



Designation: C1396/C1396M – 11

## Standard Specification for Gypsum Board<sup>1</sup>

This standard is issued under the fixed designation C1396/C1396M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope\*

1.1 This specification covers the gypsum boards described in 1.1.1-1.1.9.

NOTE 1—Specifications C840, C841, C844 and C1280 contain application procedures for gypsum board.

1.1.1 *Gypsum wallboard*, designed for use on walls, ceilings, or partitions and that affords a surface suitable to receive decoration.

1.1.2 *Predecorated gypsum board*, designed for use as the finished surfacing for walls, ceilings, or partitions.

1.1.3 *Gypsum backing board, coreboard, and shaftliner board*, designed for use as a base in multilayer systems or as a gypsum stud or core in semisolid or solid gypsum board partitions, or in shaft wall assemblies.

NOTE 2—The terms backing board, coreboard, and shaftliner board refer to different end uses. The term gypsum backing board, as used in this specification, shall include gypsum coreboard and gypsum shaftliner board unless otherwise stated.

1.1.4 *Water-resistant gypsum backing board*, designed primarily to be used as a base for the application of ceramic or plastic tile on walls or ceilings. This product is also suitable for decoration.

1.1.5 *Exterior gypsum soffit board*, designed for use on exterior soffits and carport ceilings that are completely protected from contact with liquid water.

1.1.6 *Gypsum sheathing board*, designed for use as sheathing on buildings.

1.1.7 *Gypsum base for veneer plaster*, designed for use as a base for the application of gypsum veneer plaster.

1.1.8 *Gypsum lath*, designed for use as a base for the application of gypsum plaster.

1.1.9 *Gypsum ceiling board*, designed for use on interior ceilings with framing spaced not more than 24 in. [610 mm] on center and that affords a surface suitable to receive water-based texture and other decoration. This product is also suitable for use on interior walls.

1.2 Specifications applicable to all gypsum boards are located in Section 1-4 and 13-15. Specifications applicable to specific gypsum boards are located in the following sections:

	<u>Section</u>
Gypsum Wallboard, Predecorated Gypsum Board, and Laminated Gypsum Board	5
Gypsum backing board, gypsum coreboard, gypsum shaftliner board	6
Water-resistant gypsum backing board	7
Exterior gypsum soffit board	8
Gypsum sheathing board	9
Gypsum base for veneer plaster	10
Gypsum lath	11
Gypsum Ceiling Board	12

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard

### 2. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

- C11 Terminology Relating to Gypsum and Related Building Materials and Systems
- C22/C22M Specification for Gypsum
- C473 Test Methods for Physical Testing of Gypsum Panel Products
- C645 Specification for Nonstructural Steel Framing Members
- C840 Specification for Application and Finishing of Gypsum Board
- C841 Specification for Installation of Interior Lathing and Furring
- C844 Specification for Application of Gypsum Base to Receive Gypsum Veneer Plaster
- C1264 Specification for Sampling, Inspection, Rejection, Certification, Packaging, Marking, Shipping, Handling, and Storage of Gypsum Panel Products
- C1280 Specification for Application of Exterior Gypsum

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C11 on Gypsum and Related Building Materials and Systems and is the direct responsibility of Subcommittee C11.01 on Specifications and Test Methods for Gypsum Products.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

\*A Summary of Changes section appears at the end of this standard

- Panel Products for Use as Sheathing
- E84** Test Method for Surface Burning Characteristics of Building Materials
- E96/E96M** Test Methods for Water Vapor Transmission of Materials
- E119** Test Methods for Fire Tests of Building Construction and Materials

### 3. Terminology

3.1 Definitions used in this specification shall be in accordance with Terminology **C11**.

#### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *decorative coating, n*—a paint or other liquid material with or without aggregate.

3.2.2 *decorative sheet or film, n*—a plastic film, either backed or unbacked; plastic sheet; or combination of these.

3.2.3 *edge, n*—the bound edge as manufactured.

3.2.4 *gypsum backing board, n*—a  $\frac{1}{4}$  to  $\frac{5}{8}$ -in. [6.4 to 15.9-mm] gypsum board used as a backing for gypsum wallboard, acoustical tile, or other dry cladding.

3.2.5 *gypsum coreboard, n*—a  $\frac{3}{4}$  to 1-in. [19.0 to 25.4-mm] gypsum board used as a gypsum stud or core in semisolid or solid gypsum board partitions.

