



Our Purpose

We passionately create enthusiastic customers and build a better future!

We live our values

The foundation of our culture is integrity, courage, teamwork and commitment.

Enthusiastic customers

We create success for our customers by Identifying their needs and providing Innovative and value adding solutions.

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Objectives

Understand what firestopping is and why it's needed

Know the Applicable Code Requirements

Understand Firestop System Testing and Listing

Penetrations, Joints and Perimeter Fire Barrier

Understand how firestopping fits into the specification, design and construction process

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Consequences of fires compared to other perils



Source: U.S. Fire Administration.

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Fires affecting structures



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Consequences of fires (US - 2007)



Direct property loss \$14.6 Billion



Civilian deaths 3,430 lost their lives



17,675 civilian injuries **118** firefighters killed

Source: U.S. Fire Administration.



What is the leading killer in fires?



Smoke & Toxic Gases



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Fire Statistics

Why must we contain Smoke, Toxic Gases and Fire?



3/4 of all fire deaths are caused by smoke inhalation.

Source: Hall, Jr. John R. NFPA Fire Analysis & Research, Quincy, MA. "Burns, Toxic Gases, and other Hazards".

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

Source: NFPA Fire Protection Handbook, 18th Ed. Table 1-1P. Pg.1-15.

Approximately **57%** of **people killed** in fires are **not** in the room of the fire's origin. **Source**: NFPA Fire Protection Handbook, 18th Ed. Table 8-1P. Pg. 8-17.

