Barrier Management Symposium

April 14, 2015

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

68 Mils = 14 ga  
97 Mils = 12 ga

C-DEAD / JOIST  
S-SECTIONS

TRACK  
T-SECTIONS

CHANNEL  
U-SECTIONS

FURRING CHANNEL  
F-SECTIONS
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
Significance of Test

- Type X core ≠ 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

### Proprietary Gypsum Panel Products for Use in UL Classified Systems (GA-605)

The Fire Resistance Directory published by Underwriters Laboratories Inc. lists gypsum panel products that are classified for fire resistance under category "Gypsum Board (CEFD)". 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 types 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.

<table>
<thead>
<tr>
<th>COMPANY NAME</th>
<th>PAGE</th>
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</thead>
<tbody>
<tr>
<td>American Gypsum</td>
<td>1</td>
</tr>
<tr>
<td>CertainTeed Gypsum, Inc. / CertainTeed Canada Inc.</td>
<td>2</td>
</tr>
<tr>
<td>Georgia-Pacific Gypsum</td>
<td>3</td>
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<tr>
<td>Lafarge North America</td>
<td>3</td>
</tr>
<tr>
<td>National Gypsum Company</td>
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<tr>
<td>PABCO Gypsum</td>
<td>4</td>
</tr>
<tr>
<td>Trenton-Island</td>
<td>5</td>
</tr>
<tr>
<td>United States Gypsum Company / CGC Inc.</td>
<td>6</td>
</tr>
</tbody>
</table>

### American Gypsum Company

<table>
<thead>
<tr>
<th>UL Type Designation</th>
<th>Product Name</th>
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<tbody>
<tr>
<td>1/2&quot; FireBloc® Type C</td>
<td>1/2&quot; FireBloc® Type C</td>
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<tr>
<td>5/8&quot; FireBloc® Type C</td>
<td>5/8&quot; FireBloc® Type C</td>
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<tr>
<td>1/2&quot; M-Bloc® Type C with Mold Resistance</td>
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<tr>
<td>5/8&quot; M-Bloc® Type C with Mold Resistance</td>
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<tr>
<td>5/8&quot; Firetile® Type X</td>
<td>5/8&quot; Firetile® Type X</td>
</tr>
<tr>
<td>1/2&quot; Insulation Sheathing Type X</td>
<td>1/2&quot; Insulation Sheathing Type X</td>
</tr>
<tr>
<td>5/8&quot; Scuffit® Type X</td>
<td>5/8&quot; Scuffit® Type X</td>
</tr>
<tr>
<td>5/8&quot; Venter Type X</td>
<td>5/8&quot; Venter Type X</td>
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<tr>
<td>5/8&quot; Smoother® Type X</td>
<td>5/8&quot; Smoother® Type X</td>
</tr>
<tr>
<td>1/2&quot; M-Bloc® Type X with Mold Resistance</td>
<td>1/2&quot; M-Bloc® Type X with Mold Resistance</td>
</tr>
<tr>
<td>5/8&quot; M-Bloc® AB Type X Above and Mold Resistance</td>
<td>5/8&quot; M-Bloc® AB Type X Above and Mold Resistance</td>
</tr>
<tr>
<td>5/8&quot; M-Bloc® IR Type X Impact and Mold Resistance</td>
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</tr>
</tbody>
</table>

| AG-S | 1" shaft liner with mold resistance |
| AG-CP | 1/2" FireBloc® CP Gypsum Lay-In Ceiling Panels |

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[GA-605](#) - Proprietary Gypsum Panel Products for Use in UL Classified Systems. 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.
• 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

Diagram showing repair of small holes in drywall with a patch and type "S" screw.
Repair Large Holes
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 – steelframing.org
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September 17, 2014

Nestor Sanchez, USG Corporation