

## **1. Scope**

**1.1** This specification describes the minimum requirements for, and the methods of handling, storage, and application of paper faced gypsum sheathing complying with ASTM C1396/C1396M *Standard Specification for Gypsum Board* or glass mat gypsum sheathing complying with ASTM C1177/C1177M *Standard Specification for Glass Mat Gypsum Substrate for Use as 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 exposure guidelines.)

**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, construction shall be in compliance with listings or reports of tests meeting the requirements of the fire rating specified (see GA-600 *Fire Resistance and Sound Control Design Manual*), conducted in accordance with ASTM E119 *Standard Test Methods for Fire Tests of Building Construction and Materials* or CAN/ULC-S101 *Fire Endurance Tests of Building Construction and Materials* by recognized testing laboratories.

**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 test reports that meet the requirements of the sound control rating specified, conducted in accordance with ASTM E90 *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements* (see GA-600 *Fire Resistance and Sound Control Design Manual*.)

**1.4** Where a racking resistance or wall shear requirement is specified for a system employing gypsum sheathing, construction shall be in compliance with test reports of tests conducted in accordance with ASTM E72 *Standard Test Methods of Conducting Strength Tests of Panels for Building Construction* 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 exterior 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 1½ in. (38 mm) wide and shall not vary more than ⅛ 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 1¼ 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 in properly drained and ventilated crawl spaces. Where ground moisture or humidity is extreme and/or continuous, the ground's surface shall be covered with a vapor retarder.

**2.5** Gypsum sheathing edges and ends shall be spaced a minimum of ¼ in. (6 mm) from concrete or masonry to prevent moisture from wicking into the panel.



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

**3.1 Gypsum Sheathing**—a paper faced gypsum panel with a water-resistant gypsum core and water-repellent facer, defined in ASTM C1396/C1396M *Standard Specification for Gypsum Board* or a glass mat faced panel defined in ASTM C1177/C1177M *Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing*.

**3.1.1 Type X Gypsum Sheathing**—a gypsum panel as described in 3.1 having special fire resistant properties as defined in ASTM C1396/C1396M or ASTM C1177/C1177M.

**3.2 Edge** —the bound square edge, as manufactured.

**3.3 End** — the end perpendicular to the edge, 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 perpendicular 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 that is intended to impede the penetration of environmental elements until the installation of a permanent exterior cladding.

**4. Materials**

**4.1 Gypsum Sheathing**— a paper faced gypsum panel per ASTM C1396/C1396M or glass mat faced gypsum panel per ASTM C1177/C1177M.

**4.2 Fasteners**—Shall be as described in 4.2.1 through 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 gauge, galvanized, roofing nail.

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

<b>Table 1</b>				
<b>Minimum Fastener Lengths for the Attachment of Gypsum Sheathing in. (mm)</b>				
<b>Sheathing Thickness</b>	<b>Wood Framing</b>			<b>Steel Framing</b>
<b>in. (mm)</b>	<b>Nails</b>	<b>Staples</b>	<b>Screws</b>	<b>Screws</b>
½ (12.7)	1½ (38)	1½ (38)	1¼ (32)	1 (25)
⅝ (15.9)	1¾ (44)	1⅝ (41)	1⅝ (41)	1¼ (32)

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**4.2.3** Screws—Shall be corrosion resistant and comply with ASTM C1002 *Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs*.

**4.2.3.1** Trim head screws shall not be used for the application of gypsum sheathing.

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

**4.2.3.3** Type S screws are designed for attachment to light gauge steel framing or wood framing.

**4.2.4** Screws—Shall be corrosion resistant and comply with ASTM C954 *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*.

**4.2.4.1** Type S-12 screws are designed for attachment to steel framing 33 mil (0.033 in, 0.84 mm) or greater.

### **4.3 Framing Members**

**4.3.1** Wood framing members shall conform to *American Softwood Lumber Standard, Voluntary Product Standard PS 20* or *CAN/CSA-O141 Softwood Lumber*.

**4.3.2** Nonstructural steel framing members shall conform to ASTM C645 *Standard Specification for Nonstructural Steel Framing Members* (light gauge), and AISI S220 – *North American Standard for Cold-Formed Steel Framing – Nonstructural Members*. Structural steel framing members shall conform to ASTM C955 *Standard Specification for Cold-Formed Steel Structural Framing Members* or AISI S240 – *North American Standard for Cold-Formed Steel Structural Members*

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

**4.5** Water-Resistive Barrier—Shall be as described in 4.5.1 through 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 ASTM D226 *Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing*, or ASTM D2178 *Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing*.

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

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

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

**5.2** Gypsum sheathing 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 GA-801 *Handling Gypsum Panel Products*, for proper storage and handling requirements.

