

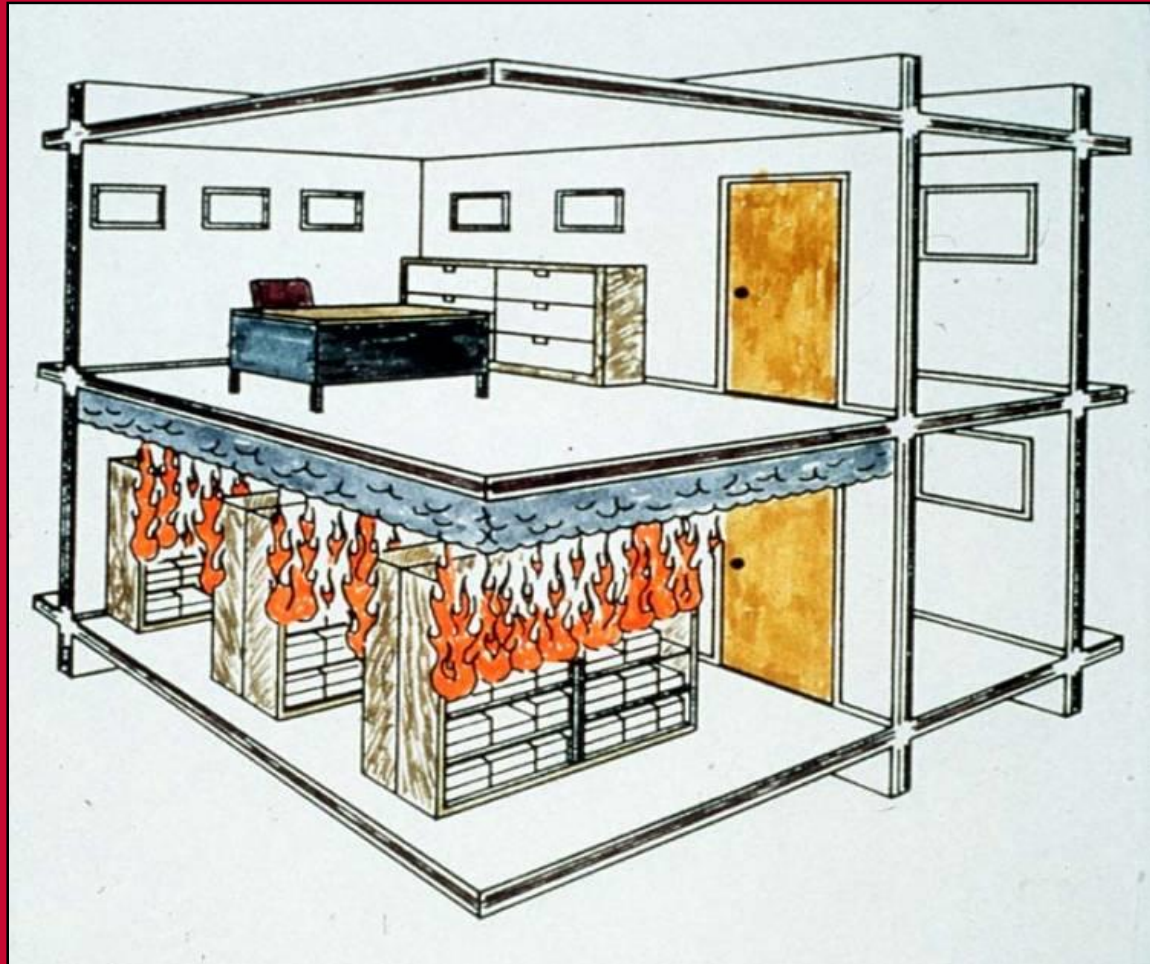
Testing of Fire Resistance and Smoke Resistant Assemblies



Rich Walke

UL Codes and Advisory Services

Fire-Resistance-Rated Construction



Fire-Resistance-Rated Construction

Code
Requirements
for
Fire-Resistance-
Rated
Construction



Code Requirements

- IBC Section 703.2 – Fire-resistance ratings shall be determined in accordance with ANSI/UL 263 or ASTM E119
- LSC 8.2.3.1 – The fire resistance of structural elements and building assemblies shall be determined in accordance with test procedures set forth in ANSI/UL 263 or ASTM E119



