

Barrier Management Symposium

Nov. 16, 2015

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

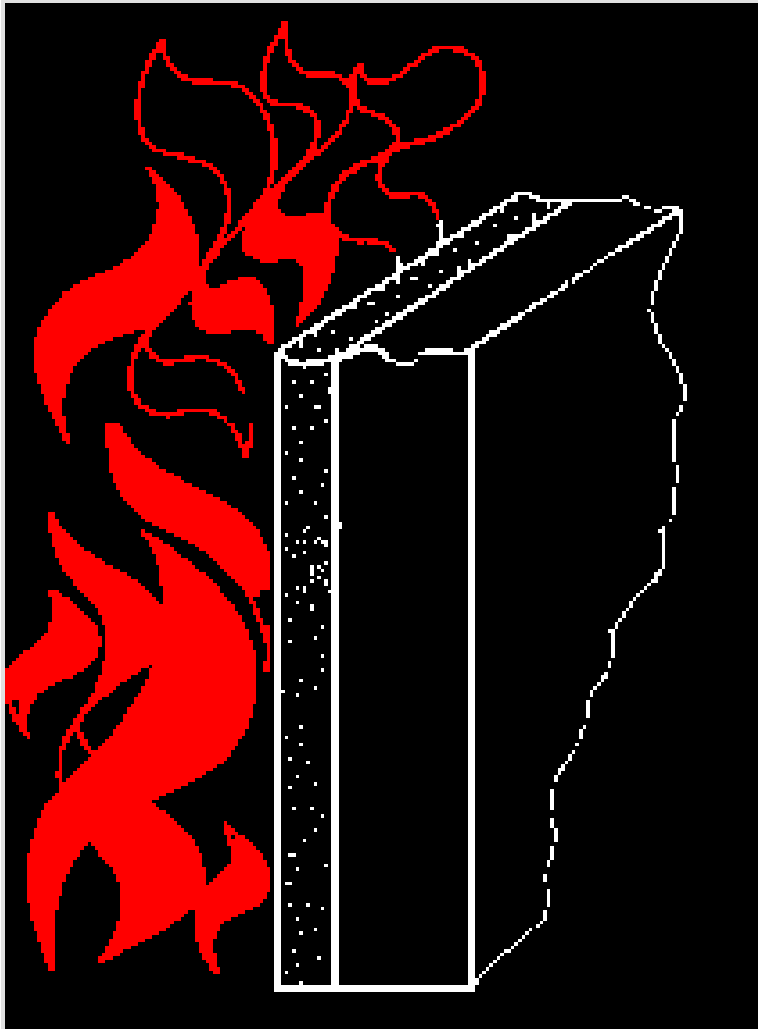
Fire Containment – Compartmentalize



Gypsum Mineral

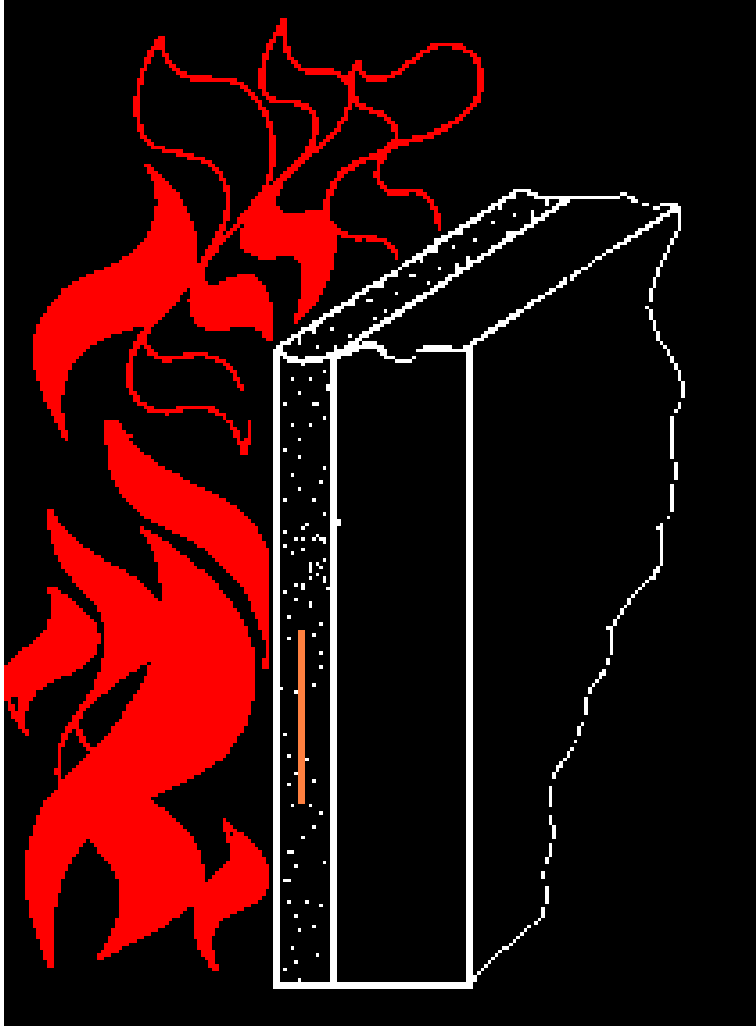
- Calcium Sulfate
- $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
- 20% water by weight

