AND
Mfr. Education



PFP/BARRIER
MANAGEMENT
Fire Codes

IBC Ch. 17 - NFPA 80 - NFPA 1

Building & Fire Code Requirements

- NFPA 5000 – 101
- International Codes –
 - New and Existing Buildings International Building Code
 - International Fire Code
- Chicago Building Code 2019 [= IBC 2018, with AMENDMENTS]
- National Building Code of Canada
- UAE Fire and Life Safety Code
- National Building Code of India
- Other Worldwide Codes....
- ***Minimum requirements - Construction & Maintaining Protection***

Fire Resistance – Terms

- **FIRE RESISTANCE.** That property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases or flames under conditions of use.
 - ***ASTM E119, UL 263, CAN/ULC-S-101, etc.***



Code Requirements Cont.

- Chapter 7 – Fire and Smoke Protection Features
 - 703.2 – Fire-resistance ratings shall be determined in accordance with Section 703.2.1 or 703.2.2 **without the use of automatic sprinklers or any other fire suppression system being incorporated**, or in accordance with Section 703.2.3
 - 703.2.1 **Tested assemblies** – Fire-resistance ratings shall be determined in accordance with ASTM E119 or UL 263
 - 703.2.1.1 – Nonsymmetrical walls shall be tested from both faces

Structural & Compartmentation....Unified

- **Connected via Continuity & Support ... See IBC '24 Fire Barrier Section 707**
- **707.5.1 Supporting construction.** The supporting construction for a *fire barrier* shall be protected to afford the required *fire-resistance rating* of the *fire barrier* supported.
- **707.5 Continuity.** *Fire barriers* shall extend from the top of the foundation or floor/ceiling assembly below to the underside of the floor or roof sheathing, slab or deck above and shall be securely attached thereto. Such *fire barriers* shall be continuous through concealed space, such as the space above a suspended ceiling. *Joints* and voids at intersections shall comply with Sections 707.8 and 707.9
- ***Fire-Resistance is Continuous...***

Standard Tests Establish Fire-Resistance

- US/UAE, Other areas
 - ASTM E119
 - NFPA 251 (Withdrawn)
 - UL 263
- Canada
 - ULC-S101
- Euro/India/UK
 - ISO 834
 - BS476/EN 1363



Barrier Continuity SYSTEMS

- **Products Become Systems – Test Standards**
 - **Fire & Smoke Barriers – Fire Separations**
 - ASTM E119, UL 263
 - **Firestopping –**
 - UL 1479, ASTM E814, FM 4990, UL 2079, E1966, E2307, E2837, E3037...test methods...”
 - **Swinging/Rolling Fire Doors – UL 10B & UL 10C....NFPA 252**
 - **Fire Rated Glazing – UL 9, NFPA 257, UL 263, ASTM E119**
 - **Fire/Smoke Dampers – UL 555, UL 555S, UL 555C**
- **SYSTEM Testing = Suitability Statement**

Building Components

- **Columns** – *Supporting Construction*,
 - (X, Y, Z)
- **Beams** – *Supporting Construction*
 - (N, O)
- **Floor/Ceilings or Roof/Ceilings** – *Supporting Construction, Compartmentation*
 - (A-M, P, Q, R)
- **Walls** – *Compartmentation, Supporting Construction*
 - (U, V, W)

Time Temperature Curve

Structural, Compartmentation, Breach

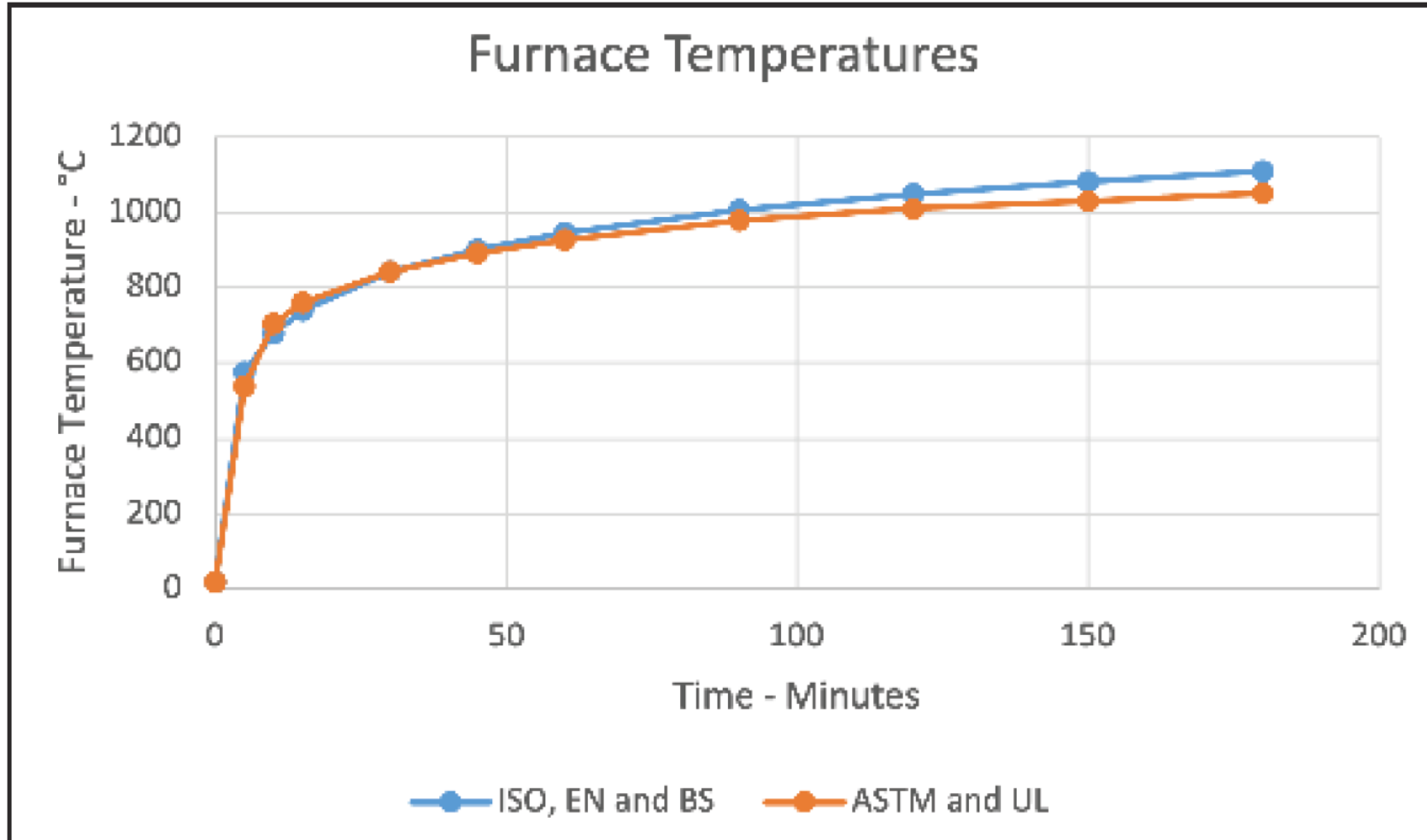
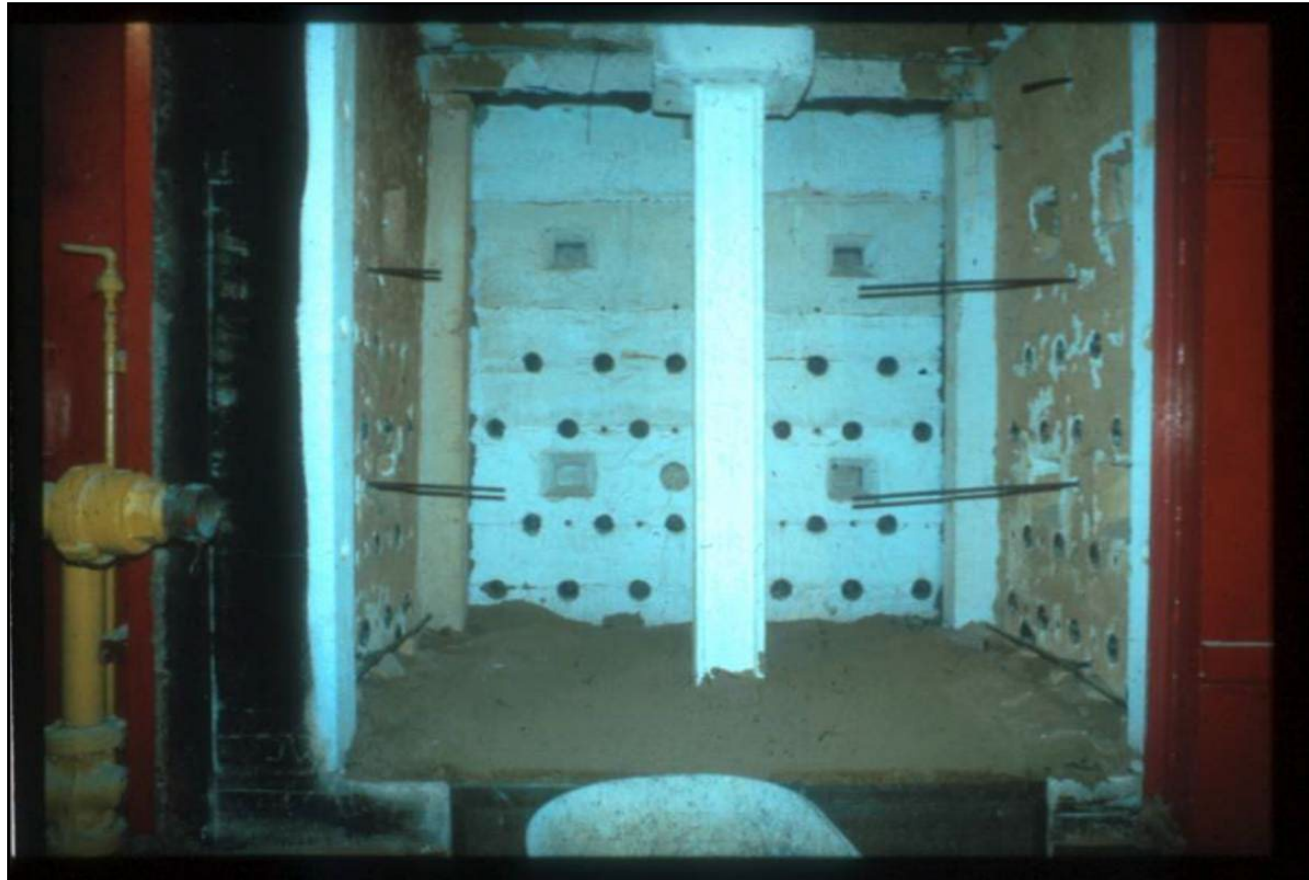


Figure 1 - Comparison of furnace temperatures, the time/temperature curve
Berhinig Image

Columns

- Sample size – Minimum approx. 3m, (9 ft)
- Most often tested unloaded



Conditions of Acceptance – Columns

- 537°C (1000°F)
648°C (1200°F)

OR

Support load if
tested load bearing



UL Image

Beams

- Sample size – Minimum approx. 4 m (12 ft)
 - “Full Scale”
- Load applied – Per design
 - How Many Beams = No Load?





