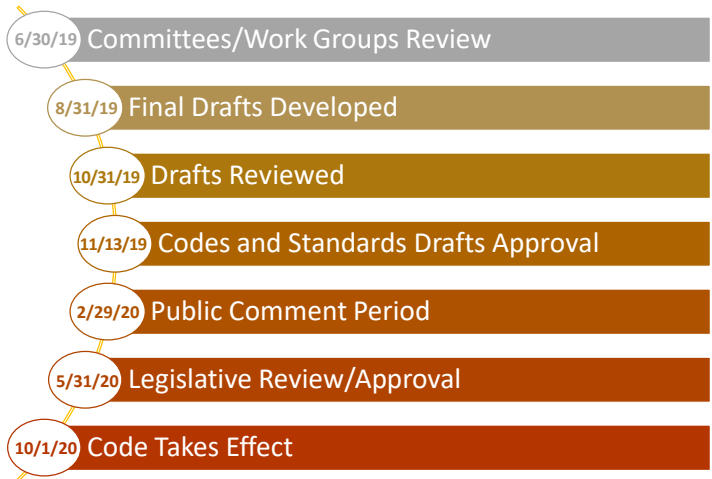


2020 Connecticut State Building and Fire Codes

Find the most current schedule at <https://portal.ct.gov/DASCodeChange>

Completed: 2020 Amendments Drafted and Code Change Proposals Received



Fire and Smoke Protection Features

Spring 2020 Career Development Series

Bruce E. Johnson, Regulatory Services Regional Manager
Building & Life Safety Technologies, UL LLC

DAS Office of Education and Data Management



State of Connecticut Fire Safety Code Reference

The following UL training program references the Fire and Smoke Protection Features from the 2015 IFC and the 2015 IBC:

2018 Connecticut State Fire Safety Code Part I, II and III – The 2015 International Fire Code

- Chapter 7A – Fire and Smoke Protection Features
 - Note – Chapter 7A is a reprint of Chapter 7 of the State Building Code:
 - The 2015 International Building Code portion of the 2018 Connecticut State Building Code, Chapter 7 - Fire and Smoke Protection Features

3

Agenda

- A brief IBC Basics Review
- Fire-Resistance-Rated Construction
 - International Building Code Requirements
 - Passive Fire Rated Construction Elements
- Protection of Openings and Penetrations
 - Fire stop systems
 - Dampers
- Methods of Showing Code Compliance
- Engineering Judgments



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Agenda Cont.

- Best Practices for Plan Review
- Best Practices for Inspection – new construction
- Inspection and Maintenance of Passive Fire Protection Systems in existing buildings
- Navigating UL Product iQ
- Summary and Closing



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Objectives

At the conclusion of this presentation, participants should be able to:

1. Define and identify the general types of fire and smoke separations such as firewalls, fire barriers, fire partitions, smoke barriers, horizontal assemblies and other separation elements.
2. Identify those specific components that make up fire and smoke separations



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Objectives - continued

At the conclusion of this presentation, participants should be able to:

3. Determine where separations are required throughout Chapter 7 of IFC and the IBC.
4. Describe the differences between floor, floor/ceiling and roof/ceiling assemblies.
5. Describe the protection requirements for penetrations, joint systems, ducts and air transfer openings in each of the separate elements



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Objectives Cont.

At the conclusion of this presentation, participants should be able to:

6. Be able to navigate UL's Product iQ and Installation Code search in order to identify *listed* products and assemblies which demonstrate compliance with the requirements of the 2015 *International Building Code*.

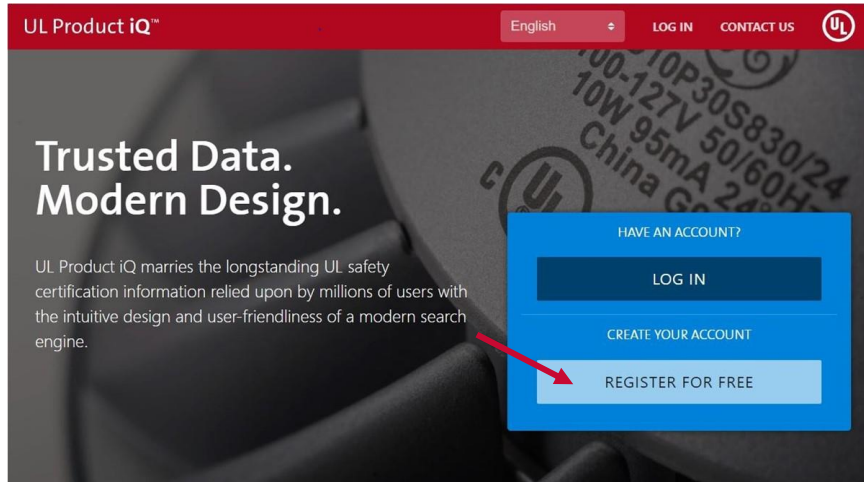


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Let's Get You Registered



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Questions / Comments



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IBC Basics

Some Fundamentals



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Use of the IBC

- *Definitions* – Chapter 2
- Occupancy Classification
- Use of Tables – Scoping Section
- Table Footnotes
- Code Exceptions
- Reference Standards
- Index and Glossary



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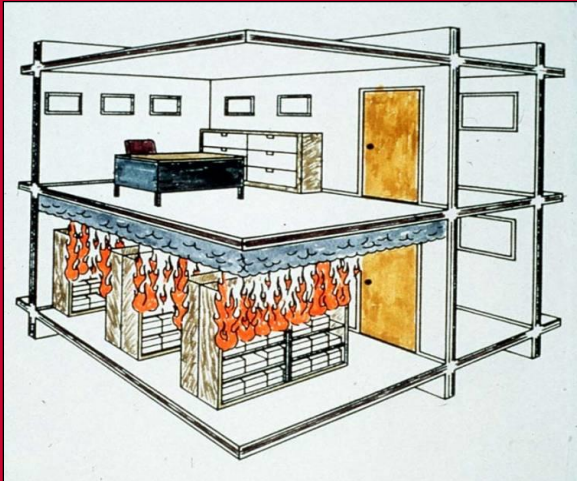
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Fire-Resistance-Rated Construction



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Passive Fire Protection

The IBC takes a systematic approach to building fire protection, including:

1. Passive Fire Protection

Fire Area = The aggregate floor area enclosed and bounded by *fire walls, fire barriers, exterior walls or horizontal assemblies* of a building.

2. Active Fire Protection

Fire Protection System = Approved devices, equipment and systems or combinations of systems used to detect a fire, activate an alarm, extinguish or control a fire, control or manage smoke and products of a fire or any combination thereof.

3. Reasonable level of redundancy; inspection, testing & maintenance



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More Definitions

- **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. (IBC)



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Definitions Cont.

- *Fire-resistance rating* - The period of time a building element, component or assembly maintains the ability to confine a fire, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests, prescribed in Section 703.3 (IBC)
 - Passage of Flames
 - Heat Transmission
 - Structural Integrity



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Definitions Cont.

- *Fire-protection rating* - The period of time that an opening protective will maintain the ability to confine a fire as determined by tests prescribed in Section 715. Ratings are stated in hours or minutes. (IBC)
 - Passage of Flames
 - Structural Integrity



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Standards Writing Organizations

American National Standards Institute (ANSI)

- ASTM International (ASTM)
- FM Global (FM)
- National Fire Protection Association (NFPA)
- Underwriters Laboratories (UL)



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Fire-Resistance-Rated Construction

International Building Code Requirements for Fire-Resistance- Rated Construction



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Code Requirements

- Chapters 3, 4, 5, 6, 7 and 10 of the IBC
- Chapters 3 and 4 – Defines Occupancies
- Chapter 5 – General Building Heights and Areas
 - Permitted building area based on four factors:
 - Type of construction
 - Occupancy
 - Available frontage
 - Use of sprinklers



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Code Requirements Cont.

- Section 508 – Covers mixed use considerations
- Chapter 6 – Types of Construction
 - Table 601 – Establishes hourly rating required for building elements based on Type of Construction
- Chapter 7 – Fire and Smoke Protection Features



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Code Requirements Cont.

- 703.2 – Fire-resistance ratings shall be determined in accordance with ASTM E 119 or UL 263
- 703.2.1 – Nonsymmetrical walls shall be tested from both faces
- 703.2.3 – Assemblies considered unrestrained unless registered design professional provides evidence satisfactory to AHJ that construction qualifies for restrained classification per ASTM E 119 or UL 263



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Restrained & Unrestrained Cont.

- I. Wall Bearing:
 - A. Single span and simply supported end spans of multiple bays.⁹
 - 1. Open-web steel joists or steel beams supporting concrete slab, precast units, or metal decking. Unrestrained
 - 2. Concrete slabs, precast units, or metal decking. Unrestrained
 - B. Interior spans of multiple bays.
 - 1. Open-web steel joists, steel beams, or metal decking supporting continuous concrete slab. Restrained
 - 2. Open-web steel joists or steel beams, supporting precast units or metal decking. Unrestrained
 - 3. Cast-in-place concrete slab systems Restrained
 - 4. Precast concrete where the potential thermal expansion is resisted by adjacent construction⁹. Restrained
- II. Steel Framing:
 - A. Steel beams welded, riveted, or bolted to the framing members Restrained
 - B. All types of cast-in-place floor and roof systems (such as beam-and-slabs, flat slabs, pan joists, and waffle slabs) where the floor or roof system is secured to the framing members Restrained
 - C. All types of prefabricated floor or roof systems where the structural members are secured to the framing members and the potential thermal expansion of the floor or roof system is resisted by the framing system or the adjoining floor or roof construction⁹. Restrained

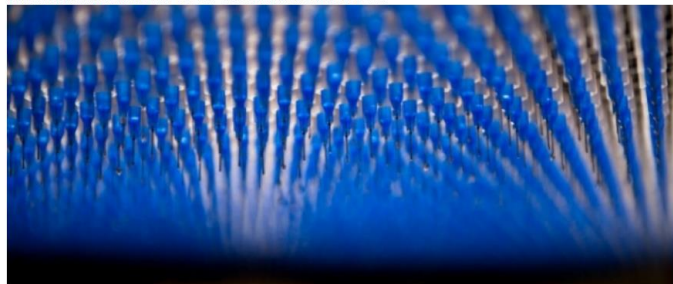


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Code Authority – Technical Library

Technical Library

Technical information on code related UL certifications and services.



TOPICS IN ALPHABETICAL ORDER

- Restrained and Unrestrained Assemblies



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Code Requirements Cont.

- 703.3 – Methods for determining *fire resistance* shall be based on fire exposure and acceptance criteria of ASTM E 119 or UL 263



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Code Requirements Cont.

- 703.3 Cont. – Required *fire resistance* permitted to be established based on any of the following:
 1. Designs documented from *approved* sources
 2. Prescriptive requirements from Section 721
 3. Calculations in accordance with Section 722
 4. **Engineering analysis based on ASTM E 119 or UL 263**
 5. Alternative protection methods as allowed in Section 104.11
 6. **Fire-resistance designs certified by an approved agency.**



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Code Requirements Cont.

- Breaches of assemblies shall be protected in accordance with Sections 712, 713, 714, 715 and 716
- Chapter 10 – Means of Egress
 - Table 1020.1– Establishes hourly rating required for corridors based on Occupancy Group



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Connecticut Amendment to IBC

- **704.6.1 Connections.** Where non-fire-resistance-rated members attach to fire-resistance rated members, the non-rated member shall be protected in the same manner as the rated member for a distance of not less than 12 inches (305 mm) from the point of connection.



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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 (horizontal and vertical compartmentalization)



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Fire-Resistance-Rated Construction

Establishing Fire-Resistance Ratings



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Standards

- ANSI / UL 263
- ASTM E 119



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Building Components

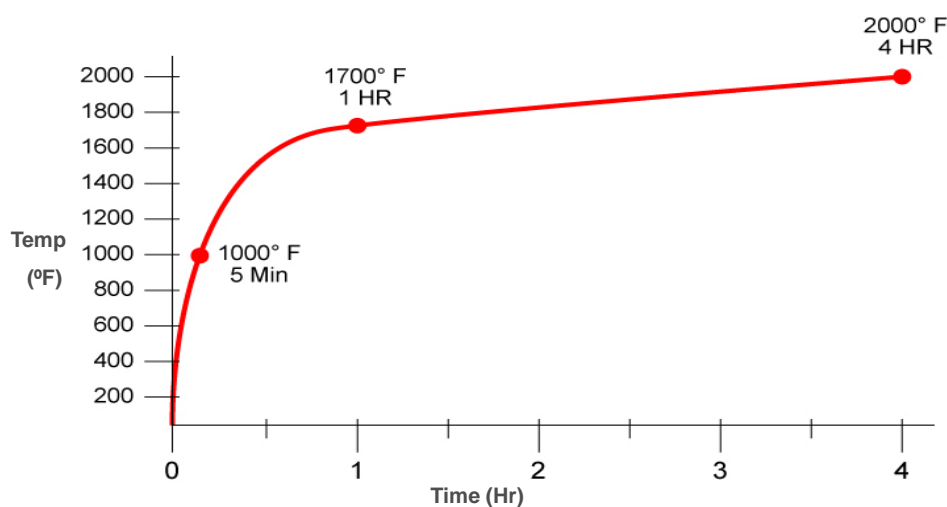
- Columns
- Beams
- Floor/Ceilings (F/C) or Roof/Ceilings (R/C)
- Walls



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Time - Temperature Curve



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Columns

- Sample size – Minimum 9 ft
- Tested unloaded



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Conditions of Acceptance – Columns

- Thermal coupling reading:
1000°F (average) / 1200°F (signal reading)



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Beams

- Sample size – Minimum 12 ft
- Load applied – Per design



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Conditions of Acceptance – Beams

- Support load
- Thermal coupling reading:
1100°F (average) / 1300°F (single reading)



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Floor/Ceiling or Roof/Ceilings

- Sample size – 180 sq ft / 12 ft
- Load applied – Per design



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Conditions of Acceptance Floor/Ceilings or Roof/Ceilings

- Support load
- No flame passage
- 250°F (average) / 325°F (single reading)
- Support temperatures (beams) 1100°F / 1300°F



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Walls

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



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Conditions of Acceptance – Walls

- No flame passage
- 250°F (average) / 325°F (single reading)
- Support load
- Hose stream (2 ½ minutes at 30 psi)



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Fire-Resistance-Rated Construction

Methods of Showing Code Compliance



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Methods of Showing Compliance with the Fire Resistance Requirements of the IBC

- 703.2 – *Fire-resistance* ratings shall be determined in accordance with ASTM E 119 or UL 263
- 703.3 – Methods for determining *fire resistance* shall be based on fire exposure and acceptance criteria of ASTM E 119 or UL 263



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Methods of Showing Compliance with the Fire Resistance Requirements of the IBC

- 703.3 Cont. – Required fire resistance permitted to be established based on any of the following:
 - Designs documented from approved sources
 - Prescriptive requirements from Section 721
 - Calculations in accordance with Section 722
 - Engineering analysis based on ASTM E 119 or UL 263
 - Alternative protection methods as allowed in Section 104.11
 - Fire-resistance designs certified by an approved agency



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Designs Documented From Approved Sources

- Product Directories of Nationally Recognized Testing Laboratories
 - UL - *Fire Resistance Directory and Online Product iQ*
 - Intertek – *Intertek Directories of Certified Products*
 - FM Global - *Factory Mutual Approval Guide*



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Designs Documented From Approved Sources Cont.

