FCIA Webinar Series

The Firestopping Joints Primer Program

Bill McHugh, Executive Director of FCIA
Rich Walke, CTI, Consultant to FCIA

FCIA
Firestop Contractors International Association

May 17, 2023

FCIA – Firestop Contractors International Association

- **Fire Exits??**
- **Housekeeping….**
- **Thanks to FCIA Members**
  - Firestop Contractors
  - Manufacturers, Consultants
  - Firestop Distributors, Reps, Friends
  - **FCIA Board of Directors**

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LEADERSHIP OVER DECADES

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- **FREE Life Safety Digest**
- **UL/ULC, FM 4991 Contractor Programs**
- **IAS AC 291 Inspection Agency Accreditation Program**
- **Firestop Certificate &** Individual Knowledge
- **ASTM Inspection Standards**
- **Tools** @ **FCIA.org** for Specifiers, AHJ's, Building Owners, Firestop Contractors & Inspection Agencies
- **Watch FCIA.org for Webinar Announcements!**

FCIA Action!

- **Doha FCIA Symposium; Members**
- **Mumbai/Ahmadabad – Fire Safe Build India – IIT-G**
- **Dubai – FCIA Symposium; Civil Defence**
- **Riyadh – BIG5 Show; UL, ICC, TBWIC**
- **More…**

FCIA Actions –2023

Firestop Contractors International Association

- Conferences
  - FCIA MENA - India
    - Doha – Feb. 5
    - FSBI – Feb. 9, 10
    - Dubai – Feb. 15
    - Riyadh – Feb. 18
  - FCIA ECA @ New Orleans, USA – May 10-13
  - FCIA CAN @ Ottawa, Ontario – Sept. 24-26
  - FCIA FIC @ ABQ, NM USA – Oct. 23-27
- Webinars & Symposiums
- Code Development & Standards Discussions
- Committee Action
- International Discussions

FCIA Actions – 2021 & 2022

Firestop Contractors International Association

- ***NEW Education for Careers in Firestopping!!***

- ***FCIA's Firestop Education Program***
  - ***3.5 Hours Level 1***
  - ***16.5 Hours Level 2***

- ***30 Hours Education & Exams –***
  - ***Members – Unlimited Subscription***
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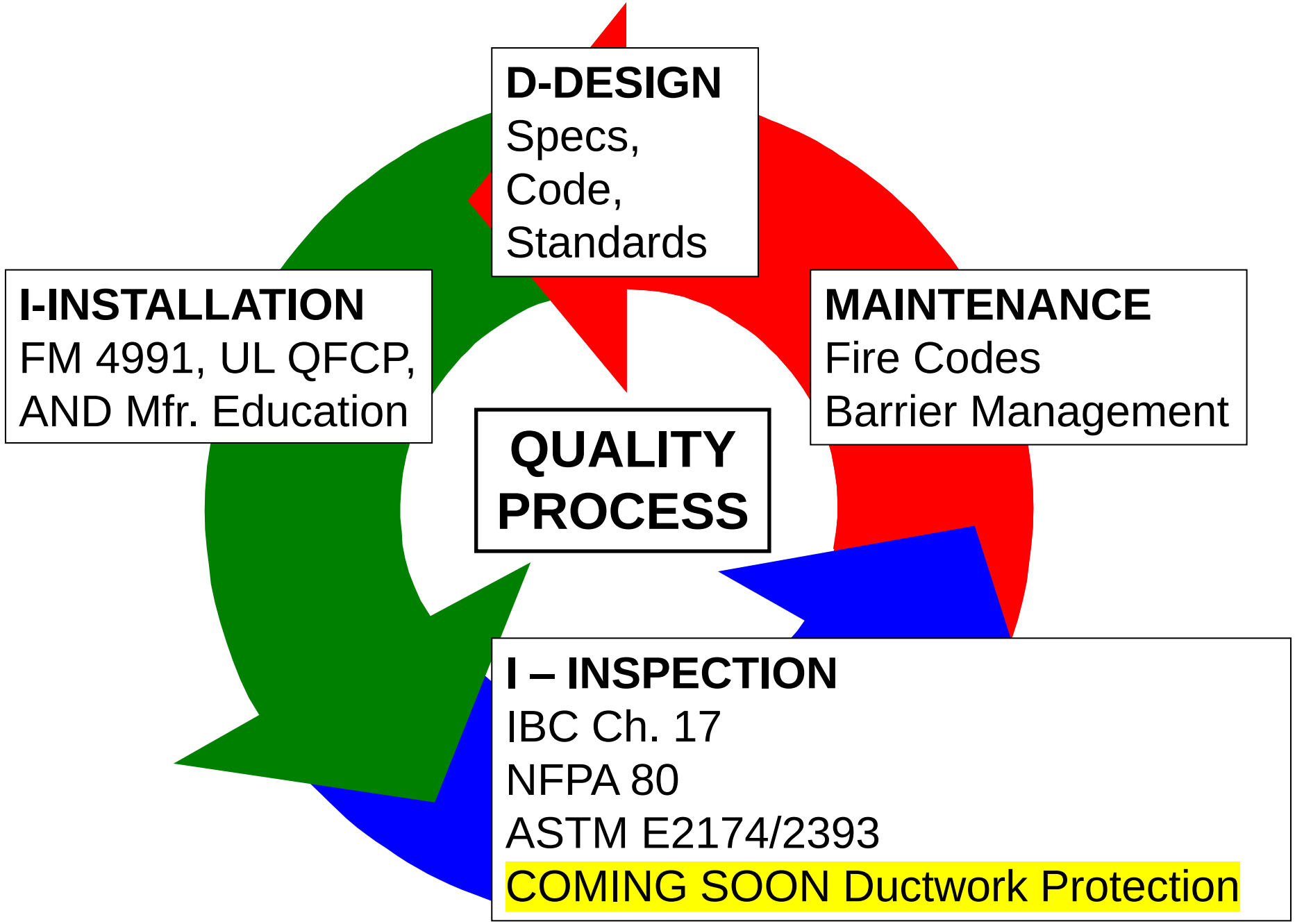
FCIA Actions - 2022

- ***NEW Education for Careers in Firestopping!!***
  - ***FCIA's Firestop Education Program (FEP)***
    - ***4 Levels***
      - ***Level 1 – General Knowledge Certificate***
      - ***Level 2 – In Depth Materials & Systems Certificate***
      - ***Level 3 – SOON…***
      - ***Level 4 - SOON***
    - ***Career Path Education***
  - ***FCIA Education Respected Worldwide***

Systems & Materials….

“TOTAL FIRE PROTECTION”

- Effective Compartmentation
  - Fire Barriers, Fire Walls, Floors, Smoke Barriers
  - Firestopping, Fire Dampers, Swinging and Rolling Fire Doors, Fire-Rated Glazing
  - Fire-Resistive Protection for Ductwork
- Detection & Alarm Systems
- Sprinkler Suppression Systems
- Education & Egress –
  - Building Owners & Managers, Building Occupants and Firefighters


D-DESIGN
Specs,
Code,
Standards
MAINTENANCE
Fire Codes
Barrier Management
I-INSTALLATION
FM 4991, UL QFCP,
AND Mfr. Education
QUALITY
PROCESS
I – INSPECTION
IBC Ch. 17
NFPA 80
ASTM E2174/2393
COMING SOON Ductwork Protection

FCIA Webinar Series

Joints and Voids

Bill McHugh, Executive Director of FCIA
Rich Walke, CTI, Consultant to FCIA

FCIA
Firestop Contractors International Association

April 12, 2023

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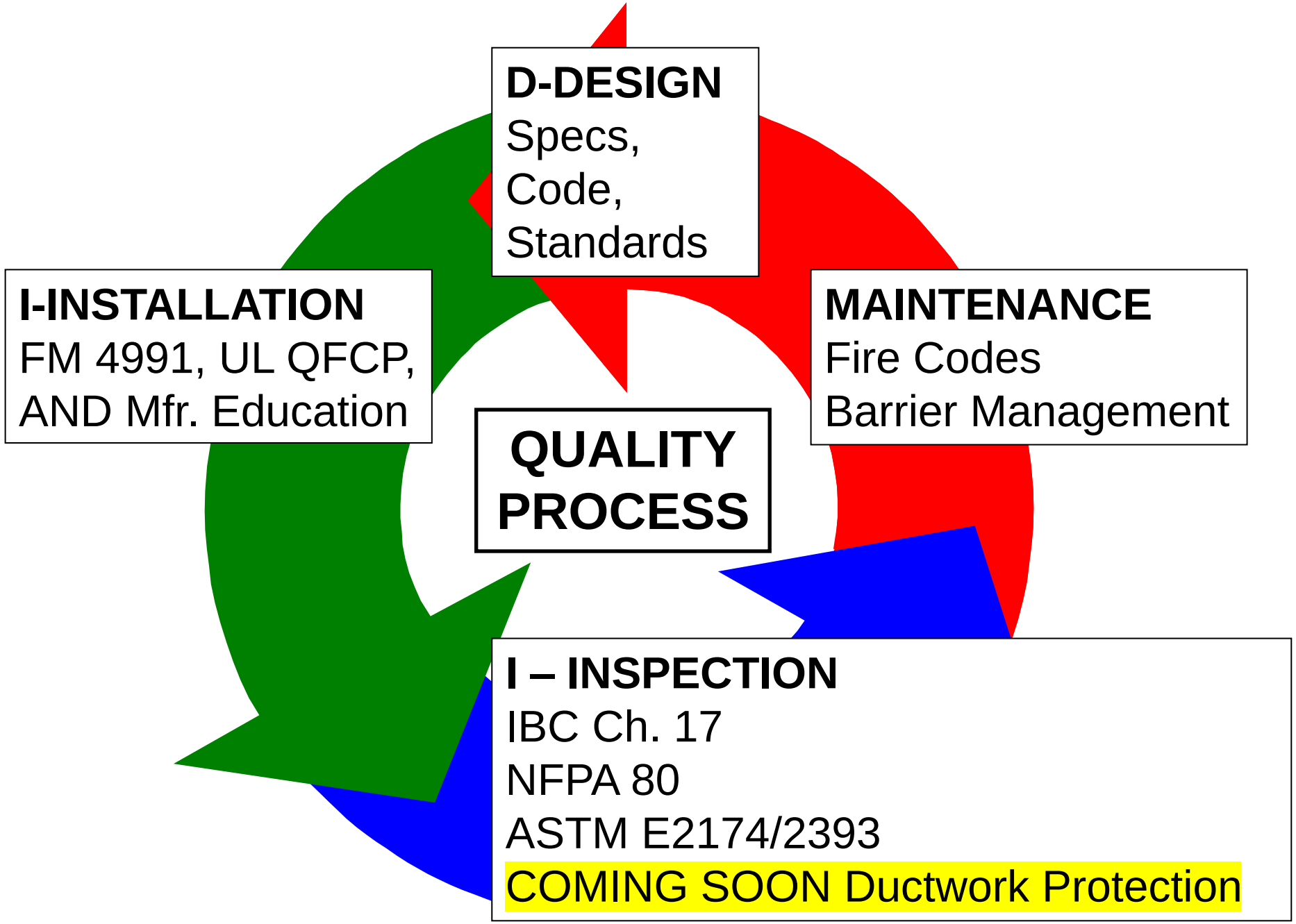
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May 17, 2023

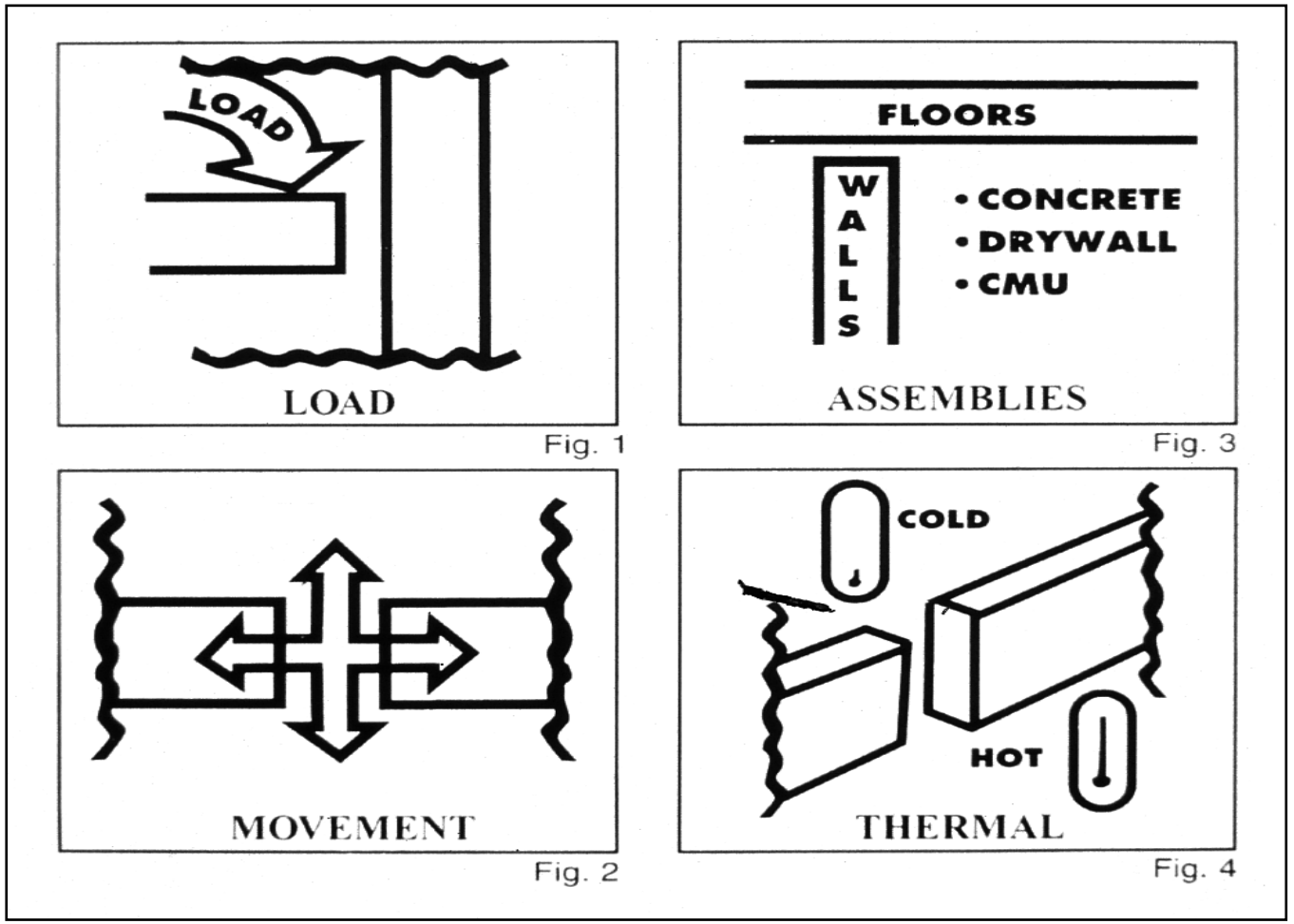
Joint vs Void - What's the Difference?

- International Building Code – Chapter 2 – Definitions
  - **Joint.** The opening in or between adjacent assemblies that is created due to building tolerances, or is designed to allow independent movement of the building in any plane caused by thermal, seismic, wind or any other loading. (2021 IBC)
  - **Void.** Undefined by the 2021 IBC. By Webster's it's an "opens space".
- By the Chapter 2 definition, all intersection points between rated construction, between rated and non-rated construction and between non-rated construction could be consider a joint.

Joint vs Void - What's the Difference?

- International Building Code – Chapter 7 – Fire and Smoke Protection Features
  - **Joint** – As used in Chapter 7, a joint is a breach in or between fire-resistance-rated construction.
  - **Void** – As used in Chapter 7, for the most part, a void is a breach between a fire-resistance-rated assembly and a non-rated assembly or between two non-rated assemblies. For example, the void between a rated floor slab and a non-rated curtain wall.
- IBC is not consistent between Chapters 2 and 7

Forces Which Induce Movement in Buildings



- Thermal
- Wind Sway
- Seismic
- Applied Loads

Fire-Resistant Joint Systems

The Protection of Joints

- International Building Code – Section 715 – Joints and Voids
  - **715.3 Fire-resistance-rated assembly intersections.** *Joints* installed in or between fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies shall be protected by an approved *fire-resistant joint system* designed to resist the passage of fire for a time period not less than the required *fire-resistance rating* of the wall, floor or roof in or between which the system is installed.

The Protection of Joints

- International Building Code – Chapter 2 – Definitions
  - **Fire-Resistant Joint System.** An assemblage of specific materials or products that are designed, tested, and fire-resistance rated in accordance with either ASTM E1966 or UL 2079 to resist for a prescribed period of time the passage of fire through *joints* made in or between fire-resistance-rated assemblies. (2021 IBC)

The Protection of Joints

- International Building Code – Chapter 2 – Definitions
  - Based on the definition of *joint* and the requirements of Section 715.3, in theory any *joint* in or between fire-resistance-rated construction created due to building tolerances or designed to allow for building movement requires protection by a fire-resistant joint system.