UL Image



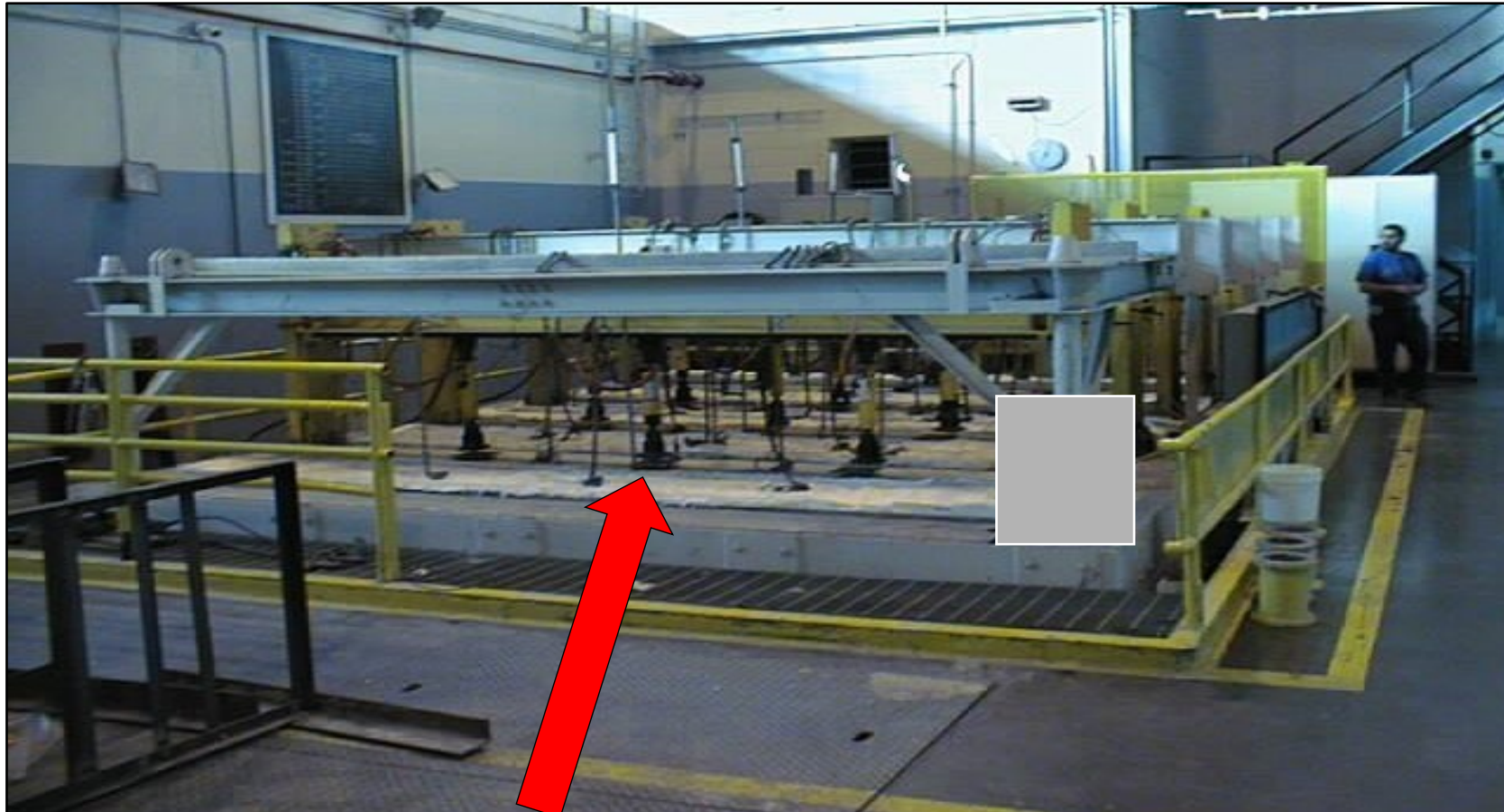
UL Image; Raymond Image



UL Image

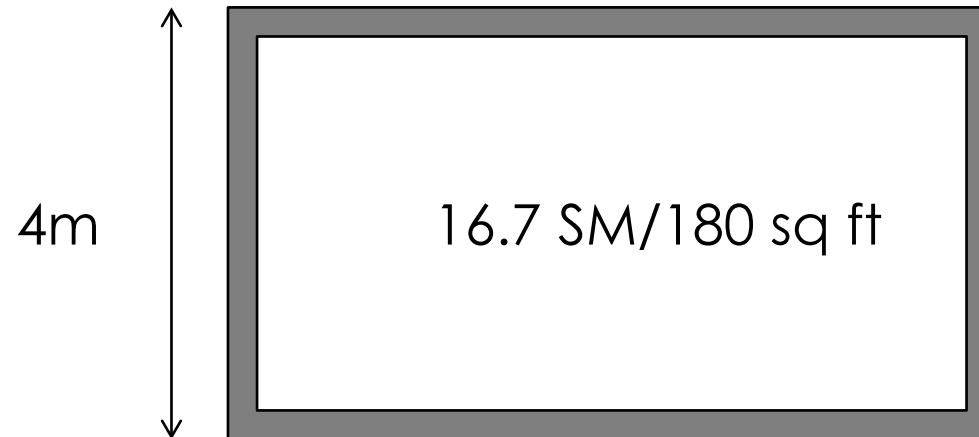
Conditions of Acceptance – Beams

- Support load
- **593°C (1100°F) / 704°C (1300°F)**



Floor/Ceiling or Roof/Ceilings

- Sample size – 16.7 sq m (180 sq ft) / 4 m (12 ft)
- ***Full Scale, Load applied*** – Per design





UL Image



UL Image

Conditions of Acceptance

Floor/Ceilings or Roof/Ceilings

- Support load
- Flame passage
- 139°C (250°F) / 181°C (325°F) Temperature Rise
- Support temperatures



Fire-Resistance Testing – ASTM E119/UL263

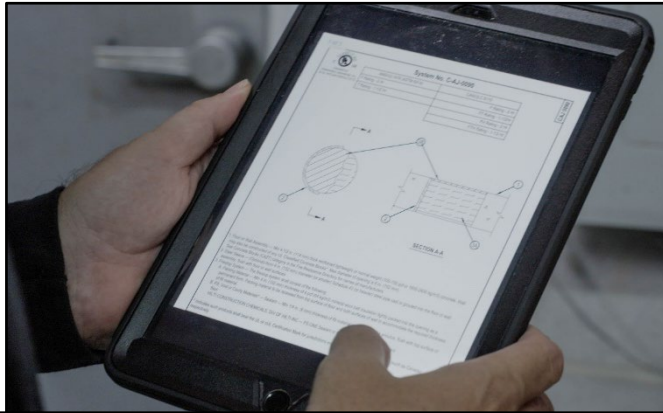
- Columns
- Beams
- Floor/Ceilings or Roof/Ceilings
- **Walls**

Building & Fire Code Requirements


- Compartment & Structural Fire Protection Terms - **US**
 - *Exterior Walls & Horizontal Assemblies*
 - *Fire Walls (IN-Fire Wall or Fire Separating Wall)*
 - *Fire Compartment (UK/IN)*
 - *Fire Barrier (IN-Fire Resisting Barrier)*
 - *Fire Partitions (Not in NFPA)*
 - *Fire Separations (CAN)*
 - *Smoke Barriers*
 - *Smoke Partitions*
 - *Archaic Assemblies*

Systems & Materials ...

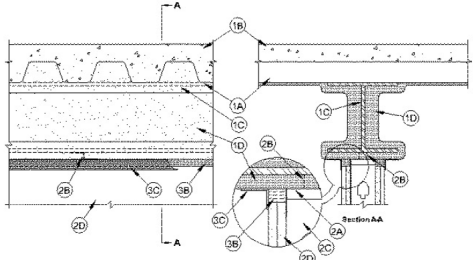
Structural & Effective Compartmentation



UL Product iQ®

SEARCH MY SEARCHES MY TAGS BILL  Solution

| | |
|---|---|
| Class II Movement Capabilities — 50% or 100 % Compression or Extension (See Item 3) | FH Ratings — 1 and 2 Hr (See Item 1) |
| L Rating At Ambient — Less Than 1 CFM/sq ft | FTH Ratings — 1 and 2 Hr (See Item 1) |
| L Rating At 400 F — Less Than 1 CFM/sq ft | Nominal Joint Width - 19 or 38 mm (See Item 3) |
| | Class II Movement Capabilities — 50% or 100 % Compression or Extension (See Item 3) |
| | L Rating At Ambient — Less Than 1.55 L/s/m |
| | L Rating At 204 C — Less Than 1.55 L/s/m |



1. **Floor Assembly** — The fire-rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D700, D800, or D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:

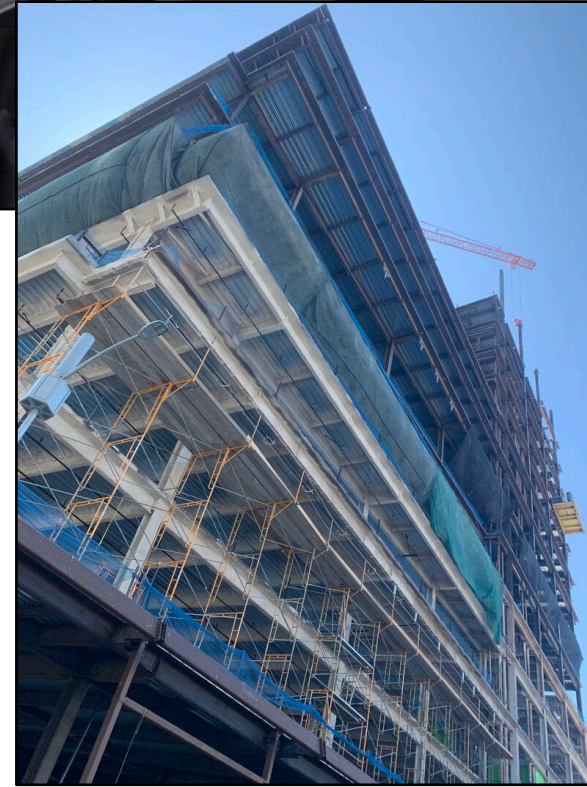
A. **Steel Floor And Floor Units*** — Max 3 in. (76 mm) deep galv steel fluted floor units.

B. **Concrete** — Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

C. **Structural Steel Support** — Steel beam, as specified in the individual D700, D800, or D900 Series Floor-Ceiling Design, used to support steel floor units. Steel beam centered over and parallel with wall assembly.

D. **Spray-Applied Fire Resistive Material*** — After installation of the steel attachment clips (Item 2B), steel floor units and structural steel support to be sprayed with the min thickness of material specified in the individual D700, D800, or D900 Series Design. The flutes of the steel floor units are to be filled with material across the entire top flange of the steel beam. **Additional material shall be applied to the web of the steel beam on each side of the wall. For a 1 hr Assembly Rating, the thickness of material applied to each side of the steel beam web shall be 1-3/8 in. (35 mm). For a 2 hr Assembly Rating, the thickness of material applied to each side of the steel beam web shall be 13/16 in. (21 mm).**

GCP APPLIED TECHNOLOGIES, INC. © 2014 GCP



Building & Fire Codes – Assemblies/Breaches

Similar Fire Test Time-Temperature Curves

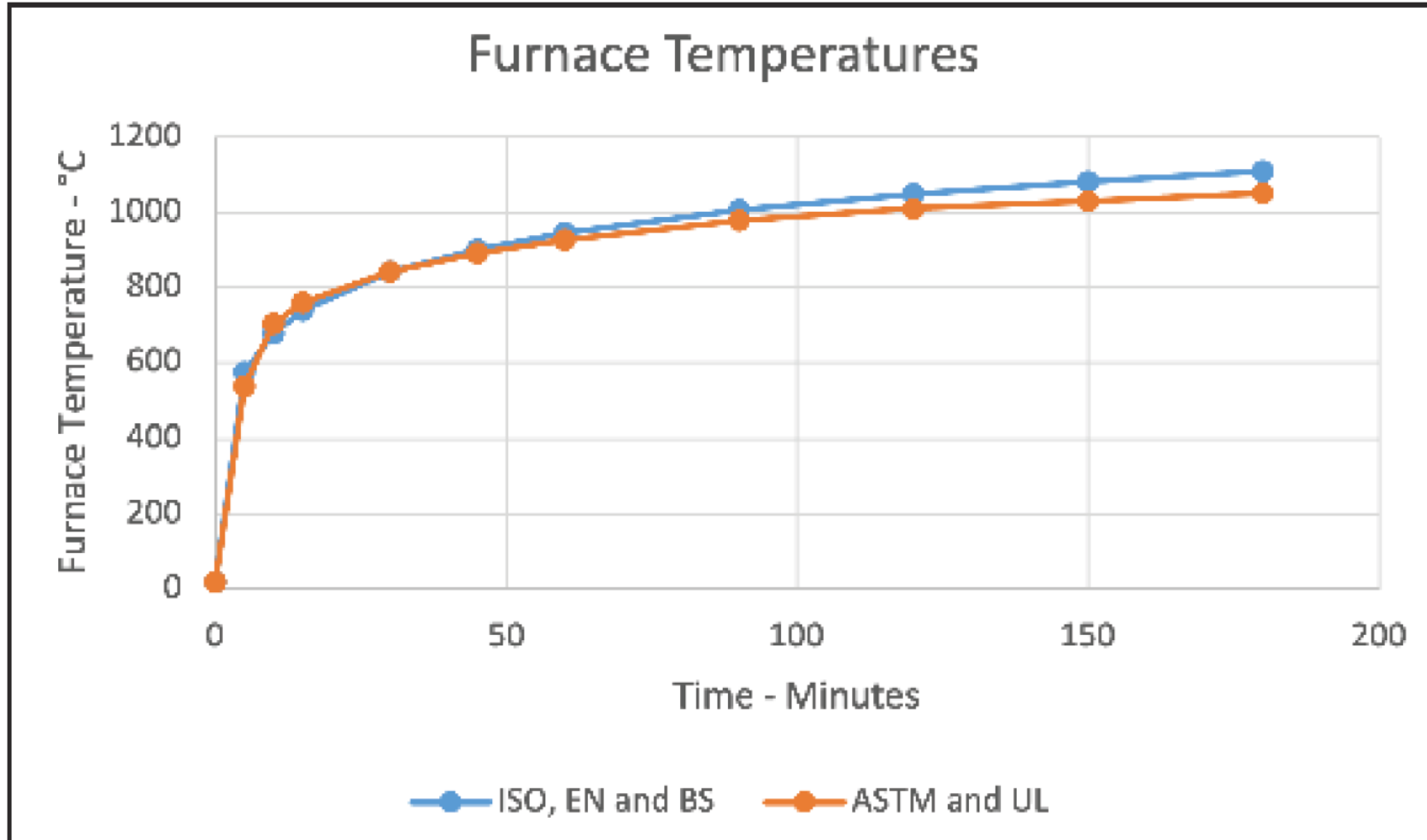


Figure 1 - Comparison of furnace temperatures, the time/temperature curve
Berhinig Image

Wall Testing Furnace



USG Photo

Walls – U, V, W

- **Tested in accordance with ...'**
 - Standards – ASTM E119, UL 263, CAN/ULC-S101
 - Flame Passage
 - Heat Transmission
 - **Hose Stream Test**
 - BS476, EN 1363, IS 3809
 - **Insulation**
 - **Integrity**
- **No Contractor Qualifications**
- **Special Inspection??**



USG Photo

Gypsum Panel Walls

- Gypsum Panel Core Types – Regular, X, C
- Test Standard & Acceptance Criteria-*ASTM E119* & *UL 263*
- Gypsum Panel Repairs



Gypsum Panel Repairs

- NFPA 1: 12.3.3.2 Where required, **fire-rated gypsum wallboard** walls or ceilings that are damaged to the extent that through openings exist, the damaged gypsum wallboard shall be **replaced or returned to the required level of fire resistance using a listed repair system or using materials and methods equivalent to the original construction.**
- Simply covering a hole or damaged area **is not a repair**
- **GA 225 – Repair of Fire-Rated Gypsum Panel Product Systems**
- ***Must contact manufacturer to verify listed repair method***