- Gypsum Association - *Fire Resistance Design Manual*
- BOCA - *Guidelines for Determining Fire Resistance Ratings of Building Elements*



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Designs Documented From Approved Sources Cont.

- ASCE / SFPE 29 – *Standard Calculation Methods for Structural Fireproofing*
- ACI 261.1 / TMS 0216.1 – *Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies*



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Prescriptive Fire Resistance Section 721 of the IBC

**TABLE 721.10.1—(CONTINUED)
MINIMUM PROTECTION OF STRUCTURAL PARTS BASED ON TIME PERIODS
FOR WHICH NONCOMBUSTIBLE AND/OR FIRE-RESISTANT MATERIALS***

STRUCTURAL PARTS TO BE PROTECTED	FIRE RATING	MINERALS MATERIAL USED	MINIMUM THICKNESS OF WALLS AND BEAMS FOR THE FOLLOWING FIRE RESISTANCE PERIODS (minutes)			
			1 1/2	2	3	4
3. Beams or flanges of steel beams and girders (nonprestressed)	3-1.1	3-3.1 Uncoated galvanized steel pipe or steel with pipe, with steel 0.150" diameter (3/8 in. [9.5 mm] pipe) and wire hangers spaced around beams and spaced 12" on center. Beams with pipe approximately 2" on center at each side and bottom. Two layers of 1/2" Type X gypsum wallboard ^b are attached to U-shaped brackets spaced 24" on center. U-shaped brackets are attached to the beam with 1/2" diameter steel bolts through the web of the beam flange to provide a 1/2" clearance to the flange. The brackets extend out 12" on center. U-shaped brackets are formed from members identical to the channel members in their profile. U-shaped brackets are formed from members identical to each other and are 1/2" deep center-to-center on the vertical outside surfaces parallel to each side of the steel flange. 2-4.1 As an alternative, 1/2" thick (3/4" concrete) steel pipe (1 1/2" outer and center angles may be used in lieu of channels), and the web corners in the U-shaped brackets may be omitted. Each angle is attached to the bracket with 1/2" long (3/4" diameter) bolts. The vertical angle is 1/2" deep (1 1/2" outer and center angles with one 1/2" long (3/4" diameter) bolt) and the other vertical angle is 1/2" deep (1 1/2" outer and center angles with one 1/2" long (3/4" diameter) bolt). The completed steel framing provides a 1/2" and 1/2" clear between the steel faces of wallboard and the side and bottom of the steel beam, respectively. The inner layer of wallboard is attached to the top surface and bottom corner channel or angle with 1/2" long (3/4" diameter) bolts spaced 24" on center. The outer layer of wallboard is applied with 1/2" long (3/4" diameter) bolts spaced 24" on center. The bottom corners are finished with steel corner brads.	—	1/2	—	—
		2-4.2 Three layers of 1/2" Type X gypsum wallboard ^b attached to a steel suspension system as described immediately above with the 1/2" thick (3/4" concrete) steel pipe (1 1/2" outer and center angles) in lieu of channels, and the web corners in the U-shaped brackets may be omitted. Each angle is attached to the bracket with 1/2" long (3/4" diameter) bolts. The vertical angle is 1/2" deep (1 1/2" outer and center angles with one 1/2" long (3/4" diameter) bolt) and the other vertical angle is 1/2" deep (1 1/2" outer and center angles with one 1/2" long (3/4" diameter) bolt). The completed steel framing provides a 1/2" and 1/2" clear between the steel faces of wallboard and the side and bottom of the steel beam, respectively. The inner layer of wallboard is attached to the top surface and bottom corner channel or angle with 1/2" long (3/4" diameter) bolts spaced 24" on center. The outer layer of wallboard is applied with 1/2" long (3/4" diameter) bolts spaced 24" on center. The bottom corners are finished with steel corner brads.	—	1 1/2	—	—
		2-4.3 Three layers of 1/2" Type X gypsum wallboard ^b attached to a steel suspension system as described immediately above with the 1/2" thick (3/4" concrete) steel pipe (1 1/2" outer and center angles) in lieu of channels, and the web corners in the U-shaped brackets may be omitted. Each angle is attached to the bracket with 1/2" long (3/4" diameter) bolts. The vertical angle is 1/2" deep (1 1/2" outer and center angles with one 1/2" long (3/4" diameter) bolt) and the other vertical angle is 1/2" deep (1 1/2" outer and center angles with one 1/2" long (3/4" diameter) bolt). The completed steel framing provides a 1/2" and 1/2" clear between the steel faces of wallboard and the side and bottom of the steel beam, respectively. The inner layer of wallboard is attached to the top surface and bottom corner channel or angle with 1/2" long (3/4" diameter) bolts spaced 24" on center. The outer layer of wallboard is applied with 1/2" long (3/4" diameter) bolts spaced 24" on center. The bottom corners are finished with steel corner brads.	—	2	—	—
3. Bonded nonprestressed reinforcement in	3-1.1	Carbonate, lightweight, sand-lightweight and siliceous aggregate concrete Beams or girders Solid slabs ^b	4 [#]	3 [#]	2 1/2	1 1/2

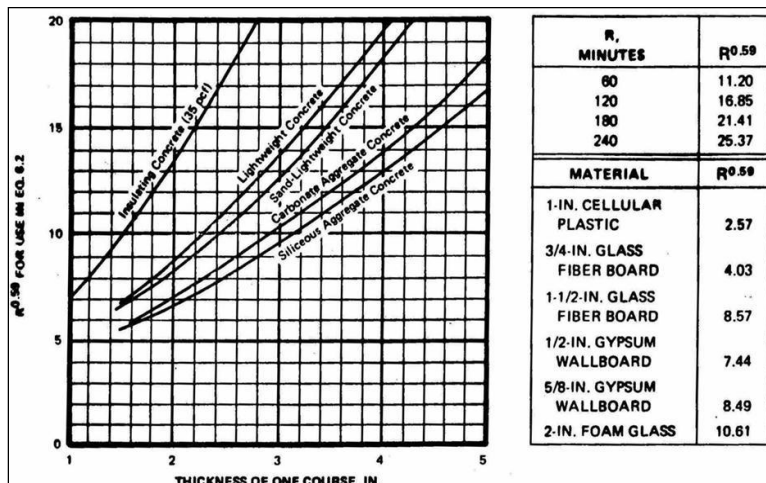


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Calculated Fire Resistance Section 722 of the IBC



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Alternate Materials, Design and Methods of Construction and Equipment

- Allows authority having jurisdiction to accept other information to show compliance
 - Evaluation Services Reports
 - IAPMO Evaluation Services
 - ICC Evaluation Services
 - UL Evaluation Services



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Passive Fire Protection

Engineering Judgments



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Engineering Judgments

- An Engineering Judgment is a letter or report issued by some knowledgeable party which evaluates the construction of some site-specific application which deviates from a tested design, system or assembly and concludes with a judgment of the applicable rating of that assembly



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Engineering Judgments Cont.

- Typically, an Engineering Judgment is used when a tested design, systems or assembly is unavailable
- Most often applied to fire resistive construction



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Engineering Judgments Cont.

- Applications for an Engineering Judgment
 - Design and system concept where multiple components, some listed and some unlisted, are used to field construct the finished assembly (e.g. wall)
 - Typically products are not required to be listed by code
- Must be acceptable to the *Code Official*



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Who Issues Engineering Judgments?

- Who issues Engineering Judgments?
 - Professional engineer
 - Fire protection engineer
 - Manufacturer
 - Testing laboratory
- Individual issuing judgment must be acceptable to the *Code Official*



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Important Points of an Engineering Judgment

- No guidance from the International Code Council or the various I-Codes
- No guidance from UL
- Best documents available are from the International Firestop Council (IFC) – www.firestop.org



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IFC Guidelines

- Four Documents – *International Firestop Council (IFC)* www.firestop.org
 - Recommended *IFC* Guidelines for Evaluating Firestop Systems in Engineering Judgments (EJs)
 - Covers firestops, joint systems and grease/air duct assemblies
 - Perimeter fire barrier systems
 - Fire resistant duct enclosure systems for commercial kitchen exhaust ducts
 - Fire resistant duct enclosure systems for ventilation ducts



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Summary of Engineering Judgments

- Emphasizes importance of tested designs
- Not a substitute for existing designs
- Should be issued only by those who know the components
- Based on sound engineering practices and knowledge of performance of the designs
- Based on interpolation of previous testing
- Issued only for a specific jobsite
- Presented in clear detail



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Questions / Comments



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Fire Resistance-Rated Construction

Permitted
Changes to
Designs



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Guide Information

- Equipment, materials or systems included in the Category
- Intended use, restrictions or supplemental information that apply
- Standard(s) used to evaluate products under the Category
- Listing or Classification Mark information for the Category



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Fire-resistance Ratings - ANSI/UL 263, BXUV

Guide Information for Fire-resistance Ratings

Design Information Section

The Design Information Section supplements the individual published designs and is organized as follows:

I. INTRODUCTION

1. Rapid-rise Fire Test	
2. Definitions	

II. GENERAL

1. Metric Dimensions	12. Dampers
2. Loading of Test Specimens	13. Wood Structural Panels
3. Finish Ratings	14. Blanket Insulation
4. Nails and Screws	15. Sound Transmission Class (STC)
5. Interior and Exterior Applications	16. Impact Insulation Class (IIC)
6. Exposed Interior Finishes	17. Penetrations
7. Radiant Heating Cable and Panels	18. Curtain Wall/Floor Protection Systems
8. Coating Materials	19. Fire-resistant Joint Systems
9. Gypsum Board	20. Fire Doors, Frames and Hardware
10. Gypsum Board Joint Treatment (Taping)	21. Glazing, Wired Glass and Glass Blocks
11. Plaster	22. Exterior Wall Systems

III. FLOOR-CEILINGS AND ROOF-CEILINGS

1. Concrete	12. Enclosures for Fluorescent Recessed Luminaires (Troffers)
-------------	---



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Architectural Services

CURRENT EVENTS

Would you like a free webinar on passive fire resistance?

[Click here to learn more.](#)

DESIGN CRITERIA AND ALLOWABLE VARIANCES

Product category guide information can clarify construction and application requirements for the certifications and view acceptable variances allowed for the designs and systems. Click below for details.

[Walls, floors, beams and columns](#)

[Firestop systems](#)

[Joint systems](#)

[Perimeter fire containment systems](#)

[Architectural services FAQs](#)



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Fasteners

- Cement coated box or cooler nails shall be used for securing gypsum board, unless otherwise specified in design
- Screws meeting ASTM C 1002 or C 954 may be substituted for nails providing head diameter and length are equal or larger than specified nail



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Concrete in Horizontal Assemblies

- Compressive strength specified may be reduced 500 psi
- Unit weight tolerance 3 pcf
- Do not substitute lightweight concrete if normal weight specified
- Do not substitute normal weight concrete if lightweight specified



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Outlet Boxes in Ceilings

- Metallic boxes may be installed in F/C and R/C assemblies incorporating gypsum board protection providing:
 - Clearance not to exceed 1/8 in.
 - Area of each box not to exceed 16 sq in.
 - Total area of boxes not to exceed 100 sq in. per 100 sq ft of ceiling area
- Nonmetallic boxes tested and listed (CEYY)



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Steel Joists

- Specified joist is minimum depth
- Specified joist is minimum weight/foot
- K-Series Joist may often substitute for older series joists specified
- Spacing between joists may be increased to 4 ft OC providing:
 - Structural integrity of floor is maintained
 - Hanger wire spacing is not increased
- Bridging bar size is minimum



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Gypsum Board on Horizontal Assemblies

- Thickness may be increased providing fastener length is also increased
- Additional layers may be added



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Recessed (Can) Lighting

- Generic recessed luminaires not permitted unless covered in design
- Luminaires specifically tested and Listed for use in fire resistive construction covered in “Luminaires and Luminaire Assemblies Classified for Fire Resistance Category” (CDHW)



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HVAC Openings in Ceilings

- Most acoustical ceilings are tested with generic hinged blade damper
- UL Classified Ceiling Damper, Ceiling Air Diffuser or Air Terminal Unit may be substituted for generic hinged blade damper
- Duct Protection Systems A and B may also be substituted per Guide Info
- Some assemblies with gypsum board ceilings have been test with specific UL Classified Ceiling Dampers
- In assemblies with gypsum board ceilings, damper may not be utilized if not specified in design



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Blanket Insulation in Horizontal Assemblies

- May cause premature disruption of ceiling membrane
- For certain assemblies, fiberglass insulation can be used with additional layer of gypsum board
- Otherwise, only permitted as specified

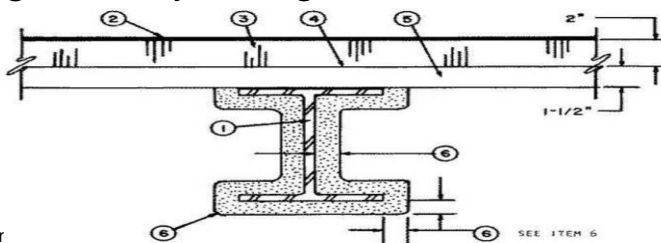


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Beam Size

- Larger beams may be substituted without restriction
- Larger is based on W/D ratio
 - W/D = weight of unit measure divided by heated perimeter (exposed surface except top flange)
- Larger W/D yields greater fire resistance

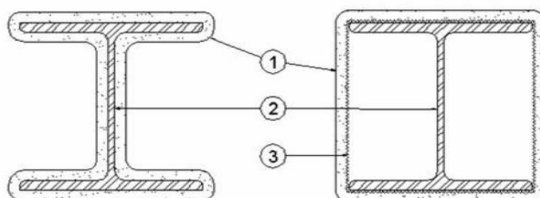


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Column Size

- Larger columns may be substituted without restriction
- Based on W/D ratio
- Larger W/D yields greater fire resistance



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Walls & Partitions

- Rating applies when either face exposed to fire, unless otherwise noted
- Unsymmetrical walls tested from both sides
- Exterior walls may only require rating from inside face
- Load bearing rating applies to non load bearing applications



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Walls & Partitions Cont.