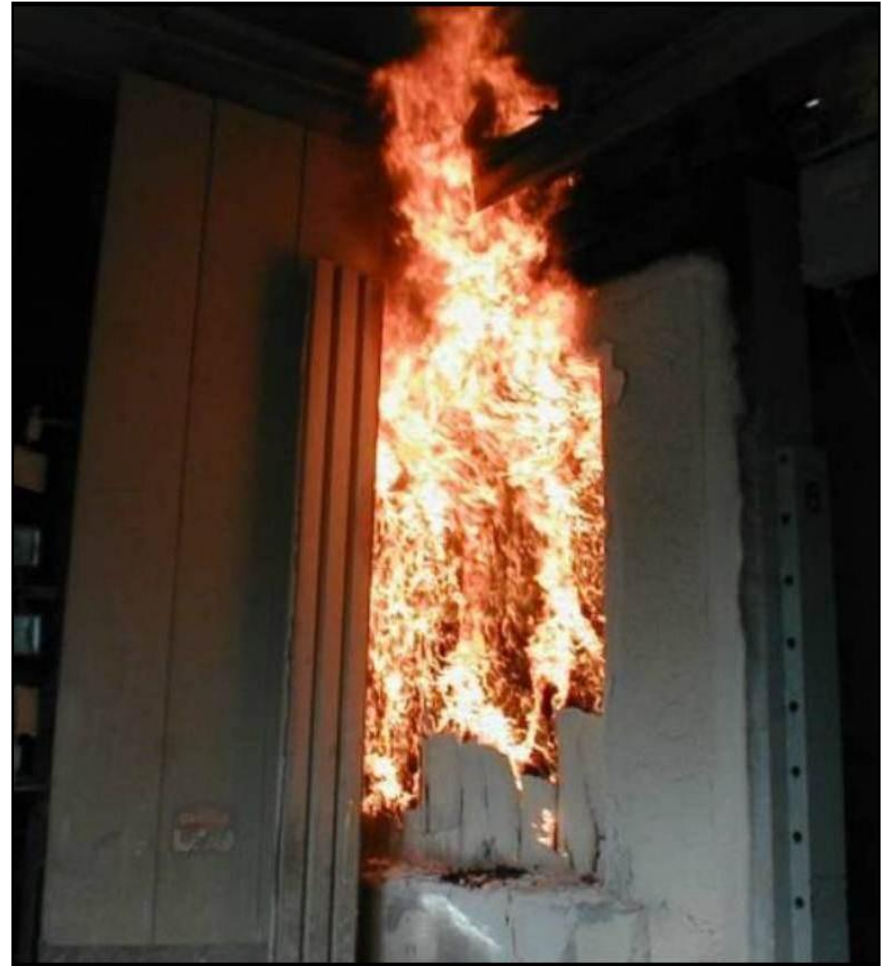
Fire Resistance

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



Fire-Resistance-Rated Construction

Establishing
Fire-Resistance
Ratings



Standards

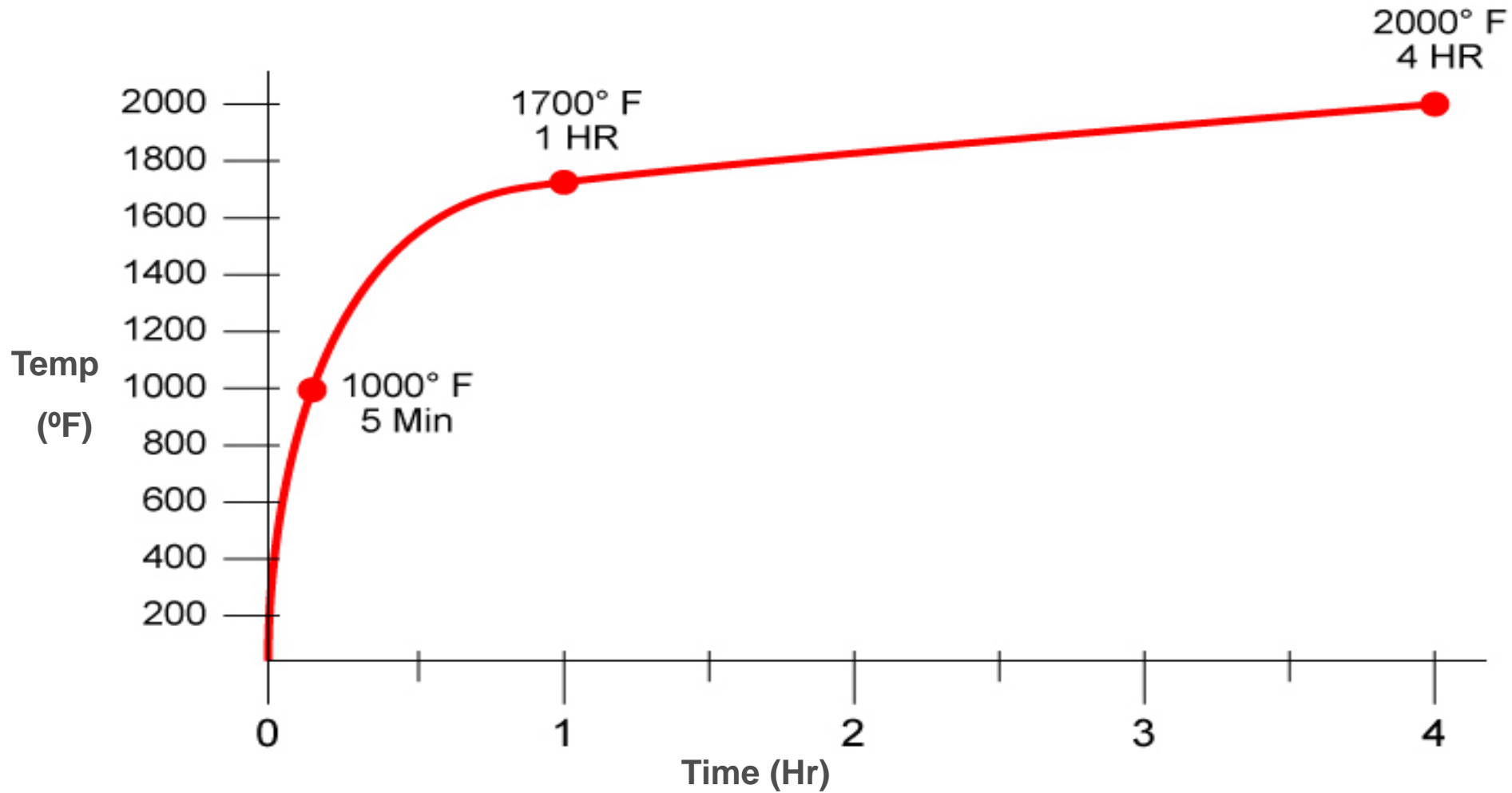
- ANSI/UL 263
- ASTM E119
- NFPA 251 (Withdrawn)



