National Fireproofing Contractors Association

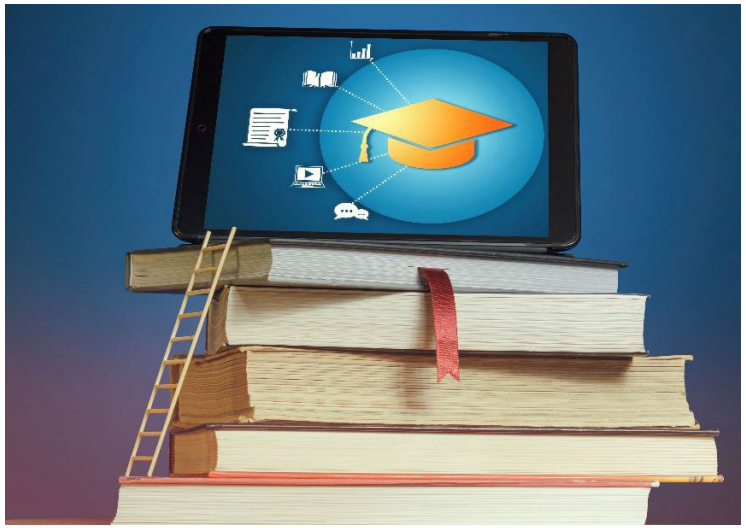
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Dr. Gabby Peck, Ph.D., MRSC
Technical Director

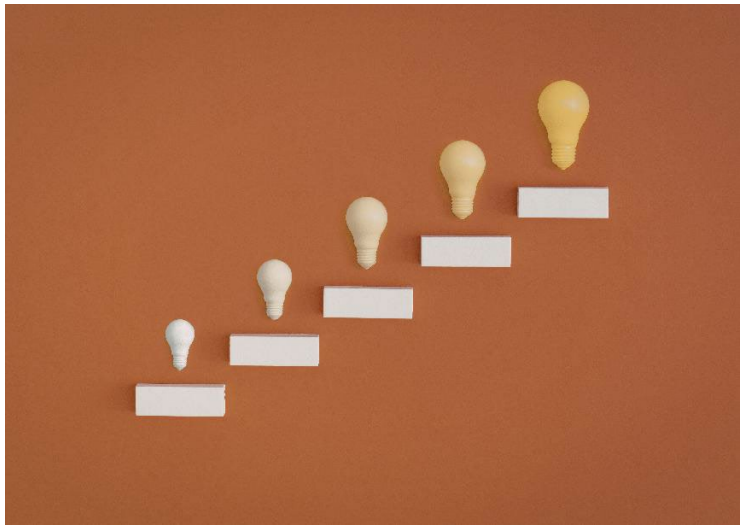
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Elevate your fireproofing standards with NFCA's expert resources.

The National Fireproofing Contractors Association (NFCA) has crafted dynamic, industry-consensus Standard Practices and Quality Assurance Procedures to guide the precise application and quality assurance procedures of fireproofing products, such as SFRM and IFRM. These are the industry authority documents, designed to ensure compliance and excellence and uniform industry practices, provide clear, actionable guidelines for contractors and construction professionals to achieve consistent, high-quality installations that meet rigorous safety and performance standards.

Explore the NFCA Approved documents below, essential tools for enhancing building safety and project success.

- NFCA 100 Standard Practice for the Application of Sprayed Fire-Resistive Material
- NFCA 200 Field Quality Assurance Procedure for the Application of Sprayed Applied Fire-Resistive Material
- NFCA 300 Standard Practice for the Application of Intumescent Fire-Resistive Material
- NFCA 400 Field Quality Assurance Procedure for the Application of Intumescent Fire-Resistive Material

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2025

12/16/2025 - 'What the Structural Fireproofing Discipline Needs to Know about Firestopping Penetrations and Fire-Resistive Joints' with Bill McHugh (FCIA), Carl Fernald (PCI -Tampa), Gus Mancini (Gleeson Powers), and Rich Walke (CTI)

11/11/2025 - 'The Most Commonly Misunderstood Code Requirements for Structural Fire-Resistance: Part II' with Tony Crimi (AC Consulting Solutions), Bill McHugh (NFCA), and Rich Walke (CTI)

09/17/2025 - 'Fireproofing Fluted Metal Decks-to-Beam Connections' with Bill McHugh (NFCA), Carl Fernald (Performance Contracting, Inc.), and Rich Walke (CTI)

08/05/2025 - 'The Most Commonly Misunderstood Code Requirements for Structural Fire-Resistance' with Tony Crimi (A.C. Consulting Solutions), Bill Koffel (Koffel Associates), Bill McHugh (NFCA), and Rich Walke (CTI)

