Life Safety Organization

LSO 2012 Winter Meeting

Holiday Inn Mart Plaza Chicago

February 16, 2012

USG

Learning Objectives

1. Different Gypsum Panel Cores, Determine UL Specific Panel Cores & How These Impact Fire Resistance

2. Effect of Sound Control in Floor- and Roof-Ceiling Assemblies with Gypsum Ceiling Membranes

3. Orientation of the Fire Resistant Gypsum Panels on Steel Stud Walls – Conventional and Equivalent Gauge Studs

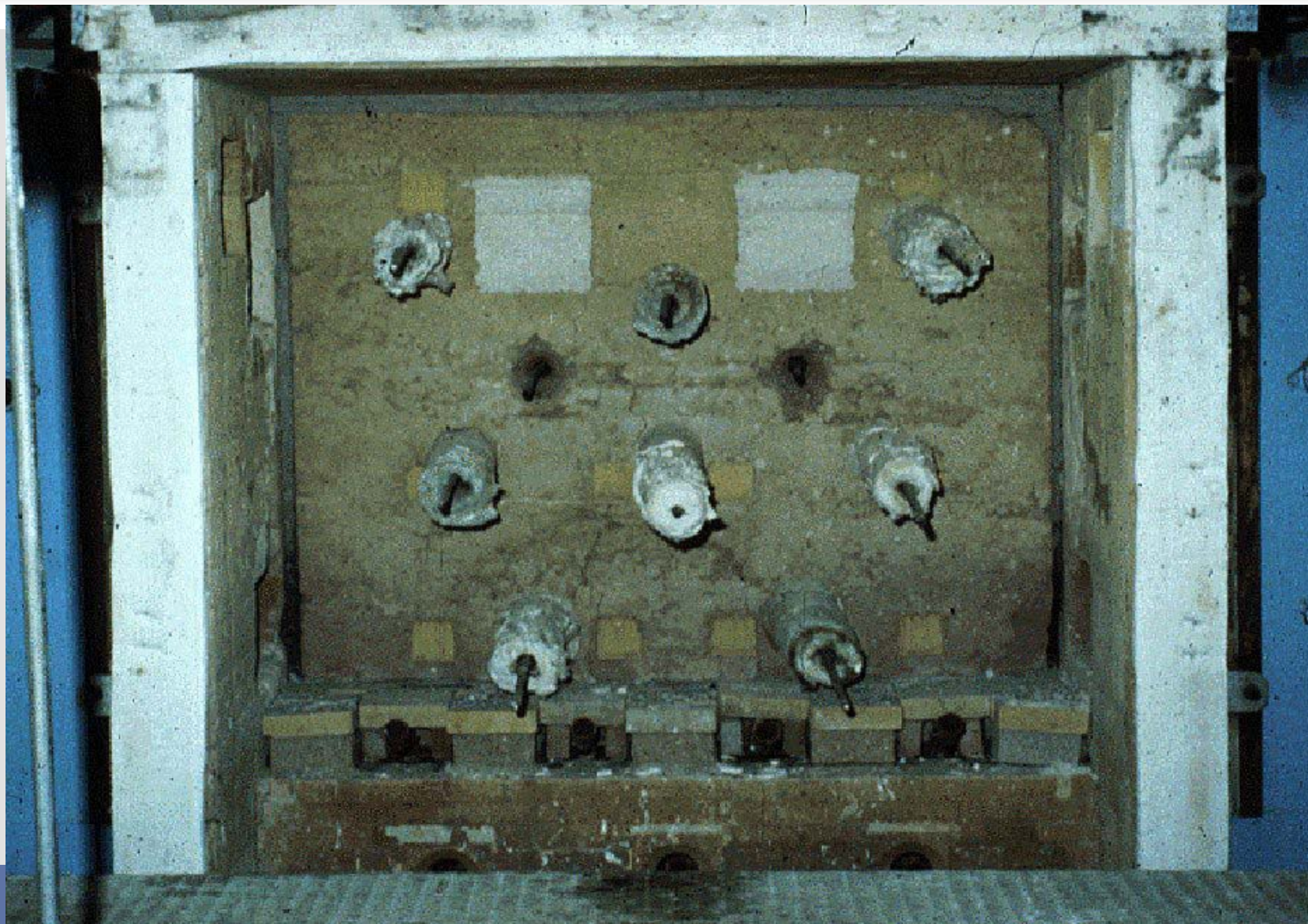4. Innovative Technology