Gypsum Mineral



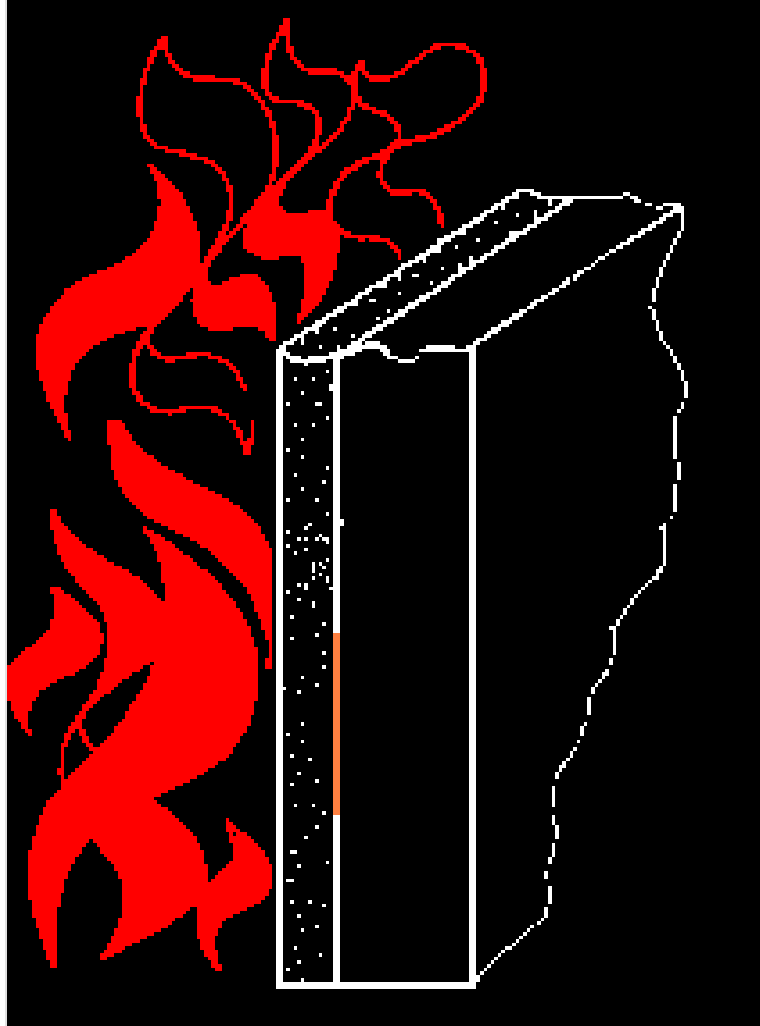
- ASTM E 119 2hr. 1900° F

Gypsum Mineral



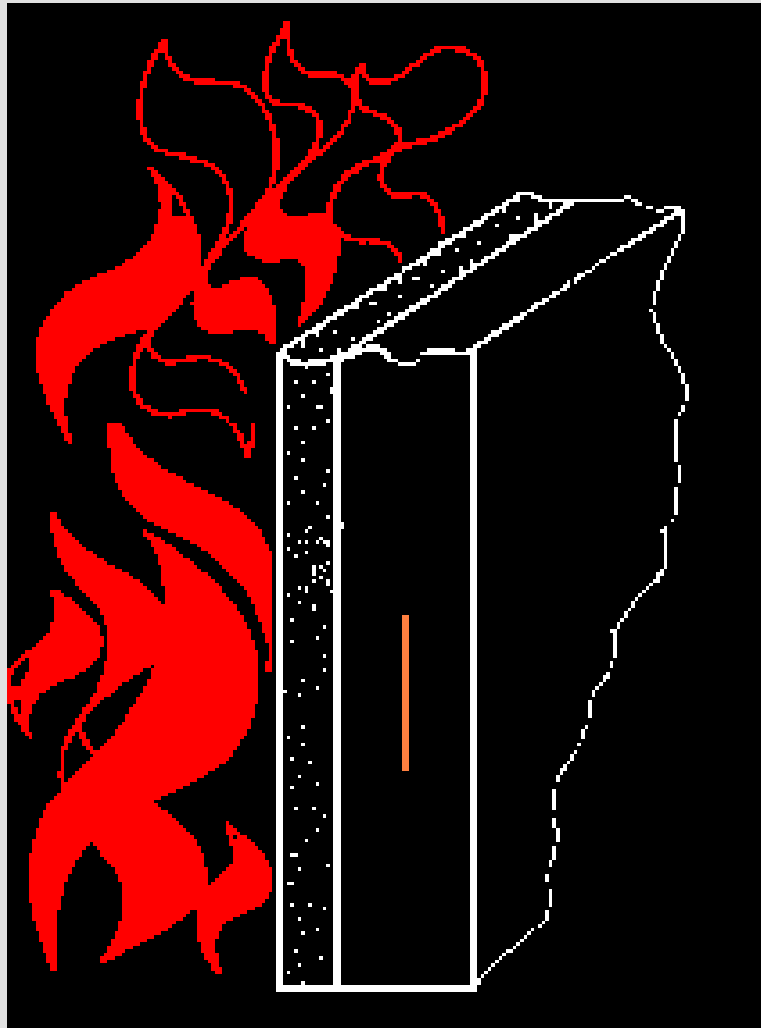
1" back 950° F

Gypsum Mineral



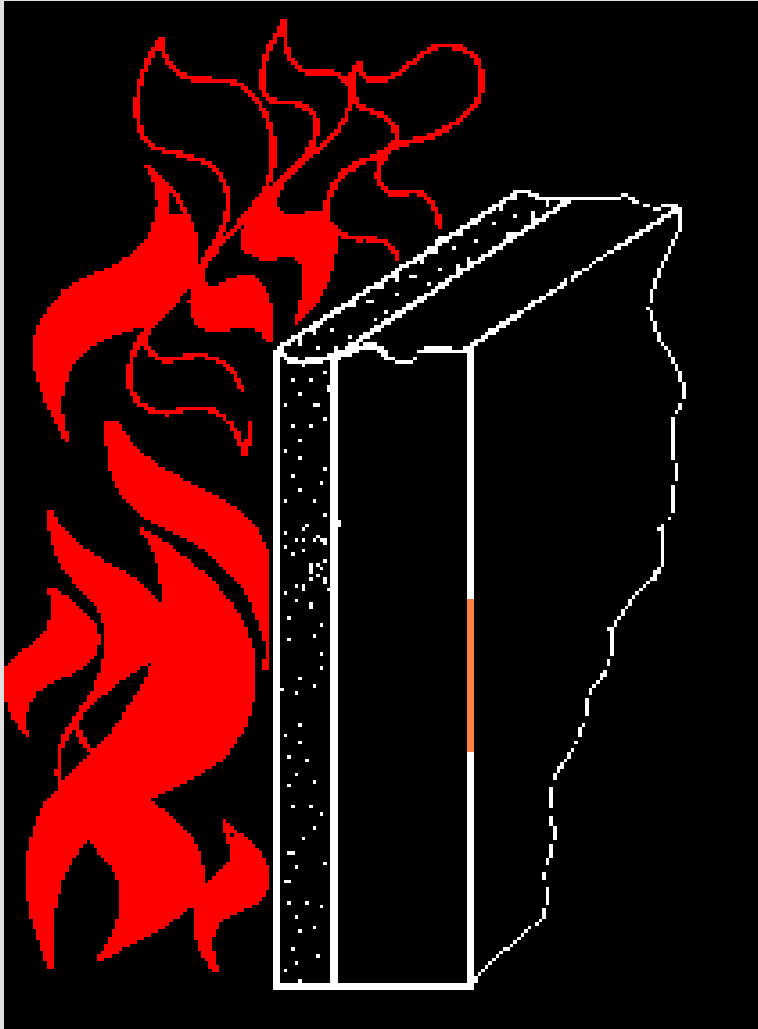
2" back 220° F

Gypsum Mineral