3.2.6 *nominal thickness, n*—the manufacturer-stated fractional value of thickness of the gypsum panel product expressed in decimal value to the nearest one-thousandth ( $\frac{1}{1000}$ ) of an inch.

### 4. Materials and Manufacture

4.1 Gypsum board shall consist of a noncombustible core of gypsum complying with Specification **C22/C22M**, surfaced with paper bonded to the core.

4.1.1 Gypsum sheathing board shall consist of a noncombustible water-resistant core of gypsum complying with Specification **C22/C22M**, surfaced on both the face and back with water-repellant paper bonded to the core.

4.1.2 Gypsum coreboard shall be either a single board or composed of two factory-laminated gypsum boards to provide up to 1 in. [25.4 mm] total nominal thickness.

4.1.3 Water-resistant gypsum backing board shall consist of a noncombustible water-resistant core of gypsum complying with Specification **C22/C22M**, surfaced on both the back and face with water-repellant paper bonded to the core.

4.1.4 Predecorated gypsum board shall consist of a noncombustible core of gypsum complying with Specification **C22/C22M**, surfaced with paper bonded to the core with the face covered with a decorative sheet, film, or coating.

4.1.4.1 Class I predecorated gypsum board shall have a decorative sheet or film laminated to the face.

4.1.4.2 Class II predecorated gypsum board shall have a decorative coating applied to the face.

4.1.5 Laminated gypsum board shall consist of two or more factory laminated gypsum boards that conform to this specification.

4.2 The back surface of foil-backed gypsum board shall in addition be covered with aluminum foil.

4.3 *Gypsum Board, type X (Special Fire-Resistant):*

4.3.1 *Gypsum Board, type X*, designates gypsum board, except gypsum lath, gypsum coreboard, and gypsum shaftliner board, complying with this specification that provides not less than 1 h fire-resistance rating for boards  $\frac{5}{8}$  in. [15.9 mm] thick or  $\frac{3}{4}$  h fire-resistance rating for boards  $\frac{1}{2}$  in. [12.7 mm] thick, applied parallel with and on each side of load bearing 2 by 4 wood studs spaced 16 in. [406 mm] on centers with 6d coated nails,  $\frac{1}{8}$  in. [48 mm] long, 0.0915-in. [2.3-mm] diameter shank,  $\frac{1}{4}$ -in. [6.4-mm] diameter heads, spaced 7 in. [178 mm] on centers with gypsum board joints staggered 16 in. [406 mm] on each side of the partition and tested in accordance with Test Methods **E119**.

4.3.2 *Gypsum Lath, type X* designates gypsum lath complying with this specification that provides not less than a 1-h fire-resistance rating for gypsum lath  $\frac{3}{8}$  in. [9.5 mm] thick, when applied at right angles to and on each side of loadbearing 2 × 4 wood studs spaced 16 in. [406 mm] on centers with blue lath nails spaced 5 in. [127 mm] on centers over which is applied  $\frac{1}{2}$  in. [12.7 mm] 1:2 gypsum sand plaster and tested in accordance with the requirements of Test Method **E119**.

NOTE 3—Consult producers for independent test data on assembly details and fire-resistance ratings for other types of construction. See fire test reports or listings from recognized fire testing laboratories for assembly particulars, materials, and ratings.

4.3.3 Gypsum shaftliner board, type X, designates gypsum shaftliner board complying with this specification that meets the acceptance criteria for temperature rise for not less than 1- $\frac{1}{2}$  h for boards  $\frac{3}{4}$ -in. [19.0 mm] thick or 2 h for boards 1-in. [25.4 mm] thick, when applied in a double layer solid nonload bearing partition as described in **4.3.3.1** and tested in accordance with Test Methods **E119** with thermocouple locations as specified in **4.3.3.2**.

4.3.3.1 Two layers of gypsum shaftliner board applied vertically and friction fit into vertical 25-gage steel “H” members, 1- $\frac{1}{2}$ -in. [38.1 mm] deep for boards  $\frac{3}{4}$ -in. [19.0 mm] thick or 2-in. [50.8 mm] deep for boards 1-in. [25.4 mm] thick, spaced 24-in. [610 mm] on centers and 25-gage steel track at the perimeter of the partition. “H” members shall be formed with a single web or shall be two pieces of perimeter track fastened together along the web with screws spaced 24-in. [610 mm] on centers.