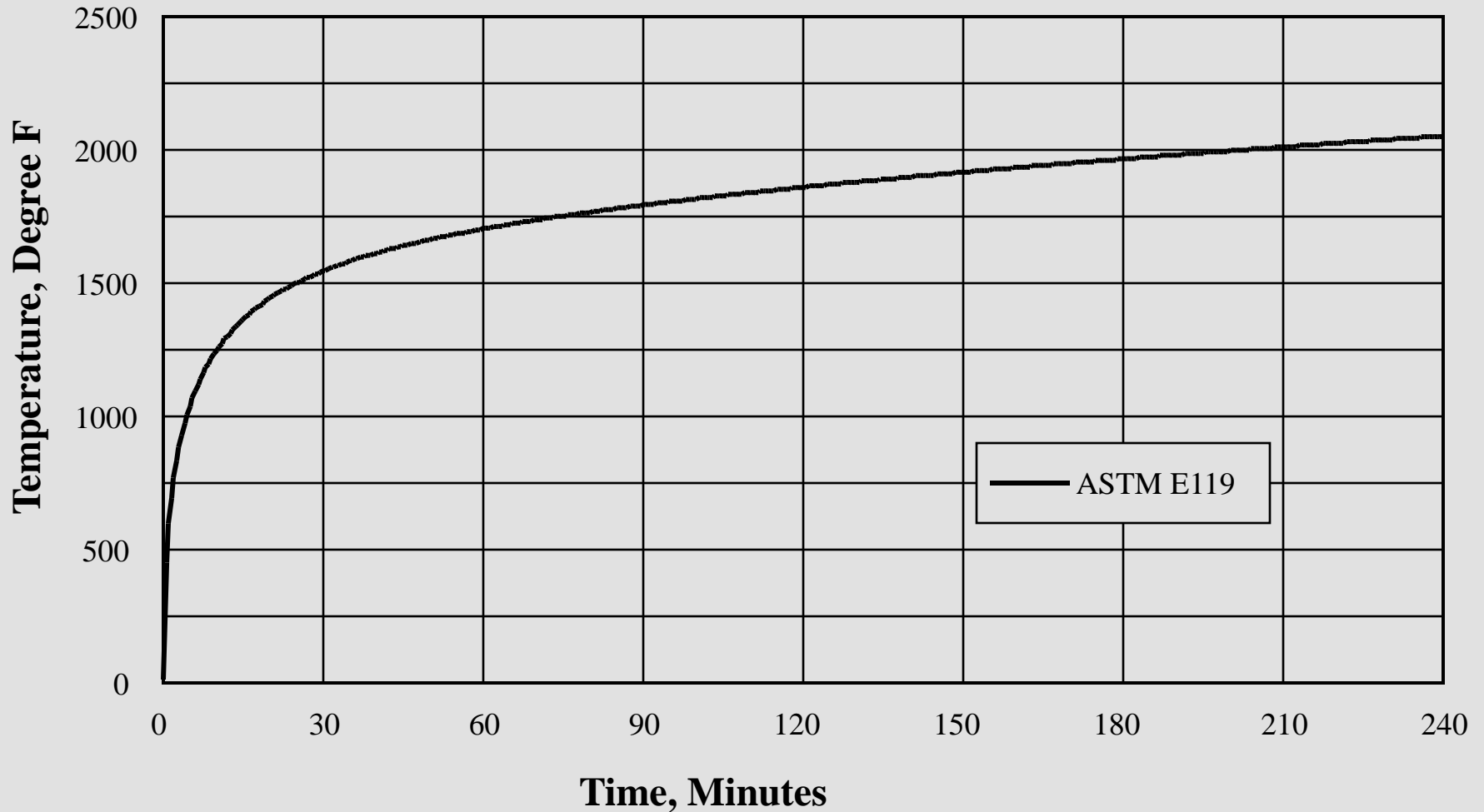# Fire Containment – Compartmentalize

Fire Test Procedures

- ASTM E-119
- Fire Resistance Ratings
  - Heat Transfer
  - Structural Integrity
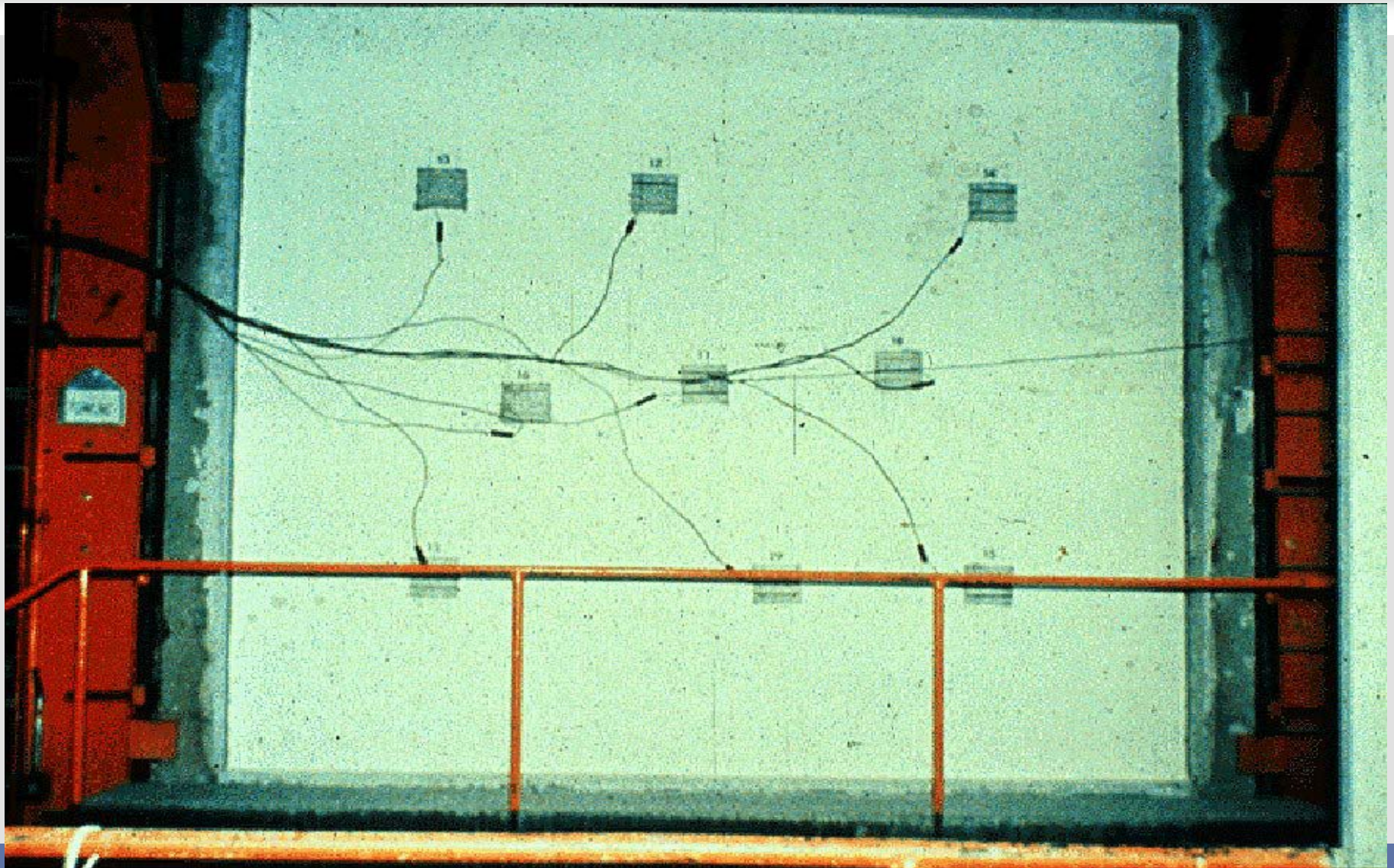 - Hose Stream Test (Walls)

