



•State of Connecticut  
•Department of Administrative Services  
•Division of Construction Services  
•Office of Education and Data Management

## **Fire Resistant Construction and UL Resources for Code Officials**

*Presented by  
Bruce E. Johnson, UL, LLC  
for the*

*Office of Education and Data Management  
Fall 2015 Career Development Series*



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## **Fire Resistive Construction** *Based on the 2012 IBC*



**Bruce E. Johnson**  
*UL Codes and Advisory Services*

## Objective

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- At the end of this lesson, you will:
  - Understand the intent and purpose behind *fire resistive construction*
  - Understand the code requirements, testing procedures, plan review requirements and inspection practices relating to *fire resistive construction*



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## Objective Cont.

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- Be able to navigate UL's Fire Resistance Directory, Online Certifications Directory and Product Spec in order to identify listed products and assemblies which demonstrate compliance with the requirements of the 2012 *International Building Code (IBC)*.
- Understand the *proposed* Connecticut modifications to the IBC model code.



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## Agenda

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- A brief IBC Basics Review
- Fire-Resistance-Rated Construction
  - *Definitions*
  - International Building Code Requirements
  - Establishing *Fire-Resistance* Ratings
  - Methods of Showing Code Compliance



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## Agenda Cont.

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- Permitted Changes to Designs
- Plan Review Process
- Inspection Process
- Navigating the UL Directories & on-line resources
- Summary and Closing



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## Questions / Comments



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## IBC Basics

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Some Fundamentals – A refresher!



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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
- Identifying Changes in Code Text



# Identifying Changes in Code Text

## Margin markings:

- Vertical lines indicate new or revised text
- Arrows indicate that an entire sentence, paragraph or Section was deleted
- \* • A single asterisk indicates that text or a table has been relocated within the code
- \*\* • A double asterisk indicates that the text or table immediately following it has been relocated there from elsewhere in the code

MEANS OF EGRESS

TABLE 1064.1.2  
MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR <sup>a</sup>
Accessory storage areas, mechanical equipment rooms	100 gross
Agricultural building	100 gross
Cultural building	100 gross
Assembly	20 gross
Assembly terrace	100 gross
Display rooms	100 gross
Display handling	100 gross
Garage	100 gross
Marine areas	15 gross
Assembly	10 gross
Garage (other than boats, cars, etc.)	10 gross
Exhibit gallery and museum	50 net
Courtyard, with floor area	See Section 1064.1.1
Assembly without fixed seats	7 net
Conventional (other than only) seat (fixed)	7 net
Standing space	15 net
Non-enclosed tables and chairs	15 net
Seating spaces, show 7 persons for each seat including 15 feet of seating, and for additional areas	7 net
Business areas	100 gross
Business offices	100 gross
Construction - other than fixed seating areas	40 net
Club areas	10 net
Communication	50 gross
Education	100 gross
Classroom areas	20 net
Workshop and other vocational rooms	50 net
Classroom rooms	50 gross
Classroom	100 gross
Group R-2 Fabrication and manufacturing area	200 gross
Industrial areas	100 gross
Industrial areas	100 gross
Industrial maintenance areas	100 gross
Occupation areas	100 gross
Shopping areas	100 gross
Machine, commercial	200 gross
Garage	100 gross
Building rooms	50 net
Deck areas	100 gross
Locker rooms	50 gross
See Section 1064.1.2 of the International Building Code	
Multi-building - enclosed and open	See Section 1064.1.2 of the International Building Code
Miscellaneous	100 gross
Other than other floors	100 gross
Roof and peak floor areas	100 gross
Roofing work, existing areas	100 gross
Parking garages	200 gross
Recreation	100 gross
Storage rooms, existing areas	50 gross
Roof and peak	100 gross
Deck areas	100 gross
Stairs and platforms	15 net
Warehouses	100 gross

<sup>a</sup> Net area for occupancies with occupant load factors of 100 or less.  
<sup>b</sup> Floor area in square feet per occupant.





## Scope of the IFC and IBC

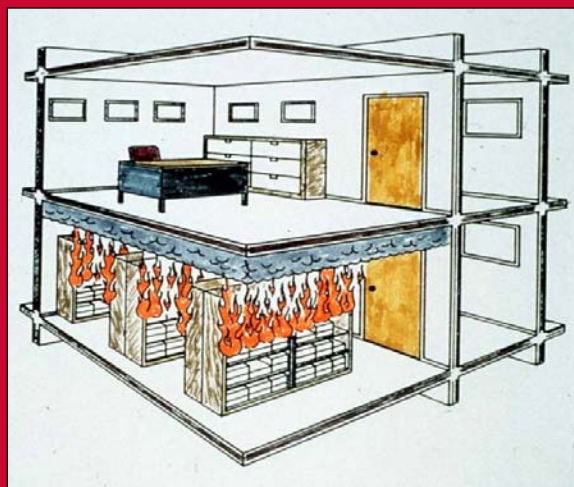
IBC	Provision	IFC
Duplicated	Smoke Control Operation	Maintained
Duplicated	Smoke Control Systems	Maintained
Duplicated	Smoke and Heat Vents	Maintained
Maintained	Means of Egress Design	Duplicated
Reference to IFC	Means of Egress Maintenance	Maintained
No Text	Retroactive Means of Egress Requirements	Maintained
Duplicated	Elevator Emergency Operation	Maintained



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## Fire-Resistance-Rated Construction



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## Passive Fire Protection

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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. (more)

### 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 (ITM)*



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## Definitions

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- **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.

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- *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. (IBC)
  - Passage of Flames
  - Heat Transmission
  - Structural Integrity



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## Definitions Cont.

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- *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

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### American National Standards Institute (ANSI)

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



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## Questions / Comments



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## Fire-Resistance-Rated Construction

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International Building  
Code Requirements  
for  
Fire-Resistance-  
Rated Construction



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## Code Requirements

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- 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.

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- 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.

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- 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 the *building official* that construction qualifies for restrained classification per ASTM E 119 or UL 263



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## Code Requirements Cont.

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- 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.

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- 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



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## Code Requirements Cont.

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- Breaches of assemblies shall be protected in accordance with Sections:
  - 713 Shaft Enclosures
  - 714 Penetrations
  - 715 Fire-Resistant Joint Systems
  - 716 Opening Protectives
- Chapter 10 – Means of Egress
  - Table 1018.1– Establishes hourly rating required for corridors based on Occupancy Group



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## Fire Resistance

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- 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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## Questions / Comments



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## Fire-Resistance-Rated Construction

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Establishing  
Fire-Resistance  
Ratings



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## Standards

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- ANSI / UL 263
- ASTM E 119
- NFPA 251 (Withdrawn)



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## Building Components

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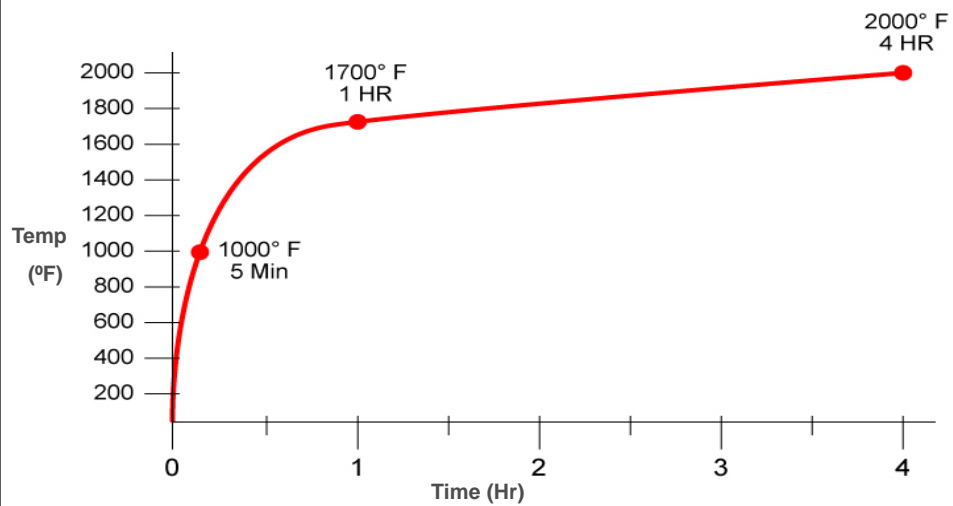
- Columns
- Beams
- Floor/Ceilings or Roof/Ceilings
- Walls



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## Time - Temperature Curve



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## Columns

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- Sample size – Minimum 9 ft
  - Tested unloaded



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## Conditions of Acceptance – Columns

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- 1000°F / 1200°F



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## Beams

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



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## Conditions of Acceptance – Beams

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- Support load
- 1100°F / 1300°F



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## Floor/Ceiling or Roof/Ceilings

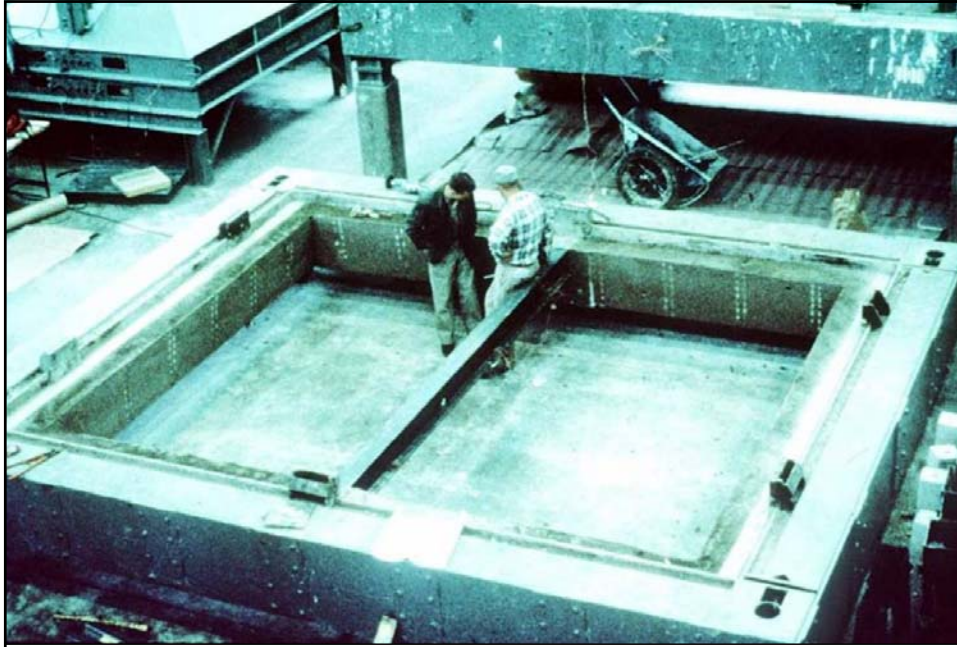
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- Sample size – 180 sq ft / 12 ft
- Load applied – Per design



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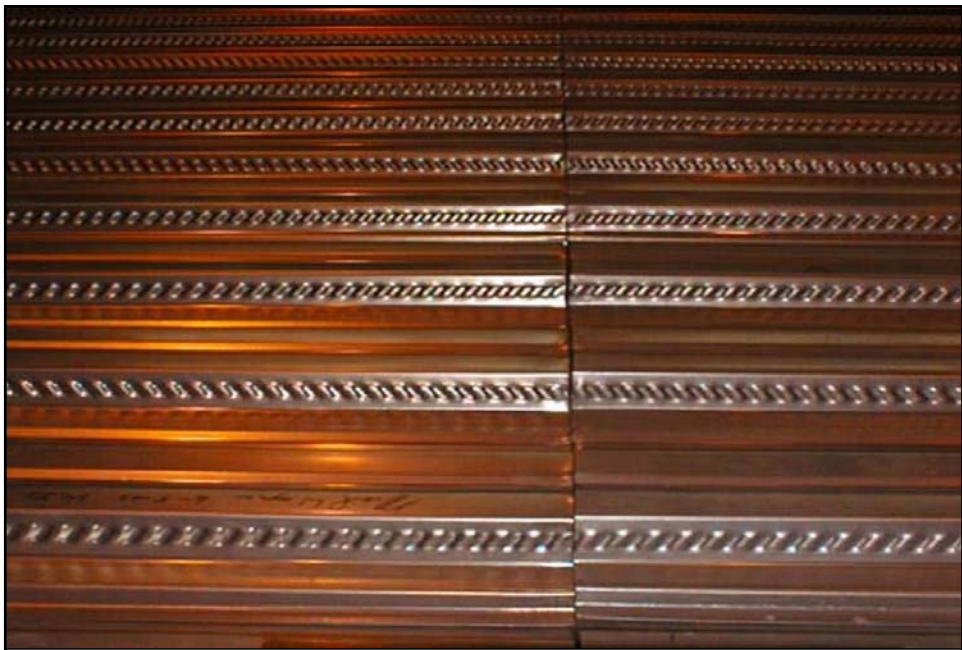
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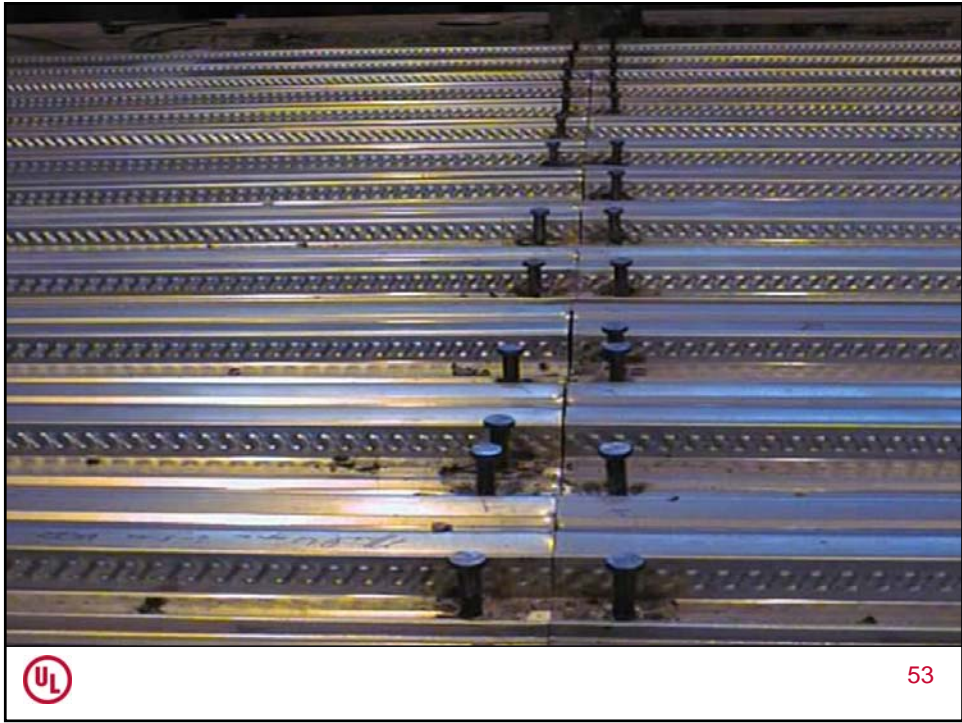