07/15/25 - Thermal & Ignition Barrier Requirements for Foamed Plastic with John Dalton (Saint-Gobain)

06/17/25 - Growing the Available Market While Unlocking Carbon Savings in Steel Buildings with Galen Burrell (Saint-Gobain)

04/14/25 - Excellence in Fireproofing Projects - The 2025 NFCA Award of Excellence Winning Projects

03/25/25 - Fireproofing Materials and Fire-Resistance

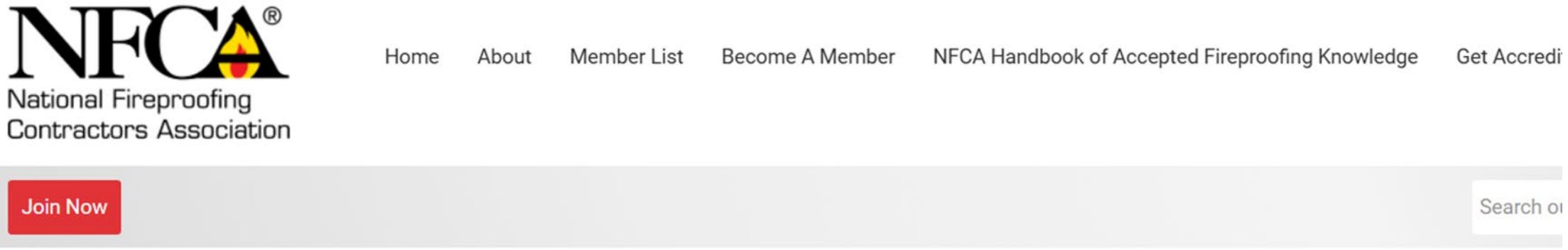
02/25/25 - Fireproofing Inspection with Bill McHugh (NFCA)

01/14/25 - The ASTM E119, UL 263, and CAN/ULC S101 Fire Test Standards with Rich Walke (CTI)

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Fireproofing Products

Fireproofing protection products protect structural steel framed buildings and are categorized into Sprayed Fire-Resistive Material (SFRM), Intumescent Fire-Resistive Material (IFRM) and Rigid Board Fire Protection. The following information separates products into these several categories and is intended to provide general information about various types of fire protection products. Manufacturer's information can be easily accessed by clicking on the Manufacturers name in the Manufacturers Section of this web site. Product details are available at the manufacturers website.

- Sprayed Fire-Resistive Materials (SFRM)
- Intumescent Fire-Resistive Material (IFRM)
- Rigid Board Fire Protection

GET ACCREDITED:



NFCA online exam registrations now open for August ‘26

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SAMPLE
Contractor Name
Location

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National Fireproofing
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TODAY'S SESSION

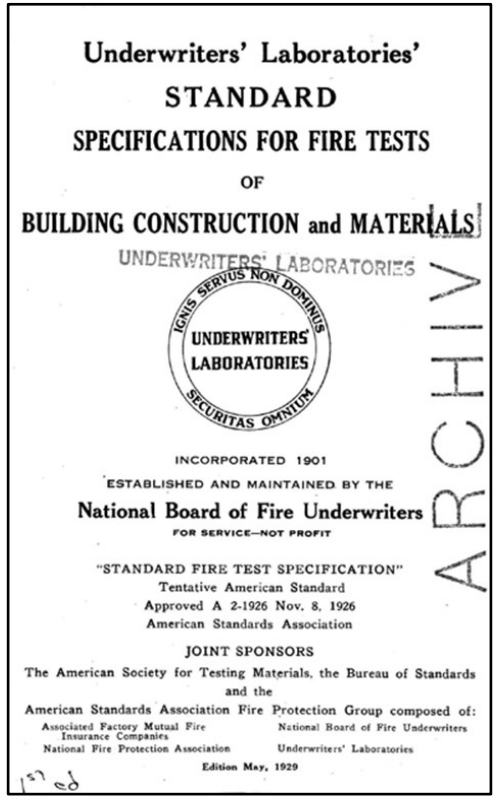
The History of ASTM E119 and UL 263

Kevin Hyland, UL Principal Engineer
Rich Walke, Consultant to NFCA

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Underwriters' Laboratories'
STANDARD
SPECIFICATIONS FOR FIRE TESTS
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"STANDARD FIRE TEST SPECIFICATION"
Tentative American Standard
Approved A 2-1926 Nov. 8, 1926
American Standards Association
JOINT SPONSORS
The American Society for Testing Materials, the Bureau of Standards and the
American Standards Association Fire Protection Group composed of:
Associated Factory Mutual Fire Insurance Companies
National Board of Fire Underwriters
National Fire Protection Association
Underwriters' Laboratories
Edition May, 1929