Wall Furnace

STANDARD TIME - TEMPERTURE CURVE

ASTM E119

Hose Stream Test - Exposed Side
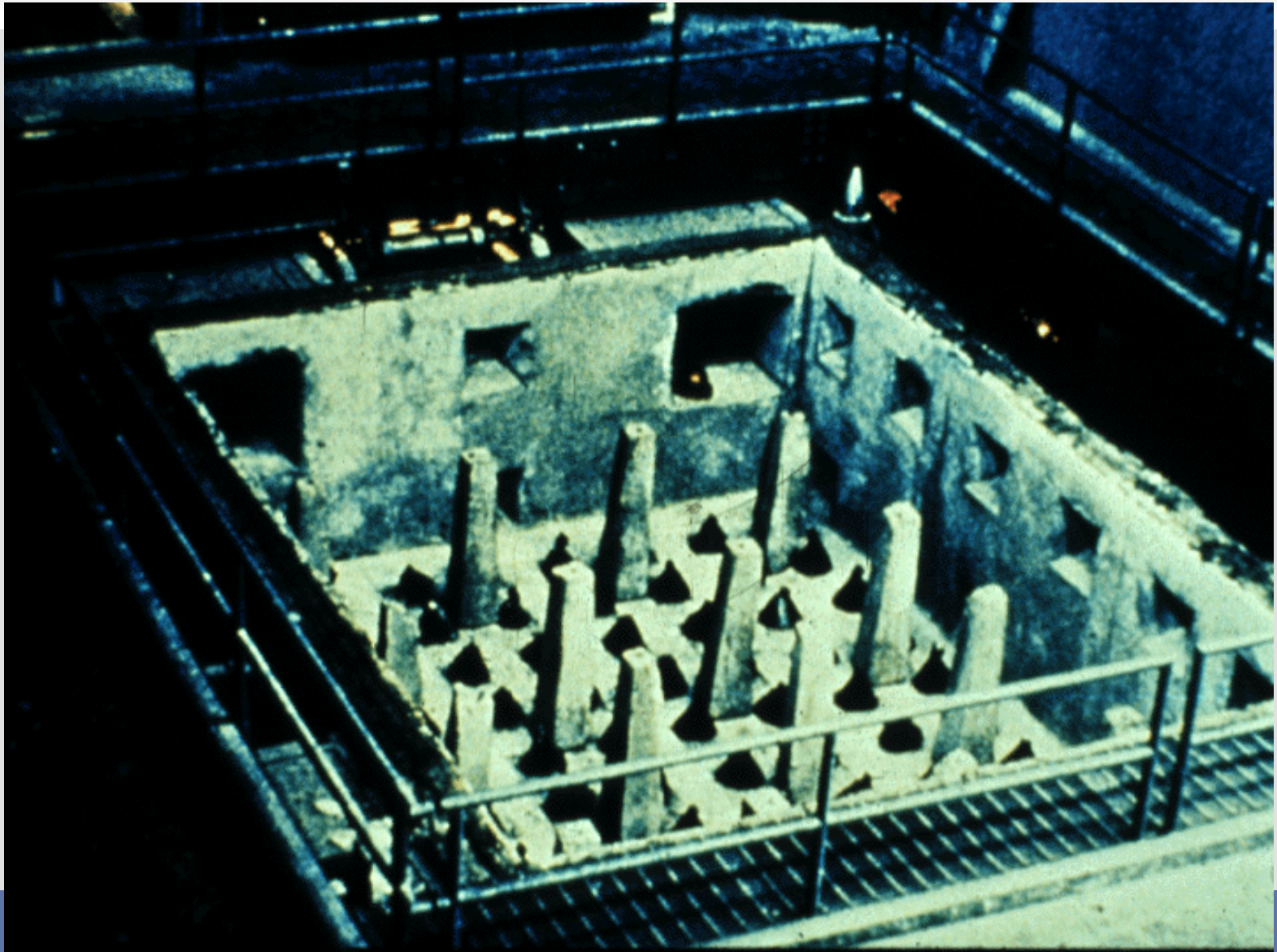
Hose Stream Test - Exposed Side

