Testing of Fire Resistance and Smoke Resistant Assemblies

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Fire-Resistance-Rated Construction
Fire-Resistance-Rated Construction

Code Requirements for Fire-Resistance-Rated Construction
Code Requirements

- IBC Section 703.2 – Fire-resistance ratings shall be determined in accordance with ASTM E 119 or UL 263
- LSC 8.2.3.1 – The fire resistance of structural elements and building assemblies shall be determined in accordance with test procedures set forth in ASTM E 119 or ANSI/UL 263
Fire Resistance

• Expressed as an Hourly Time Period
• Ratings range from 1/2 to 4 hours
• Containment of Fire to Room or Floor of Origin
Fire-Resistance-Rated Construction

Establishing Fire-Resistance Ratings
Standards

- ANSI / UL 263
- ASTM E 119
Building Components

- Columns
- Beams
- Floor/Ceilings or Roof/Ceilings
- Walls
Time - Temperature Curve

Temp (°F)

1700° F
1 HR

1000° F
5 Min

2000° F
4 HR

Time (Hr)

0 1 2 3 4
Columns

- Sample size – Minimum 9 ft
- Tested unloaded
Conditions of Acceptance – Columns

• 1000°F / 1200°F
Beams

- Sample size – Minimum 12 ft
- Load applied – Per design
Conditions of Acceptance – Beams

• Support load
• 1100°F / 1300°F
Floor/Ceiling or Roof/Ceilings

• Sample size – 180 sq ft / 12 ft
• Load applied – Per design
Conditions of Acceptance
Floor/Ceilings or Roof/Ceilings

• Support load
• Flame passage
• 250°F / 325°F
• Support temperatures
Walls

• Sample size - 100 sq ft / 9 ft
• Load applied - Per design
Conditions of Acceptance – Walls

• Flame passage
• 250°F / 325°F
• Support load
• Hose stream
Where Are Listings Found?

- **Hard Copy**
  - **FIRE RESISTANCE DIRECTORY**
  - **VOLUME 1**
  - **2012**
  - With Hourly Ratings for Beams, Floors, Roofs, Columns, Walls and Partitions
  - Certifications in effect as of January 3, 2012

- **CD-ROM**
  - **2012 DIRECTORIES**
  - Building Materials
  - Roofing Materials & Systems
  - Fire Protection Equipment
  - Fire Resistance

- **Online**
  - **UL ONLINE CERTIFICATIONS DIRECTORY**
  - Search a basic search
  - Search by product name, code, etc.
  - Specific searches
  - Fire Resistant Assemblies and Systems
  - Lines of interest
  - Featured links
Questions / Comments
Breaches in Fire-Resistance-Rated Construction

• Penetrations
• Joint Systems
• Opening Protectives
• Ducts and Air Transfer Openings
Breaches in Fire-Resistance-Rated Construction Cont.

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

Absolutely!!!
Breaches in Fire-Resistance-Rated Construction Cont.

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

• IBC – Breaches shall be protected
  • Section 713 – Penetrations
  • Section 714 – Fire-Resistant Joint Systems
  • Section 715 – Opening Protectives
  • Section 716 – Ducts and Air Transfer Openings
• Each type of breach has a unique fire test standard associated with it which compliments ASTM E 119 and UL 263
Code Requirements Cont.

• LSC – Breaches shall be protected
  • Penetrations
  • Joint Systems
  • Opening Protectives
  • Ducts and Air Transfer Openings
• Each type of breach has a unique fire test standard associated with it which compliments ASTM E 119 and UL 263
Questions / Comments
Through- and Membrane-Penetration Firestop Systems
Penetrations

Code Requirements for Penetrations
Code Requirements

- IBC Section 713 – Firestop systems shall be protected by an approved penetration firestop system installed as tested in accordance with ASTM E 814 or UL 1479
- LSC – Firestop systems or devices shall be tested in accordance with ASTM E 814 or UL 1479
Ratings

• F - Flame Occurrence
• T - Heat Transmission
• L - Leakage (Optional)
• W - Water Leakage (Optional)
Fire-Resistance-Rated Construction

Establishing F and T Ratings
Standards

• ANSI / UL 1479
• ASTM E 814
Three Elements of a Firestop System

• Floor or Wall Assembly
• Penetrating Item
• Firestopping Products
Full-Scale Wall Assembly
Small-Scale Wood Floor Assembly
Cables Through Wood Floor
Conduit Through Wood Floor
Hose Stream Test
Conditions of Acceptance
F Rating

- Passage of Flame
- Hose Stream
Conditions of Acceptance
T Rating

• Passage of Flame
• 325°F Temperature Rise
• Hose Stream
Where Are Listings Found?

Hard Copy

Fire Resistance Directory
Volume 1
2012

With Hourly Ratings for Beams, Floors, Roofs, Columns, Walls and Partitions

Certifications in effect as of January 3, 2012

CD-ROM

Online

UL 2012 Directories
Building Materials
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Online Certifications Directory

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Introduction: UL Recognized Components
Introduction: UL Recognized for Canada

Featured Links
Questions / Comments
Opening Protectives

• Fire Door Assemblies

• Fire Window Assemblies
Opening Protective Code Requirements for Fire Door Assemblies
Code Requirements

• Section 715 of the IBC
  • 715.4.1 – Side-hinged or pivoted swinging doors shall be tested to ANSI/UL 10C or NFPA 252
  • 715.4.2 – Other types of doors shall be tested to ANSI/UL 10B or NFPA 252
• 715.4.3.1 – Doors in corridors and smoke barriers required to have leakage rating of 3 cfm per sq ft of door opening when tested to UL 1784

• 715.4.4 – Doors in exit enclosures and exit passageways shall have maximum transmitted temperature end point of not more than 450°F for 30 minutes
Code Requirements Cont.

- LSC
  - Fire protection ratings shall be determined in accordance with NFPA 252, UL 10B or UL 10C
Opening Protectives

Establishing Fire-Protection Rating
Standards

- ANSI / UL 10B
- ANSI / UL 10C
- NFPA 252
Time - Temperature Curve

- 1000°F (5 Min)
- 1700°F (1 HR)
- 2000°F (4 HR)
Conditions of Acceptance
Fire Door Assemblies

• Flame Passage
• Hose Stream After Full Duration Fire Exposure
Where Are Listings Found?

Hard Copy

CD-ROM

Online
Questions / Comments
Fire Resistive Construction

UL’s Online Search Tools
UL’s Online Search Tools

- Online Certifications Directory
- ULtimate Fire Wizard
- Code Correlation Database
Online Certifications Directory

• Helps you achieve code compliance
• Is continuously updated
• Needs no password
• Is free – no charge for use
• www.ul.com/database
ULtimate Fire Wizard

- Helps identify designs meeting project parameters
- Needs no password
- Is free – no charge for use
- Saves search results in Design Lists
- www.ul.com/firewizard
Code Correlation Database

- Correlates model code sections to UL product categories
- Covers many model codes and editions (IBC, IFC, NEC, etc.)
- Flexible search capabilities
- Powerful tool to locate appropriate Listings
- www.ul.com/codelink
Questions / Comments
Thank You for Attending!!!

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