

# Barrier Management Symposium

January 29, 2016

Bill McHugh, FCIA for

Nestor Sanchez, USG Corporation

# Learning Objectives

1. Explore the gypsum mineral and its impact on fire resistance in a systems basis
2. Understand the different types of gypsum core and their relation to fire resistance
3. Determine recognized methods for repair installed gypsum panels
4. Innovative Technology

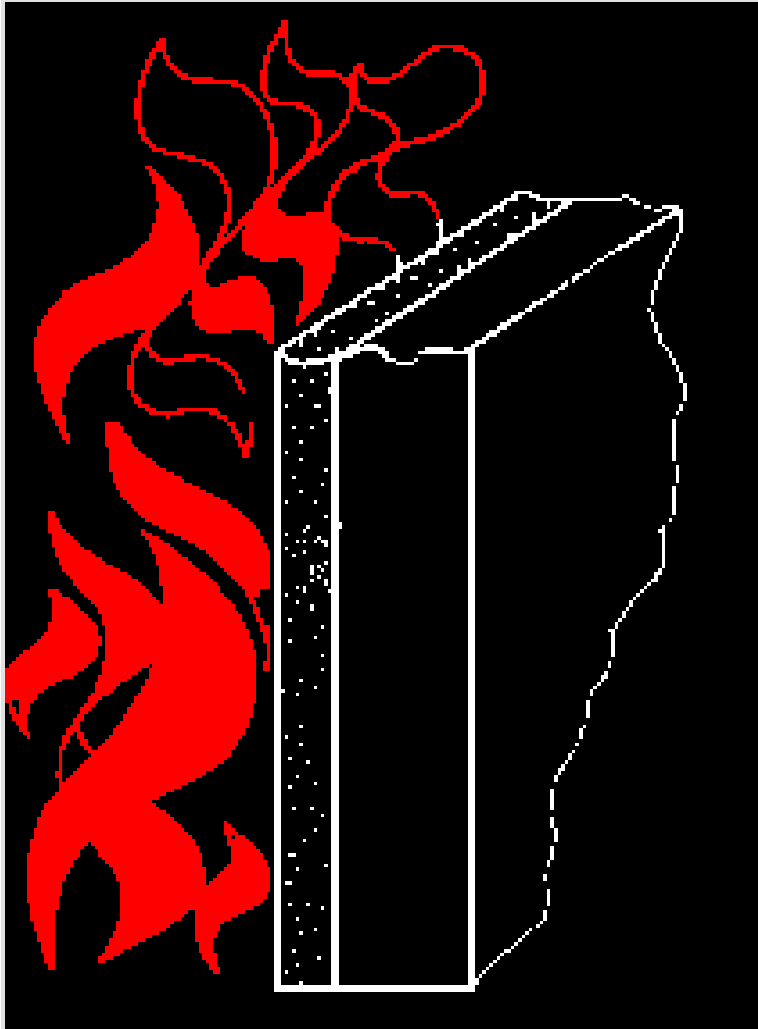
# Fire Containment – Compartmentalize



# Gypsum Mineral

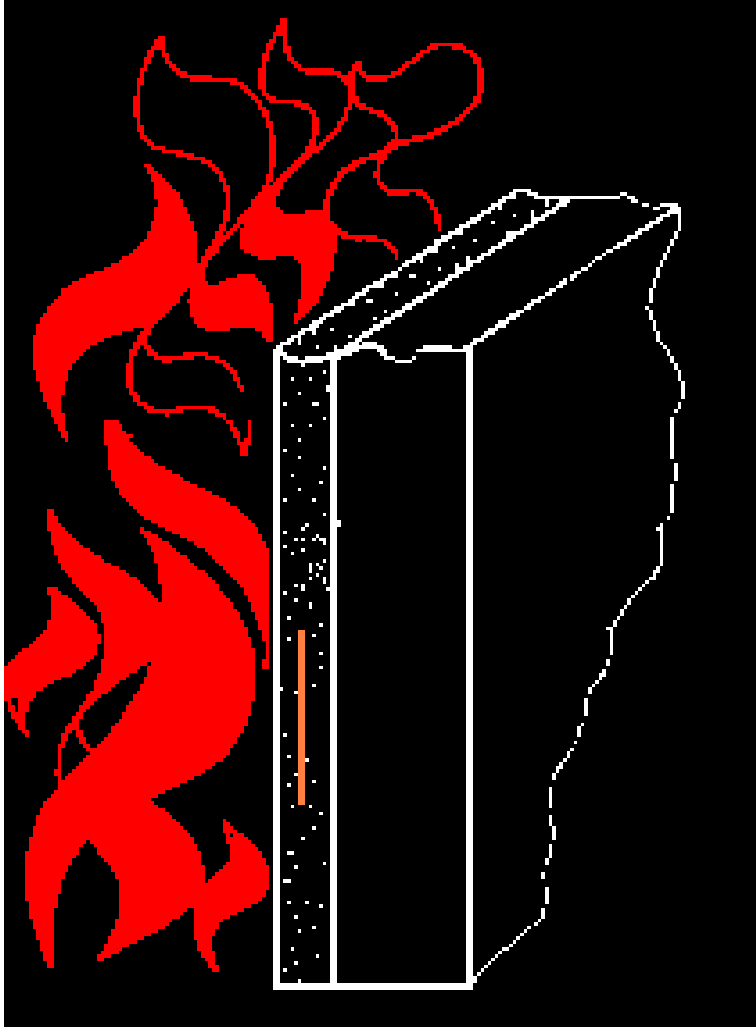
- Calcium Sulfate
- $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
- 20% water by weight