Building Components

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

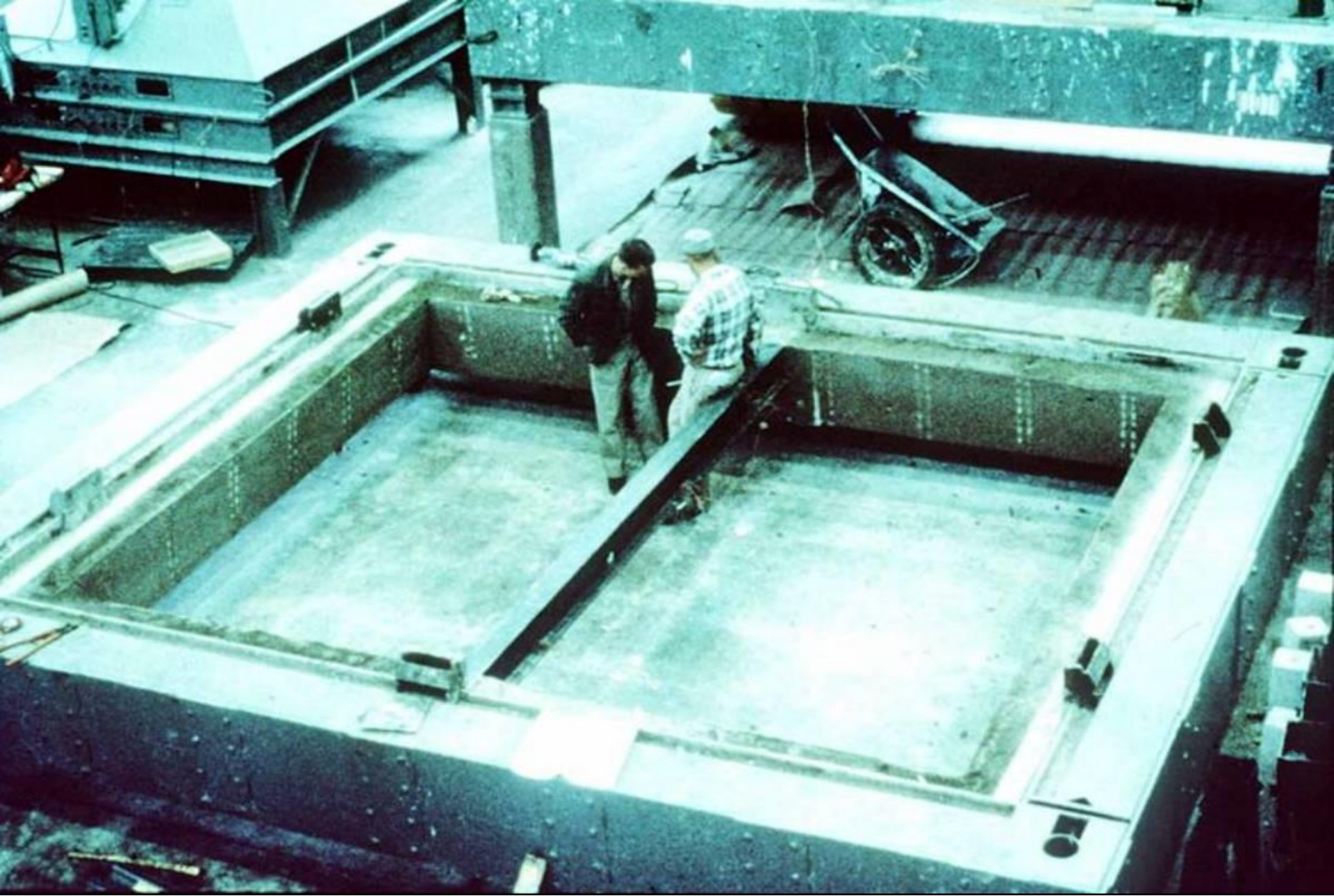
Time - Temperature Curve

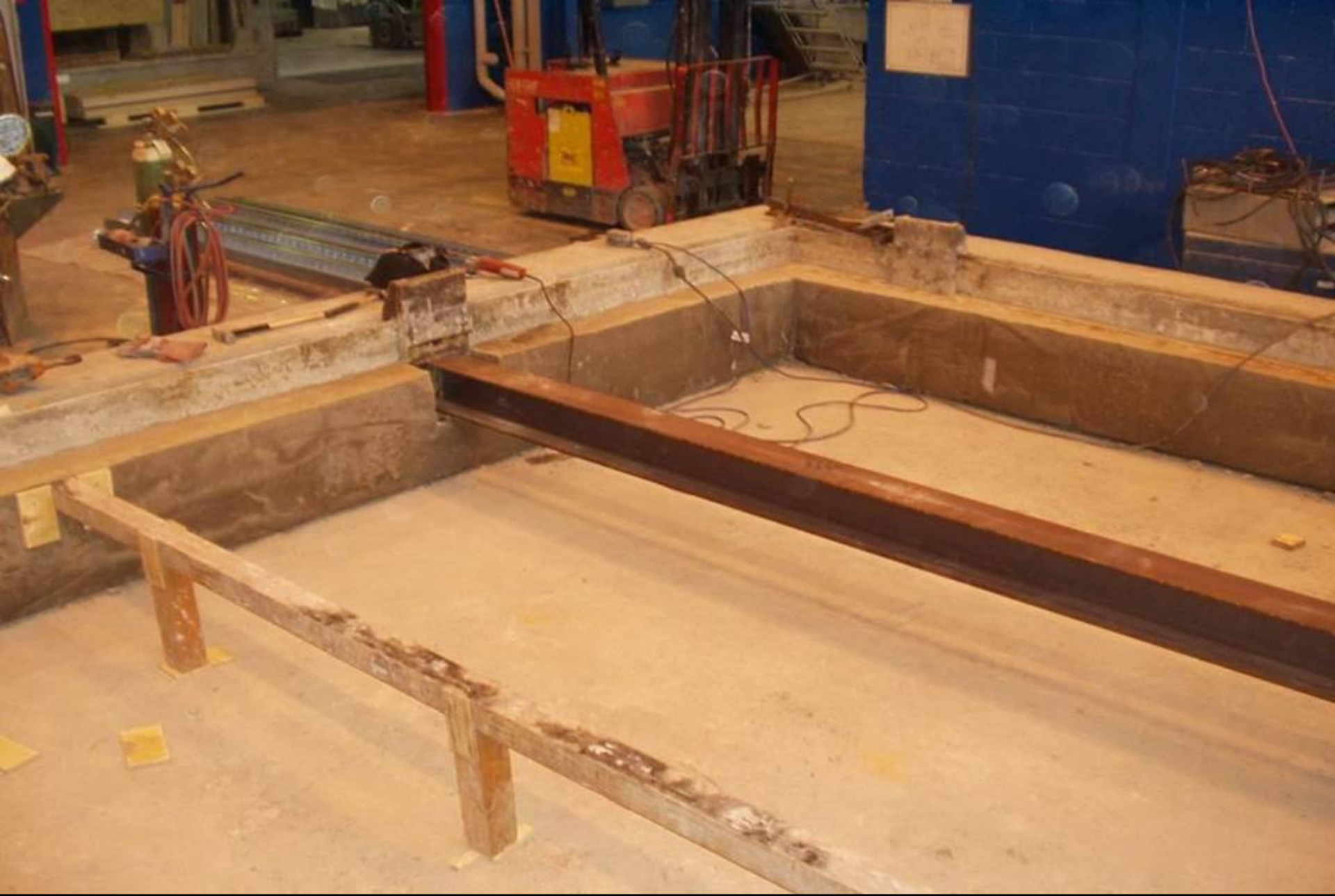


Floor/Ceiling or Roof/Ceilings