- Size of studs specified is minimum
- Stud spacing specified is maximum
- Board orientation as specified in design



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Walls & Partitions Cont.

- Metallic boxes may be installed in wall assemblies incorporating gypsum board protection providing:
 - Max 2 hr rated assemblies
 - Clearance not to exceed 1/8 in.
 - Area of each box not to exceed 16 sq in.



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Walls & Partitions Cont.

- Total area of boxes not to exceed 100 sq in. per 100 sq ft of wall surface
- Boxes on opposite sides of wall separated by min 24 in. or provided with protection (CLIV)
- Nonmetallic boxes tested and listed (CEYY)



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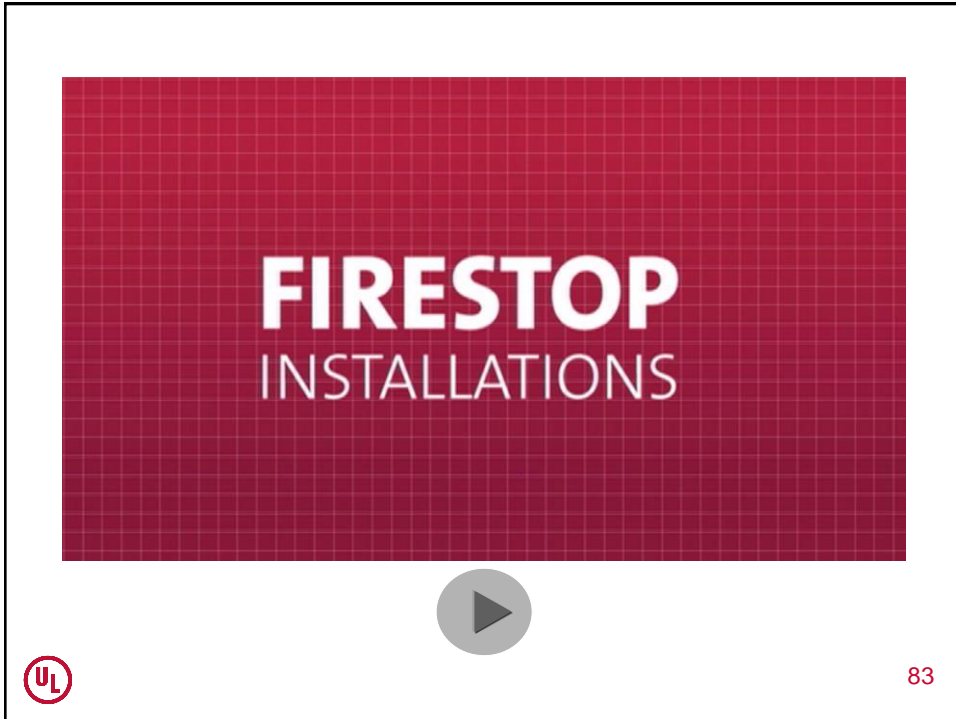
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Questions / Comments



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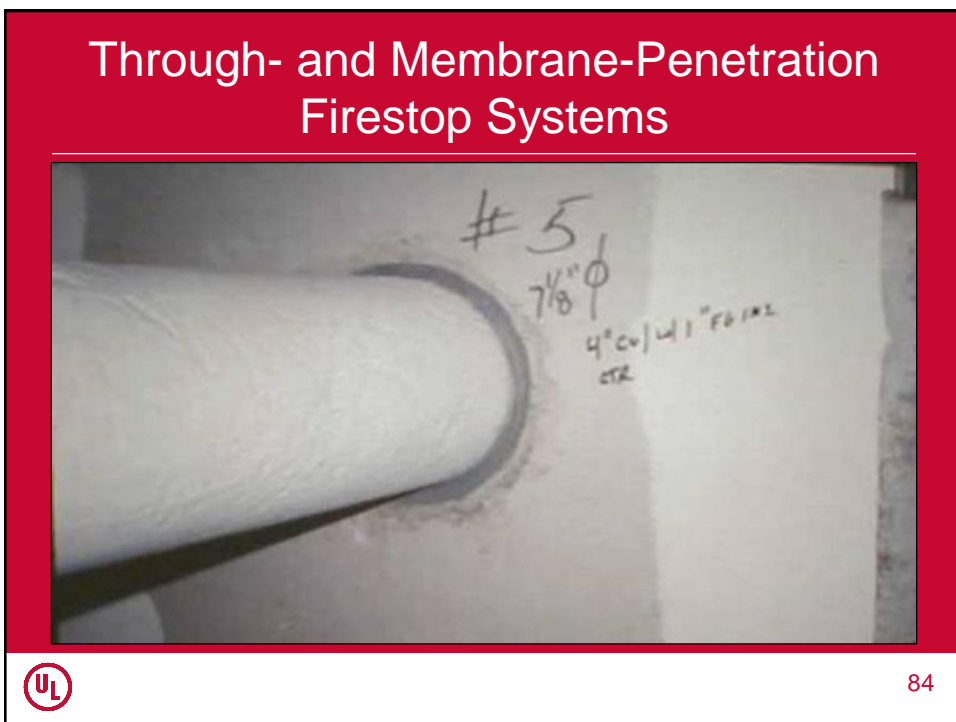
82



FIRESTOP
INSTALLATIONS

UL 83

Through- and Membrane-Penetration Firestop Systems

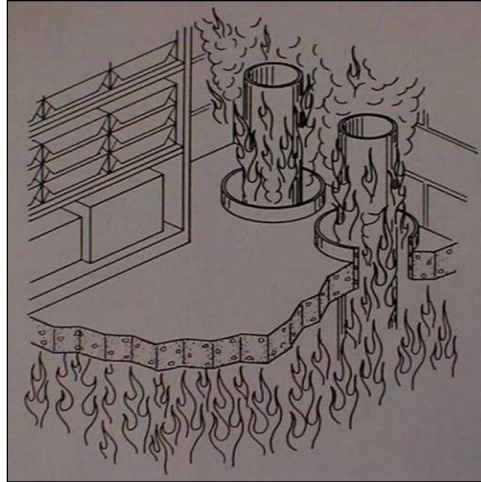


#5
7/8" ϕ
4" cu/w/1" F&I
CTR

UL 84



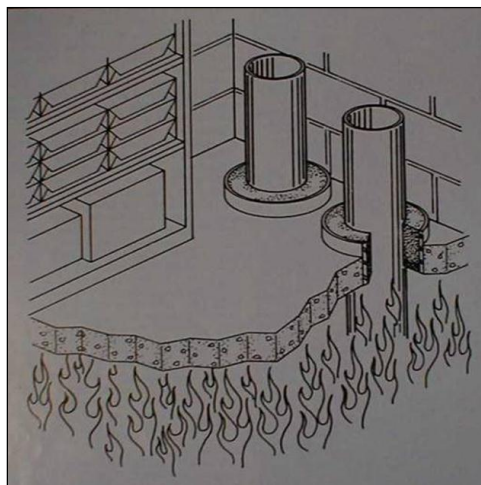
No Firestopping



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Proper Firestopping



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Some Definitions

- What is Firestopping?
 - Firestopping (v) is the process of restoring the integrity of a fire-resistance-rated assembly at a penetration of the assembly through the use of a properly designed, installed, inspected and maintained firestop system
 - Firestopping (n) is a material or device installed to resist the passage of flame and heat through penetrations (i.e. a firestop)



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Definitions Cont.

- *Membrane Penetration* – A breach in one side of a floor-ceiling, roof-ceiling or wall assembly to accommodate an item installed into or passing through the breach. (IBC)
- *Through Penetration* – A breach in both sides of a floor, floor-ceiling or wall assembly to accommodate an item passing through the breaches. (IBC)



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Definitions Cont.

- *Membrane-Penetration Firestop* – A material, device or construction installed to resist for a prescribed time period the passage of flame and heat through openings in a protective membrane in order to accommodate cables, cable trays, conduit, tubing, pipes or similar items. (IBC)



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Definitions Cont.

- *Through-Penetration Firestop System* – An assemblage consisting of a fire-resistance-rated floor, floor-ceiling, or wall assembly, one or more penetrating items passing through the breaches on both sides of the assembly and the materials or devices, or both, installed to resist the spread of fire through the assembly for a prescribed period of time. (IBC)



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Definitions Cont.

- *Firestop System* – Membrane or through-penetration firestop system. (BEJ)

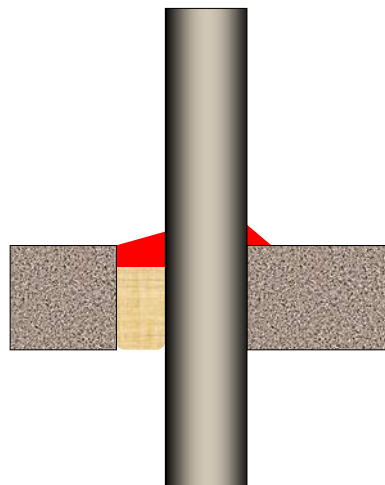


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Three Elements of a Firestop System

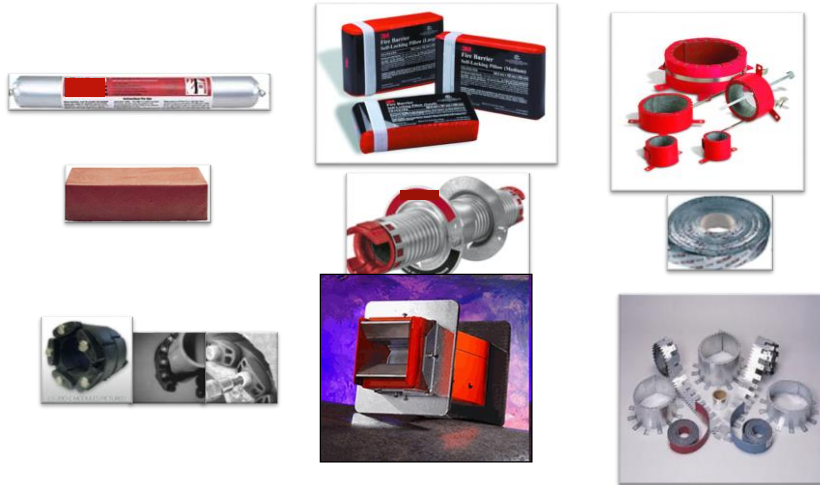
- Floor or Wall Assembly
- Penetrating Item
- Firestopping Products



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The Right Product for the Right Application

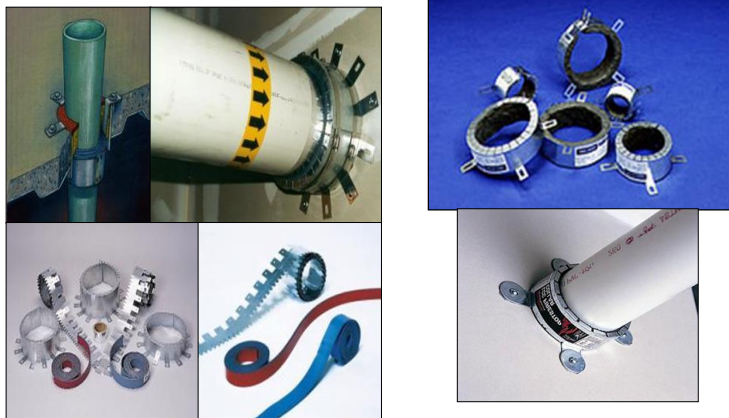


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Steel Collars and Intumescent Wrap Strips

- Intumescent sealant expands and fills the void
- The collar expands to crush pipe



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Enclosures: Valves, Controls, Speaker, Lighting



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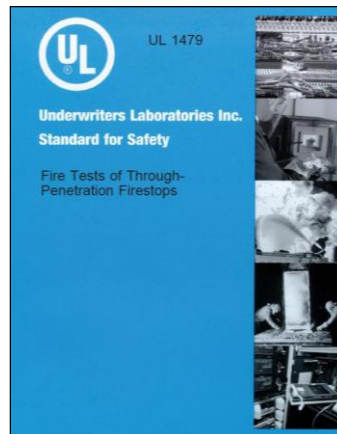


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Firestop Systems

Standards



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Standards

- ANSI / UL 1479
- ASTM E814



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Ratings

- F - Flame Occurrence
- T - Heat Transmission
- L - Leakage (Optional)
- W - Water Leakage (Optional)



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Conditions of Acceptance F Rating

- Passage of Flame
- Hose Stream
- *IBC Definition:*

F RATING. The time period that the *through-penetration firestop system* limits the spread of fire through the penetration when tested in accordance with ASTM E 814 or UL 1479.



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Conditions of Acceptance T Rating

- Passage of Flame
- 325°F Temperature Rise
- Hose Stream
- *IBC Definition:*

T RATING. The time period that the *penetration firestop system*, including the penetrating item, limits the maximum temperature rise to 325° F (163° C) above its initial temperature through the penetration on the nonfire side when tested in accordance with ASTM E 814 or UL 1479.



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L Rating

- Air Leakage Rate at Ambient Temperature
- Air Leakage Rate at 400°F
- *IBC Definition:*

L RATING. The air leakage rating of a *through penetration firestop system* or a fire-resistant *joint system* when tested in accordance with UL 1479 or UL 2079, respectively.



