National Fireproofing Contractors Association

Fire-Resistance Code Requirements, Standards and Testing

Rich Walke, Consultant to the NFCA

NFCA FREE Webinar Series

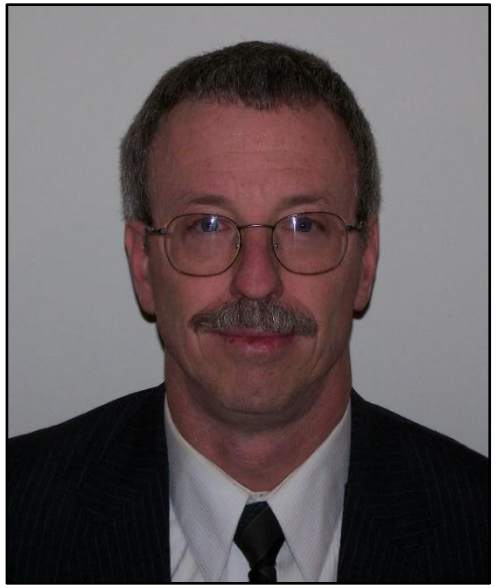
Learn – Network – Grow

February 22, 2022

Today's Presentation

National Fireproofing Contractors Association

"Fire-Resistance Code Requirements, Standards and Testing"



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National Fireproofing Contractors Association

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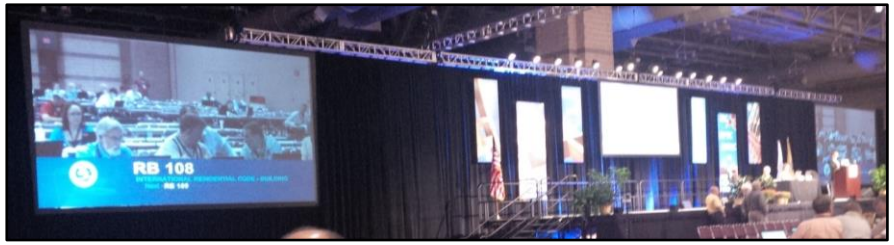
What Does NFCA Provide?

National Fireproofing Contractors Association

- World-Class SFRM & IFRM Fireproofing Instruction
- Educational Conference
  - Network with top Fireproofing Contractors, Manufacturers, Associates
  - A forum for suppliers and contractors to learn from one another
- NFCA Contractor Accreditation Program for IFRM & SFRM
  - Educated fireproofing Companies
- NEW UL Qualified SFRM Contractor Program – SPECIAL PRICES NOW
- NFCA Website to find Fireproofing Leaders – NFCA-online.org
- NFCA 100-400 Standards for quality and life safety
- Technical expertise
- Standards and code development

What does NFCA Do?

- NFCA @ ICC Codes…
  - 2021/2024 SFRM/IFRM Proposals…
- NFCA @ ASTM Task Groups - Fireproofing
- NFCA @ NFPA Fire Protection Features
- NFCA @ AISC, AISI
- NFCA @ National Codes, Canada
- NFCA @ American Institute of Steel Construction & American Iron and Steel Institute
- Life Safety Digest Articles
  - Thermal Barriers, Patching, more…
- NFCA @ SFPE/ASCE Meetings
- NFCA requests IAS add NFCA Fireproofing Exam
- NFCA Committee ACTIONS



ASTM INTERNATIONAL

ICC INTERNATIONAL CODE COUNCIL
People Helping People Build a Safer World™

NFPA

NEW NFCA Handbook of Accepted Fireproofing Knowledge (HAFK)

National Fireproofing Contractors Association

- Study Resource for NFCA Fireproofing Exams
- Fireproofing in ‘One Place’
- NFCA Members = $500 Discount
- FREE HAFK PDF for AHJ’s & Specifiers with Design Firms, Independent Specifiers
- More New Chapters coming…
  www.nfca-online.org

NFCA Award of Excellence
CALL FOR ENTRIES

National Fireproofing Contractors Association

- Recognizes NFCA Contractor Members for an exceptional fireproofing project demonstrating innovation & safety.
- Projects submitted should exceed standard fireproofing practices and should be unique and creative, demonstrating excellence in innovation and safety.
- **Entry Deadline** – January 31, 2021
- Go to www.NFCA-online.org for entry form and details.
- Winners announced at the 2021 NFCA Fireproofing Educational Conference