October 23, 2026

Kevin Hyland

Principal Engineer for Fire Resistance and Containment, UL Solutions

- 29 years at UL Solutions
- 2024 Inductee into the William Henry Merrill Society as a UL Distinguished Member of Technical Staff
- UL 263 (ASTM E119), ULC S101, UL 1709 Columns, beams, floors, roofs, walls, gypsum board, IFRM's, SFRM's, concrete blocks
- UL 1479, UL 2079, ASTM E2307 Penetrations and joints
- ASTM E05.11 Fire Resistance
- ASTM E06.21 Serviceability
- ISO TC 92 SC2 Fire Resistance (head of U.S. delegation)



Rich Walke

Consultant to NFCA

- Retired from UL after 43 years
- 2008 Inductee into the William Henry Merrill Society as a UL Distinguished Member of Technical Staff
- 29 years conducting and supervising investigations on surface flammability, factory built air duct products, fire-resistance-rated construction, firestop systems, joint systems and perimeter fire containment systems
- Developed test method and test equipment for testing joint systems and perimeter fire containment systems
- 14 years in the UL Codes and Regulatory Services Department
- Member of ICC Fire Safety Committee during 2018 and 2021 code development cycles
- Member of NFPA 101/5000 Fire Protection Features Committee



Fire-Resistance in Commercial Construction

Past



Past – The Early Years – Global Efforts

- Earliest fire-resistance testing known was in London in the 1790s, done by The Associated Architects
  - Evaluated floor assemblies fireproofed using steel plates vs stucco
- Next record of floor fire testing, also from London, was in 1877
  - Evaluated the performance of reinforced concrete floors.

Past – The Early Years – Global Efforts

- Column testing began in Germany in 1884
- Next recorded column testing was done in Austria in 1887
- Wall testing began in Germany in 1891
  - Compared wood walls with proprietary wallboard walls
- Floor testing began in Germany in 1893

Past – The Early Years – US

- In the 1870s, larger height and areas made load-bearing masonry too costly
- By the 1880s, steel frame construction became more common
- Non combustible equals fire resistive??? Wrong!!!
- Early attempts at fireproofing steel used intuitive methods, such as terra-cotta tile on steel
- “Codes” were prescriptive but vague

Past – The Early Years – US

- In the 19th century, differentiation between fire resistance and non combustible was often confused.
- Early “codes” required non combustible construction, thinking that meant the building would withstand a fully evolved fire.
- Non combustible may not equal fire resistance due to:
  - Spalling and fracturing of some non combustible materials
  - Some n/c materials lose their strength at elevated temperatures
  - Methods of construction

Past – The Early Years – US

- As fire incident reports became available, these intuitive methods proved inadequate
- 1906 SF earthquake / fire generated many lessons of how not to fireproof buildings
  - Protection materials delaminated
  - Tiles cracked when hit with water from fire fighting efforts

Past – The Early Years – US

- First fire tests in US began in the 1890s
- 1890 Denver Tests – Fire and Hose Stream Test on floors
- 1891 St Louis Tests – Fire Tests on concrete arched floors protected with hung clay tiles
- 1896 New York Tests – Fire and Hose Stream Tests on loaded floor assemblies

Past – The Early Years – US

- 1896 New York Tests – Fire and Hose Stream Tests on unprotected steel and cast iron columns
- All of above test were ad hoc tests conducted using method developed by group conducting tests. No standardized test method existed.

Past – The Early Years – US

- First permanent test furnaces were constructed in 1902 in NY to conduct standardized tests for NYC
  - 18 by 21 ft floor furnace
  - 10 by 15 ft wall furnace
  - Few details available on furnaces or test results
  - Presumably constructed based on “standard” included in 1899 NYC Building Code

Past – The Early Years – US

- UL developed permanent wall furnace in Chicago in 1903
  - Intended for testing fire doors and fire windows, but later used for testing walls. First wall tests focused on non-combustible materials
  - Gas-fired
  - 9 by 12 ft in size
  - Considered the first “modern” furnace

Past – The Early Years – US

- UL developed permanent floor furnace in Chicago in 1912
  - Few details available on furnaces or test results

Past – The Early Years – US

- UL conducted first standardized column tests between 1917 and 1920.
  - Conducted more than 100 tests on steel, cast iron, reinforced concrete and timber columns
  - Gas-fired furnace
  - Specimen loaded during fire test
  - Rating established based on temperature

Past – The Early Years
Development of ASTM Test Standard

- First standard for fire-resistance-rated floor assemblies promulgated as part of the NYC Building Code in 1899. Presumably standard was based on early testing done in NY.
- ASTM began work on standard in 1904
  - New standard initially cover “Fire-Proof Floor Construction”
  - Based on NYC Building Code Standard
  - Hose stream applied after fire exposure
  - Conceptually parameters of test similar to those today