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W Rating

- **Optional program***, applicable to incidental water
 - 3 Ft WC Pressure Head / 72 Hr Exposure
 - Firestop subjected to water exposure, followed by standard fire and hose stream tests
 - Firestop systems assigned a W Rating
- * No IBC definition or requirements*



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Questions / Comments



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Firestop Systems

International Building Code Requirements



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Code Requirements General

- Section 714 of the 2015 IBC
- 714.3.2 Membrane penetrations shall comply with Section 714.3.1. Where walls or partitions are required to have a *fire-resistance rating*, recessed fixtures shall be installed such that the required fire resistance will not be reduced.
- There are 6 prescriptive exceptions



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Code Requirements General

- Section 714 of the 2015 IBC
 - 714.3 – Penetrations into or through *fire walls, fire barriers, smoke barrier walls and fire partitions* shall comply with 714.3.1 through 714.3.3. Penetrations in *smoke barrier walls* shall also comply with 714.4
 - 714.4 – Penetrations of horizontal assemblies not required to be protected by shaft enclosure shall be protected per Section 714.4.1 through 714.4.4



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Code Requirements Wall Assemblies

- Section 714.3 of the 2015 IBC
 - 714.3.1 – Through penetrations shall be protected by one of the following:
 - As tested as part of the entire wall assembly
 - As tested to ANSI/UL 1479 / ASTM E814
 - Exceptions
 - Concrete, grout or mortar (full thickness of the wall)
 - Annular space protection material



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Code Requirements Wall Assemblies Cont.

- 714.3.1.2 – When tested to ANSI/UL 1479 / ASTM E814, through penetrations shall have an F Rating of not less than the required rating of wall penetrated



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Code Requirements Wall Assemblies Cont.

- 714.3.2 – Membrane penetration shall be protected as follows:
 - As specified in 714.3.1 (i.e. through penetrations)
 - Recessed fixtures shall be installed so as not to reduce the required fire resistance



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Code Requirements Wall Assemblies Cont.

- Exceptions
 - Steel electrical boxes installed per prescriptive requirements
 - Listed electrical boxes of any material installed per listing
 - Electrical boxes of any size or type installed with tested and listed protection
 - Boxes other than electrical boxes tested and listed for such use
 - Annular space created by fire sprinklers (covered by metal escutcheon plate)
 - Steel electrical boxes exceeding 16 sq. in in area or any size exceeding prescriptive requirements protected by listed putty pads or other listed material and method installed per its listing.



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Code Requirements Horizontal Assemblies

- Section 714.4 of the 2015 IBC
 - 714.4.1.1 – Through penetration shall be protected by one of the following:
 - As tested as part of the entire horizontal assembly
 - As tested to ANSI/UL 1479 / ASTM E814
 - Exceptions
 - Annular space protection material
 - Concrete, grout or mortar
 - Listed electrical boxes of any material installed per listing



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Code Requirements Horizontal Assemblies Cont.

- 714.4.1.2 – When tested to ANSI/UL 1479 / ASTM E814, through penetrations shall have F and T Ratings of not less than 1 hour but not less than required rating of assembly penetrated
 - Exceptions
 - Penetrations contained and located within the cavity of a wall above or below the floor do not require a T Rating
 - Penetrations by floor, tub or shower drains contained and located within the concealed space of a horizontal assembly do not require a T Rating
 - Penetrations a maximum of 4” in diameter penetrating directly into metal-enclosed electrical power switchgear do not require a T Rating



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Code Requirements Horizontal Assemblies Cont.

- 714.4.2 – Membrane penetration shall be protected as follows:
 - As specified in 714.4.1.1 or 714.4.1.2 (i.e. through penetrations)
 - Recessed fixtures in floor/ceiling assemblies shall be installed so as not to reduce the required fire resistance



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Code Requirements Horizontal Assemblies Cont.

- Exceptions
 - If less than 100 sq in. per 100 sq ft, metallic penetrants may be either firestopped or fireblocked
 - Steel electrical boxes installed per prescriptive requirements
 - Electrical boxes of any size or type installed with tested and listed protection
 - Listed electrical boxes of any material installed per listing
 - Annular space created by fire sprinklers (covered by metal escutcheon plate)
 - Interruption by a double wood top plate of a wall assembly sheathed with X-Rated gypsum; provided all penetrating items through the double top plates are protected and the ceiling membrane is tight to the top plates.



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Code Requirements Miscellaneous

- 714.4.3 – Noncombustible penetrants shall not be connected to combustible penetrants beyond point of firestop system
- 714.4.4 – Penetrations in smoke barriers shall have an L Rating at ambient and 400°F
 - Max 5.0 CFM / sq ft of opening
 - Aggregate 50 CFM / 100 sq ft of barrier



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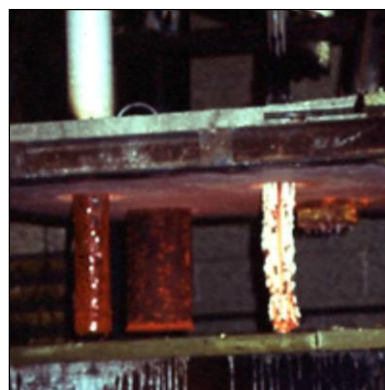


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Firestop Systems

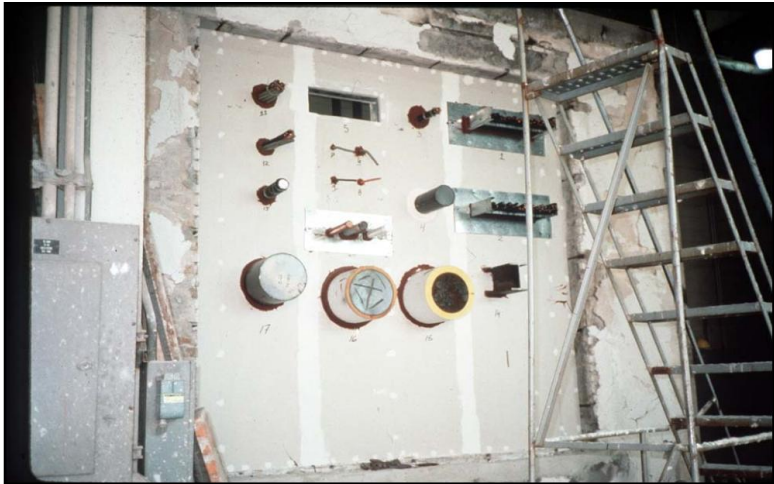
Establishing
F and T Ratings



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Full-Scale Wall Assembly



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Small-Scale Wood Floor Assembly



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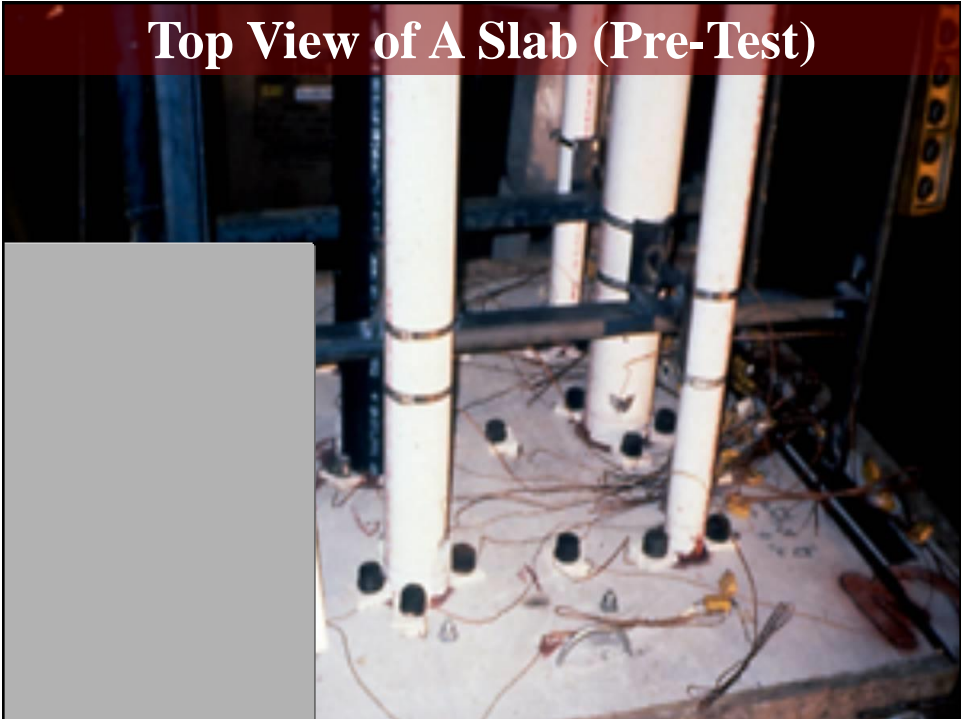
Cables Through Wood Floor

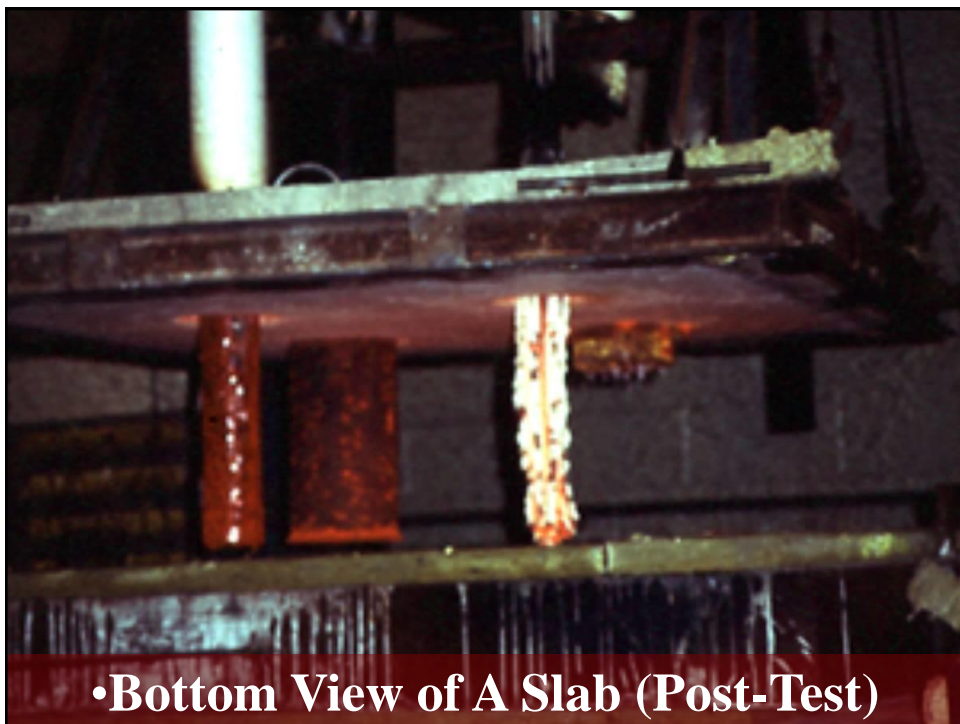
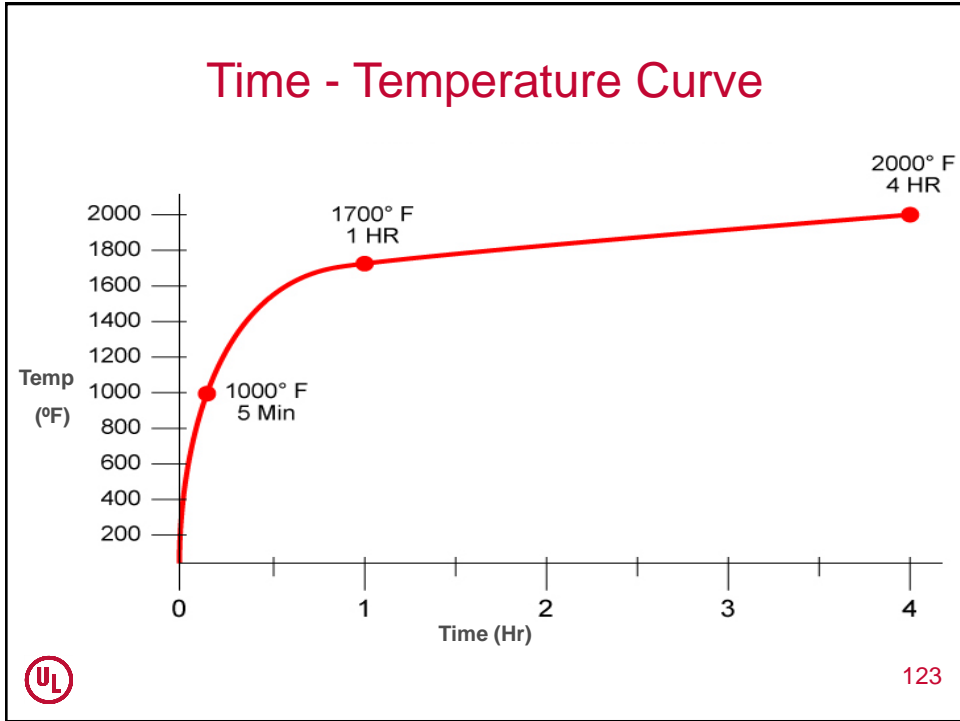


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Top View of A Slab (Pre-Test)





Hose Stream Test



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Guide Information

- Equipment, materials or systems included in the Category
- Intended use, restrictions or supplemental information that apply
- Standard(s) used to evaluate products under the Category
- Listing or Classification Mark information for the Category



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Examples of Guide Information for Firestop Systems

- General Description of a Firestop System
- Standard
- Description of Ratings
- Permitted Substitutions
- Specifications of Penetrating Items
- Support of Penetrating Items
- Angle of Penetration
- Description of Numbering System



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C-A J-1000

First Alpha Character

- C - Either Floor or Wall being Penetrated
- F - Floor being Penetrated
- W - Wall being Penetrated



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C-AJ-1000

Second and Third Alpha Characters

Letter	Description
A	Concrete floors with a minimum thickness less than or equal to 5 in.
B	Concrete floors with a minimum thickness greater than 5 in.
C	Framed floors
D	Steel decks in marine vessels
E	Floor-ceiling assemblies consisting of concrete with membrane protection
F - I	Not used a present time
J	Concrete or masonry walls with a minimum thickness less than or equal to 8 in.
K	Concrete or masonry walls with a minimum thickness greater than 8 in.
L	Framed wall
M	Bulkheads in marine vessels
N	Composite panel walls
O-Z	Not used at present time



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C-AJ-1000 Numeric Characters

Numeric Range	Description
0000 - 0999	No penetrating items
1000 - 1999	Metallic pipe, conduit or tubing
2000 - 2999	Nonmetallic pipe, conduit or tubing
3000 - 3999	Electrical cables
4000 - 4999	Cable trays with electrical
5000 - 5999	Insulated pipes
6000 - 6999	Misc. electrical penetrants such as busducts
7000 - 7999	Misc. mechanical penetrants such as air ducts
8000 - 8999	Groupings of penetrations including any combination of items listed above
9000 - 9999	Not used at present time



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Firestop Systems

- Each firestop system contains specific construction features
- Many firestop systems contain various options and various ratings
- Must be followed exactly for rating to apply



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Additional Resources

- Firestop Contractors International Association www.FCIA.org
- National Fireproofing Contractors Association www.NFCA-online.org
- UL – Code Authorities Technical Library www.ul.com/codeauthorities



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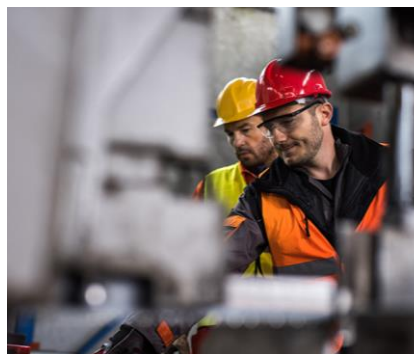
UL Onsite Firestop Inspection Service

As experts in testing, inspection and certification of building materials, UL ensures proper installation of firestop systems.