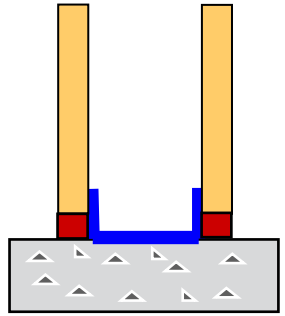
The Protection of Joints

- In practice, that may not be the case for *joints* created due to building tolerances. Are fire-resistant joints typically used in the following locations?
  - Bottom-of-wall applications
  - Inside and outside corners of gypsum board / wood or steel framed walls
  - Head-of-wall joints of gypsum board in platform construction

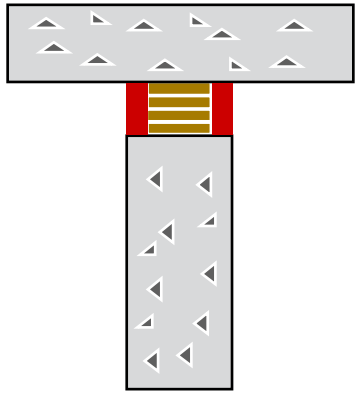
The Protection of Joints

- Fire-Resistant Joint Systems are also referred to as:
  - **Joint Systems**
  - Construction Joints
  - Expansion Joints
  - Joint Firestops

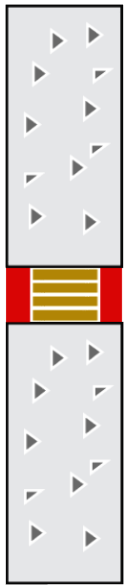
Types of Fire-Resistant Joint Systems



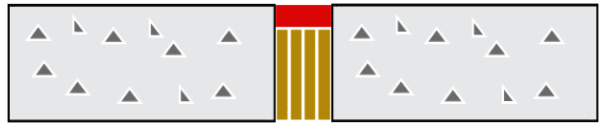
Bottom-of-Wall



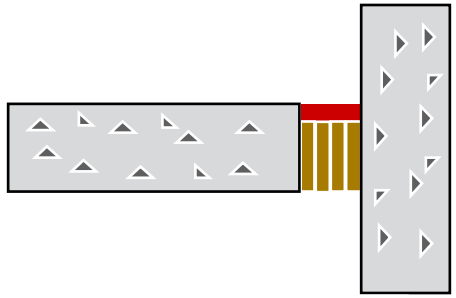
Head-of-Wall



Wall-to-Wall



Floor-to-Floor

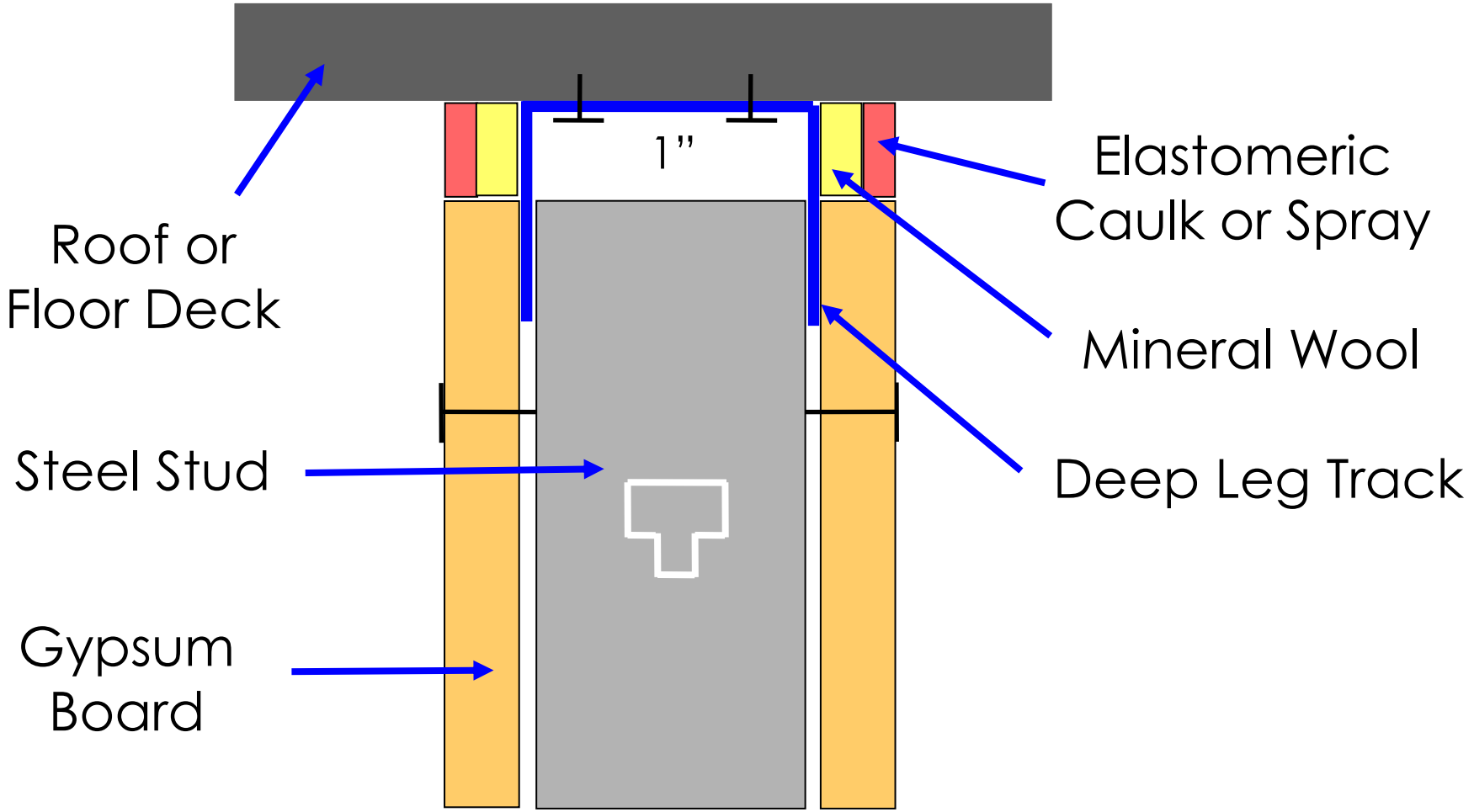


Floor-to-Wall

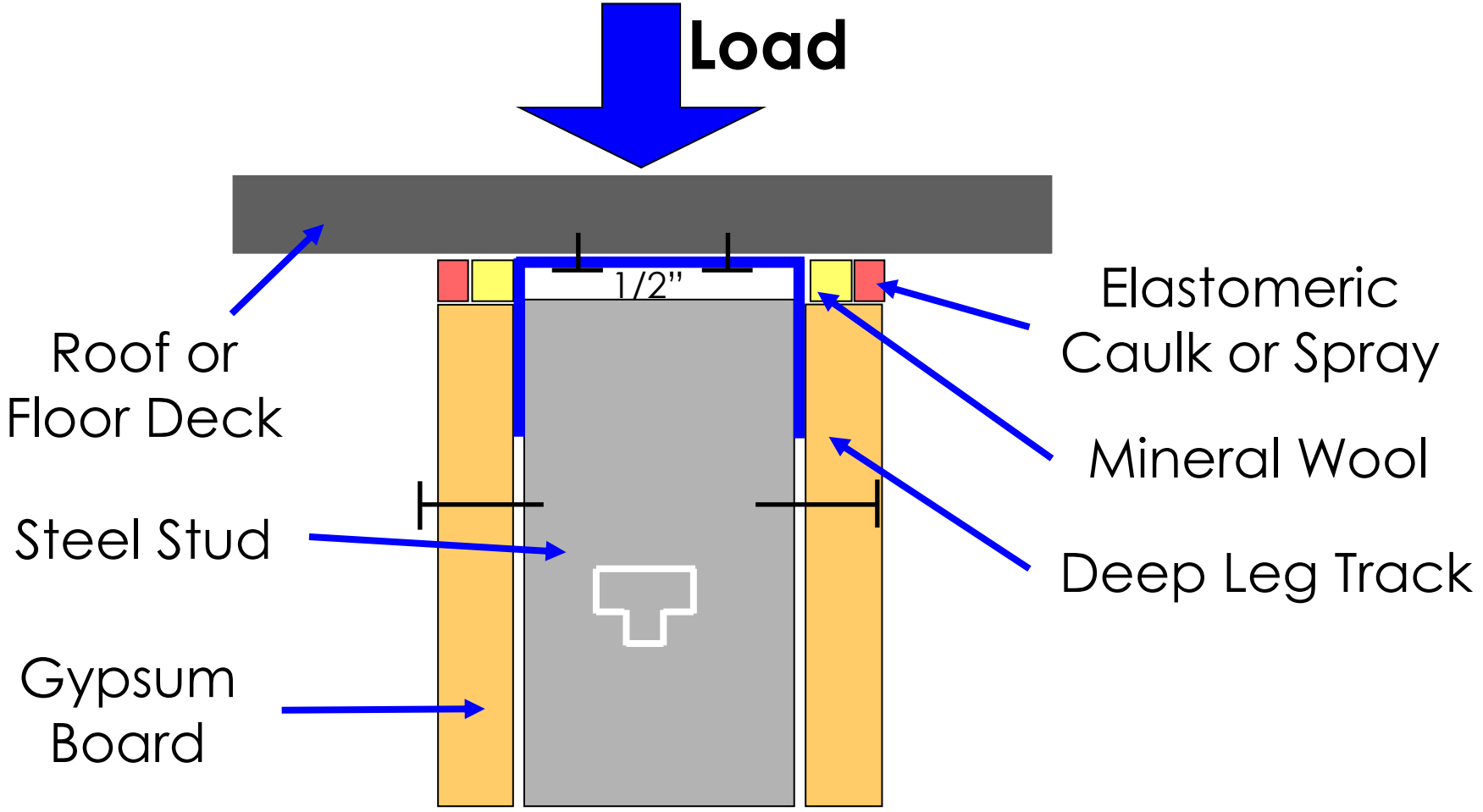
Methods of Protecting Joint Systems

- Elastomeric Systems
  - Sealants
  - Sprays
- Mechanical Systems
  - Slotted Tracks
  - Offset Tracks
  - Draped Blankets

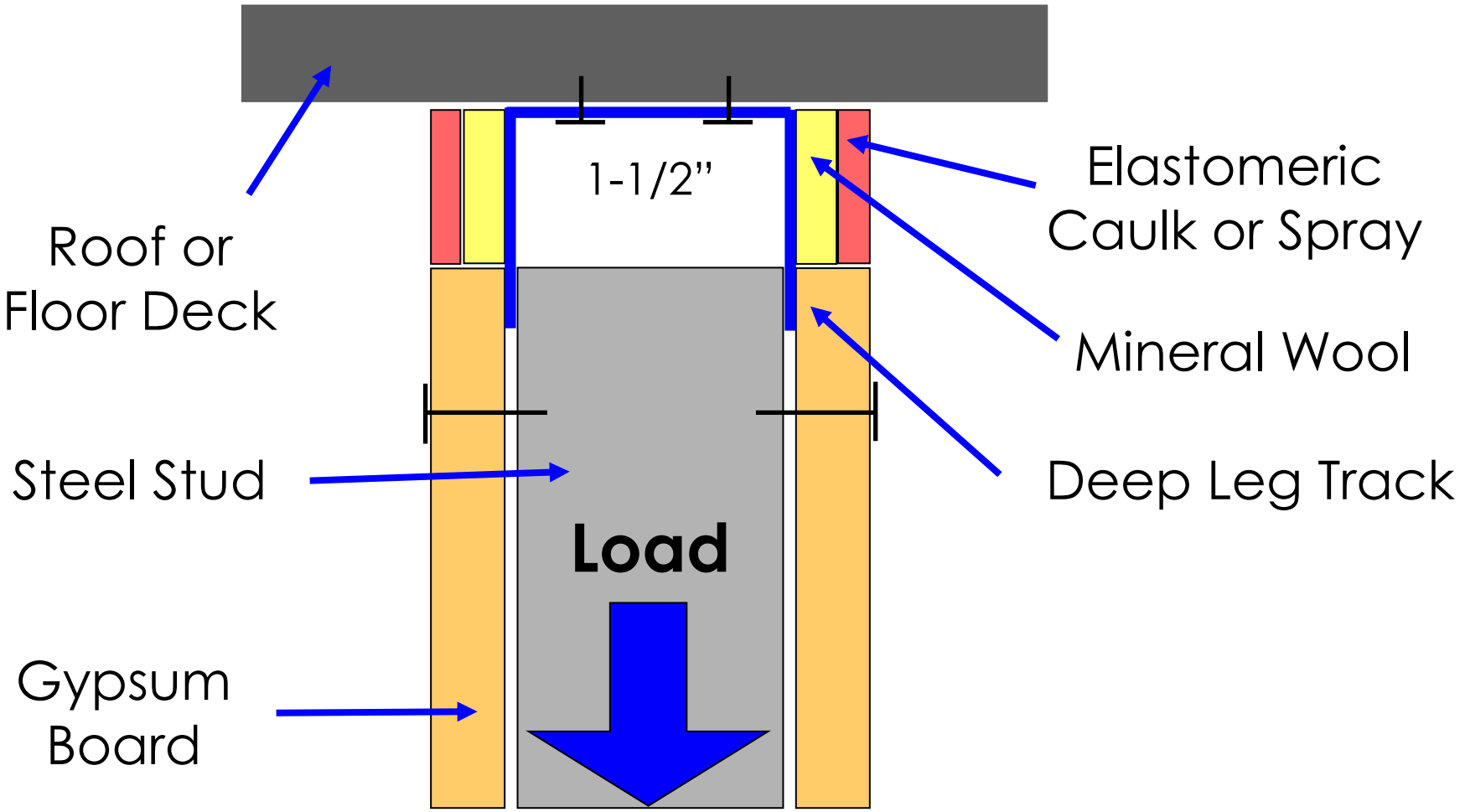
Joint System at Nominal Joint Width



Joint System at Minimum Joint Width

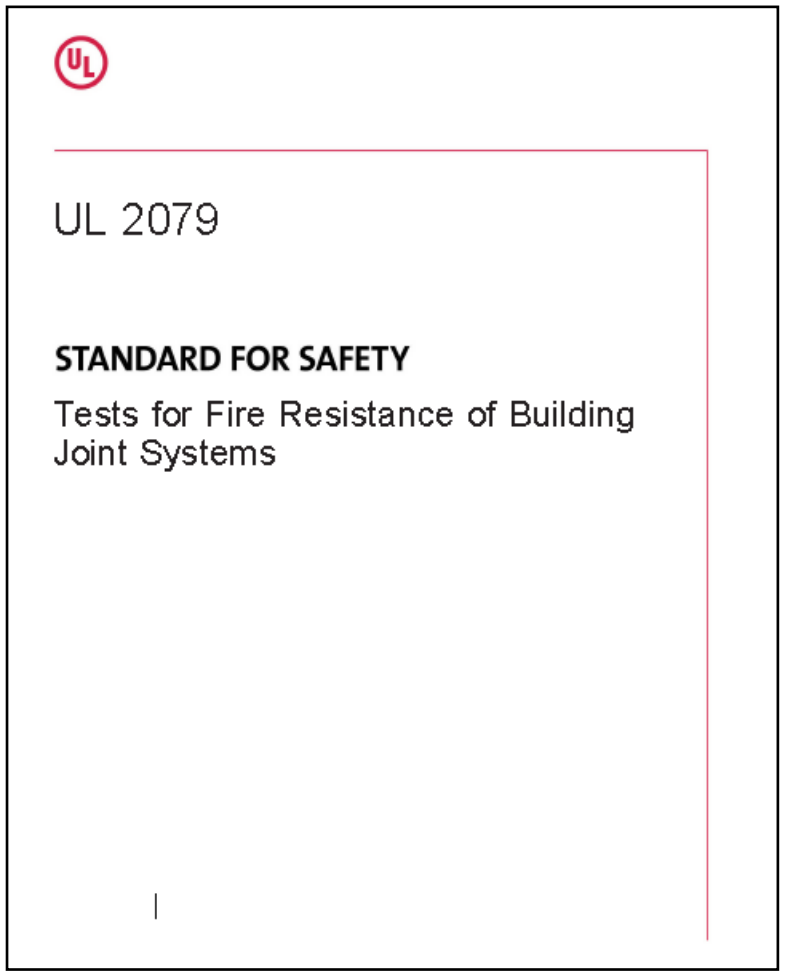


Joint System at Maximum Joint Width



Joint Systems

Test Method



Standards

- UL 2079
- ASTM E1966

Ratings

- Assembly Rating
- L – Leakage (Optional)
- W – Water Leakage (Optional, Not Applicable to Head-of-Wall Joint Systems)

Assembly Rating

- Passage of Flame
- 325ºF Individual Point Temperature Rise
- 250ºF Average Temperature Rise (If Joint Width > 6 in.)
- Support Load (Joint in Floor Assemblies, if Load Bearing)
- Hose Stream (Joints in Wall Assemblies Only)

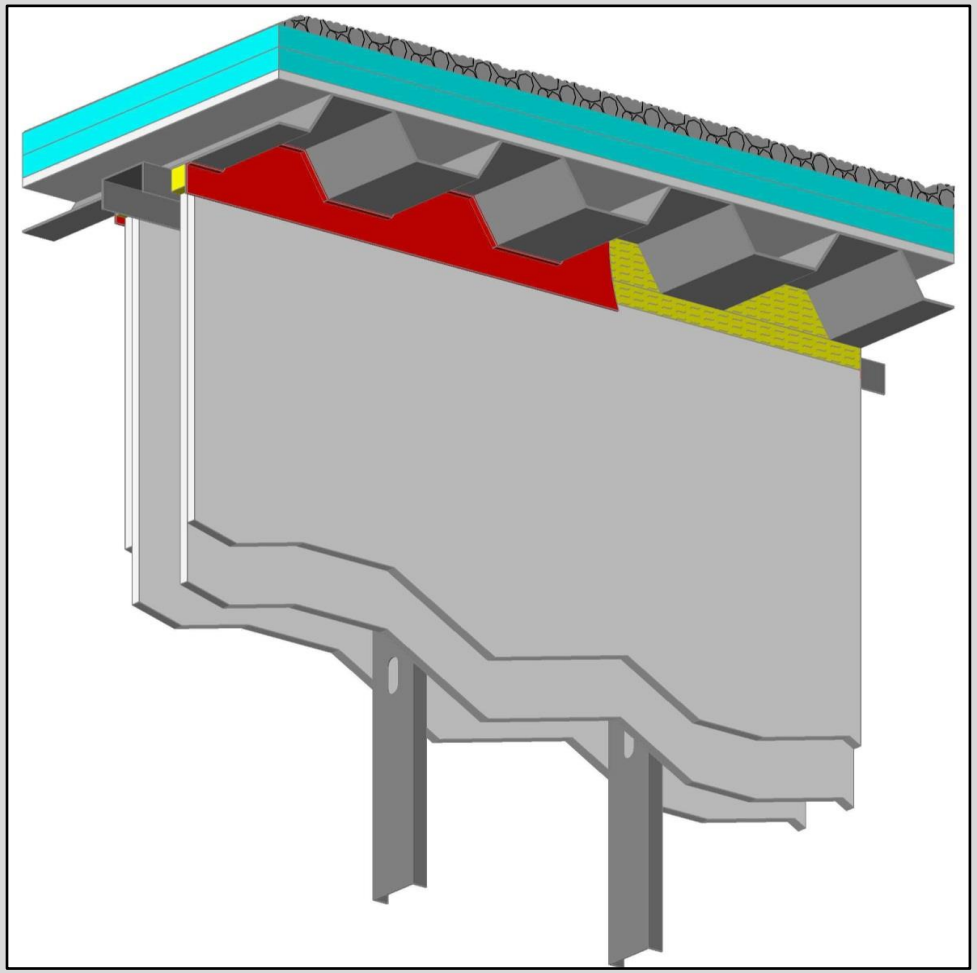
L Rating

- Air Leakage Rate at Ambient Temperature
- Air Leakage Rate at 400ºF

W Rating

- Optional program, applicable to incidental water
- 3 Ft WC Pressure Head / 72 Hr Exposure
- Joint subjected to water exposure, followed by standard fire and hose stream tests
- Joint systems assigned a W Rating

Protection of Voids



The Protection of Voids

- International Building Code – Chapter 7 – Fire and Smoke Protection Features
  - For the most part, Chapter 7 refers to the breach between rated and non-rated construction, and between non-rated construction as a void.