Past – The Early Years
Development of ASTM Test Standard

- Conditions of Acceptance
  - No flame through or passage of smoke
  - No collapse
  - Permanent deflection no more than1/96 of length

Past – The Early Years
Development of ASTM Test Standard

- ASTM began work on a separate standard in covering non-load bearing walls in 1909
  - Conditions of Acceptance
    - No flame through or passage of smoke
    - Sustain the hose stream test
    - No “warp or bulge, or disintegration to an extent as to be unsafe”

Past – The Early Years
Development of ASTM Test Standard

- ASTM published ASTM C19 in 1918
  - Covered floor assemblies and non-load bearing partitions
  - Used Standard Time-Temperature curve developed by UL in 1916
    - Curve recognizes it takes time to heat up furnace.
    - Curve is an idealization of curves used by the various tests conducted prior to 1916
    - Curve remains unchanged today
  - Test conducted 25% longer than desired rating

Past – The Early Years
Development of ASTM Test Standard

- Partition specific criteria
  - Minimum specimen size of 9 by 14 ft
  - Hose stream applied after fire exposure
- Conditions of Acceptance for partitions
  - No flame through
  - Unexposed surface temperature shall not exceed 300°F (149°C)
  - Sustain the hose stream test
  - No “warp or bulge, or disintegration to an extent as to be unsafe”

Past – The Early Years
Development of ASTM Test Standard

- Floor specific criteria
  - Floor loaded to maximum working stress during fire test
  - Hose stream applied after fire exposure
  - After cooling, floor loaded to 2-1/2 times maximum working stress
- Conditions of Acceptance for floor assemblies
  - No flame through
  - No collapse

Past – The Early Years
Development of ASTM Test Standard

- Questions persisted after publication of ASTM C19 on Efficacy of Time-Temperature curve
  - Did curve accurately represent both wood and metallic furniture?
  - Multiple burn-out studies conducted. Concluded that assembly achieving a 4 hr rating by this curve would survive a burn-out.
  - Determined that area under curve, not specific curve, defined fire. This may not be true for intumescent products.
  - Concluded multiple curves for different occupancies was impractical
  - Curve remains today as originally published

Past – Development of ASTM Test Standard 1926 Evolutionary Changes

Floors and Roofs

- Unexposed surface temperature limits added
  - Maximum average temperature rise limitation of 250°F (139°C) and maximum individual point limitation of 325°F (181°C)
- Cotton waste test added

Past – Development of ASTM Test Standard 1926 Evolutionary Changes

Columns

- Criteria for testing columns added
  - Column loaded to maximum working stress during fire test
- Conditions of Acceptance for columns
  - Must maintain structural integrity

Past – Development of ASTM Test Standard 1947 Evolutionary Changes

General

ASTM C19 renumbered as ASTM E119

Columns

- Alternate criteria for testing columns unloaded added
- Conditions of Acceptance for columns
  - Average steel temperature limitation of 1000°F (538°C) and maximum individual point limitation of 1200°F (649°C)

Past – Development of ASTM Test Standard 1953 Evolutionary Changes

Beams

- Criteria for testing unloaded beams added
- Conditions of Acceptance for beams
  - Average steel temperature limitation of 1000°F (538°C) and maximum individual point limitation of 1200°F (649°C)

Past – Development of ASTM Test Standard 1953 Evolutionary Changes

Floors and Roofs

- Hose stream criteria removed
- Requirement to reload floors and roofs after hose steam removed

Past – Development of ASTM Test Standard 1973 Evolutionary Changes

Floors and Roofs, and Beams

- Concept of restrained vs unrestrained assemblies and beam introduced
- Conditions of Acceptance
  - Unrestrained Rating
    - Structural integrity
    - Average structural steel temperature limitation of 1100°F (593°C) and maximum individual point limitation of 1300°F (704°C) where steel is spaced more than 4 ft OC

Past – Development of ASTM Test Standard 1973 Evolutionary Changes

- Structural steel temperature limitation of 1100°F (593°C) where steel is spaced 4 ft or less OC
- For concrete structural members employing tensioning steel intended for use in spams greater than those tested, a steel temperature limitation of 800°F (427°C) for cold-drawn prestressing steel or 1100°F (593°C) for reinforcing steel applies

Past – Development of ASTM Test Standard 1973 Evolutionary Changes

- Conditions of Acceptance
  - Restrained Rating
    - Structural integrity
    - Average structural steel temperature limitation of 1100°F (593°C) and maximum individual point limitation of 1300°F (704°C) where steel is spaced more than 4 ft OC, applied for one half the rating period or 1 hr, whichever is greater
    - Structural steel temperature limitation of 1100°F (593°C) where steel is spaced 4 ft or less OC, applied for one half the rating period or 1 hr, whichever is greater