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

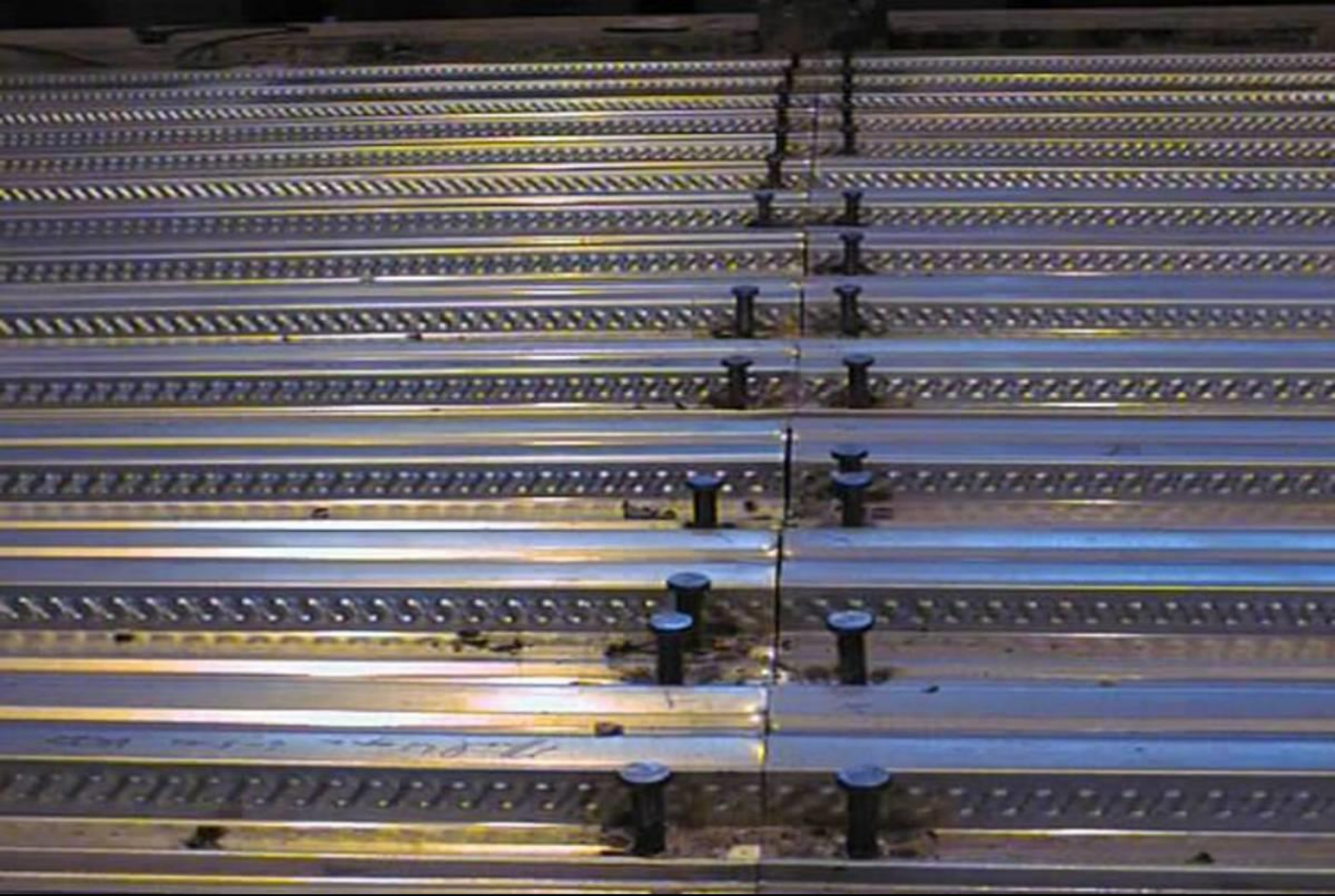
























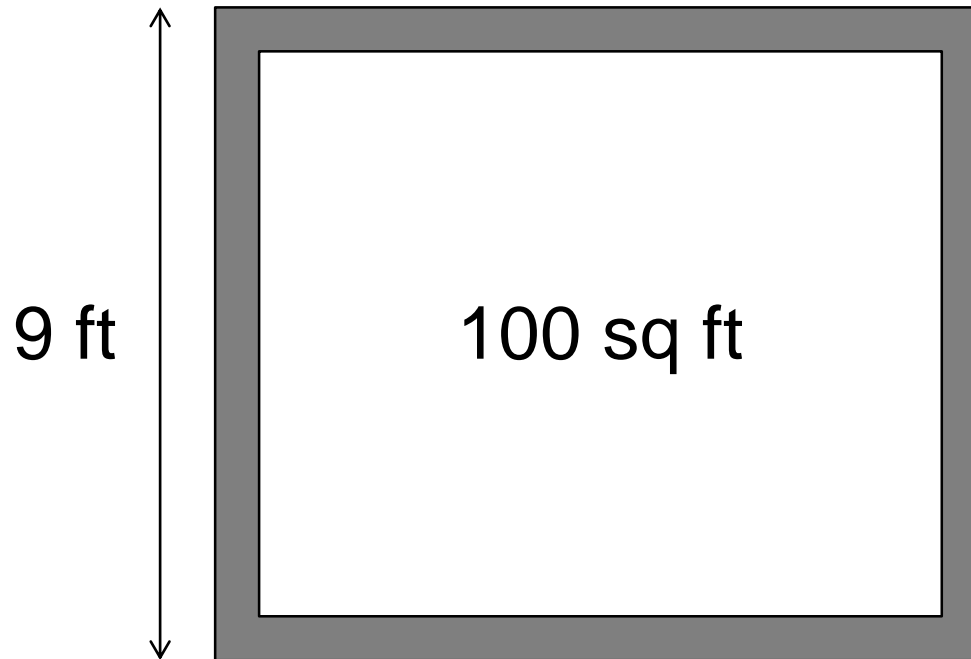
Conditions of Acceptance Floor/Ceilings or Roof/Ceilings