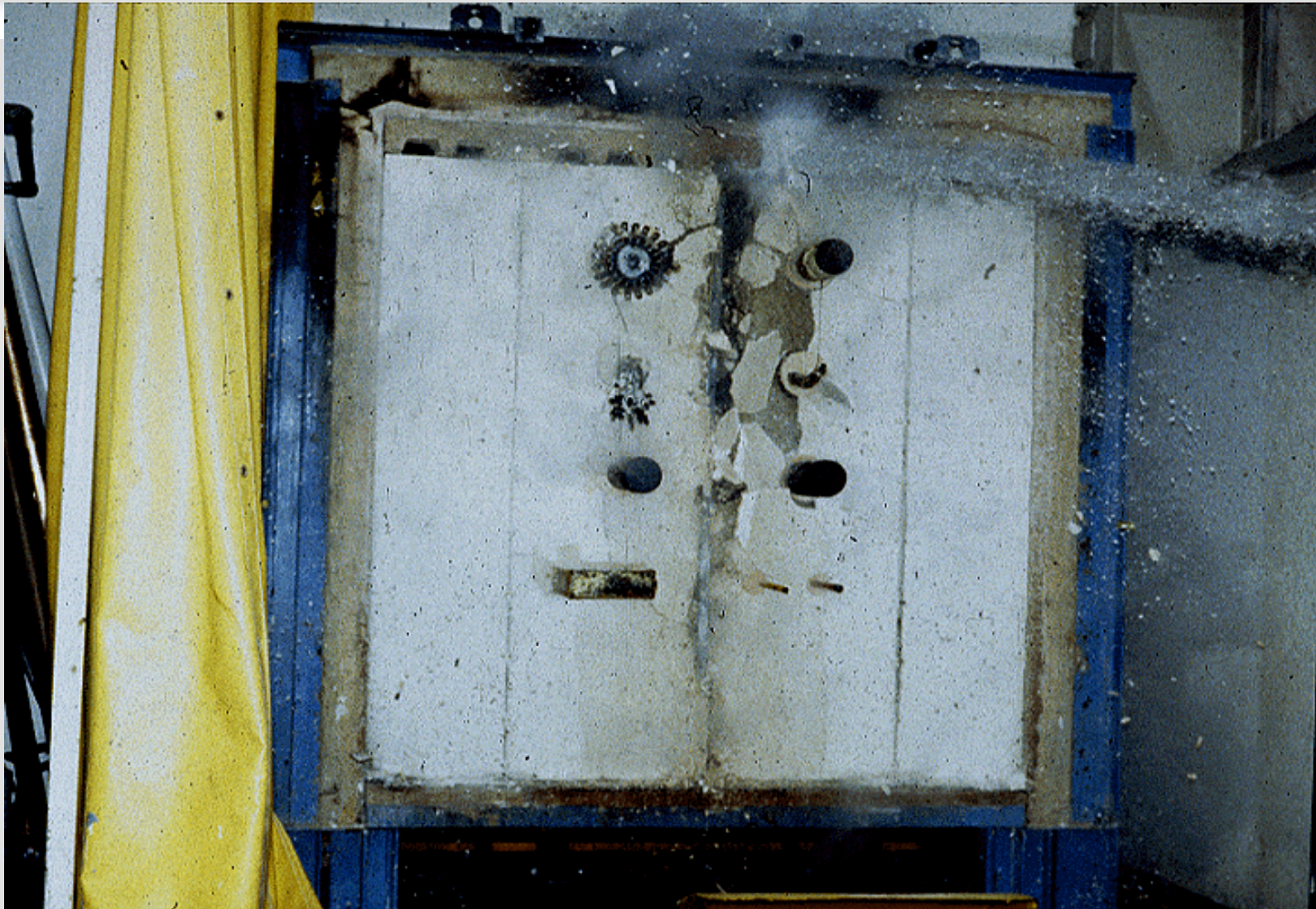
4" back 180° F

Gypsum Mineral

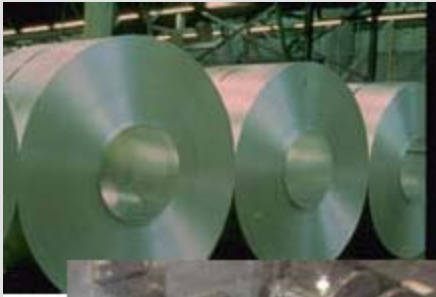


6" back 130° F

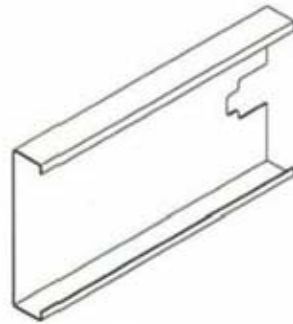
Hose Stream Test - Exposed Side



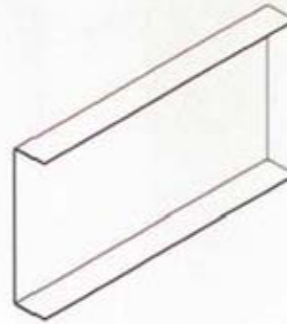