The Protection of Voids

- Exceptions to this where the breach between rated and non-rated construction, and between non-rated construction is referred to as a joint includes:
  - Section 710 – Smoke Partitions
  - Section 712 – Vertical Openings
  - Section 715 – Joints and Voids, in the list of exceptions of joints not requiring protection in Section 715.3

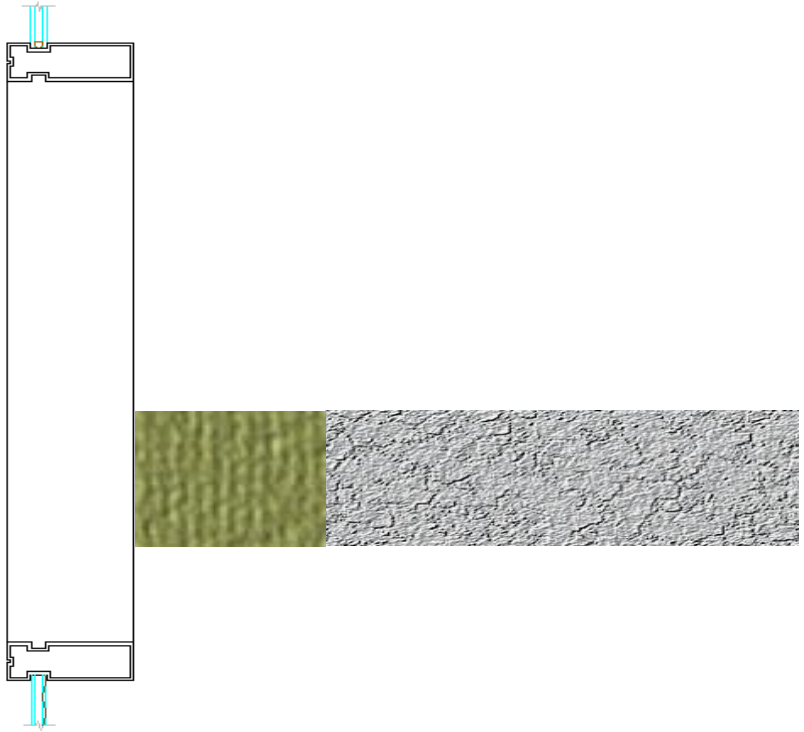
Format of IBC

- **707.8 Joints.** *Joints* made in or between *fire barriers*, and joints made at the intersection of *fire barriers* with the underside of a fire-resistance-rated floor or roof sheathing, slab or deck above, and with other fire-resistance-rated wall assemblies shall comply with Section 715.
- **707.9 Voids at intersections.** The voids created at the intersection of a *fire barrier* and a nonfire-resistance-rated roof assembly or a nonfire-resistance-rated exterior wall assembly shall comply with Section 715.
- Section 715 then provides the details of how to protect the joint or void.

Voids Which Require Protection

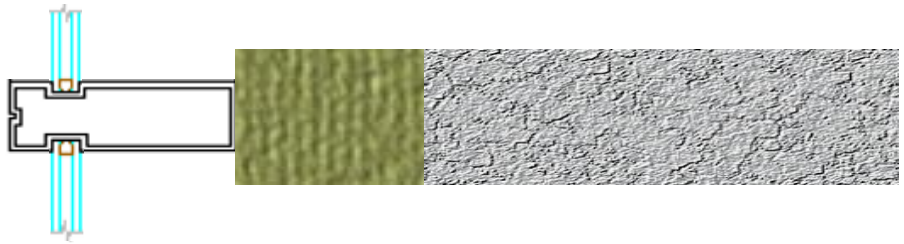
- Exterior Curtain Wall/Fire-Resistance-Rated Floor Intersection – Referred to as a Perimeter Fire Containment System

- Exterior Curtain Wall/Non Fire-Resistance-Rated Floor Assembly Intersection

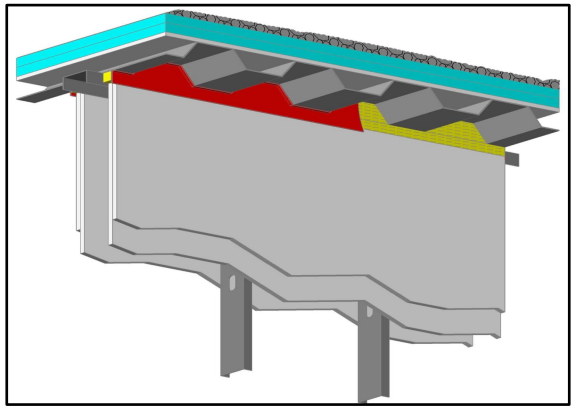


Voids Which Require Protection Cont.

- Exterior Curtain Wall/Vertical Fire Barrier Intersection



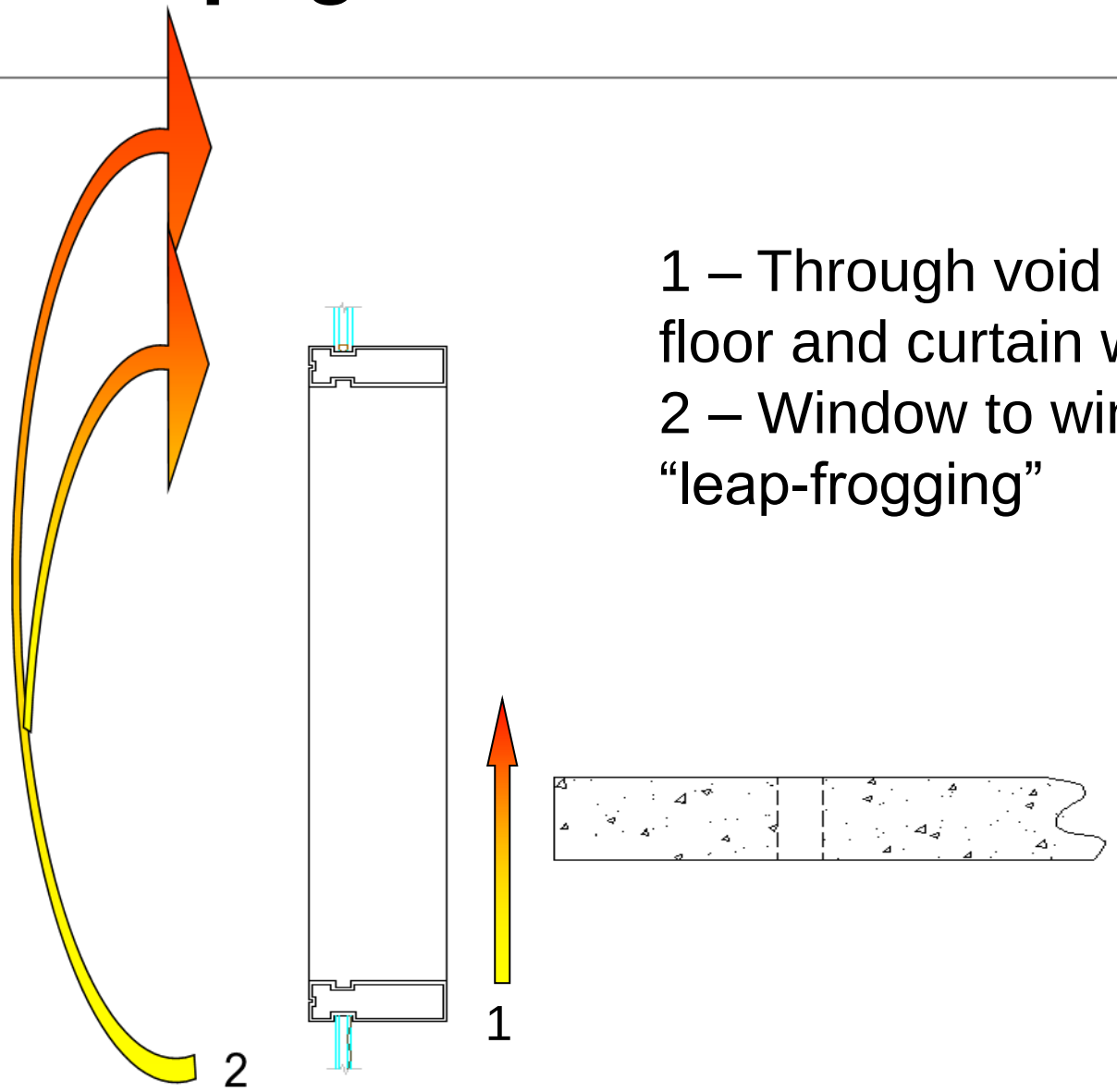
- Fire Barrier/Non Fire-Resistance-Rated Roof Assembly Intersection



Exterior Curtain Wall / Fire-Resistance-Rated Floor Intersection

- **715.4 Exterior curtain wall/fire-resistance-rated floor intersections.** Voids shall protected with an approved Perimeter Fire Containment System
  - System tested to ASTM E2307
  - F Rating shall be not less than rating of floor
  - Exception for cases where vision glass extends to finished floor

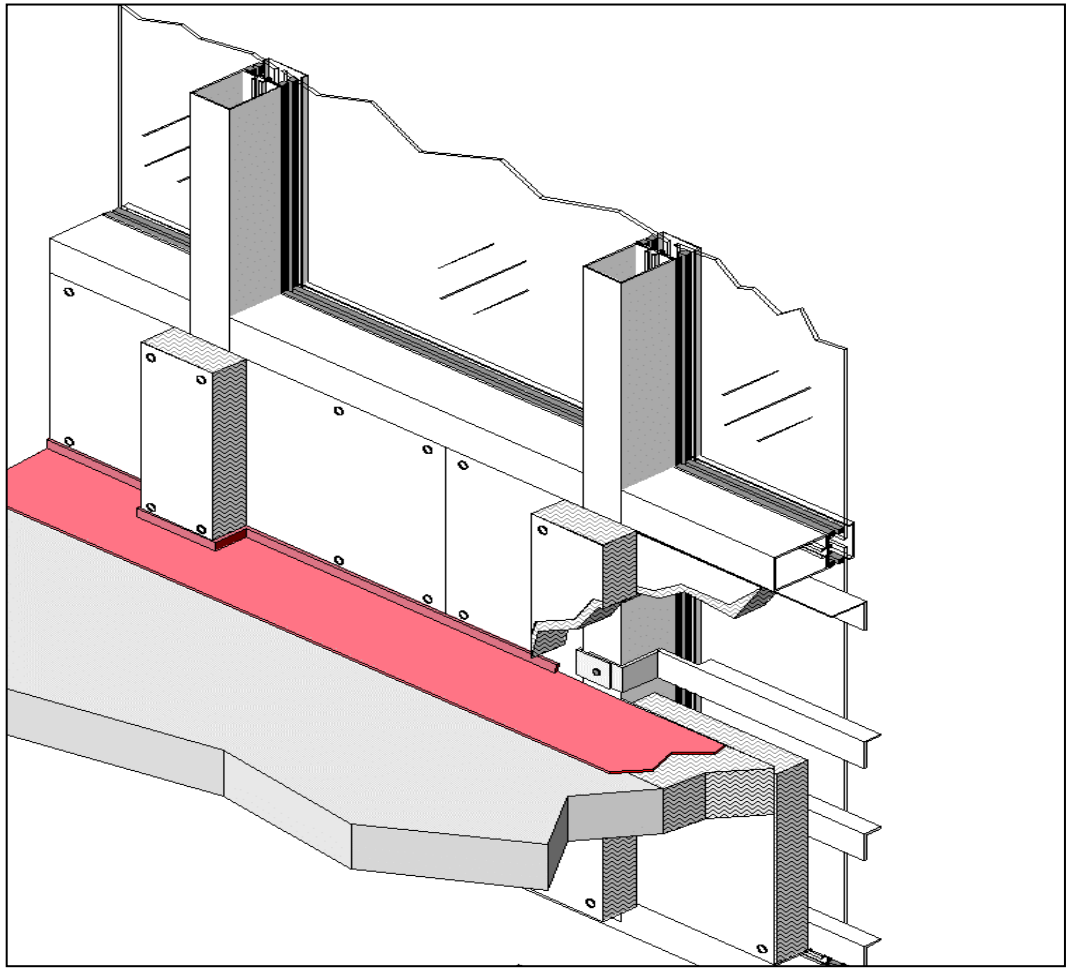
Paths of Fire Propagation



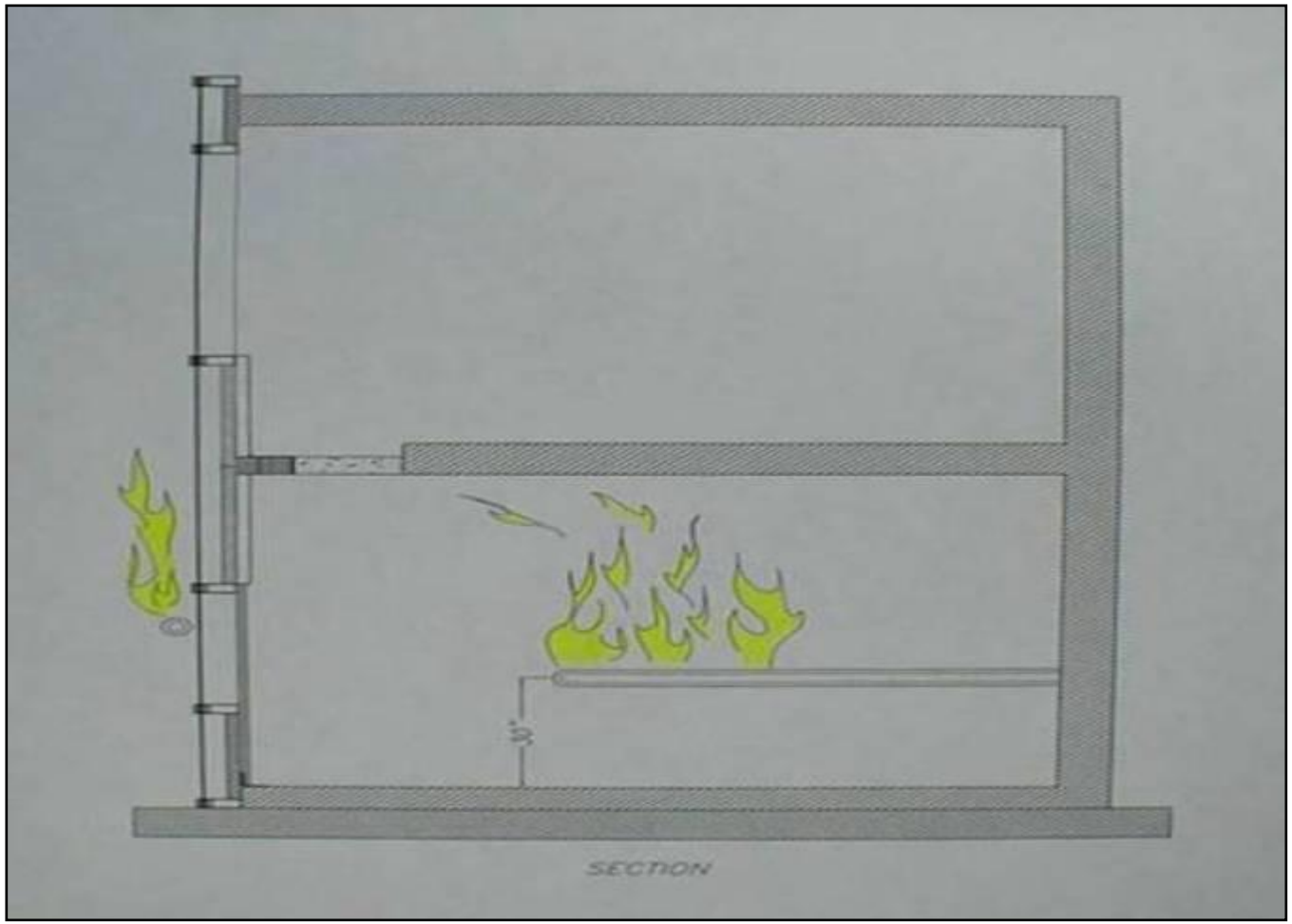
1 – Through void between floor and curtain wall
2 – Window to window “leap-frogging”

F (Flame) Rating by ASTM E2307

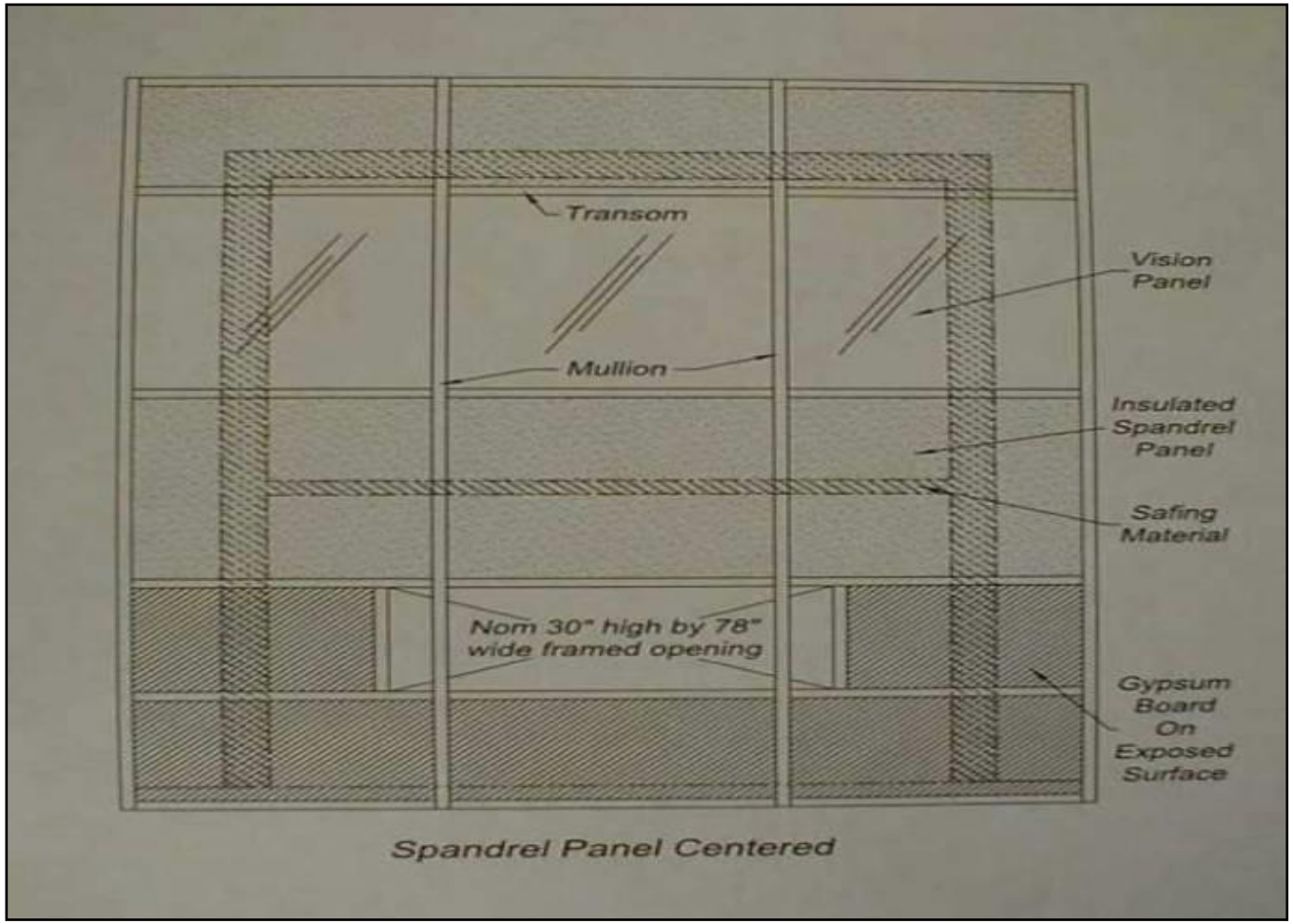
- No passage of flames through protected void (i.e. Path 1). Flame passage anywhere else is acceptable.