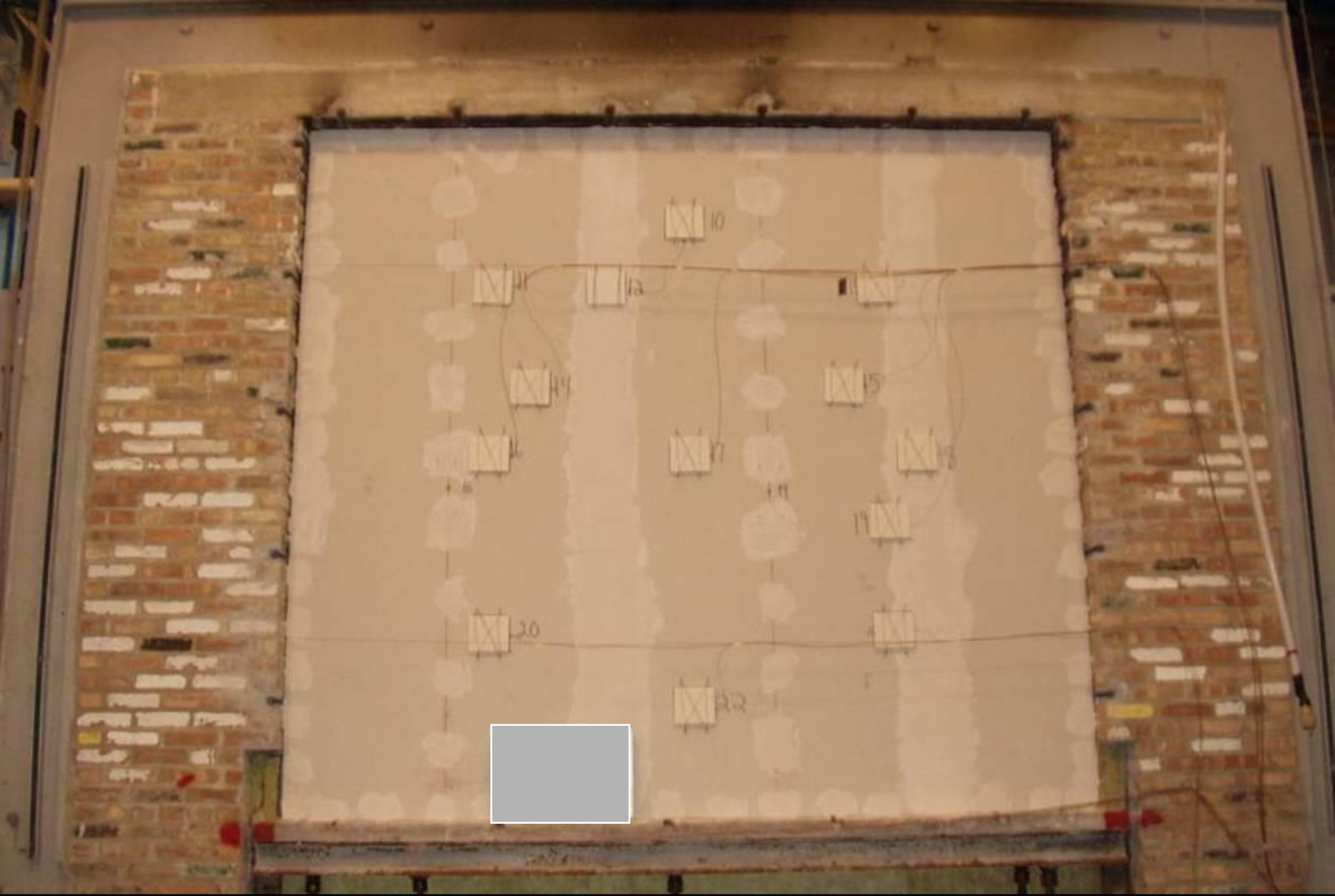
- Support load
- Flame passage
- 250°F / 325°F
- Support temperatures



Walls

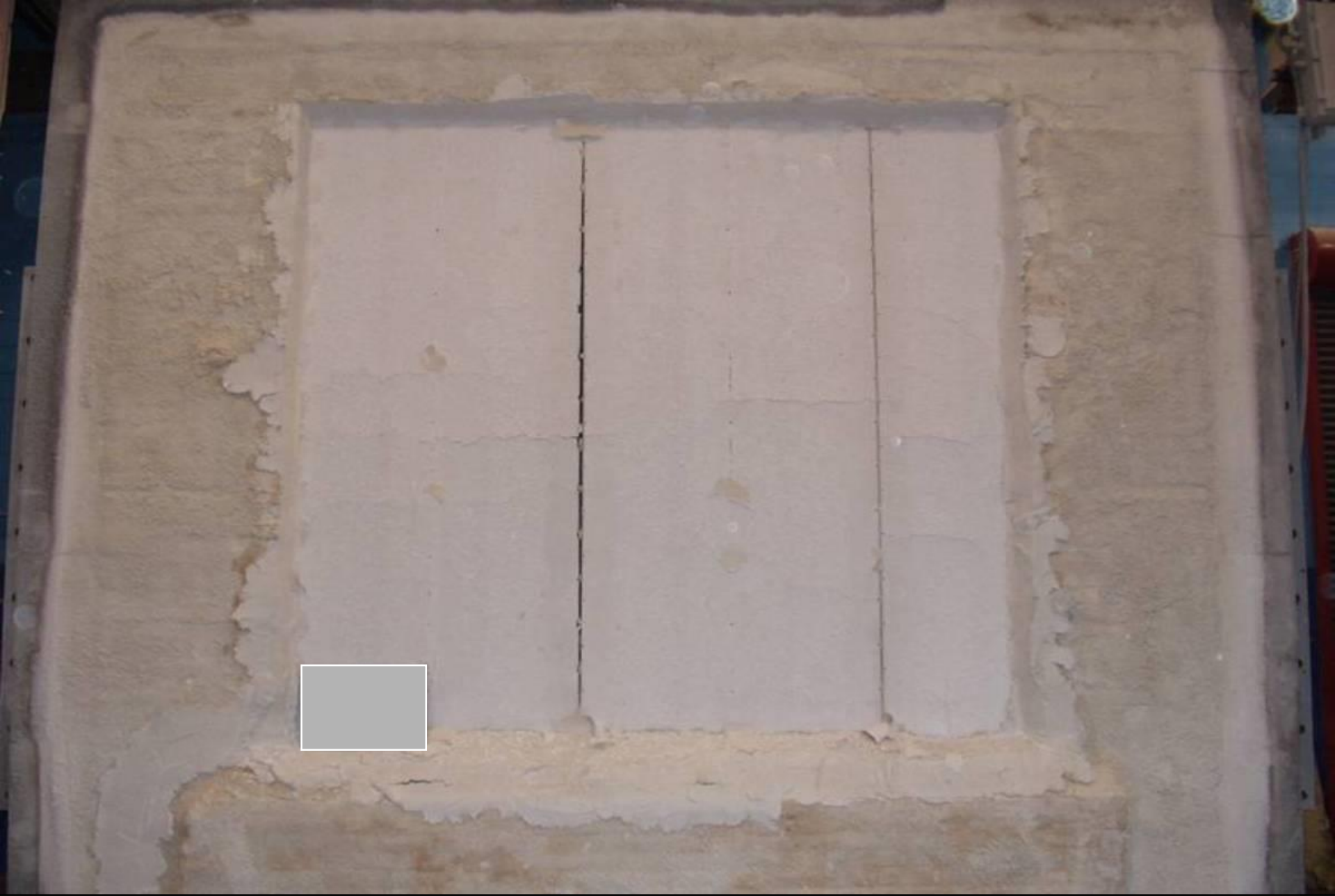
- Sample size - 100 sq ft / 9 ft
- Load applied - Per design