# Gypsum Mineral



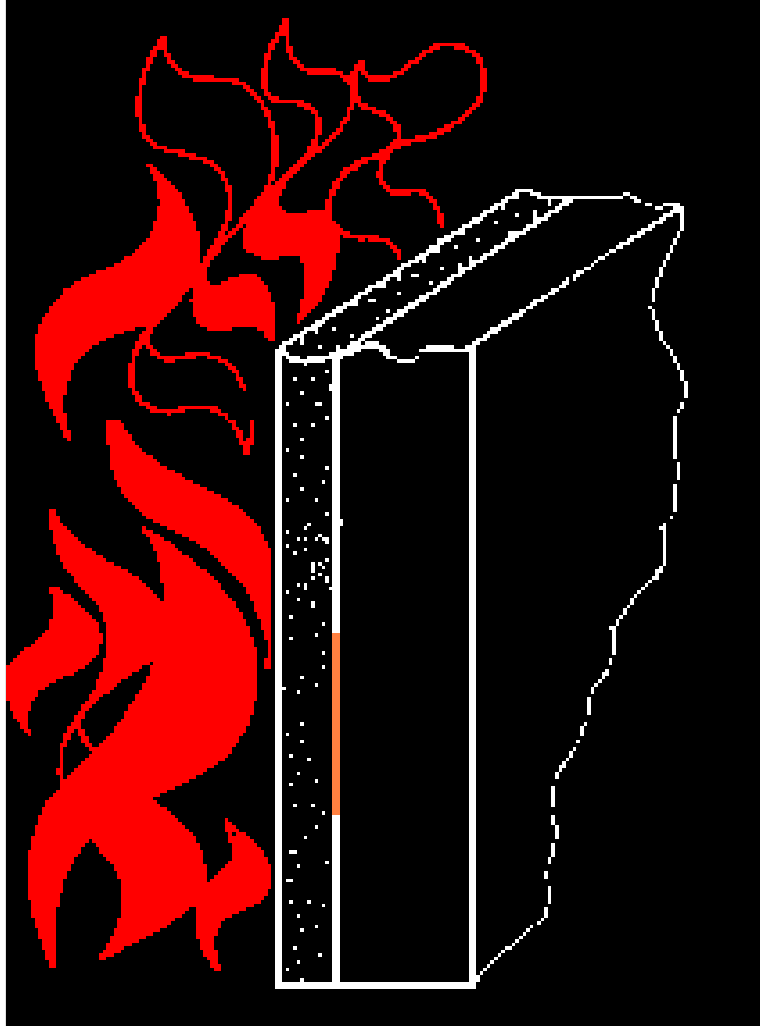
- ASTM E 119 2hr. 1900° F

# Gypsum Mineral



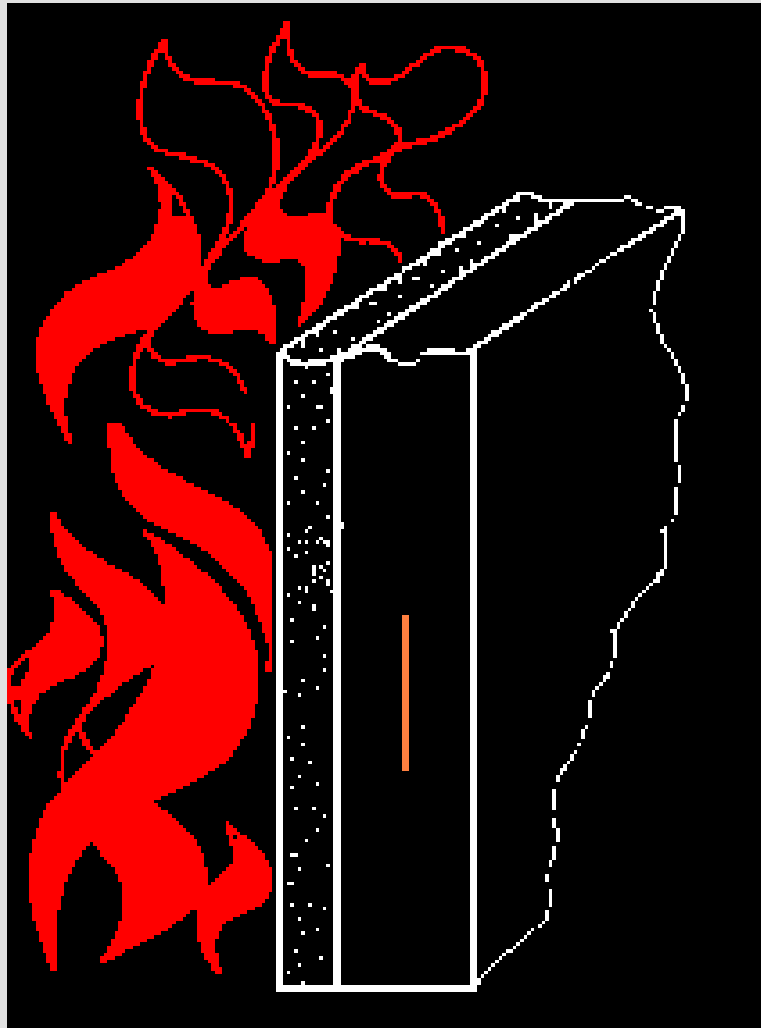
1" back 950° F

# Gypsum Mineral



2" back 220° F

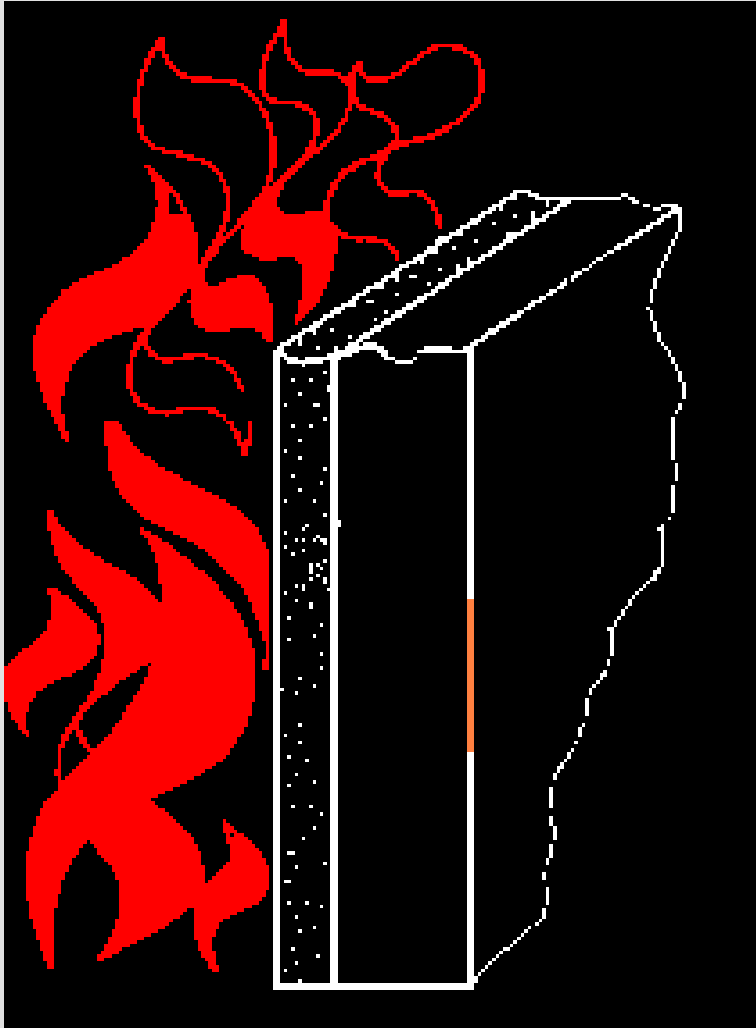
# Gypsum Mineral



4" back 180° F