Test Apparatus



Curtain Wall Orientation



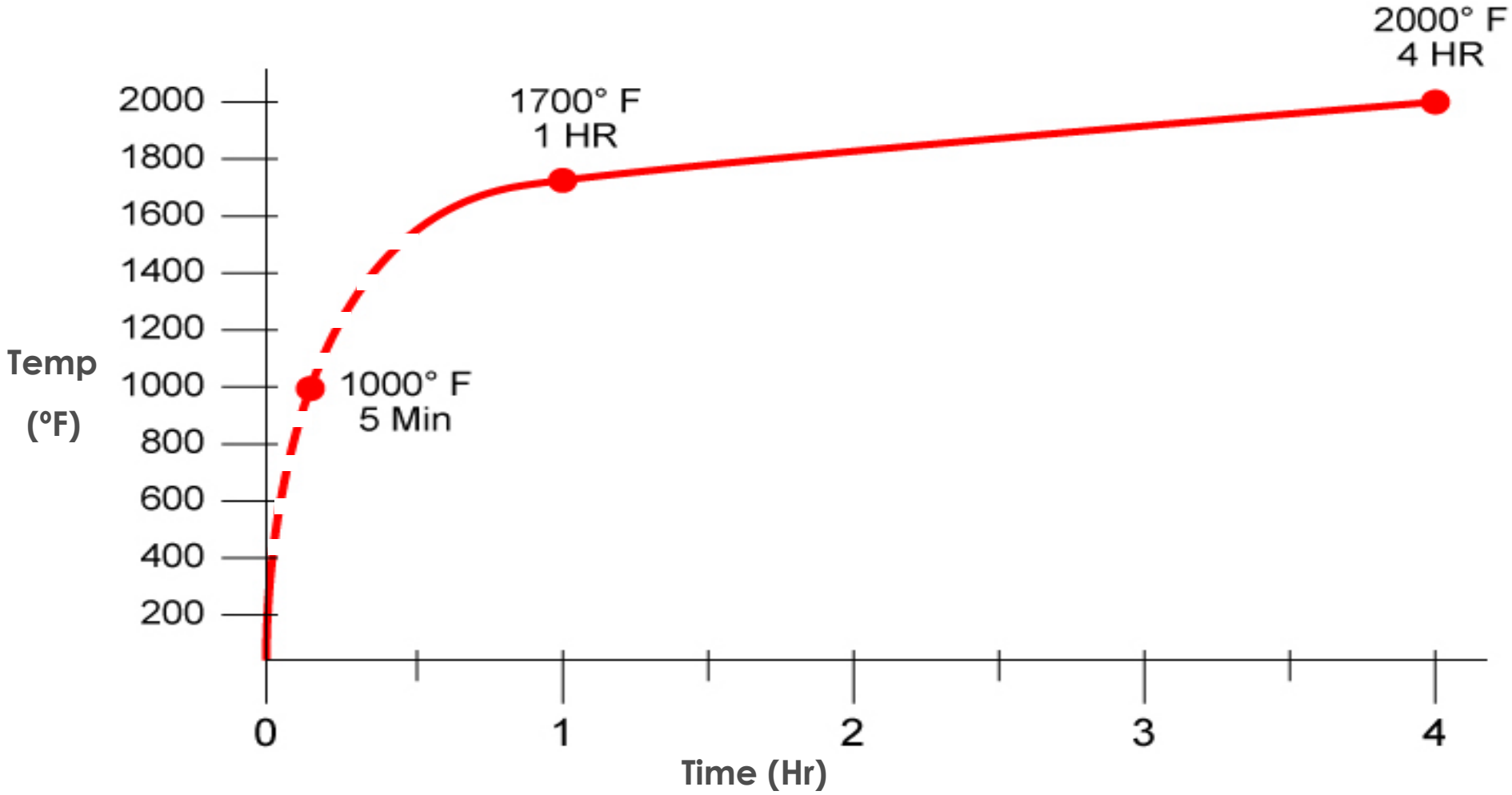
First Floor - Underside of Protected Void

Second Floor – Topside of Protected Void

Conditioning Prior to Fire Test

Movement Class	Min. No. of Cycles	Min. Cycling Rate (Cycles / Minutes)
Class I (Thermal)	500	1
Class II (Wind Sway)	500	10
Class III (Seismic)	100	30

Time-Temperature Curve



Approximately 2 Minutes

Approximately 120 Minutes

Exterior Curtain Wall/Non Fire-Resistance-Rated Floor Assembly Intersections

- **Section 715.5 Exterior curtain wall/nonfire-resistance-rated floor assembly intersections.** Voids created at the intersection of exterior curtain wall assemblies and nonfire-resistance-rated floor or floor/ceiling assemblies shall be filled with an *approved* material or system to retard the interior spread of fire and hot gases between *stories*.

Exterior Curtain Wall/Vertical Fire Barrier Intersections

- **Section 715.6 Exterior curtain wall/vertical fire barrier intersections.** Voids created at the intersection of nonfire-resistance-rated exterior curtain wall assemblies and vertical fire barriers shall be filled with an *approved* material or system to retard the interior spread of fire and hot gases.
  - Will read “Exterior wall/vertical fire barrier intersections” in 2024 IBC

Fire Barrier/Non Fire-Resistance-Rated Roof Assembly Intersection

- **707.9 Voids at Intersections.** The voids created at the intersection of a *fire barrier* and a nonfire-resistance-rated *roof assembly* or a nonfire-resistance-rated *exterior wall* assembly shall be filled. An *approved* material or system shall be used to fill the void, and shall be securely installed in or on the intersection for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to retard the passage of fire and hot gases.

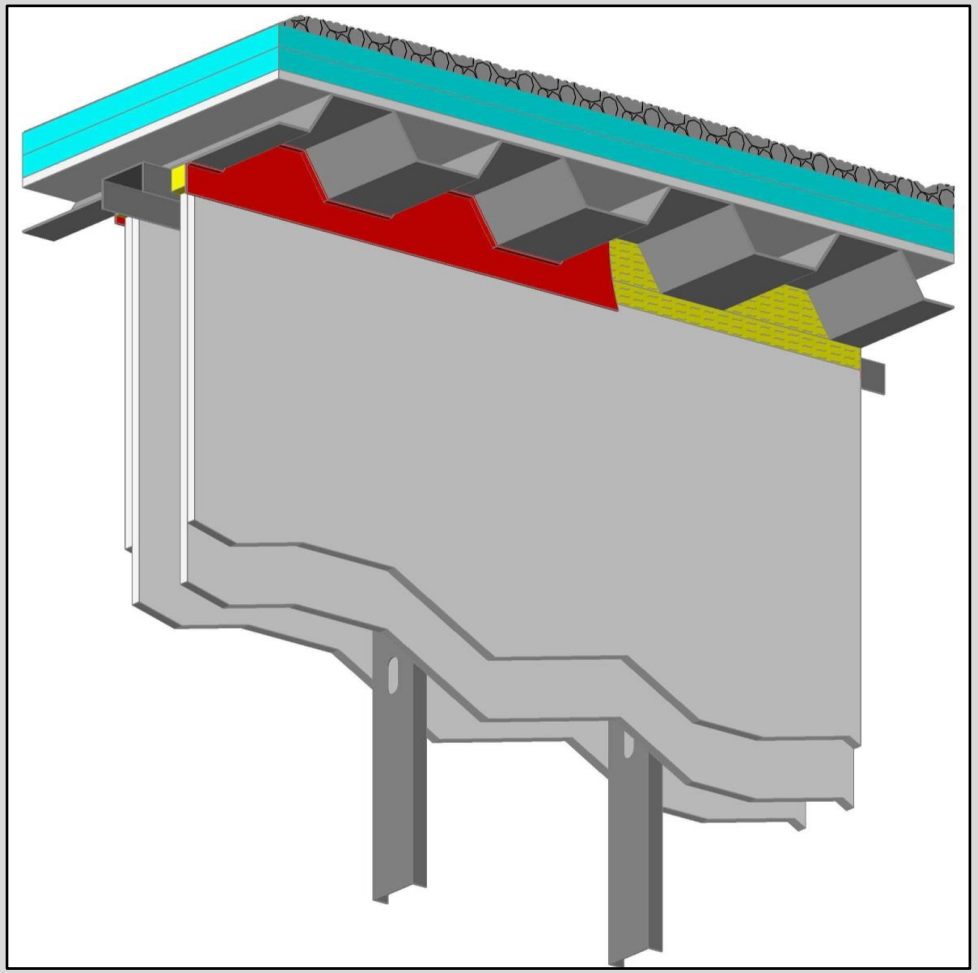
Fire Barrier/Non Fire-Resistance-Rated Roof Assembly Intersection

- Requirements for protecting these voids are incorrectly located in Section 707, covering fire barriers. Should be in Sections Section 715.
- 2024 IBC has been revised as follows:
  - Requirements to protect void between vertical fire barrier and exterior wall “moved” to Section 715.6
  - Installation shall be in accordance with Section 715.2

Fire Barrier/Non Fire-Resistance-Rated Roof Assembly Intersection

- Requirements to protect void between fire barrier and non fire-resistance-rated roof assembly moved to Section 715.7 with two options for protection
  - Protect with approved material
  - Protect with Continuity Head-of-Wall System tested to ASTM E2837, and having an F and T Rating not less than rating of wall
- Installation shall be in accordance with Section 715.2
- Section 707.9 retained as pointer to Section 715

Continuity Head-of-Wall Systems



Background

- Continuity Head-of-Wall System
  - Higher elevation of head-of-wall location equals
    - Higher temperature
    - Higher pressure
  - A wall is only as good as its weakest link
    - Clear need for fire rated doors, glazing, penetration seals, joints
    - Likewise, clear need for continuity head-of-wall systems

Background Cont.

- Continuity provisions of fire barriers requires fire barrier to extend to roof sheathing or deck.
- A void is often required to allow deflection of roof above, or may exist due to construction tolerances
- ASTM E2837: Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies published in 2011 to address this void.

MBMA Tests at UL
General Layout and Conditioning

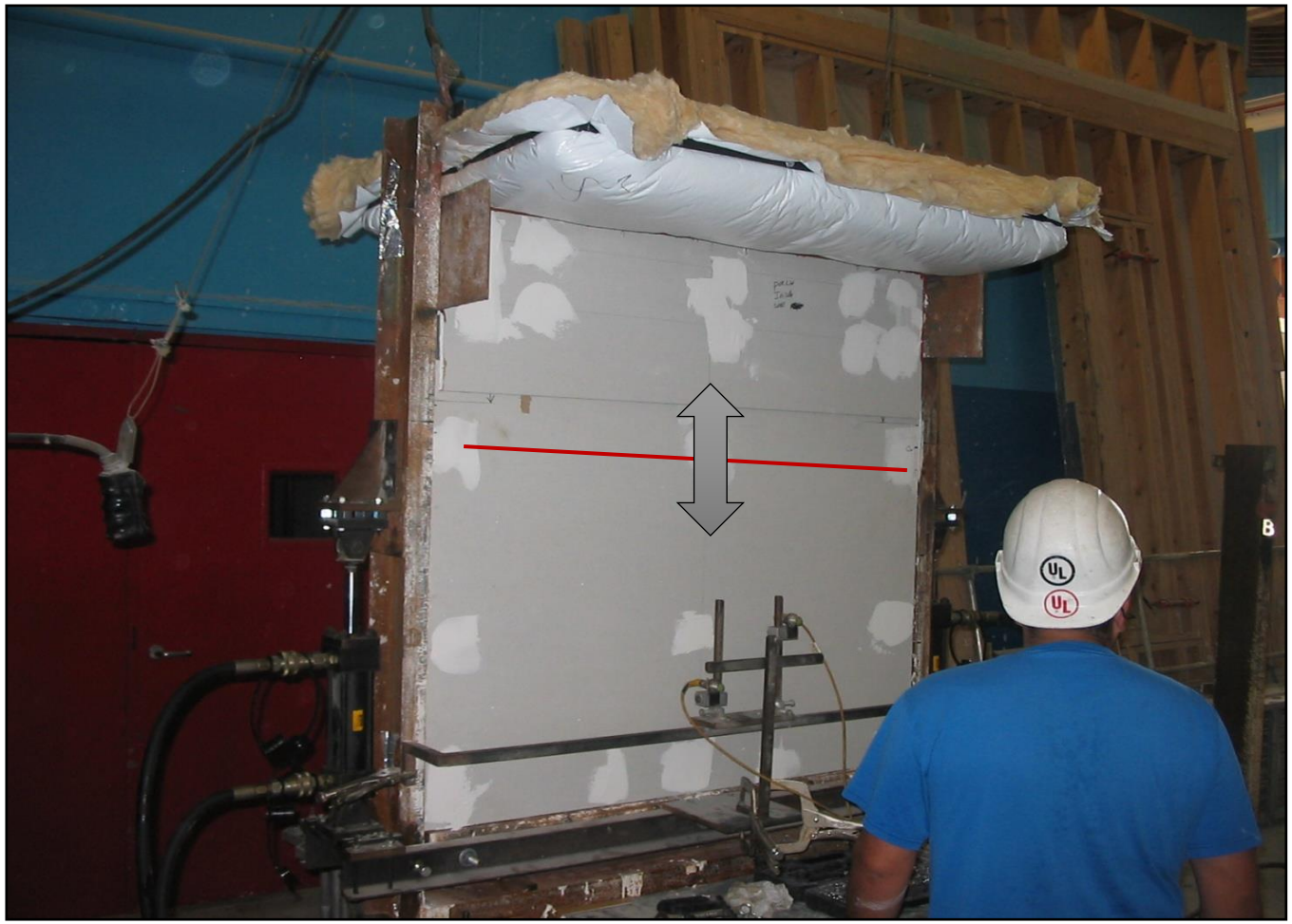


Photo courtesy of the Metal Building Manufacturers Association

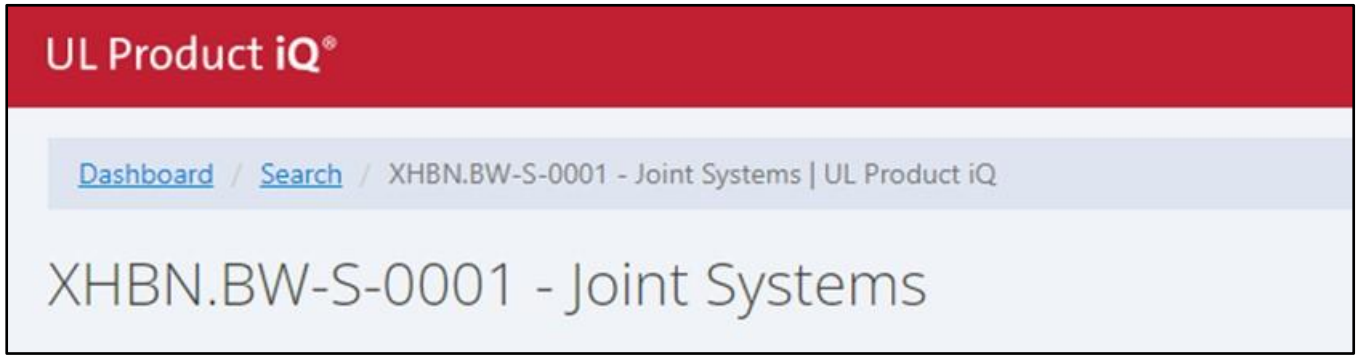
ASTM E2837 Compared to ASTM E1966

- Major differences:
  - No thermocouples on wall, roof, floor
  - As roof/floor may sag in a “real” fire, test protocol does not rigidly support the roof/floor
- E2837-17: Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies

Where Do You Find the Most Current Systems?

- Online Directories from the testing laboratories
  - FM Approvals
  - Intertek
  - UL/ULC Product iQ Online Directory

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



Product Categories

- XHBN – Joint Systems
  - Covers Fire-Resistant Joint Systems including Head-of-Wall Joint Systems
  - Includes approximately 2351 individual systems
- XHBO – Continuity Head-of-Wall Joint Systems
  - Covers Continuity Head-of-Wall Systems
  - Includes approximately 25 individual systems

Product Categories Cont.

- XHDG – Perimeter Fire-Containment Systems
  - Covers Perimeter Fire-Containment Systems
  - Includes approximately 228 individual systems

Product Categories Covering Products Used to Construct These Systems

- Product Categories
  - XHDI – Accessories for Use in Perimeter Fire-Containment Systems
  - XHHW – Fill, Void or Cavity Materials
  - XHKU – Forming Materials
  - XHLI – Light-Gauge Framing
  - XHLP – Mechanical Joint Assemblies
  - XHLR – Membranes

UL System Approach
Joint Systems (XHBN)

HW-D-0060

What does this mean?

HW	-	Head-of-Wall Joint System
D	-	Dynamic
0	-	Joint width less than or equal to 2 in.
060	-	60th such system published

UL System Approach
Continuity Head-of-Wall Systems (XHBO)

CJ-D-0015

What does this mean?

CJ - Continuity Head-of-Wall System
D - Dynamic
0 - Joint width less than or equal to 2 in.
015 - 15th such system published

UL System Approach
Perimeter Fire-Containment Systems (XHDG)

CW-D-0015

What does this mean?