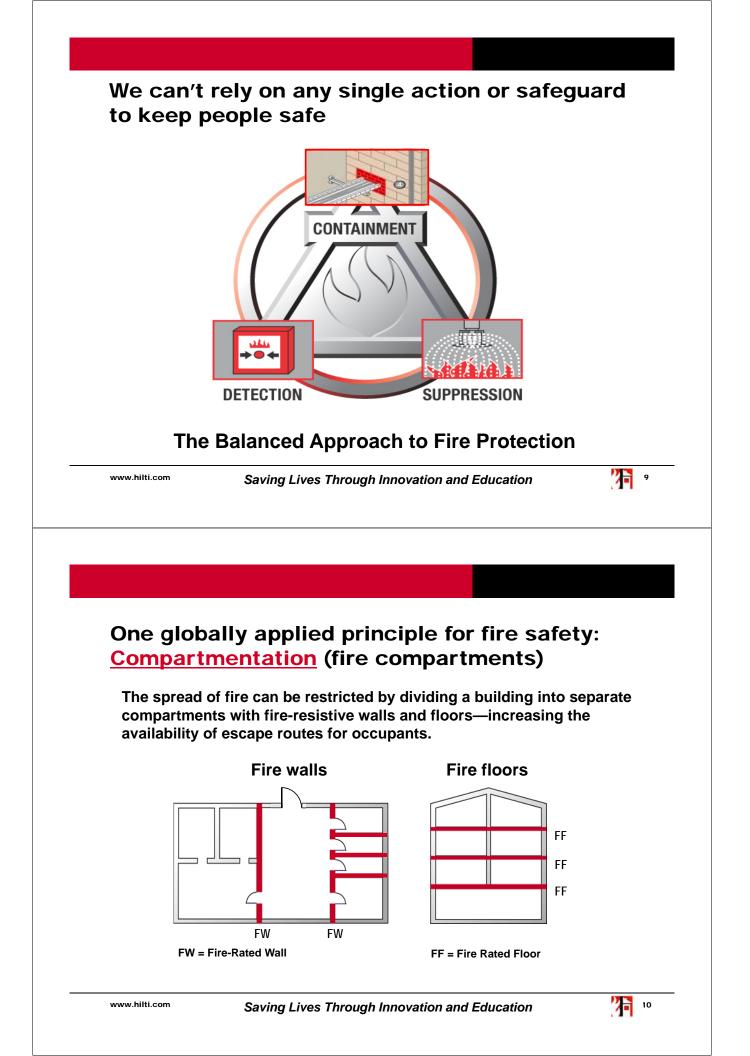


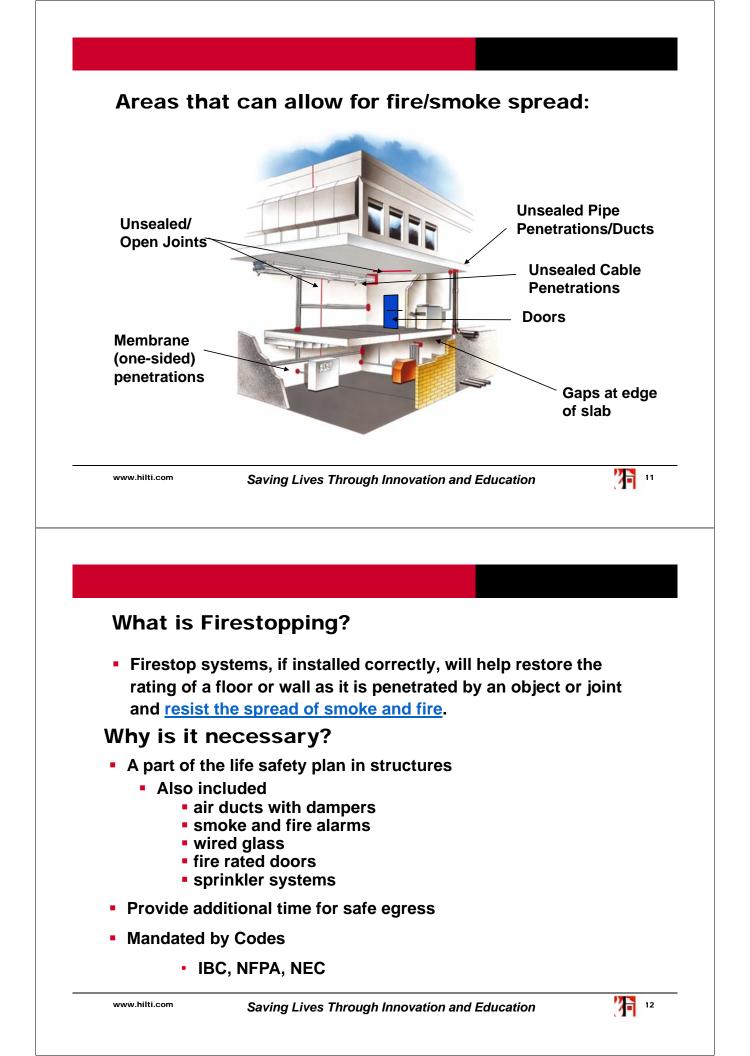


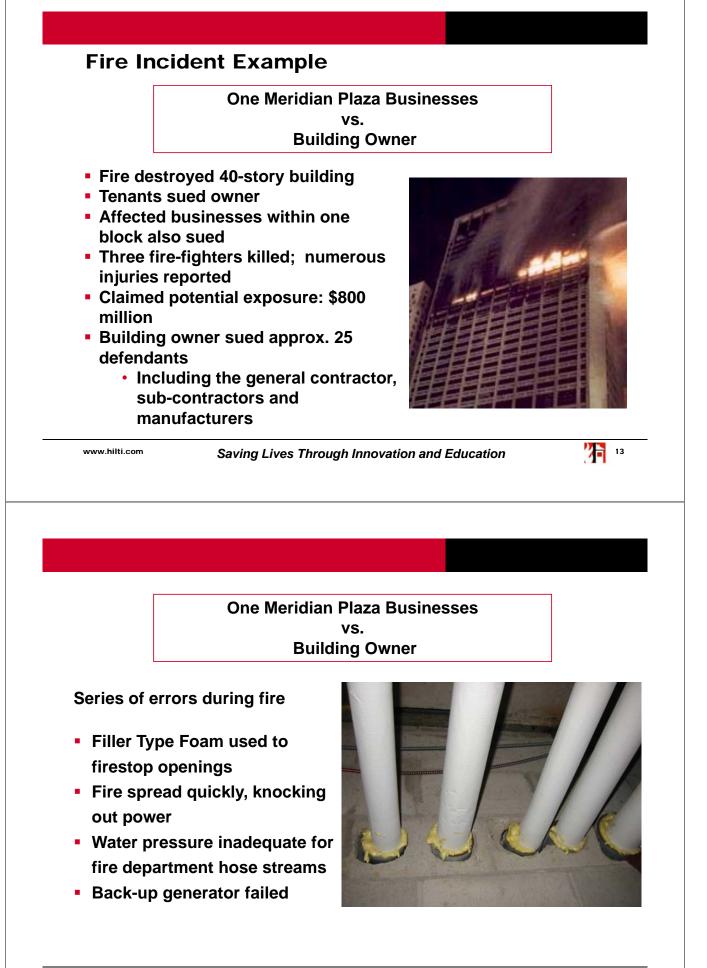
Source: Estimate based upon ceiling jet velocity calculations for typical ceiling heights and heat release rates.