Floor Furnace

Floor-Ceiling Prior to Test

Surface Burning Characteristics

- ASTM E84

  – FLAME SPREAD

  – SMOKE DEVELOPED
    - Inorganic Reinforced Cement Board - 0
    - Red Oak Flooring - 100

Surface Burning Characteristics

Gypsum Panels

– Flame Spread

- Paper Faced   15
- Sheathing   20
- Glass Mat Faced   Close to 0

– Smoke Developed

- All   0

Meets Type A Classification (IBC Section 803)

Noncombustible Composite Material

- Core Meets ASTM E - 136
- Surfacing < 1/8" w/ Flame Spread < 50

- Meets IBC 703.4.2

Gypsum Panel Cores

- Gypsum Core Types
- Manufacturer Specific Cores
- Gypsum Core Compliance with Individual UL Designs
- Where to find information…

Gypsum Core Types

Three (3) Types of Gypsum Cores

- Regular Core

- Type X

- Type C

Panel Strength Comparison

- **Simple Test @ 1850° F**
- 13" x 13" x 5/8" Panels
- Regular, Type X & Type C Panels
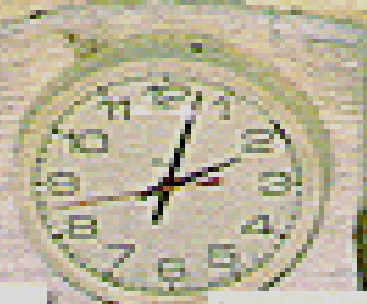- 12lb - 9oz. loading

