A Look…
Fire Resistive Standards

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FCIA
Firestop Contractors International Association

Welcome….

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FREE MOP

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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

FCIA – Firestop Contractors International Association

- **Info@FCIA.org for FREE Webinars**
- **Info@FCIA.org FREE Life Safety Digest**
- **INFO@FCIA.org FREE MOP**
- **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

FCIA – Firestop Contractors International Association

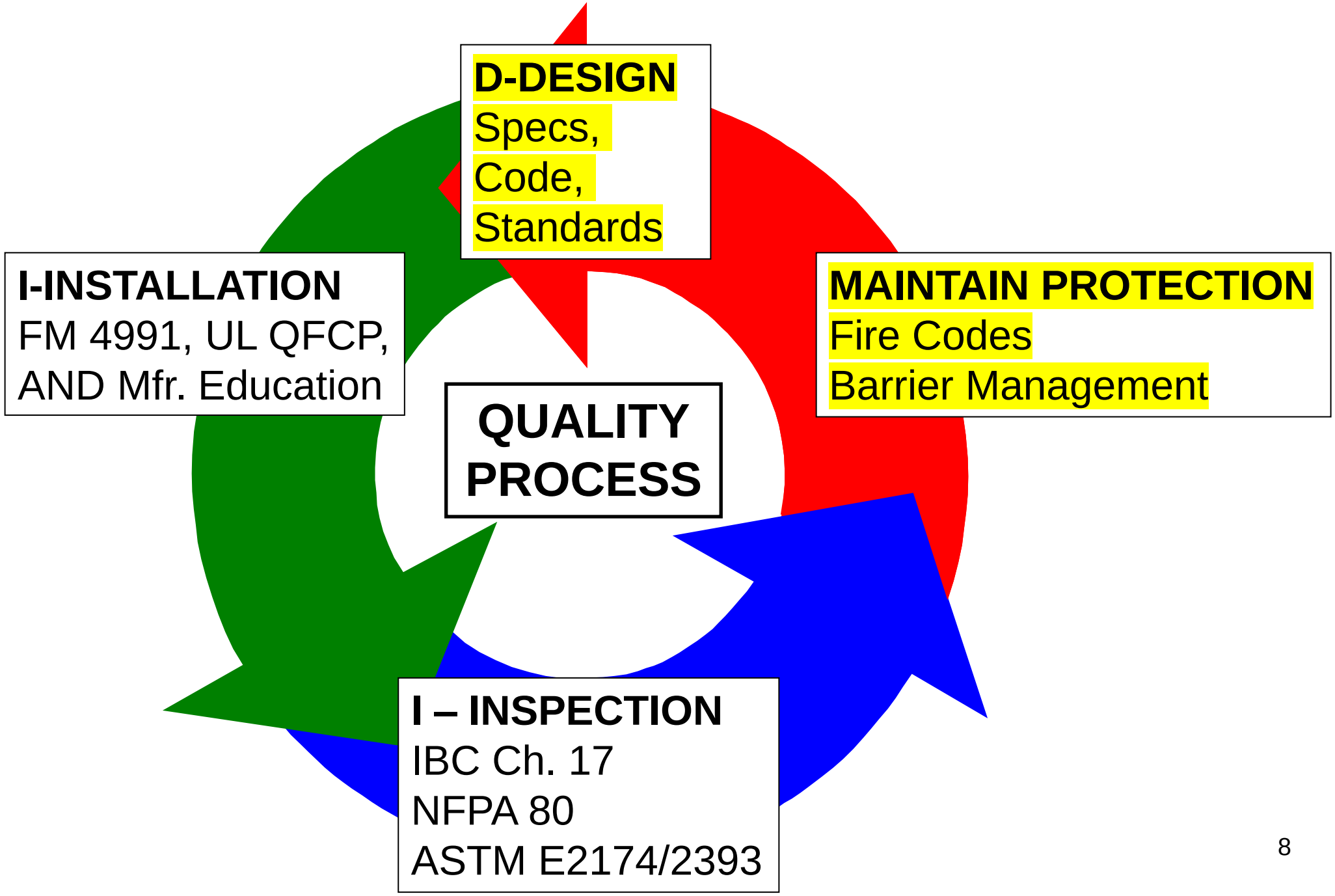
- Canada – Symposium Sept. 21-23 – Ottawa FCIA.org/EVENTS
- Qatar - Doha FCIA Symposium; Members
- India - Mumbai/Ahmadabad – Fire Safe Build India – IIT-G
- UAE - Dubai – FCIA Symposium; Civil Defence
- Saudi Arabia - Riyadh – BIG5 Show; UL, ICC, TBWIC
- Mexico/LATAM - CONAPCI/AMRACI
- Australia/New Zealand – FPA, Etc.

FCIA Actions –

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

- ***FCIA's Firestop Education Program (FEP)***
  - ***3.5 Hours Level 1***
  - ***16.5 Hours Level 2***
  - ***4.0 Hours Level 3 – LAUNCHING THIS MONTH!***

- ***30++ Hours = Education & Exams –***
  - ***Members – Unlimited Subscription***
  - ***Non-Members – Visit FCIA.org***


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

“TOTAL FIRE PROTECTION”

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

Systems & Materials….