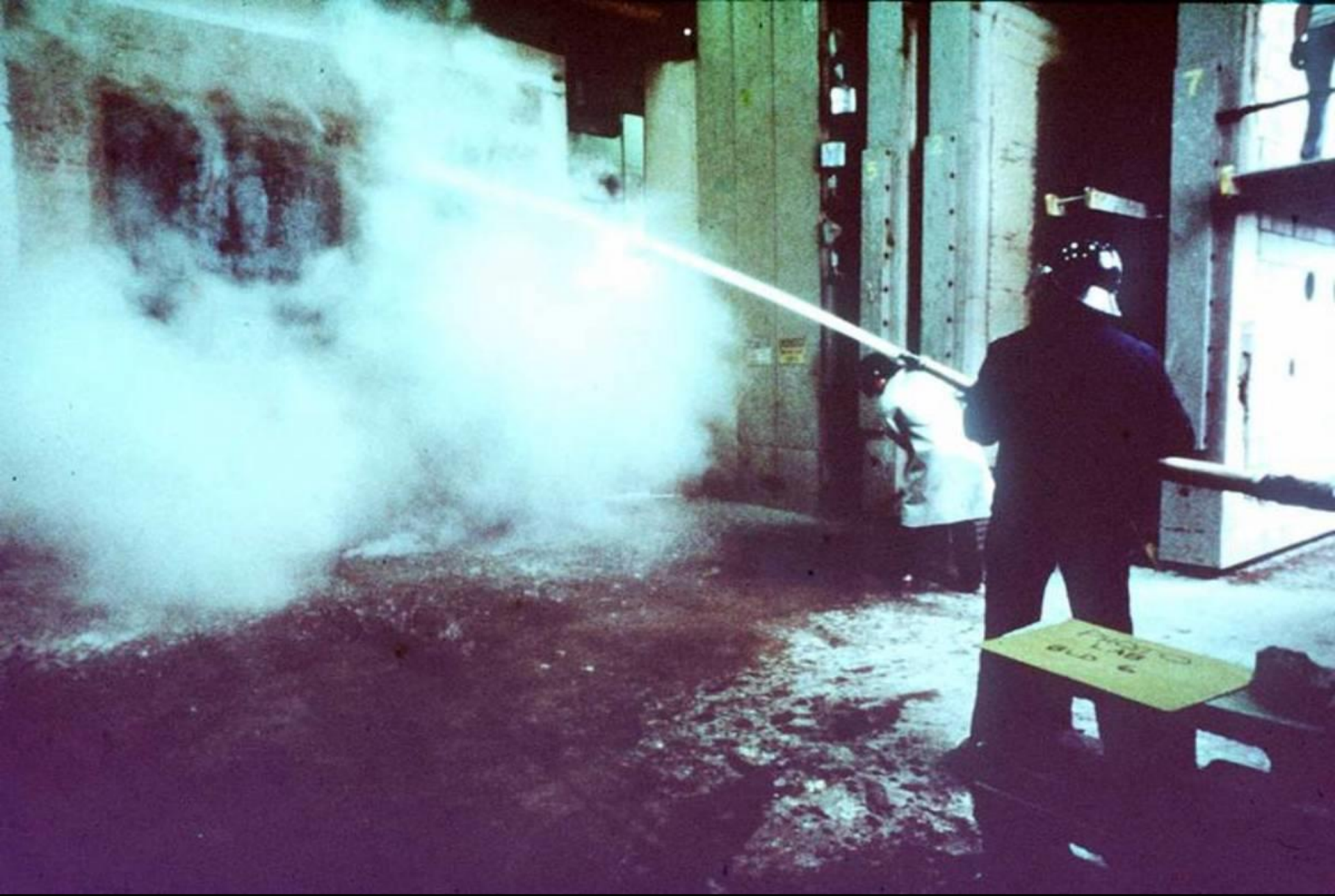














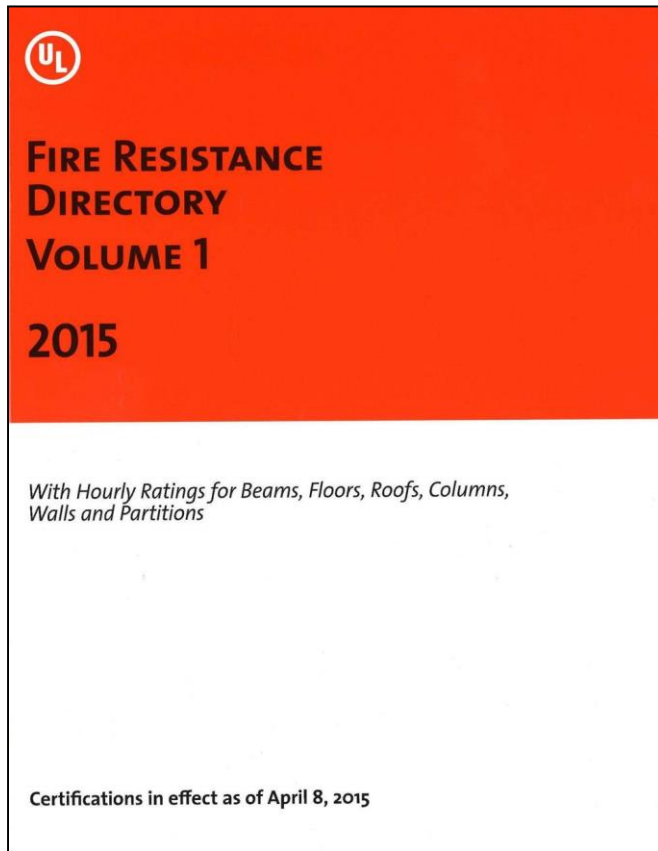
Conditions of Acceptance – Walls

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



Where are the Listings Found?

Hard Copy



Online

UL ONLINE CERTIFICATIONS DIRECTORY

Quick Guide Contact Us UL.com

BEGIN A BASIC SEARCH

To begin a search, please enter one or more search criteria in the parameters below.

Company Name

City

U.S. State

U.S. Zip Code

Country

Region

Postal Code (non-US)

UL Category Code

UL File Number (File)

Keyword

SEARCH CLEAR

ABOUT THE OCD

You can use the UL Online Certification Directory to:

- Verify a UL Listing or Classification
- Verify a UL Listed product use
- Verify a product safety standard

Learn more with the [QuickGuide to the OCD](#)

SPECIFIC SEARCHES

[Fire Resistant Assemblies and Systems](#)

LINKS OF INTEREST

[ULC Online Directories](#)

[Notice of Disclaimer](#)

[Order Printed Directories](#)

[Order Listing Cards](#)

[Index of Trademarks & Trademarks](#)

[Introduction, UL Listed and Classified Products](#)

[Introduction, UL Recognized Components](#)

[Introduction, Products Certified for Canada](#)

FEATURED LINKS

UL

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



Questions / Comments



Breaches in Fire-Resistance-Rated Construction

- Penetrations
- Joint Systems
- Opening Protectives
- Ducts and Air Transfer Openings

Breaches in Fire-Resistance-Rated Construction Cont.