CW	-	Perimeter Fire-Containment System
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0	-	Joint width less than or equal to 2 in.
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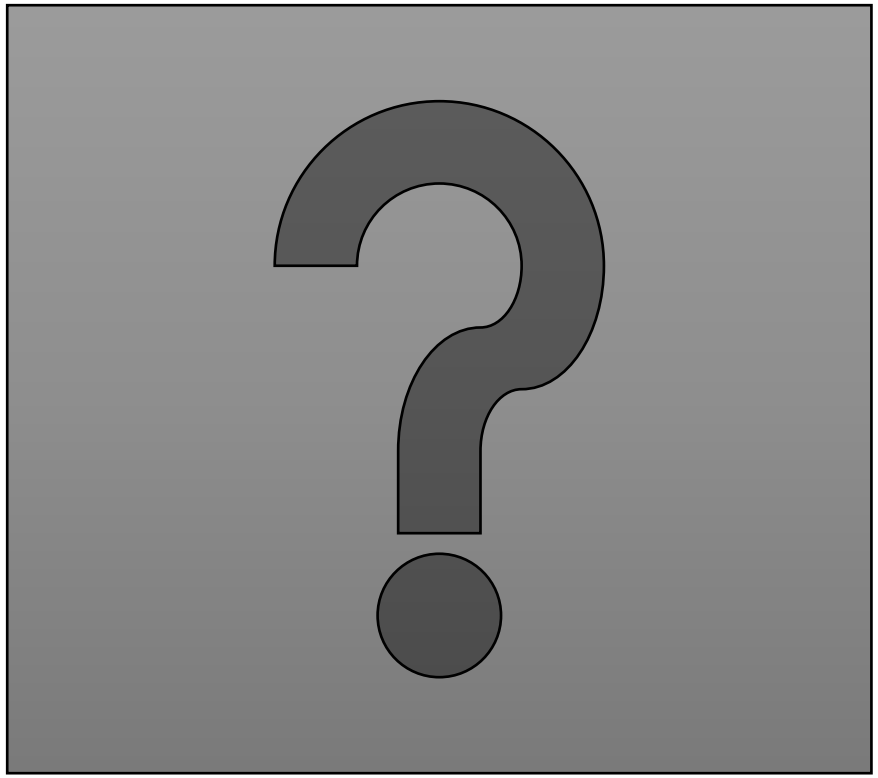
Questions??



Bill McHugh, FCIA Executive Director
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FCIA
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FCIA – Firestop Contractors International Association

- **Fire Exits??**
- **Housekeeping….**
- **Thanks to FCIA Members**
  - Firestop Contractors
  - Manufacturers, Consultants
  - Firestop Distributors, Reps, Friends
  - **FCIA Board of Directors**

FCIA BOARD OF DIRECTORS
LEADERSHIP OVER DECADES

Welcome, Thanks, From FCIA…..

Firestop Contractors International Association

FREE PDF MOP, SPECIFICATION & Life Safety Digest for Code Officials, Fire Marshals, & Specifiers with Design Firms

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www.FCIA.org

FCIA – Firestop Contractors International Association

- **FREE Life Safety Digest**
- **UL/ULC, FM 4991 Contractor Programs**
- **IAS AC 291 Inspection Agency Accreditation Program**
- **Firestop Certificate &** Individual Knowledge
- **ASTM Inspection Standards**
- **Tools** @ **FCIA.org** for Specifiers, AHJ's, Building Owners, Firestop Contractors & Inspection Agencies
- **Watch FCIA.org for Webinar Announcements!**

FCIA Actions –2023

- Conferences
  - FCIA MENA - India
    - Doha – Feb. 5
    - FSBI – Feb. 9, 10
    - Dubai – Feb. 15
    - Riyadh – Feb. 18
  - FCIA ECA @ New Orleans, USA – May 10-13
  - FCIA CAN @ Ottawa, Ontario – Sept. 24-26
  - FCIA FIC @ ABQ, NM – Oct. 23-27
- Webinars & Symposiums
- Code Development & Standards Discussions
- Committee Action
- International Discussions

FCIA Actions – 2021 & 2022

- ***NEW Education for Careers in Firestopping!!***

- ***FCIA's Firestop Certificate of Achievement & Education Program***
  - ***3.5 Hours Level 1***
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FCIA Actions - 2022

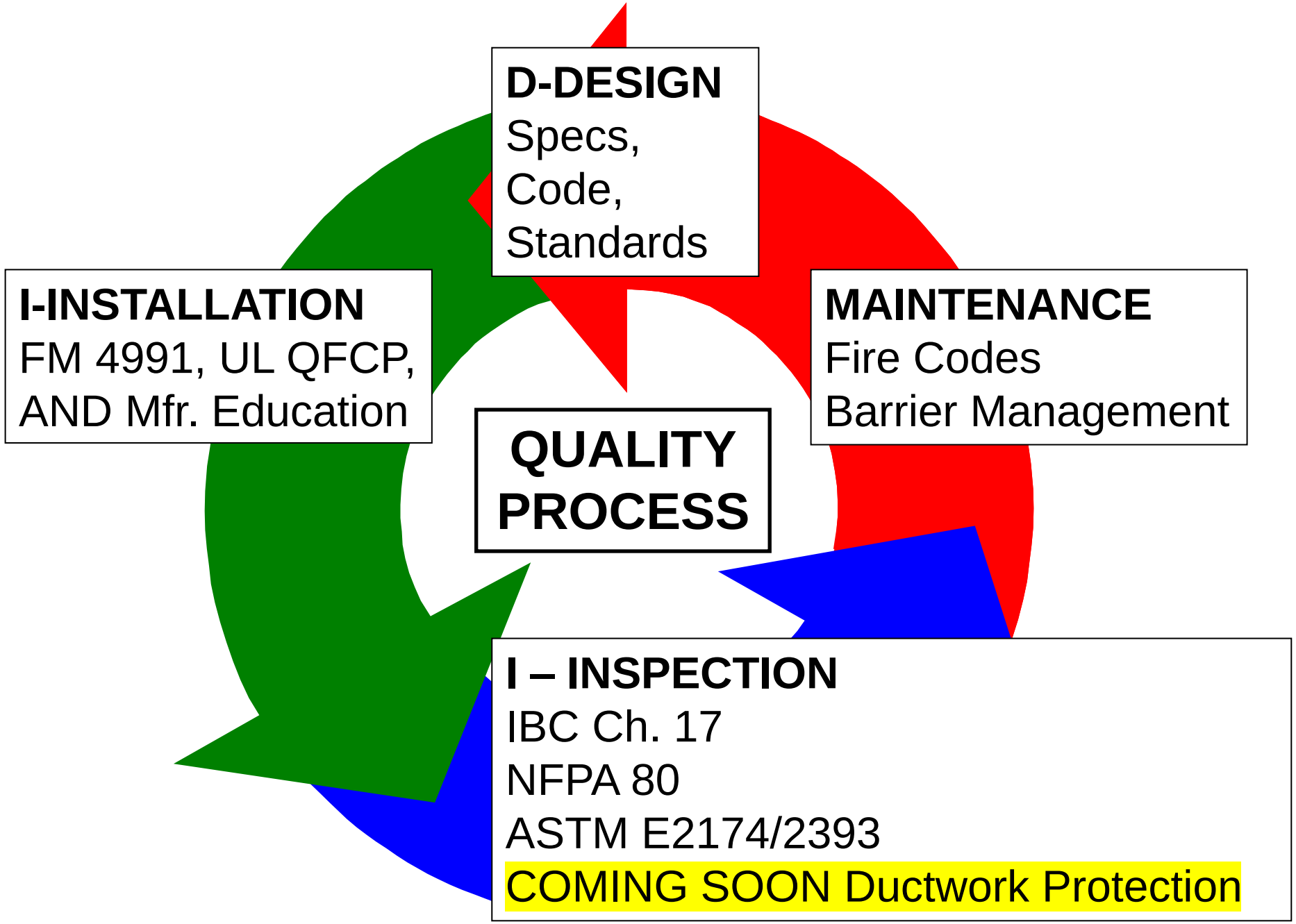
Firestop Contractors International Association

- ***NEW Education for Careers in Firestopping!!***
  - ***FCIA's Firestop Certificate of Achievement***
    - ***4 Levels***
      - ***Level 1 – General Knowledge Certificate***
      - ***Level 2 – In Depth Materials & Systems Certificate***
      - ***Level 3 – SOON***
      - ***Level 4 - SOON***
    - ***Career Path Education***
  - ***FCIA Education Respected Worldwide***

Systems & Materials….

“TOTAL FIRE PROTECTION”

- Effective Compartmentation
  - Fire Barriers, Fire Walls, Floors, Smoke Barriers
  - Firestopping, Fire Dampers, Swinging and Rolling Fire Doors, Fire-Rated Glazing
  - Fire-Resistive Protection for Ductwork
- Detection & Alarm Systems
- Sprinkler Suppression Systems
- Education & Egress –
  - Building Owners & Managers, Building Occupants and Firefighters


D-DESIGN
Specs,
Code,
Standards
MAINTENANCE
Fire Codes
Barrier Management
I-INSTALLATION
FM 4991, UL QFCP,
AND Mfr. Education
QUALITY
PROCESS
I – INSPECTION
IBC Ch. 17
NFPA 80
ASTM E2174/2393
COMING SOON Ductwork Protection

FCIA Webinar Series

The Firestopping Joints Primer Program

Bill McHugh, Executive Director of FCIA
Rich Walke, CTI, Consultant to FCIA

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Firestop Contractors International Association

May 17, 2023

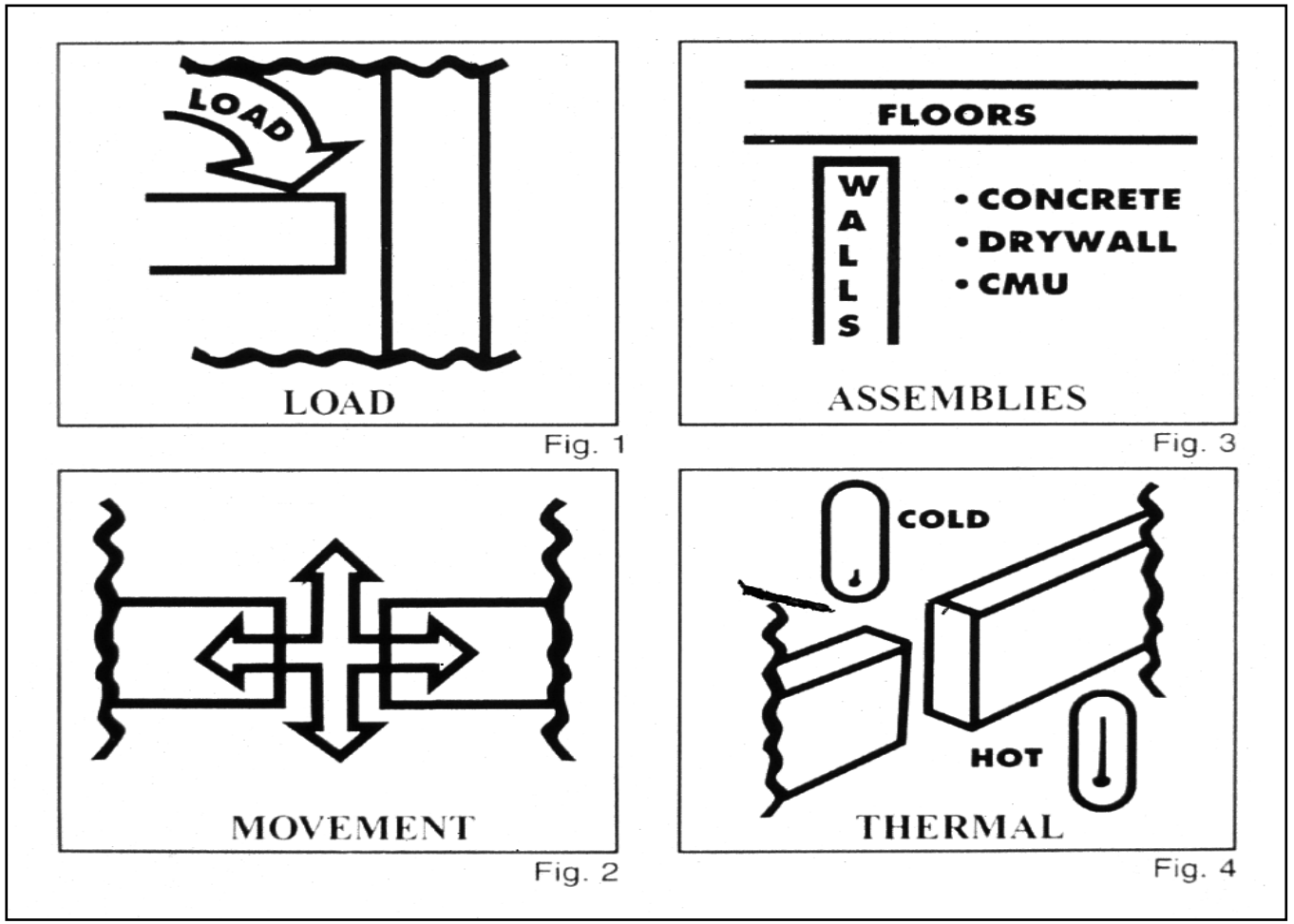
Joint vs Void - What's the Difference?

- International Building Code – Chapter 2 – Definitions
  - **Joint.** The opening in or between adjacent assemblies that is created due to building tolerances, or is designed to allow independent movement of the building in any plane caused by thermal, seismic, wind or any other loading. (2021 IBC)
  - **Void.** Undefined by the 2021 IBC. By Webster's it's an "opens space".
- By the Chapter 2 definition, all intersection points between rated construction, between rated and non-rated construction and between non-rated construction could be consider a joint.

Joint vs Void - What's the Difference?

- International Building Code – Chapter 7 – Fire and Smoke Protection Features
  - **Joint** – As used in Chapter 7, a joint is a breach in or between fire-resistance-rated construction.
  - **Void** – As used in Chapter 7, for the most part, a void is a breach between a fire-resistance-rated assembly and a non-rated assembly or between two non-rated assemblies. For example, the void between a rated floor slab and a non-rated curtain wall.
- IBC is not consistent between Chapters 2 and 7

Forces Which Induce Movement in Buildings



- Thermal
- Wind Sway
- Seismic
- Applied Loads

Fire-Resistant Joint Systems

The Protection of Joints

- International Building Code – Section 715 – Joints and Voids
  - **715.3 Fire-resistance-rated assembly intersections.** *Joints* installed in or between fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies shall be protected by an approved *fire-resistant joint system* designed to resist the passage of fire for a time period not less than the required *fire-resistance rating* of the wall, floor or roof in or between which the system is installed.

The Protection of Joints

- International Building Code – Chapter 2 – Definitions
  - **Fire-Resistant Joint System.** An assemblage of specific materials or products that are designed, tested, and fire-resistance rated in accordance with either ASTM E1966 or UL 2079 to resist for a prescribed period of time the passage of fire through *joints* made in or between fire-resistance-rated assemblies. (2021 IBC)

The Protection of Joints

- International Building Code – Chapter 2 – Definitions
  - Based on the definition of *joint* and the requirements of Section 715.3, in theory any *joint* in or between fire-resistance-rated construction created due to building tolerances or designed to allow for building movement requires protection by a fire-resistant joint system.

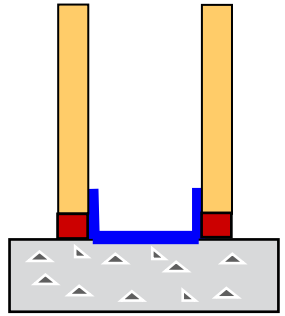
The Protection of Joints

- In practice, that may not be the case for *joints* created due to building tolerances. Are fire-resistant joints typically used in the following locations?
  - Bottom-of-wall applications
  - Inside and outside corners of gypsum board / wood or steel framed walls
  - Head-of-wall joints of gypsum board in platform construction

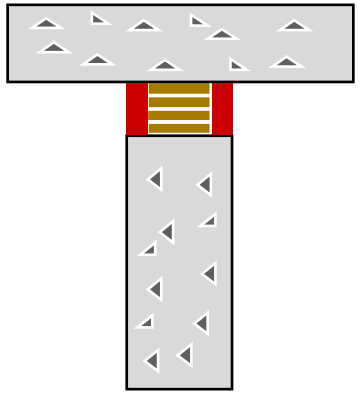
The Protection of Joints

- Fire-Resistant Joint Systems are also referred to as:
  - **Joint Systems**
  - Construction Joints
  - Expansion Joints
  - Joint Firestops