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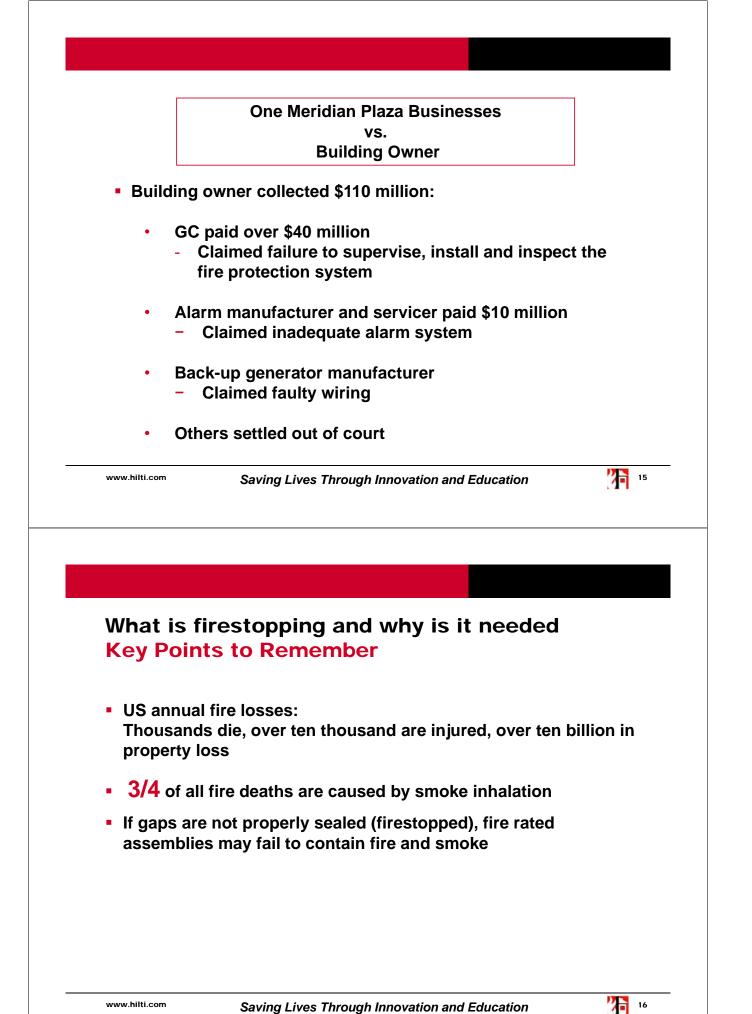
















International Building Code (2006 IBC)

Section 712.3.1.2 (Walls) – Through-penetration Firestop systems

"Through-penetrations shall be protected by an approved penetration Firestop system installed as tested in accordance with ASTM E 814 or UL 1479..."

Section 712.4.1.1.2 (Floors) – Through-penetration firestop system

"Through penetrations shall be protected by an approved through-penetration firestop system installed and tested in accordance with ASTM E 814 or UL 1479....

"The system shall have an F-rating and a T-rating of not less than 1 hour but not less than the required rating of the floor penetrated

Exception: Floor penetrations contained and located within the cavity of a wall do not require a T- rating.

Section 712.3.2 – Membrane penetrations

"...Outlet boxes on opposite sides of the wall shall be **separated** by a horizontal distance of not less than 24 inches...or other listed materials and methods"

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International Building Code (2006 IBC)

Section 713.3 – Fire resistant joint systems

"Fire resistant joint systems shall be tested in accordance with the requirements of either ASTM-E1966 or UL 2079..."

Section 713.4 – Exterior Curtain wall/floor intersection

"...Shall be sealed with an approved material or system to prevent the interior spread of fire...installed and tested in accordance with ASTM E2307 "



New for 2009 International Fire Code: Annual inspection of rated assemblies

703.1 Maintenance. The required *fire-resistance rating* of fireresistance-rated construction (including walls, firestop, shaft enclosures, partitions, *smoke barriers*, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and fireresistant joint systems) shall be maintained. <u>Such elements shall be</u> visually inspected by the **owner annually** and properly repaired, restored or replaced when damaged, altered, breached or penetrated. Where concealed, such elements shall not be required to be visually inspected by the *owner* unless the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space.

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Firestop requirements in Life Safety Code (NFPA 101-2006)

8.3.5.1* Firestop Systems and Devices Required. Penetrations for cables, cable trays, conduits, pipes, tubes, combustion vents and exhaust vents, wires, and similar items to accommodate electrical, mechanical, plumbing, and communications systems that pass through a wall, floor, or floor/ceiling assembly constructed as a fire barrier shall be protected by a firestop system or device.

The firestop system or device shall be tested in accordance with ASTM-E 814...



Joint protection requirements in Life Safety Code (NFPA 101-2009)

8.3.6.5* Joints made within or between fire resistance–rated assemblies shall be protected with a joint system that is designed and tested to prevent the spread of fire for a time period equal to that of the assembly in which the joint is located. Such materials, systems, or devices shall be tested as part of the assembly in accordance with the requirements of ASTM E 1966, *Standard Test Method for Fire-Resistive Joint Systems*, or ANSI/UL2079, *Standard for Tests for Fire Resistance of Building Joint Systems*.