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

Absolutely!!!



Breaches in Fire-Resistance-Rated Construction Cont.

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

IBC Requirements

- IBC – Breaches shall be protected
 - Section 714 – Penetrations
 - Section 715 – Fire-Resistant Joint Systems
 - Section 716 – Opening Protectives
 - Section 717 – Ducts and Air Transfer Openings

IBC Requirements Cont.

- Each type of breach has a unique fire test standard associated with it which compliments ANSI/UL 263 and ASTM E119
- Where breach occurs in, through or between assemblies intended to restrict the movement of smoke, the IBC also sets limits on the leakage through the breach



LSC Requirements

- LSC – Breaches shall be protected
 - Penetrations
 - Joint Systems
 - Opening Protectives
 - Ducts and Air Transfer Openings

LSC Requirements Cont.

- Each type of breach has a unique fire test standard associated with it which compliments ANSI/UL 263 and ASTM E119
- Where breach occurs in, through or between assemblies intended to restrict the movement of smoke, the LSC also sets limits on the leakage through the breach.

Questions / Comments



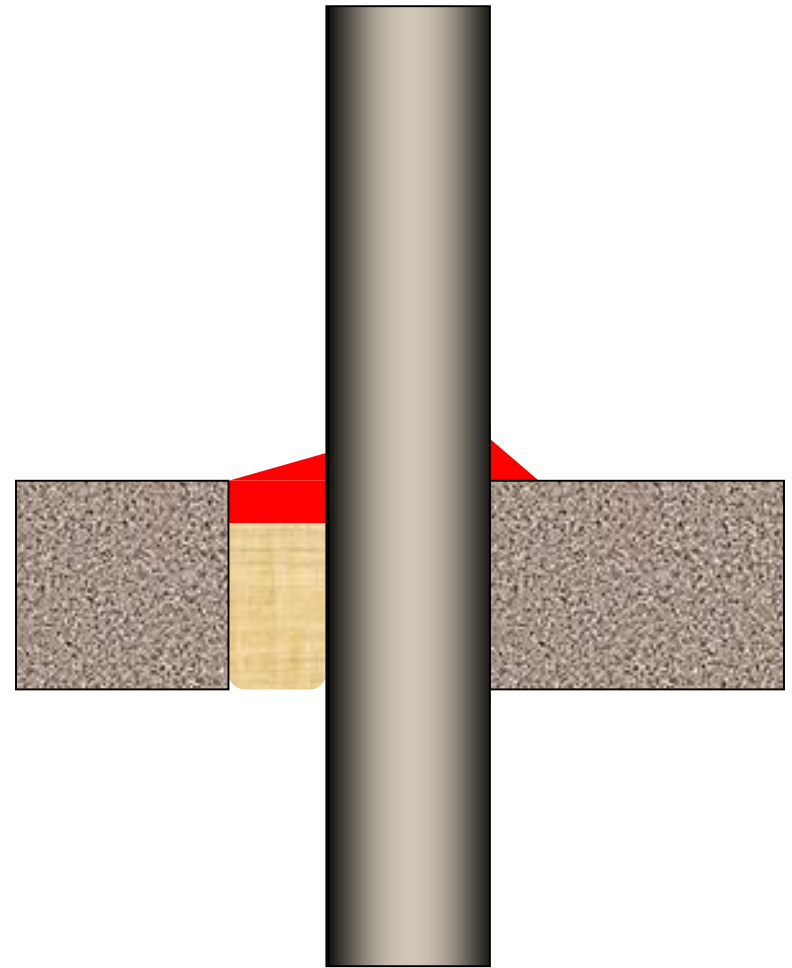
Firestop Systems

Code
Requirements
for Penetrations
of Smoke
Resistant
Construction



Firestop Systems

- Three elements
 - Floor or Wall Assembly
 - Penetrating Item
 - Firestopping Products
- Tested in accordance with ANSI/UL 1479



Ratings

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

Code Requirements

- IBC 714.4.4 – Penetrations in smoke barriers shall have an L Rating at ambient and 400°F
 - Max 5.0 CFM / sq ft of opening for each system
 - Cumulative 50 CFM for all systems in any 100 sq ft of barrier
- LSC 8.5.6.2 – Penetrations shall be protected by a system or material capable of restricting the transfer of smoke

Firestop Systems

Establishing Leakage Ratings



L (Air Leakage) Ratings

- L Rating methodology added to ANSI/UL 1479 in 1993
- Leakage determined at 0.3 in. WC
- Tested at Ambient and 400°F
- Results published in either CFM or CFM per sq ft