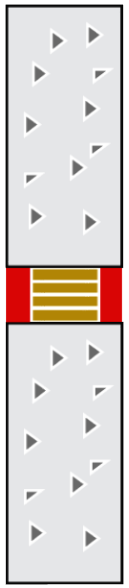
Types of Fire-Resistant Joint Systems



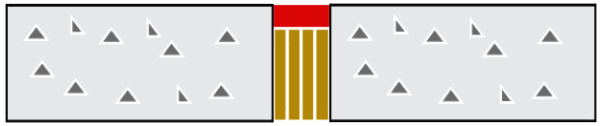
Bottom-of-Wall



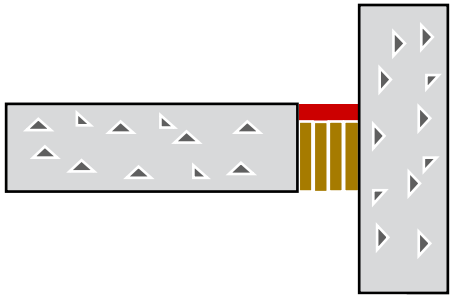
Head-of-Wall



Wall-to-Wall



Floor-to-Floor

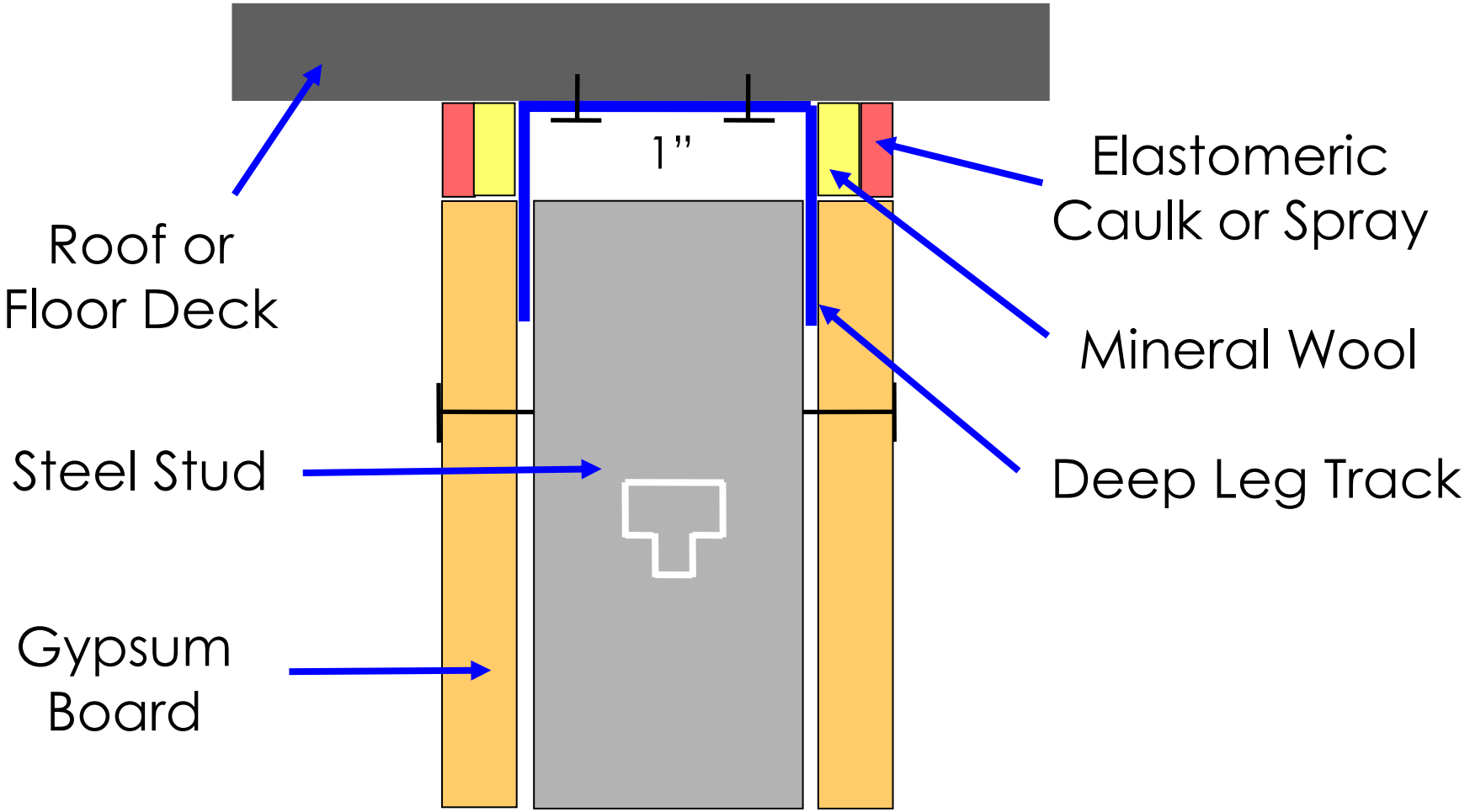


Floor-to-Wall

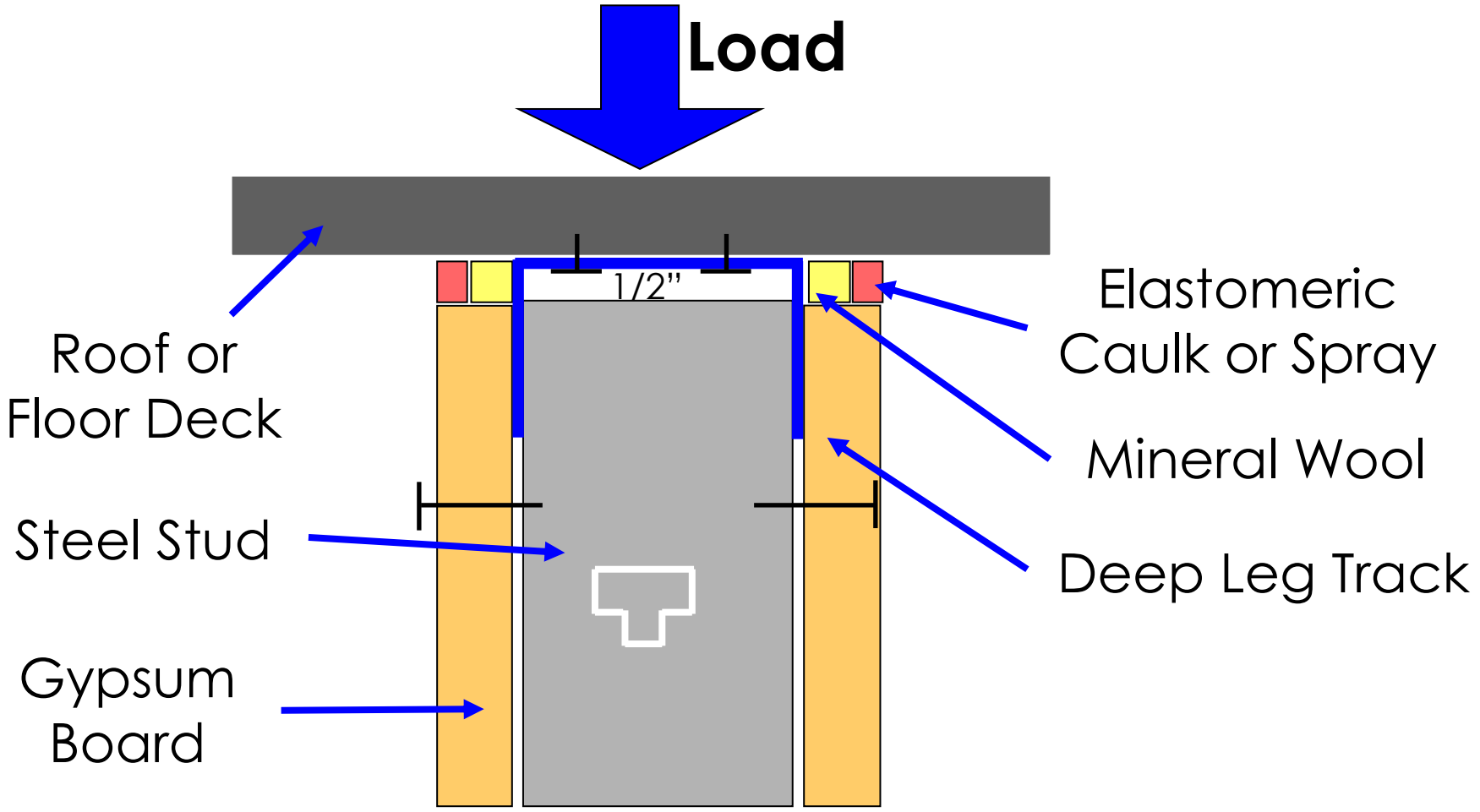
Methods of Protecting Joint Systems

- Elastomeric Systems
  - Sealants
  - Sprays
- Mechanical Systems
  - Slotted Tracks
  - Offset Tracks
  - Draped Blankets

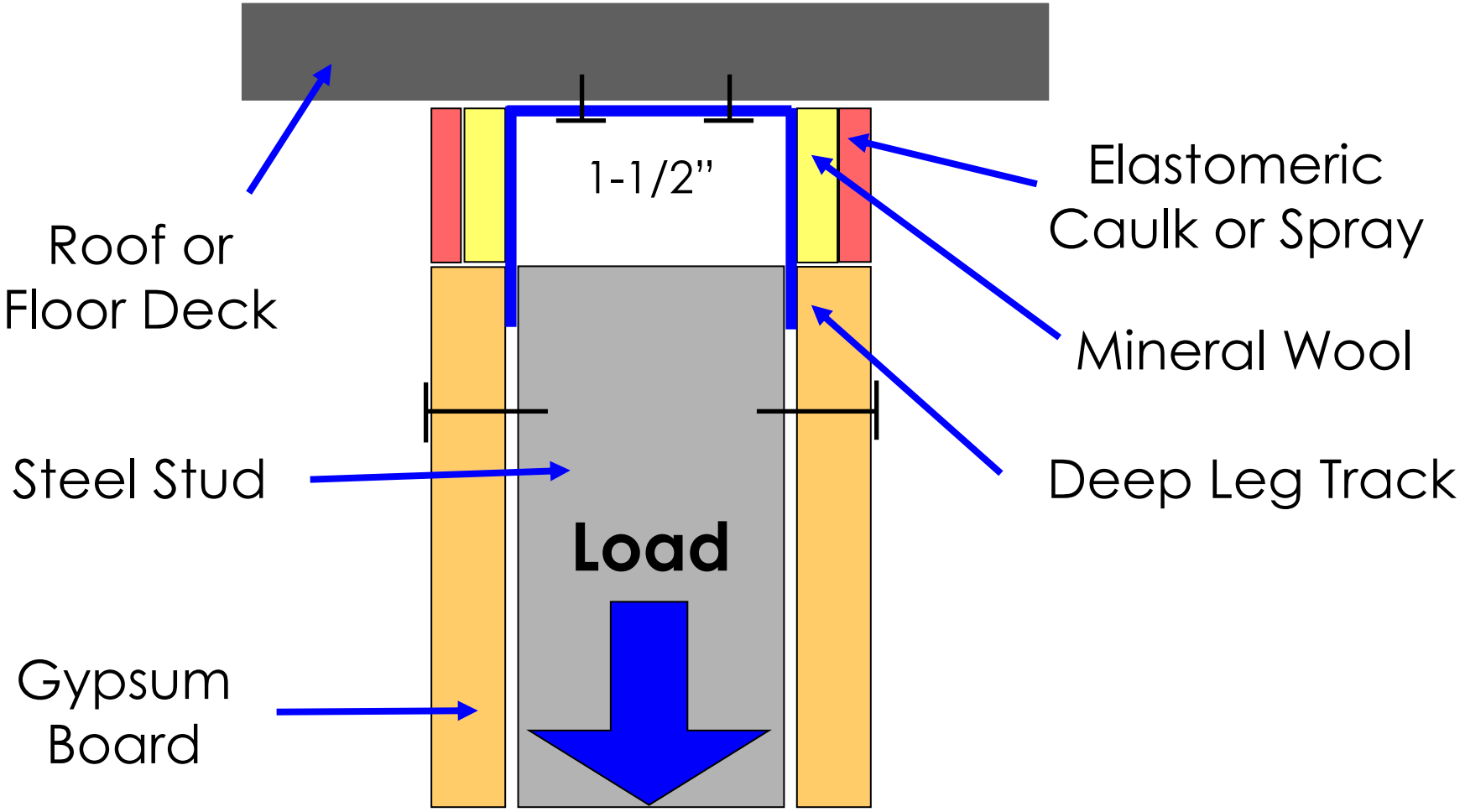
Joint System at Nominal Joint Width



Joint System at Minimum Joint Width

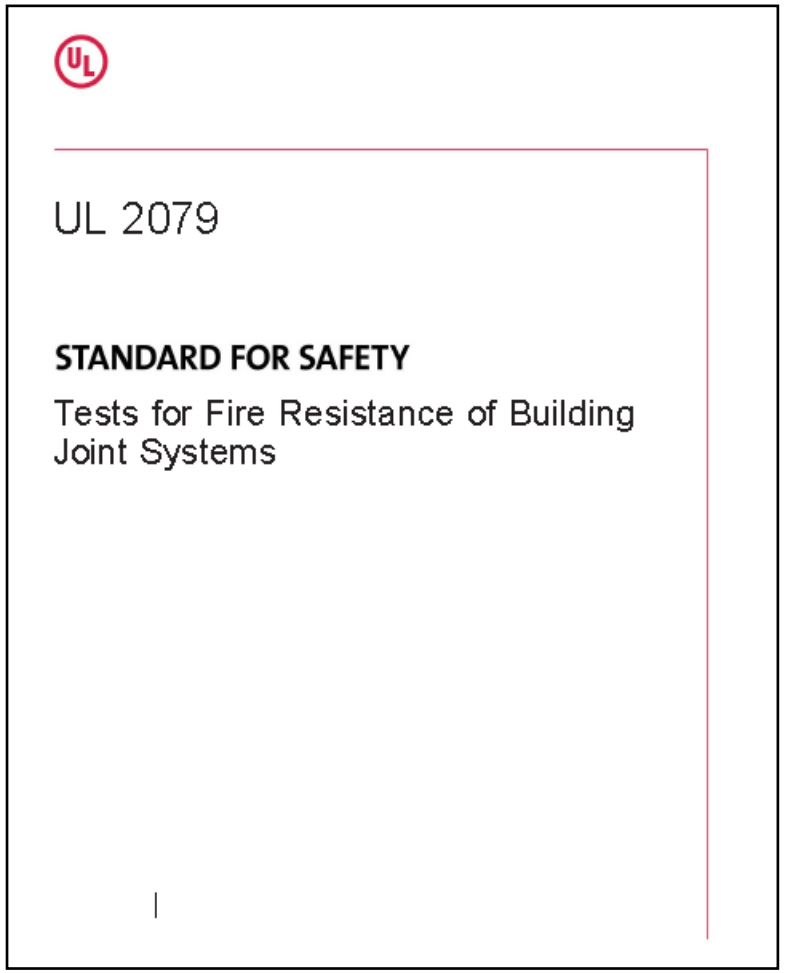


Joint System at Maximum Joint Width



Joint Systems

Test Method



Standards

- UL 2079
- ASTM E1966

Ratings

- Assembly Rating
- L – Leakage (Optional)
- W – Water Leakage (Optional, Not Applicable to Head-of-Wall Joint Systems)

Assembly Rating

- Passage of Flame
- 325ºF Individual Point Temperature Rise
- 250ºF Average Temperature Rise (If Joint Width > 6 in.)
- Support Load (Joint in Floor Assemblies, if Load Bearing)
- Hose Stream (Joints in Wall Assemblies Only)

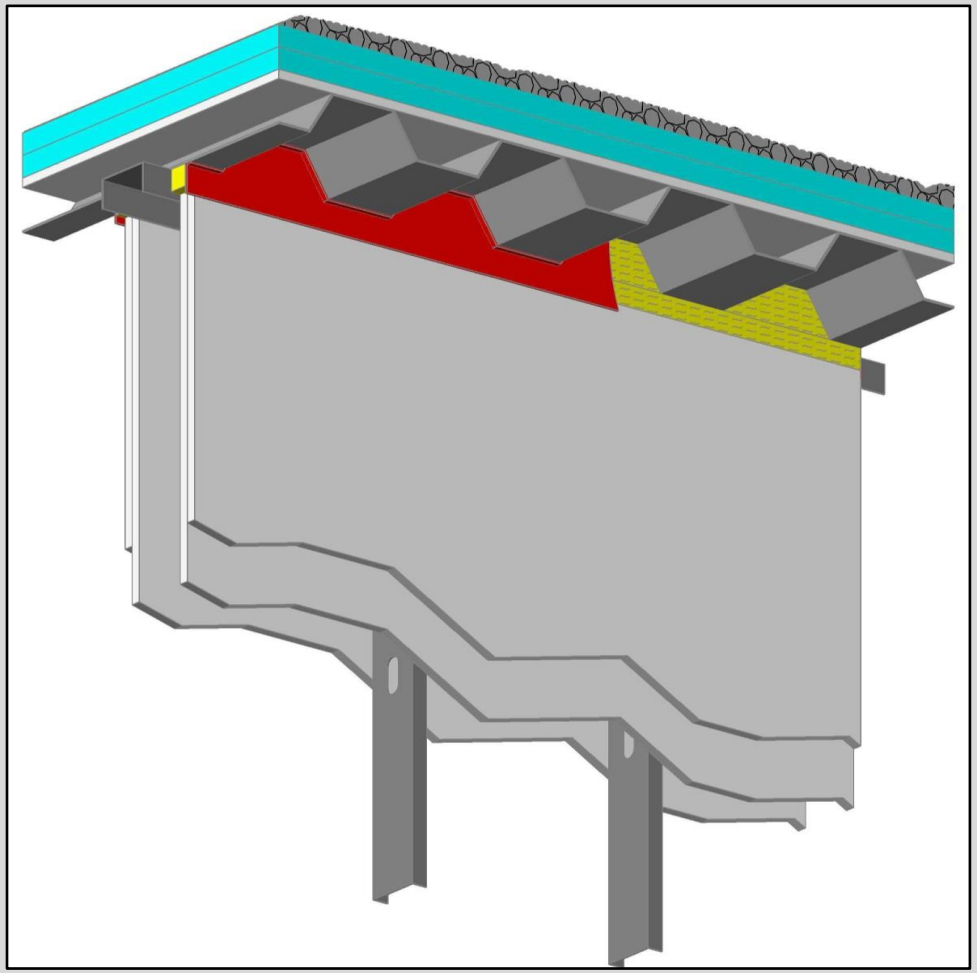
L Rating

- Air Leakage Rate at Ambient Temperature
- Air Leakage Rate at 400ºF

W Rating

- Optional program, applicable to incidental water
- 3 Ft WC Pressure Head / 72 Hr Exposure
- Joint subjected to water exposure, followed by standard fire and hose stream tests
- Joint systems assigned a W Rating

Protection of Voids



The Protection of Voids

- International Building Code – Chapter 7 – Fire and Smoke Protection Features
  - For the most part, Chapter 7 refers to the breach between rated and non-rated construction, and between non-rated construction as a void.

The Protection of Voids

- Exceptions to this where the breach between rated and non-rated construction, and between non-rated construction is referred to as a joint includes:
  - Section 710 – Smoke Partitions
  - Section 712 – Vertical Openings
  - Section 715 – Joints and Voids, in the list of exceptions of joints not requiring protection in Section 715.3

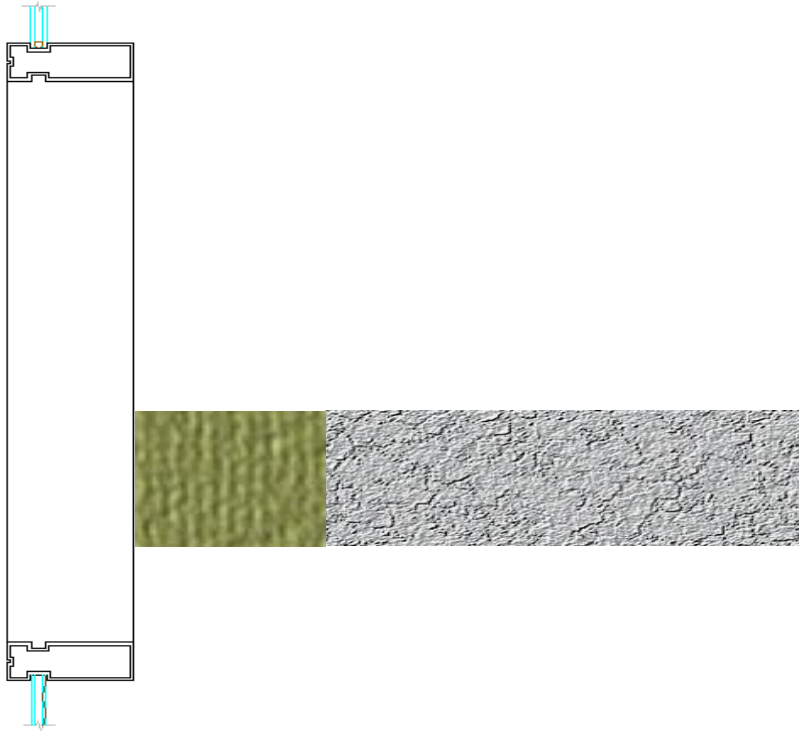
Format of IBC

- **707.8 Joints.** *Joints* made in or between *fire barriers*, and joints made at the intersection of *fire barriers* with the underside of a fire-resistance-rated floor or roof sheathing, slab or deck above, and with other fire-resistance-rated wall assemblies shall comply with Section 715.
- **707.9 Voids at intersections.** The voids created at the intersection of a *fire barrier* and a nonfire-resistance-rated roof assembly or a nonfire-resistance-rated exterior wall assembly shall comply with Section 715.
- Section 715 then provides the details of how to protect the joint or void.