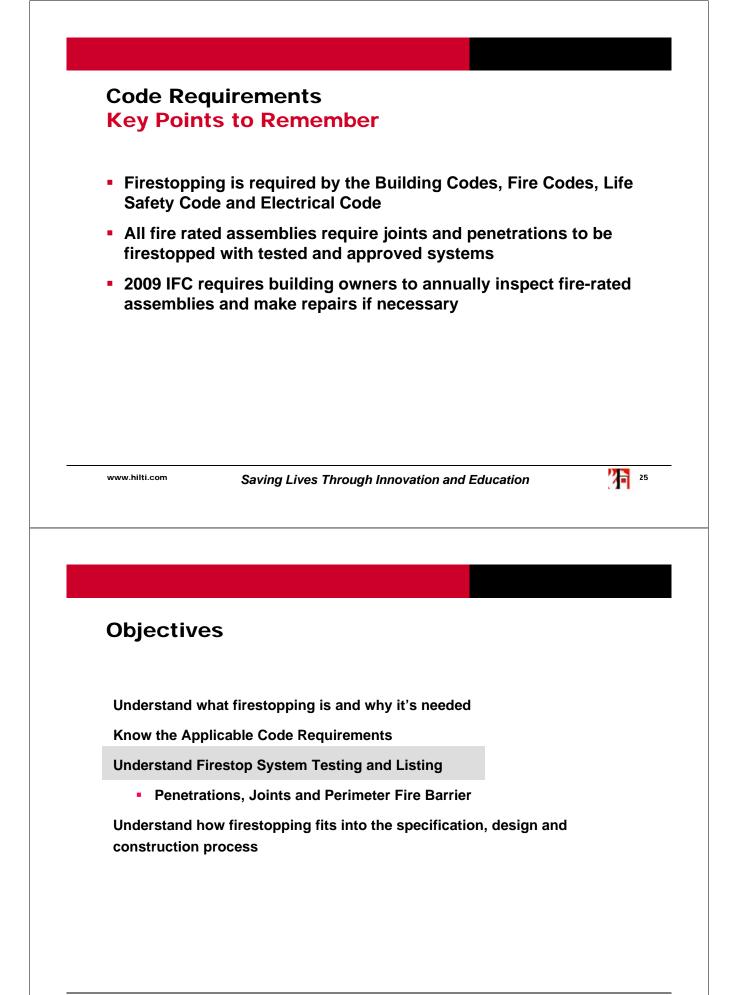
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National Electrical Code (NFPA 70) also mandates firestopping

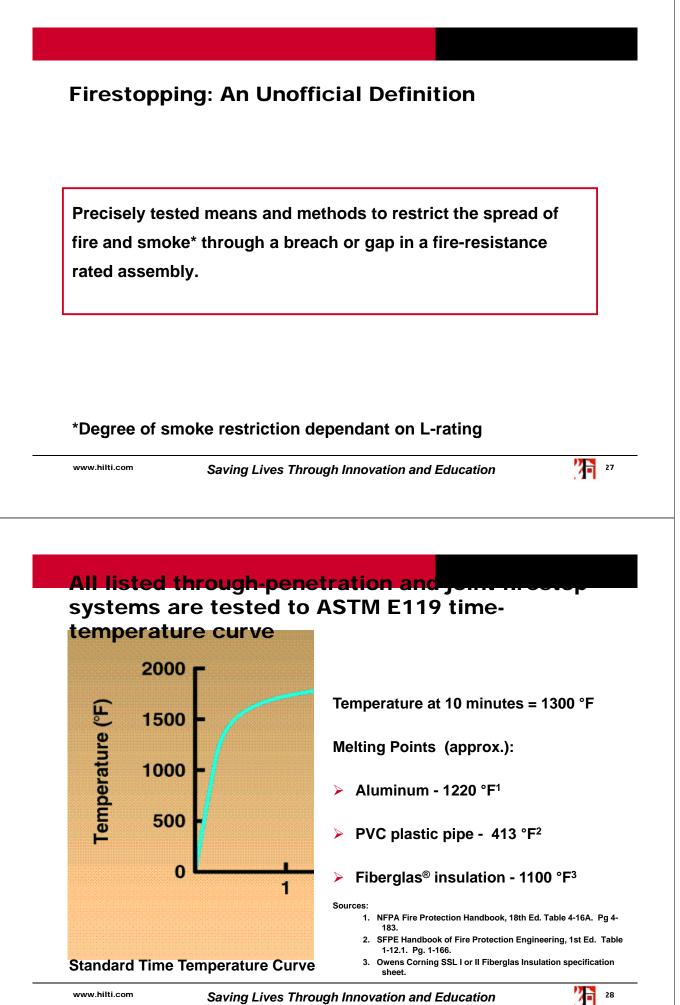
300-21 – Spread of Fire or Products of Combustion

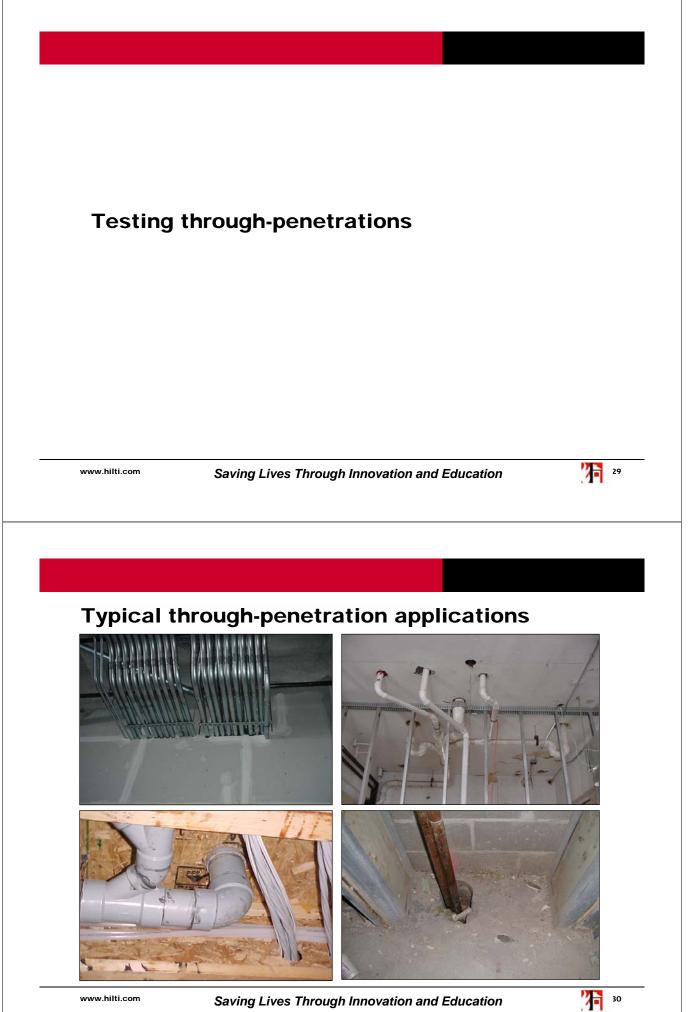
"Openings around electrical penetrations through fire-resistant-rated walls, partitions, floors, or ceilings shall be firestopped using approved methods to maintain the fire resistance rating."