Cold-Formed Steel Background



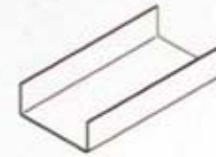
33 Mils=20ga 43 Mils=18ga 54 Mils=16ga



C-STUD / JOIST
S-SECTIONS



TRACK
T-SECTIONS



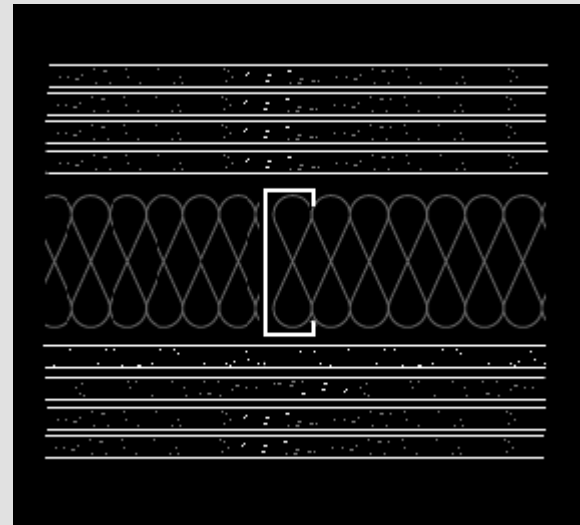
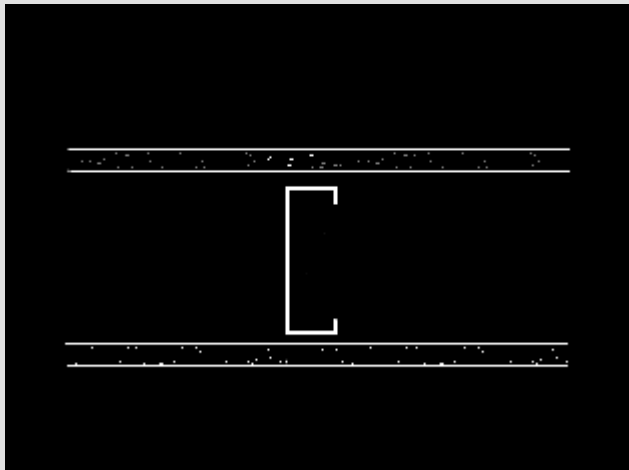
CHANNEL
U-SECTIONS