NFCA Upcoming Educational Events

National Fireproofing Contractors Association

- **NFCA Free Webinar Series Upcoming Dates:**

  For 2021, Watch NFCA-Online.org –

- **NFCA 2021 Fireproofing Educational Conference**
  - **DATE & FORMAT TBD … Likely Fall.**

- **NFCA 2021 Education for NFCA Fireproofing Exams**
  - **Likely Q2 VIRTUAL & Fall LIVE**
  - **NFCA Contractor Accreditation Program**
  - **UL Qualified SFRM Contractor Program**

NFCA Membership

National Fireproofing Contractors Association

- Thank you NFCA Members – You make NFCA programs possible!
- Not a Member? Join Now!
- Annual Contractor Membership $1400
- Contact Sandy@nfca-online.org for an application
- NFCA Membership is an investment in your company and your industry

Today's Presentation

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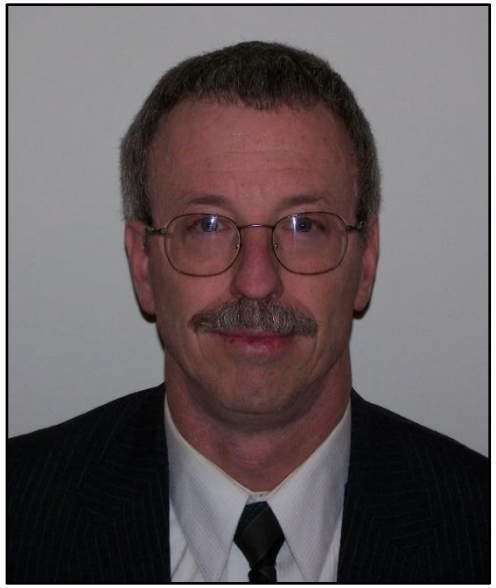

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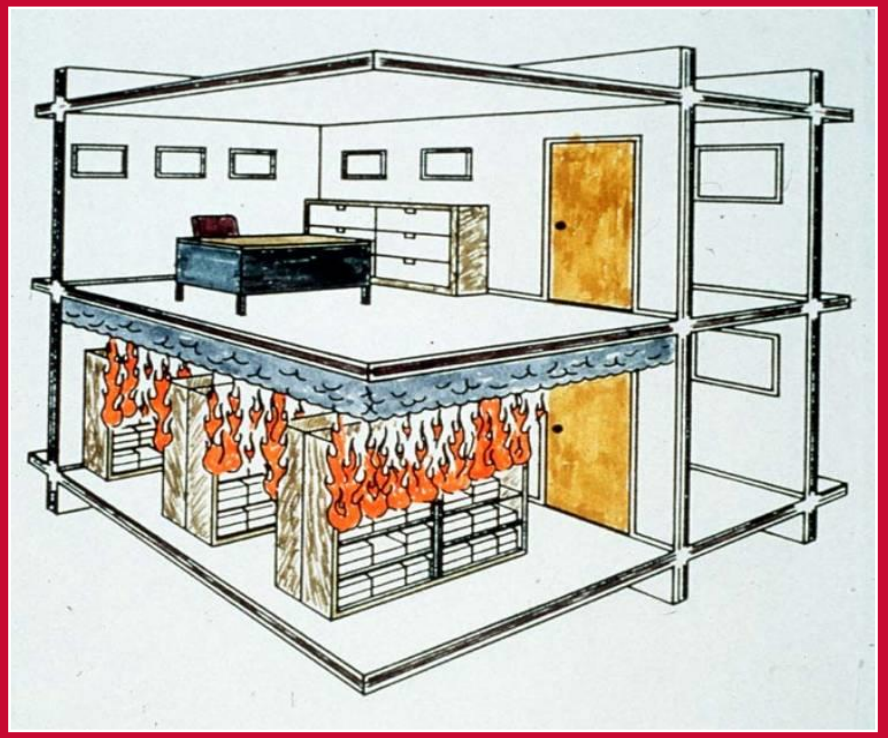
Fire-Resistance-Rated Construction