**5.4** Plastic covers used to protect panel products during shipment are intended to provide temporary protection from moisture exposure and should be removed upon receipt at the distributor's location. Failure to remove this plastic covering can result in damage to gypsum panel products due to moisture, condensation and/or mold.

## 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. For gypsum sheathing meeting ASTM C1177 (glass mat), see manufacturer's recommendations for long-term exposure. The gypsum sheathing shall be covered immediately with a water-resistive barrier if exposure time will be extended or weather conditions will be severe.

Note: Avoid conditions during construction that result in excessive moisture load in the building. High moisture can cause condensation in the unfinished exterior walls and on sheathing during periods of cold weather.

**6.2 Methods of Cutting and Installation**—Gypsum sheathing shall be cut by scoring and snapping or by sawing, working from the face side. When cut by scoring, a sharp knife shall be used to cut through the facer into the gypsum core. The gypsum sheathing is then snapped back away from the cut face and the back facer cut along the crease. All cut edges and ends of gypsum sheathing shall be trimmed to obtain neat fitting joints when gypsum sheathing is installed. Vertical joints shall be staggered. 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, 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 located so that joints shall be offset a minimum of four inches (100 mm) from the edge of the opening.

**6.4.1** Holes and cutouts for plumbing penetrations, or other small openings, shall be sealed with water-resistant flexible sealant complying with ASTM C920 *Standard Specification for Elastomeric Joint Sealants, Type S, Grade NS, Class 25*.

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

**6.5.1** Any fastener in the framing shall not protrude more than 1/8" (3 mm) in order to ensure the sheathing will be installed against the framing.

**6.6** Gypsum sheathing shall not be continuous through building construction joints.

**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** Gypsum sheathing shall be covered with a water-resistive barrier or horizontal joints shall be sealed in accordance with the criteria of the local building code.

**6.8.1** All penetrations shall be sealed in accordance with the criteria of the local building code.

**6.9** 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.

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



- 6.9.2 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 facer or fracturing the core.
- 6.9.3 Screws shall be driven so that the screw heads are at or slightly below the gypsum sheathing facer without breaking the face or stripping the framing member around the screw shank.
- 6.9.4 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 facer
- 6.10 Application of Gypsum Sheathing Under Self-Furred Metal Lath
  - 6.10.1 Gypsum Sheathing shall be permitted to be applied as specified in 6.10.2, and fastening of the gypsum sheathing shall be completed with the attachment of the self-furred metal lath when all the following apply:
    - 6.10.1.1 Where fire resistance or shear resistance is not required,
    - 6.10.1.2 When metal lath and Portland cement plaster are to be applied as the exterior cladding over gypsum sheathing products installed over framing members spaced not more than 16 in. (406 mm) o.c., and
    - 6.10.1.3 When the metal lath is to be installed in accordance with ASTM C1063 *Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster* within 24 hours after the gypsum sheathing products are installed.
  - 6.10.2 The vertical ends or edges of gypsum sheathing products shall be fastened in accordance with Section 6.9.
  - 6.10.3 Accessories and metal plaster base shall be fastened through gypsum sheathing products to framing members.

**APPENDIX**

**A.1 Structural**

- A.1.1 Shear values for wind or seismic forces based on racking tests conducted in accordance with ASTM E72 on 4 ft. (1220 mm) wide gypsum sheathing applied parallel to framing are listed in Table 2.
- 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.

<b>Table 2 Shear Values of Gypsum Sheathing</b>		
Gypsum Sheathing Thickness in. (mm)	Shear Value Ultimate Load plf (kN/m)	
	DRY	WET
½ (12.7) <sup>(1)</sup>	540 (7.88)	332 (4.84)
⅝ (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 1½ in. (38 mm) galvanized 11 gauge 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 1¼ in. (45 mm) galvanized 11 gauge roofing nails spaced 4 in. (100 mm) o.c. along edges and ends and 7 in. (178 mm) o.c. to intermediate studs.		

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**A.2 Thermal**

**A.2.1** Thermal resistance and thermal conductance values for gypsum sheathing are shown in Table 3.

<b>Table 3 Thermal Values of Gypsum Sheathing</b>		
<b>Thickness in. (mm)</b>	<b>Conductance "C" Btu/h·ft<sup>2</sup>·°F (W/m<sup>2</sup>·K)</b>	<b>Resistance "R" °F·h·ft<sup>2</sup>/Btu (K·m<sup>2</sup>/W)</b>
½ (12.7)	2.22 (12.6)	0.45 (0.079)
⅝ (15.9)	2.08 (11.8)	0.48 (0.085)

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