Past – Development of ASTM Test Standard 1973 Evolutionary Changes

- For concrete structural members spaced more than 4 ft OC, employing tensioning steel, steel temperature limitation of 800°F (427°C) for cold-drawn prestressing steel or 1100°F (593°C) for reinforcing steel, applied for one half the rating period or 1 hr, whichever is greater

Past – Development of ASTM Test Standard 1976 Evolutionary Changes

Floors and Roofs

- “Restricted Load Condition” in report title, if assembly loaded less than 100%
- Steel deck temperature requirements added for unrestrained assemblies

Past – Development of ASTM Test Standard 2011 Evolutionary Changes

Beams

- New test for Loaded Unrestrained Beams

Past – Development of UL 263 Test Standard

- UL 263 first approved in 1926
- First standard was identified as UL A-2
- Over the years the UL standards development committee, now referred to as a Technical Committee, and the ASTM E5 committee have attempted to align the requirements of UL 263 and ASTM E119
- For the most part, the committees have been successful

Past – UL Certification Activities – 1972

- Designs of horizontal assemblies rewritten to reflect restrained and unrestrained ratings
- Designs renumbered from previous numeric system to current alpha-numeric system
  - Design No. 99 – 3 Hr = N803

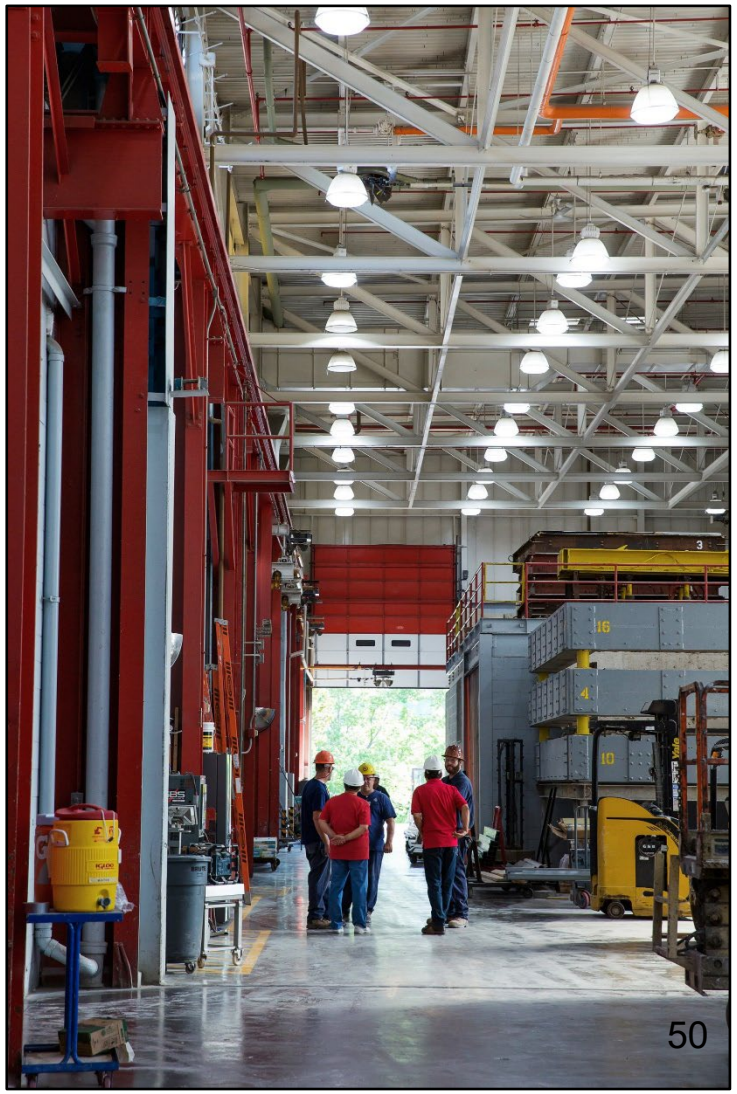
Fire-Resistance in Commercial Construction

Present



UL 263 14th edition

- Revisions published August 5, 2021
- Overhaul of sample conditioning requirements
- Measurement recording intervals (chart recorder to electronic)
- Intended to represent current practice…
- SFRM: “air condition the test lab”