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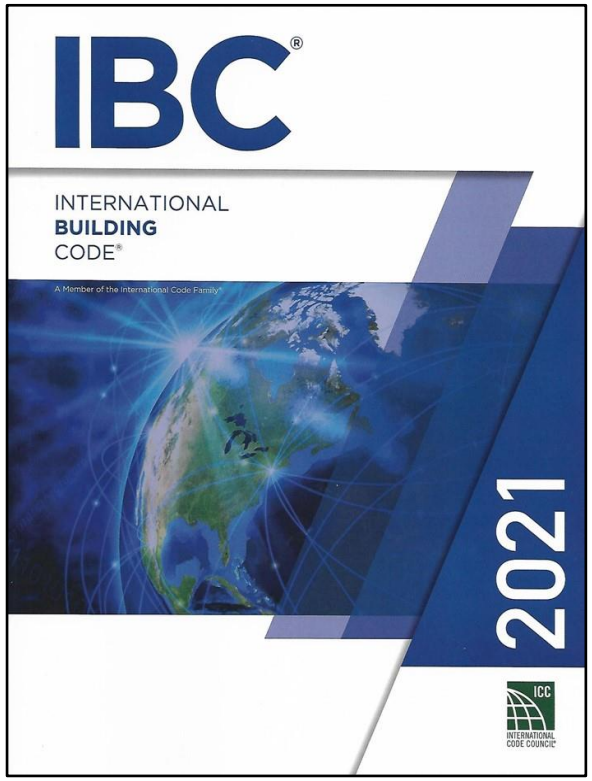
Fire-Resistance-Rated Construction

Code Requirements for Fire-Resistance-Rated Construction



IBC Requirements

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

Code Requirements Cont.

- Section 508 – Covers mixed use considerations
- Chapter 6 – Types of Construction
  - Table 601 – Establishes hourly rating required for building elements based on Type of Construction
  - Table 705.5 (Formerly Table 602) – Establishes hourly rating required for exterior walls based on fire separation distance, type of construction and occupancy

Code Requirements Cont.

- Chapter 7 – Fire and Smoke Protection Features
  - 703.2 – Fire-resistance ratings shall be determined in accordance with Section 703.2.1 or 703.2.2 without the use of automatic sprinklers or any other fire suppression system being incorporated, or in accordance with Section 703.2.3
    - 703.2.1 **Tested assemblies** – Fire-resistance ratings shall be determined in accordance with ASTM E119 or UL 263
      - 703.2.1.1 – Nonsymmetrical walls shall be tested from both faces

Code Requirements Cont.

- 703.2.1.3 – Assemblies considered unrestrained unless registered design professional provides evidence satisfactory to AHJ that construction qualifies for restrained classification per ASTM E119 or UL 263

Code Requirements Cont.

- 703.2.2 **Analytical methods** – Methods for determining fire resistance shall be based on fire exposure and acceptance criteria of ASTM E119 or UL 263

Code Requirements Cont.

- 703.2.2 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 E119 or UL 263
  - Fire-resistance designs certified by an approved agency

Code Requirements Cont.

- 703.2.3 **Approved alternate methods** – Required fire resistance permitted to be established by alternate protection methods in accordance with Section 104.11

Fire Resistance – Summary

- Chapters 3, 4, 5, 6 and 10 establish the required ratings
- Chapter 7 establishes how the rating is determined
- Rating expressed as an Hourly Time Period
- Ratings range from 1/2 to 4 hours
- Contain Fire to Room or Floor of Origin and Maintain Structural Integrity