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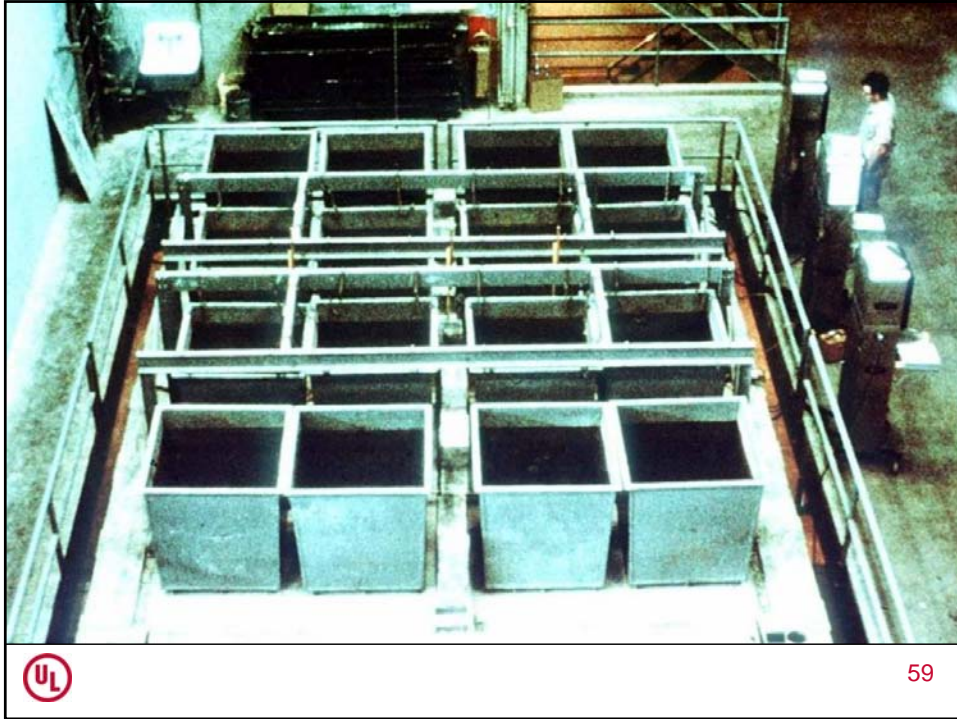


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## Conditions of Acceptance Floor/Ceilings or Roof/Ceilings

- Support load
- Flame passage
- 250°F / 325°F
- Support temperatures



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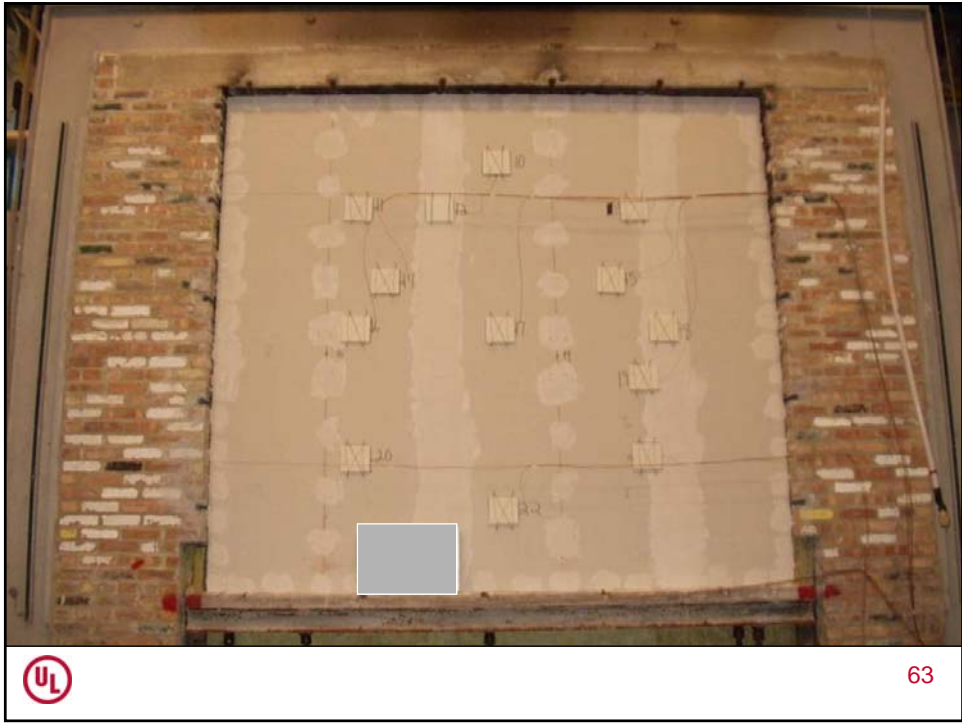
## Walls

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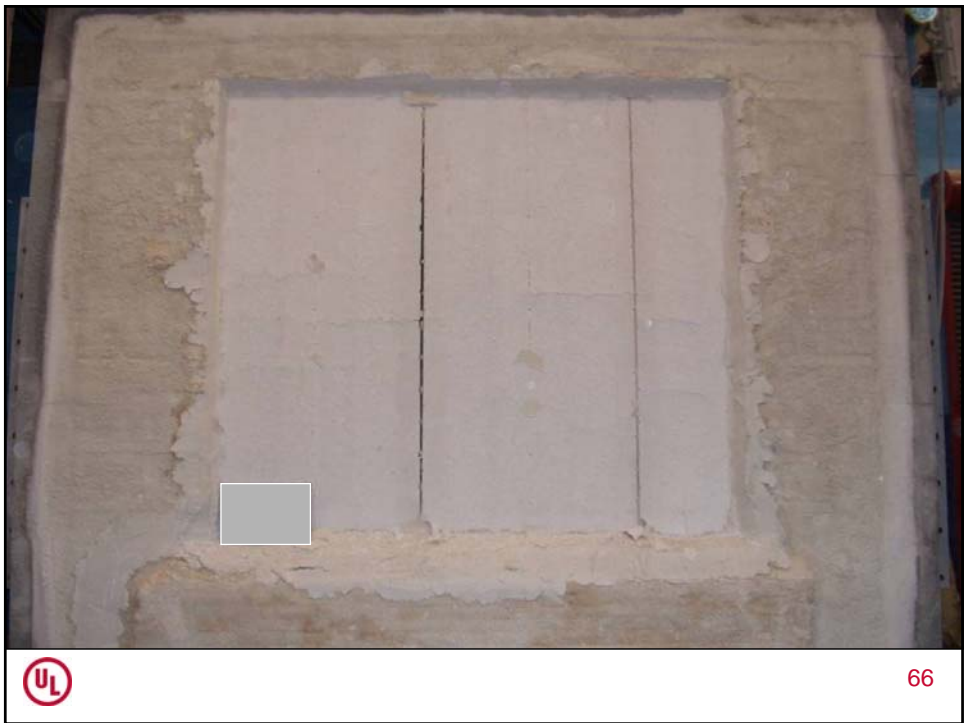
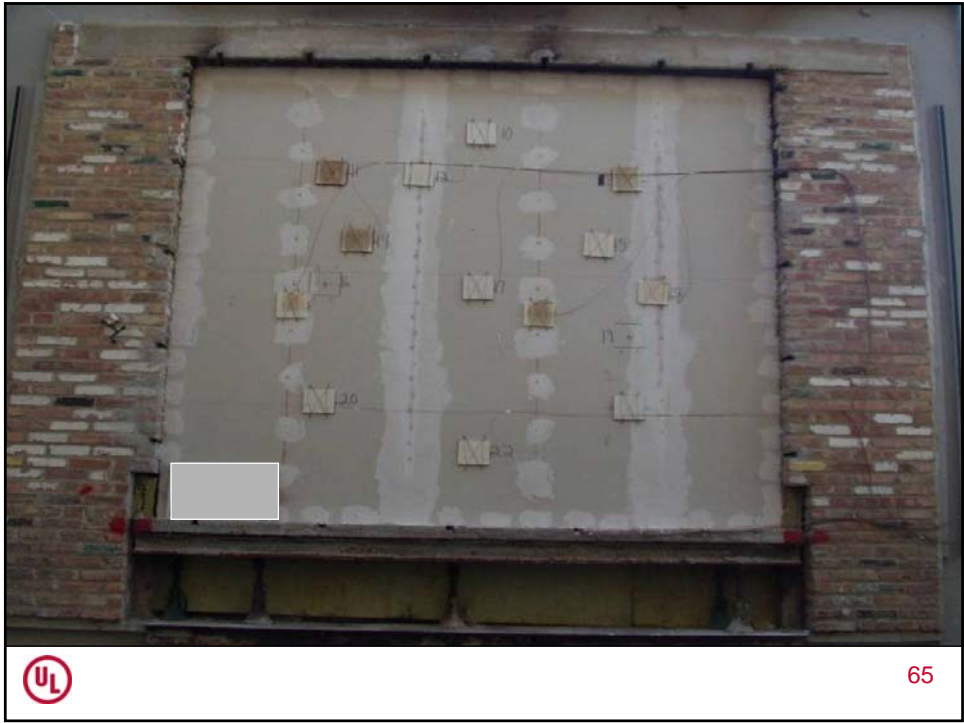
- Sample size - 100 sq ft / 9 ft
- Load applied - Per design

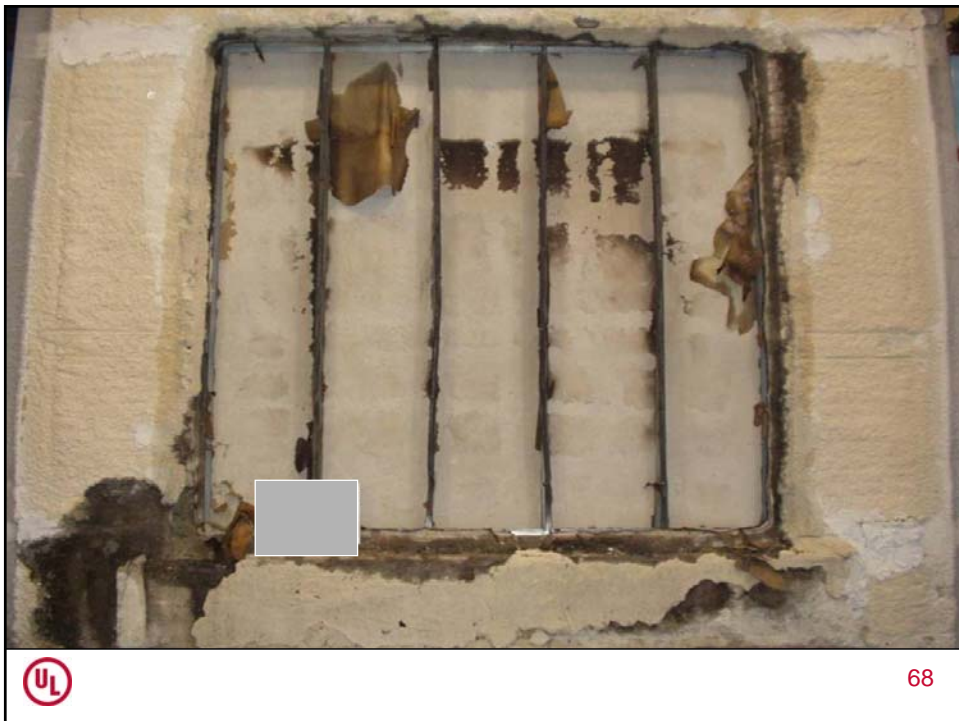


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## Conditions of Acceptance – Walls

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- Flame passage
- 250°F / 325°F
- Support load
- Hose stream



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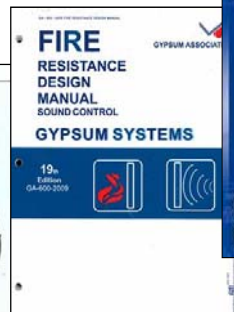
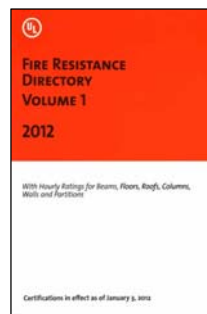
## Questions / Comments



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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 – Alternative 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

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- 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



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## Designs Documented From Approved Sources

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- Product Directories of Nationally Recognized Testing Laboratories
  - UL - *Fire Resistance Directory, Fire Resistance Directory on CD-ROM and Product Spec™*
  - Intertek – *Intertek Directories of Certified Products*
  - FM Global - *Factory Mutual Approval Guide*



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## Designs Documented From Approved Sources Cont.