⅝" SHEETROCK
REGULAR

⅝" SHEETROCK
TYPE-X

⅝" SHEETROCK
FIRECODE-C

⅝" SHEETROCK
REGULAR

⅝" SHEETROCK
TYPE-X

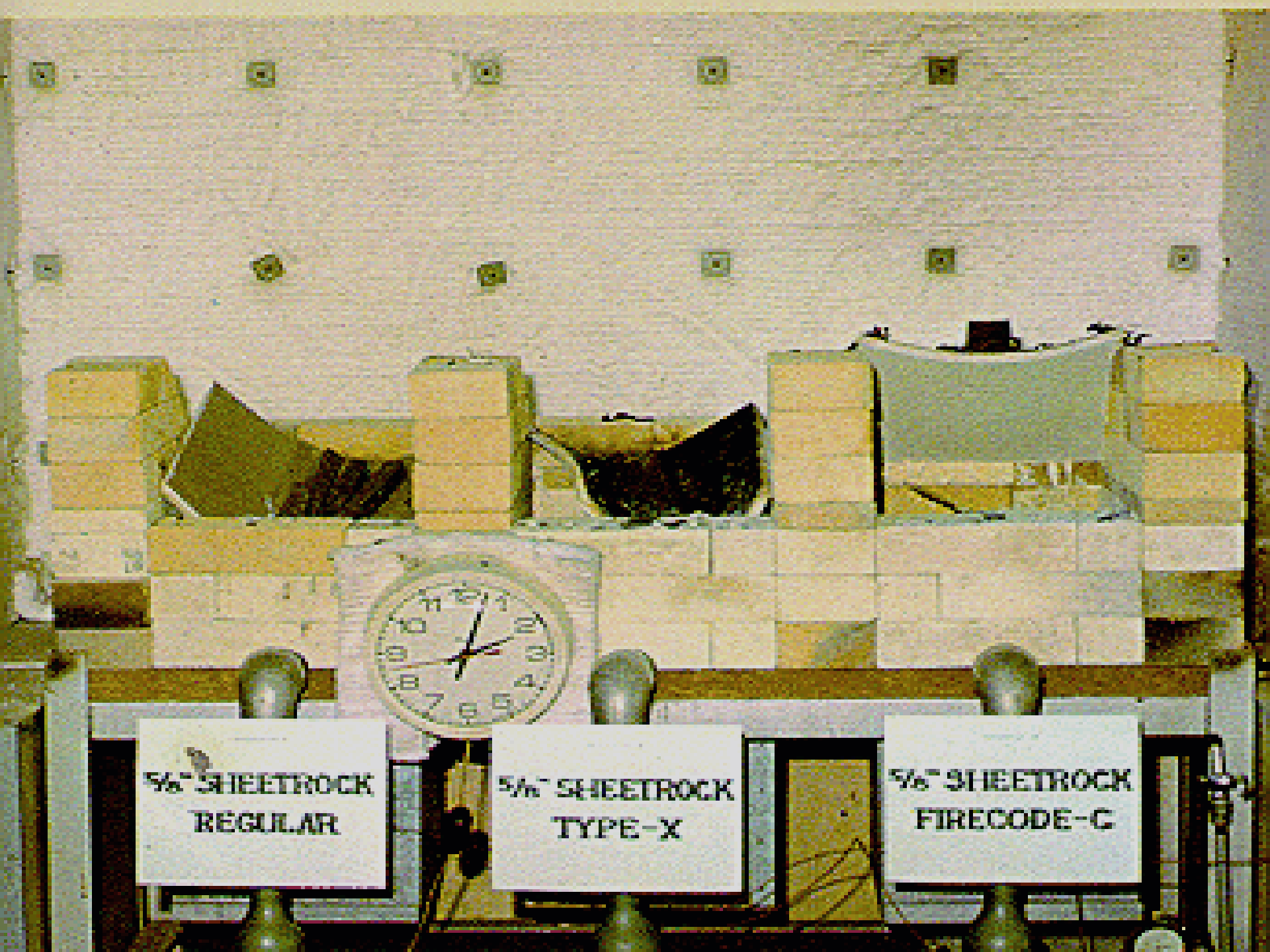⅝" SHEETROCK
FIRECODE-C

⅝" SHEETROCK
REGULAR

⅝" SHEETROCK
TYPE-X

⅝" SHEETROCK
FIRECODE-C

Significance of Test

- Type X core $\neq$ Type C core

- Specify board type per UL design

- Specified panel must be installed

GA-605 – Gyp. Panel Products for use in UL Classified Systems

- Free to download
- www.gypsum.org
- Dec 6, 2010
- Next update mid-2012
- Gyp. Mfg. UL Type & Product Name

GYPSUM ASSOCIATION

6525 Belcrest Road, Suite 480, Hyattsville MD 20782

PROPRIETARY GYPSUM PANEL PRODUCTS FOR USE IN UL CLASSIFIED SYSTEMS
(GA-605)
Rev. December 6, 2010

The *Fire Resistance Directory* published by Underwriters Laboratories Inc. lists gypsum panel products that are classified for fire resistance under category "Gypsum Board (CKNX)." Each UL Design lists the specific manufacturers and products that are suitable for use in the design. The products are identified with a Type designation that ties back to specific board formulations. The UL Type designation appears on the UL label on the product. However, gypsum board end tapes and product literature do not generally contain the UL type designation but a product name or trademark. The following tables provide a quick and easy reference to identify the specific products, brand names, or trademarks of each gypsum board manufacturer for each type designation in the UL *Directory*.

COMPANY NAME	PAGE
American Gypsum	1
CertainTeed Gypsum, Inc./CertainTeed Canada Inc.	2
Georgia-Pacific Gypsum	3
Lafarge North America	3
National Gypsum Company	4
PABCO Gypsum	4
Temple-Inland	5
United States Gypsum Company/CGC Inc.	6

American Gypsum Company

UL Type Designation	Product Name
AG-C	1/2" FireBloc® Type C
	5/8" FireBloc® Type C
	5/8" FireBloc® Type C Soffit
	1/2" M-Bloc® Type C with Mold Resistance
	5/8" M-Bloc® Type C with Mold Resistance
AGX-1, AGX-11	5/8" FireBloc® Type X
	5/8" AquaBloc® Type X
	5/8" Exterior Sheathing Type X
	5/8" Soffit Type X
	5/8" Veneer Type X
	5/8" SmoothRoc® Type X
	5/8" M-Bloc® Type X with Mold Resistance
	5/8" M-Bloc® AR Type X Abuse and Mold Resistance
	5/8" M-Bloc® IR Type X Impact and Mold Resistance
AG-S	1" Shaft Liner
	1" M-Bloc® Shaft Liner with Mold Resistance
AG-CP	1/2" FireBloc® CP Gypsum Lay-In Ceiling Panels

GA-605-11-10
Page 1 of 7

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GA-605 Type "C": Ex. Mfg. Name & UL Type

- American Gypsum: AG-C
- CertainTeed: ProRoc Type C
- GP: Type 5
- LaFarge: Type LGFC-C/A
- National Gypsum: Type FSW-C
- Pabco: Type PG-C & Type C
- Temple-Inland: Fire Rated Type TG-C
- USG: Type C

* not all mfg.'s "C" core panels listed. See mfg.