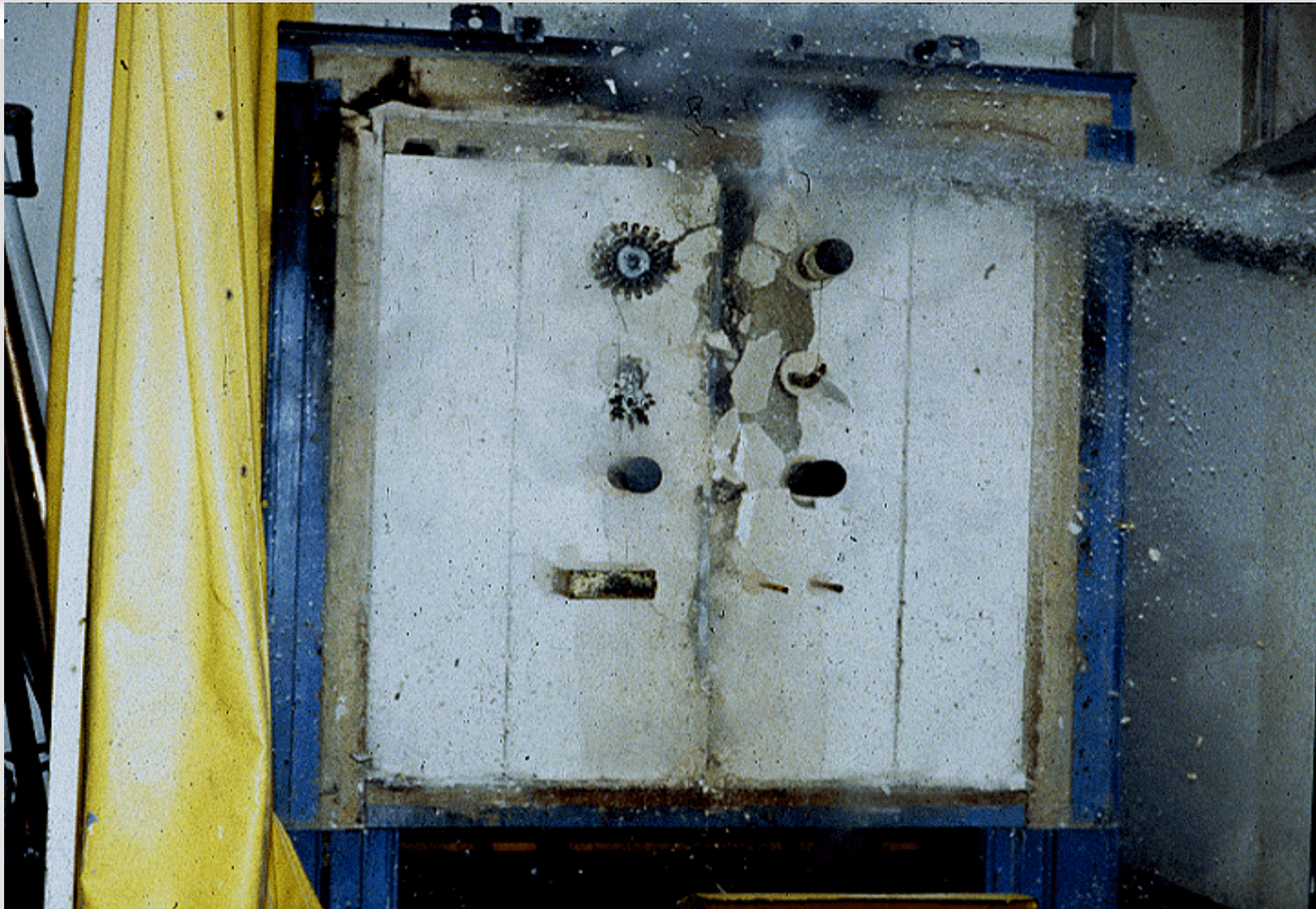


# Gypsum Mineral

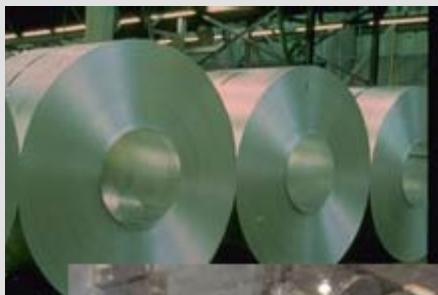


6" back 130° F

# Hose Stream Test - Exposed Side



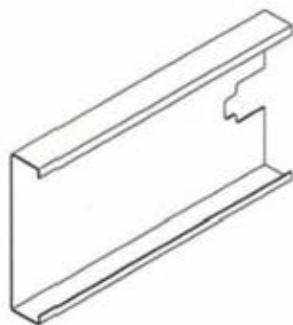
# Cold-Formed Steel Background



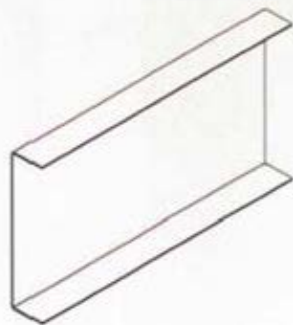