Fire Resistive Standards – DIIM

- Properly ***Designed*** and Specified Firestopping
  - FCIA – 07-84-00 - Specification
- ***Tested and Listed Systems*** – ASTM E814 / UL 1479, ASTM E1966 / UL 2079, FM 4990, ULC-S115, ASTM E2837, E2307, E3037, more
- Professional ***Installation*** – FCIA Member, FM 4991 Approved, UL/ULC Qualified Contractors
- Properly ***Inspected*** – ASTM E2174 / 2393 Processed by IAS AC 291 Accredited Inspection Agencies, Inspectors w/FM, UL, ULC,IFC Exam Success
- ***Maintained & Managed*** – Annually – FCIA Members – NFPA 1, 101, International Fire Code

FCIA Webinar Series

A Look at the Fire-Resistive Standards

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

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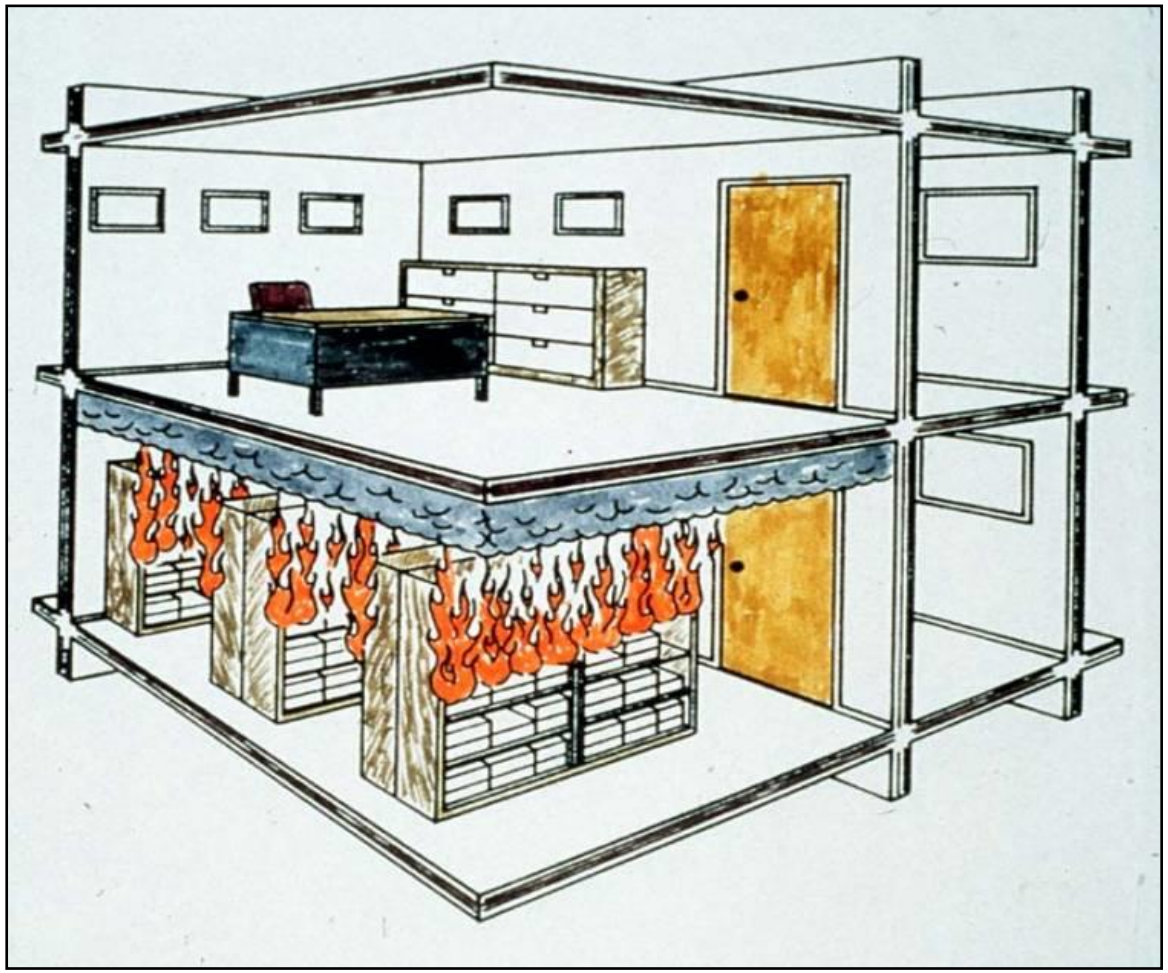
Firestop Contractors International Association

July 19, 2023

Maintaining Compartmentation Through Use of Fire-Resistive Construction



Two Purposes of Fire-Resistance-Rated Construction:

- **Compartmentation**
  - It's what we do!
- Structural Fire Resistance

Requirements for Protecting Breaches In or Through Fire-Resistance-Rated Construction

- Each type of breach of hourly rated construction has one or more unique fire test standards associated with it which compliment ASTM E119 and UL 263. In addition, each breach has a series of additional standards which relate to other characteristics of the protection materials or systems.
- The protection of breaches relates to the compartmentation side of fire-resistance