The UL Firestop Inspection Service helps ensure the system was installed in accordance with the system requirements

Working with UL delivers other benefits like:

- Accurate and complete inspections
- Fast response times and flexible scheduling
- An independent, third party partner that is widely recognized and accepted by Authorities Having Jurisdiction



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UL Qualified Firestop Contractor Program

The UL Qualified Firestop Contractor Program allows contractors to demonstrate their commitment to properly installed firestop systems.

UL Qualified Firestop Contractors have implemented a stringent quality management system. To obtain certification, a Qualified Firestop Contractor must:

1. Employ at least one individual with firestop expertise
2. Pass the UL Firestop Exam
3. Maintain a management system evaluated through an annual audit

The benefits of working with a qualified contractor include increased confidence, easy identification of contractors, and superior installations.



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Ducts and Air Transfer Openings



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Damper Types

- Fire Dampers
- Smoke Dampers
- Combination Dampers
- Corridor Dampers
- Ceiling Radiation Dampers



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Damper - *Definition*

DAMPER. See “*Ceiling radiation damper,*” “*Combination fire/smoke damper,*” “*Corridor damper,*” “*Fire damper*” and “*Smoke damper.*”



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Fire Dampers - *Definition*

FIRE DAMPER. A *listed* device installed in ducts and air transfer openings designed to close *automatically* upon detection of heat and resist the passage of flame. Fire dampers are classified for use in either static systems that will *automatically* shut down in the event of a fire, or in dynamic systems that continue to operate during a fire. A dynamic fire damper is tested and rated for closure under elevated temperature airflow.



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Smoke Dampers - *Definition*

SMOKE DAMPER. A *listed* device installed in ducts and air transfer openings designed to resist the passage of smoke.

The device is installed to operate *automatically*, controlled by a smoke detection system, and where required, is capable of being positioned from a *fire command center*.



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Combination Dampers - *Definition*

COMBINATION FIRE/SMOKE DAMPER. A *listed* device installed in ducts and air transfer openings designed to close *automatically* upon the detection of heat and resist the passage of flame and smoke. The device is installed to operate *automatically*, controlled by a smoke detection system, and where required, is capable of being positioned from a *fire command center*.



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Corridor Dampers - *Definition*

CORRIDOR DAMPER. A *listed* device intended for use where air ducts penetrate or terminate at horizontal openings in the ceilings of fire-resistance-rated corridors, where the corridor ceiling is permitted to be constructed as required for the corridor walls.



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Ceiling Radiation Dampers - *Definition*

CEILING RADIATION DAMPER. A *listed* device installed in a ceiling membrane of a fire-resistance-rated floor/ceiling or roof/ceiling assembly to limit *automatically* the radiative heat transfer through an air inlet/outlet opening.

Ceiling radiation dampers include air terminal units, ceiling dampers and ceiling air diffusers.



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Code Requirements

International
Building Code
Requirements



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Code Requirements Fire Dampers

- Section 717 of the 2015 IBC
Ducts and Air Transfer Openings
- 717.5 – Penetrations of fire walls, fire barriers, shaft enclosures and fire partitions by duct or air transfer opening shall be protected by the appropriate **Damper**



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Code Requirements Fire Dampers Cont.

- 717.6 – Penetrations of horizontal assemblies by duct or air transfer opening shall be protected by shaft enclosure
- 717.6.1 – Ducts connecting not more than two stories shall be protected with a fire damper or a firestop system
- 717.3 – Fire dampers shall be *listed* and *labeled* (tested) to ANSI/UL 555



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Code Requirements Fire Dampers Cont.

- 717.3.1 – Static or dynamic
- 717.3.2.1 – Minimum fire protection rating:
 - 1.5 hr when assembly rating is less than 3 hr
 - 3 hr when assembly rating is 3 hr or greater
- Fire dampers shall be *listed* and *labeled*
- Installed per mfrs instructions



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Code Requirements Smoke Dampers

- Section 717 of the 2015 IBC
- 717.5.3 – Penetrations of shaft enclosures, corridor walls, smoke barriers and smoke partition by duct or air transfer opening shall be protected by a smoke damper
- 717.3.2.2 – Leakage rating shall be Class I or II with a temperature rating of not less than 250°F



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Code Requirements Smoke Dampers Cont.

SMOKE DAMPERS

Smoke dampers (leakage-rated dampers) are intended for the protection of openings in smoke barriers, or in engineered smoke-control systems as specified in ANSI/NFPA 90A. Smoke dampers are prescribed for use by codes such as the IBC, IMC and UMC.

Leakage ratings for smoke dampers are identified as Class Designation I, II or III as shown in the following table. Leakage ratings of the dampers are established at a minimum differential pressure of 4 in. water gauge (WG), across the closed damper. Leakage rates may also be established at higher differential pressures, in increments of 2 in. water gauge.

Maximum Leakage
(CFM/ft²)

Class	4 In. WG	6 In. WG	8 In. WG	10 In. WG	12 In. WG
I	8.0	9.5	11.0	12.5	14.0
II	20.0	24.0	28.0	31.5	35.0
III	80.0	96.0	112.0	125.0	140.0

Leakage ratings for smoke dampers are determined at elevated temperatures. The elevated temperatures are in increments of 100°F with the minimum temperature being 250°F. Leakage ratings of smoke dampers are established based on test conditions using heated air.

Certified dampers are marked with respect to the Leakage Class at elevated test temperature.



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Code Requirements Smoke Dampers Cont.

- 717.3 – Smoke dampers shall be *listed and labeled* (tested) to ANSI/UL 555S
- Also used to control pressure differentials in smoke control systems
- Smoke dampers shall be listed and labeled
- Installed per mfrs instructions



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Code Requirements Combination Dampers

- 717.3 Dampers that meet the requirements of both a fire damper and a smoke damper
- Tested per ANSI/UL 555 and 555S
- Combination dampers shall be *listed* and *labeled*
- Installed per mfrs instructions



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Corridor Dampers

- Used in ceilings of exit corridors where ceiling is constructed as required for corridor walls per Section 708.4, Exception 3
- Designed to be installed in horizontal “wall”
- Operation specified in 2015 IBC Section 717.3.3.5 – actuation as a fire damper (717.3.3.1) and smoke damper (717.3.3.2)



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Corridor Dampers Cont.

- Combination fire damper and smoke damper
 - 1 hr fire rated
 - Leakage rating shall be Class I or II with a temperature rating of not less than 250°F
 - Must close when subjected to 150 fpm velocity across the face of the damper during fire exposure



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Corridor Dampers Cont.

- Corridor dampers shall be *listed* and *labeled* to UL 555 and UL 555C as per 717.3.1 (5)
- Installed per mfrs instructions



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Code Requirements Ceiling Radiation Dampers

- 717.6.2 – Used in fire resistive floor-ceiling and roof-ceiling assemblies where duct penetrates membrane ceiling
- Intent is to minimize heat transfer into concealed space



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Code Requirements Cont. Ceiling Radiation Dampers

- In acoustical ceilings, performance compared to generic hinged blade damper in accordance with UL 555C
 - Listings permit substitution of ceiling radiation damper for generic hinged blade damper specified in the design
 - If hinged blade damper is not specified in design, no ceiling radiation damper may be substituted into the design



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Code Requirements Cont. Ceiling Radiation Dampers

- In gypsum ceilings, ceiling radiation dampers may be tested as part of floor-ceiling or roof-ceiling assembly in accordance with ASTM E119 or UL 263
 - Ceiling radiation damper may be used only if specified in the design
 - Design will specify manufacturer and designation of the ceiling radiation damper(s) which may be used



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Code Requirements Cont. Ceiling Radiation Dampers

- Ceiling radiation dampers shall be *listed* and *labeled* 2015 IBC 717.3.1(4)
- Installed per mfrs instructions



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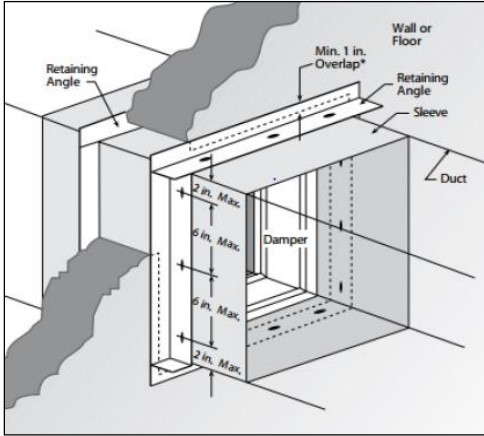
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Damper Installation Considerations



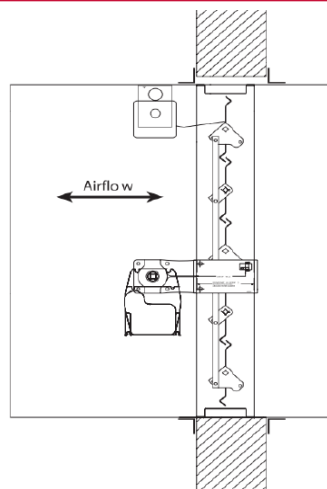
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What Makes a Code Compliant Installation?

- Fire and/or smoke rated barrier
- Correct *listed* damper
- Installation in accordance with manufacturer's instructions



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What is the Correct Damper Type

- Damper Type
 - Fire Damper
 - Smoke Damper
 - Combination Damper
 - Corridor Damper
 - Ceiling Radiation Damper



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What is the Correct Damper? Product Labels

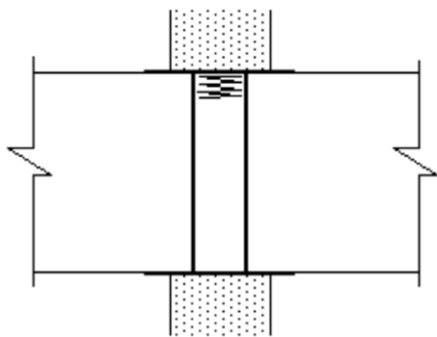


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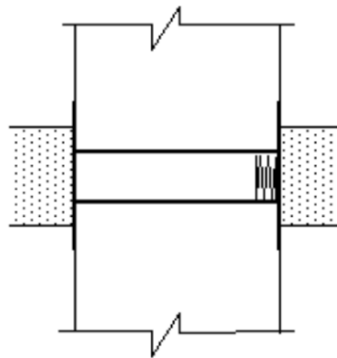
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What is the Correct Damper? Orientation

Fire, Smoke and Combination Dampers



Vertical



Horizontal



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What is the Correct Damper? Damper Size

- Listings of fire (static and dynamic), smoke, combination and corridor damper will specify maximum size for a single section and for multiple sections
- Listing of ceiling radiation dampers will specify the maximum size (rectangular or circular) of damper



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What is the Correct Damper? Air Flow Conditions

Fire and Ceiling Radiation Dampers

- Static
 - For use with HVAC systems that automatically shut down in the event of a fire
- Dynamic
 - For use with HVAC systems that remain operational during a fire
 - Tested to demonstrate ability to close under air flow conditions
 - Pressure and flow ratings must match installation



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What is the Correct Damper? Air Flow Conditions

Dynamic Fire, Smoke, Combination and Corridor Dampers

- Listings state maximum air flow and pressure ratings
- Field installations conditions must match listing



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What is the Correct Damper? Performance Criteria

- Static fire dampers
 - Hourly rating
 - Actuation temperature
 - Approx 50°F above duct operating temperature, but not less than 160°F per IBC



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What is the Correct Damper? Performance Criteria Cont.

- Dynamic fire dampers
 - Hourly rating
 - Actuation temperature
 - Approx 50°F above duct operating temperature, but not less than 160°F per IBC
 - Not more than 350°F where located in smoke control system per IBC



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What is the Correct Damper? Performance Criteria Cont.

- Smoke dampers
 - Leakage rating (2015 IBC 717.3.2.2)
 - Class I or II per IBC
 - Elevated temperature rating not less than 250°F
 - Actuation conditions (717.3.3.2)
 - Smoke detectors
 - Smoke control system



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What is the Correct Damper? Performance Criteria Cont.

- Combination dampers
 - In accordance with requirements of dynamic fire and smoke dampers (2015 IBC 717.3.3.3)



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What is the Correct Damper? Performance Criteria Cont.

- Corridor dampers 2015 IBC 717.3.1(5)
 - 1 hr fire rating
 - Leakage rating
 - Class I or II
 - Elevated temperature rating of not less than 250°F
 - Must close when subjected to 150 fpm velocity across the face of the damper during fire exposure



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What is the Correct Damper? Performance Criteria Cont.