33 Mils=20ga

43 Mils=18ga

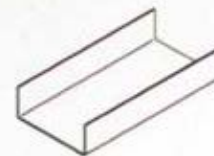
54 Mils=16ga



C-STUD / JOIST  
*S-SECTIONS*



TRACK  
*T-SECTIONS*



CHANNEL  
*U-SECTIONS*

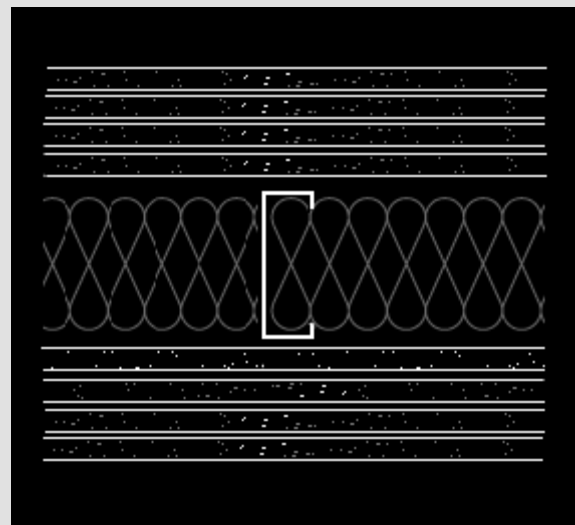
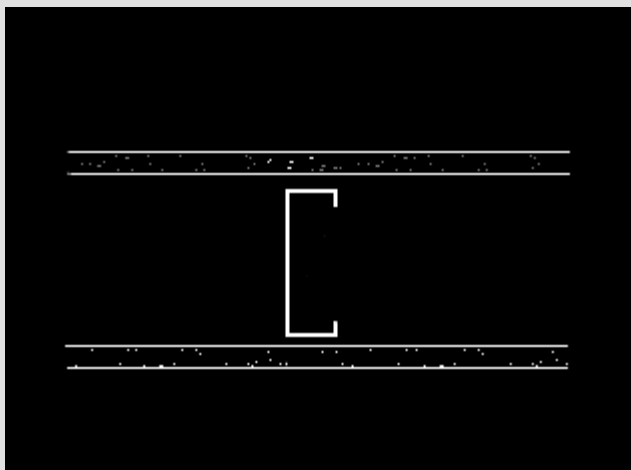