Types of Breaches

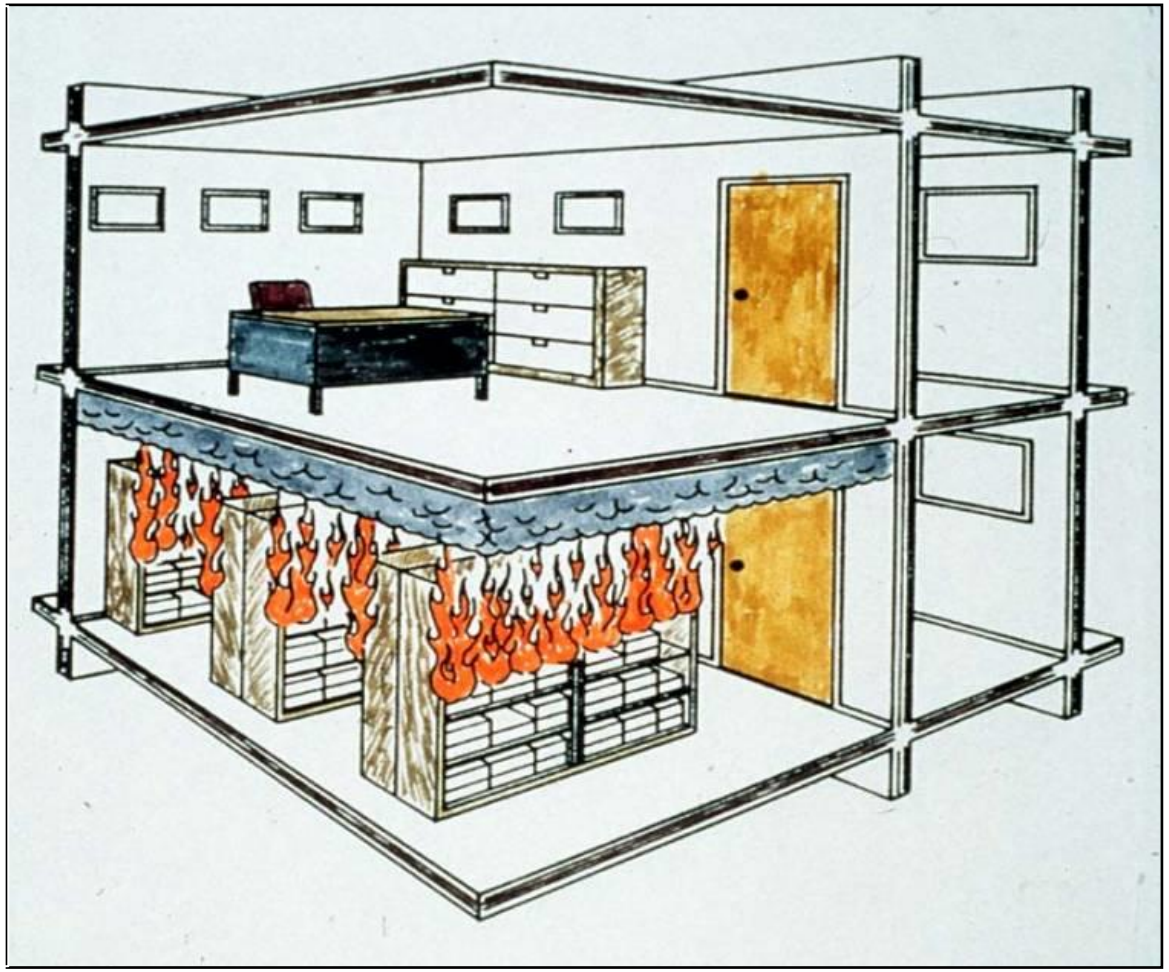
- Penetrations (Section 714 of IBC)
- Joints and Voids (Section 715 of IBC)
- Opening Protectives (Section 716 of IBC)
- Ducts and Air Transfer Openings (Section 717 of IBC)

Requirements for Protecting Breaches In or Through Fire-Resistance-Rated Construction

- Focus of today's program are these complimentary standards relating to the protection of the family of breaches
- These complimentary standards address the nuances of each breaches
  - Sample size
  - Differential pressure
  - Is temperature rise needed?
  - Thermocouple locations
  - Other considerations – Smoke leakage, water leakage, movement, reliability, etc.