Voids Which Require Protection

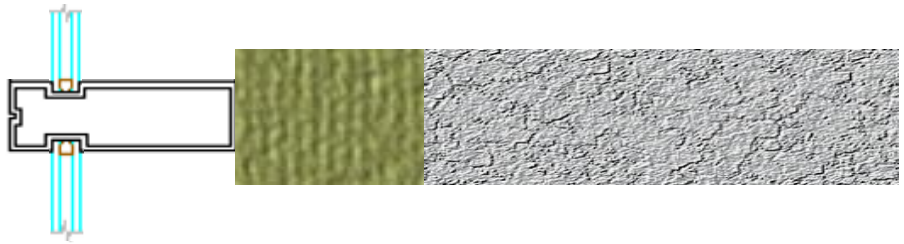
- Exterior Curtain Wall/Fire-Resistance-Rated Floor Intersection – Referred to as a Perimeter Fire Containment System

- Exterior Curtain Wall/Non Fire-Resistance-Rated Floor Assembly Intersection

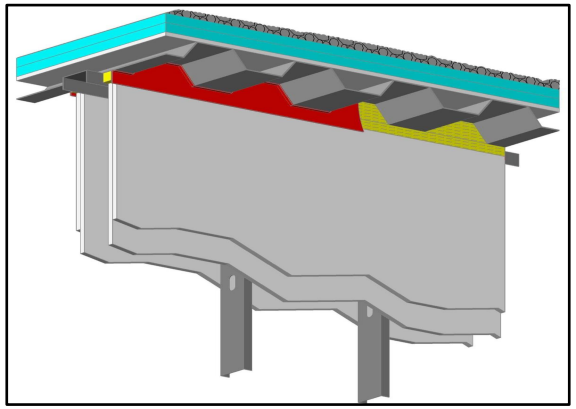


Voids Which Require Protection Cont.

- Exterior Curtain Wall/Vertical Fire Barrier Intersection



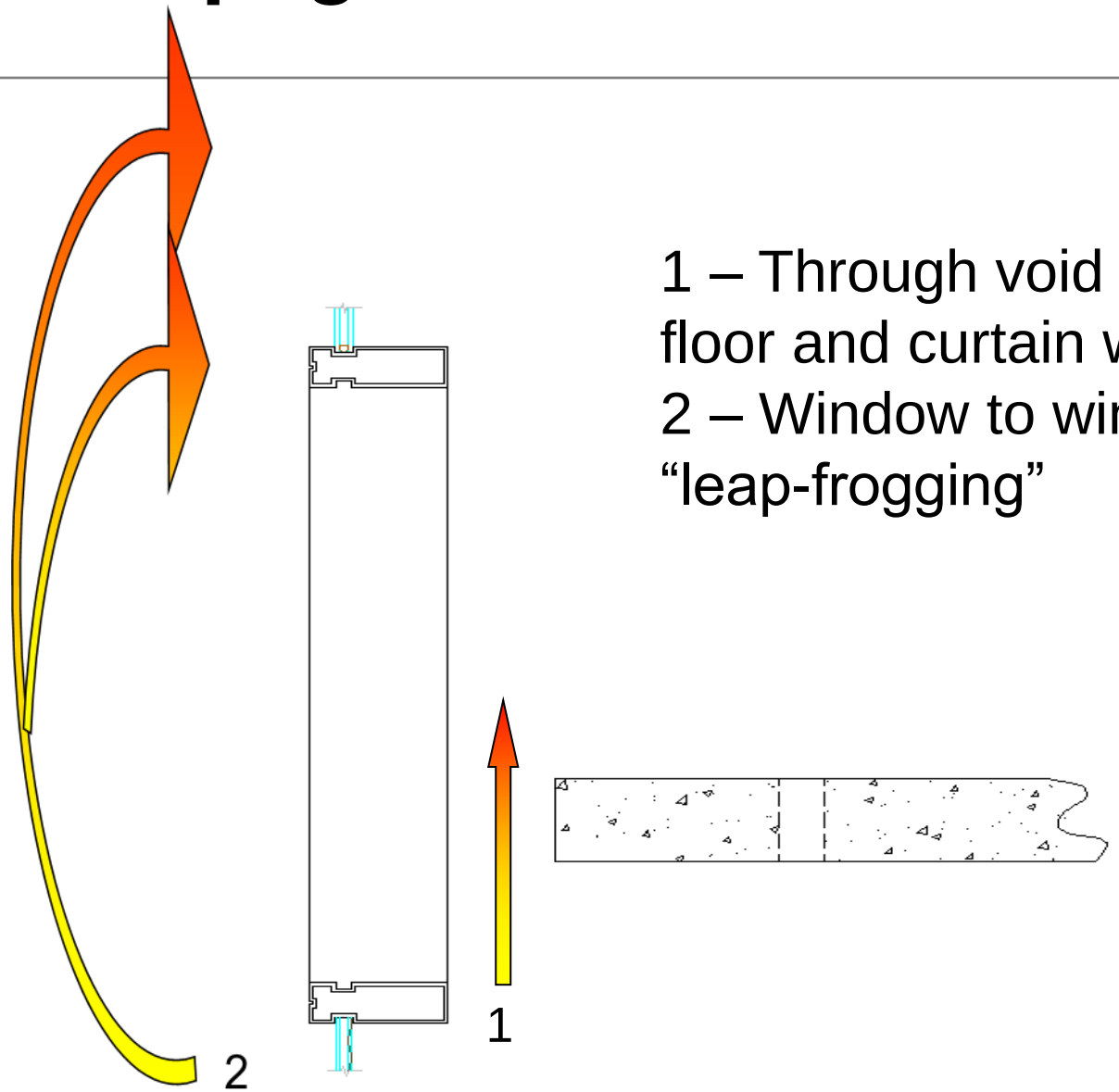
- Fire Barrier/Non Fire-Resistance-Rated Roof Assembly Intersection



Exterior Curtain Wall / Fire-Resistance-Rated Floor Intersection

- **715.4 Exterior curtain wall/fire-resistance-rated floor intersections.** Voids shall protected with an approved Perimeter Fire Containment System
  - System tested to ASTM E2307
  - F Rating shall be not less than rating of floor
  - Exception for cases where vision glass extends to finished floor

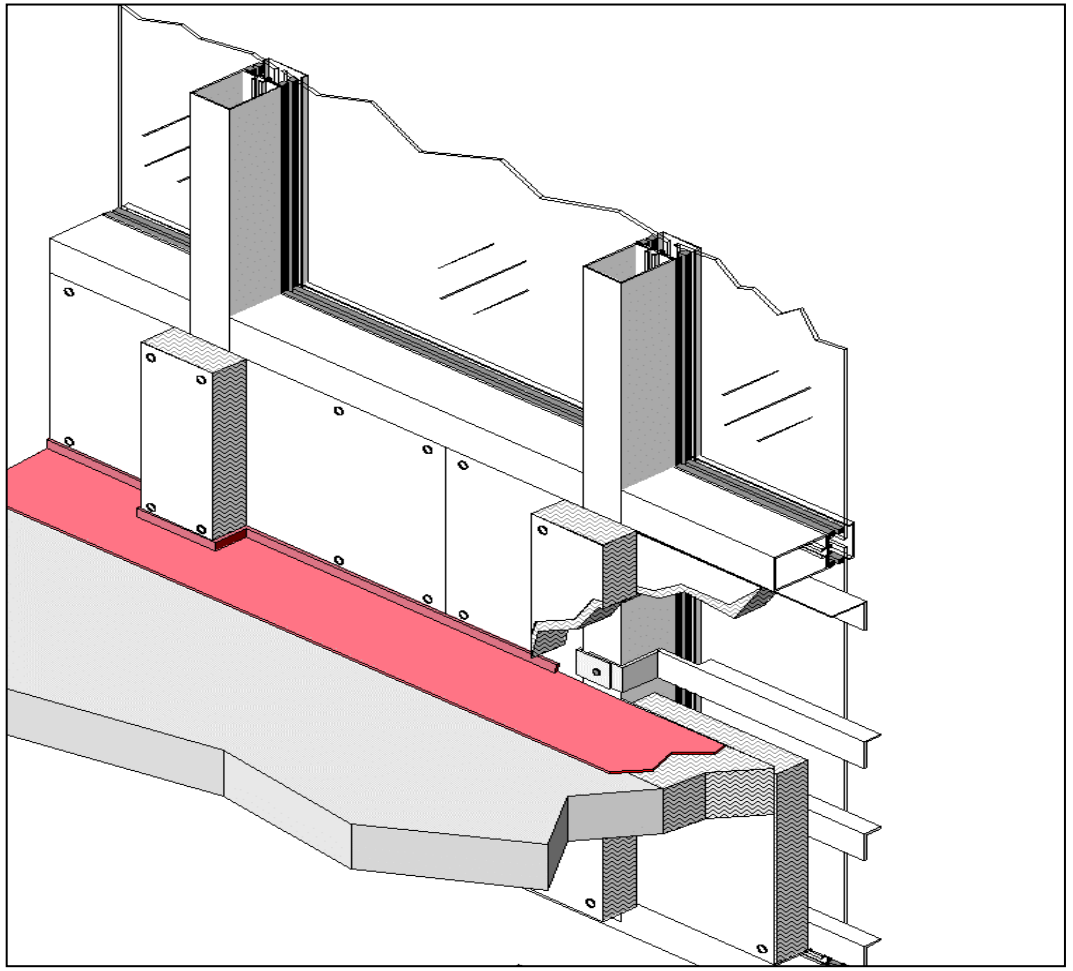
Paths of Fire Propagation



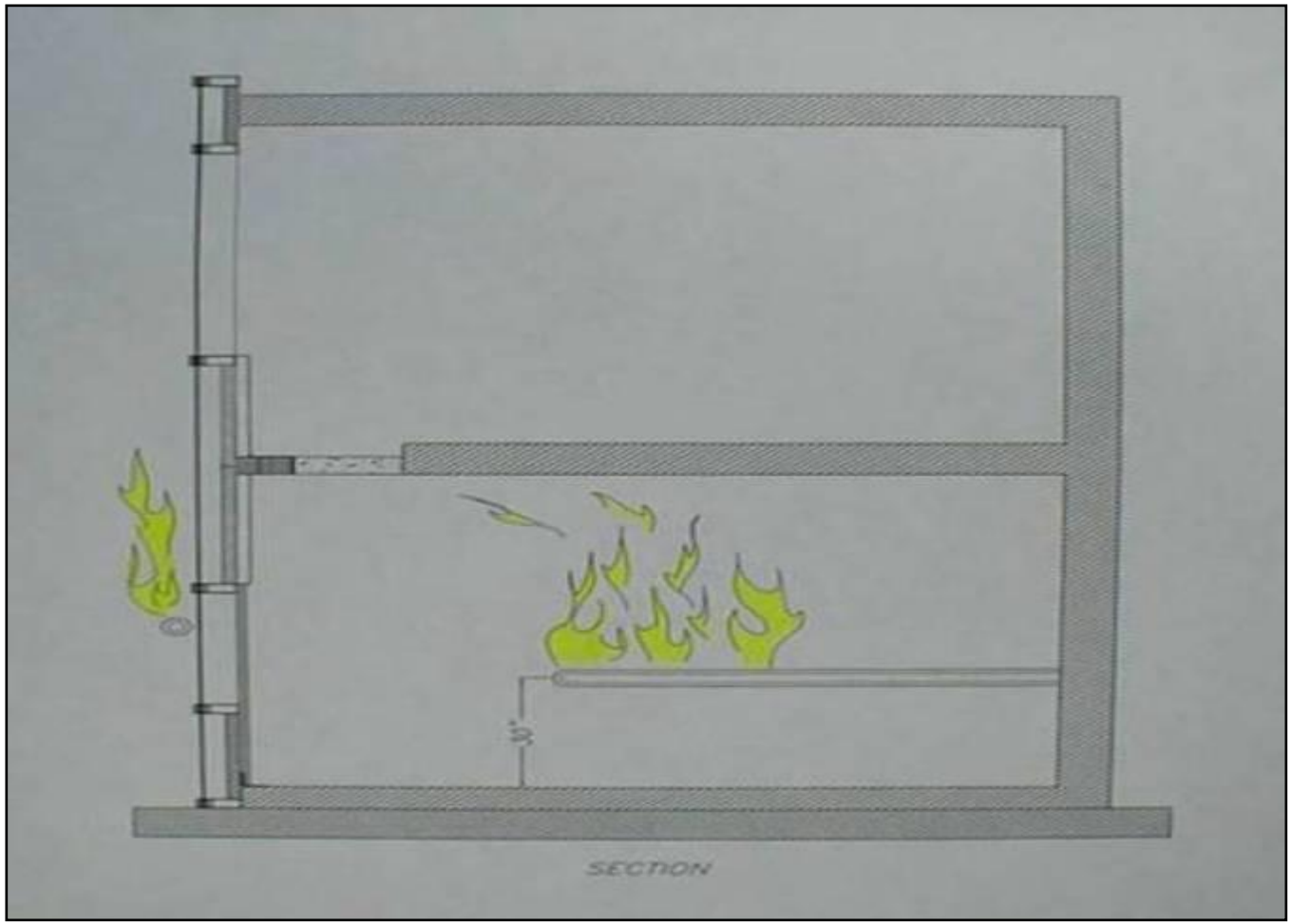
1 – Through void between floor and curtain wall
2 – Window to window “leap-frogging”

F (Flame) Rating by ASTM E2307

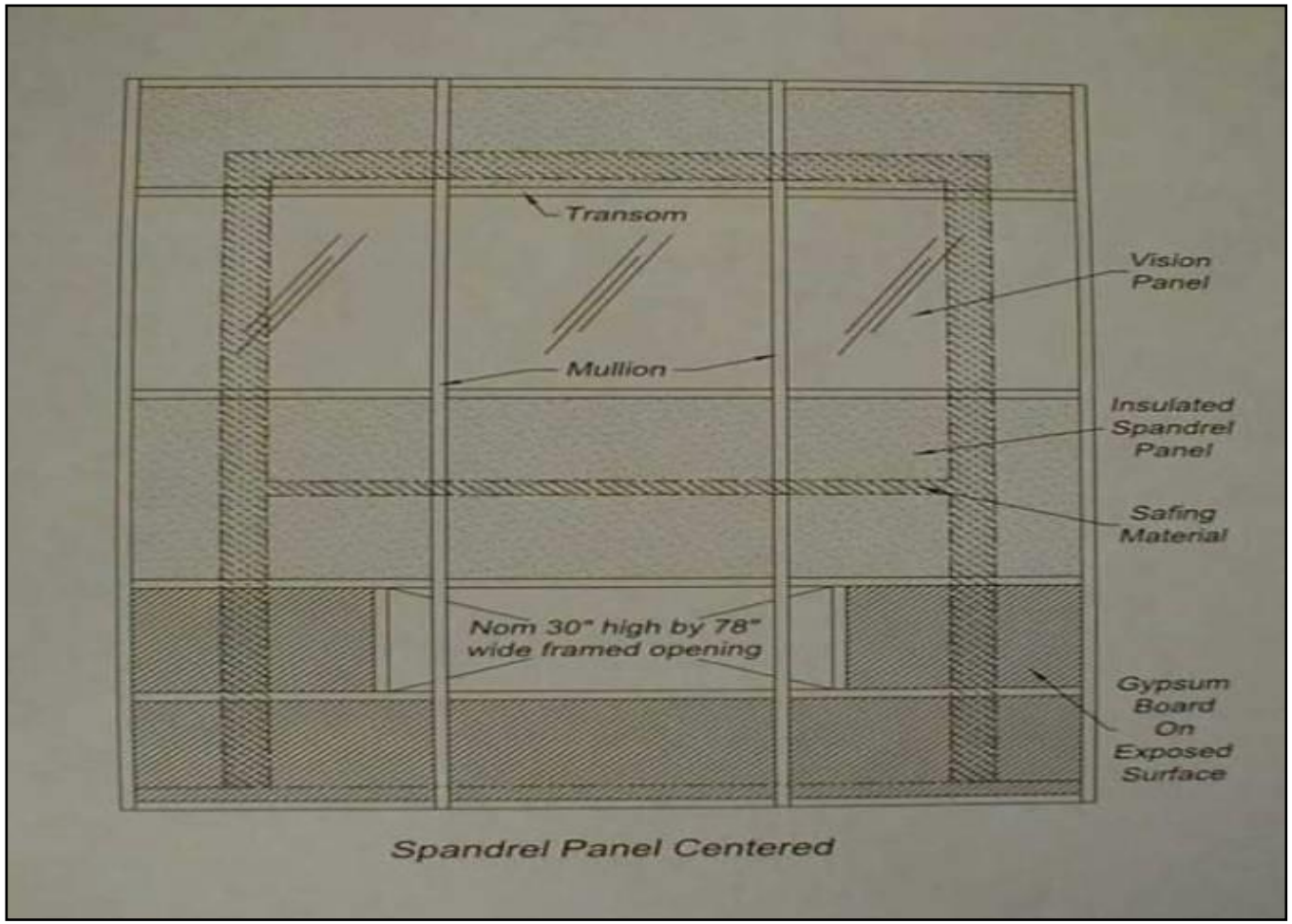
- No passage of flames through protected void (i.e. Path 1). Flame passage anywhere else is acceptable.