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to	044/10 4470
ASTIVIE <u>F-Rating</u>	814 / UL 1479
	which flames do not pass through the system
T-Rating	
Time during v temperatu	vhich temp on non-fire side is < 325°F (163°C) above initial (pre-test) ire
Includes temp	o of penetrating item
Not a pass	s/fail criterion
L-Rating (opt	onal)
Air leakag	e through firestop system at ambient and at 400°F
Indicates	ability to restrict movement of smoke
 Reported 	in CFM/cu. ft. or CFM/penetration
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To obtain F-rating, must also pass hose stream

Verifies mechanical integrity after fire

Stream delivered through 2-1/2 inch hose with a straight-bore nozzle at:

- 30 psi 1, 2 & 3-hour tests
- 45 psi 4-hour test





ASTM/UL test apparatus



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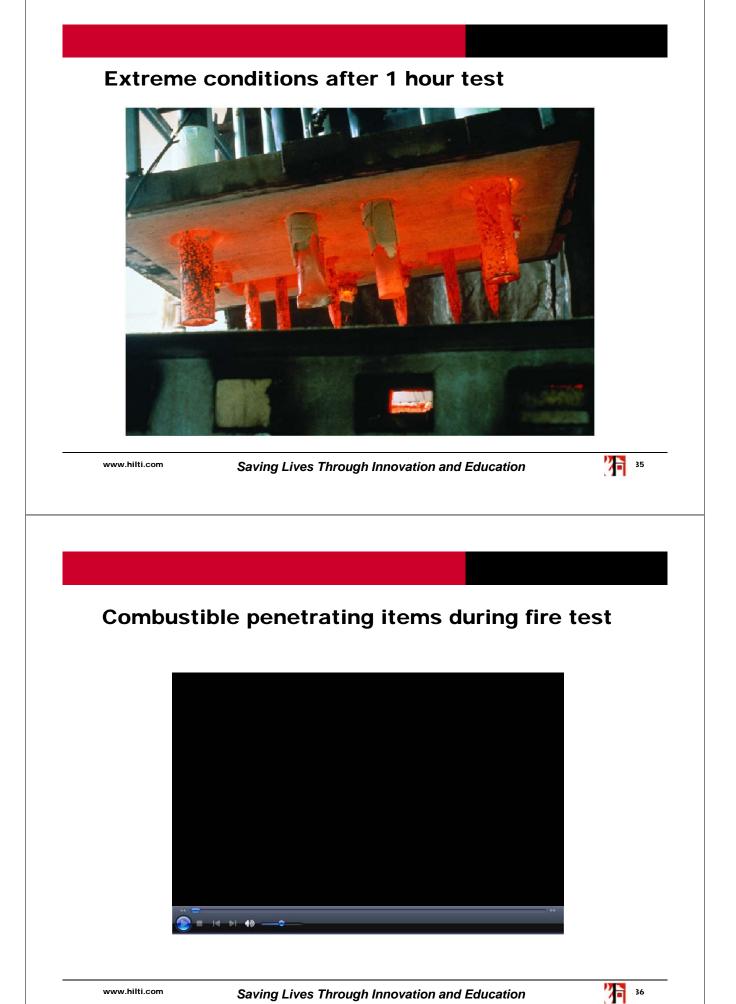
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Video demo of ASTM/UL through-penetration test







Combustible penetrating items after fire test



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Firestop performance can change completely with small change in any parameter

- Size and type of penetrating item(s)
- Size and shape of opening
- Desired fire rating (hrs)
- Stud width for gypsum walls
- Floor or wall construction type and thickness
- Annular space
- Percent fill (cables)







ASTM E 1966 / UL 2079 Test Standards for Construction Joint Firestop Systems

Assembly Rating

- Measures both fire and temperature ratings on non-fireside
- Hose stream only required for top-of-wall and wall-to-wall joints
- Joint cycled prior to fire testing

L-Rating (optional)

- Amount of air leakage through firestop system at ambient and 400°F
- Indicates ability to restrict movement of smoke
- Measured in CFM/lin. ft.