Gypsum Panel Repairs

- GA-225 – Repair of Fire-Rated Gypsum Panel Product Systems



Figure 1: Damaged Gypsum Panel



Figure 2: Square Off Damaged Area

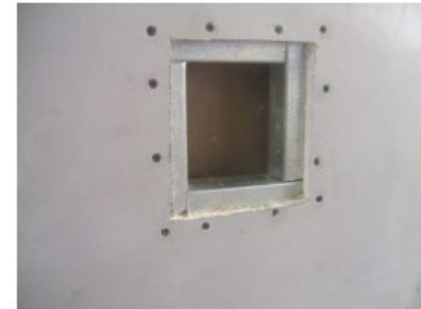


Figure 3: Frame Opening



Figure 4: Apply Gypsum Panel Patch



Figure 5: Tape and Finish Patched Area

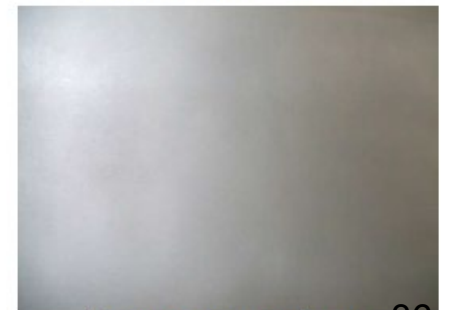
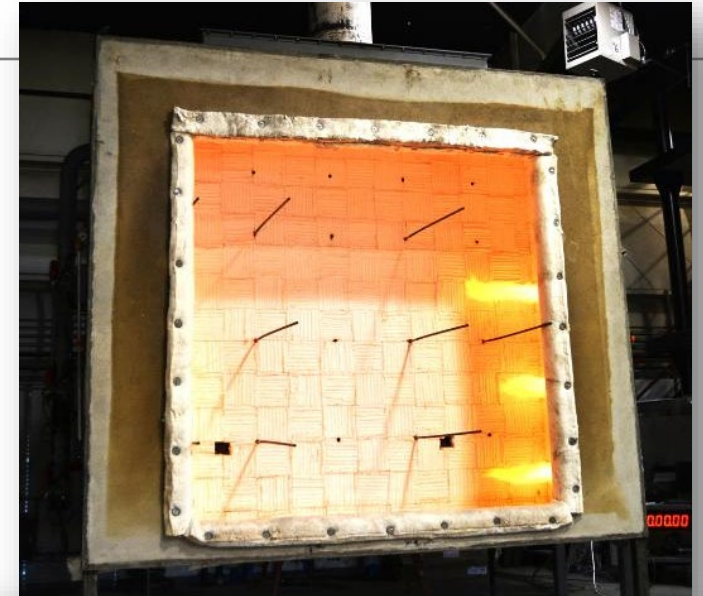


Figure 6: Redecorate Repaired Area

Fire, Smoke, Combo, Radiation Damper Standards

- **UL 555** - standard for Fire dampers
- **UL 555S** - standard for Smoke dampers
- **UL 555C** - standard for Ceiling Radiation dampers
- CAN/ULC-S112 (Fire), 112.1 (Smoke Control)
- ISO 21925-1:2018 – Fire Dampers
- EN 1366-2 Fire Resistance (Integrity E), Smoke Leakage, (S)
- Contractor Qualifications? Inspection, NFPA 80



Fire Dampers & Compartmentation



Fire Damper Annular Space?

FCIA Images



Fire Rated Glazing & Compartmentation



TGP Image

Standards

Fire-Protection-Rated Glazing

- When Used in Fire Door Assemblies
 - UL 10B
 - UL 10C
 - NFPA 252
- Fire Window Assemblies
 - UL 9
 - NFPA 257
- ***NBC references NFPA 80, CAN/ULC-S106***
- ***ISO – 12543 – Heat, Flame***
- ***EN 1363, 1364, 1365, Heat, Flame in minutes...***

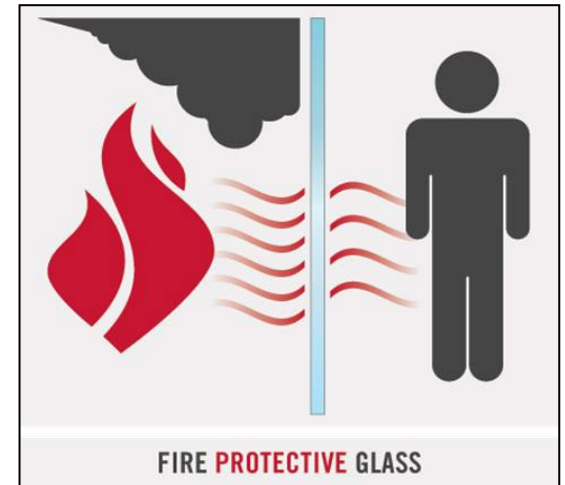
Fire Door / Window Assembly Under Test



Conditions of Acceptance

Fire-Protection-Rated Glazing

- Flame Passage
- Hose Stream after Full Duration Fire Exposure
 - Limited Openings (Max 5% Fall-Out) Permitted
- Fire-Protective = Does not limit Radiant Heat; not a wall!
- Contractor Qualifications? Inspection?
- NFPA 80, Inspection, Maintain Protection



Fire Door Assemblies Under Test



Hose Stream Test



Fire Door and Shutter Assemblies – IBC Section 716

- IBC Referenced Standards
 - Side-hinged or pivoted swinging doors - UL 10C or NFPA 252 (positive pressure)
 - Tin-clad fire door assemblies - UL 10A, UL 14B, and UL 14C
 - Other types of doors - UL 10B or NFPA 252 (neutral pressure)
- ISO 3008-1:2019 & ISO 834-1
- BS EN 1634 & BS 476

Firestopping for Continuity

Products become **SYSTEMS** Based on Testing

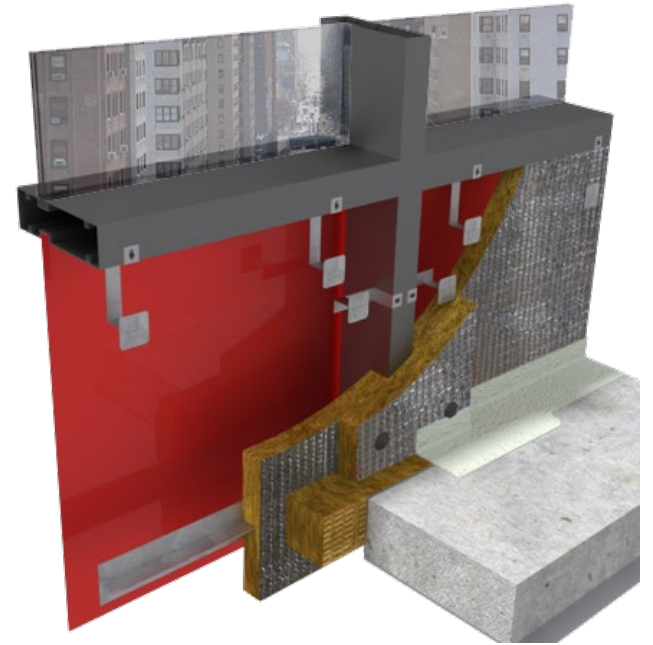
- ‘Field Erected Construction...Tested to...’
 - Standards – UL 1479, ASTM E814, FM 4990, UL 2079, ASTM E1966, ASTM E2307, ASTM E2837
 - F Rating – Flame/Hose in US
 - T Rating – Temperature/Hose in US
 - L Rating – Smoke
 - W Rating – Water
 - M Rating – Movement
 - H – Hose Stream Test in Canada
 - ISO 10295-1 – F & T...
 - EN 1366-3 – F & T ...



3M Image

IBC & Curtain Walls – **ASTM E2307**

- Prevent Fire Spread – @ **Interior** Safing Slot
 - Interior Flame
 - Exterior Flame Plume from Window
 - Time & Temperature
 - Tested Systems....
- EN 13501-2



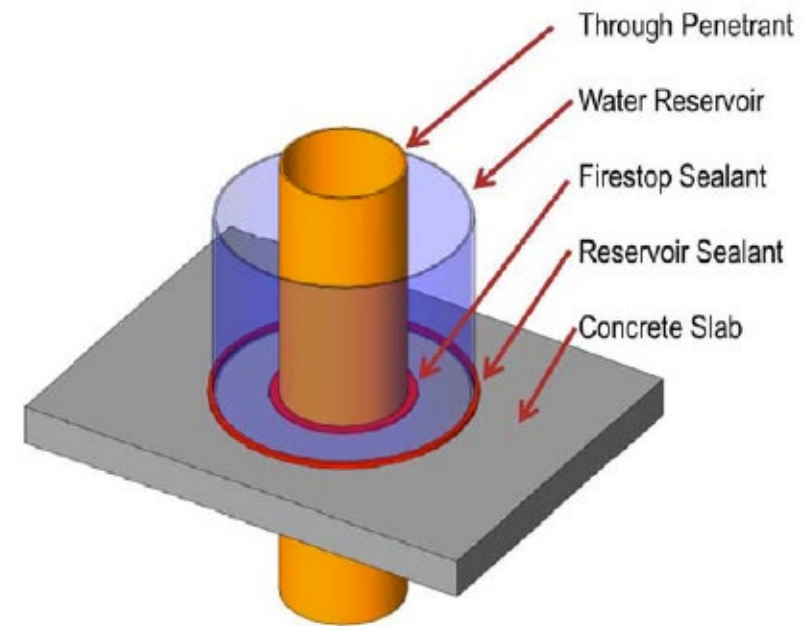
OCF/Thermafiber Graphics

“L” Ratings - Smoke Barriers & Firestopping

- Smoke Barriers differ from Smoke Partitions?
 - **Smoke Barrier** –
 - **IBC** – Hourly Rated, “restricting the passage of smoke”
 - Quantified Firestop “L” Rating
 - < 5 cfm/sf (IBC 2006)
 - < 50 cfm per 100 sf of Wall Area (IBC 2009)
 - **NFPA** – ... ‘restricting the passage of smoke’...
 - Hourly Rated, Quantified Firestop L Rating Chapter 8
 - NO quantified “L” Rating ... Healthcare Chapter
 - Continuous, Barrier to Barrier, ... through concealed spaces
 - Not always fire-resistance-rated
 - **Smoke Partition** –
 - **IBC** – Continuous barrier, not fire rated... ‘retard’
 - **NFPA** – Continuous membrane that is designed to form a barrier to *limit the transfer of smoke*....

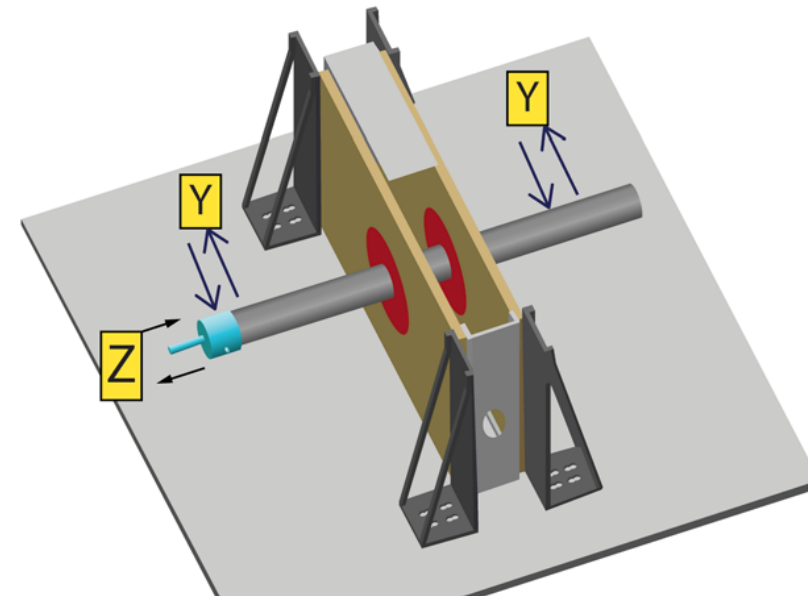
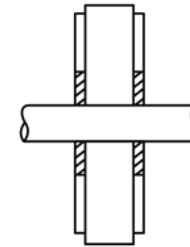
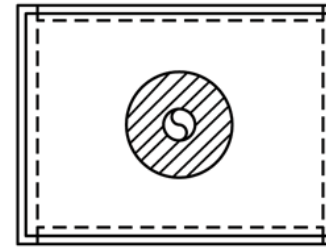
W Rating (Optional)

- W Rating – UL 1479
 - 0.91 m (36") Water, Water Column 72 hrs
 - Class 1 = No Leakage
 - Must Pass Fire & Hose Stream Test After Water Exposure



M Rating (Optional)

- M Rating – ASTM E3037
 - Move Specified Amount
 - Must Pass Fire & Hose Stream Test After Movement



ASTM Image

Building & Fire Worldwide Code Requirements

- *Chemical, Biological, Radiation, Explosion, Germ, etc.*
 - Standards?
 - C – Which Chemicals? Check with manufacturer
 - B – Which Agents? Check with manufacturer
 - R – Nuclear Power Plant Standards? Check with manufacturer
 - E – Blast Strength? Check with manufacturer
 - G – Germ – Check with manufacturer & industrial hygienist
 - How to Regulate for Unexpected Events?
 - Due Diligence – Review Required by code?
 - **SPECIFIED ...**

Barrier Continuity Products become SYSTEMS

- Fire Rated Systems Directories –
 - FM Approvals
 - Intertek
 - UL/ULC Product iQ Online Directory



Systems Selection & Analysis...Not as easy as it looks...

A screenshot of the UL Product iQ website. The header is red with "UL Product iQ™" on the left and "SEARCH MY SEARCHES M" on the right. Below the header is a navigation bar with "Dashboard / Search / THROUGH-PENETRATION FIRESTOP SYSTEMS | UL Product iQ". The main content area displays "XHEZ.C-AJ-8038 - THROUGH-PENETRATION FIRESTOP SYSTEMS". At the bottom, there are three tabs: "DETAILS", "RESOURCES", and "TAGS".A screenshot of the Intertek Directory of Building Products website. The header is "INTERTEK DIRECTORY OF BUILDING PRODUCTS". Below the header is a search bar with the text "Search and view information on the Directory of Building Products, including Product Listings, Code Compliance Research Reports (CCRRs), Certificates of Compliance (COCs), Quality Assurance, and Industry Programs." To the right of the search bar is a "RESOURCES" section with a list of links: "Intertek BBC", "Product Directories", "AHJ Resources", "SpecDIRECT", "My TestCentral", and "Fire Door Categories". Below the search bar are several dropdown menus for "Company", "Listing Category", "CSI Code", "Standard", "Keywords", "Spec ID", "COC #", and "Design Document". There are also checkboxes for "Limit results to listings with code compliance research reports (CCRRs)" and "Limit results to listings with certificates of compliance (COCs)". At the bottom are "SEARCH" and "RESET" buttons. The Intertek logo is visible in the bottom right corner.