Test Apparatus



Curtain Wall Orientation



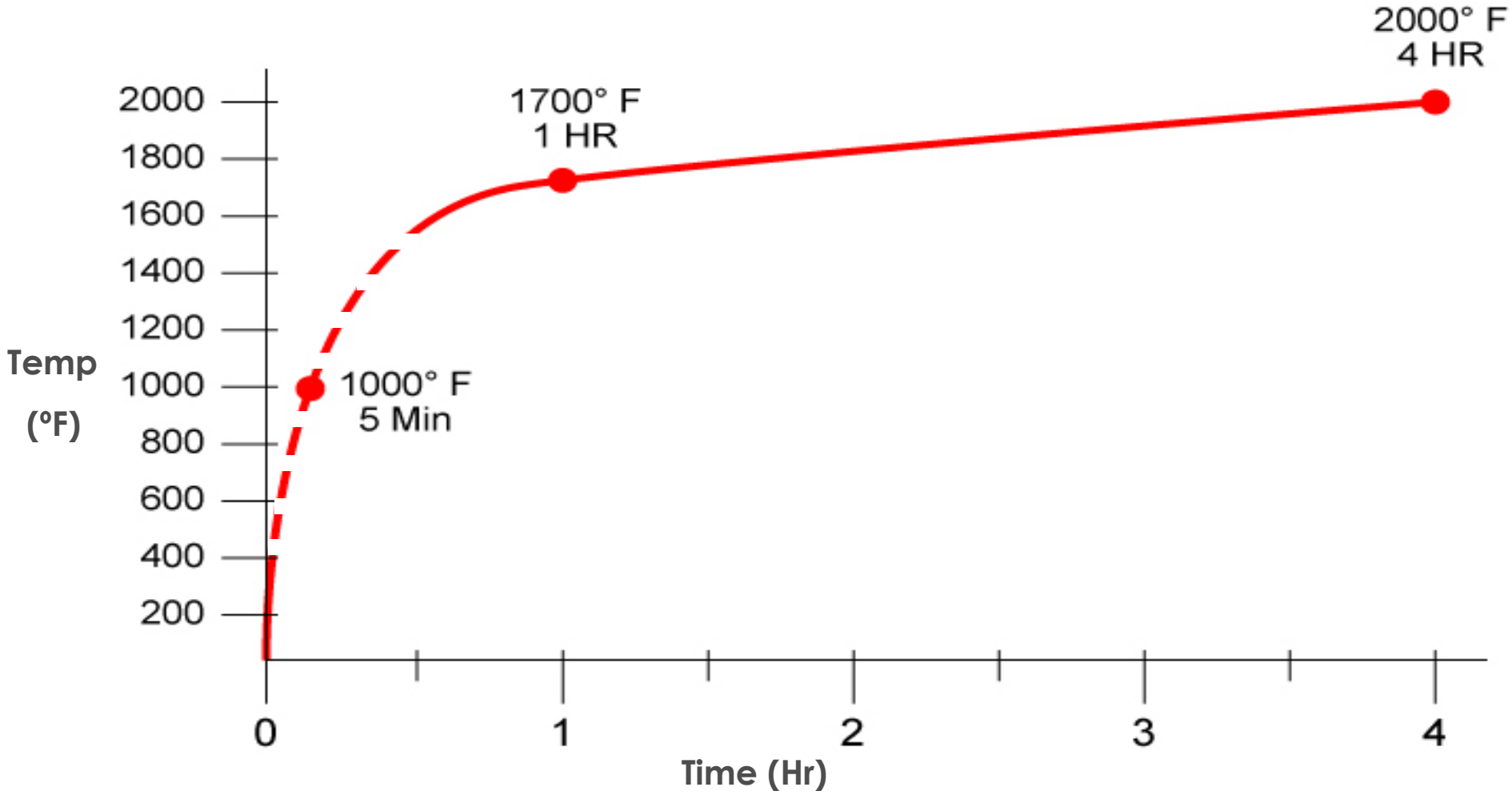
First Floor - Underside of Protected Void

Second Floor – Topside of Protected Void

Conditioning Prior to Fire Test

Movement Class	Min. No. of Cycles	Min. Cycling Rate (Cycles / Minutes)
Class I (Thermal)	500	1
Class II (Wind Sway)	500	10
Class III (Seismic)	100	30

Time-Temperature Curve



Approximately 2 Minutes

Approximately 120 Minutes

Exterior Curtain Wall/Non Fire-Resistance-Rated Floor Assembly Intersections

- **Section 715.5 Exterior curtain wall/nonfire-resistance-rated floor assembly intersections.** Voids created at the intersection of exterior curtain wall assemblies and nonfire-resistance-rated floor or floor/ceiling assemblies shall be filled with an *approved* material or system to retard the interior spread of fire and hot gases between *stories*.

Exterior Curtain Wall/Vertical Fire Barrier Intersections

- **Section 715.6 Exterior curtain wall/vertical fire barrier intersections.** Voids created at the intersection of nonfire-resistance-rated exterior curtain wall assemblies and vertical fire barriers shall be filled with an *approved* material or system to retard the interior spread of fire and hot gases.
  - Will read “Exterior wall/vertical fire barrier intersections” in 2024 IBC

Fire Barrier/Non Fire-Resistance-Rated Roof Assembly Intersection

- **707.9 Voids at Intersections.** The voids created at the intersection of a *fire barrier* and a nonfire-resistance-rated *roof assembly* or a nonfire-resistance-rated *exterior wall* assembly shall be filled. An *approved* material or system shall be used to fill the void, and shall be securely installed in or on the intersection for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to retard the passage of fire and hot gases.

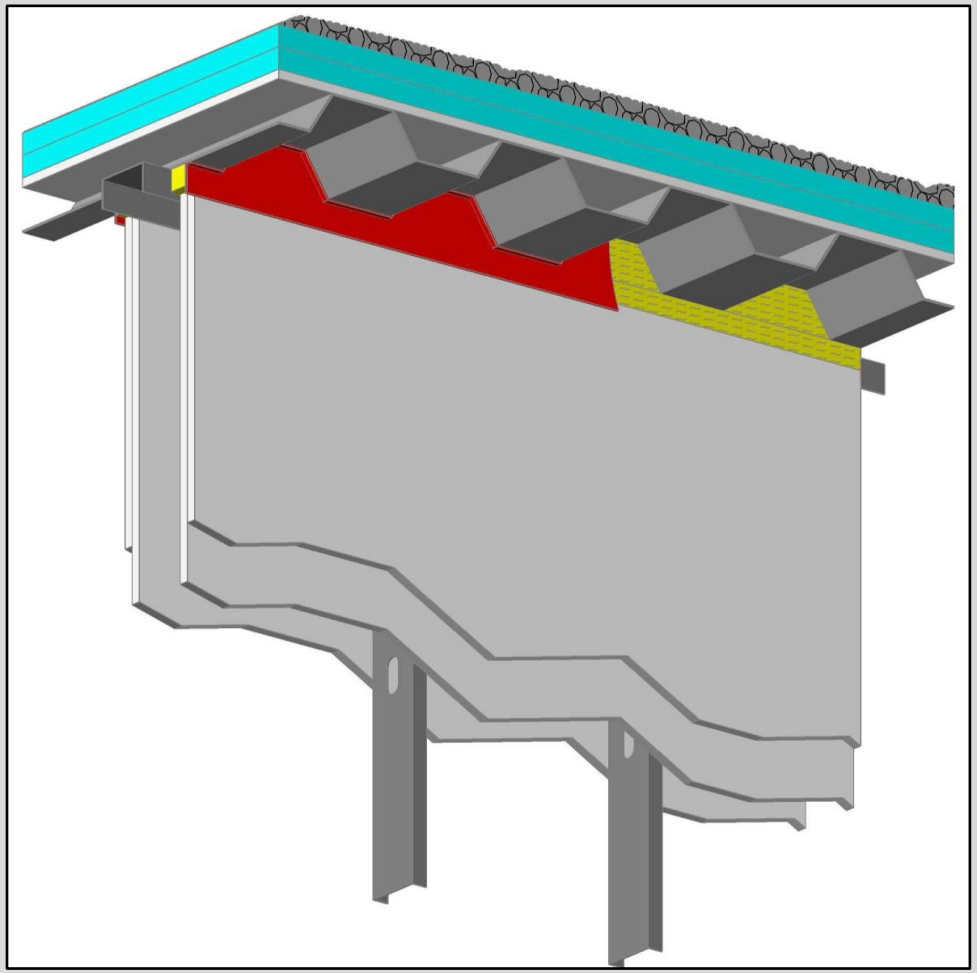
Fire Barrier/Non Fire-Resistance-Rated Roof Assembly Intersection

- Requirements for protecting these voids are incorrectly located in Section 707, covering fire barriers. Should be in Sections Section 715.
- 2024 IBC has been revised as follows:
  - Requirements to protect void between vertical fire barrier and exterior wall “moved” to Section 715.6
  - Installation shall be in accordance with Section 715.2

Fire Barrier/Non Fire-Resistance-Rated Roof Assembly Intersection

- Requirements to protect void between fire barrier and non fire-resistance-rated roof assembly moved to Section 715.7 with two options for protection
  - Protect with approved material
  - Protect with Continuity Head-of-Wall System tested to ASTM E2837, and having an F and T Rating not less than rating of wall
- Installation shall be in accordance with Section 715.2
- Section 707.9 retained as pointer to Section 715

Continuity Head-of-Wall Systems



Background

- Continuity Head-of-Wall System
  - Higher elevation of head-of-wall location equals
    - Higher temperature
    - Higher pressure
  - A wall is only as good as its weakest link
    - Clear need for fire rated doors, glazing, penetration seals, joints
    - Likewise, clear need for continuity head-of-wall systems

Background Cont.

- Continuity provisions of fire barriers requires fire barrier to extend to roof sheathing or deck.
- A void is often required to allow deflection of roof above, or may exist due to construction tolerances
- ASTM E2837: Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies published in 2011 to address this void.

MBMA Tests at UL
General Layout and Conditioning

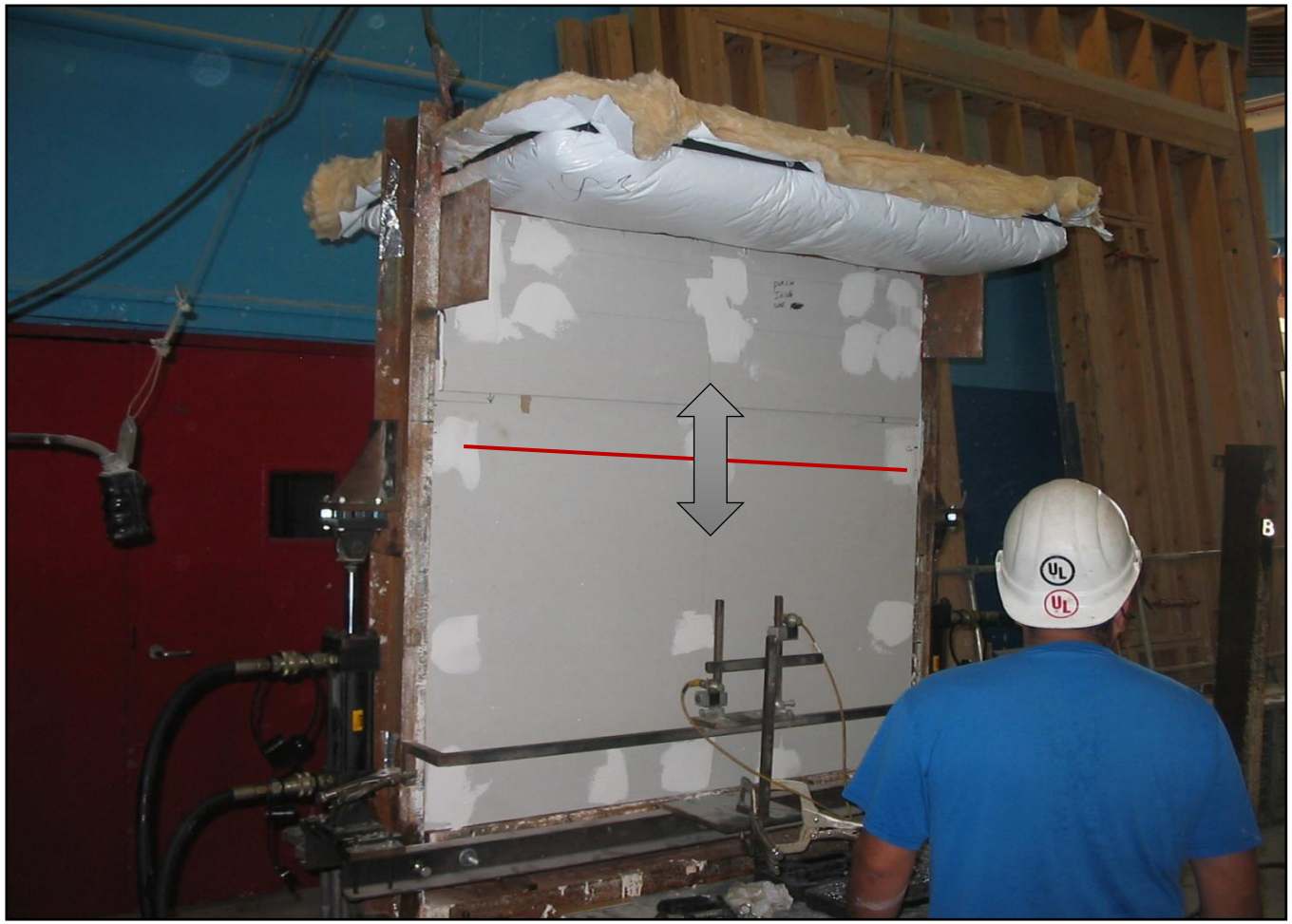


Photo courtesy of the Metal Building Manufacturers Association

ASTM E2837 Compared to ASTM E1966

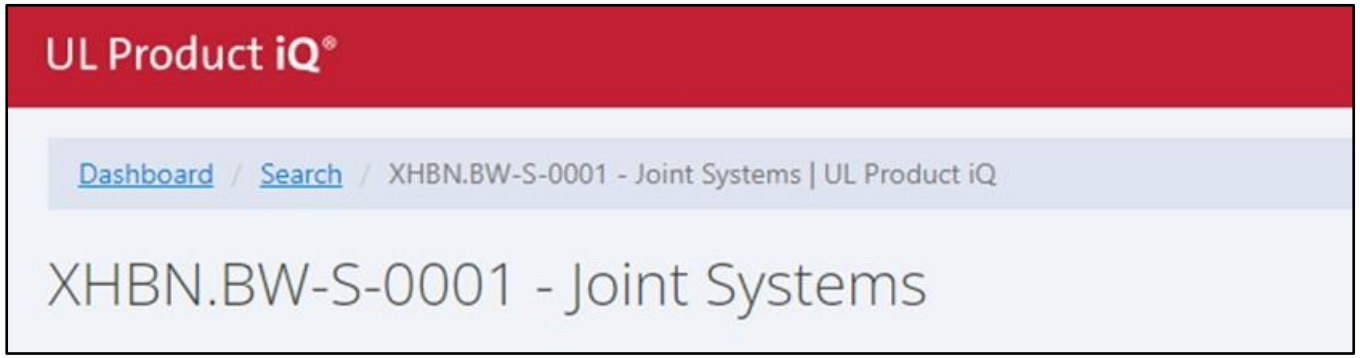
- Major differences:
  - No thermocouples on wall, roof, floor
  - As roof/floor may sag in a “real” fire, test protocol does not rigidly support the roof/floor
- E2837-17: Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies

Where Do You Find the Most Current Systems?

- Online Directories from the testing laboratories
  - FM Approvals
  - Intertek
  - UL/ULC Product iQ Online Directory

ApprovalGuide

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



Product Categories

- XHBN – Joint Systems
  - Covers Fire-Resistant Joint Systems including Head-of-Wall Joint Systems
  - Includes approximately 2351 individual systems
- XHBO – Continuity Head-of-Wall Joint Systems
  - Covers Continuity Head-of-Wall Systems
  - Includes approximately 25 individual systems

Product Categories Cont.

- XHDG – Perimeter Fire-Containment Systems
  - Covers Perimeter Fire-Containment Systems
  - Includes approximately 228 individual systems

Product Categories Covering Products Used to Construct These Systems

- Product Categories
  - XHDI – Accessories for Use in Perimeter Fire-Containment Systems
  - XHHW – Fill, Void or Cavity Materials
  - XHKU – Forming Materials
  - XHLI – Light-Gauge Framing
  - XHLP – Mechanical Joint Assemblies
  - XHLR – Membranes

UL System Approach
Joint Systems (XHBN)

HW-D-0060

What does this mean?

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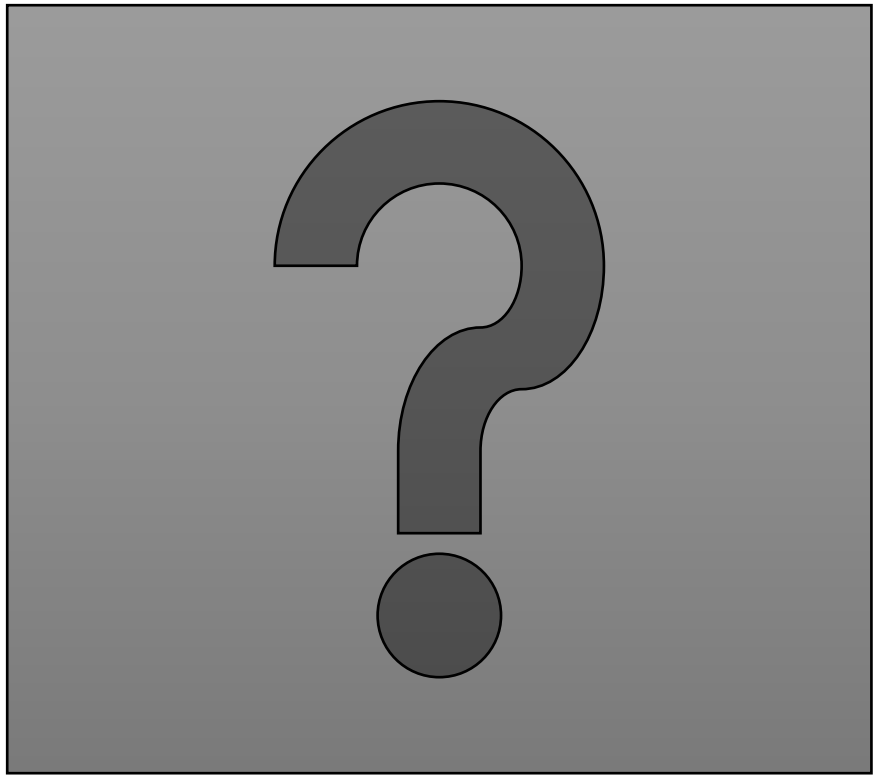

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