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ASTM E 1	966 joint cyc	cling test	
Non-compl	iant joint seal	Code-compliant joint sys	stem
Alr	nost all construct	tion joints will be dynamic	
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Factors Affecting Joint System Performance

- Joint width
- Movement requirements (% of joint width)
- Desired fire rating (hrs)
- Floor and wall construction type
- Stud width for gypsum walls
- Floor and wall thickness



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Perimeter Fire Barrier Testing



Typical perimeter fire barrier applications



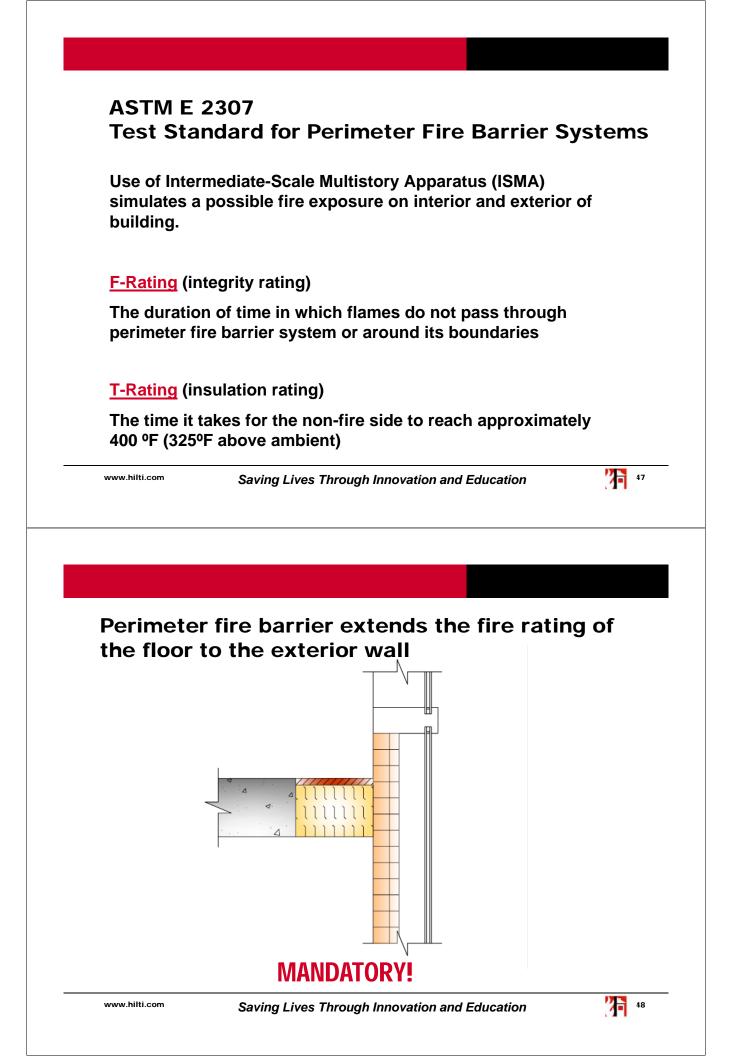
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Typical perimeter fire barrier applications