Maintaining Compartmentation Through Use of Fire-Resistive Construction

Core Attributes of Fire-Resistance Standards



UL Drawing

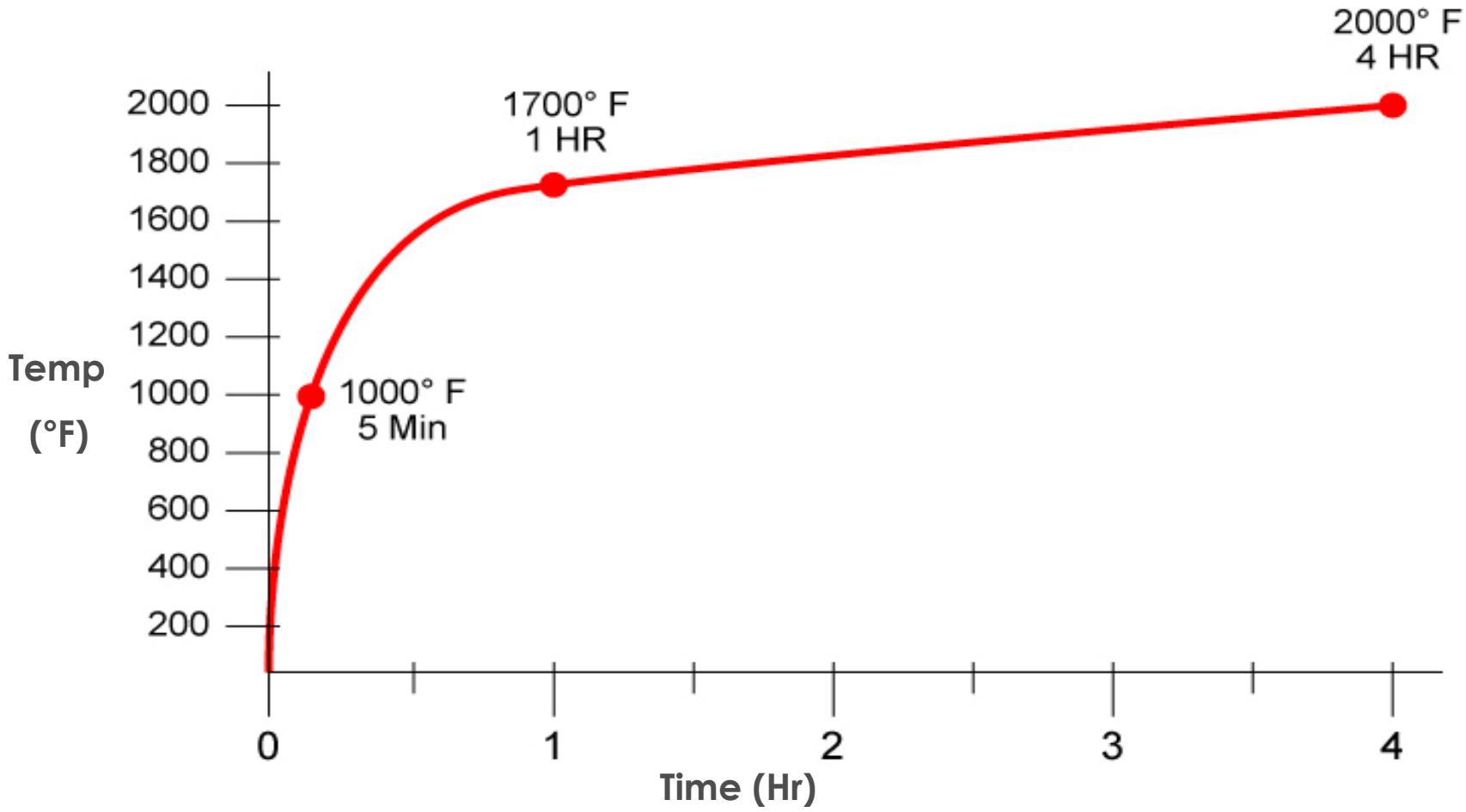
Fire-Resistance Standards

- US
  - ASTM E119
  - UL 263
  - NFPA 251 (Withdrawn)
- Canada
  - ULC-S101

Building Components Evaluated for Fire-Resistance by ASTM E119 / UL 263

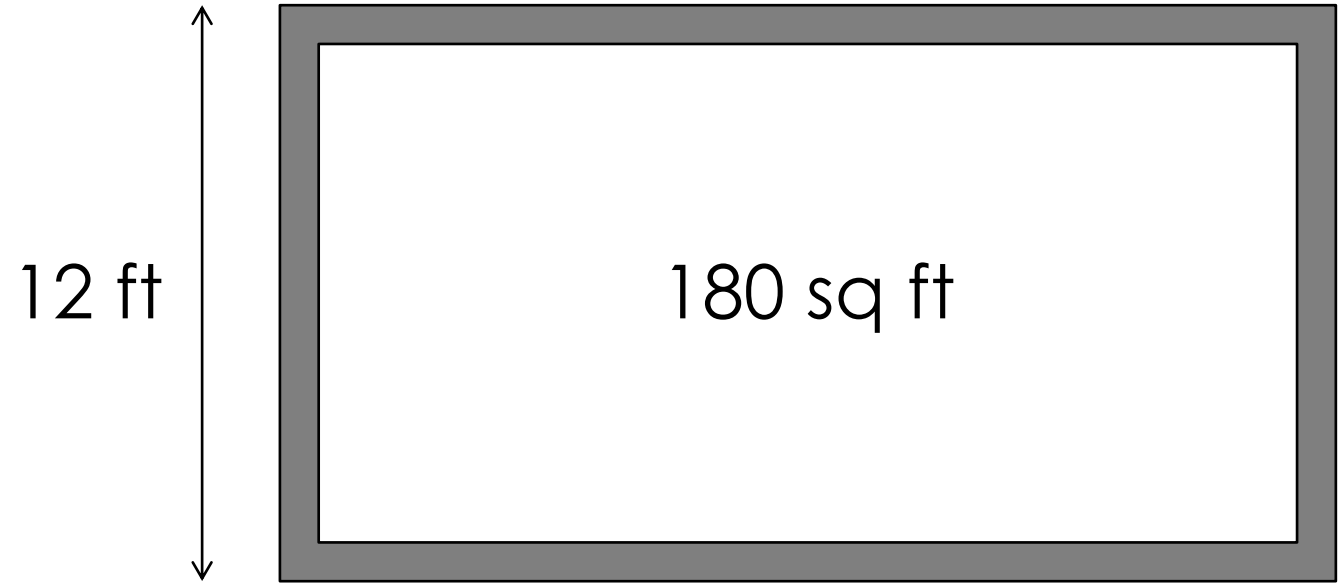
- Columns
- Beams
- **Floor/Ceilings or Roof/Ceilings**
- **Walls**