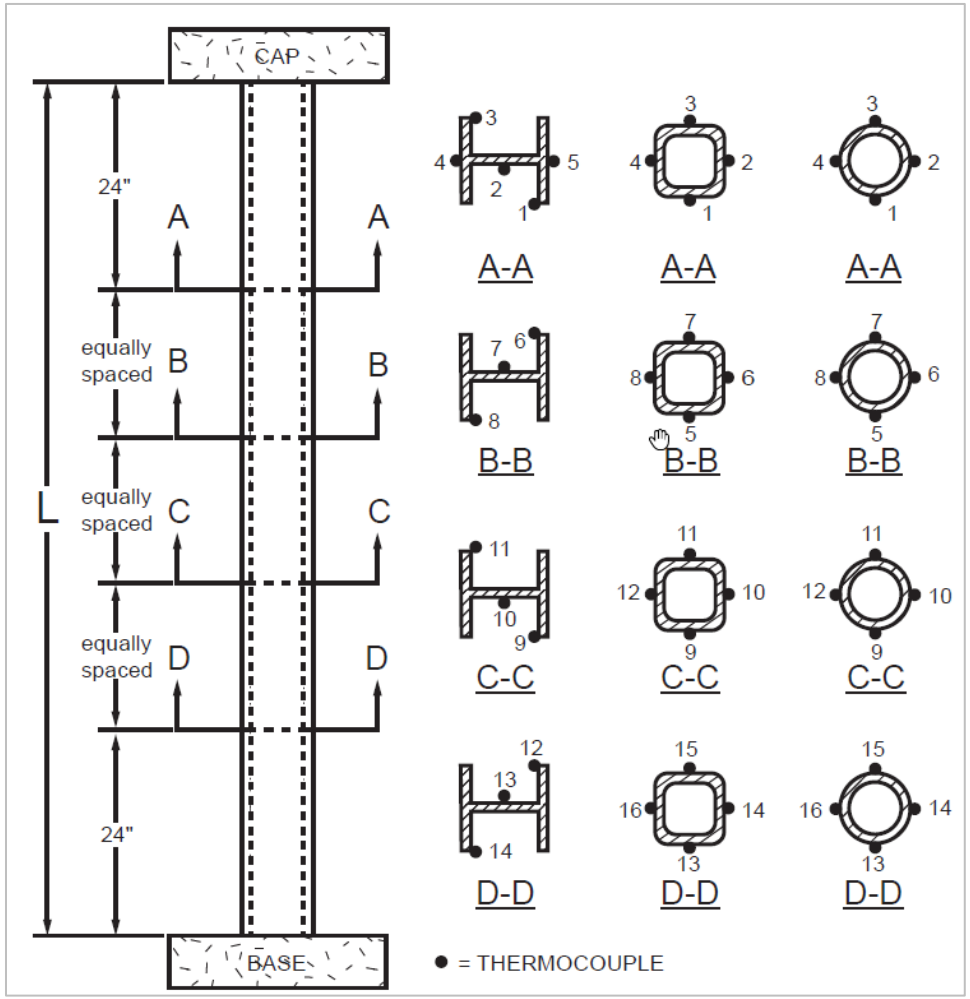
UL 263 14th edition

- Revisions published March 14, 2022
- Aligned SFRM conditioning requirement with existing practice



UL 263 14th edition

- Revisions published September 2, 2025
- Furnace pressure measurement probe
- New figure: steel column thermocouple locations
- Small-scale fire test for recessed luminaires
- Classification procedures for unloaded steel columns



UL 263, Figure 9.1

Fire-Resistance in Commercial Construction

Future



UL 263 – Future – Furnace / Method

- Harmonize UL 263 with ULC S101?
- Harmonize time-temperature curve with EN curve?
- Harmonize furnace thermocouple with EN standard?
- Heat flux measurements?
- Formalize furnace construction requirements?
- Formalize small-scale testing procedures?