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- Gypsum Association - *Fire Resistance Design Manual*
- American Insurance Services Group, Inc.  
(210) 469 – 3922 - *Fire Resistance Ratings*
- BOCA - *Guidelines for Determining Fire Resistance Ratings of Building Elements*



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## Designs Documented From Approved Sources Cont.

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- 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 720 of the IBC

**TABLE 720.1-1 (CONTINUED)**  
**MINIMUM PROTECTION OF STRUCTURAL MEMBERS BASED ON THE PERIODS FOR VARIOUS RISK-CONSEQUENCE AREA-FRAME SYSTEMS<sup>a</sup>**

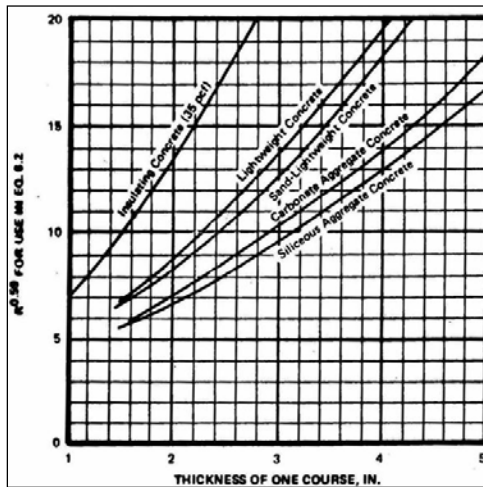
STRUCTURAL PARTS TO BE PROTECTED	RISK AREA	PROTECTIVE MATERIALS, SYSTEMS	MINIMUM PROTECTION PERIODS (MINUTES)			
			R	30	60	120
3. Bonded prestensioned reinforcement in prestressed concrete <sup>c</sup>	3-1.1	3.1.1 Carbonate, lightweight, sand-lightweight and siliceous <sup>f</sup> aggregate concrete Beams or girders	4 <sup>g</sup>	3 <sup>g</sup>	2 1/2	1 1/2
		Solid slabs <sup>h</sup>	2	1 1/2	1	
		3.1.2 Carbonate, lightweight, sand-lightweight and siliceous <sup>f</sup> aggregate concrete Beams or girders	4 <sup>g</sup>	3 <sup>g</sup>	2 1/2	1 1/2

3. Bonded prestensioned reinforcement in prestressed concrete <sup>c</sup>	3-1.1	Carbonate, lightweight, sand-lightweight and siliceous <sup>f</sup> aggregate concrete Beams or girders	4 <sup>g</sup>	3 <sup>g</sup>	2 1/2	1 1/2
		Solid slabs <sup>h</sup>	2	1 1/2	1	



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# Calculated Fire Resistance Section 721 of the IBC



R, MINUTES	R <sub>0.59</sub>
60	11.20
120	16.85
180	21.41
240	25.37

MATERIAL	R <sub>0.59</sub>
1-IN. CELLULAR PLASTIC	2.57
3/4-IN. GLASS FIBER BOARD	4.03
1-1/2-IN. GLASS FIBER BOARD	8.57
1/2-IN. GYPSUM WALLBOARD	7.44
5/8-IN. GYPSUM WALLBOARD	8.49
2-IN. FOAM GLASS	10.61



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## Engineering Analysis Based on ASTM E 119 or UL 263

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- Engineering judgments
  - Product manufacturer
  - Testing laboratory
  - Fire protection engineer
  - Professional engineer



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## Alternate Materials, Design and Methods of Construction and Equipment

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- 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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## Questions / Comments

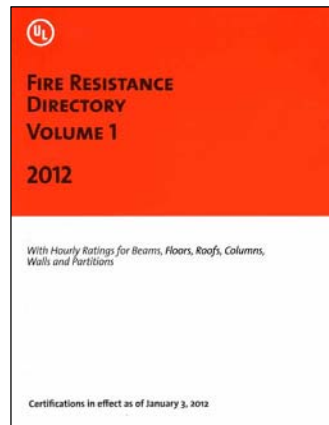


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## Fire-Resistance-Rated Construction

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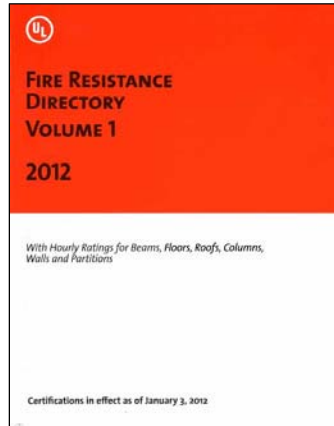
### Navigating the UL Directories



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# Navigating the UL Directories

Hard Copy



CD-ROM

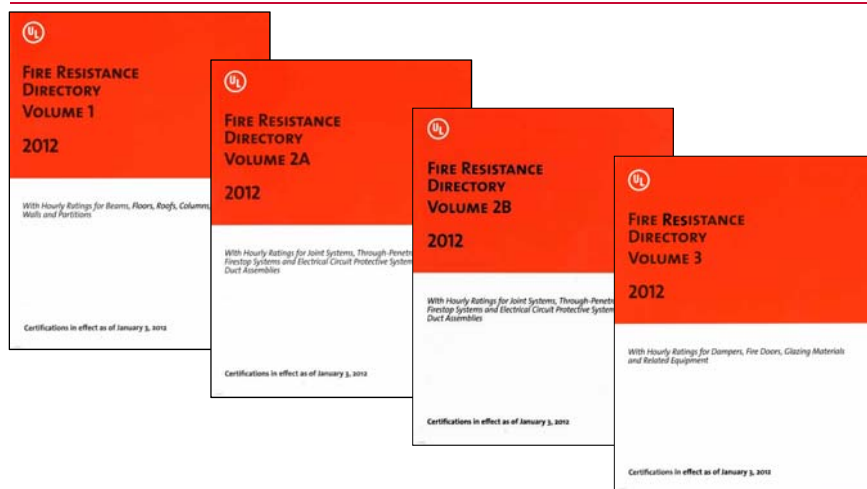


Online



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# Fire Resistance Directory



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## Fire Resistance Directory

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- Volume 1 – Columns, Beams, Floor/Ceilings, Roof/Ceilings and Walls
- Volumes 2A & 2B – Joint Systems, Perimeter Fire Containment Systems, and Through-Penetration Firestop Systems
- Volume 3 – Dampers, Fire Doors, Door Frames and Glazing



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## Organization Under Each Product Area

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- 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	900-999
Floors-Ceilings A, B*, or C* Concrete and Cellular Steel Floor	Concealed Grid Sys.	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Miscel- laneous	SFRM +	Unprotected
D, E*, or F* Concrete and Steel Floor Units	Concealed Grid Sys.	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Mastic Coating	SFRM +	Unprotected
G, H*, or I* Concrete and Steel Joists	Concealed Grid Sys.	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Miscel- laneous	SFRM +	Unprotected
J or K Concrete	Concealed Grid Sys.	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Miscel- laneous	SFRM +	Unprotected
L or M* Wood Joist or Combination Wood and Steel Assemblies	Concealed Grid Sys.	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Miscel- laneous	SFRM +	Unprotected
Beams: N or O* for Floor Ceiling	Concealed Grid Sys.	(Reserved)	Exposed Grid System	Batts and Blankets or Mineral and Fiber Boards	Metal Lath	Gypsum Board	Mastic Coating	SFRM +	Unprotected
Roof-Ceiling: P, Q* or R*	Concealed Grid Sys.	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Miscel- laneous	SFRM +	Unprotected
Beams: S or T* Roof-Ceiling	Building Units	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Mastic Coating	SFRM +	Unprotected
Wall & Partition: U, V or W*	Bldg. or Partition Panel Units	(Reserved)	Insulat- ing Concrete	Wood Stud Gypsum Bd Lath &/or Plaster	Metal Stud Gypsum Bd Lath &/or Plaster	Misc.	Metal Panels Gypsum Bd Lath &/or Plaster	SFRM +	Masonry
Columns: X, Y or Z*	Building Units	Prefab- ricated	(Reserved)	Batts and Blankets or Mineral or Fiber Boards	Metal Lath & Plaster	Gypsum Board	Mastic Coating	SFRM +	(Reserved)

The prefix numbers with an asterisk (\*) and the design numbers indicated as "Reserved" in the above table are for future expansion and to cater to new types of systems developed in the future.

+ SFRM denotes Spray-Applied Fire Resistive Materials



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## Designs

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- 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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## Product Categories

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- Located near end of Volume 1 of Fire Resistance Directory
- Each Product Category describes some generic family of products (e.g. Acoustical Materials)
- Each Product Category contains the manufacturers and designations of products tested and specified in the designs



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## Product Categories Cont.

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- Manufacturers arranged alphabetically within Product Category



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## Questions / Comments



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## Fire Resistance-Rated Construction

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### Permitted Changes to Designs



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## Fasteners

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- 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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## Primers with SFRM

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- May be applied to primed structural elements providing:
  - Beam flange width shall not exceed 12 inch
  - Column flange width shall not exceed 16 inch
  - Web depth shall not exceed 16 inch
  - Pipe diameter or tube width shall not exceed 12 inch
  - Bond tests conducted to ASTM E 736
    - Average > 80% of uncoated steel and individual > 50% of uncoated steel, or
    - Wrap member with metal lath



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## Concrete in Horizontal Assemblies

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- 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

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- Metallic boxes may be installed in Floor/Ceiling and Roof/Ceiling 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

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- Specified joist is minimum depth
- Specified joist is minimum weight/foot
- K-Series Joist may often substitute
- 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

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



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## Gypsum Ceiling Control Joints

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- Ceiling suspended below floor assembly
- Guide describes control joints when gypsum board is parallel to wood joists
- Guide describes control joints when gypsum board is perpendicular to wood joists



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## Recessed (Can) Lighting

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- 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)

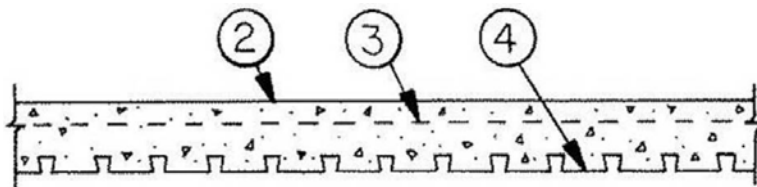


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## Restrained & Unrestrained

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- Designer & code official must determine
- Unrestrained ratings may be used for either condition



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## Restrained & Unrestrained Cont.