GA-605 Type "X" : Ex. Mfg. Name & UL Type

- American Gypsum: Type AGX-1, AGX-11
- CertainTeed: ProRoc Type X
- GP: Type 9
- LaFarge: Type LGFC6A
- National Gypsum: Type FSW
- Pabco: Type PG-11
- Temple-Inland: Fire Rated Type X
- USG: Type SCX

* not all mfg.'s "X" core panels listed. See mfg.

Effect of Insulation on Integrity of Ceiling Membranes

Heat is trapped behind membrane – Flow of heat is interrupted

Calcination of gypsum panel is accelerated

Additional support needed to keep membrane in place

Type C panels likely a "MUST"

Orientation of Gypsum Panels on Walls

Perpendicular to the studs (horizontally applied)

Parallel to the studs (vertically applied)

Orientation of Gypsum Panels on Walls

- Conventional studs (minimum 25 gauge)

- Light gauge studs (equivalent thickness)

Orientation of Gypsum Panels on Walls

On Conventional Studs

- Vertical application – Standard

- Horizontal application – Referenced in the IBC and GA 600 – Based on an old test

- Achieved by most manufacturers at UL

Orientation of Gypsum Panels

On Light Gauge Studs

- Vertical application – Standard - Most manufacturers

- Horizontal application – Only achieved at UL with USG's Ultra Light FIRECODE® Type X (UL designation "Type ULX")

Fire Performance
Light Gauge Steel Stud Construction – UL U419

- **Perpendicular (horizontal) installation with aligned horizontal joints**
  - Top-down construction

- **Installation advantage**
  - 25 EQ Gage Steel Studs – majority of market
    - ClarkDietrich: ProSTUD
    - Marino-Ware/CEMCO: Viper25

1-hr Rated System Horizontal Without Backing

Innovative Technology

- 5/8" SHEETROCK Brand Ultra Light FIRECODE X Gypsum Panels (UL designation "Type ULX")

- 5/8" SHEETROCK Brand Ultra Light FIRECODE 30 (UL designation "Type FC30")

5/8" Ultra Light FIRECODE® X Gypsum Panels

- Classified as Type X (per ASTM C 1396)

- 15% lighter than conventional 5/8" Type X

	5/8''- 4'x9'	5/8'' – 4'x12'
Competitive 5/8" Type X	**74–85 lbs**	**99–113 lbs**
SHEETROCK® UltraLight Panels FIRECODE® X	**70 lbs**	**93 lbs**
Average Weight Difference*	**10 lbs**	**13 lbs**