Engineering Judgments/EFRRRA

- Variances to Systems at Site?
 - **First Action in Process**
 - Find another system – Same Manufacturer
 - Find another system – Different Manufacturer
 - If no system exists in either case....
 - **Second Action –**
 - *Engineering Judgment –*
 - “EJ”
 - *Equivalent Fire Resistance Rated Assembly*
 - “EFRRRA”
 - *Based on Engineering, IFC Protocol*



J. Sharp – ProFirestop Image



C. Zussman – Pepper Image



Joints and Voids

Head-of-Wall – Mineral Wool and Spray

System No. HW-D-0300

October 16, 2015

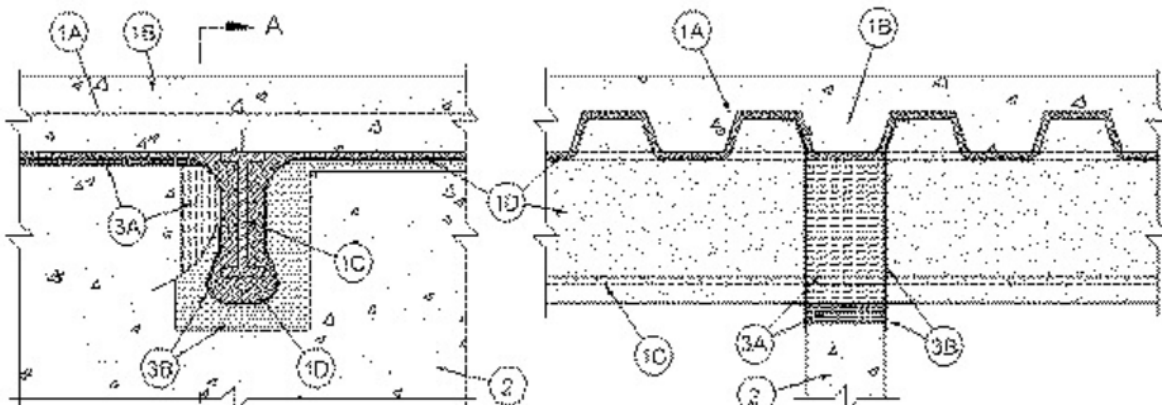
Assembly Ratings — 2 and 3 Hr (See Item 3A)

Nominal Joint Width — 1 and 2 In. (See Item 3)

Class II Movement Capabilities — 25% Compression or Extension

L Rating At Ambient - Less Than 1 CFM/Lin Ft

L Rating At 400 F - Less Than 1 CFM/Lin Ft



UL Solutions Image / Text HW-D0300 - Rectorseal

1A. **Roof Assembly (Not Shown)** — As an alternate to the floor assembly, a fire-rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P700 and P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater than the hourly rating of the wall assembly.

The roof assembly shall include the following construction details:

A. **Steel Roof Deck** — Max 2 in. (51 mm) deep galv steel fluted roof deck.

B. **Roof Insulation** — For **P900 Series Designs**, min 2-1/4 in. (57 mm) thick poured insulating concrete, as measured from the top plane of the roof deck. **For P700 Series Designs, as specified in the individual P700 Series Design.**

C. **Spray-Applied Fire Resistive Materials*** — Prior to the installation of the Forming Material and Fill, Void or Cavity Material (Items 3A and 3B, respectively), the steel roof deck shall be sprayed with the thickness of material specified in the individual P700 Series Design. For P900 Series Designs, structural steel supports only to be sprayed in accordance with the specifications in the individual P900 Series Design.

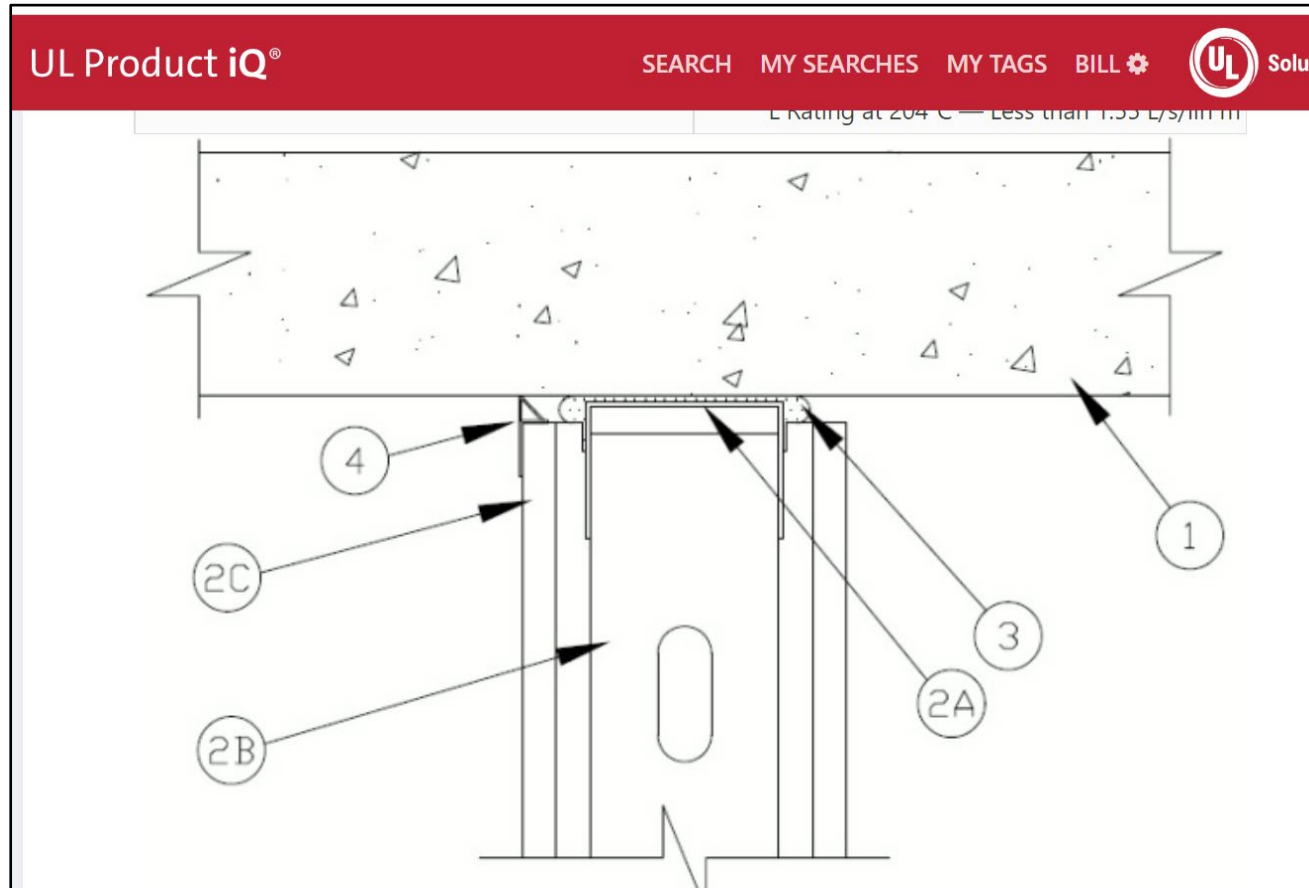
ISOLATEK INTERNATIONAL — Type 300

GCP APPLIED TECHNOLOGIES INC — Type MK-6/HY, MK-6/HY ES, MK-6S and RG

The hourly fire rating of the roof assembly shall be equal to or greater than the hourly rating of the wall assembly.

Joints and Voids

Head-of-Wall – Intumescent Strips



UL Solutions Image

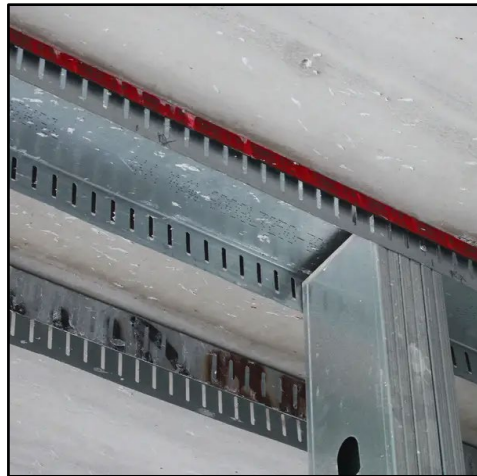
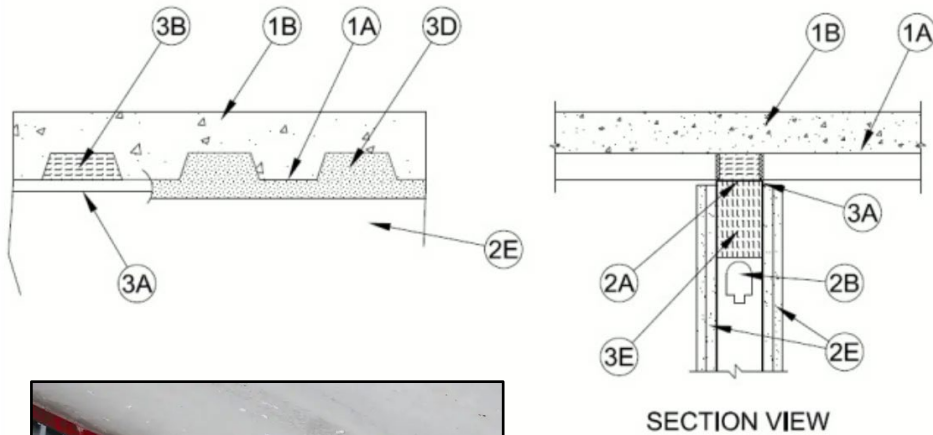
3. Fill, Void or Cavity Material* — Top Track Seal — When max separation between the bottom of floor and top of wall is **1/2 in. (13 mm)**, the joint system is designed to accommodate a max 50 percent compression or extension from its installed width. When max separation between the bottom of floor and top of wall is **3/4 in. (19 mm)**, the joint system is designed to accommodate a max 66% compression only from its installed width.

Factory supplied foam seal sized for width of and installed over the ceiling runner (Item 2A) prior to attachment to underside of concrete floor in accordance with the installation instructions. Butt joints in CFS-TTS shall be compressed min 1/2 in. (13 mm).

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS-TTS 212, CFS-TTS 358, CFS-TTS 600, CFS-TTS R or CFS-TTS-OS

Joints and Voids

Head-of-Wall – Intumescent Strips



3. Joint System — Max separation between bottom plane of the floor or roof and top of gypsum board is 1 in. (25 mm). The joint system is designed to accommodate a max 100 percent compression or extension from its installed width. The joint system consists of the following:

A. Fill, Void or Cavity Material* — Factory-supplied intumescent gasket installed and nominally centered over the ceiling runner (Item 2A, 2A1, 2A2, 2A3) prior to attachment to underside of floor or roof assembly. Gypsum wallboard layers to be installed on both sides of the wall maintaining a minimum 1/8 in. (3 mm) overlap over the intumescent gasket at time of installation.

SPECIFIED TECHNOLOGIES INC — Speed Flex Track Top Gasket

C. Forming Material* — As an option to Item 3B, preformed mineral wool plugs, formed to the shape of the fluted floor units, friction fit to completely fill the flutes above ceiling runner. The forming material shall be recessed from each surface of wall ceiling runner to accommodate the required thickness of fill material (Item 3D).

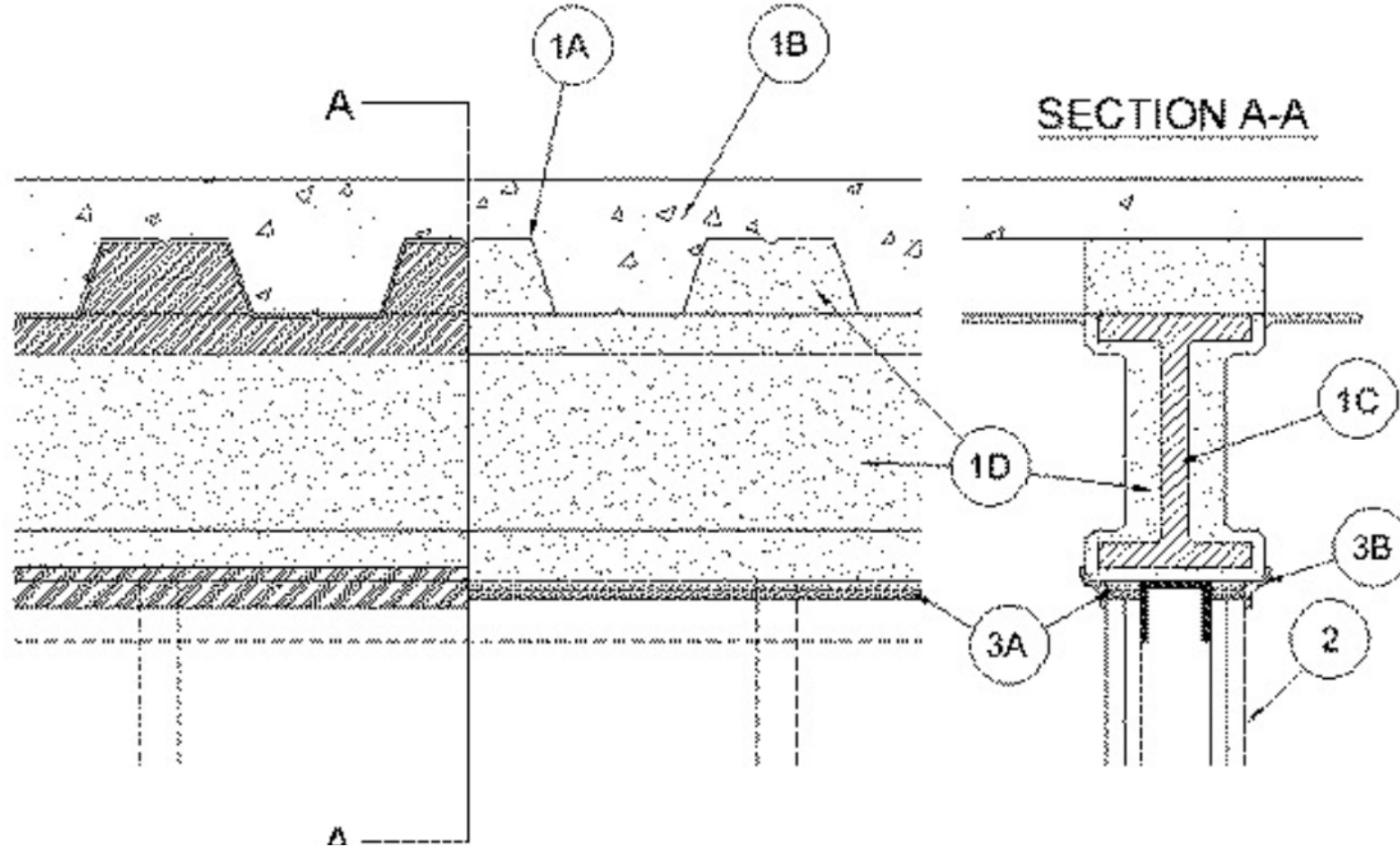
THERMAFIBER INC — TopStop mineral wool deck plugs Type SAF batts

D. Fill, Void or Cavity Material* — Sealant — Min 1/4 in. (6 mm) thickness of fill material installed on each side of the wall in the flutes of the steel floor or roof deck and between the top of the fill, void or cavity material (Item 3A) and the bottom of the steel floor or roof deck, flush with each surface of wall framing.