- I. Wall Bearing:
- A. Single span and simply supported end spans of multiple bays:<sup>9</sup>
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 construction<sup>9</sup>. . . . . 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 construction<sup>9</sup>. . . . . Restrained



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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

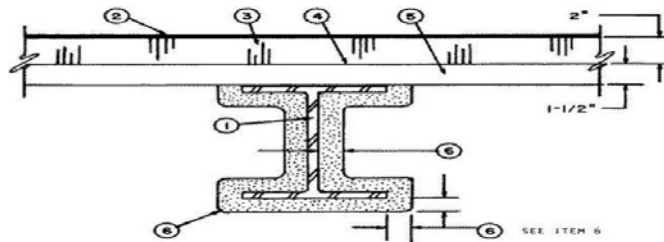
- May cause premature disruption of ceiling membrane
- For certain assemblies, fiberglass insulation can be used with additional layer of gypsum board
- Otherwise, only permitted as specified



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## Beam Size

- Larger beams may be substituted without restriction
- Larger is based on W/D ratio
- Larger W/D yields greater fire resistance

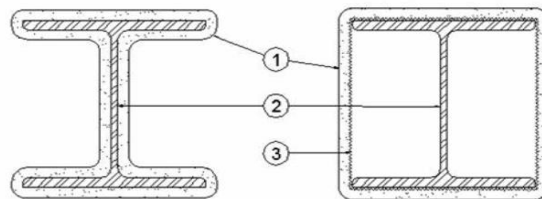


106

## Column Size

---

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



107

## 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



108

## Walls & Partitions Cont.

---

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



109

## 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.



110

## 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)



111

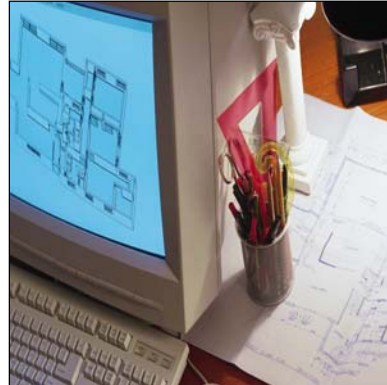
## Questions / Comments



112

# Fire-Resistance-Rated Construction

## Plan Review



113

## 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**

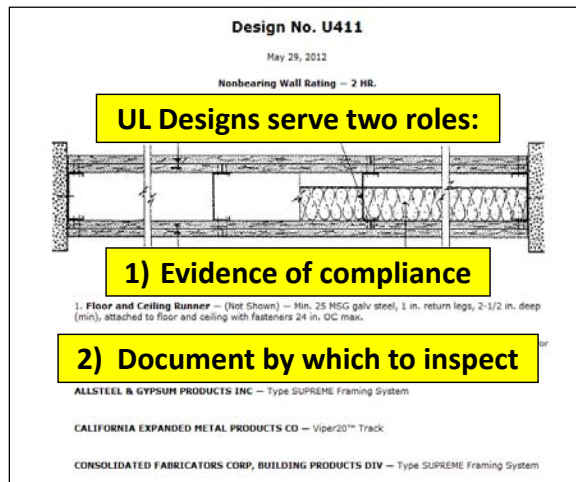
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100.A

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**CALIFORNIA EXPANDED METAL PRODUCTS CO** – Viper20™ Track  
**CONSOLIDATED FABRICATORS CORP, BUILDING PRODUCTS DIV** – Type SUPREME Framing System



114

## For the Building Official



115

## 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 ...



116



## 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



117

## 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 Directory



118

## 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



119

## Questions / Comments



120

## Fire-Resistance-Rated Construction

---

### Inspection Process



121

## Inspection of Fire-Resistance-Rated Assemblies

---

- Inspections typically done by code official, 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

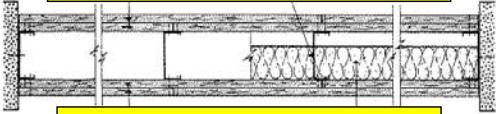


122

## 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  
US  
OC  
in 1 - For  
24 in.

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CALIFORNIA EXPANDED METAL PRODUCTS CO – Viper20™ Track

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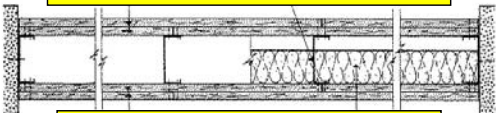


123

## 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  
US  
OC  
in 1 - For  
24 in.

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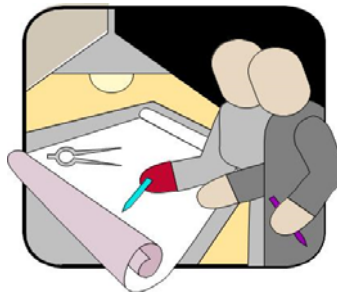


124

## 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



125

## 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



126

## At the Inspection Site

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- 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



127

## 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



129

## Reference Materials

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- 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”



130

## Reference Materials Cont.

---

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



131

## Available Resources

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



132

## Questions / Comments



133

## Fire Resistive Construction

UL's Online  
Search Tools



134

## UL's Online Search Tools

---

- Product Spec™
- Code Link
- Online Certifications Directory



135

## Online Certifications Directory or *OCD*

---

- Helps you achieve code compliance
- Is continuously updated
- Needs no password
- Is free – no charge for use
- [www.ul.com/database](http://www.ul.com/database)



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- Verify a UL Listed product use
- Verify a UL Recognized component use
- Verify a product safety standard

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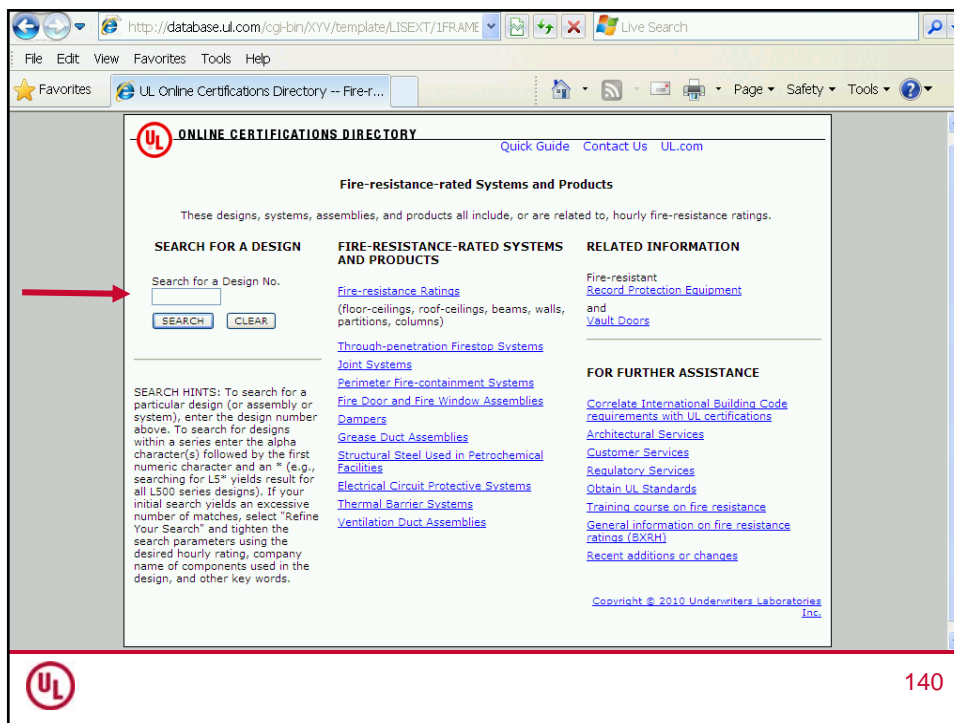
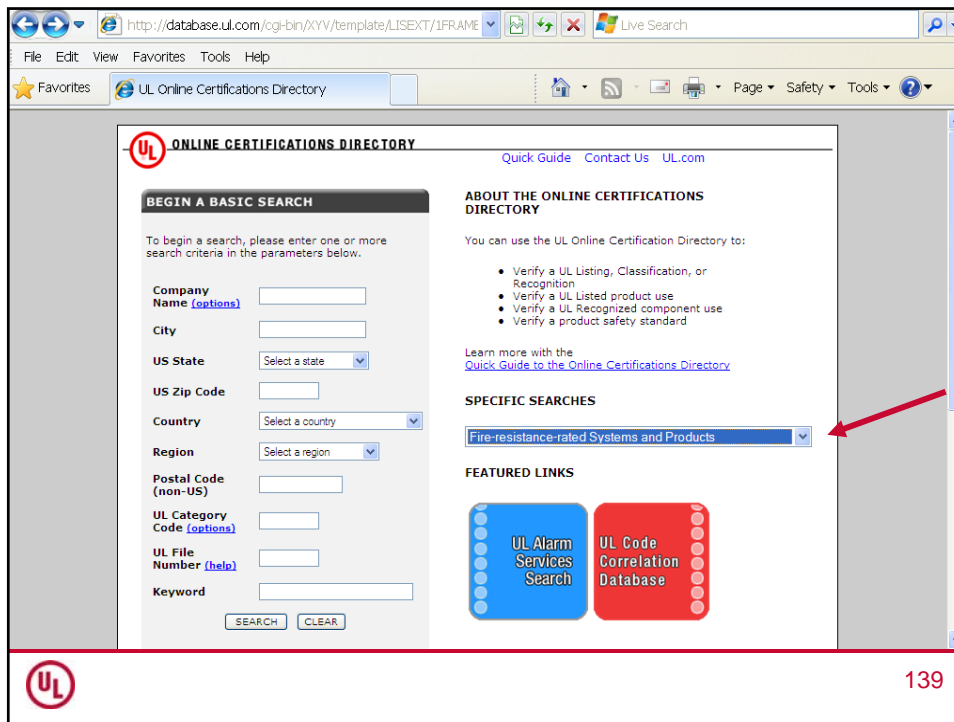
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These designs, systems, assemblies, and products all include, or are related to, hourly fire-resistance ratings.

**SEARCH FOR A DESIGN**

Search for a Design No.

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**Fire-resistance Ratings**

This category covers floor-ceilings, roof-ceilings, beams, columns, walls and partitions investigated for an hourly fire-resistance rating.

For US applications, designs are investigated in accordance with test method and acceptance criteria in ANSI/UL 263 (ASTM E 119 and NFPA 251), "Fire Tests of Building Construction and Materials." For Canadian applications, designs are investigated in accordance with the test method and acceptance criteria in CAN/ULC-5101, "Standard Methods of Fire Endurance Tests of Building Construction and Materials."

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Fire Rated Assemblies (BXUV)

The summarized form of the test assembly is identified by an alphanumeric design number. The prefix letter designates the group of construction, the first number designates the type of protection and the other numbers and letters identify the particular assembly.

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	900-999
<b>Floors-Ceilings:</b> A or E* Concrete and Cellular Steel Floor C - Glazing Systems	<a href="#">Concealed Grid Sys.</a>	(Reserved)	<a href="#">Exposed Grid System</a>	(Reserved)	<a href="#">Metal Lath</a>	<a href="#">Gypsum Board</a>	Misc.	<a href="#">SFRM+</a>	<a href="#">Unprotected</a>
D, E*, F* Concrete and Steel Floor Units	<a href="#">Concealed Grid Sys.</a>	(Reserved)	<a href="#">Exposed Grid System</a>	<a href="#">Mineral and Fiber Boards</a>	<a href="#">Metal Lath</a>	<a href="#">Gypsum Board</a>	Mastic and Intumescent Coatings	<a href="#">SFRM+</a>	<a href="#">Unprotected</a>
G, H*, or I* Concrete and Steel Joists	<a href="#">Concealed Grid Sys.</a>	(Reserved)	<a href="#">Exposed Grid System</a>	<a href="#">Mineral and Fiber Boards</a>	<a href="#">Metal Lath</a>	<a href="#">Gypsum Board</a>	Misc.	<a href="#">SFRM+</a>	<a href="#">Unprotected</a>
J or K Concrete	<a href="#">Concealed Grid Sys.</a>	(Reserved)	<a href="#">Exposed Grid System</a>	<a href="#">Mineral and Fiber Boards</a>	<a href="#">Metal Lath</a>	<a href="#">Gypsum Board</a>	Misc.	<a href="#">SFRM+</a>	<a href="#">Unprotected</a>
L or M Wood Joist or Combination Wood and Steel Assemblies	<a href="#">Concealed Grid Sys.</a>	(Reserved)	<a href="#">Exposed Grid System</a>	(Reserved)	<a href="#">Metal Lath</a>	<a href="#">Gypsum Board</a>	Misc.	<a href="#">SFRM+</a>	<a href="#">Unprotected</a>



<b>Roof-Ceiling:</b> P, Q* or R*	<a href="#">Concealed Grid Sys.</a>	(Reserved)	<a href="#">Exposed Grid System</a>	<a href="#">Mineral and Fiber Boards</a>	<a href="#">Metal Lath</a>	<a href="#">Gypsum Board</a>	Misc.	<a href="#">SFRM+</a>	<a href="#">Unprotected</a>
<b>Beams:</b> S or T* for Roof-Ceiling	<a href="#">Building Units</a>	(Reserved)	<a href="#">Exposed Grid System</a>	<a href="#">Mineral and Fiber Boards</a>	<a href="#">Metal Lath</a>	<a href="#">Gypsum Board</a>	<a href="#">Mastic and Intumescent Coatings</a>	<a href="#">SFRM+</a>	<a href="#">Unprotected</a>
<b>Wall and Partition:</b> U, V or W	<a href="#">Building or Partition Panels Units</a>	(Reserved)	<a href="#">Insulating Concrete</a>	<a href="#">Wood Stud, Gypsum Board, Lath &amp;/or Plaster</a>	<a href="#">Metal Stud, Gypsum Board, Lath &amp;/or Plaster</a>	Misc.	<a href="#">Metal Panels, Gypsum Board, Lath &amp;/or Plaster</a>	<a href="#">SFRM+</a>	<a href="#">Masonry</a>
<b>Columns:</b> X, Y or Z*	<a href="#">Building Units</a>	<a href="#">Prefabricated</a>	<a href="#">Mat Materials</a>	<a href="#">Batts and Blankets or Mineral and Fiber Boards</a>	<a href="#">Metal Lath &amp; Plaster</a>	<a href="#">Gypsum Board</a>	<a href="#">Mastic and Intumescent Coatings</a>	<a href="#">SFRM+</a>	<a href="#">Masonry</a>

The prefix numbers with an asterisk (\*) and the design numbers indicated as "Reserved" in the above table are for future expansion and to cater to new types of systems developed in the future.

+ SFRM denotes Spray-Applied Fire Resistant Materials

[View the UL Guide Information for Fire Resistance Designs \(BXUV\).](#)

[View the UL Guide Information for Fire Resistance Designs Certified for Canada \(BXUV7\).](#)

How to use this table to find UL Fire Resistant Design No.:

If you know the exact Design Number, enter this number (i.e. U351, P907, X520) in the available Fire Resistant Design field and click "Search".