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**

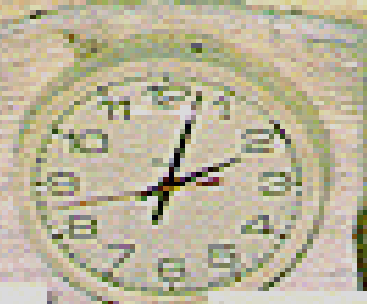
**5/8" SHEETROCK
FIRECODE-C**



5/8" SHEETROCK
REGULAR

5/8" SHEETROCK
TYPE-X

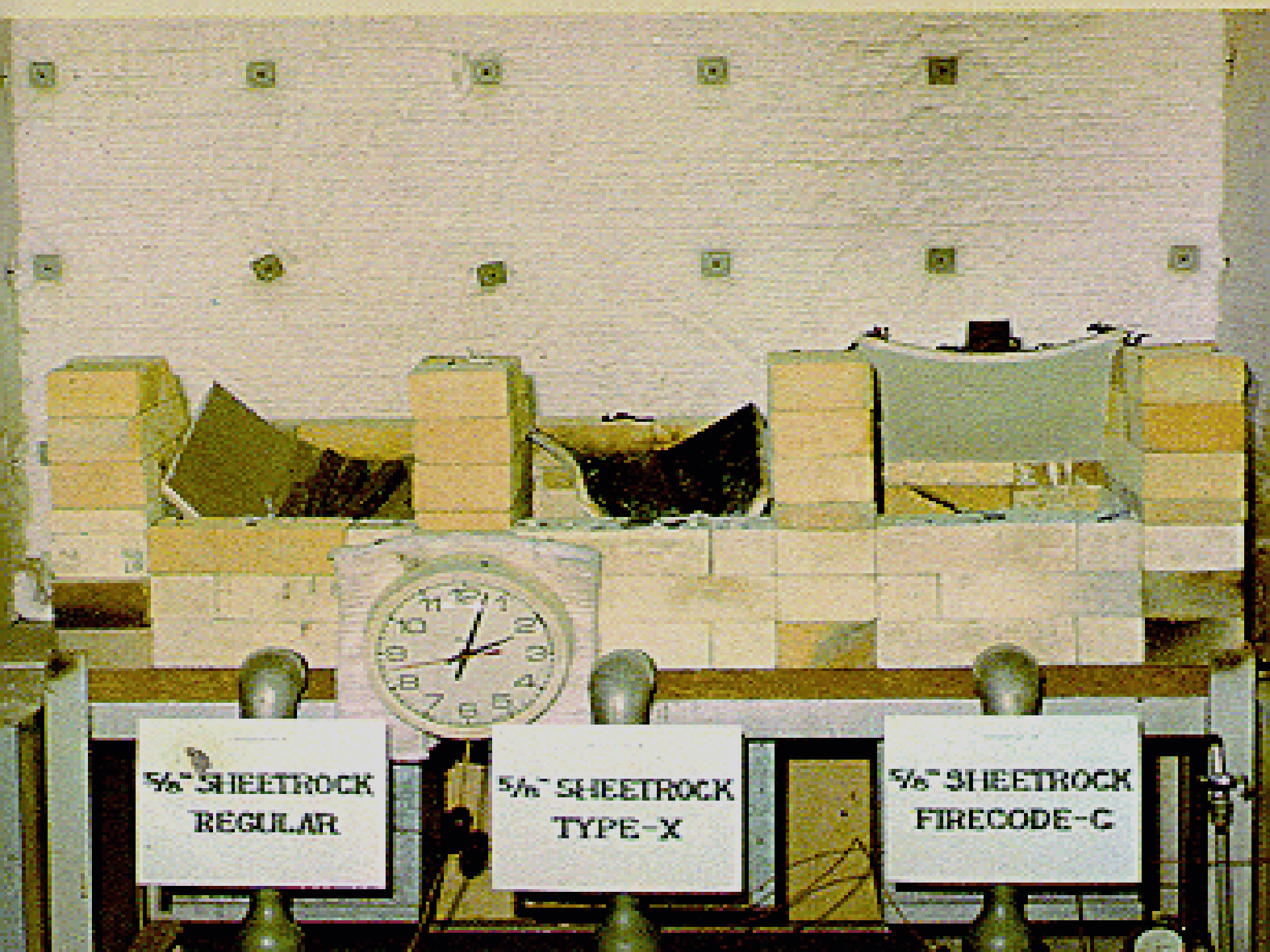
5/8" SHEETROCK
FIRECODE-C



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
- Gyp. Mfg. UL Type & Product Name
- www.UL.com