SPECIFIED TECHNOLOGIES INC — SpecSeal ES Sealant

I-Beam to Fluted Deck OVER WALL

HW-D-0259

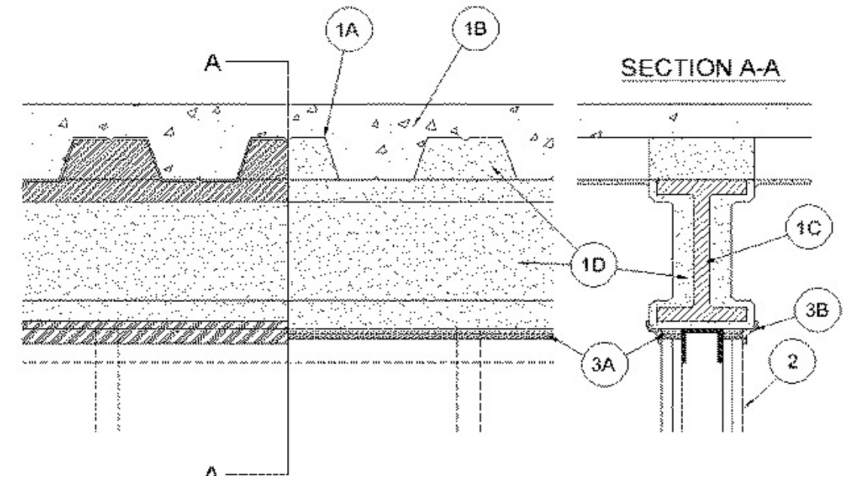


UL Solutions Image

I-Beam to Fluted Deck OVER WALL

HW-D-0259

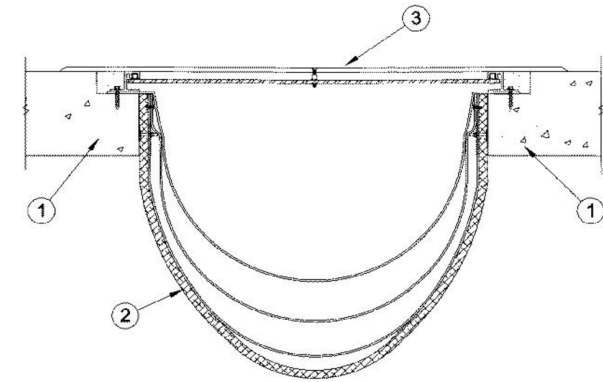
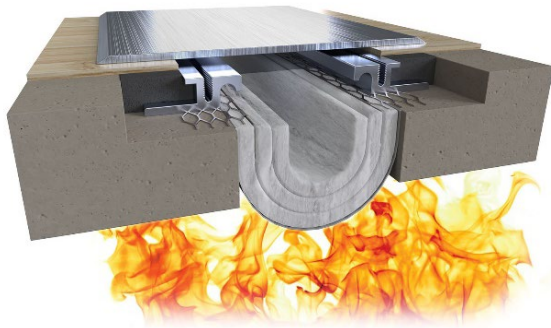
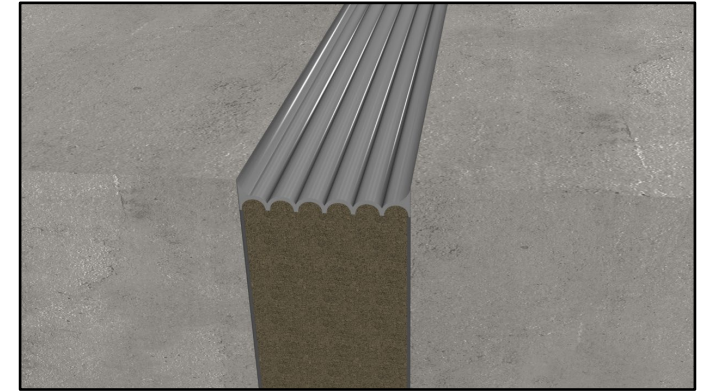
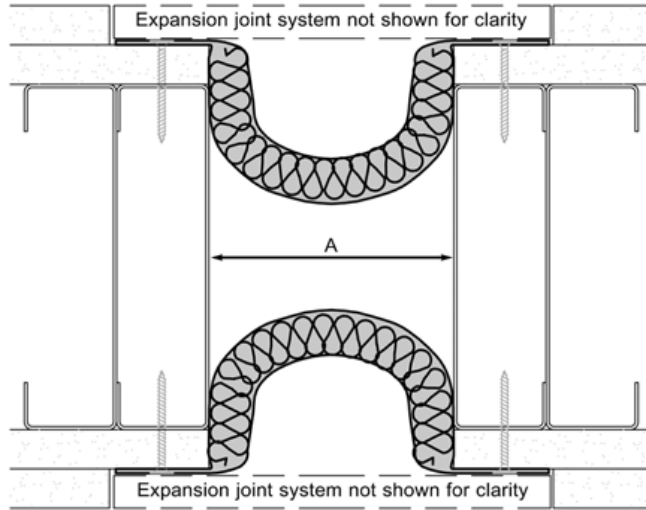
- Beam Size, Shape
- INCREASED Fireproofing Thickness on Web of Beam
 - Acceptance Criteria – 139°C (250°F) Ave Rise / 181°C (325°F) Individual Point Rise on non-fire side
- Rest of beam protected based on beam design
- Continuous FP @ Bottom
- Clips? Top Track Attachment?
- Sequencing??



UL Solutions Image

Fire Rated Expansion Joints

FF-D-4001, -1201, -1204...more



Balco, Construction Specialties, Inpro,
MM Systems, UL Solutions

Fire Rated Expansion Joints

FF-D-4001, 1201, 1204...more

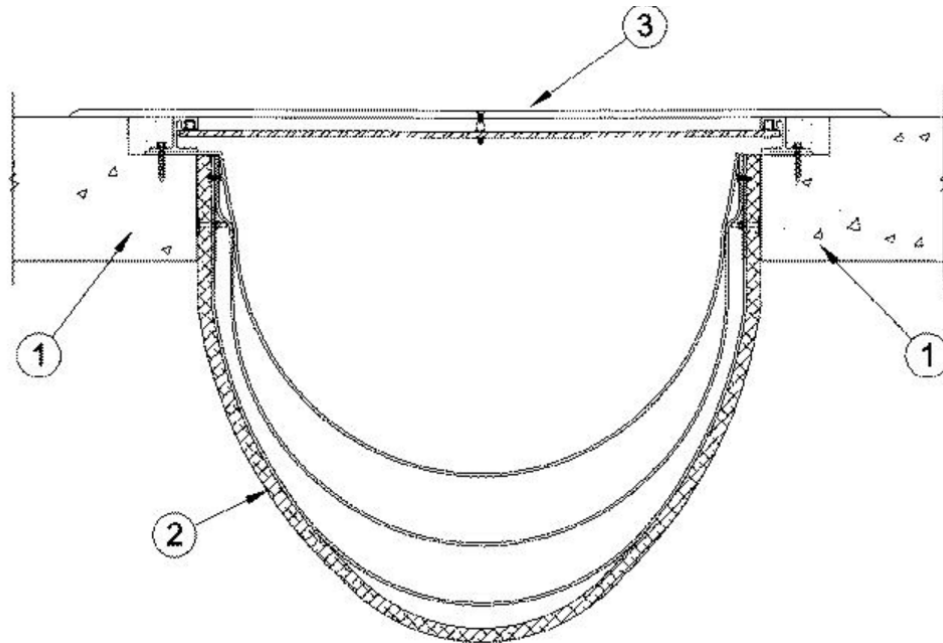
System No. FF-D-4001

September 20, 2000

Assembly Rating — 2 Hr

Nominal Joint Width — 25 to 36 in.

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



1. **Floor Assembly** — Reinforced lightweight or normal weight (100-150 pcf) structural concrete having a min thickness of 4-1/2 in. at stepped-edges receiving joint cover (Item 3).

2. **Mechanical Joint Assembly*** — **Nom width of joint is 25 to 36 in.** Flexible multilayer mat material with galv steel mounting angles on longitudinal edges. The mechanical joint assembly shall be installed in accordance with the installation instructions accompanying the units.

CONSTRUCTION SPECIALTIES INC — FB97-25F-++ through FB97-36F-++ (++=max width of joint opening)

3. **Joint Cover** — Min 0.030 in. thick joint cover formed of aluminum, bronze, stainless steel or galv steel. Joint covers anchored to floor slabs on each side of joint opening, continuous over entire length of joint, in accordance with the manufacturer's installation instructions.

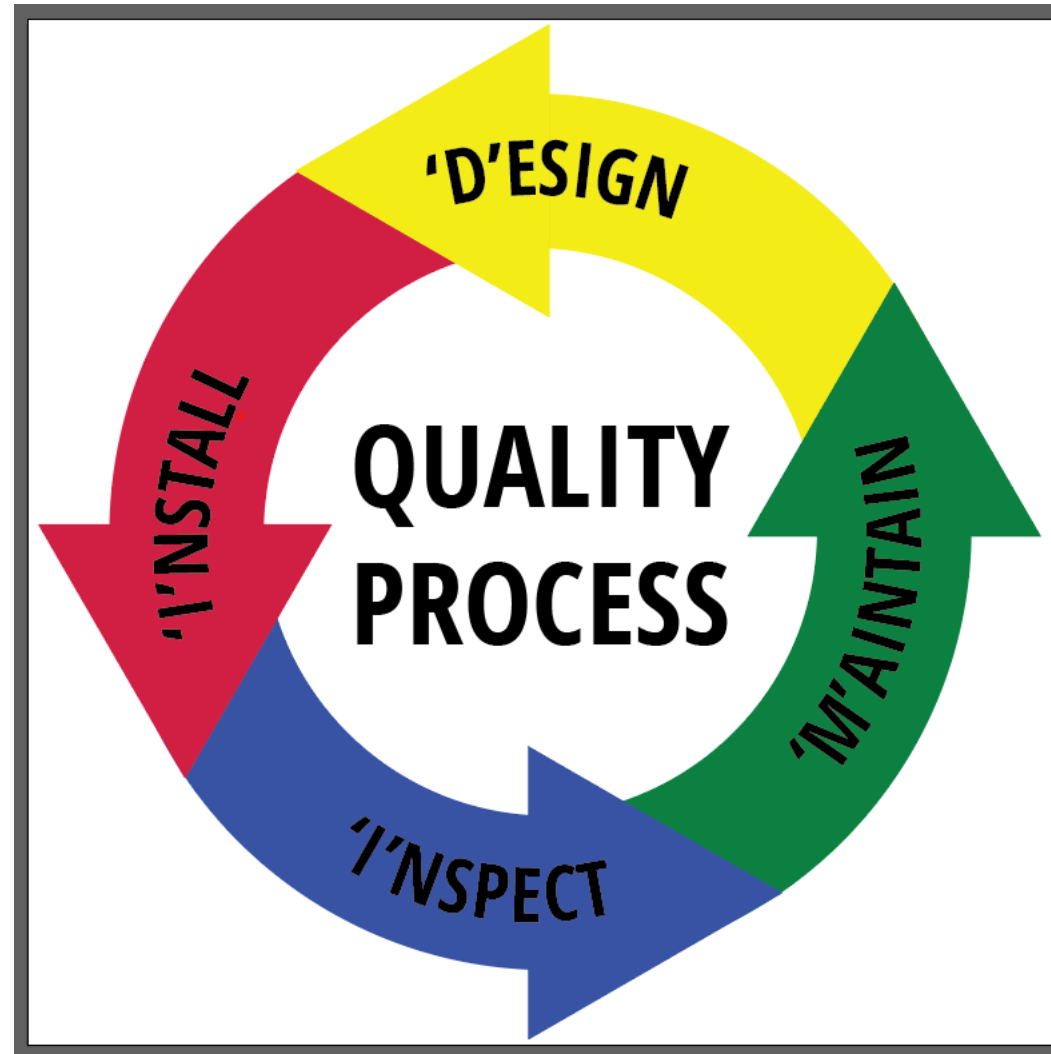
As an alternate, where the linear joint opening is enclosed within a chase wall and is non load bearing, a cover consisting of a creased sheet of min 2 mil stainless steel foil secured with 1 in. wide continuous galv steel washer strips along each side of the joint opening may be used.

D-DESIGN - Specs, Code

FCIA's DIIM™

I-INSTALL

FM 4991/UL QFCP
Programs AND
Mfr. Education



M-Maintain
PFP/BARRIER
MANAGEMENT
Fire Codes

I-INSPECT
IBC Ch. 17 -NFPA 80 - NFPA 1

How do Contractors Select/Analyze Systems & Inspection Agencies Analyze?