If you do not know the exact Design Number, use the above Numbering System to refine your search options by following these steps:

- Choose the type of construction (i.e. column, wall, roof-ceiling, etc) from the first column, "Groups of Construction". This will determine the alpha component necessary for your search (i.e. A, U, X, etc.).
- Follow along the respective row until you find the type of Protection (i.e. gypsum board, SFRM, masonry, unprotected, etc.) applicable to your construction then proceed to the top of that column to obtain the numeric components (range of numbers) necessary for your search (i.e. 400-499, 500-599, etc.).
- In the Fire Resistant Design search field, enter the alpha numeric component followed by the first number in the numeric component, then the wildcard \* (i.e. U4\*, X5\*, etc.).
- Click Search.
- The search results will provide all Fire Resistant Design Numbers in the range provided (i.e. U400 - U499). Choose to view each Design individually by clicking the link in the "Link to File" column or choose to "Refine Your Search".
- Refine your search using key words such as 2 hr, vapor barrier, or recessed light.



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For US applications, designs are investigated in accordance with test method and acceptance criteria in [ANSI/UL 263](#) (ASTM E 119 and NFPA 251), "Fire Tests of Building Construction and Materials." For Canadian applications, designs are investigated in accordance with the test method and acceptance criteria in CAN/ULC-S101, "Standard Methods of Fire Endurance Tests of Building Construction and Materials."

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## Online Certifications Directory (OCD)

- Sample Search - Accessing a design if design number is known
  - Design No. L501
  - L = (L or M) Wood Joist or Combination Wood and Steel Assemblies
  - 501 (500-599) = Gypsum Board



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City

US State

US Zip Code

Country

Region

Postal Code (non-US)

UL Category Code [\(options\)](#)

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Keyword

**ABOUT THE ONLINE CERTIFICATIONS DIRECTORY**

You can use the UL Online Certification Directory to:

- Verify a UL Listing, Classification, or Recognition
- Verify a UL Listed product use
- Verify a UL Recognized component use
- Verify a product safety standard

Learn more with the [Quick Guide to the Online Certifications Directory](#)

**SPECIFIC SEARCHES**

**FEATURED LINKS**

[UL Alarm Services Search](#) [UL Code Correlation Database](#)

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**Fire-resistance-rated Systems and Products**

These designs, systems, assemblies, and products all include, or are related to, hourly fire-resistance ratings.

**SEARCH FOR A DESIGN**

Search for a Design No.

**FIRE-RESISTANCE-RATED SYSTEMS AND PRODUCTS**

[Fire-resistance Ratings](#)  
(floor-ceilings, roof-ceilings, beams, walls, partitions, columns)

[Through-penetration Firestop Systems](#)

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[Perimeter Fire-containment Systems](#)

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SEARCH HINTS: To search for a particular design (or assembly or system), enter the design number above. To search for designs within a series enter the alpha character(s) followed by the first numeric character and an \* (e.g., searching for LS\* yields result for all L500 series designs). If your initial search yields an excessive number of matches, select "Refine Your Search" and tighten the search parameters using the desired hourly rating, company name of components used in the design, and other key words.

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### Fire-resistance Ratings

This category covers floor-ceilings, roof-ceilings, beams, columns, walls and partitions investigated for an hourly fire-resistance rating.

For US applications, designs are investigated in accordance with test method and acceptance criteria in ANSI/UL 263 (ASTM E 119 and NFPA 251), "Fire Tests of Building Construction and Materials." For Canadian applications, designs are investigated in accordance with the test method and acceptance criteria in CAN/ULC-S101, "Standard Methods of Fire Endurance Tests of Building Construction and Materials."

#### SEARCH FOR DESIGNS

**Search for Design No.**

LS01

[Numbering information for Fire-resistance Designs](#)

**SEARCH HINTS:** To search for a particular design, enter the design number above. To search for designs within a series, enter the alpha character(s) identifying the series followed by the first numeric character and an \* (e.g. searching for LS\* yields result for all LS00 series designs). Refer to the numbering system to identify suitable design numbers. If your initial search yields an excessive number of matches, select "Refine Your Search" and tighten the search parameters using the desired hourly rating, company name of components used in the design, or other key words.

[Try the NEW Ultimate Fire Wizard™ search!](#)

#### RELATED INFORMATION

Search Fire-resistance Guide Information by Topic

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[Guide information - For general information on Fire-resistance Ratings - ANSI/UL 263 \(RXUV\)](#)  
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### Search results

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Company Name	Category Name	Link to File
Design No. LS01	Fire Resistance Ratings - ANSI/UL 263	<a href="#">RXUV.LS01</a>

Model number information is not published for all product categories. If you require information about a specific model number, please contact [Customer Service](#) for further assistance.

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BXUV.L501 - Fire Resistance Ratings - AN...

**Fire Resistance Ratings - ANSI/UL 263**

[See General Information for Fire Resistance Ratings - ANSI/UL 263](#)


**Design No. L501**

September 01, 2010

**Unrestrained Assembly Rating – 1 Hr.**

**Finish Rating – 30 Min. or (16 Min. See Item 5A)**

**Load Restricted for Canadian Applications – See Guide BXUV7**

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BXUV.L501 - Fire Resistance Ratings - AN...

**1. Flooring Systems** – The flooring system shall consist of one of the following:

**System No. 1**

**Subflooring** – Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick plywood or min 7/16 in. thick oriented strand board (OSB) wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panel to be perpendicular to joists with joints staggered.

**Vapor Barrier** – Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring** – Min 1 by 4 in. T & G lumber installed perpendicular to joists, or min 19/32 in. thick wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered.

**System No. 2**

**Subflooring** – Min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier – (Optional)** – Nom 0.030 in. thick commercial asphalt saturated felt.

**Floor Mat Materials\* - (Optional)** – Min 3/8 in. to max 3/4 in. thick floor mat material loose laid over the subfloor. Floor topping thickness shall be as specified under **Floor Topping Mixture**.


**UNITED STATES GYPSUM CO** – Levellock Brand Sound Reduction Board

**Alternate Floor Mat Materials\* - (Optional)** – Nom 1/4 in. thick floor mat material loose laid over the subfloor. Floor topping thickness shall be as specified under **Floor Topping Mixture**.

**UNITED STATES GYPSUM CO** – Levellock Brand Floor Underlayment SRM-25

**Alternate Floor Mat Materials\* - (Optional)** – Nom 3/8 in. thick floor mat material loose laid over the subfloor. Floor topping thickness shall be as specified under **Floor Topping Mixture**.

**SOLUTIA INC** – Type SC50

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BXUV.L501 - Fire Resistance Ratings - AN...

2. **Wood Joists** — Min 2 by 10, spaced 16 in. OC and effectively fireblocked in accordance with local codes.

3. **Cross Bridging** — Min 1 by 3 in. or min 2 by 10 solid blocking.

3A. **Horizontal Bridging** — Used in lieu of Item 3 in same joist bay as ceiling damper (Item 4), when ceiling damper is employed. Wood 2 by 4 in. secured between joists with nails.

4. **Ceiling Damper\*** (Optional) — Max nom area shall be 198 sq in. Max rectangular size shall be 12 in. wide by 16-1/2 in. long. Max height of damper shall be 9-3/8 in. Aggregate damper openings shall not exceed 99 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper. A steel grille (Item 7) shall be installed in accordance with installation instructions.

**AIR BALANCE INC** — Type 299 (See Item 5A)

**AIR KING VENTILATION PRODUCTS** — Series AS, Series AK

**DLX: DAMPERS AND LOUVERS EXPRESS** — Models CRD,S,HC, CRD,R,HC

**E H PRICE LTD** — Models CD-S/R-HC, CD-RD-HC


**GREENHECK FAN CORP** — Model CRD-1WJ

**METAL-FAB INC** — Models MSCDHC, MRDCHD

**NCA MFG INC** — Models CD-S/R-HC, CD-RD-HC

**RUSKIN CO** — Model CFD7

**UNITED ENERTECH CORP** — Models C-S/R-HC(-A), C-RD-HC(-A)

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BXUV.L501 - Fire Resistance Ratings - AN...

5. **Gypsum Board\*** — Nom 5/8 in. thick, 48 in. wide gypsum board, installed with long dimension perpendicular to joists. Gypsum board secured with 1-7/8 in. long, 6d cement coated nails spaced 6 in. OC.

**AMERICAN GYPSUM CO** — Types AGX-1, AG-C

**BEIJING NEW BUILDING MATERIALS PUBLIC**

**LTD CO** — Type DBX-1

**CERTAINTED GYPSUM INC** — Types EGRG, GlasRoc, FRPC, SF3, ProRoc Type C, ProRoc Type X

**CERTAINTED GYPSUM CANADA INC** — Types ProRoc Type C, ProRoc Type X, ProRoc Type Abuse-Resistant

**CANADIAN GYPSUM COMPANY** — Types C, IP-X1, IP-X2, IPC-AR, SCX, WRX

**GEORGIA-PACIFIC GYPSUM L L C** — Types S, 9, C, GPF51, GPF56, DA, DAP, DAPC, DGG, DS,

**LAFARGE NORTH AMERICA INC** — Types LGFC3, LGFC6, LGFC6A, LGFC-C, LGFC-C/A

**NATIONAL GYPSUM CO** — Types FSK, FSK-C, FSK-G, FSW, FSW-2, FSW-3, FSW-C, FSW-G, FSW-6


**NATIONAL GYPSUM CO** — Riyadh, Saudi Arabia — Type FR, or WR.

**PABCO BUILDING PRODUCTS L L C, DBA**

**PABCO GYPSUM** — Types C, PG-3, PG-4, PG-5, PG-6, PG-9, PG-C, PG-11

**PANEL REY S A** — Type PRC

**STAM GYPSUM INDUSTRY (SARABURTI) CO LTD** — Type EX-1

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BXUV.L501 - Fire Resistance Ratings - AN...

**TEMPLE-INLAND** – Type X, Veneer Plaster Base-Type X, Water Rated-Type X, Sheathing Type-X, Soffit-Type X, TG-C, GreenGlass Type X.  
**UNITED STATES GYPSUM CO** – Types C, IP-X1, IP-X2, IPC-AR, SCX, WRX  
**USG MEXICO S A DE C V** – Types C, IP-X1, IP-X2, IPC-AR, SCX, WRX  
**5A. Gypsum Board\*** – (Finish Rating - 16 min.) Required when Air Balance Inc. Type 299 ceiling damper (Item A) is installed. Nom 5/8 in. thick, 48 in. wide gypsum board, installed with long dimension perpendicular to joists. Gypsum board secured with 1-7/8 in. long, 6d cement coated nails spaced 6 in. OC with the first nails located 1/2 in. and 3 in. from the board edges.  
**UNITED STATES GYPSUM CO** – Type C  
**USG MEXICO S A DE C V** – Type C  
**6. Finishing System - (Not shown)** – Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads. Nom 2 in. wide paper tape embedded in first layer of compound over all joints. As an alternate, nom 3/32 in. thick veneer plaster may be applied to the entire surface of gypsum board.  
**7. Grille** – Steel grille, installed in accordance with the installation instructions provided with the ceiling damper.  
**8. Steel Corner Fasteners** – (Optional-not shown) - Used to attach ends of gypsum board at wall intersection where joists run parallel to wall. Channel shaped, 2 in. long by 1 in. high on the back side with two 1/8 in. wide cleats protruding into the 5/8 in. wide channel, fabricated from 24 gauge galvanized steel. Fasteners nailed to face of wall bearing plate through fastener tab with one No. 6d cement coated nail, spaced not greater than 16 in. OC and 2 in. from edge of gypsum board. Fasteners covered with gypsum board facing applied to intersecting wall.

\*Bearing the UL Classification Mark

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## OCD or UL Product Spec™

- **Sample Search - Searching for a design based on specific parameters**
  - Wood stud/gypsum board wall assembly
  - 2 hour rating
  - Gypsum board supplied by the United States Gypsum Company





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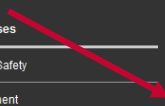
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The screenshot shows a web browser window displaying the 'ONLINE CERTIFICATIONS DIRECTORY' search page. The browser's address bar shows the URL: <http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME>. The page features a search form on the left with fields for Company Name, City, US State, US Zip Code, Country, Region, Postal Code (non-US), UL Category Code, UL File Number, and Keyword. A 'SEARCH' button and a 'CLEAR' button are at the bottom of the form. To the right of the search form, there is a section titled 'ABOUT THE ONLINE CERTIFICATIONS DIRECTORY' with a list of uses: 'Verify a UL Listing, Classification, or Recognition', 'Verify a UL Listed product use', 'Verify a UL Recognized component use', and 'Verify a product safety standard'. Below this is a 'SPECIFIC SEARCHES' section with a dropdown menu currently set to 'Fire-resistance-rated Systems and Products'. At the bottom right, there are two featured links: 'UL Alarm Services Search' and 'UL Code Correlation Database'. A red arrow points to the dropdown menu in the 'SPECIFIC SEARCHES' section.



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### Fire-resistance-rated Systems and Products

These designs, systems, assemblies, and products all include, or are related to, hourly fire-resistance ratings.

#### SEARCH FOR A DESIGN

Search for a Design No. →

SEARCH HINTS: To search for a particular design (or assembly or system), enter the design number above. To search for designs within a series enter the alpha character(s) followed by the first numeric character and an \* (e.g., searching for LS\* yields result for all L500 series designs). If your initial search yields an excessive number of matches, select "Refine Your Search" and tighten the search parameters using the desired hourly rating, company name of components used in the design, and other key words.