Fire Resistance Directory



GYPSUM ASSOCIATION
 1524 Leclerc Road, Suite 400, Havawille MD 21772

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

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

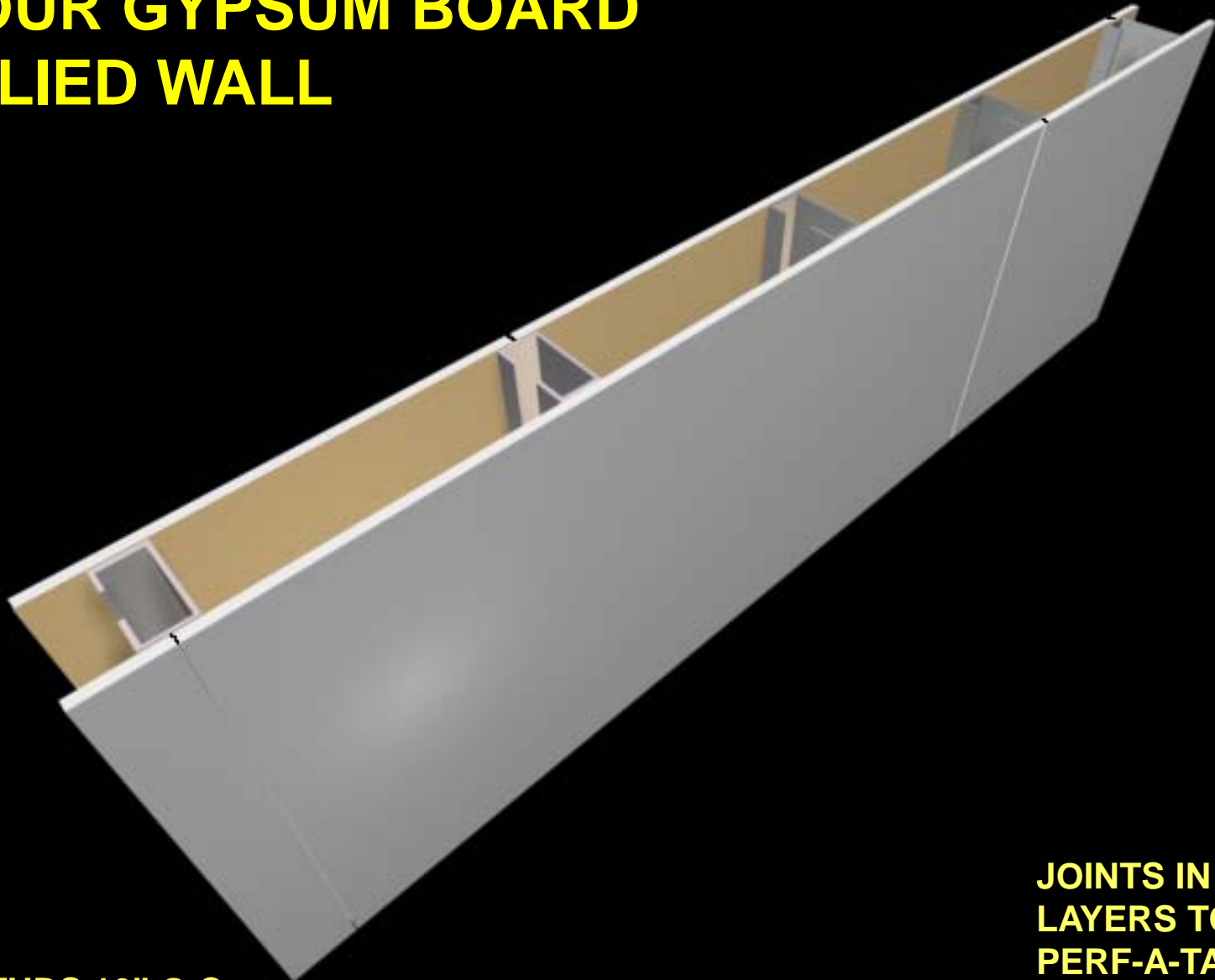