Fire-Resistance-Rated Construction

Establishing
Fire-Resistance Ratings

UL Image

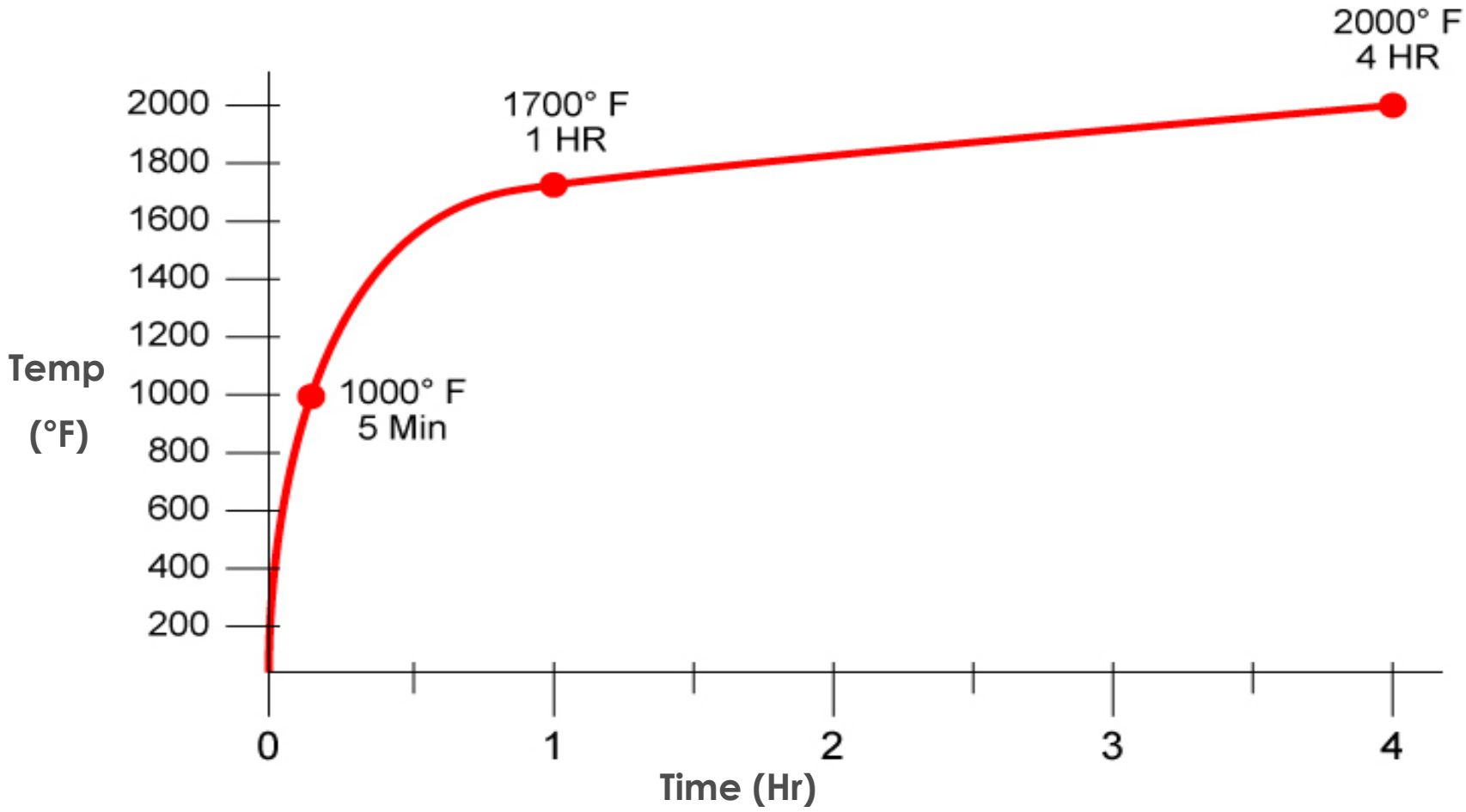
Standards

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

Building Components

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

Time – Temperature Curve



Columns

- Sample size – Minimum 9 ft
- Tested unloaded

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Conditions of Acceptance – Columns