L (Air Leakage) Ratings



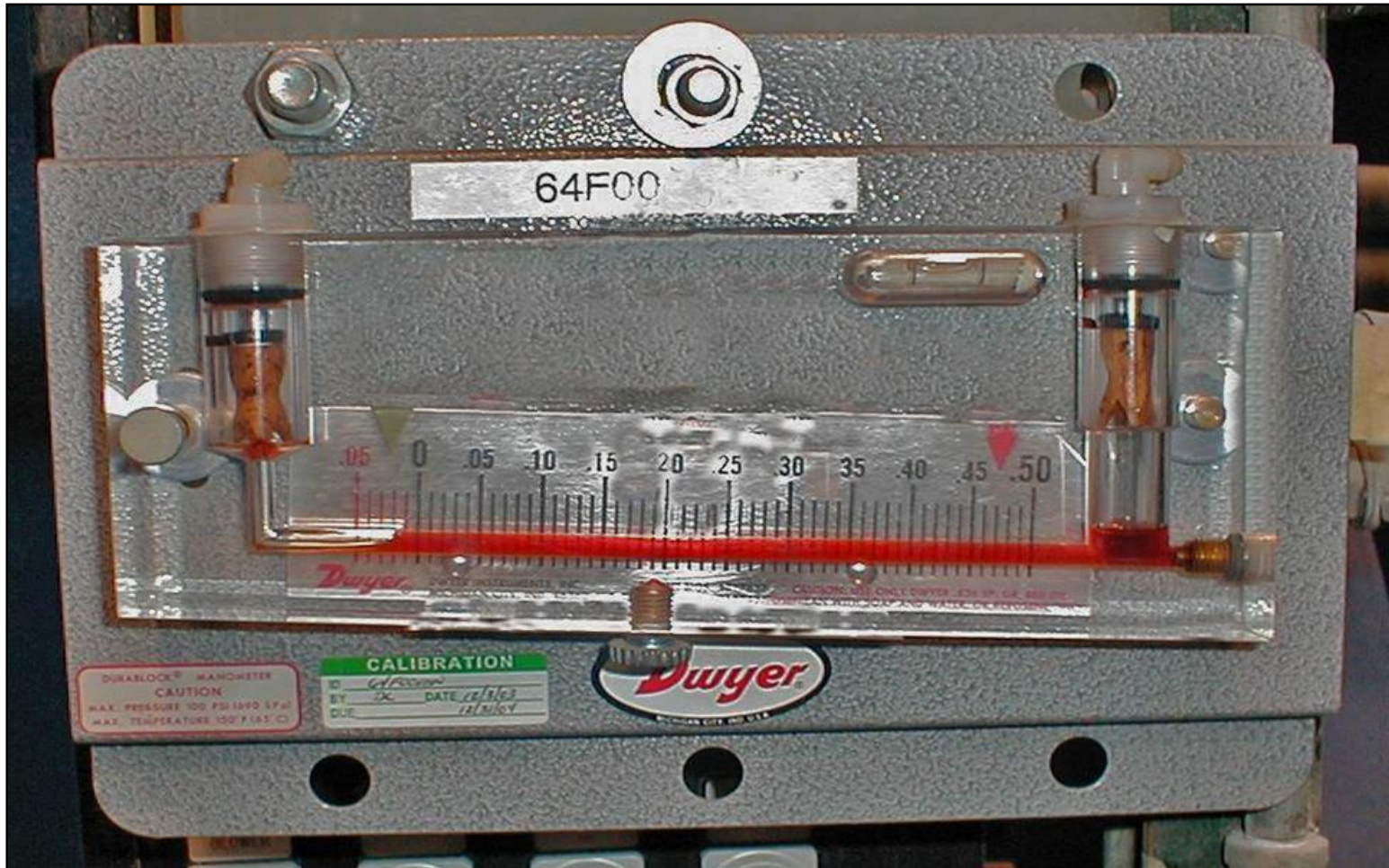
L (Air Leakage) Ratings



L (Air Leakage) Ratings



L (Air Leakage) Ratings



Test Procedure

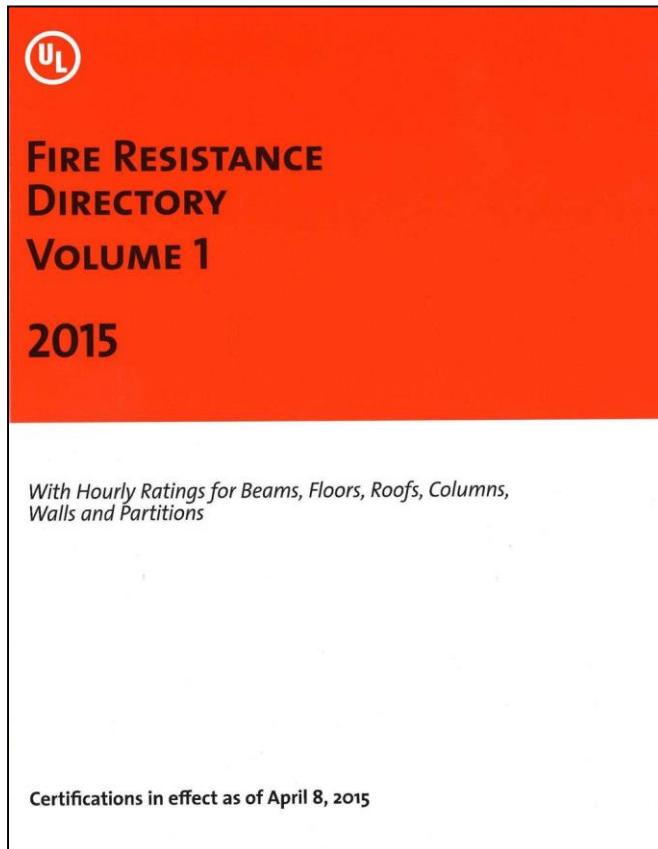
- Incidental chamber leakage determined using blank slab
- Air leakage of test sample determined at ambient temperature
- Air leakage of test sample determine at 400°F
- Incidental chamber leakage rechecked after cooling

Test Procedure Cont.

- Firestop system assigned L Rating at ambient and 400°F, by subtracting incidental chamber leakage from test sample leakage
- L Ratings of firestop systems published in UL Fire Resistance Directory along with F and T Ratings

Where are the Listings Found?

Hard Copy



Online

UL ONLINE CERTIFICATIONS DIRECTORY

Quick Guide Contact Us UL.com

BEGIN A BASIC SEARCH

To begin a search, please enter one or more search criteria in the parameters below.

Company Name

City

U.S. State

U.S. Zip Code

Country

Region

Postal Code (non-US)

UL Category Code

UL File Number (Title)

Keyword

SEARCH CLEAR

ABOUT THE OCD

You can use the UL Online Certification Directory to:

- Verify a UL Listing or Classification
- Verify a UL Listed product use
- Verify a product safety standard

Learn more with the [QuickStart to the OCD](#)

SPECIFIC SEARCHES

[Fire Resistant Assemblies and Systems](#)

LINKS OF INTEREST

[ULC Online Directories](#)

[Notice of Disclaimer](#)

[Order Printed Directories](#)

[Order Listing Cards](#)

[Index of Trademarks & Trademarks](#)

[Introduction, UL Listed and Classified Products](#)

[Introduction, UL Recognized Components](#)

[Introduction, Products Certified for Canada](#)

FEATURED LINKS

UL

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



Questions / Comments



Fire Resistive Construction

UL's Online Search Tools



UL's Online Search Tools

- Online Certifications Directory
- Product Spec
- Code Link



Online Certifications Directory

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

Product Spec

- Helps identify designs meeting project parameters
- Needs no password
- Is free – no charge for use
- Covers everything discussed at this symposium
- www.ul.com/productspec



Code Link

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



Questions / Comments



Thank You for Attending!!!

Rich Walke
Codes and Advisory Services Department
Underwriters Laboratories
333 Pfingsten Road
Northbrook, IL 60062
Richard.N.Walke@UL.com
(847) 664-3084

www.ul.com