FURRING CHANNEL  
*F-SECTIONS*

68 Mils=14ga

97 Mils=12ga

# 1 to 4 Hour Ratings



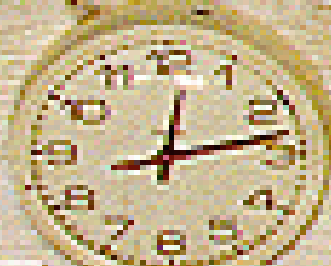
# Gypsum Core Types

## 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



**5/8" SHEETROCK  
REGULAR**

**5/8" SHEETROCK  
TYPE-X**

**5/8" SHEETROCK  
FIRECODE-C**

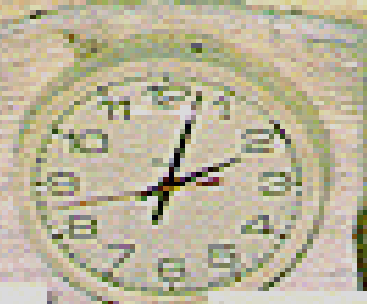


5/8" SHEETROCK  
REGULAR

5/8" SHEETROCK  
TYPE-X

5/8" SHEETROCK  
FIRECODE-C

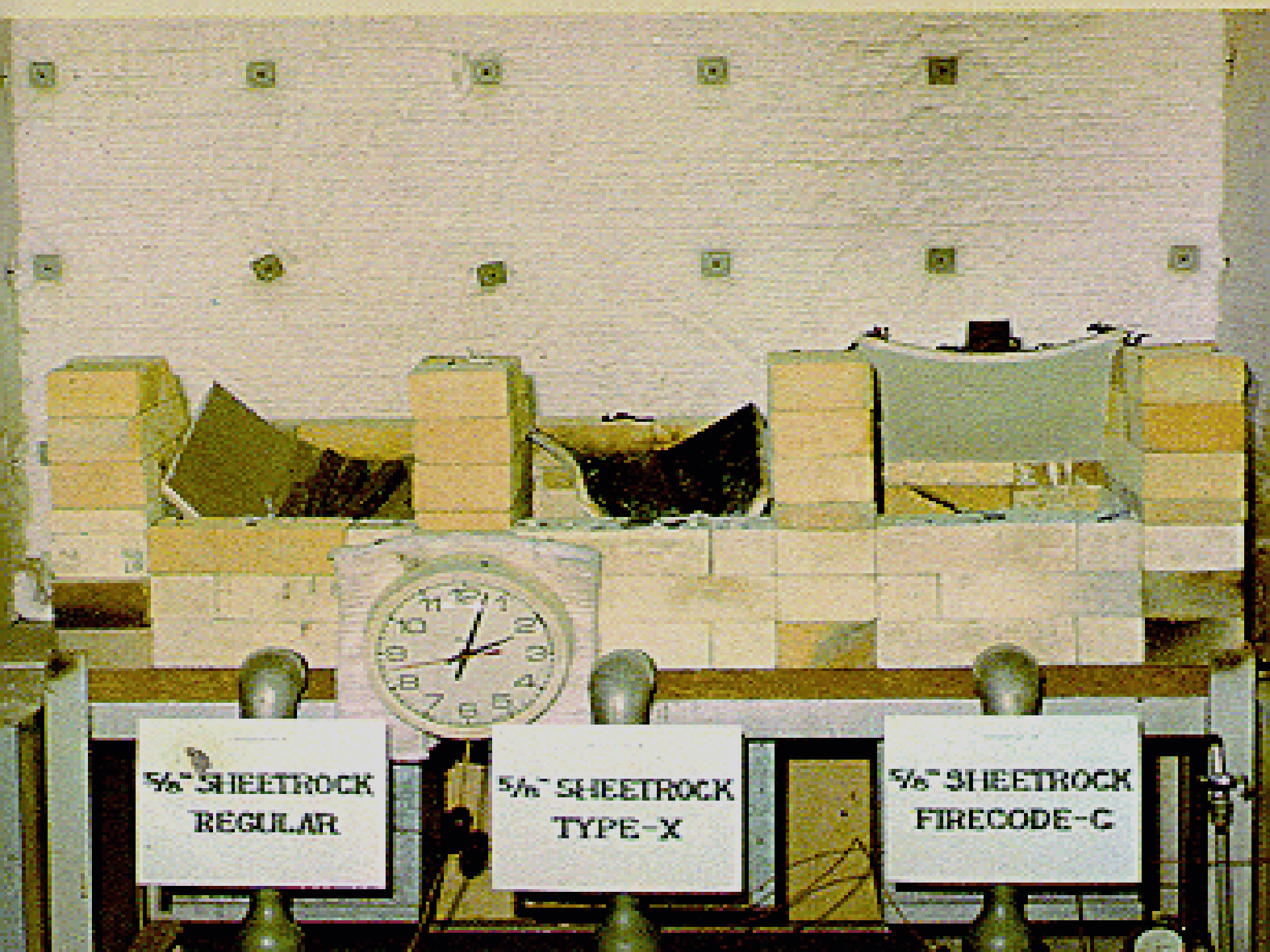




5/8" SHEETROCK  
REGULAR

5/8" SHEETROCK  
TYPE-X

5/8" SHEETROCK  
FIRECODE-C



# Significance of Test

- Type X core  $\neq$  Type C core
- Specify board type per UL design
- Specified panel must be installed


# Floor-Ceiling Prior to Test



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

- Free to download
- [www.gypsum.org](http://www.gypsum.org)
- Gyp. Mfg. UL Type & Product Name
- [www.UL.com](http://www.UL.com)

## Fire Resistance Directory



**GYPSUM ASSOCIATION**  
 1524 Leitch Road, Suite 400, Ithaca, NY 14850

### 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
	5/8" FireBloc® Type X
AGX-1, AGX-11	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

Copyright © Gypsum Association 2010. All rights reserved.  
Printed in U.S.A.

## 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.

# 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 wallboard manufacturers at  
UL

# Orientation of Gypsum Panels

## On Light Gauge Studs

- Vertical application – Standard - Most manufacturers
- Horizontal application – Only achieved at UL with certain manufacturers