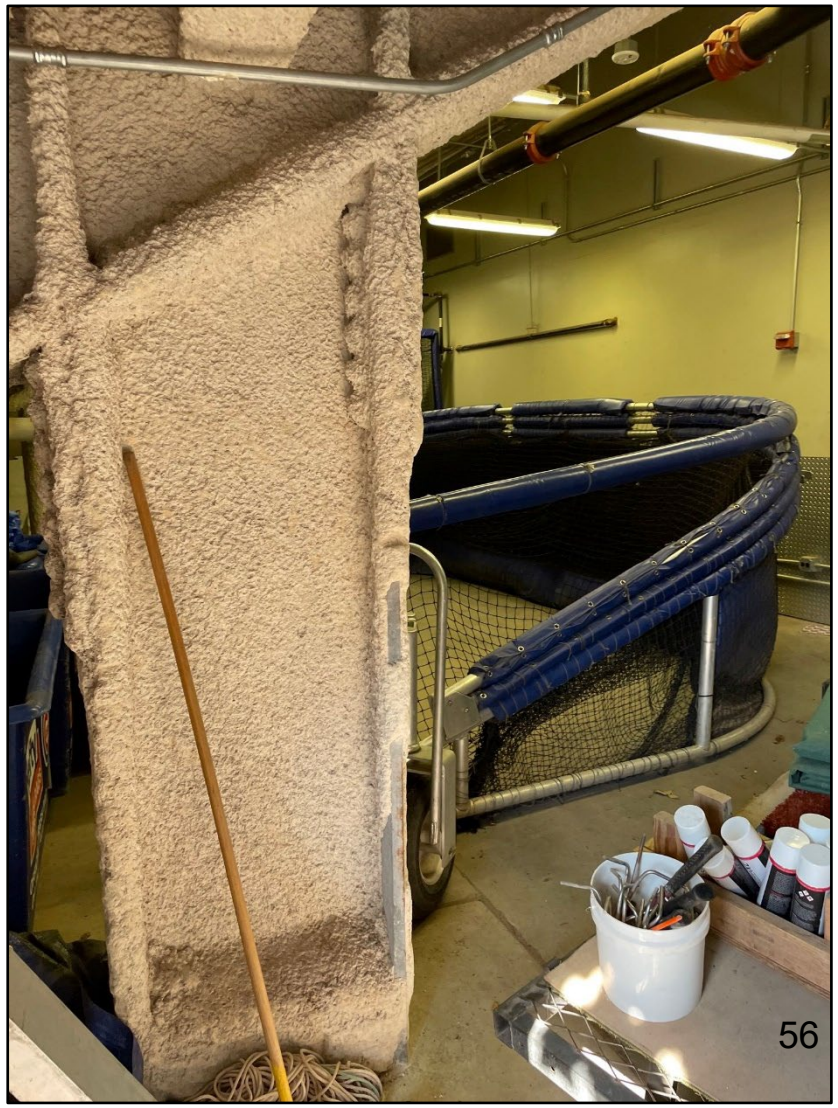
UL 263 – Future – Acceptance Criteria

- Alternate acceptance criteria?
- Report additional results?

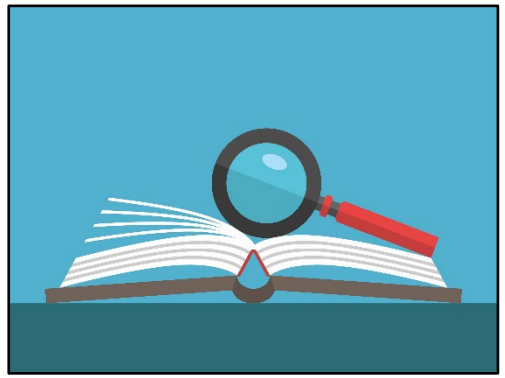


UL 263 – Future – Product Specific

- SFRM / IFRM patching test?



UL 263 – Past Criticisms



- Differing criteria for different building elements
- No furnace design criteria
- Measuring unexposed surface temperature under pad is unrealistic
- Restraint – “many heated discussions”
- Future
  - Determine contribution of each layer (component) in assembly
  - Replace time-temperature curve with “more realistic ones”
  - Computer design for fire endurance

T.Z. Harmathy and T.T. Lie (Fire Test Standard in the Light of Fire Research), 1970

UL 263 – Past Attempt to Change

K.J. Schwartz and T.T. Lie (Investigating the Unexposed Surface Temperature Criteria of Standard ASTM E119), 1985

- Research: self-ignition temperatures of combustibles in contact with unexposed surface in excess of 520°F
- Increase unexposed surface temperature rise criteria from 250°F / 325°F to 400°F / 450°F
- “fire spread by heat conduction is rare”



UL 263 proposal submitted March 1, 2013

- Transmission of heat through the specimen during the classification period shall not have raised the average temperature on its unexposed surface to more than ~~250°F (139°C) above its initial temperature~~ 400°C (752°F).

Yes	No	Abstain	Not Returned	Eligible Voters
1	17	1	8	27

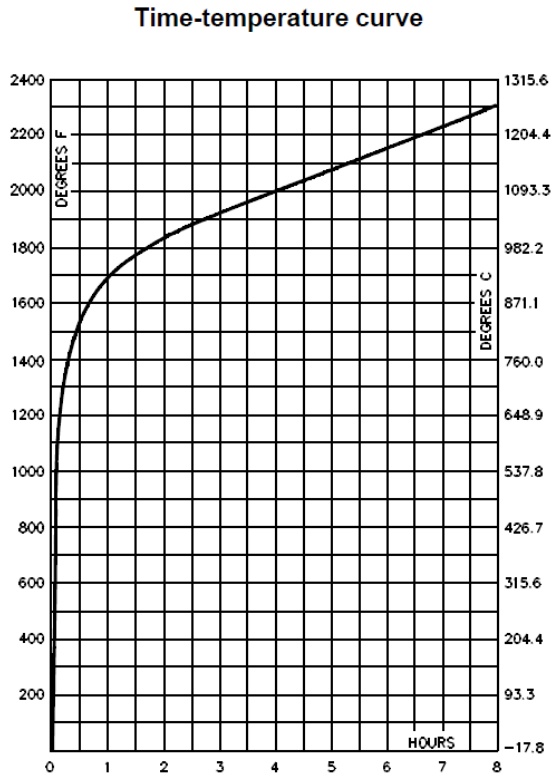
UL 263 – Recent Criticisms

Gales, J., Chorlton, B. & Jeanneret, C. The Historical Narrative of the Standard Temperature–Time Heating Curve for Structures. Fire Technology 57, 529–558 (2021)