- Wall or Floor Construction Type, Rating
- Wall or Floor Thickness
- Penetrating Item, Coverings
- Size, Type, Thickness
- Annular Space, Joint, Breach Sizes
- Packing/Damming/Backing Materials
- Fill Material(s)

= *Rated Firestop System*

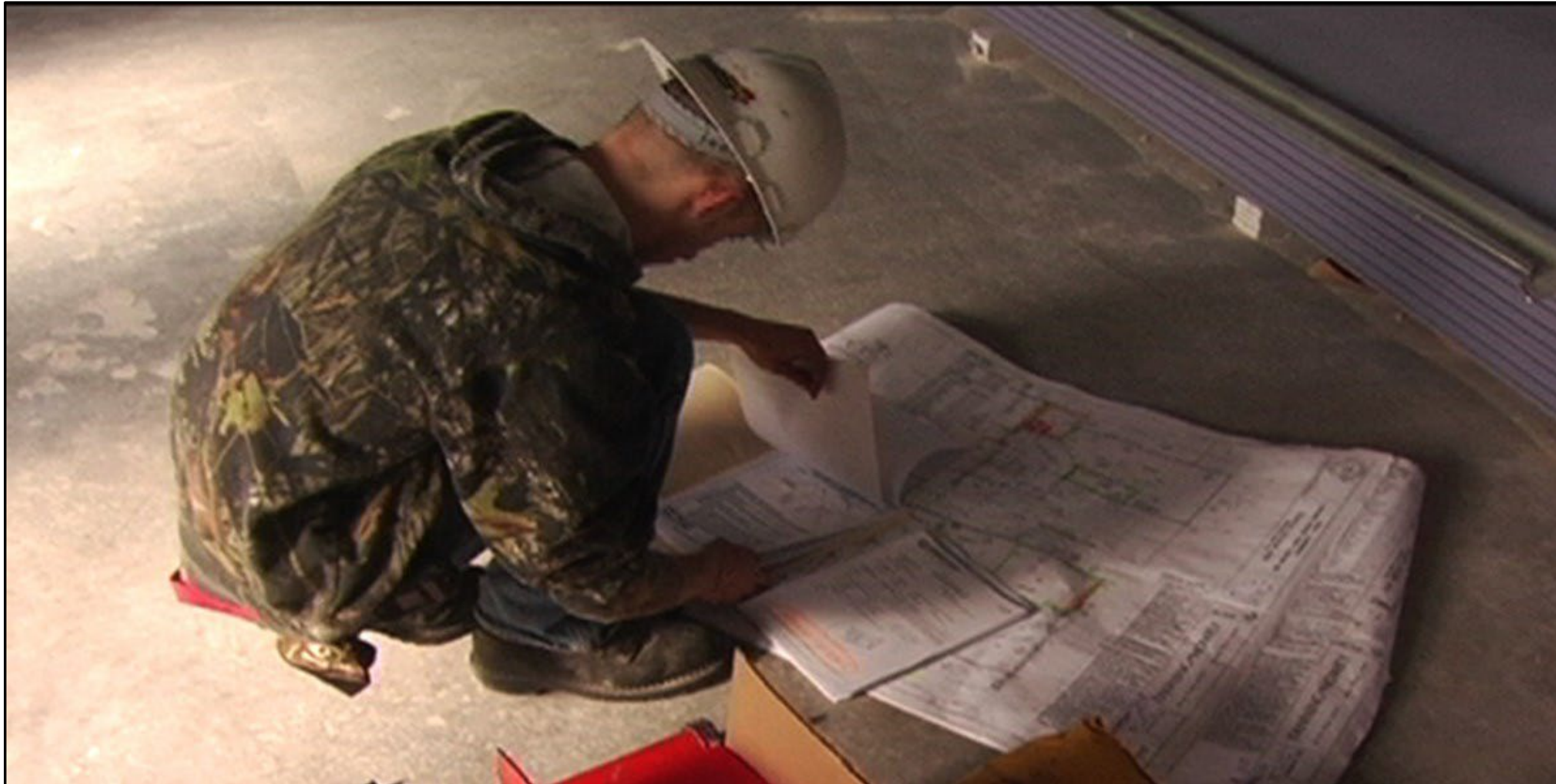
Manufacturers Instructions, Tested and Listed Designs



STI Graphic

I – Installation – Listed Systems – **ALL FIRESTOPPING**

- New 2027 DRAFT Code Requirement
- *LISTINGS Mandatory on Jobsite !!*



Firestopping for Continuity – Firestop Products

- Sealants
 - Silicone, Acrylic/Latex, Intumescent
- Wrap Strips & Collars
 - “Thick, Thin, Wide, Less Wide”
- Putties
- Pre Fabricated MCT Devices
- Fire Pillows
- Mortar
- Composite Sheets
- Bricks / Plugs
- Spray Products
- Tapes
- Cavity Barriers, Strips



Who Installs Firestopping?

- **Each Trade**
 - “He/She who pokes hole, fills hole”
- **Multiple Contracts**
 - Firestop Contractors, Trades
- **Single Source Firestop Contractor**
 - *FCIA Member in Good Standing*
 - *FM 4991, UL, ULC Qualified Firestop Contractors*

Spec Contractor Qualifications

- FM 4991 – Standard for the Approval of Firestop Contractors
- UL Qualified Firestop Contractors
- Other Industries???
- ***FM 4991 / UL-ULC CONTRACTORS UNDERSTAND MANAGEMENT SYSTEM FOR FIRESTOP SYSTEMS, INVENTORY – DOCUMENTATION***



FM 4991 & UL/ULC QFC Requirements

- **FM, UL/ULC Firestop Exam @ 80% min.**
- **Management System (MS) Written**
- **MS Procedures implemented**
- **MS Audit @.....**
 - **Contractor Office** – Records & Documents
 - **Jobsite** – Observation, possible destructive



FM 4991 & UL/ULC QFC

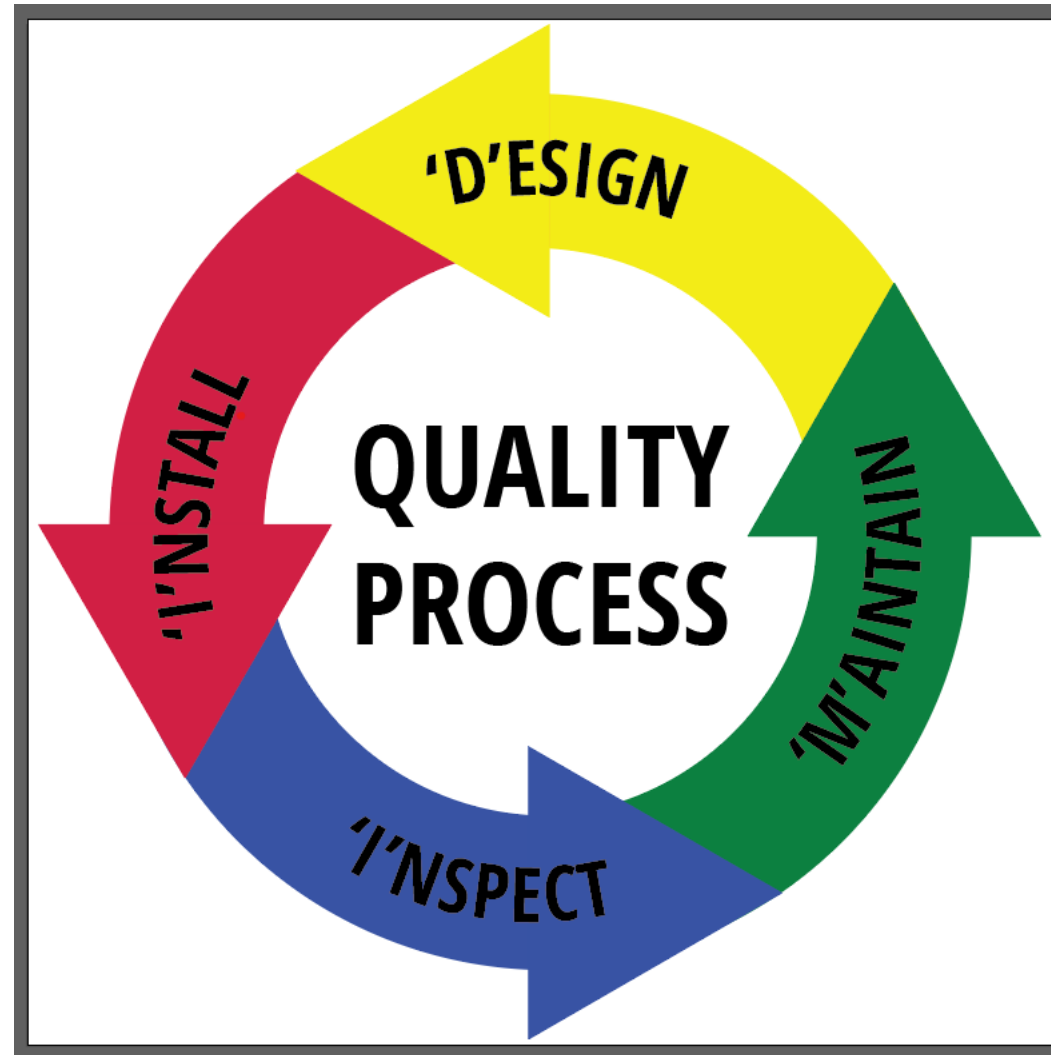
- **UL QUALIFIED or FM 4991 APPROVED**
- **DRI – Appointed by Contractor, CEU's**
- **Listed @**
 - www.FCIA.org
 - www.UL.com/PiQ
 - www.ApprovalGuide.com



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MANAGEMENT
Fire Codes

I-INSPECT

IBC Ch. 17 -NFPA 80 - NFPA 1

Firestop, Fireproofing & Inspection

- ASTM E2174 / ASTM E2393 – “*Inspection Process*”



Firestop Inspection in Codes

ASTM E2174 – ASTM E2393

- NFPA 1 – Ch. 12
- NFPA 101 / 5000 – Chapter 8 – Annex
- 2012 – 2018 International Building Code
- IBC Ch. 17 – Special Inspections – Firestop
 - Buildings 75' & higher above Fire Department Access
 - Risk Category Types III, IV, Chapter 16, Table 1604.5
 - **IBC 2021 Residential Occupancy \geq 250 Occupants**
- Abu Dhabi International Building Code

FCIA & KOFFEL
2002-2023



Inspection in Codes

- Compartmentation Features
- Fire Dampers
 - NFPA 80, @ Commissioning, 1 yr, 4/6 years
- Fire Doors & Glazing – NFPA 80, Commission, Annual
- Fire Rated Walls, Floors – Annual Visual, IFC

Inspection in Codes

- Structural Fireproofing – IBC Ch. 17
 - SFRM – ASTM E605, E736
 - IFRM – AWCI 12b
 - Boards & Wraps –
 - Standard being developed
 - Why? See 1702.1

1702.1 General. New *building* materials, equipment, appliances, systems or methods of construction not provided for in this code, and any material of questioned suitability proposed for use in the construction of a *building* or *structure*, shall be subjected to the tests prescribed in this chapter and in the *approved* rules to determine character, quality and limitations of use.

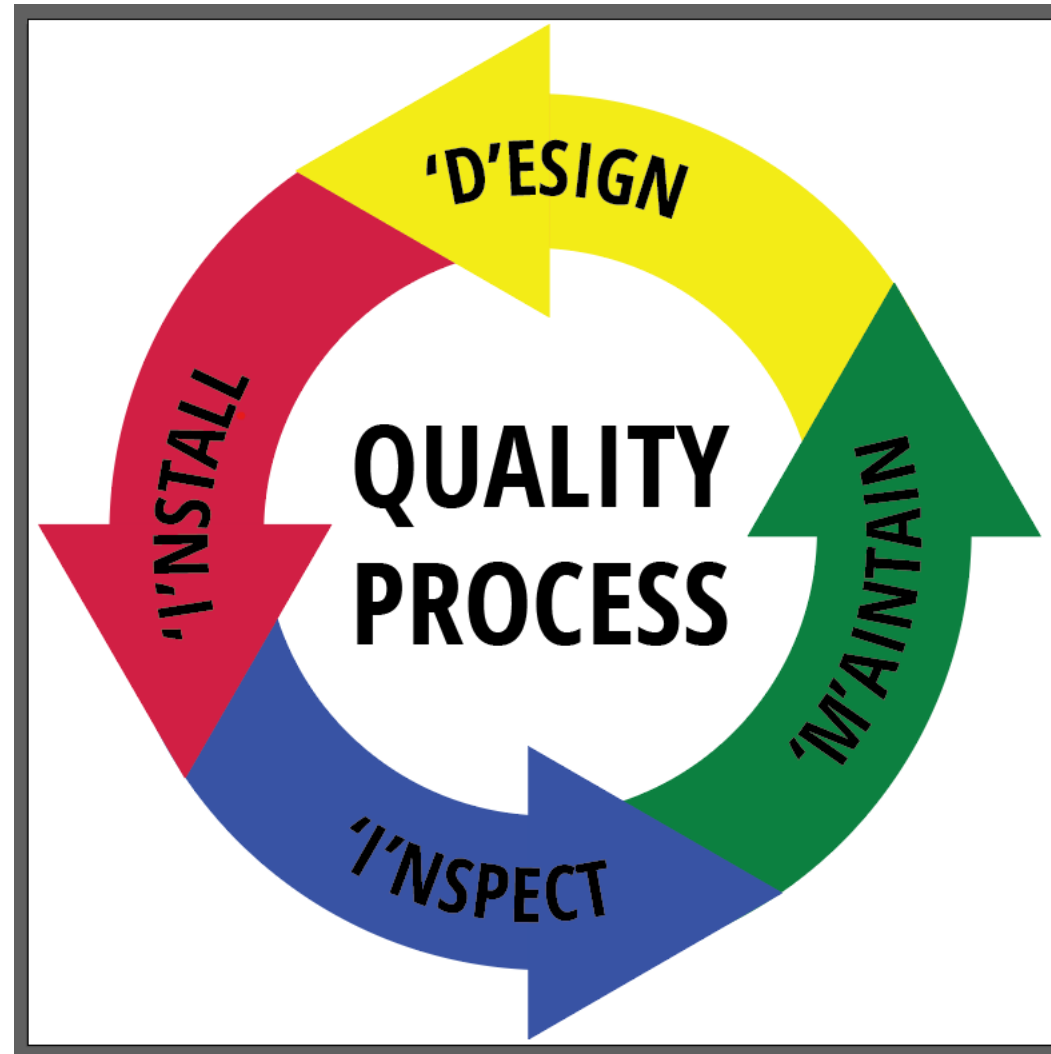
Inspection Spec Notes – CH. 17

- Special Inspection Agency
 - IAS AC 291
- Special Inspectors
 - Exam – FM, UL, IFC, WABO, ICC CLA
- Conflicts, Disqualifying Inspectors
 - Competitor
 - Manufacturer
 - Supplier
 - Self

D-DESIGN - Specs, Code

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M-Maintain Protection
PFP/BARRIER
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Fire Codes

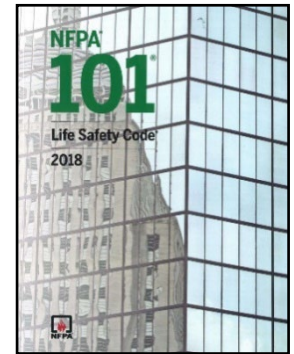
I-INSPECT
IBC Ch. 17 -NFPA 80 - NFPA 1

National Fire Protection Association

NFPA 101 – 2018

- **SECTION 4.6.12 Maintenance, Inspection, and Testing.**

- **4.6.12.1 Whenever or wherever any device**, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or any other feature **is required for compliance** with the provisions of this Code, **such device**, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or other feature **shall thereafter be continuously maintained** ... in accordance with applicable NFPA requirements or requirements developed as part of a performance-based design, or as directed by the AHJ.