Time – Temperature Curve



Floor/Ceilings or Roof/Ceilings

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

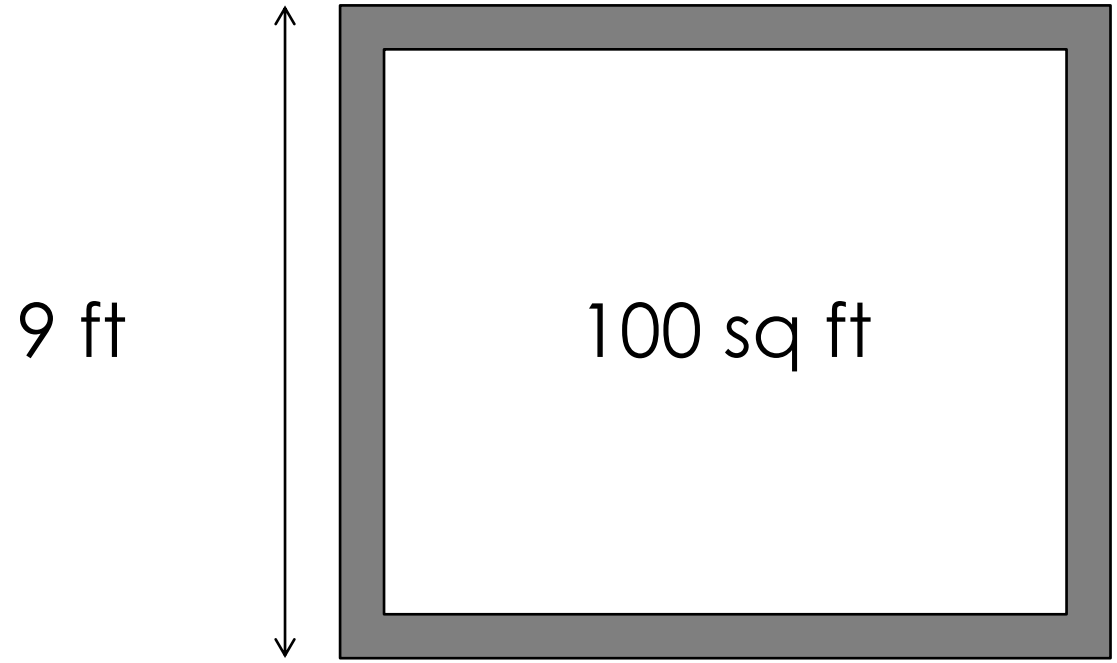


Conditions of Acceptance
Floor/Ceilings or Roof/Ceilings

- Prevent flame passage
- Limit temperature rise to 250ºF average / 325ºF individual point
- Support load
- Limit temperature of supporting construction

Walls

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



Conditions of Acceptance – Walls

- Prevent flame passage
- Limit temperature rise to 250ºF average / 325ºF individual point
- Support load if load bearing
- Meet hose stream test conducted after partial exposure duration

Fire-Resistance Standards vs Firestop Systems Standards

Affinity Firestop Photo

Nuances of Firestop Systems

- Penetrating items are frequently small
- Penetrating items may be metallic
- As combustible penetrants are consumed or small voids develop in firestop system, a flow of hot gases can develop
- Thermocouple placement envision by ASTM E119 / UL 263 is not possible
- A firestop systems are viewed as a localized hot spot
- Smoke or water leakage is likely through system

Current Ratings of Firestop Systems

- Currently Ratings Published by UL
  - F (Fire) Rating
  - T (Temperature) Rating
  - L (Smoke Leakage) Rating
  - W (Water Leakage) Rating
  - M (Movement) Rating

Affinity Firestop Photo

Standards Relating to Firestop Systems

- Fire / Hose Stream Test Standards
  - ASTM E814 / UL 1479 / FM 4990 / ULC-S115 (Fire)
  - ASTM E2226 (Hose Stream)
- Smoke Leakage Standards
  - UL 1479 / ULC-S115
- Water Leakage Standard
  - UL 1479

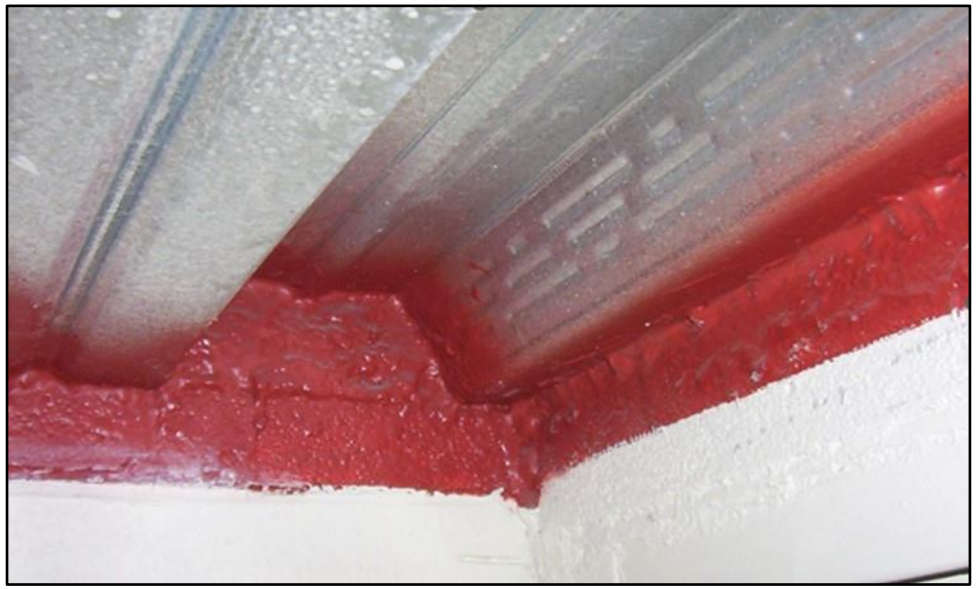
Standards Relating to Firestop Systems Cont.