Light Gauge Steel Stud Construction – UL U419



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

1-hr Rated System Horizontal Without Backing

VERTICALLY 1 HOUR GYPSUM BOARD APPLIED WALL



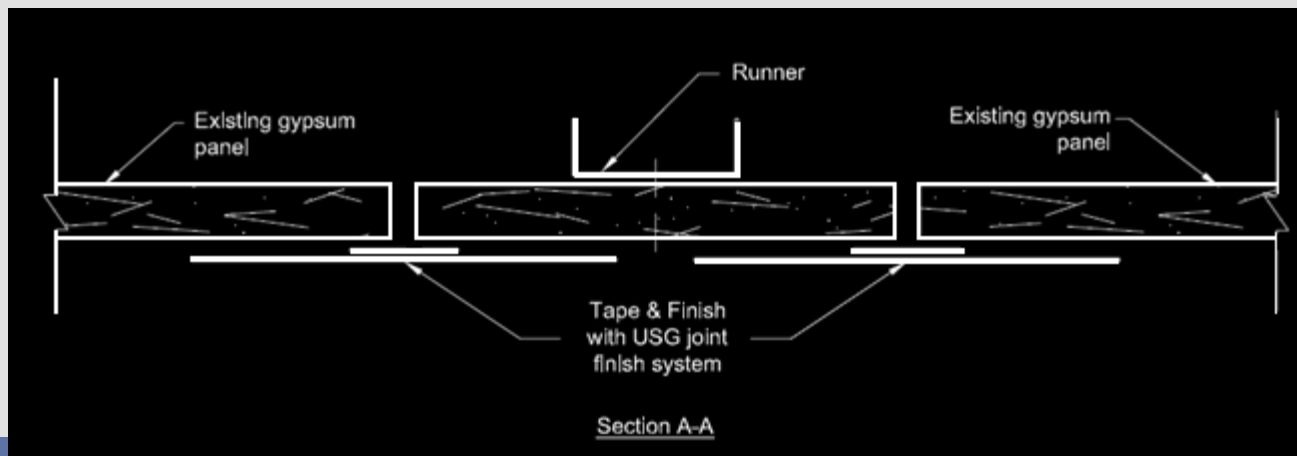
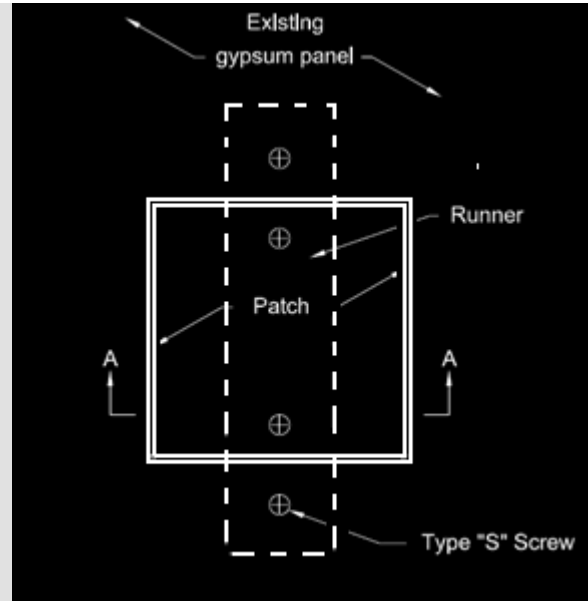
STUDS 16" O.C.