- 1000ºF / 1200ºF

OR

Support load if tested load bearing

UL Image

Beams

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

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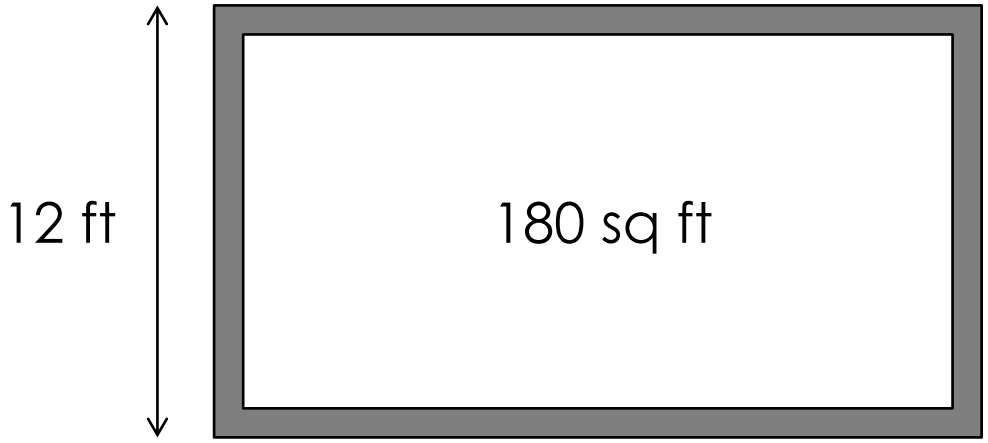
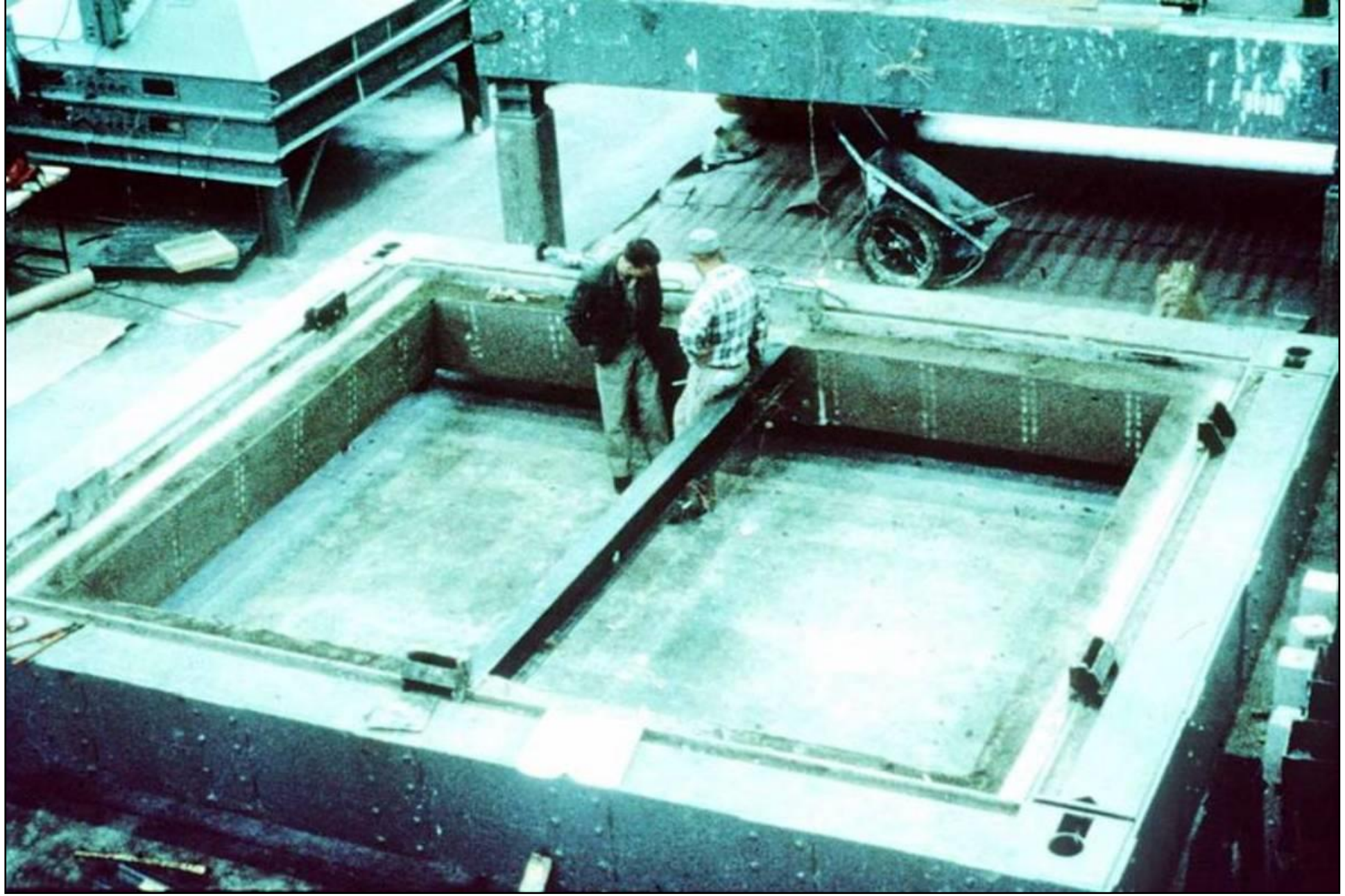
Conditions of Acceptance – Beams