- Movement Standard
  - ASTM E3037 / UL 1479
- Aging Standards
  - UL 1479, ASTM E2943
- Environmental Exposure Standard
  - ASTM E2785

Fire-Resistance Standards vs Firestop Systems Standards – What's the Difference?

- Sample Size – Minimum size of firestop test sample based on firestop system size
- Pressure – Tested under positive pressure
- Thermocouples – Located on penetrant(s), firestopping materials and adjacent assembly
- Heat Transmission – 325°F only
- Optional tests available for air leakage, water leakage and movement of penetrant(s)

Fire-Resistance Standards vs Joint Systems Standards



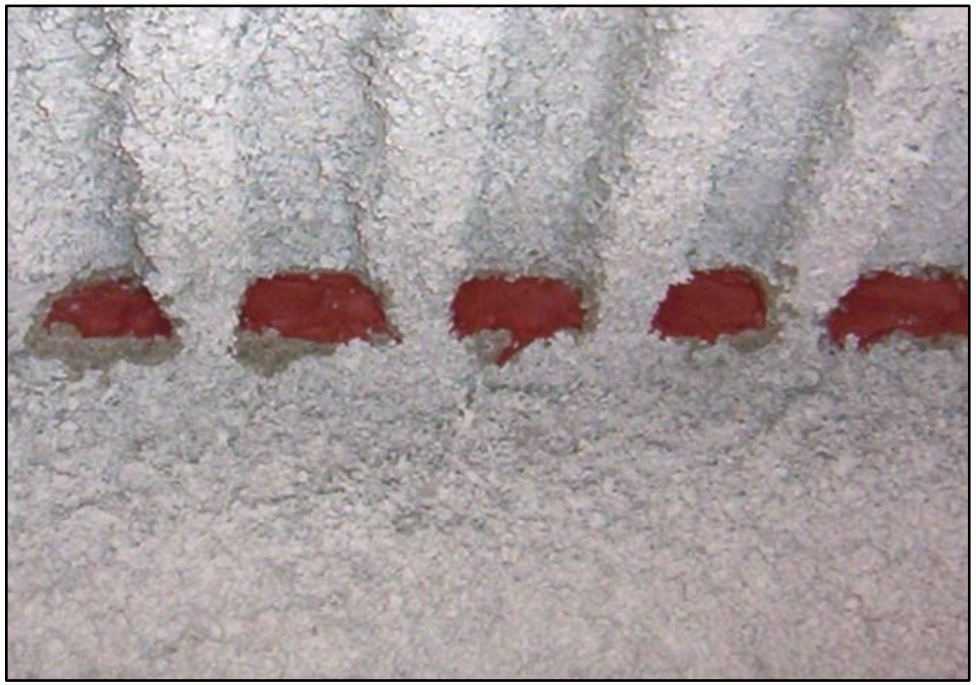
Firestop Solutions Photo

Nuances of Joint Systems

- Joints are frequently small in width
- Joints are intended to accommodate movement
- As small voids develop in joint system, a flow of hot gases can develop
- Thermocouple placement envision by ASTM E119 / UL 263 is not possible
- Narrow joint systems are viewed as a localized hot spot
- Smoke or water leakage is likely through system

Current Ratings of Joint Systems

- Currently Published Ratings
  - Assembly (Fire) Rating
  - L (Smoke Leakage) Rating
  - W (Water Leakage) Rating



Firestop Solutions Photo

Standards Relating to Joint Systems

- Fire / Hose Stream Test Standards
  - ASTM E1966 / UL 2079 / ULC-S115 (Fire)
  - ASTM E2226 (Hose Stream)
- Smoke Leakage Standards
  - UL 2079 / ULC-S115
- Water Leakage Standard
  - UL 2079
- Aging Standard
  - UL 2079

Fire-Resistance Standards vs Joint Systems Standards – What's the Difference?

- Sample Size – Minimum size of test sample based on the joint width
- Subject to movement cycling prior to fire exposure
- Pressure – Tested under positive pressure
- Thermocouples – Located on the "firestopping" materials and adjacent assembly

Fire-Resistance Standards vs Joint Standards – What's the Difference?

