Barrier Management Symposium

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. Construction details & repair methods for 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. 1850 °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
Cold-Formed Steel Background

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

68 Mils = 14 ga  97 Mils = 12 ga
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

<table>
<thead>
<tr>
<th>COMPANY NAME</th>
<th>PAGE</th>
</tr>
</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>
</tr>
<tr>
<td>Lafarge North America</td>
<td>4</td>
</tr>
<tr>
<td>National Gypsum Company</td>
<td>4</td>
</tr>
<tr>
<td>PASCO Gypsum</td>
<td>4</td>
</tr>
<tr>
<td>Triangle Island</td>
<td>5</td>
</tr>
<tr>
<td>United States Gypsum Company/CRC Inc.</td>
<td>6</td>
</tr>
</tbody>
</table>

### American Gypsum Company

<table>
<thead>
<tr>
<th>UL Type Designation</th>
<th>Product Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 FireBloc® Type C</td>
<td>1/2 FireBloc® Type C with Mold Resistance</td>
</tr>
<tr>
<td>5/8 FireBloc® Type C</td>
<td>5/8 FireBloc® Type C with Mold Resistance</td>
</tr>
<tr>
<td>AG-C</td>
<td>1/2 M-Bloc® Type C with Mold Resistance</td>
</tr>
<tr>
<td>5/8 M-Bloc® Type C</td>
<td>5/8 M-Bloc® Type C with Mold Resistance</td>
</tr>
<tr>
<td>5/8 FireBloc® Type X</td>
<td>5/8 FireBloc® Type X with Mold Resistance</td>
</tr>
<tr>
<td>AGX-1, AGX-11</td>
<td>5/8 Stiffit® Type X</td>
</tr>
<tr>
<td></td>
<td>5/8 Stiffit® Type X with Mold Resistance</td>
</tr>
<tr>
<td>AG-S</td>
<td>5/8 SinusBloc® Type X</td>
</tr>
<tr>
<td>AG-CP</td>
<td>1/2 FireBloc® CP Gypsum Lay-In Ceiling Panels</td>
</tr>
<tr>
<td>AG-CP</td>
<td>1/2 FireBloc® CP Gypsum Lay-In Ceiling Panels</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>
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.
INSTALLATION OF 1 HR WALL

Horizontal Applied 1 HR U419.avi
INSTALLATION OF 2 HR WALL

Construction of 2 Hr. Fire Rated Wall
UL Design U419

Click to start animation
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)
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
Repair Gypsum Panels

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

[Diagram of repair process]

- Existing gypsum panel
- Type "S" Screw
- Patch
- Runner

[Diagram of section A-A]

- Existing gypsum panel
- Runner
- Tape & Finish with USG joint finish system

Section A-A
Repair Large Holes

Partial Elevation - 1
FLUSH PATCH - SMALL

EXISTING GYPSUM PANEL

CUT-OUT 6 “ MAX.

STUD

ELEVATION
SECTION A-A

EXISTING GYPSUM PANEL

RUNNER

EXISTING GYPSUM PANEL

TAPE & FINISH WITH USG FINISH SYSTEM
FLUSH PATCH - LARGE

PARTIAL ELEVATION - 1
FLUSH PATCH - LARGE

EXISTING GYPSUM PANEL

USE METAL RUNNER FOR BLOCKING

SEE DETAIL 714

LINE OF PATCH REMOVAL

PARTIAL ELEVATION - 2
FLUSH PATCH - LARGE

DETAIL 714

SELF-TAPPING METAL SCREW

RUNNER

EXISTING GYPSUM PANEL

STUD
STUD

TAPE & FINISH JOINTS

PATCH

TYPE S SCREWS

STUD

TYPE S SCREWS

PARTIAL ELEVATION - 3
SHAFTWALL PANEL REPLACEMENT

Click for Animation
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
Barrier Management Symposium

Nestor Sanchez, USG Corporation