# Fire Performance

## Light Gauge Steel Stud Construction – UL U419

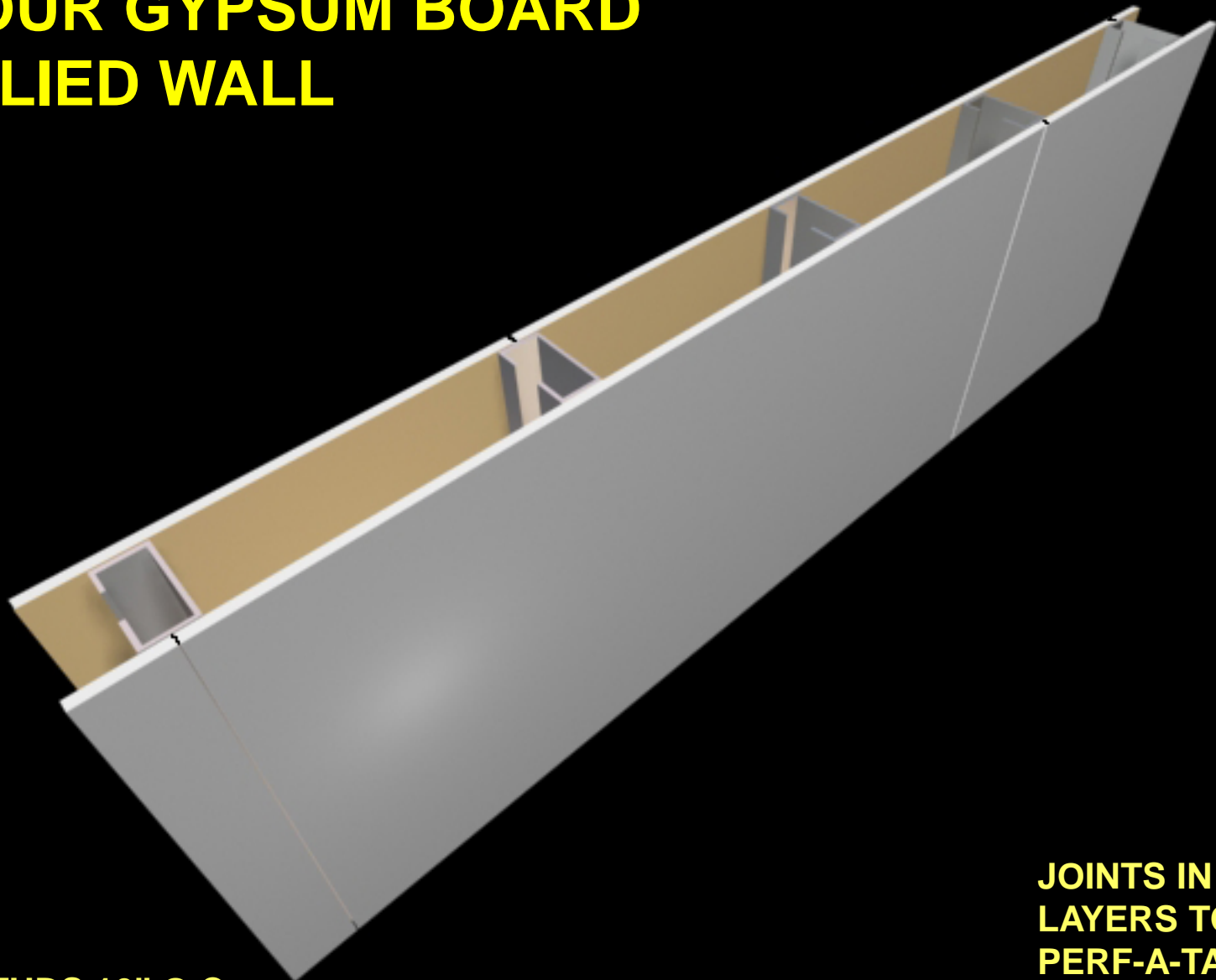


- **Perpendicular (horizontal) installation with aligned horizontal joints**
  - Top-down construction