- Heat Transmission – For joints < 6 in. in width, 325°F at any individual point only. For joints ≥ 6 in. in width, 250°F ave and 325°F at any individual point.
- Hose stream test only conducted on joints contained within vertical assemblies (HW and WW joints)
- Optional tests for air leakage and water leakage

Fire-Resistance Standards vs Opening Protective (Fire Door and Fire Window) Standards

Nuances of Opening Protectives

- Doors can be relatively narrow in width negating need for 100 sq ft sample
- Doors require gap around perimeter to allow proper opening. Gap permits flow of hot gases around door.
- Gap around door inherently permits small mounts of flaming through gap
- Opening protectives got hot during fire due to type of construction used

Nuances of Opening Protectives Cont.

- Thermocouple placement envision by ASTM E119 / UL 263 does not address fire door or fire window assemblies

Current Ratings of Opening Protectives

- Currently Published Ratings
  - Fire-Protection Rating
  - Leakage Rating

Standards Relating to Opening Protectives

- Fire / Hose Stream Test Standards
  - Fire Door Assemblies
    - UL 10B / UL 10C / NFPA 252 / ULC-S104 – Doors / ULC-S105 – Frames (Fire)
    - ASTM E2226 (Hose Stream)
  - Fire Window Assemblies
    - UL 9 / NFPA 257 / ULC-S106 - Windows / ULC-S105 - Frames (Fire)
    - ASTM E2226 (Hose Stream)
- Smoke & Draft Control Door Standards
  - UL 1784

Fire-Resistance Standards vs Opening Protective Standards – What's the Difference?

- Sample Size – Minimum size of test sample based on size of fire door or fire window
- Pressure
  - Fire Doors – Tested under specific pressures
    - Swinging doors tested at positive pressure
    - Other doors tested at "neutral" pressure
  - Fire Windows
    - Tested at positive pressure

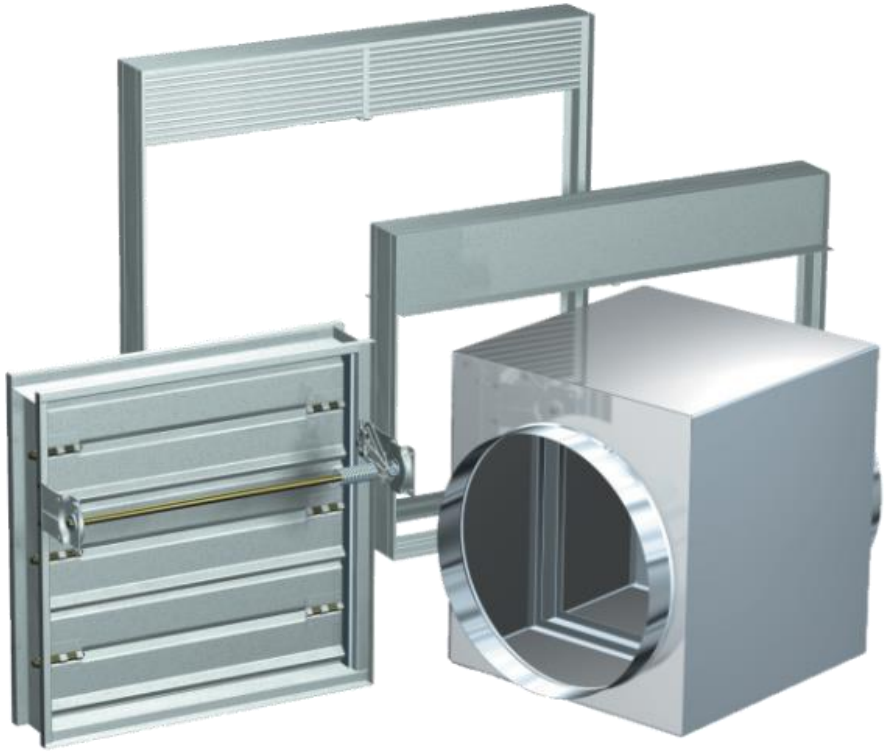
Fire-Resistance Standards vs Opening Protective Standards – What's the Difference?

- Flame Through – Standard permits limited flaming on unexposed side
- Standard does not have temperature limitations
- Building codes do contain temperature limitation for doors in interior exit stairways and ramps and exit passageway

Fire-Resistance Standards vs Opening Protective Standards – What's the Difference?

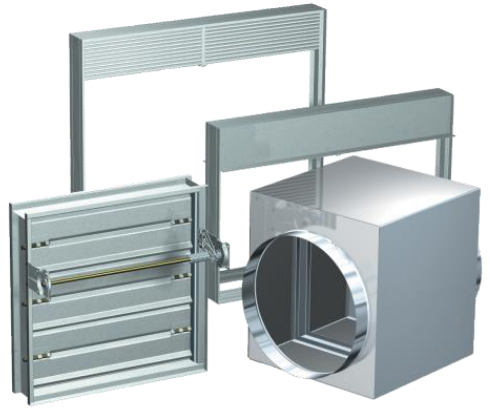
- Hose stream test conducted after full duration fire exposure
- Optional air leakage test for smoke and draft control doors