- "No currently available historical literature can support the definition of the temperature points which describe the standard temperature–time heating curve."
- "This reinforces contemporary discussion that the heating curve lacks scientific basis in its representation of a real fire."

Babrauskas, V. Comments on "The Historical Narrative of the Standard Temperature–Time Heating Curve for Structures" by Gales, et al.. Fire Technology 58, 15–20 (2022)

- "Over the decades, there has been a great deal of scientific research confirming that the temperatures on the ASTM E119 time–temperature curve describe a well-justified, near-upper-bound to experimental data."



UL 263 / ASTM E119 – Final Thoughts

- Standard not product specific
- Gypsum, plywood, IFRM, SFRM
- Construction element specific (wall, floor, column, beam, etc.)
- Brilliant foresight in 1918 to establish test method to evaluate construction of any material
- 100 year lifespan



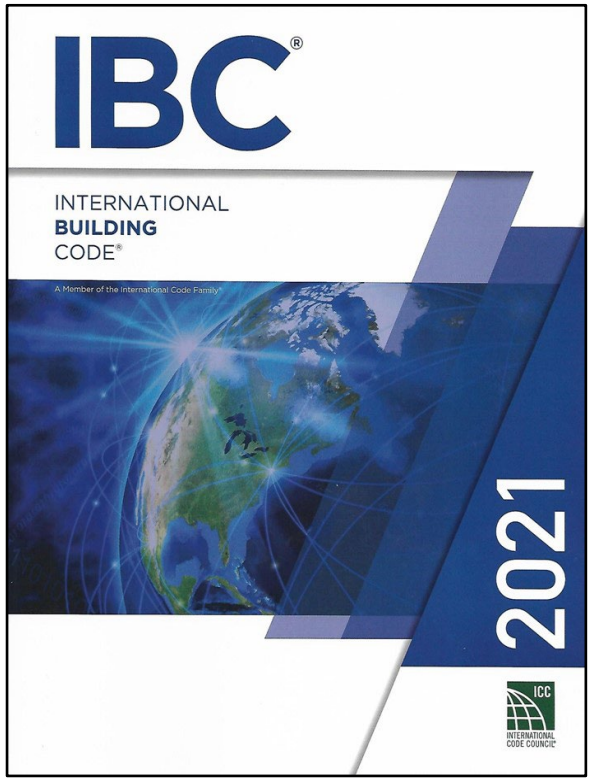
UL 263 / ASTM E119 – Final Thoughts

- Buildings are safer
- Occupants are safer
- First responders are safer
- Standard is doing its job



Fire-Resistance-Rated Construction

Code Requirements for Fire-Resistance-Rated Construction



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 by the test procedures set forth in ASTM E119 or UL 263.

Code Requirements Cont.

- 703.2.2 **Analytical methods** – The fire resistance … established by an analytical method shall be by any of the methods listed in this section, based on fire exposure and acceptance criteria of ASTM E119 or UL 263.
    - 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** – The *fire resistance …* not complying with Sections 703.2.1 or 703.2.2 shall be permitted to be established by an alternate protection methods in accordance with Section 104.2.3.

Suggested Reading & Watching

- Babrauskas, V. (1976) Fire Endurance in Buildings. Ph.D. Dissertation, University of California, Berkeley
- Fire Protection Through Modern Building Codes, 5th edition, AISI (1981)
- Bono, J.A., “New Criteria for Fire Endurance Tests,” Fire Test Performance, ASTM STP 464, 1970
- Babrauskas, V. Comments on “The Historical Narrative of the Standard Temperature–Time Heating Curve for Structures” by Gales, et al.. Fire Technology 58, 15–20 (2022)
- UL video "An Unbeliever Convinced (1917 Silent Movie)"



National Fireproofing Contractors Association



Thanks for Attending!!!

National Fireproofing Contractors Association

Kevin Hyland
UL Solutions
333 Pfingsten Road
Northbrook, IL 60062
Kevin.R.Hyland@UL.com
+1 (847) 664-2652

Rich Walke
National Fireproofing Contractors Association
800 Roosevelt Road – Building C, Suite 312
Glen Ellyn, IL 60137
+1 (708) 236-3411