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

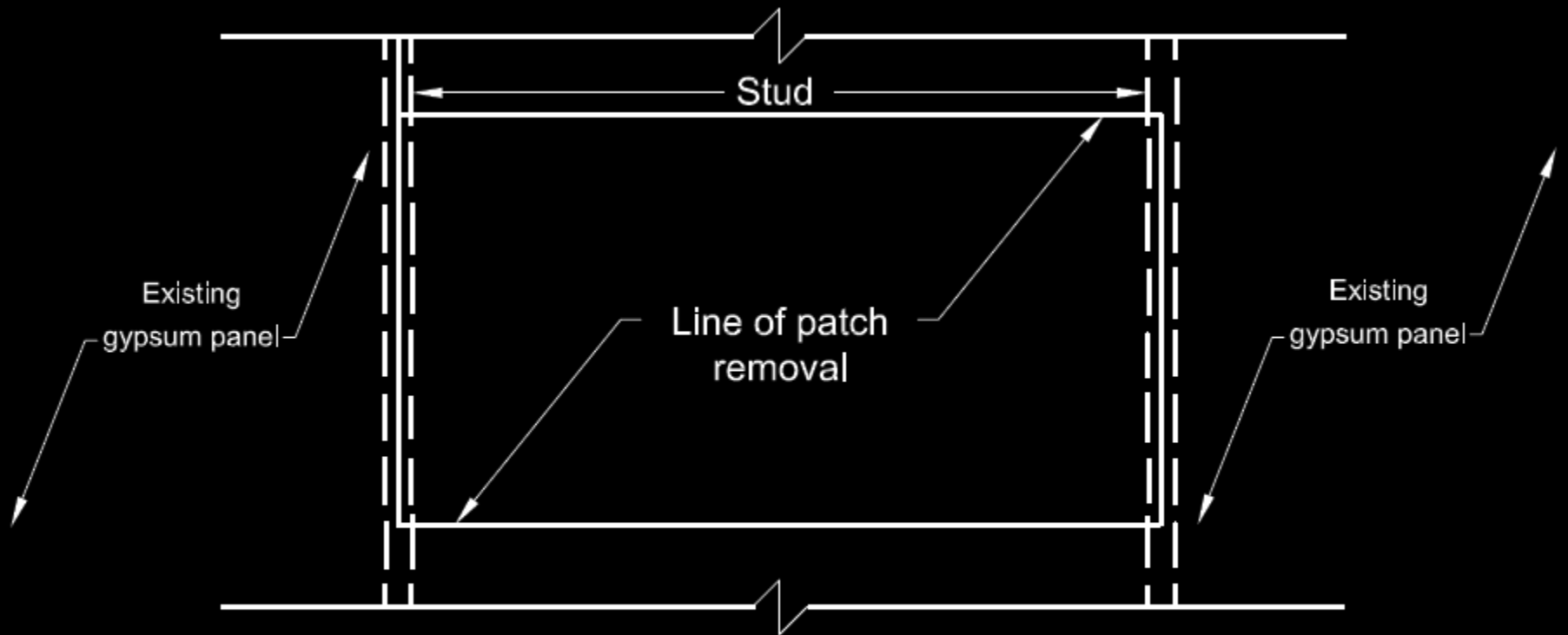
Repair Gypsum Panels

- 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
 - Steel Framing Alliance – steel framing.org

Barrier Management Symposium

Nov. 16, 2015

Bill McHugh, FCIA for
Nestor Sanchez, USG Corporation