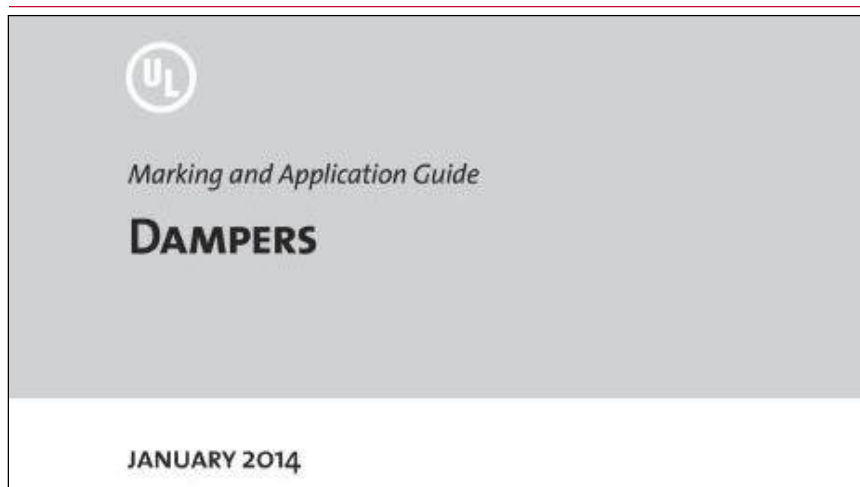
- Ceiling radiation dampers
 - Hourly rating
 - Actuation temperature
 - 50°F above duct operating temperature, but not less than 160°F per 2015 IBC (717.3.3.4)



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Installation Code



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Questions / Comments



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Fire-Resistance-Rated Construction

Plan Review



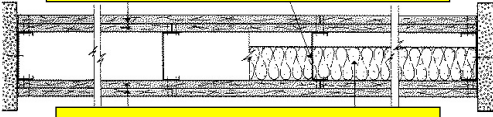
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For the Architect / Contractor

Design No. U411
 May 29, 2012
 Nonbearing Wall Rating – 2 HR.

UL Designs serve two roles:



1) Evidence of compliance

1. **Floor and Ceiling Runner** – (Not Shown) – Min. 25 MSG galv steel, 1 in. return legs, 2-1/2 in. deep (min), attached to floor and ceiling with fasteners 24 in. OC max.

2) A set of build-instructions

1A
 UB
 OC

1 - For
 24 in.

ALLSTEEL & GYPSUM PRODUCTS INC – Type SUPREME Framing System

CALIFORNIA EXPANDED METAL PRODUCTS CO – Viper20™ Track

CONSOLIDATED FABRICATORS CORP, BUILDING PRODUCTS DIV – Type SUPREME Framing System



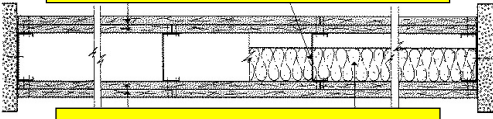
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For the Building Official

Design No. U411
 May 29, 2012
 Nonbearing Wall Rating – 2 HR.

UL Designs serve two roles:



1) Evidence of compliance

1. **Floor and Ceiling Runner** – (Not Shown) – Min. 25 MSG galv steel, 1 in. return legs, 2-1/2 in. deep (min), attached to floor and ceiling with fasteners 24 in. OC max.

2) Document by which to inspect

1A
 UB
 OC

1 - For
 24 in.

ALLSTEEL & GYPSUM PRODUCTS INC – Type SUPREME Framing System

CALIFORNIA EXPANDED METAL PRODUCTS CO – Viper20™ Track

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Plan Review

- 107.2.1 - Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code ...



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Plan Review Cont.

- Details showing compliance with the fire-resistive requirements of the IBC should be included on the plans and in the specifications
- Recommended that the UL designs (or others) be imported into the plans
- Importing designs into plans does NOT violate UL copyright requirements



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Plan Review Cont.

- Review proposed fire-resistance-rated assemblies for compliance with code
 - Hourly rating requirement
 - Type of Construction
 - Details of assemblies proposed relative to actual construction
 - Consider variations identified relative to permitted substitutions stated in the UL Fire Resistance Guide Information



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Plan Review Cont.

- Consider need for engineering judgments if permitted by department policy
- Consider need for special inspections as required by code and/or by department policy



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Questions / Comments



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Fire-Resistance-Rated Construction

Inspection
Process
New Construction



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Inspection of Fire-Resistance-Rated Assemblies

- Inspections typically done by CEO, but may be inspected by an approved agency or individual
- Verifies approved design is being used
- Verifies assembly is being constructed in accordance with the approved design



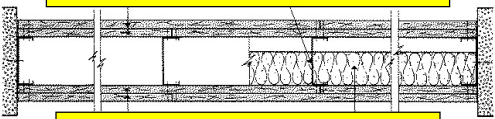
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For the Architect / Contractor

Design No. U411
May 29, 2012
Nonbearing Wall Rating – 2 HR.

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1) Evidence of compliance

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2) A set of build-instructions

IA
US
OC

n 1 - For
24 in.

ALLSTEEL & GYPSUM PRODUCTS INC – Type SUPREME Framing System

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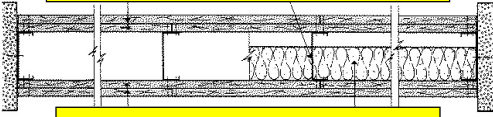
188



For the Certified Code Official

Design No. U411
May 29, 2012
Nonbearing Wall Rating – 2 HR.

UL Designs serve two roles:



1) Evidence of compliance

1. **Floor and Ceiling Runner** – (Not Shown) – Min. 25 MSG galv steel, 1 in. return legs, 2-1/2 in. deep (min), attached to floor and ceiling with fasteners 24 in. OC max.

2) Document by which to inspect

ALLSTEEL & GYPSUM PRODUCTS INC – Type SUPREME Framing System

CALIFORNIA EXPANDED METAL PRODUCTS CO – Viper20™ Track

CONSOLIDATED FABRICATORS CORP, BUILDING PRODUCTS DIV – Type SUPREME Framing System

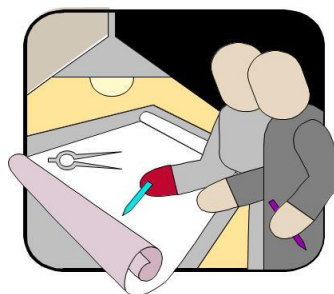


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Pre-Construction Meeting

- Review selected designs
- Obtain engineering judgments as needed
- Establish inspection guidelines and expectations
- Establish work and inspection schedules
- Review qualifications /experience of contractors



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Pre-Inspection

- Require construction documents that detail all fire-resistance-rated assemblies
- Obtain copies of all fire-resistance-rated designs
- Develop a plan to inspect each assembly at the appropriate times during the construction process



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At the Inspection Site

- Have your inspection tools such as a flashlight, coring device, depth gauge, calipers, tape measure, etc.
- Review the general layout of the assembly
- Verify the building materials being utilized match those described in the approved design



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At the Inspection Site Cont.

- For board products, verify the type, manufacturer, thickness and orientation match what is described in the approved design
- Verify fastener type, size and spacing for compliance with the approved design
- For insulation products, verify the type, manufacturer, thickness and density match what is described in the approved design



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At the Inspection Site Cont.

- Verify that the approved third party testing agency's labels are on the products, empty containers or boxes
- When necessary conduct destructive evaluations on the assemblies
- During the inspection have the contractor follow along to repair assemblies after destructive testing



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Marking and Identification

IBC Section 703.7 requires:

- Marking in accessible concealed spaces of:
 - ✓ Fire Walls, Fire Barriers or Fire Partitions
 - ✓ Smoke Barriers or Smoke Partitions
 - ✓ Floor-Ceiling or Horizontal assembly
- Assembly Rating Sign: “Protect all Openings”
 - ✓ Within 15 ft of end of wall
 - ✓ Intervals not exceeding 30 feet



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Questions / Comments



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Fire-Resistance-Rated Construction

Inspection
Process
Existing Buildings
Alterations,
Additions



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Passive Fire Protection

The IBC takes a systematic approach to building fire protection, including:

1. Passive Fire Protection

Fire Area = The aggregate floor area enclosed and bounded by *fire walls, fire barriers, exterior walls* or *horizontal assemblies* of a building.

2. Active Fire Protection

Fire Protection System = Approved devices, equipment and systems or combinations of systems used to detect a fire, activate an alarm, extinguish or control a fire, control or manage smoke and products of a fire or any combination thereof.

3. Reasonable level of redundancy; inspection, testing & maintenance



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IFC Chapter 7 Section 703.1

- Requires Maintenance of:
 - ✓ Walls & Floors
 - ✓ Fire and Smoke Barriers and Partitions
 - ✓ Firestops
 - ✓ Shaft enclosures
 - ✓ Fire resistive coatings/SFRM
 - ✓ Joint systems
- Requires annual visual inspection by owner
- Repaired, restored or replaced when damaged



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IFC Chapter 7

- 703.2 Opening Protectives maintained in accordance with NFPA 80
- 703.2.1 Signage – Fire Doors
- 703..2.2 Hold-open Devices
- 703.3 Ceilings (prohibited items from rated ceiling)

Just an FYI – Significant changes to 2018



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Code Compliant?



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Code Compliant?



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Reference Materials

- ASTM E 736 – “Standard Test Method for Cohesion / Adhesion of Sprayed Fire Resistive Materials Applied to Structural Members”
- ASTM E 605 – “Standard Test Methods for Thickness and Density of Sprayed Fire Resistive Material Applied to Structural Members”



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Reference Materials Cont.

- Association of Wall and Ceiling Industry – *Technical Manuals 12, 12-A and 12-B*
- Gypsum Association – *Fire Resistance Design Manual*
- International Firestop Council Video – *Inspecting Firestop for Compliance*



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Available Resources

- Fire Safe North America (FSNA) – www.firesafenorthamerica.org
- Association of Wall and Ceilings Industry (AWCI) – www.awci.org
- Gypsum Association (GA) – www.gypsum.org



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Additional Resources

- Firestop Contractors International Association www.FCIA.org
- National Fireproofing Contractors Association www.NFCA-online.org



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Questions / Comments



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UL Resources for Code Compliance

UL's Online Search Tools



Organization Under Each Product Area

- Guide Information
- Designs, Systems or Assemblies
- Product Categories (indexed by manufacturer's names)



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Guide Information

- Equipment, materials or systems included in the Category
- Intended use, restrictions or supplemental information that apply
- Standard(s) used to evaluate products under the Category
- Listing or Classification Mark information for the Category




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NUMBERING SYSTEM FOR FIRE-RATED ASSEMBLIES

Groups of Construction	TYPES OF PROTECTION								
	Membrane Protection						Direct-applied Protection		Unprotected
	000-099	100-199	200-299	300-399	400-499	500-599	600-699	700-899	
Floors-Ceilings: A or S* Concrete and Cellular Steel Floor	Concealed Grid System	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Misc.	Spray-applied Fire-resistant Material	Unprotected
C - Glazing Systems	(Reserved)	(Reserved)	(Reserved)	(Reserved)	(Reserved)	(Reserved)	(Reserved)	(Reserved)	Unprotected
D, E* or F* Concrete and Steel Floor Units	Concealed Grid System	(Reserved)	Exposed Grid System	Mineral and Fiber Boards	Metal Lath	Gypsum Board	Mastic and Intumescent Coatings	Spray-applied Fire-resistant Material	Unprotected
G or H* Concrete and Steel Joists	Concealed Grid System	(Reserved)	Exposed Grid System	Mineral and Fiber Boards	Metal Lath	Gypsum Board	Misc.	Spray-applied Fire-resistant Material	Unprotected
I Non-load-bearing Horizontal Barrier	(Reserved)	(Reserved)	(Reserved)	(Reserved)	(Reserved)	Gypsum Board	(Reserved)	(Reserved)	(Reserved)
J or K Concrete	Concealed Grid System	(Reserved)	Exposed Grid System	Mineral and Fiber Boards	Metal Lath	Gypsum Board	Misc.	Spray-applied Fire-resistant Material	Unprotected
L or M Wood Joist or Combination Wood and Steel	Concealed Grid System	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Misc.	Spray-applied Fire-resistant Material	Unprotected

 211


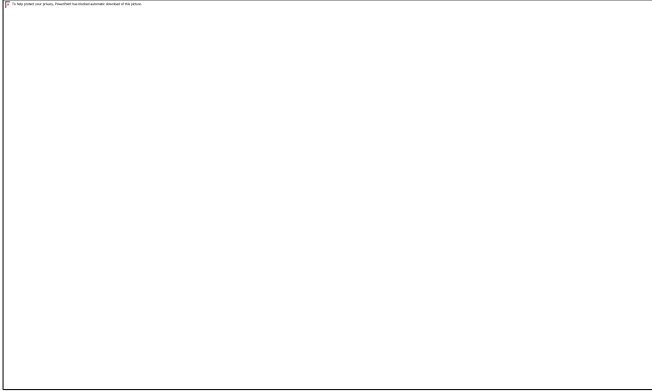
Designs

- Each design contains specific construction features
- Many designs contain various options and various ratings
- Must be followed exactly for rating to apply

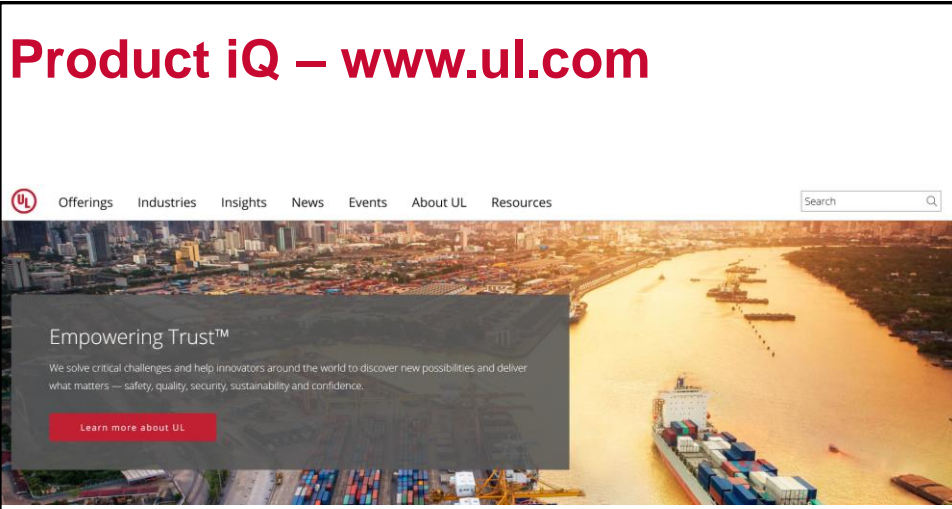
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UL Product iQ