National Fire Protection Association

NFPA 1 – 2018

- **12.3.3* Maintenance of Fire-Resistive Construction, Draft-Stop Partitions, and Roof Coverings.**
 - **12.3.3.1 Required fire-resistive construction**, including fire barriers, fire walls, exterior walls due to location on property, fire-resistive requirements based on type of construction, draftstop partitions, and roof coverings, *shall be maintained and shall be properly repaired, restored, or replaced where damaged, altered, breached, penetrated, removed, or improperly installed.*

FCIA Added Emphasis

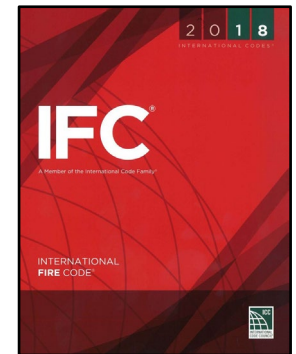


2018 International Fire Code Maintenance

SECTION 701 GENERAL

- **701.1 Scope.** The provisions of this chapter shall govern the **inspection and maintenance of the materials, systems and assemblies used for structural fire-resistance, fire-resistance-rated construction separation of adjacent spaces and construction** installed to resist the passage of smoke to safeguard against the spread of fire and smoke within a building and the spread of fire to or from buildings. New buildings shall comply with the *IBC*.

FCIA Added Emphasis

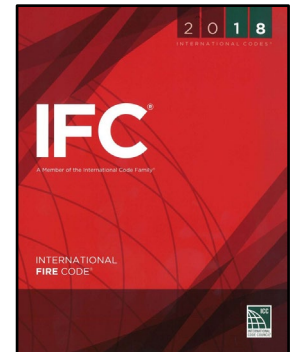


2018 International Fire Code Maintenance

SECTION 701 GENERAL

- **701.6 Owner's responsibility.** The **owner shall maintain an inventory** of all required fire-resistance-rated construction, construction installed to resist the passage of smoke and the construction included in Sections 703 through 707. **Such construction shall be visually inspected by the owner annually and properly repaired, restored or replaced where damaged, altered, breached or penetrated.**
- **Records of inspections and repairs shall be maintained.**

FCIA Added Emphasis



International Property Maintenance Code

[F] 703.1 Fire-resistance-rated assemblies. The required fire-resistance rating of fire-resistance-rated walls, fire stops, shaft enclosures, partitions and floors shall be maintained.

[F] 703.2 Opening protectives. Required opening protectives shall be maintained in an operative condition. Fire and smokestop doors shall be maintained in operable condition. Fire doors and smoke barrier doors shall not be blocked or obstructed or otherwise made inoperable.

703.3 Maintenance. The required fire-resistance rating of fire-resistance-rated construction, including walls, firestops, shaft enclosures, partitions, smoke barriers, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and joint systems, shall be maintained. Such elements shall be visually inspected annually by the owner and repaired, restored or replace where damaged, altered, breached or penetrated. Records of inspections and repairs shall be maintained. [IPMC 2018, 703]

National Fire Code of Canada

National Fire Code of Canada

- *Division B – Part 2, Building and Occupant Fire Safety*

2.2.1.2 – Damage to Fire Separations

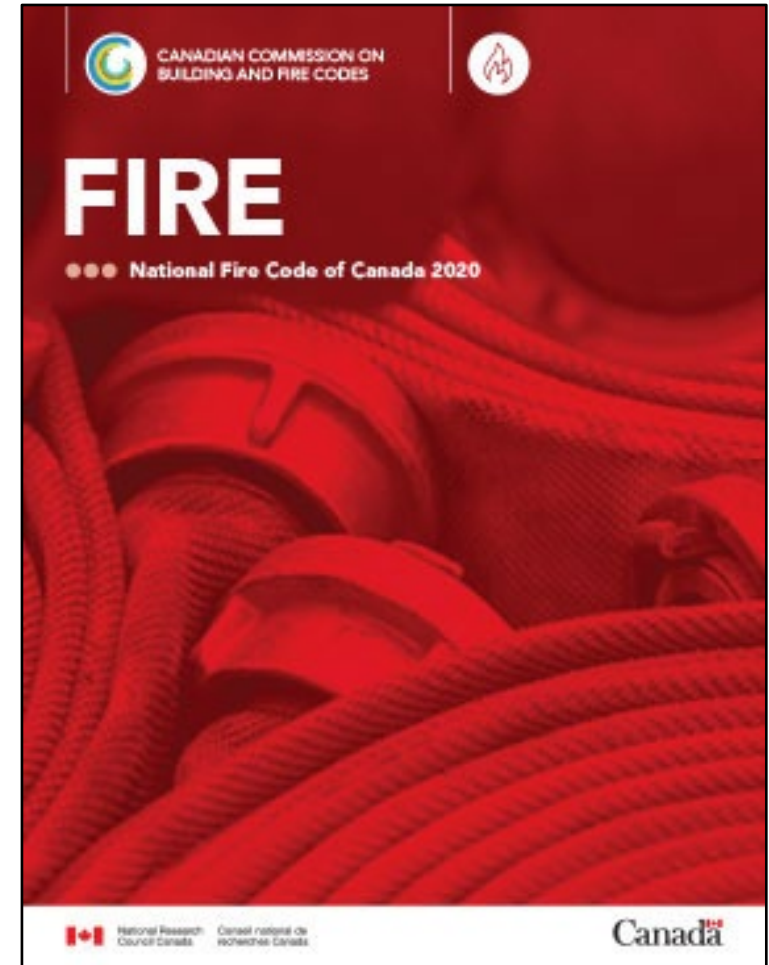
Where *fire separations* are damaged so as to affect their integrity, they shall be repaired so that the integrity of the *fire separation* is maintained...



National Fire Code of Canada - Fireproofing

- *Division B – Part 2, Building and Occupant Fire Safety*
2.2.1.2 (2) – Damage to *Fire Separations* & *Fire Protection Materials*

Where materials used to provide fire protection are damaged or removed, they shall be repaired or replaced so that the integrity of the fire protection is maintained.



UAE Fire & Life Safety Code of Practice

3.7. Maintenance & Management

3.7.1. Provide protection and maintain conditions during & after installation that ensure installed firestop systems are without damage or deterioration at the time of Substantial Completion. If, despite such protection, damage or deterioration occurs, damaged/deteriorated systems shall be removed and replaced with new ones.

UAE Fire & Life Safety Code of Practice

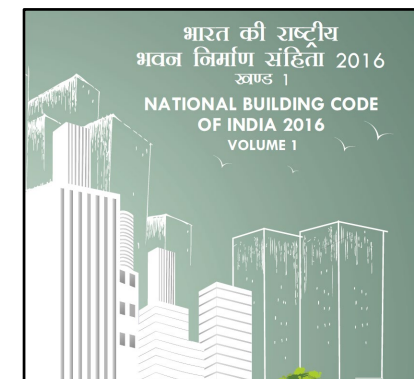
3.7. Maintenance & Management

3.7.2. The condition of installed firestop systems shall be visually inspected by the owner or owner's representative annually.

Damaged, altered or breached firestop systems shall be properly repaired, restored or replaced to comply with applicable codes as per the guidelines of Civil Defense.

Codes & Maintenance – INDIA

- Ch. 12, Section 9 Asset and Facility Maintenance
- **BUILDING MAINTENANCE – METHODS AND MANAGEMENT**
- **9.1 General** – “Any building (including its services) when built has certain objectives and during its total economic life, it has to be maintained in proper condition to meet those objectives. **Maintenance is a continuous process requiring a close watch and taking immediate remedial action.** It is interwoven with good quality of housekeeping. It is largely governed by the quality of original construction. **The owners, engineers, constructors, occupants and the maintenance agency are all deeply involved in this process and share a responsibility....”.**



Saudi Arabia Fire Code – “Continuously Maintained”

SECTION 107 MAINTENANCE

107.1 Maintenance of safeguards. Where any device, equipment, system, condition, arrangement, level of protection, or any other feature is required for compliance with the provisions of this code, or otherwise installed, such device, equipment, system, condition, arrangement, level of protection, or other feature shall thereafter be continuously maintained in accordance with this code and applicable referenced standards.

Master Audit Certificate of Compliance Program

A **Jobsite Specific Management System Audit** – Our audit provides verified processes were followed to properly installed firestop systems.

UL Solutions Image

A **Renewable Jobsite Specific Certificate** – After completion of a successful audit, UL issues a jobsite specific certificate that is renewable for the building owner.

Improved Firestop Systems Documentation – The MACC certificate in conjunction with the firestop systems documentation, **builds the fire-resistance inventory required by the 2018 International Fire Code** for fire and smoke protection features.



This certificate reports the findings of an audit by UL to the management system requirements of the Qualified Firestop Contractor Program. The audit was conducted to the requirements specified in the Qualified Firestop Contractor Program requirements. The UL qualified contractor was found to be in compliance with the requirements at the time of the site audit.

Structure Name: Underwriters Laboratories
Job Number: 0001
Address: 333 Pfingsten Rd
Northbrook, IL 60062

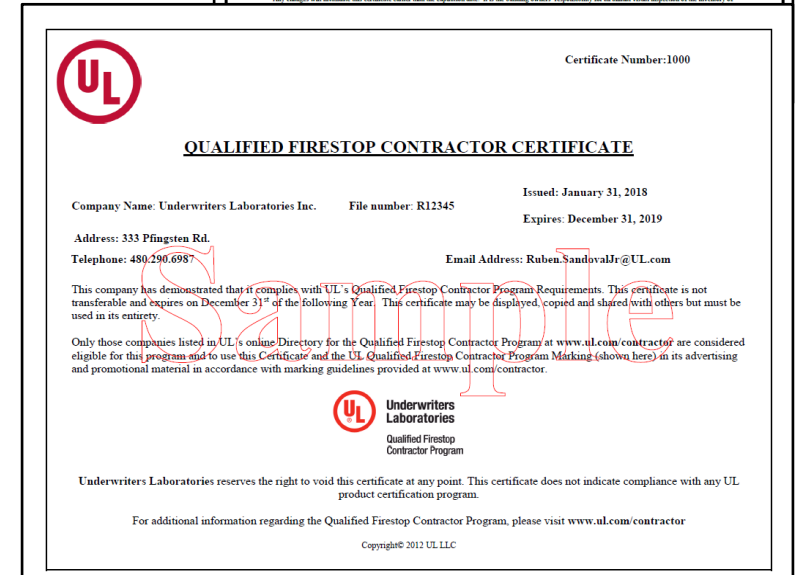
Qualified Contractor: PCIA
Address: 4415 W. Harrison Street, Suite 540
Hillside, IL 60162

Qualified Contractor Scope of Work:
For Project # 0001 Firestopping Head and Bottom of Interior Fire Walls and all Trade Penetrations / Except Cable Tray

UL LLC makes no representations or warranties, expressed or implied, that the installed firestop system will prevent any loss or damage in the event of a fire or similar event, or that the system will in all cases provide the protection for which it is installed or intended. The certificate is evidence that the installing contractor's management system was in compliance with the applicable requirements of the Qualified Firestop Contractor Program.

UL LLC is not an insurer and does not assume any obligation or undertake to discharge any liability of the Qualified building Contractor, or any other party for any loss, which may result in failure, incorrect installation, use contrary to requirements, cancellation of this certificate, or withdrawal by the Qualified building Contractor from the Qualified Firestop Contractor Program.

Any modification to any firestop system of the structure will affect the complete firestopping system and may render protection effected by the system ineffective. Any changes will invalidate this certificate unless the expiration date. It is the building owner's responsibility for an annual visual inspection of the inventory of



QUALIFIED FIRESTOP CONTRACTOR CERTIFICATE

Company Name: Underwriters Laboratories Inc. **File number:** R12345 **Issued:** January 31, 2018
Address: 333 Pfingsten Rd. **Expires:** December 31, 2019
Telephone: 480.290.6987 **Email Address:** Ruben.SandovalJr@UL.com

This company has demonstrated that it complies with UL's Qualified Firestop Contractor Program Requirements. This certificate is not transferable and expires on December 31st of the following Year. This certificate may be displayed, copied and shared with others but must be used in its entirety.

Only those companies listed in UL's online Directory for the Qualified Firestop Contractor Program at www.ul.com/contractor are considered eligible for this program and to use this Certificate and the UL Qualified Firestop Contractor Program Marking (shown here) in its advertising and promotional material in accordance with marking guidelines provided at www.ul.com/contractor.

Underwriters Laboratories
Qualified Firestop Contractor Program

Underwriters Laboratories reserves the right to void this certificate at any point. This certificate does not indicate compliance with any UL product certification program.