#### FIRE-RESISTANCE-RATED SYSTEMS AND PRODUCTS

- [Fire-resistance Ratings](#)  
(floor-ceilings, roof-ceilings, beams, walls, partitions, columns)
- [Through-penetration Firestop Systems](#)
- [Joint Systems](#)
- [Perimeter Fire-containment Systems](#)
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### Fire-resistance Ratings

This category covers floor-ceilings, roof-ceilings, beams, columns, walls and partitions investigated for an hourly fire-resistance rating.

For US applications, designs are investigated in accordance with test method and acceptance criteria in ANSI/UL 263 (ASTM E 119 and NFPA 251), "Fire Tests of Building Construction and Materials." For Canadian applications, designs are investigated in accordance with the test method and acceptance criteria in CAN/ULC-S101, "Standard Methods of Fire Endurance Tests of Building Construction and Materials."

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LS\*

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- [Guide Information - For general information on Fire-resistance Ratings - ANSI/UL 263 \(BXUV\)](#)
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Design No. U302	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U302</a>
Design No. U303	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U303</a>
Design No. U304	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U304</a>
Design No. U305	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U305</a>
Design No. U306	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U306</a>
Design No. U308	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U308</a>
Design No. U309	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U309</a>
Design No. U311	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U311</a>
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Design No. U313	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U313</a>
Design No. U314	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U314</a>
Design No. U315	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U315</a>
Design No. U316	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U316</a>
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Groups of Construction	Membrane Protection				Direct Applied Protection		Unprotected		
	000-099	100-199	300-399	500-599	600-699	700-999			
<b>Floors</b> Ceilings 2, 4, 6" or C+ Concrete and Cellular Steel Floor	Concrete Gird.Sls.	(Reinced)	Exposed Gird System	Metal and Steel Deck	Metal Lath	Gypsum Board	Misc.	SFRMA	Unprotected
2, 4, 6", 1" Concrete and Steel Floor Joists	Concrete Gird.Sls.	(Reinced)	Exposed Gird System	Metal and Steel Deck	Metal Lath	Gypsum Board	Mastic and Inorganic Coatings	SFRMA	Unprotected
2, 4", or 1" Concrete and Steel Floor Joists	Concrete Gird.Sls.	(Reinced)	Exposed Gird System	Metal and Steel Deck	Metal Lath	Gypsum Board	Misc.	SFRMA	Unprotected
2 or 4 Concrete	Concrete Gird.Sls.	(Reinced)	Exposed Gird System	Metal and Steel Deck	Metal Lath	Gypsum Board	Misc.	SFRMA	Unprotected
1 or 1/2" Wood Joist or Combination Wood and Steel Assemblies	Concrete Gird.Sls.	(Reinced)	Exposed Gird System	Metal and Steel Deck	Metal Lath	Gypsum Board	Misc.	SFRMA	Unprotected
<b>Beams</b> 4 or 6" for Floor-Ceiling	Concrete Gird.Sls.	(Reinced)	Exposed Gird System	Steel and Concrete or Steel Deck	Metal Lath	Gypsum Board	Mastic and Inorganic Coatings	SFRMA	Unprotected
<b>Roof Ceiling</b> 2, 4, 6" or 1"	Concrete Gird.Sls.	(Reinced)	Exposed Gird System	Metal and Steel Deck	Metal Lath	Gypsum Board	Misc.	SFRMA	Unprotected
<b>Beams</b> 4 or 6" for Roof	Reinforced Concrete	(Reinced)	Exposed Gird System	Metal and Steel Deck	Metal Lath	Gypsum Board	Mastic and Inorganic Coatings	SFRMA	Unprotected
<b>Wall &amp; Partition: U, V or W*</b>	Concrete Gird.Sls.	(Reinced)	Exposed Gird System	Metal and Steel Deck	Metal Lath	Gypsum Board	Mastic and Inorganic Coatings	SFRMA	Masonry
<b>Wood Stud Gypsum Bd Lath &amp;/or Plaster</b>	Concrete Gird.Sls.	(Reinced)	Exposed Gird System	Metal and Steel Deck	Metal Lath	Gypsum Board	Mastic and Inorganic Coatings	SFRMA	Masonry

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Design No. U303	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U303</a>
Design No. U304	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U304</a>
Design No. U305	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U305</a>
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Keyword:

**Refine your search for Fire Resistive Hourly Ratings or Companies**

Fire Resistive Hourly Rating:  

Company Name within Fire Resistive System, Design, or Assembly:

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Design No. U308	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U308</a>
Design No. U332	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U332</a>
Design No. U334	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U334</a>
Design No. U336	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U336</a>
Design No. U342	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U342</a>
Design No. U347	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U347</a>
Design No. U349	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U349</a>
Design No. U350	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U350</a>
Design No. U351	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U351</a>
Design No. U357	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U357</a>
Design No. U360	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U360</a>
Design No. U366	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U366</a>
Design No. U369	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U369</a>

Page: 1 | 2



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http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME

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UL Online Certifications Directory - Refine...

**ONLINE CERTIFICATIONS DIRECTORY** Home Quick Guide Contact Us UL.com

UL Category Code:  [More information on UL Category Codes](#)

UL File Number:  [More information on UL File Numbers](#)

Company Name:

U.S. State:


U.S. Zip Code:

Canadian Province:

Postal Code (non-US):

Country:

Region:


Registration Standard:  

Keyword:

**Refine your search for Fire Resistive Hourly Ratings or Companies**

Fire Resistive Hourly Rating:

Company Name within Fire Resistive System, Design, or Assembly:



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http://database.ul.com/cgi-bin/XYV/cgfind.new/LISEXT/1FRA

UL ONLINE CERTIFICATIONS DIRECTORY

Home Quick Guide Contact Us UL.com

Search results

Number of hits: 10 The maximum number of hits returned is 5000.  
 You may choose to [Refine Your Search.](#)

Company Name	Category Name	Link to File
Design No. U301	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U301</a>
Design No. U302	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U302</a>
Design No. U308	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U308</a>
Design No. U334	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U334</a>
Design No. U336	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U336</a>
Design No. U342	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U342</a>
Design No. U370	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U370</a>
Design No. U378	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U378</a>
Design No. U382	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U382</a>
Design No. U395	Fire Resistance Ratings - ANSI/UL 263	<a href="#">BXUV.U395</a>

Model number information is not published for all product categories. If you require information about a specific model number, please contact [Customer Service](#) for further assistance.

[Search Tips](#) [Print this page](#) [Disclaimer](#) [IQ Family of Databases](#)

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http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME

BXUV.U301 - Fire Resistance Ratings - A...

Fire Resistance Ratings - ANSI/UL 263

[See General Information for Fire Resistance Ratings - ANSI/UL 263](#)

Design No. U301  
 November 17, 2010

Bearing Wall Rating - 2 HR.  
 Finish Rating - 66 Min.

Load Restricted for Canadian Applications - See Guide [BXUV7](#)

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.

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http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME

File Edit View Favorites Tools Help

BXUV.U301 - Fire Resistance Ratings - A...

- 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, non 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.
- 4. Gypsum Board** — 5/8 in. thick, two layers applied either horizontally or vertically. Inner layer attached to studs with the 1-7/8 in. nails spaced 6 in. OC. Outer layer attached to studs over inner layer with the 2-3/8 in. long nails spaced 8 in. OC. Vertical joints located over studs. All joints in face layers staggered with joints in base layers. Joints of each base layer offset with joints of base layer on opposite side.

When used in widths other than 48 in., gypsum board to be installed horizontally.

When Steel Framing Members® (Item 6) are used, base layer attached to furring channels with 1 in. long Type S bugle-head steel screws spaced max 24 in. OC; face layer attached with 1-5/8 in. long Type S bugle-head steel screws spaced max 12 in. OC.


**AMERICAN GYPSUM CO** — Types AGX-1, AG-C, AGX-11.

**BEIJING NEW BUILDING MATERIALS PUBLIC LTD CO** — Type DBX-1.

**CERTAINTEEED GYPSUM INC** — Types 1, FRPC, EGRG, GlasRoc, ProRoc Type C or ProRoc Type X.

**CERTAINTEEED GYPSUM CANADA INC** — ProRoc Type C, ProRoc Type X, ProRoc Type Abuse-Resistant.

**CANADIAN GYPSUM COMPANY** — Types AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, WRC, WRX .



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http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME

File Edit View Favorites Tools Help

BXUV.U301 - Fire Resistance Ratings - A...

**GEORGIA-PACIFIC GYPSUM L L C** — Types S, 6, 9, C, DAP, DD, DA, DAPC, DGG, DS, GPF56.

**LAFARGE NORTH AMERICA INC** — Types LGFC-C, LGFC2, LGFC2A, LGFC6, LGFC6A., LGFC-C/A, LGFC-WD.

**NATIONAL GYPSUM CO** — Types FSK, FSK-C, FSK-G, FSW, FSW-3, FSW-5, FSW-6, FSW-C, FSW-G, FSMR-C.

**NATIONAL GYPSUM CO** — Riyadh, Saudi Arabia — Type FR, or WR.

**PABCO BUILDING PRODUCTS L L C, DBA**

**PABCO GYPSUM** — Type C, PG-2, PG-3, PG-3W, PG-4, PG-5, PG-5W, PG-5WS, PG-9, PG-11 or PG-C.


**PANEL REY S A** — Types PRC, PRX, RHX, MDX, ETX

**SIAM GYPSUM INDUSTRY (SARABURI) CO LTD** — Type EX-1

**TEMPLE-INLAND** — Type TG-C, Type X, Veneer Plaster Base-Type X, Water Rated-Type X, Sheathing Type-X, Soffit-Type X, GreenGlass Type X.

**UNITED STATES GYPSUM CO** — Types AR, C, FRX-G, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, WRC, WRX, USGX.

**USG MEXICO S A DE C V** — Types AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, WRC, WRX.



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http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME

File Edit View Favorites Tools Help

BXUV.U301 - Fire Resistance Ratings - A...

5. **Molded Plastic\*** — Not shown, Optional — Solid vinyl siding mechanically secured over the outer layer to framing members in accordance with manufacturer's recommended installation details.

**ALSIDE, DIV OF ASSOCIATED MATERIALS**

**INC**

**GENTEK BUILDING PRODUCTS LTD**

**VYTEC CORP**


**NEBRASKA PLASTICS INC**

6. **Steel Framing Members** — (Optional, Not Shown)\* - Furring channels and resilient sound isolation clip as described below:

A. **Furring Channels** — Formed of No. 25 MSG galv steel, 2-3/8 in. wide by 7/8 in. deep, spaced 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Ends of adjoining channels are overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping #6 framing screws, min. 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Wallboard attached to furring channels as described in Item 4.

B. **Steel Framing Members\*** — Resilient sound isolation clip used to attach furring channels (Item 6a) to studs. Clips spaced 48 in. OC., and secured to studs with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. Furring channels are friction fitted into clips.

**PAC INTERNATIONAL INC** — Type RSIC-1.



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http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME

File Edit View Favorites Tools Help

BXUV.U301 - Fire Resistance Ratings - A...

7. **Wall and Partition Facings and Accessories\*** — (Optional, Not shown) — Nominal 1/2 in. thick, 4 ft wide panels, for optional use as an additional layer on one or both sides of the assembly. Panels attached in accordance with manufacturer's recommendations. When the QR-510 panel is installed between the wood framing and the UL Classified gypsum board, the required UL Classified gypsum board layer(s) is/are to be installed as indicated as to fastener type and spacing, except that the required fastener length shall be increased by a minimum of 1/2 in. Not evaluated or intended as a substitute for the required layer(s) of UL Classified Gypsum Board.

**SERIOUS MATERIALS INC** — Type QuietRock QR-510.

8. **Cementitious Backer Units\*** — (Optional Item Not Shown - For Use On Face Of 2 Hr Systems With All Standard Items Required) - 1/2 in., 5/8 in., 3/4 in. or 1 in. thick, min. 32 in. wide.- Applied vertically with vertical joints centered over studs. Face layer fastened over gypsum board to studs and runners with cement board screws of adequate length to penetrate stud by a minimum of 3/8 in. for steel framing members, and a minimum of 3/4 in. for wood framing members spaced a max of 8 in. OC.


**NATIONAL GYPSUM CO** — Type PermaBase

\*Bearing the UL Classification Mark

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## Questions / Comments



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## UL Product Spec™

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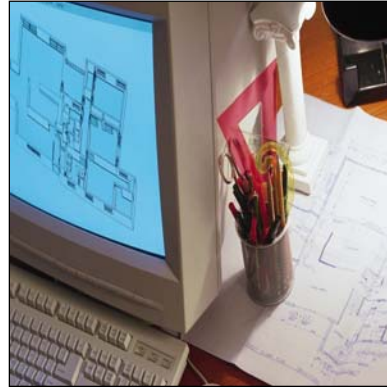
- Supplements Online Certification Directory
- Replaces Code Correlation Database
- Needs no password
- Is free – no charge for use
- [www.ul.com/productspec](http://www.ul.com/productspec)



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## UL Product Spec™

Searching for  
Information on  
Fire-Resistance-  
Rated Construction



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## UL Product Spec™

**UL PRODUCT SPEC™** Quickly find, specify, or verify UL Certified products for your projects.

**1. HOW DO YOU WANT TO SEARCH?** **2. RESULTS**

- > Installation Code
- > Product Type
- > **Products, Systems or Assemblies**
- > UL Product Category Code
- > Master Format Number



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# UL Product Spec™

The screenshot shows the UL Product Spec™ search interface. At the top is the UL logo and the text "UL PRODUCT SPEC™" with the tagline "Quickly find, specify, or verify UL Certified products for your projects." Below this is a navigation bar with two tabs: "1. HOW DO YOU WANT TO SEARCH?" (active) and "2. RESULTS". Under the active tab, there is a section titled "Products, Systems or Assemblies" with a list of options: "Electrical", "Building or Fire Systems", and a "Back" button. A red arrow points to "Building or Fire Systems".