Works Best with Chrome



Product iQ – www.ul.com




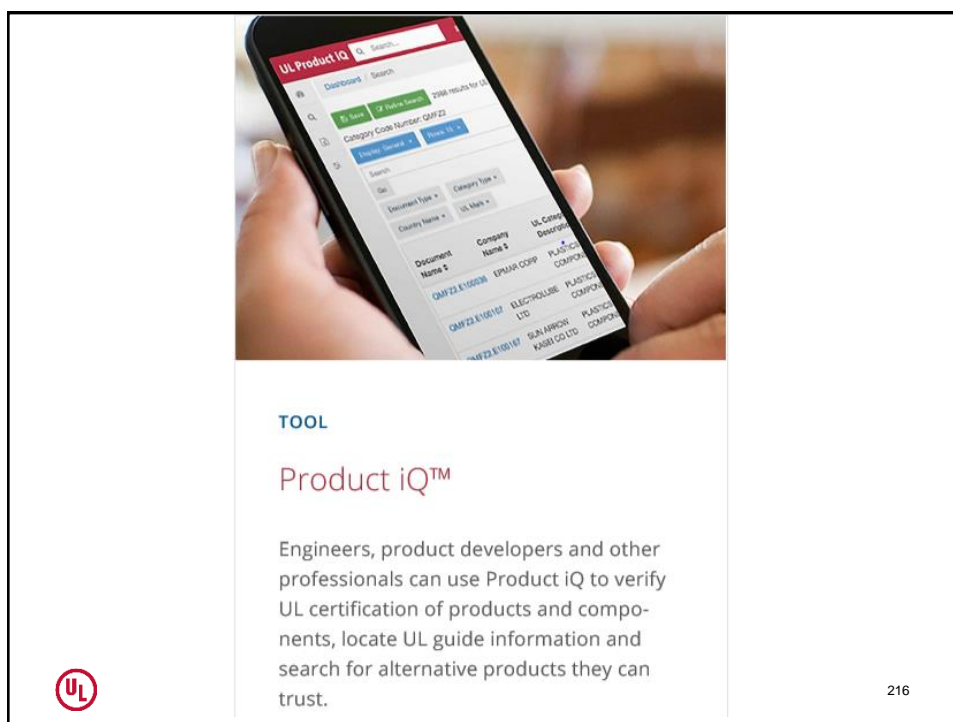
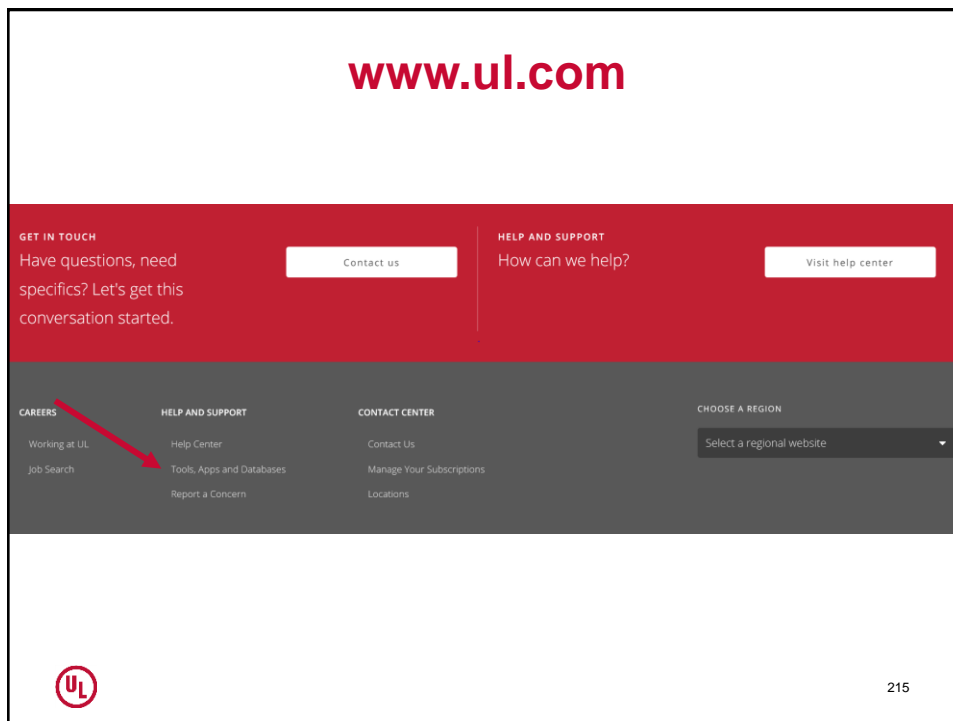
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Product iQ Cont.



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Register For Free



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UL Product iQ

English



Product iQ is a commercial platform for product information, including UL's safety certifications. This registration form is tailored to industry professionals. If you are a non-commercial user, please read the information prompts for help completing certain fields. Additional information regarding free accounts.

Upon submission of this form, you will receive an email with an activation link. Click the link and receive immediate access to Product iQ. If you do not receive the email within a few minutes, please check your spam folder.

CREATE YOUR ACCOUNT

Helpful Hints

Read the information prompts for help completing certain fields.

After submitting this form, check your inbox for an email with your activation link to access this site.

If you are missing the activation email, look in your email spam folder.



Product iQ – UL’s New Online Directory

- ✓ Helps you achieve code compliance
- ✓ Is continuously updated
- ✓ Requires registration to create user account
- ✓ Basic Service – no charge for use
- ✓ Paid Subscription Service provides more features
- ✓ www.ul.com/PiQ

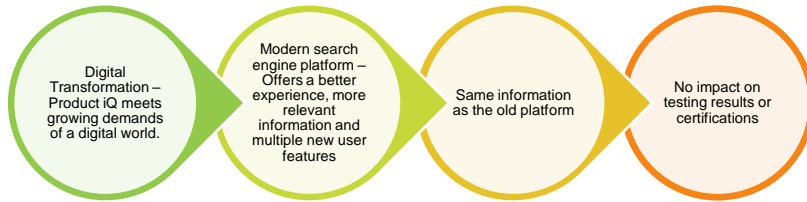


Why is UL replacing the current Online Certifications Directory?

- Digital Transformation – Product iQ meets growing demands of a digital world
- Modern search engine platform – Offers a better experience, more relevant information and multiple new user features
- Same information as the old platform
- No impact on testing results or certifications



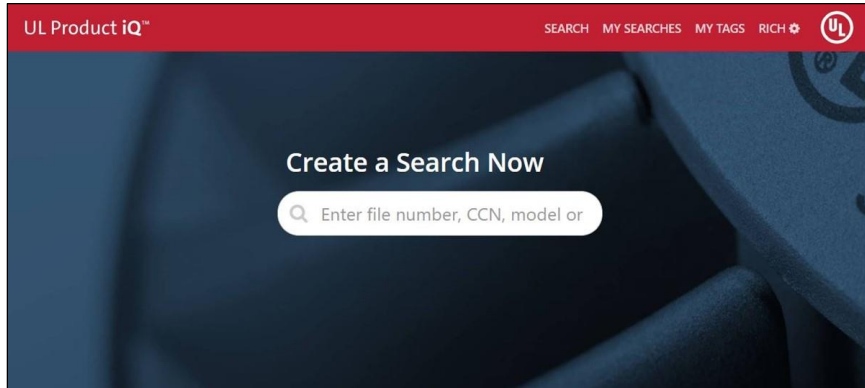
Why is UL Replacing the Online Certifications Directory?



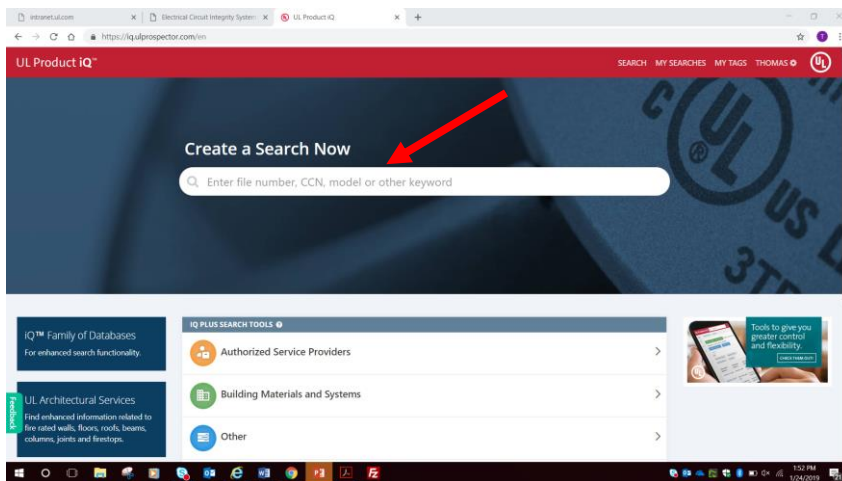
Product iQ Cont.



Product iQ Cont. Smart Search



Keyword Search- One Field For Almost Everything



Product iQ Home page

Create a Search Now


Q Enter file number, CCN, model or other keyword

iQ™ Family of Databases
For enhanced search functionality.


UL Architectural Services
Find enhanced information related to fire rated walls, floors, roofs, beams, columns, joints and firestops.

IQ PLUS SEARCH TOOLS

- 🏠 Authorized Service Providers >
- 🏢 Building Materials and Systems > ←
- 📄 Other >



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UL Architectural Services
Find enhanced information related to fire rated walls, floors, roofs, beams, columns, joints and firestops.

Product iQ tip Confirmation Letters
Shareable document confirming a Product iQ listing. [LEARN MORE](#)

Building Materials and Systems

Search for designs, systems, assemblies, and products that include, or are related to, hourly fire-resistance ratings.

Dampers
The category Dampers for Fire Barrier and Smoke Applications covers fire dampers, smoke dampers (leakage-rated dampers), combination fire and smoke dampers (fire and leakage-rated dampers), and corridor dampers.


Electrical Circuit Protective Systems (FHIT)
Electrical Circuit Protective Systems consist of components and materials that are intended for installation as protection for specific electrical wiring systems, with respect to the disruption of electrical circuit integrity upon exterior fire exposure.

Fire Door and Fire Window Related Certifications
Fire door assemblies and window assemblies are construction details and the fire ratings for fire door assemblies and fire window assemblies that are more complex than those typically associated with these assemblies.

Fire Rated Roofs, Walls, Floors, Beams and Columns
This category covers floor-ceilings, roof-ceilings, beams, columns, walls and partitions investigated for an hourly fire-resistance rating.

Fire-rated Grease Duct Assemblies

Fire-resistance Ratings of Structural Steel Used in Petrochemical Facilities
This category covers hourly fire-resistance ratings of steel columns intended for use in petrochemical facilities investigated using a rapid rise fire exposure.



Product iQ Cont. iQ Plus Search

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Firestop Systems
This category covers firestop systems, which are specific constructions consisting of a wall or floor assembly, a penetrating item passing through an opening in the wall or floor assembly, and the materials designed to prevent the spread of fire.

Firestop Systems for Canada
This category covers firestop systems, which are specific constructions consisting of a wall or floor assembly, a penetrating item passing through an opening in the wall or floor assembly, and the materials designed to prevent the spread of fire.

Installation Code Search
Search for UL Certified products by installation code. Select your model installation code and section to locate UL Certified products for Code compliant installations.

Joint Systems
This category covers joint systems, which are specific constructions consisting of adjacent fire-resistance-rated wall and/or floor assemblies and the materials designed to prevent the spread of fire through a linear opening between the wall and/or floor.

Perimeter Fire Containment Systems
A perimeter fire containment system is a specific construction consisting of a floor with an hourly fire endurance rating, an exterior curtain wall with no hourly fire endurance rating, and the fill material installed between the floor and the curtain wall.

Qualified Firestop Contractors (RFTI)

Roof Deck Constructions
This category covers roof deck constructions investigated as to the spread of fire on the underside and/or resistance to wind uplift forces.

Sprinkler Identification Number



Product iQ Cont. iQ Plus Search

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Thermal Barrier Systems (XCLF)
This category covers thermal barrier systems consisting of components and materials intended for installation as protection for electrical wiring systems specified in the individual systems. These systems are investigated with respect to heat transmission.

UL Evaluation Reports

Ventilation Duct Assemblies
This category covers the fire-resistive performance of ventilation duct assemblies. These assemblies are investigated with respect to their ability to resist the spread of fire from one compartment to another without the aid of fire dampers.

Windstorm Rated Building Products
This category covers windstorm-rated exterior building products intended to protect the exterior envelope of structures in the event of hurricanes or tornadoes.

Other >

PIQ DATABASE INFO



 229327 Document Count	 15 Jan, 2019 Last Update	 68474 Companies Listed
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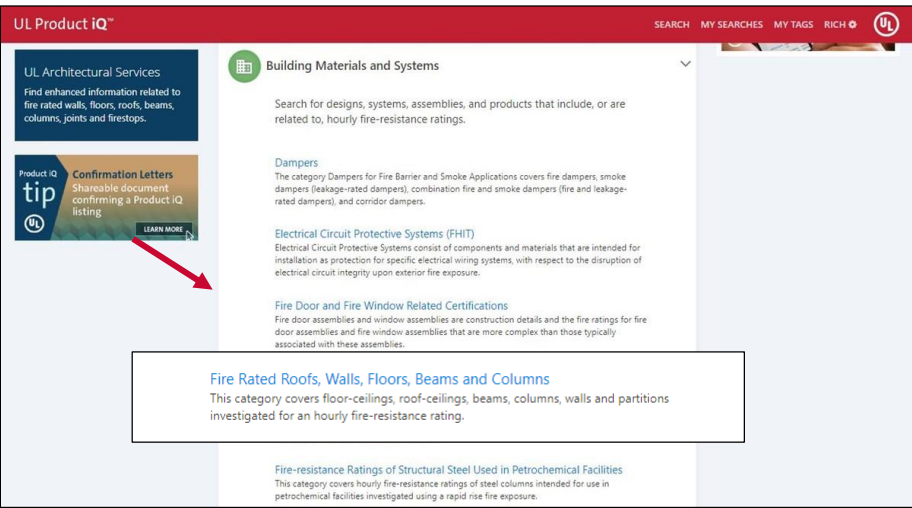
UL Product iQ Search

iQ Plus Search under Building Materials and Systems for fire-resistance-rated wall design based on specific parameters

- Wood stud/gypsum board wall assembly
- 2 hour rating
- Gypsum board supplied by the United States Gypsum Company

Product iQ Search



UL Architectural Services
Find enhanced information related to fire rated walls, floors, roofs, beams, columns, joints and firestops.