- Support load
- 1100ºF / 1300ºF

Floor/Ceiling or Roof/Ceilings

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





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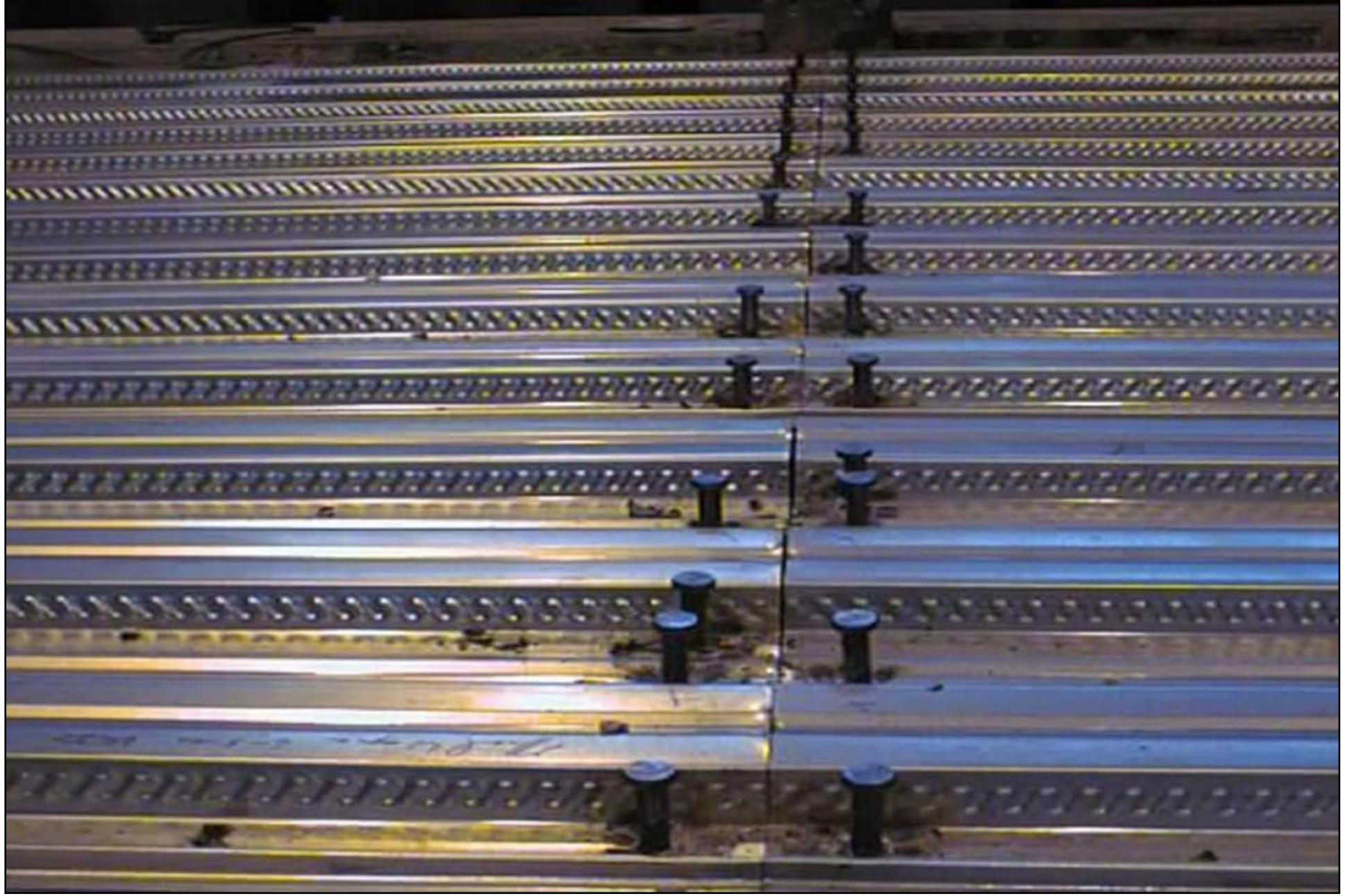

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Conditions of Acceptance
Floor/Ceilings or Roof/Ceilings

- Support load
- Flame passage
- 250ºF / 325ºF
- Support temperatures

UL Image

Fire-Resistance-Rated Construction

Common Questions, Misconceptions and Misunderstandings

Question, Misconception or Misunderstanding No. 1

- What is the difference between ASTM E119 / UL 263 and ULC-S101?
  - ASTM E119 and UL 263 are US based standards and are referenced in US based codes and international codes which are based on US codes (e.g. UAE Fire & Life Safety Code)
  - ULC-S101 is Canadian based, published by Underwriters' Laboratories of Canada and is referenced in Canadian based codes
  - Technical content is identical

Question, Misconception or Misunderstanding No. 2

- What is the difference between a UL listing, a cUL listing and a ULC listing?
  - A UL listing is issued by UL based on US standards and is intended to address US based code requirements. A UL listed product will bear a mark which will include one of the following UL logos.

