



# APPLICATION OF GYPSUM SHEATHING

## (GA-253-07)

### 1. Scope

**1.1** This specification describes the minimum requirements for, and the methods of handling, storage, and application of, gypsum sheathing for use as a substrate for exterior claddings.

**1.1.1** Exterior claddings shall be provided to protect gypsum sheathing from long-term weather exposure. (See section 6.1 for short-term exposure.)

**1.1.2** Exterior claddings and their application methods shall be the responsibility of those making the recommendation. Consult the local building code or cladding manufacturer to determine when a water-resistive barrier is required.

**1.2** Where fire resistance is required for a system employing gypsum sheathing, details of construction shall be in compliance with listings or reports of tests of systems tested in accordance with ASTM E 119 procedures by recognized testing laboratories and shall meet the requirements of the fire rating specified (see Fire Resistance Design Manual, GA -600).

**1.3** Where a sound control requirement is specified for a system employing gypsum sheathing, details of construction shall be in compliance with listings or reports of tests of systems tested in accordance with ASTM E 90 or E 336 that meet the requirements of the sound control rating specified (see Fire Resistance Design Manual, GA -600).

**1.4** Where a racking resistance or wall shear requirement is specified for a system employing gypsum sheathing, details of construction shall be in compliance with reports of tests of systems tested in accordance with ASTM E 72 that meet the requirements of the racking or shear value specified by the designer or applicable building code.

### 2. General Provisions

**2.1** Gypsum sheathing shall not be used on ceilings, soffits or sills unless otherwise recommended by the manufacturer.

**2.2** All wood framing members to which gypsum sheathing will be fastened shall be straight and true. Stud spacing shall be not greater than 24 in. (610 mm) o.c. The fastening surface shall be not less than 1 ½ in. (38 mm) wide and shall not vary more than 1/8 in. (3 mm) from the plane of the faces of adjacent framing.

**2.3** All steel framing members to which gypsum sheathing will be screw attached shall be straight and true, and shall be spaced not greater than 24 in. (610 mm) o.c. They shall be

produced from steel of the design thickness required and shall be protected with a protective coating to prevent corrosion. The fastening surface to which gypsum sheathing will be attached shall be not less than 1 ¼ in. (32 mm) wide.

**2.4** Gypsum sheathing used in building construction shall be not less than 8 in. (200 mm) from the finish grade in fully weather and water-protected siding systems, and not less than 12 in. (300 mm) from the ground for properly drained and ventilated crawl spaces. Where ground moisture or humidity are extreme and/or continuous, the ground's surface shall be covered with a vapor retarder.

### 3. Definitions and Terms Relating to the Specification

**3.1** Gypsum Sheathing — a gypsum board, 2 ft (610 mm) or 4 ft (1220 mm) wide, with a water-resistant gypsum core and water repellent surfaces, defined in ASTM Specification C 1396/C 1396M.

**3.1.1** Type X Gypsum Sheathing — a gypsum board as described in 3.1 having special fire resistant properties as defined in ASTM Specification C 1396/C 1396M.

**3.2** Edge — paper bound edge, as manufactured.

**3.3** End — mill-cut or field-cut end perpendicular to edge. At such cuts, the gypsum core is exposed.

**3.4** Exterior Cladding — a permanent material or system that impedes the transmission of environmental elements to the sheathing.

**3.5** Framing Member — that portion of framing, furring, etc., to which gypsum sheathing is attached.

**3.6** Fastener — nails, screws or staples used for the mechanical application of gypsum sheathing.

**3.7** Perpendicular Application — an application where gypsum sheathing edges are at right angles to the framing members to which it is attached.

**3.8** Parallel Application — an application where gypsum sheathing edges are parallel to the framing members to which it is attached.

**3.9** Shear Wall — a wall designed and constructed to resist lateral wind or seismic loads.

**3.10** Water-Resistive Barrier — a temporarily exposed protective membrane, such as building felt or building paper, that is intended to impede the penetration of environmental elements until the installation of a permanent exterior cladding.

**4. Materials**

**4.1 Gypsum Sheathing** — *Standard Specification for Gypsum Board*, ASTM C 1396/C 1396M.

**4.2 Fasteners** — Shall be as described in 4.2.1 thru 4.2.4. Fastener length shall be not less than that specified in Table 1.