Confirmation Letters
Shareable document confirming a Product iQ listing
[LEARN MORE](#)

Building Materials and Systems
Search for designs, systems, assemblies, and products that include, or are related to, hourly fire-resistance ratings.

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Fire-resistance Ratings of Structural Steel Used in Petrochemical Facilities
This category covers hourly fire-resistance ratings of steel columns intended for use in petrochemical facilities investigated using a rapid rise fire exposure.

Product iQ Search

The screenshot shows the UL Product iQ search interface. The search results are filtered by the search template 'Fire Rated Walls, Floors, Beams and Columns'. The results list includes document numbers, UL CCN descriptions, and related images. A red circle highlights the result count '2414 Results'. The left sidebar contains filter options for Keyword, Design Number, Fire Rated Walls, Floors, Beams and Columns, Construction Group, Protection Type, and Company Name.

Document Name	UL CCN Description	Related Images
BXUV.A002	FIRE-RESISTANCE RATINGS - ANS/UL 263	
BXUV.A003	FIRE-RESISTANCE RATINGS - ANS/UL 263	
BXUV.A212	FIRE-RESISTANCE RATINGS - ANS/UL 263	

Product iQ Search

The screenshot shows the UL Product iQ search interface with specific filters applied. The search results are filtered by the search template 'Fire Rated Walls, Floors, Beams and Columns', the company name 'UNITED STATES GYPSUM CO.', and the protection type 'Wood Stud, Gypsum Board, Lath and/or Plaster'. The results list includes document numbers, UL CCN descriptions, and related images. Red arrows point to the 'Design Number' filter, the 'Protection Type' filter, and the 'Company Name' filter. A red circle highlights the result count '31 Results'. A red arrow points to the 'Display Images' button. The text 'Also added 2 hr as required rating' is written below the screenshot.


Document Name	UL CCN Description	Related Images
BXUV.U301	FIRE-RESISTANCE RATINGS - ANS/UL 263	
BXUV.U302	FIRE-RESISTANCE RATINGS - ANS/UL 263	
BXUV.U308	FIRE-RESISTANCE RATINGS - ANS/UL 263	

Also added 2 hr as required rating



Product iQ Search

UL Product iQ™

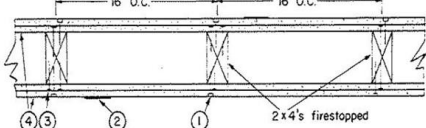
SEARCH MY SEARCHES MY TAGS RICH 

Design No. U301
December 21, 2018

Bearing Wall Rating — 2 Hr.
Finish Rating — 66 Min.

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.



1. **Nailheads** — Exposed or covered with joint compound.

2. **Joints** — Exposed joints covered with joint compound and paper tape. Joint compound and paper tape may be omitted when square edge boards are used. As an alternate, nom 3/32 in. thick gypsum veneer plaster may be applied to the entire surface of Classified veneer baseboard with the joints reinforced with paper tape.

3. **Nails** — 6d cement coated nails 1-7/8 in. long, 0.0915 in. shank diam, 1/4 in. diam heads, and 8d cement coated nails 2-3/8 in. long, 0.113 in. shank diam, 9/32 in. diam heads.



Product iQ Cont.

iQ Plus Search under Building Materials and Systems based on specific code requirements

- Looking for a Smoke Alarm which complies with the requirements of the 2015 edition of the International Residential Code, Section R314.1.1



Product iQ Cont.

The screenshot shows the UL Product iQ homepage. At the top, there is a navigation bar with 'SEARCH', 'MY SEARCHES', 'MY TAGS', 'RICH', and the UL logo. Below this, the page is divided into several sections:

- iQ™ Family of Databases:** For enhanced search functionality.
- UL Architectural Services:** Find enhanced information related to fire rated walls, floors, roofs, beams, columns, joints and firestops.
- Confirmation Letters:** Shareable document confirming a Product iQ listing. Includes a 'LEARN MORE' button.
- IQ PLUS SEARCH TOOLS:**
 - Authorized Service Providers
 - Building Materials and Systems
 - Other
- PIQ DATABASE INFO:** Includes icons for document, refresh, and keyboard.

On the right side, there is a promotional banner for mobile tools: 'Tools to give you greater control and flexibility. CHECK THEM OUT!' with an image of a smartphone.



Product iQ Cont.

The screenshot shows search results on the UL Product iQ website. The top navigation bar includes 'SEARCH', 'MY SEARCHES', 'MY TAGS', 'THOMAS', and the UL logo. The main content area lists several categories:

- Fire Door and Fire Window Related Certifications:** Fire door assemblies and window assemblies are construction details and the fire ratings for fire door assemblies and fire window assemblies that are more complex than those typically associated with these assemblies.
- Fire Rated Roofs, Walls, Floors, Beams and Columns:** This category covers floor-ceilings, roof-ceilings, beams, columns, walls and partitions investigated for an hourly fire-resistance rating.
- Fire-rated Grease Duct Assemblies**
- Fire-resistance Ratings of Structural Steel Used in Petrochemical Facilities:** This category covers hourly fire-resistance ratings of steel columns intended for use in petrochemical facilities investigated using a rapid rise fire exposure.
- Firestop Systems:** This category covers firestop systems, which are specific constructions consisting of a wall or floor assembly, a penetrating item passing through an opening in the wall or floor assembly, and the materials designed to prevent the spread of fire.

A red arrow points to a highlighted box at the bottom of the page:

Installation Code Search
 Search for UL Certified products by installation code. Select your model installation code and section to locate UL Certified products for Code compliant installations.

Below the highlighted box, the text 'and/or floor' is visible.



Product iQ Cont.

The screenshot shows the UL Product iQ search interface. The search results are filtered by 'Installation Code Search'. The results table lists various documents related to 'AGENCY CERTIFICATION PROGRAM'. A sidebar on the right contains a 'Product iQ tip' and a 'Confirmation Letters' section with a 'LEARN MORE' button.

REFINE RESULTS
Build or filter your results by keyword and/or adding criteria like document type, file number and country name.

Search Template: Installation Code Search

- Keyword**
Filter by Keyword [Search]
- Installation Code**
 - Code**
Click to view and filter values
 - Year**
Click to view and filter values
 - Section**
Click to view and filter values
- Add Filter**

Dashboard / Search
229212 Results - Base Template: Installation Code Search - No Search Criteria
Display: Images Rows: 100

Document Name	UL CCN Description	Related Images	My Tags
AABM.GuideInfo	BUILDING MATERIALS		
AABM7.GuideInfo	BUILDING MATERIALS CERTIFIED FOR CANADA		
AACA.AG104	AGENCY CERTIFICATION PROGRAM		
AACA.AG105	AGENCY CERTIFICATION PROGRAM		
AACA.AG131	AGENCY CERTIFICATION PROGRAM		
AACA.AG160	AGENCY CERTIFICATION PROGRAM		
AACA.AG182	AGENCY CERTIFICATION PROGRAM		
AACA.AG184	AGENCY CERTIFICATION PROGRAM		
AACA.AG210	AGENCY CERTIFICATION PROGRAM		
AACA.AG213	AGENCY CERTIFICATION PROGRAM		

Product iQ tip
Confirmation Letters
Shareable document confirming a Product iQ listing
[LEARN MORE](#)

Product iQ Cont.

The screenshot shows the UL Product iQ search interface with specific filters applied. The search results are filtered by 'Installation Code Search'. The results table lists two documents related to 'CARBON MONOXIDE ALARMS'. Red arrows point to the filters for Code, Year, and Section. A sidebar on the right contains a 'Product iQ tip' and a 'Guided Keyword Search' section with a 'LEARN MORE' button.

REFINE RESULTS
Build or filter your results by keyword and/or adding criteria like document type, file number and country name.

Search Template: Installation Code Search

- Keyword**
Filter by Keyword [Search]
- Installation Code**
 - Code**
x International Residential Code (IRC)
 - Year**
x 2015
 - Section**
x R314.1.1

Dashboard / Search
2 Results - Base Template: Installation Code Search - Code: International Residential Code (IRC) - Year: 2015 - Section: R314.1.1
Display: Images Rows: 100

Document Name	UL CCN Description	Related Images	My Tags
CZHF.GuideInfo	CARBON MONOXIDE ALARMS, SINGLE AND MULTIPLE STATION		
UTGT.GuideInfo	SINGLE- AND MULTIPLE-STATION SMOKE ALARMS		

Product iQ tip
Guided Keyword Search
Intuitive keyword suggestions to expedite your search
[LEARN MORE](#)



Product iQ Cont.

UL Product iQ™

Dashboard / Search / SMOKE ALARMS | UL Product iQ

UTGT.GuideInfo SMOKE ALARMS

DETAILS
 UL Category (CCN): [UTGT.Q](#)
 Document Type: Guide Info
 Parent Category (CCN): [UTER.Q](#)

RESOURCES
[View UL Certified Products](#)
[Guide Info \(UTER\)](#)

TAGS
[Add Tag](#)

Document

[Signal and Fire Alarm Equipment and Services] (Fire Alarm Devices, Single and Multiple Station, and Accessories) Smoke Alarms

See General Information for Fire Alarm Devices, Single and Multiple Station, and Accessories

USE
 This category covers single- and multiple-station smoke alarms intended to be employed in indoor locations where sensitivity testing and maintenance of alarms, per section 10.4.4 of ANSI/NFPA 72, "National Fire Alarm Code" (2007), is required by code, Authorities Having Jurisdiction, or other requirement.

Product iQ Cont.

UL Product iQ™

Dashboard / Search

REFINE RESULTS
 Build or filter your results by keyword and/or adding criteria like document type, file number and country name.

Keyword
 Filter by Keyword

UL Category Control Number
 x UTGT

Document Type
 x Guide Info

Add Filter
 Cancel Reset Save Search

27 Results :: UL Category Control Number: UTGT :: Document Type: Not Guide Info

Display: General Rows: 100

Document Name	Company Name	UL CCN Description	My Tags
UTGT.S35829	ADEC & PARTNER AG	SINGLE- AND MULTIPLE-STATION SMOKE ALARMS	
UTGT.S36059	ADEC & PARTNER AG	SINGLE- AND MULTIPLE-STATION SMOKE ALARMS	
UTGT.S25004	APPLIED FIRE TECHNOLOGIES L L C	SINGLE- AND MULTIPLE-STATION SMOKE ALARMS	
UTGT.S25412	CLIMAX TECHNOLOGY CO LTD	SINGLE- AND MULTIPLE-STATION SMOKE ALARMS	
UTGT.S1272	EDWARDS, A UNIT WITHIN UTC FIRE & SECURITY AMERICAS CORPORATION, INC.	SINGLE- AND MULTIPLE-STATION SMOKE ALARMS	

Quickly access confirmation letters with an upgraded Product iQ account

Learn more



Product iQ Cont.

UL Product iQ™
SEARCH MY SEARCHES MY TAGS RICH

Single- and Multiple-station Smoke Alarms

See General Information for Single- and Multiple-station Smoke Alarms

ADEC & PARTNER AG S35829
 Staldenbachstrasse 30
 8808 Pfäeffikon SZ, SWITZERLAND
Remote receiver horn, Model ABC for use with Model 123.

Type	Principle	Supply Connection	Model No.	Date of Manufacture	Time of Manufacture Firmware Version	Firmware Version Update
SS, TY	Photo	3Vdc Battery	Guardian RW-16S4, Guardian RW-16S9	—	UL02	—

Date of Manufacture identifies the manufacturing start date of all product models that will use the specific Time of Manufacture Firmware Version. The date of manufacture is noncoded and in the format YEAR (in 4 digits), MONTH (in letters), DAY (in 2 digits).

Time of Manufacture Firmware Version identifies a numerical and/or alphabetic series designation that is product and date-code specific and will only identify the Firmware Version at the time the product was manufactured. The numeric and/or alphabetic sequence is defined by the manufacturer.

Firmware Version Update is a numerical and/or alphabetic sequential identification that is product and date-code specific and sequentially identifies the Firmware Version Update from the previous version of firmware. The numerical and/or alphabetic sequence is defined by the manufacturer.

Codes:
 SS - Single station
 MS - Multiple station

Questions?

UL Product iQ™
SEARCH MY SEARCHES MY TAGS

REFINE RESULTS
Build or filter your results by keyword and/or adding criteria like document type, file number and country name.

Search Template Exterior Wall Systems

Keyword

System Number

Company Name

Filter

Dashboard Search

69 Results - Base Template: Exterior Wall Systems - No Search Criteria

Display: General Rows: 15

Document Name	Company Name	UL CCN Description	My Tags
FWFO.EW50001	AEROSEAL LLC AFM CORP ATLAS EPS, DIV OF ATLAS ROOFING CORP OWENS CORNING SCIENCE AND TECHNOLOGY, LLC THE DOW CHEMICAL CO TREMCO INC UNITED STATES GYPSUM CO	EXTERIOR WALL SYSTEMS	
FWFO.EW50002	AEROSEAL LLC AFM CORP ATLAS EPS, DIV OF ATLAS ROOFING CORP OWENS CORNING SCIENCE AND TECHNOLOGY, LLC THE DOW CHEMICAL CO TREMCO INC UNITED STATES GYPSUM CO	EXTERIOR WALL SYSTEMS	
CPVX.BP1692	CENTRAL DISTRICT ALARM INC	CENTRAL-STATION BURGLAR ALARM SYSTEMS	
CPVX.BP1790	ADT LLC, DBA PROTECTION 1	CENTRAL-STATION BURGLAR ALARM SYSTEMS	
CPVX.BP1963	ENGINEERED PROTECTION SYSTEMS INC	CENTRAL-STATION BURGLAR ALARM SYSTEMS	
CPVX.BP2072	STANLEY CONVERGENT SECURITY SOLUTIONS INC	CENTRAL-STATION BURGLAR ALARM SYSTEMS	

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YOUR QUESTIONS, ANSWERED.



Questions / Comments



Use of OEDM Training Materials

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Thank You for Attending!!!

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