For additional information regarding the Qualified Firestop Contractor Program, please visit www.ul.com/contractor

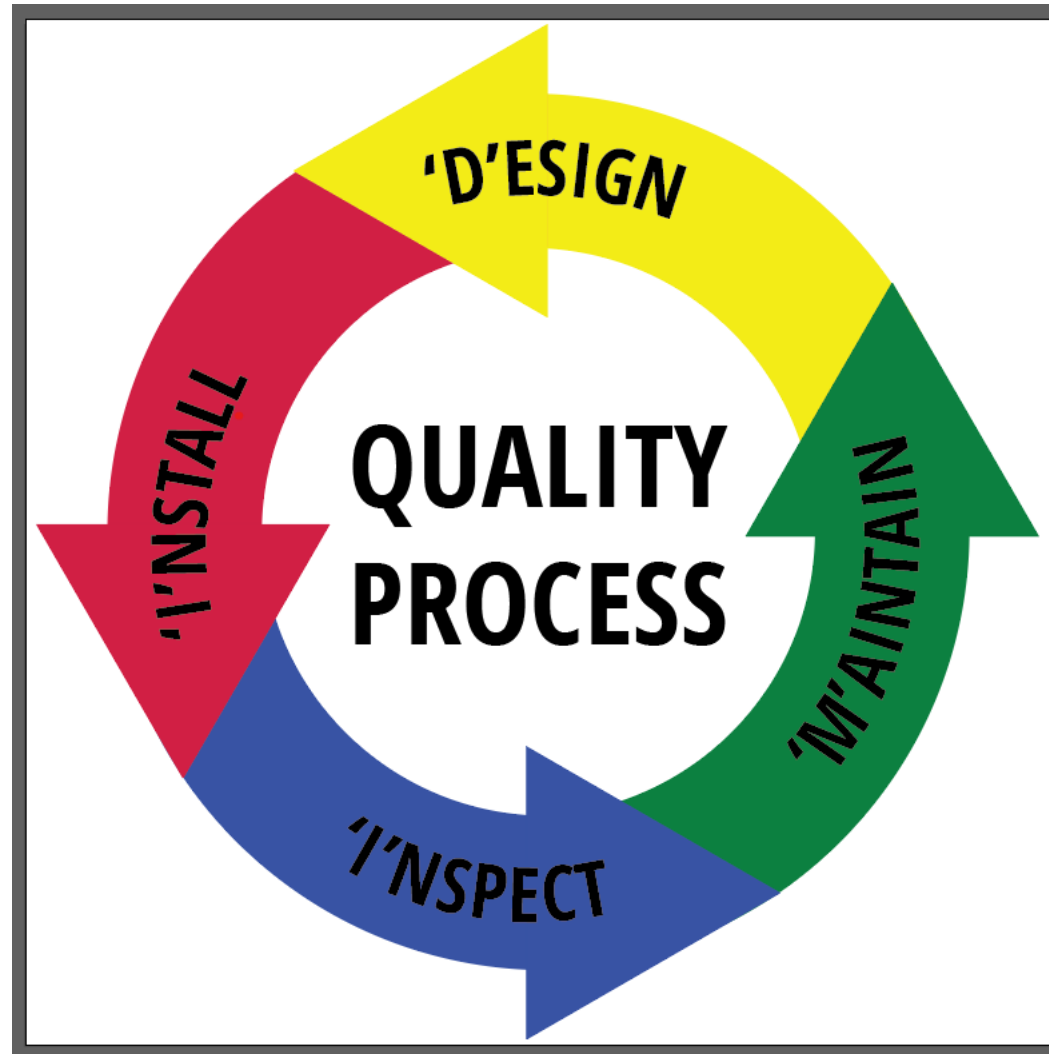
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D-DESIGN - Specs, Code

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M-Maintain

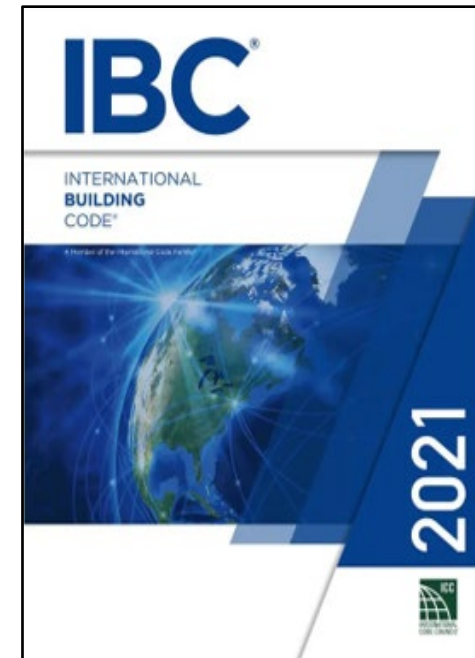
PFP/BARRIER
MANAGEMENT
Fire Codes

I-INSPECT

IBC Ch. 17 -NFPA 80 - NFPA 1

Existing Buildings? Did you know...

- **Fire, existing building codes have existed for decades**
- Fire Codes dictate maintaining protection of structural fire-protection and fire-resistance-rated compartmentation



Facility Budget Line Items...

- Fire-Sprinklers, Pumps, etc... **YES**
- Fire-Detection & Alarms... **YES**
- Fire Separations / Barriers? **WHAT?**
 - Fire-Resistance Rated Walls/Floors
 - Penetrations & Joints
 - Fire Doors
 - Fire/Smoke Dampers
 - Fire-Rated Glazing
- **In-House Staff?**
- **Barrier Services Contractor?**



M–PFP/Barrier Management Systems Building Owner's Policy Topics

- **Create a Budget to Meet Code Requirements**
- **Inventory – What Info?**
 - Life Safety Drawings
 - Manufacturers Instructions
 - Tested and Listed Systems (Listings)
- **Implement Fire Resistance Management**
 - In House Policy
 - Outside Contractor Policy
- **Monitor Process**
- **Annual Visual Inspection & Keep Records**
- **Show Fire Marshal....Insurance Company**

M–PFP/Barrier Management System for Building Owners - *Inventory*

- Life Safety **Drawings**
- Tested and Listed **Systems** (Listings), if not incorporated in the
- Manufacturers **Installation, Maintenance and Repair Instructions**
- Manufacturers **Product Data Sheets**
- **Manufacturers Safety Data Sheets**

Codes Require Maintaining Protection.

SPECIFIER SETS STAGE @ 01 78 39

- Fire-Resistance Rated Walls/Floors
 - Fireproofing
 - Penetrations/Joints
 - Fire Doors
 - Fire/Smoke Dampers
 - Fire-Rated Glazing



Specs – Don't Forget Division 1

Documentation for Building Life Cycle

- **Reference to ALL Divisions for Closeout Submittals**
 - **01 78 29 Final Site Survey**
 - **01 78 33 Bonds**
 - **01 78 36 Warranties**
 - **01 78 39 Project Record Documents (Ref.07-84-00, etc.)**
 - **01 78 43 Spare Parts**
 - **01 78 46 Extra Stock Materials**
 - **01 78 53 Sustainable Design Closeout Documentation**

ALL PFP Specifications Send to 01 78 39

- **Section 01 78 39 - Project Record Documents**
= INVENTORY Requirements (SYSTEMS)
 - Life Safety & Structural FP Drawings
 - Manufacturers Installation Instructions
 - Product Data Sheets
 - Safety Data Sheets
 - Tested and Listed Systems
- In-House Staff?
- PFP/Barrier Contractor?

Firestopping Specifications

- Construction Specifications Institute
- Construction Specifications Canada
- *MasterFormat*
 - *Master List – Titles & Numbers*
 - *Focus on Work Results*



Firestopping Section

- **07 84 00 – Firestopping = ONE DISCIPLINE**
 - *Penetrations*
 - *Joints*
 - *Perimeter Fire Containment –*
 - *Horizontal ONLY*
 - *Horizontal and Vertical*
 - *Vertical ONLY*
 - *IF SPEC IN MEP, WALL*
 - *FM 4991, ULQFCP, INSPECTION*

Firestopping Sections in CSI/CSC MasterFormat

- 07 84 13 – Penetration Firestopping
 - 07 84 13.13 – Penetration Firestopping Mortars
 - 07 84 13.16 – Penetration Firestopping Devices
- 07 84 43 – Joint Firestopping
- 07 84 53 – Building Perimeter Firestopping (Alternate Terms/Abbreviations: fire safing.)
- 07 86 00 – Smoke Seals (Includes: material installed at the perimeter of openings to prevent the spread of smoke.)
 - NOTE: Smoke Seals are in another location –
 - Perimeter of ‘openings’. Annular Spaces?
 - Openings not defined.

Firestopping Specifications

- **Scope Summary – Firestopping Specifications**

Provide firestop systems consisting of a material, or combination of materials installed to retain the integrity of fire-resistance-rated assemblies by maintaining an effective **barrier against the spread of flame, smoke, water, movement**, at through penetrations, blank openings, construction joints, or at the gap that is created at the building perimeter of the horizontal fire resistance rated assembly and exterior wall and in or adjacent to either fire-resistance or non-fire-resistance-rated barriers in accordance with the requirements of the Building Code in force at the location of this project.

SCOPE Summary

- Scope covers what you do...some PDS
- “Seal” - “Sealing” – Against What?
- F & T = ONLY **Protecting against fire spread**, Temperature
- F & T & L – Fire, Temperature, Air Leakage (SMOKE)
- F & T & L & M – Adds Movement for Pen’s
- F & T & L & W – Adds Water Resistance (3’)
- F & T & L & M & E - Adds Exposure Resistance, E2750 ONLY
- F & T & L & M & E & ALL C, B, R, G, S Impact???
- Manufacturer Testing Available -- Request

Fireproofing Sections

- 07 81 00 – Applied Fireproofing (SFRM & IFRM)
 - 07 81 13 – Cement Aggregate Fireproofing
 - 07 81 23 – Intumescent Fireproofing (IFRM in IBC now)
 - 07 81 23.10 – Epoxy Intumescent Fireproofing
 - 07 81 23.30 - Water-Borne Intumescent Fireproofing
 - 07 81 33 – Mineral-Fiber Fireproofing
- 07 82 00 – Board Fire Protection
 - 07 82 13 – Calcium-Silicate Board Fireproofing
 - 07 82 16 – Slag-Fiber Board Fireproofing
- 07 ?? 00 - Endothermic Wraps??

Great DIIM starts @ SPEC...

- **NEW Buildings – 07-84-00 Specs**
 - **www. FCIA .org & FCIA MOP**
- **Part I – Products...but**
 - **Systems – SUBMITTED, Firestop Installation Contractor**
 - **Product Properties**
 - **Manufacturers**
- **“Single Manufacturer to the greatest extent possible” - For EJ/EFRRRA’s**



Specs – Key Parts Relating to Installation

- **Contractor/Installer Qualifications**
 - FCIA Member in Good Standing, **AND**
 - FM 4991, Standard for the Approval of Firestop Contractors, **OR**
 - UL Qualified Firestop Contractor Program
 - **AND**
 - Manufacturer Accredited, Approved, Trained



Specs – Key Parts Relating to Inspection

- **NEW Buildings – 07-84-00 Specs - [www. FCIA .org](http://www.FCIA.org)**
- **Qualifications – Special Inspection**
 - **Special Inspection **Agency** –**
 - **IAS AC 291 Accredited Special Inspection Agencies**
 - **Special **Inspector** Qualifications**
 - **FM Firestop Exam**
 - **UL Firestop Exam**
 - **AND**
 - **IFC Exam**
 - **ICC Certificate of Learning Achievement**
 - **FCIA Certificate of Achievement Education Program**



Specs – Key Parts Relating to Execution

- **NEW Buildings – 07-84-00 Specs**
- **Execution**
 - **Listings, Manufacturer Instructions, Physical Properties, Surface Prep, etc.**
 - **Special Inspection**
 - **ASTM E2174 – Penetrations**
 - **ASTM E2393 – Joints**

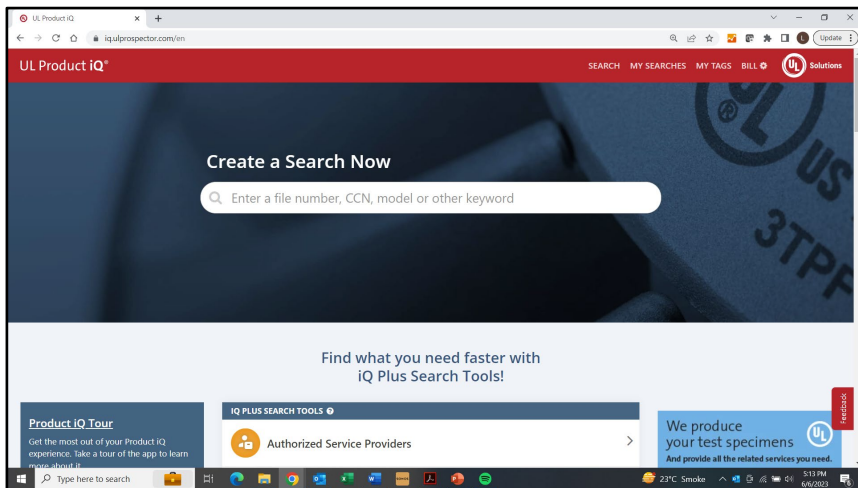
Specs – Don't Forget Division 1

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 - **01 78 43 Spare Parts**
 - **01 78 46 Extra Stock Materials**
 - **01 78 53 Sustainable Design Closeout Documentation**

Specific Ask...Specs, Maintain Protection

Please protect the breaches in fire-resistance-rated assemblies with firestop (OR...) system installed in accordance with a listing and manufacturers instructions...
= SYSTEM



Firestop (& Other Fire-Resistance Repairs)

- Repairs
 - Instruction requirements by manufacturer
 - TESTED AND LISTED SYSTEMS
 - Patching
 - Systems....Ratings
 - Adhesion
 - Movement
 - T, L, W Ratings
 - ***As recommended by MFR, Listing***



Affinity Firestop Photo

M–Barrier Management Systems

Building Owner's Policy Topics

- **Create a Budget to Meet Code Requirements**
- **Inventory – What Info?**
 - Life Safety Drawings
 - Manufacturers Instructions
 - Tested and Listed Systems (Listings)
- **Implement Fire Resistance Management**
 - In House Policy
 - Outside Contractor Policy
- **Monitor Process**
- **Annual Visual Inspection & Keep Records**
- **Show Fire Marshal....Insurance Company**

FCIA's DIIM Webinar

January 29, 2025



**Bill McHugh, FCIA
Rich Walke, CTI**

**FREE STUFF –
INFO@FCIA.org**

Bill@FCIA.org