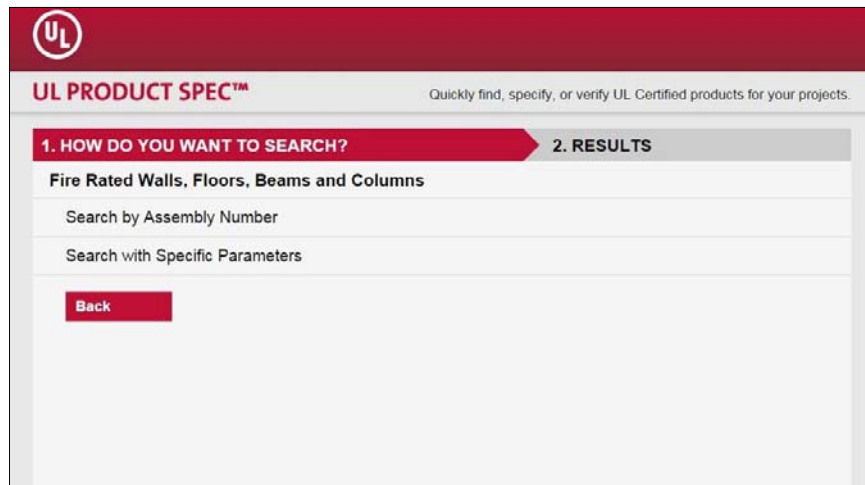


# UL Product Spec™

The screenshot shows the UL Product Spec™ search interface. At the top is the UL logo and the text "UL PRODUCT SPEC™" with the tagline "Quickly find, specify, or verify UL Certified products for your projects." Below this is a navigation bar with two tabs: "1. HOW DO YOU WANT TO SEARCH?" (active) and "2. RESULTS". Under the active tab, there is a section titled "Building or Fire Systems" with a list of options: "Fire Protection Systems", "Commercial Cooking", "Elevators", "Fire Rated Walls, Floors, Beams and Columns", "Firestop Systems", "Passive Systems", "Roofing", "Windstorm Rated Products", "Egress Equipment", and "Green Buildings". A red arrow points to "Fire Rated Walls, Floors, Beams and Columns".



# UL Product Spec™



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# UL Product Spec™

- Sample Search - Accessing a design if design number is known
  - Design No. L501



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# UL Product Spec™

The screenshot shows the UL Product Spec™ search interface. At the top is the UL logo. Below it is the text "UL PRODUCT SPEC™" and "Quickly find, specify, or verify UL Certified products for your projects." The main content area is divided into two steps: "1. HOW DO YOU WANT TO SEARCH?" and "2. RESULTS". Under step 1, there are three options: "Fire Rated Walls, Floors, Beams and Columns", "Search by Assembly Number", and "Search with Specific Parameters". A red arrow points to the "Search by Assembly Number" option. A "Back" button is located at the bottom left of the search options.



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# UL Product Spec™

The screenshot shows the UL Product Spec™ search interface. At the top is the UL logo. Below it is the text "UL PRODUCT SPEC™" and "Quickly find, specify, or verify UL Certified products for your projects." The main content area is divided into two steps: "1. HOW DO YOU WANT TO SEARCH?" and "2. RESULTS". Under step 1, there is one option: "Search by Assembly Number". Below this option is a search input field containing the text "L501" and a "Search" button. A "Back" button is located at the bottom left of the search options.



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# UL Product Spec™

The screenshot shows the UL Product Spec search interface. At the top, the UL logo is on the left, and the text "UL PRODUCT SPEC™" and "Quickly find, specify, or verify UL Certified products for your projects." is on the right. Below this, there are two tabs: "1. HOW DO YOU WANT TO SEARCH?" and "2. RESULTS". Under the "1. HOW DO YOU WANT TO SEARCH?" tab, the search criteria are "Search: Assembly number: L501" and "Results: viewing 1-1 of 1". A red arrow points to the "FIRE-RESISTANCE DESIGN" section, which contains the text "L501 - BXUV.L501" and "Results: viewing 1-1 of 1". At the bottom right of the search results area, there are two buttons: "Print" and "New Search".



# UL Product Spec™

The screenshot shows the UL Product Spec product details page for assembly number L501. At the top, the UL logo is on the left, and the text "UL PRODUCT SPEC™" and "Quickly find, specify, or verify UL Certified products for your projects." is on the right. Below this, there are two tabs: "1. HOW DO YOU WANT TO SEARCH?" and "2. RESULTS". Under the "2. RESULTS" tab, the "FIRE-RESISTANCE DESIGN" section is expanded, showing the following text: "Assembly Usage Disclaimer", "BXUV - Fire Resistance Ratings - ANSUL 203", "BXUV7 - Fire Resistance Ratings - CANULC-5101 Certified for Canada", "See General Information for Fire Resistance Ratings - ANSUL 203", "See General Information for Fire Resistance Ratings - CANULC-5101 Certified for Canada", "Design No. L501", "October 20, 2014", "Unrestrained Assembly Rating — 1 Hr.", "Finish Rating — (See Item 5 and 5A)", "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", and "\* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively." Below the text is a technical drawing of a fire-resistance assembly with numbered callouts 1 through 7.



## UL Product Spec™

- Sample Search - Searching for a design based on specific parameters
  - Wood stud/gypsum board wall assembly
  - 2 hour rating
  - Gypsum board supplied by the United States Gypsum Company



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## UL Product Spec™

UL

**UL PRODUCT SPEC™** Quickly find, specify, or verify UL Certified products for your projects.

**1. HOW DO YOU WANT TO SEARCH?** **2. RESULTS**

**Fire Rated Walls, Floors, Beams and Columns**

Search by Assembly Number

Search with Specific Parameters

Back



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# UL Product Spec™

**UL**  
**UL PRODUCT SPEC™** Quickly find, specify, or verify UL Certified products for your projects.

**1. HOW DO YOU WANT TO SEARCH?** **2. RESULTS**

**Search with Specific Parameters**

Select from the following menus, then click Search.

Assembly type: Walls and Partitions	Construct group: 	Protection type: Wood Stud, Gypsum Board, Lath &/or Plaster
Hourly ratings: Rating ≥ 2 hr and < 3 hr	Manufacturer (optional): United States Gypsum	Keyword (optional): Example: "plastic"

**Search**

**Back**



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# UL Product Spec™

**UL**  
**UL PRODUCT SPEC™** Quickly find, specify, or verify UL Certified products for your projects.

**1. HOW DO YOU WANT TO SEARCH?** **2. RESULTS**

Search Assembly type: Walls and Partitions; Protection type: Wood Stud, Gypsum Board, Lath &/or Plaster; Rating: Rating ≥ 2 hr and < 3 hr; Manufacturer: United States Gypsum

Results viewing 1-25 of 26 **1 | 2 | »**

**FIRE-RESISTANCE DESIGN** ^

U301 - BXUV.U301
U302 - BXUV.U302
U308 - BXUV.U308
U309 - BXUV.U309
U332 - BXUV.U332
U334 - BXUV.U334
U336 - BXUV.U336



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# UL Product Spec™

UL PRODUCT SPEC™ Quickly find, specify, or verify UL Certified products for your projects.

1. HOW DO YOU WANT TO SEARCH? 2. RESULTS

**FIRE-RESISTANCE DESIGN**

Assembly Usage Dictionary

**BXUV - Fire Resistance Ratings - ANSUL 263**

**BXUV7 - Fire Resistance Ratings - CANULC-5101 Certified for Canada**

See General Information for Fire Resistance Ratings - ANSUL 263

See General Information for Fire Resistance Ratings - CANULC-5101 Certified for Canada

**Design No. U301**

October 29, 2014

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.

16" O.C. 16" O.C.

4-3 2 1 2x4's Firestopped



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## Code Link feature of Product Spec™

- Correlates model code sections to UL product categories
- Covers many model codes and editions (IBC, IFC, NEC, etc.)
- Flexible search capabilities
- Powerful tool to locate appropriate Listings
- [www.ul.com/codelink](http://www.ul.com/codelink)



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# UL Product Spec™

**UL PRODUCT SPEC™** Quickly find, specify, or verify UL Certified products for your projects.

**1. HOW DO YOU WANT TO SEARCH?** **2. RESULTS**

- > Installation Code
- > Product Type
- > Products, Systems or Assemblies
- > UL Product Category Code
- > Master Format Number



# Code Link

**UL CODE LINK** Quickly find the correlations between building codes and UL Certified products.

**1. HOW DO YOU WANT TO SEARCH?** **2. RESULTS**

National Electrical Code	2014	2011
International Fire Code	2012	2009
NFPA 1: Fire Code	2012	
International Building Code	2012	2009
International Residential Code	2012	2009
Canadian Electrical Code, Part 1	2012	2009
ASHRAE 189.1	2011	
CAL Green	2013	
ICC 700	2012	
International Fuel Gas Code	2012	2009
International Green Construction Code	2012	
International Mechanical Code	2012	2009
International Plumbing Code	2012	2009
International Swimming Pool & Spa Code	2012	



# Code Link

**UL CODE LINK** Quickly find the correlations between building codes and UL Certified products.

**1. HOW DO YOU WANT TO SEARCH?** **2. RESULTS**

National Electrical Code	2014	2011
International Fire Code	2012	2009
NFPA 1: Fire Code	2012	
International Building Code	2012	2009

Enter one of the following search parameters:

**Code Section Number:**  **UL Product Category Code:**

**Search**

International Residential Code	2012	2009
Canadian Electrical Code, Part 1	2012	2009
ASHRAE 109.1	2011	
CAL Green	2013	
ICC 700	2012	
International Fuel Gas Code	2012	2009



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# Code Link

**UL CODE LINK** Quickly find the correlations between building codes and UL Certified products.

**1. HOW DO YOU WANT TO SEARCH?** **2. RESULTS**

Results: 1-15 of 15

INSTALLATION CODE	UL PRODUCT CATEGORY & CODE
IBC 2009: 716.3	Air Terminal Units: BZSU
IBC 2009: 716.3	Ceiling Air Diffusers: BZSU
IBC 2009: 716.3	Ceiling Dampers: CABS
IBC 2009: 716.3	Dampers for Fire Barrier and Smoke Applications: EMME
IBC 2009: 716.3	Curtain Type Fire Doors: GSGX
IBC 2009: 716.3.1	Air Terminal Units: BZSU
IBC 2009: 716.3.1	Ceiling Air Diffusers: BZSU
IBC 2009: 716.3.1	Ceiling Dampers: CABS
IBC 2009: 716.3.1	Dampers for Fire Barrier and Smoke Applications: EMME
IBC 2009: 716.3.1	Curtain Type Fire Doors: GSGX
IBC 2009: 716.3.2.1	Dampers for Fire Barrier and Smoke Applications: EMME
IBC 2009: 716.3.2.1	Curtain Type Fire Doors: GSGX
IBC 2009: 716.3.2.2	Dampers for Fire Barrier and Smoke Applications: EMME
IBC 2009: 716.3.3.1	Dampers for Fire Barrier and Smoke Applications: EMME
IBC 2009: 716.3.3.2	Smoke-Automatic Fire Detectors: UROX

Results: 1-15 of 15

**Print** **Now Search**



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# Code Link

**UL CODE LINK** Quickly find the correlations between building codes and UL Certified products.

**1. HOW DO YOU WANT TO SEARCH?** **2. RESULTS**

**UL PRODUCT CATEGORY**

**EMME**  
Dampers for Fire Barrier and Smoke Applications  
> View certification and installation parameters...

**VIEW UL CERTIFIED PRODUCTS**  
View list

**UL PUBLICATIONS**  
Damper Marking Guide

**UL STANDARDS**  
UL 555 Scope  
UL 555S Scope

Print New Search



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# Code Link

**ONLINE CERTIFICATIONS DIRECTORY** Home Quick Guide Contact Us UL.com

**EMME.GuideInfo**  
Dampers for Fire Barrier and Smoke Applications

[View Listings](#) [Page Bottom](#)

**Dampers for Fire Barrier and Smoke Applications**

[Guide Information for Fire Resistance Ratings](#)  
[Guide Information for Heating, Cooling, Ventilating and Cooking Equipment](#)

**GENERAL**

This category covers fire dampers, smoke dampers (leakage-rated dampers), combination fire and smoke dampers (fire and leakage-rated dampers), and corridor dampers.