**4.2.1 Nails** — Shall be not less than 12 gage, galvanized, roofing nail.

**4.2.2 Staples** — Shall be galvanized steel, not less than 16 gage, 7/16 in. (11 mm) crown, with divergent points.

**4.2.3 Screws** — *Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs*, ASTM C 1002.

**4.2.3.1** Type W screws are designed for attachment to wood framing.

**4.2.3.2** Type S screws are designed for attachment to light gage steel framing or wood framing.

**4.2.4 Screws** — *Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness*, ASTM C 954.

**Table 1**

Minimum Fastener Lengths for the Attachment of Gypsum Sheathing in. (mm)

Sheathing Thickness in. (mm)	Wood Framing			Steel Framing
	Nails	Staples	Screws	Screws
½ (12.7)	1½ (38)	1½ (38)	1-1/4 (32)	1 (25)
5/8 (15.9)	1-3/4 (44)	1-5/8 (41)	1-5/8 (41)	1-1/4 (32)

**4.3 Framing Members**

**4.3.1** Wood framing members shall conform to *American Softwood Lumber Standard*, Voluntary Product Standard PS 20.

**4.3.2** Steel framing members shall conform to *Standard Specification for Nonstructural Steel Framing Members*, ASTM C 645 (light gage), or *Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases*, ASTM C 955 (not less than 0.033 in. thick).

**4.4 Exterior Cladding(s)** — Sidings such as, but not limited to, wood, aluminum, vinyl, plywood, brick, stucco, or Exterior Insulation and Finish Systems.

**4.5 Water-Resistive Barrier** — Shall be as described in 4.5.1 thru 4.5.2, or other code-compliant water-resistive barrier.

**4.5.1 Building Felt** — Shall be not less than No. 15 asphalt-saturated felt conforming to either *Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing*, ASTM D 226, or *Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing*, ASTM D 2178.

**4.5.2 Building Paper** — Type D paper conforming to *Federal Specification for Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellant and Fire Resistant)*, Federal Specification UU-B-790a, Interim Amendment 1.

**5. Delivery, Identification, Handling, and Storage**

**5.1** All materials shall be delivered in original packages, containers or bundles bearing brand name, applicable standard designation, and name of manufacturer or supplier for whom product is manufactured.

**5.2** Gypsum sheathing and accessories shall be properly supported on risers on a level platform, and fully protected from weather, direct sunlight exposure, and condensation.

**5.3** Gypsum sheathing shall be neatly stacked flat with care taken to prevent sagging or damage to edges, ends and surfaces. Refer to *Handling Gypsum Panel Products*, GA-801, for proper storage and handling requirements.

**6. Application of Gypsum Sheathing**

**6.1 Exposure After Installation** — Gypsum sheathing is designed for use as a substrate that is covered by an exterior wall cladding. Local weather conditions will dictate the length of time gypsum sheathing may be permitted to be exposed; however it should perform satisfactorily if exposed to the elements for up to one month. The gypsum sheathing shall be covered immediately with a water-resistive barrier if exposure time will be extended or weather conditions will be severe.

**6.2 Methods of Cutting and Installation** — Gypsum sheathing shall be cut by scoring and snapping or by sawing, working from the face paper side. When scoring, a sharp knife shall be used to cut through the face paper into the gypsum core. The gypsum sheathing is then snapped back away from the cut face. The back paper shall be permitted to be broken by snapping the gypsum sheathing in the reverse direction, or preferably by cutting the back paper. All cut edges and ends of gypsum sheathing shall be trimmed to obtain neat fitting joints when gypsum sheathing is installed. Holes for pipes, fixtures or other small openings shall be cut out with a saw or special tool designed for this use. Where gypsum sheathing meets projecting surfaces, the gypsum sheathing shall be neatly scribed and cut.

**6.3** When a mechanically attached water-resistive barrier is required, the water-resistive barrier shall be attached over the face of the gypsum sheathing, to the framing, with the upper layer lapped over the lower layer in accordance with the code.

**6.4** Gypsum sheathing shall be properly flashed at openings and preferably located so that no joint will align with an edge of the opening. Joints shall be staggered.

**6.4.1** Holes and cutouts for pipes or fixtures, or other small openings shall be properly protected by means such as flashing or caulking.

**6.5** Maximum spacing of framing members shall be 24 in. (610 mm) o.c.

**6.6** Control joints shall be installed in walls wherever specified.

**6.7** Where shear values are not required, gypsum sheathing 4 ft (1220 mm) wide shall be permitted to be applied parallel or perpendicular to framing with vertical joints over framing members and with gypsum sheathing fitted snugly around all window and door openings.

**6.8** Square edge gypsum sheathing applied perpendicular to framing shall be covered with a water-resistive barrier or horizontal joints shall be sealed.