Question, Misconception or Misunderstanding No. 2 Cont.

- A cUL listing is issued by UL based on Canada standards and is intended to address Canadian based code requirements. A cUL listed product will bear a mark which will include one of the following UL logos.

Question, Misconception or Misunderstanding No. 2 Cont.

- A ULC listing is issued by ULC based on Canada standards and is intended to address Canadian based code requirements. A ULC listed product will bear a mark which will include the following UL logo.

Question, Misconception or Misunderstanding No. 2 Cont.

- Many products will bear a UL and a cUL mark issued by UL. This mark signifies the product was investigated by UL based on both US and Canada standards and is intended to address both US and Canadian based code requirements. Such product will bear a mark which will include one of the following UL logos.

Question, Misconception or Misunderstanding No. 3

- Is it necessary to leave space around a building element which is protected with an intumescent fire-resistive material?
  - Yes, an intumescent fire-resistive material need space for free expansion in order to develop the proper char formation. The UL Guide Information for Fire-resistance Ratings – ANSI/UL 263 states: "Unless otherwise detailed in the individual designs, mastic and intumescent coatings are tested without any covering adjacent to the tested member that might interfere with the expansion of the coating. The effect on the fire-resistance rating of steel members (beams, columns, etc.) caused by any covering that would interfere with the expansion of a mastic and intumescent coating during a fire has not been investigated. Contact the manufacturer for their required clearance around structural members protected with mastic and intumescent coatings."

Question, Misconception or Misunderstanding No. 4

- The building configuration prevents the application of protection on one side of a beam or column. What can be done to properly protect this element?
  - Tested and listed designs from UL and other are tested with protection on all exposed sides. As such, some type of protection is needed.
  - Mfrs have developed a number of creative solutions, typically ending in an Engineering Judgment.
  - Contact your manufacturer when the situation develops.

Question, Misconception or Misunderstanding No. 5

- Does “small-scale” testing have a place within fire-resistive construction?
  - Generally no! ASTM E119 and UL 263 require min sample sizes to allow for realistic deflection during the fire tests. “Small scale” testing does not allow for this deflection resulting in a less critical test. Also, small-scale assemblies typically can not be loaded as required by the standards.
  - “Small-scale” testing is used very judicially to ***supplement*** full-scale testing.
    - If “small-scale” testing is suspected, ASK THE QUESTION!!!

Question, Misconception or Misunderstanding No. 6

- Are horizontal assemblies (floors and roofs) required to be loaded during a fire resistance test?
  - Yes, ASTM E119 and UL 263 require assemblies be loaded to their maximum-load condition allowed under nationally recognized structural design criteria unless limited design criteria are specified
    - Very few assemblies have been tested at a reduced load
    - If tested at a reduced load, design will clearly specify the loading applied
    - If loading is not specified in documentation, ASK THE QUESTION!!!

Question, Misconception or Misunderstanding No. 7

- Engineering judgments (EJs) represent a “Get out of Jail Free” card to avoid the use of a tested design!
  - Absolutely not! Engineering judgments are not a substitute for tested designs and should only be used after exhausting the search for a tested design.
  - Concept of EJs based on IBC Section 703.2.2:
    - 703.2.2 – Methods for determining fire resistance shall be based on fire exposure and acceptance criteria of ASTM E119 or UL 263. The required fire resistance permitted to be established based on any of the following:

      4. Engineering analysis based on ASTM E119 or UL 263

Question, Misconception or Misunderstanding No. 7 Cont.

- EJs should only be issued by those with a thorough understanding of the performance of the materials and assemblies in question
  - PE
  - FPE
  - Manufacturer
  - Testing Lab
- **Ask for a Resume or CV of the individual issuing the EJ to better understand their qualifications**
- EJs issued for a specific job site

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Thanks for Attending!!!

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Rich Walke, Consultant to the NFCA
National Fireproofing Contractors Association
4415 W. Harrison St., #540
Hillside, IL 60162
(708) 236-3411