- 

**1-hr Rated System Horizontal Without Backing**

---

# **VERTICALLY 1 HOUR GYPSUM BOARD APPLIED WALL**



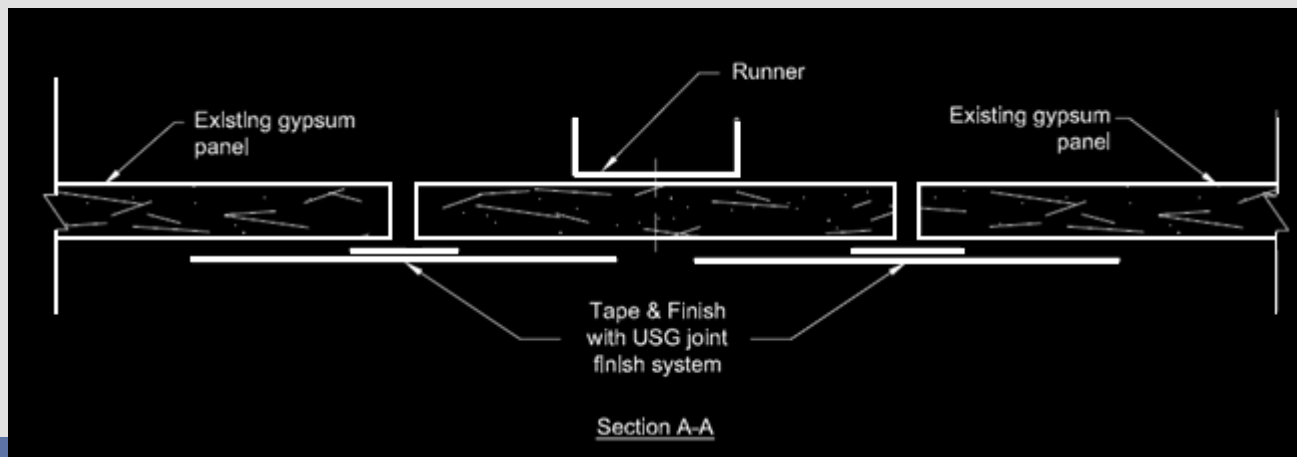
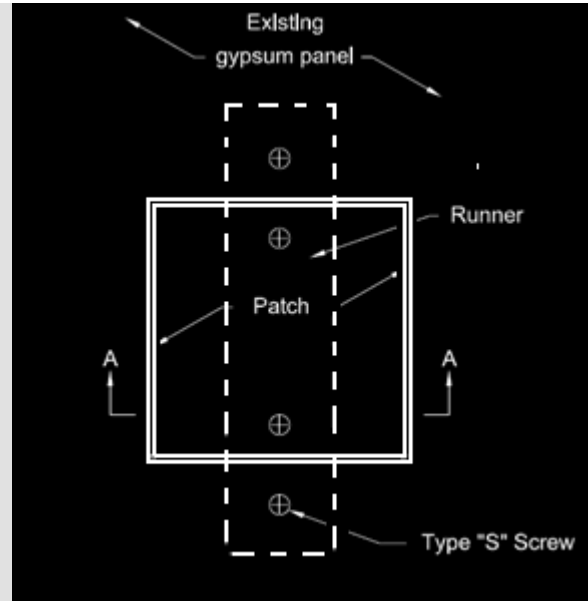
**STUDS 16" O.C.**