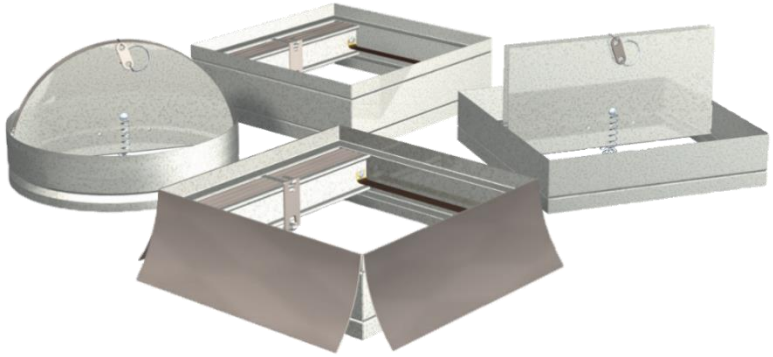
Fire-Resistance Standards vs Life Safety Damper Standards



Types of Life-Safety Dampers

- Fire Dampers
- Smoke Dampers
- Combination Fire / Smoke Dampers
- Corridor Dampers
- Ceiling Dampers





Nuances of Life Safety Dampers

- Dampers can be relatively small in size negating need for 100 sq ft sample
- Dampers got hot during fire due to type of construction used
- As small voids develop between blades of damper, a flow of hot gases can develop
- Gaps between damper blades inherently permits small mounts of flaming through gaps

Current Ratings of Life Safety Dampers

- Currently Published Ratings
  - Fire Dampers, Combination Dampers and Corridor Dampers
    - Fire Rating
  - Ceiling Radiation Dampers
    - Fire-Resistance Rating
  - Smoke Dampers, Combination Dampers and Corridor Dampers
    - Leakage Rating

Standards Relating to Life Safety Dampers

- Fire / Hose Stream Test Standards
  - Fire Dampers, Combination Dampers, and Corridor Dampers
    - UL 555 / ULC-S112 – Fire and Combination Dampers (Fire)
    - ASTM E2226 (Hose Stream)
  - Smoke Dampers, Combination Dampers, Corridor Dampers
    - UL 555S / ULC-S112.1 – Smoke and Combination Dampers (Smoke)
  - Ceiling Radiation Dampers
    - UL 555C / ASTM E119 / UL 263 / ULC-S112.2 (Fire)
    - ASTM E2226 (Hose Stream)

Fire-Resistance Standards vs Life Safety Damper Standards – What's the Difference?

- Fire Test
  - Sample Size – Minimum size of test sample based on size of life safety damper
  - Pressure – Tested under positive pressure
  - Flame Through – Standard permits limited flaming on unexposed side
  - Pass/Fail Criteria relates to size of openings between blades
  - Standard does not have temperature limitations
  - Hose stream test conducted after full duration fire exposure

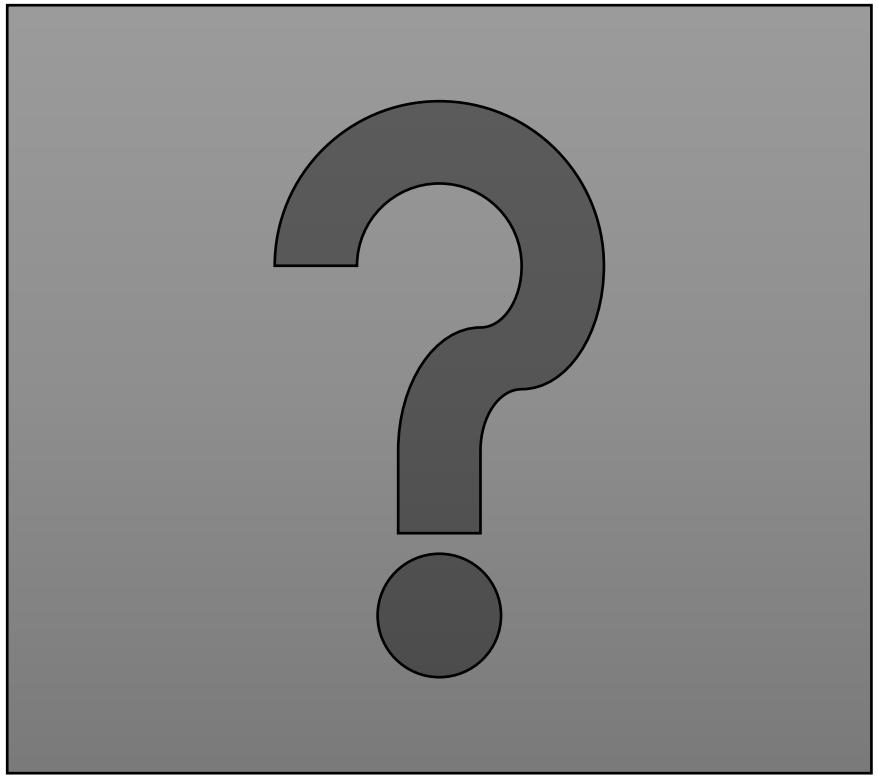
Fire-Resistance Standards vs Life Safety Damper Standards – What's the Difference?

- Leakage Rating
  - Standard defines three Classes of Smoke Leakage – Class I, Class II and Class III
  - Tested at multiple differential pressures
  - Each class has a maximum allowable leakage at specific differential pressures

Summary

- ASTM E119 and UL 263 are the basis of the fire testing of fire-resistance-rated construction
- Each type of breach has one or more unique fire test standards associated with it which compliment ASTM E119 and UL 263
- Each breach has a series of additional standards which relate to other characteristics of the protection materials or systems
- The protection of breaches relates to the compartmentation side of fire-resistance

Questions??



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