**6.9** Tongue & Groove (V-edge) gypsum sheathing shall be applied perpendicular to framing members, with grooved edges down, interlocking the tongue of the panel below without forcing. Ends of panels shall abut over centers of framing members and all end joints shall be staggered between adjacent courses. Gypsum sheathing shall be fitted snugly around all window and door openings.

**6.10** When shear values are not required, fasteners shall be spaced not more than 8 in. (200 mm) o.c. along vertical ends or edges and intermediate supports. When wall bracing or wall shear values are being assigned to the installed gypsum sheathing, the fastener spacing shall be as specified by the gypsum sheathing manufacturer or as set forth in the Appendix.

**6.10.1** Fasteners shall be spaced not less than 3/8 in. (10 mm) from the ends and edges of the gypsum sheathing.

**6.10.2** Nails shall be driven so that the heads are at or slightly below the surface of the gypsum sheathing. Care shall be taken to avoid damage to the face and core, such as breaking the paper or fracturing the core.

**6.10.3** Screws shall be driven so that the screw heads are at or slightly below the gypsum sheathing surface paper without breaking the surface paper or stripping the framing member around the screw shank.

**6.10.4** Staples shall be driven with the crown parallel to framing members and in such a manner that the crown bears tightly against the gypsum sheathing but does not cut into the face paper.

**APPENDIX**

**A.1 Structural**

**A.1.1** Shear values for wind or seismic forces based on racking tests conducted in accordance with ASTM E 72 on 4 ft (1220 mm) wide gypsum sheathing applied parallel to framing are listed in Table 2.

Table 2 Shear Values of Gypsum Sheathing		
Gypsum Sheathing Thickness in. (mm)	Shear Value Ultimate Load lbs/ft (kN/m)	
	DRY	WET
1/2 (12.7) <sup>(1)</sup>	540 (7.88)	332 (4.84)
5/8 (15.9) <sup>(2)</sup>	654 (9.54)	522 (7.62)
(1) Wood studs, 2x4, spaced 16 in. (406 mm) o.c. Gypsum sheathing on one side attached with 1 1/2 in. (38 mm) galvanized 11 gage roofing nails spaced 4 in. (100 mm) o.c. along edges and ends and 8 in. (200 mm) o.c. to intermediate studs.		
(2) Wood studs, 2x4, spaced 16 in. (406 mm) o.c. Gypsum sheathing on one side attached with 1-3/4 in. (45 mm) galvanized 11 gage roofing nails spaced 4 in. (100 mm) o.c. along edges and ends and 7 in. (180 mm) o.c. to intermediate studs.		

**A.1.2** Wall Bracing — Building codes permit 4 ft (1220 mm) wide panels of gypsum sheathing, applied parallel to framing, in place of continuous diagonal bracing.

**A.1.3** Shear Walls — Where wind or seismic forces require shear walls to resist these lateral forces, building codes provide allowable shear values for walls having gypsum sheathing applied to wood framing. Specific values with construction requirements and limitations are contained in the building codes.

**A.2 Thermal**

**A.2.1** Thermal values for gypsum sheathing are shown in Table 3.

Table 3 Thermal Values of Gypsum Sheathing		
Thickness in. (mm)	Conductance "C" Btu/h-ft <sup>2</sup> ·°F (W/m <sup>2</sup> ·K)	Resistance "R" °F·h-ft <sup>2</sup> /Btu (K·m <sup>2</sup> /W)
1/2 (12.7)	2.22 (12.6)	0.45 (0.079)
5/8 (15.9)	2.08 (11.8)	0.48 (0.085)

Characteristics, properties, or performance of materials or systems herein described are based on data obtained under controlled test conditions. The Gypsum Association and its member companies make no warranties or other representations as to the characteristics, properties, or performance of any materials in actual construction.

This document may be revised or withdrawn from circulation at any time. The status of the document should be verified by the user prior to following any recommendations contained herein. To verify that you have the most current edition of the document, access the Gypsum Association website at: [www.gypsum.org](http://www.gypsum.org).

# **Gypsum Association Membership – 2007**

**American Gypsum**

**CertainTeed Gypsum, Inc.**

**CertainTeed Gypsum Canada, Inc.**

**CGC Inc.**

**Federal Gypsum Company**

**G-P Gypsum Corporation**

**Lafarge North America Inc.**

**National Gypsum Company**

**PABCO Gypsum**

*a division of PABCO Building Products, LLC*

**Temple-Inland Forest Products Corporation**

**United States Gypsum Company**



**GYPSUM ASSOCIATION**

810 First Street NE, #510  
Washington, DC 20002  
202-289-5440  
Fax: 202-289-3707