**JOINTS IN FINISH  
LAYERS TO RECEIVE  
PERF-A-TAPE AND  
JOINT COMPOUND**

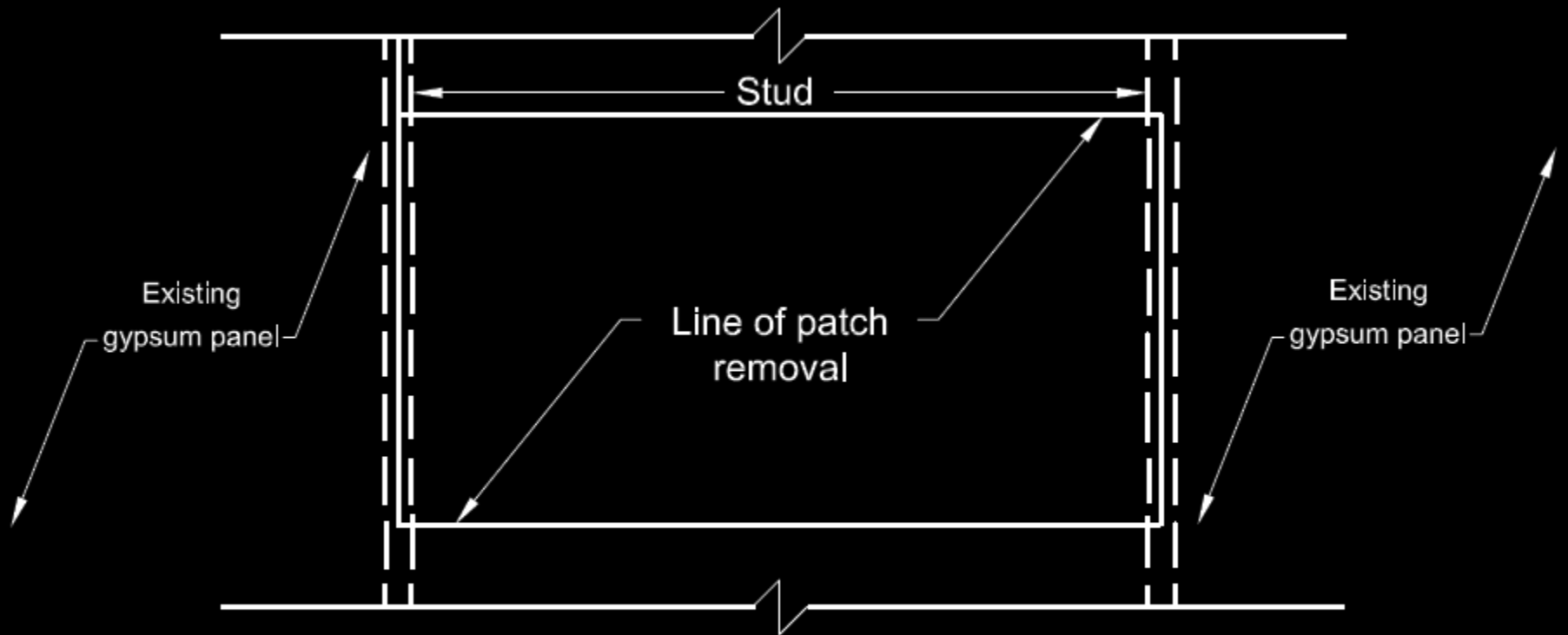
# Repair Gypsum Panels

- Incidental Tears
- Small Indentation
- Fractured Core
- “Crease in Panel”
- Back Paper Damage

# Repair Small Holes



# Repair Large Holes



Partial Elevation - 1

# Innovations

- Mold – Resistant Boards
- Lightweight Gypsum Panels Regular Core
- Lightweight Gypsum Panels
- Dust Control Joint Compound



# Resources

- U.L. Fire Resistance Directory
- Gypsum Association
- Manufacturers' Catalogs
- Technical Websites
  - UL Ultimate Fire Wizard
  - GA Association – [gypsum.org](http://gypsum.org)
  - Steel Framing Alliance – [steel framing.org](http://steel framing.org)

# Barrier Management Symposium

January 29, 2016

Bill McHugh, FCIA for

Nestor Sanchez, USG Corporation