Factors Affecting Perimeter Fire Performance

Floor

Curtain wall

- Spandrel height
- Spandrel panel material
- Insulation of spandrel
 Supports

Safing insulation

- Type
- Compression
- Fiber direction
- Method of attachment

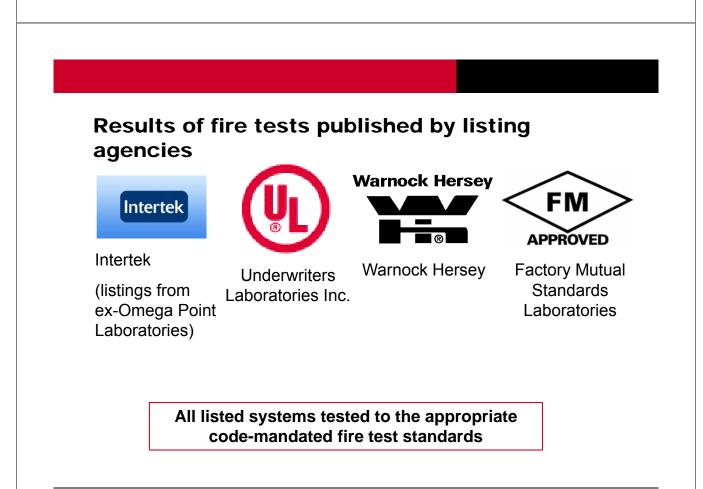
Sealant

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- Type
- Thickness

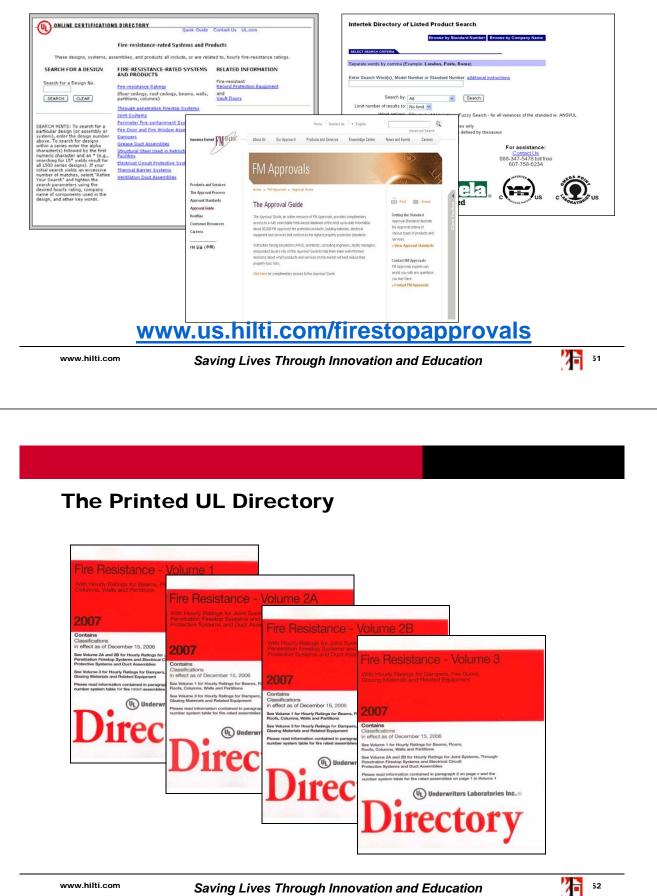


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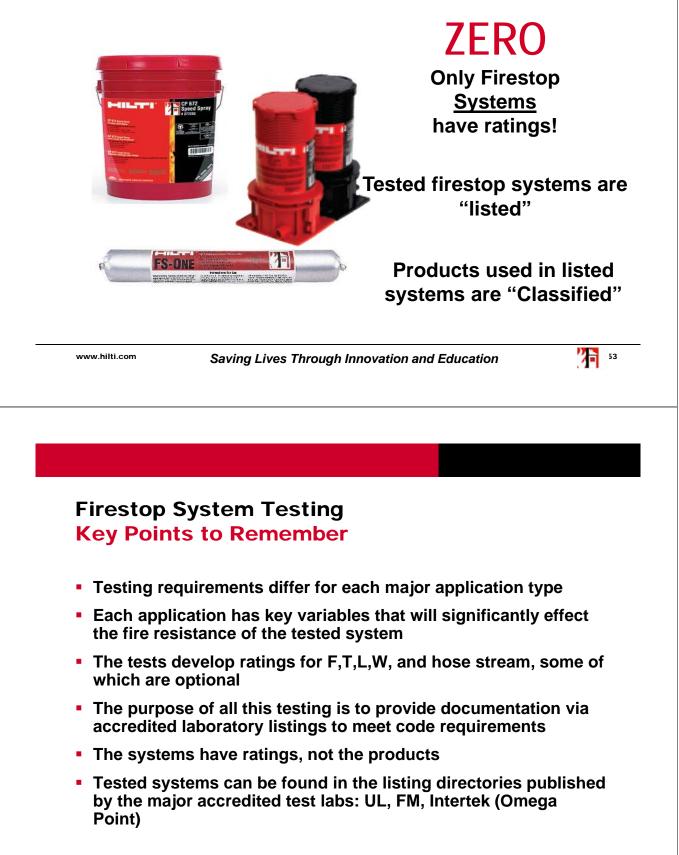




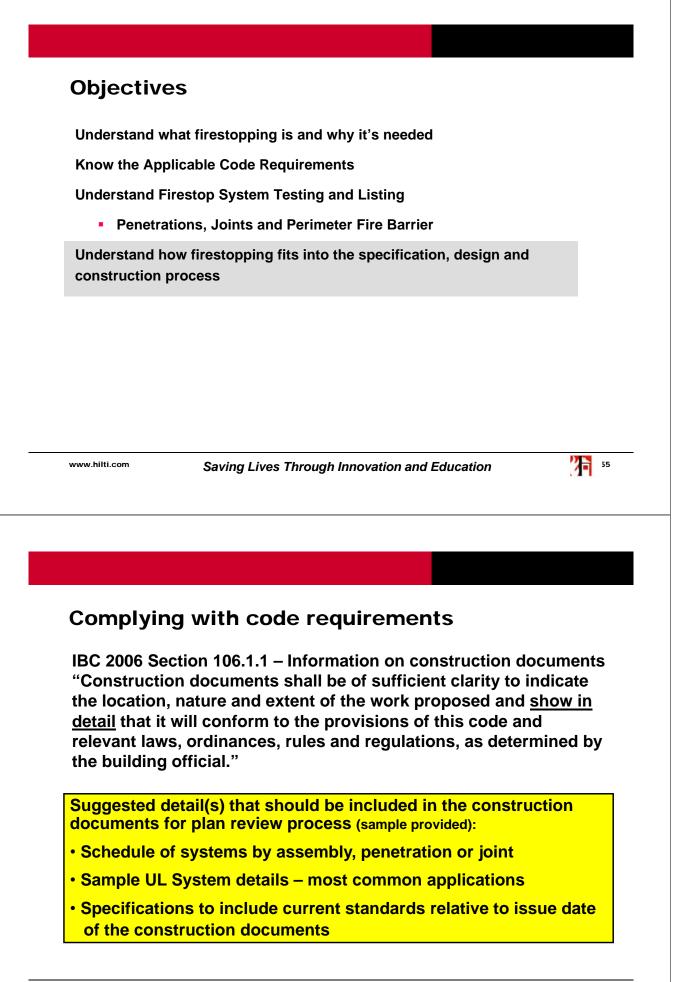
Where to find firestop systems



What is the hourly rating of any Firestop Product?