* Compared industry low and high plant weights

Up to
15%
lighter

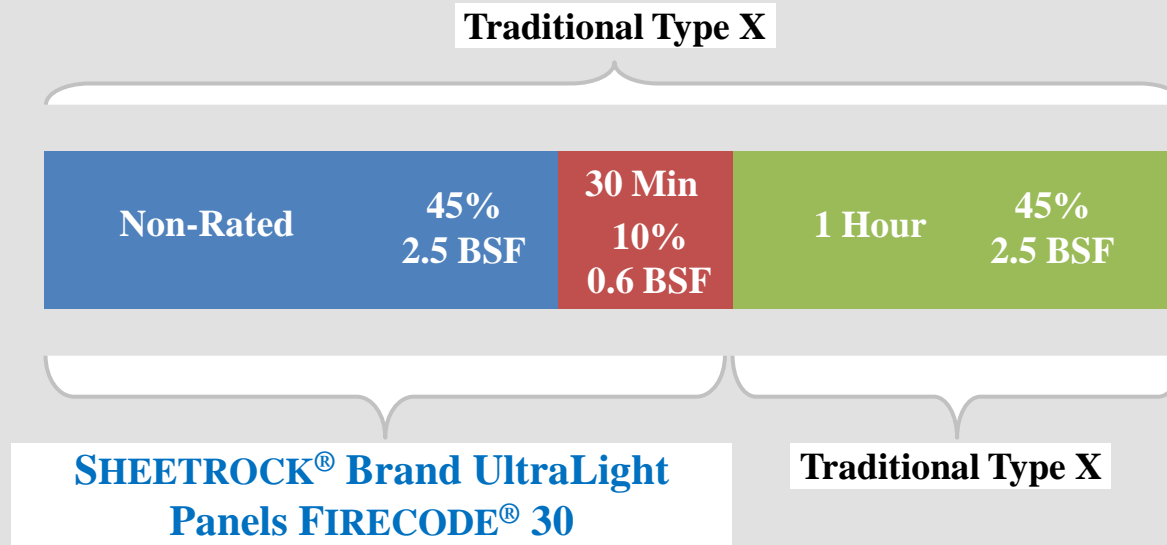|	5/8"- 4'x12'	5/8" - 54"x12'
Competitive 5/8" Type X	**99–111 lbs**	**111–126 lbs**
Ultra Light FIRECODE® 30	**78 lbs**	**88 lbs**
Average Weight Difference*	**27 lbs**	**31 lbs**

* Compared to industry low and high plant weights

Up to 30% lighter

Fire Rated vs Non Rated Walls

Based on 2010 total industry 5/8" volume

CURRENTLY: **One-size fits all**

Traditional Type X

Non-Rated	45% 2.5 BSF	30 Min 10% 0.6 BSF	1 Hour	45% 2.5 BSF

SHEETROCK® Brand UltraLight Panels FIRECODE® 30

Traditional Type X
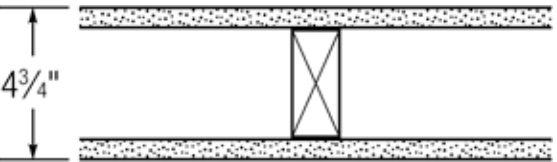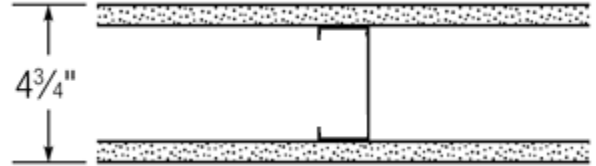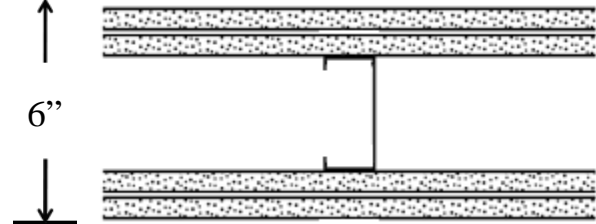
Case Study

USG Office Building

- Open plan office
  - 500 MSF of wallboard

- Non-fire rated
  - **80% partitions**
  - 400 MSF of wallboard

- Only elevator shafts and lobbies, stair shafts and exit corridors, kitchen areas have fire rated partitions

Source: The Environments Group - now part of Perkins + Will

UL Designs

Construction Detail	Description	Test Number
30 minute $4\frac{3}{4}"$	5/8" SHEETROCK® Brand UltraLight Panels Firecode® 30 each side 2x4 wood studs 16" o.c – ***load bearing***	UL Design No. U407
30 minute $4\frac{3}{4}"$	5/8" SHEETROCK® Brand UltraLight Panels Firecode® 30 each side 25 EQ gauge steel studs 24" o.c.	UL Design No. U407
60 minute, STC 52 w/ R-11 bat 6"	2 layers 5/8" SHEETROCK® Brand UltraLight Panels Firecode® 30 each side 25 EQ gauge steel studs 24" o.c.	UL Design No. U407

Resources

- U.L. Fire Resistance Directory
- Gypsum Association
- Manufacturers' Catalogs
- Technical Websites
  - UL Ultimate Fire Wizard
  - GA Association – gypsum.org
  - USG Design Studio www.usgdesignstudio.com
  - USG Architectural Binder
- Gypsum Construction Handbook