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
- CaSO$_4$·2H$_2$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
Cold-Formed Steel Background

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

68 Mils = 14ga  
97 Mils = 12ga
1 to 4 Hour Ratings
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
- Gyp. Mfg. UL Type & Product Name
- www.UL.com

Fire Resistance Directory
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.
<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Gypsum</td>
<td>AGX-1, AGX-11</td>
</tr>
<tr>
<td>CertainTeed</td>
<td>ProRoc Type X</td>
</tr>
<tr>
<td>GP</td>
<td>Type 9</td>
</tr>
<tr>
<td>LaFarge</td>
<td>Type LGFC6A</td>
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<tr>
<td>National Gypsum</td>
<td>Type FSW</td>
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</tr>
<tr>
<td>Temple-Inland</td>
<td>Fire Rated Type X</td>
</tr>
<tr>
<td>USG</td>
<td>Type SCX</td>
</tr>
</tbody>
</table>

*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 process:
- Existing gypsum panel
- Runner
- Patch
- Type "S" Screw
- Tape & Finish with USG joint finish system

Section A-A
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 – steelframing.org
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