Sequencing of inspection with wall and ceiling construction

Section 109.3.6 – Fire-resistant penetrations

"Protection of joints and penetrations in fire-resistance-rated assemblies shall not be concealed from view until inspected and approved."

Section 109.6 – Approval required

"...Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the building official."

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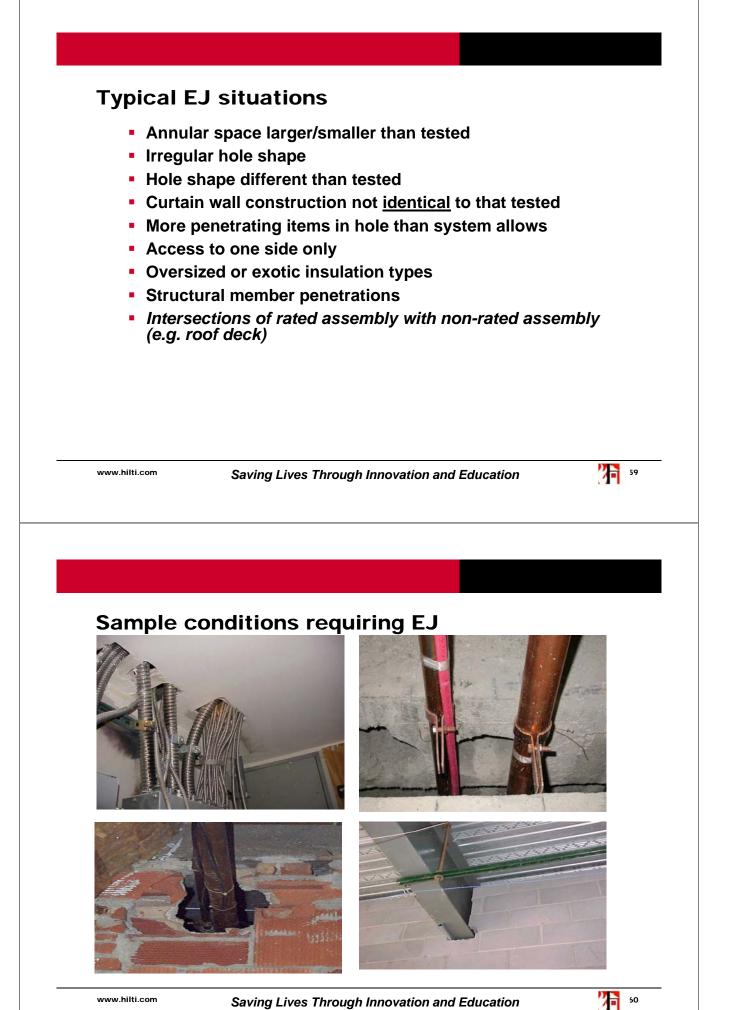


Recommendation from the manufacturer of firestop products when no tested/listed system meets actual field conditions

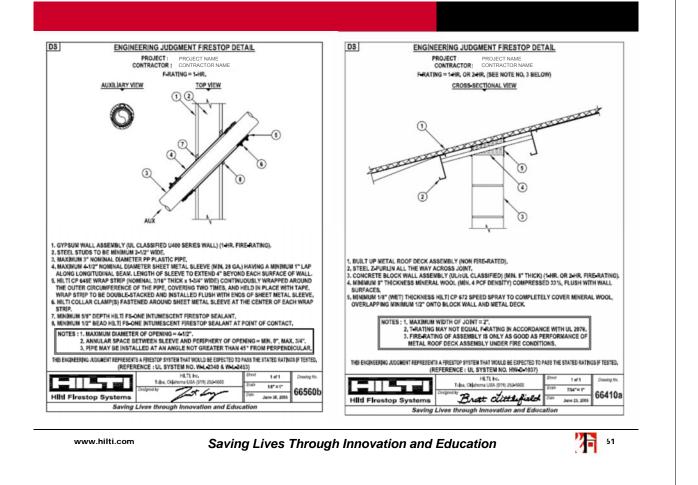
EJ Evaluation guidelines from International Firestop Council www.firestop.org







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Pre-Construction Meetings: Key firestop details

- Review Contract Document Requirements
- Review Firestop Submittal/s
- Coordination of Trades (if no single FSC)
- Color code wall types in field
- Review applications for Engineering Judgments
 - Obtain approvals
 - Discuss constructability issues
- Establish Inspection Guidelines & Expectations
 - Mock-up of each application for reference
 - Submittal with UL Details available for every inspection
- Schedule installer training (if no single FSC)