**Installation** — All dampers covered under this category are intended to be installed in accordance with the installation instructions provided with the dampers. Authorities Having Jurisdiction should be consulted before installation. Unless otherwise indicated in the installation instructions, the annular space between the sleeves of fire dampers, combination fire and smoke dampers, or corridor dampers and the wall opening should not be filled with firestop materials such as fill, void or cavity materials.

**Air-flow and Pressure Ratings** — Fire dampers for use in dynamic systems, smoke dampers, combination fire and smoke dampers, and corridor dampers are marked with the maximum air flow and static pressure HVAC system conditions for which the damper has been investigated. The air-flow (velocity) ratings are established in increments of 1000 CFM/ft<sup>2</sup> of damper area (FPM), with the minimum being 2000 CFM/ft<sup>2</sup>. The air-flow ratings are established based on test conditions with the damper in the full open position. The static pressure ratings are established in increments of 2 in.WG, with the minimum being 4 in.WG. The static pressure ratings are established based on test conditions with the damper in the full closed position.



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# Code Link

**UL CODE LINK** Quickly find the correlations between building codes and UL Certified products.

1. HOW DO YOU WANT TO SEARCH? → 2. RESULTS

**UL PRODUCT CATEGORY**

**EMME**  
Dampers for Fire Barrier and Smoke Applications  
> View certification and installation parameters...

**VIEW UL CERTIFIED PRODUCTS**  
View list

**UL PUBLICATIONS**  
Damper Marking Guide

**UL STANDARDS**  
UL 555 Scope  
UL 555S Scope

Print New Search



# Code Link

**UL ONLINE CERTIFICATIONS DIRECTORY** Home Quick Guide Contact Us UL.com

**Search results**

You may choose to [Refine Your Search](#).

Company Name	Category Name	Link to File
AIR BALANCE INC	Dampers for Fire Barrier and Smoke Applications	<a href="#">EMME.R4708</a>
AIR MANAGEMENT INC	Dampers for Fire Barrier and Smoke Applications	<a href="#">EMME.R22333</a>
AIR MASTER EQUIPMENTS EMIRATES L L C	Dampers for Fire Barrier and Smoke Applications	<a href="#">EMME.R21172</a>
AIRE TECHNOLOGIES INC	Dampers for Fire Barrier and Smoke Applications	<a href="#">EMME.R17066</a>
ALDES MIDDLE EAST	Dampers for Fire Barrier and Smoke Applications	<a href="#">EMME.R25305</a>
ALUMAVENT INC	Dampers for Fire Barrier and Smoke Applications	<a href="#">EMME.R25565</a>
AMERICAN WARMING & VENTILATING	Dampers for Fire Barrier and Smoke Applications	<a href="#">EMME.R16398</a>
ARABIAN THERMAL AIRE INDUSTRIES CO LTD	Dampers for Fire Barrier and Smoke Applications	<a href="#">EMME.R25079</a>
ARLAN DAMPER CORP	Dampers for Fire Barrier and Smoke Applications	<a href="#">EMME.R8610</a>
ARROW UNITED INDUSTRIES, DIV OF MESTEK	Dampers for Fire Barrier and Smoke Applications	<a href="#">EMME.R19235</a>

Page: 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9

Model number information is not published for all product categories. If you require information about a specific model number, please contact [Customer Service](#) for further assistance.



## Additional Resources

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- Firestop Contractors International Association [www.FCIA.org](http://www.FCIA.org)
- National Fireproofing Contractors Association [www.NFCA-online.org](http://www.NFCA-online.org)



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## Questions / Comments



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Thank You for Attending!!!

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**Bruce E. Johnson**  
Codes and Advisory Services Department  
Underwriters Laboratories

Bruce.Johnson@UL.com  
(631) 680-5174

[www.ul.com](http://www.ul.com)



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# Restrained and Unrestrained Assemblies – What Designers and AHJs Need to Know

By **Richard N. Walke** / Senior Regulatory Engineer

*Section 703.2.3 of the International Building Code (IBC) specifies that fire-resistance-rated assemblies tested in accordance with ASTM E119 or UL 263 are not to be considered to be restrained unless evidence satisfactory to the building official is furnished by the registered design professional showing that the construction qualifies for a restrained classification in accordance with ASTM E119 or UL 263. It also specifies that restrained construction shall be identified on the construction documents.*

Knowing that a rated assembly qualifies as restrained construction in some cases reduces the amount of protection required to achieve a given rating. This article describes two sources of information that can be used to demonstrate if an assembly can be considered restrained.

The two tests standards used to determine fire-resistance ratings, ASTM E119 and UL 263, the Standard for Fire Tests of Building Construction and Materials, both define restraint in buildings. UL 263 states, “Floor-ceiling and roof-ceiling assemblies and individual beams in buildings should be considered restrained

when the surrounding or supporting structure is capable of resisting substantial thermal expansion throughout the range of anticipated elevated temperatures. Constructions not complying with this definition are assumed to be free to rotate and expand and should be therefore considered as unrestrained.”

Both test standards contain Conditions of Acceptance for determining restrained and unrestrained ratings of horizontal assemblies based on the data generated during fire testing. The resulting published certifications provide both restrained and unrestrained ratings, along with

descriptions of the protection needed to achieve each rating. The decision on which of the published rating to use is dependent on whether the construction in question is restrained or unrestrained based on the above definition of restraint. The requirements for unrestrained ratings are more conservative, often requiring more fire protection. And since they are more conservative, they can always be used in conditions where the assembly is judged to be restrained.

## Determining restrained conditions

One source of information that can be used to help determine if a rated assembly is being installed in a restrained application (as referenced in IBC Section 703.2.3) is included in Appendix C of UL 263. The other is information included in the UL Guide Information for Fire Resistance Ratings – UL 263 (BXUV). Once the restrained versus unrestrained determination has been made and approved by the building official, the designer and involved contractors follow the published certification to determine the required fire protection to achieve the required rating.

### Table C1.1 of UL 263

Appendix C1.1 of UL 263 provides general information with respect to the use of



the restrained and unrestrained ratings published in the various certifications of horizontal assemblies.

The definition of restraint in buildings specified in Table C1.1 requires the exercise of engineering judgment to determine what constitutes restraint to “substantial thermal expansion.” Restraint may be provided by the lateral stiffness of supports for floor and roof assemblies and intermediate beams forming part of the assembly. In order to develop restraint, connections must adequately transfer thermal thrusts to such supports. The rigidity of adjoining panels or structures should be considered in assessing the capability of a structure to resist thermal expansion. Continuity, such as that occurring in beams acting continuously over more than two supports, will induce rotational restraint, which will usually add to the fire resistance of structural members. Table C1.1 of UL 263 (shown below) addresses common types of constructions and specifies whether that construction is considered as restrained or unrestrained. Having these examples in mind, the user should be able to rationalize the less common types of construction.

The foregoing methods of determining the presence or absence of restraint, according to the type and detail of construction, represent only one procedure for establishing fire-resistance ratings. This procedure alone does not represent all restrained and unrestrained construction conditions.

## UL Guide Information for Fire Resistance Ratings – UL 263 (BXUV)

Since the information shown in Table C1.1 of UL 263 may not be appropriate for all conditions of restraint in actual structures, the UL Guide Information for Fire Resistance Ratings – UL 263 provides additional guidance. It also recognizes the exercise of engineering judgment is required to determine what constitutes “substantial

### UL 263, Table C1.1: Considerations of restraint for common construction

I. Wall Bearing:	
<b>A. Single Span and simply supported end spans of multiple bays.a</b>	
1. Open-web steel joist or steel beams supporting concrete slab, precast units or metal decking	<b>Unrestrained</b>
2. Concrete slabs, precast units, or metal decking	<b>Unrestrained</b>
<b>B. Interior spans of multiple bays.</b>	
1. Open-web steel joists, steel beams, or metal decking supporting continuous concrete slab	<b>Restrained</b>
2. Open-web steel joists or steel beams, supporting precast units or metal decking	<b>Unrestrained</b>
3. Cast-in-place concrete slab systems	<b>Restrained</b>
4. Precast concrete where the potential thermal expansion is restricted by adjacent construction <sup>b</sup>	<b>Restrained</b>
II. Steel Framing:	
<b>A. Steel beams welded, riveted, or bolted to the framing members</b>	<b>Restrained</b>
<b>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</b>	<b>Restrained</b>
<b>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 members or the adjoining floor or roof construction<sup>b</sup></b>	<b>Restrained</b>
III. Concrete Framing:	
<b>A. Beams securely fastened to the framing members</b>	<b>Restrained</b>
<b>B. All types of cast-in-place floor or roof systems, such as beam-and-slabs, flat slabs, pan joists, and waffle slabs, where the floor systems is cast with the framing members</b>	<b>Restrained</b>
<b>C. Interior and exterior spans of precast systems with cast-in-place joints resulting in restraint equivalent to that which would exist in Condition III, item <sup>A</sup></b>	<b>Restrained</b>
<b>D. All types of prefabricated floor or roof systems where the structural members are secured to such systems and the potential thermal expansion of the floor or roof system is resisted by the framing system or the adjoining floor or roof construction<sup>b</sup></b>	<b>Restrained</b>
IV. Wood Construction:	
<b>A. All types</b>	<b>Unrestrained</b>

<sup>a</sup> Floor and roof systems can be considered restrained if they are tied into walls with or without tie beams, and the walls are designed and detailed to resist thermal thrust for the floor or roof system.

<sup>b</sup> For example, resistance to potential thermal expansion is considered to be achieved if:

1. Continuous structural concrete topping is used.
2. The space between the ends of precast units or between the ends of units and the vertical face of supports is filled with concrete or mortar.
3. The space between the ends of precast units and the vertical faces of supports or between the ends of solid or hollow core slab units does not exceed 0.25% of the length for normal-weight concrete members or 0.1% of the length for structural light-weight concrete members.

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thermal expansion” when determining the conditions under which the restrained or unrestrained ratings should be used.

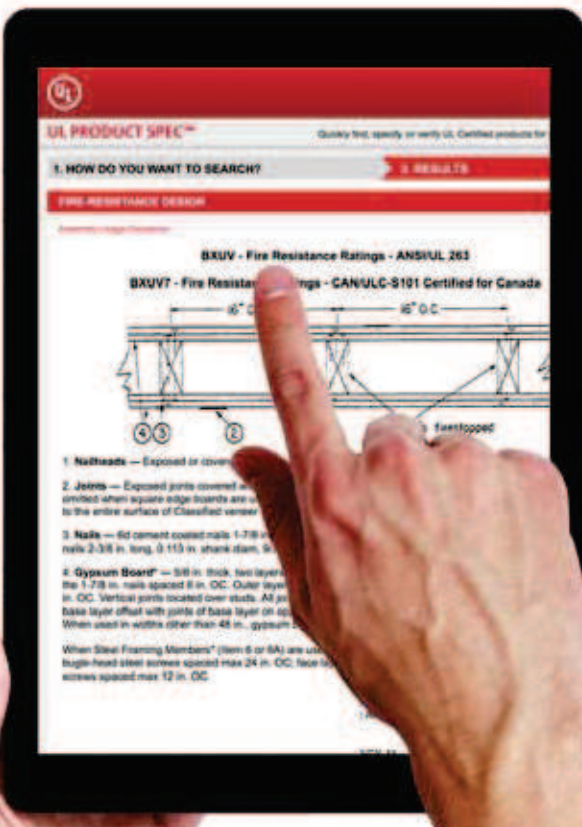
Restrained conditions for the fire-test assemblies are provided by constructing floor, roof and beam test assemblies within nominal 14-foot by 17-foot frames of composite steel/concrete cross sections having an approximate stiffness (EI/L) of 850,000 kip-in. and 700,000 kip-in. along the 14 foot and 17 foot sides, respectively. The frame stiffness remains constant throughout the fire test because the test frame is insulated from the fire environment.

When applying the published restrained ratings, it is recognized that the individual responsible for the design of the fire-resistance-rated construction may ascertain that a different degree of restraint may be provided to the building assembly during a fire condition than was provided to the test sample during the fire test. Under these conditions, the designer may review the Conditions of Acceptance for restrained and unrestrained assemblies and beams in UL 263 for additional guidance in determining whether restrained or unrestrained ratings should be specified.

### Summary

As can be seen in the information included in UL 263, Appendix C reproduced above, and in the UL Guide Information for Fire Resistance Ratings – UL 263, can be utilized by the design professional to demonstrate that a given construction qualifies for a restrained classification in accordance with UL 263.

For more information on restrained and unrestrained ratings, please contact Rich Walke in Northbrook, Ill., at [Richard.N.Walke@ul.com](mailto:Richard.N.Walke@ul.com), or at +1.847.664.3084.



## Web Compliance Tool Updated

*Al Ramirez / Regulatory Services Regional Manager*

UL Product Spec™, UL's newest web database, now contains correlations to the most popular 2015 International Code Council Installation codes. Specifically, Product Spec now includes 2015 editions of the International Building Code (IBC), International Fire Code, International Residential Code and International Mechanical Code. The update provides links to more than 10,000 UL Certified Products to code sections and retains 2012 editions to access for municipalities still basing their installation regulations on previously published codes. Overall, Product Spec contains over 20 of the most common model installation codes enforced in the United States and Canada. Besides correlations to installation codes, UL Product Spec contains multiple UL Certified product search options and correlation to MasterFormat specifications. UL Product Spec can be accessed at [ul.com/productspec](http://ul.com/productspec).