4.3.3.2 Temperature rise on the unexposed surface shall be measured using not less than five thermocouples; one shall be located at the center of the assembly and one shall be located at the center of each quadrant. Thermocouples shall be located not less than 3-in. [76 mm] from an “H” member.

4.4 Gypsum wallboard, gypsum backing board, exterior gypsum soffit board, and gypsum ceiling board shall have a flame spread index of not more than 25 when tested in accordance with Test Method **E84**.

4.5 *Physical Properties, Dimensions, and Tolerances of Gypsum Board:*

4.5.1 Specimens shall be taken from the samples obtained in accordance with Specification **C1264**.

4.5.1.1 Specimens shall be tested in accordance with Test Methods **C473**.

4.5.2 *Core, End, and Edge Hardness*—The specimens shall have an average hardness of not less than 15 lbf [67 N] when tested by Method A and 11 lbf [49 N] when tested by Method B.

4.5.2.1 When testing laminated gypsum board, if the laminated components are the same product and thickness, the test shall be conducted on either component of the laminated product. If the laminated gypsum board is comprised of different products or thicknesses, each component shall be tested.

4.5.3 *Edges and Ends*—The edges and ends shall be straight.

4.5.4 *Length*—The tolerance in length shall be  $\pm 1/4$  in. [ $\pm 6$  mm].

4.5.5 *Tapered Edge Depth*—The average thickness of the edge of recessed or tapered edge gypsum board shall be not less than 0.020 in. [0.51 mm] but not more than 0.090 in. [2.29 mm] less than the average thickness of the gypsum board.

**5. Gypsum Wallboard, Predecorated Gypsum Board, and Laminated Gypsum Board**

5.1 *Physical Properties of Gypsum Wallboard, Predecorated Gypsum Board, and Laminated Gypsum Board:*

5.1.1 *Flexural Strength*—The specimens shall be tested face up and face down. The average breaking load shall be not less than the following:

Thickness, in. [mm]	Method A	Method A	Method B	Method B
	Bearing Edges Perpendicular to Panel Length, lbf [N]	Bearing Edges Parallel to Panel Length, lbf [N]	Bearing Edges Perpendicular to Panel Length, lbf [N]	Bearing Edges Parallel to Panel Length, lbf [N]
1/4 [6.4]	50 [222]	20 [89]	46 [205]	16 [71]
5/16 [7.9]	65 [289]	25 [111]	62 [276]	21 [93]
3/8 [9.5]	80 [356]	30 [133]	77 [343]	26 [116]
1/2 [12.7]	110 [489]	40 [178]	107 [476]	36 [160]
5/8 [15.9]	150 [667]	50 [222]	147 [654]	46 [205]
3/4 [19.0]	170 [756]	60 [267]	167 [743]	56 [249]

5.1.2 *Humidified Deflection*—The specimens shall have an average deflection of not more than the following:

Thickness, in. [mm]	Deflection, eighths of an inch [mm]
1/4 [6.4]	not required
5/16 [7.9]	not required
3/8 [9.5]	15 [48]
1/2 [12.7]	10 [32]
5/8 [15.9]	5 [16]
3/4 [19.0]	5 [16]

5.1.3 *Nail Pull Resistance*—The specimens shall have an average nail-pull resistance of not less than the following:

Thickness, in. [mm]	Method A, lbf [N]	Method B, lbf [N]
1/4 [6.4]	40 [178]	36 [160]
5/16 [7.9]	50 [222]	46 [205]
3/8 [9.5]	60 [267]	56 [249]
1/2 [12.7]	80 [356]	77 [343]
5/8 [15.9]	90 [400]	87 [387]
3/4 [19.0]	100 [445]	97 [432]

5.1.4 *Foil-Backed Gypsum Wallboard and Foil-Backed Predecorated Gypsum Board:*

5.1.4.1 Foil-backed gypsum wallboard and foil-backed predecorated gypsum board shall meet all of the requirements for gypsum wallboard and predecorated gypsum board.

5.1.4.2 When tested in accordance with Test Methods E96/E96M, the permeance of foil-backed gypsum wallboard and foil-backed predecorated gypsum board shall be not more than 0.30 perm [17 ng/Pa-s-m<sup>2</sup>] (Desiccant Method) for the condition of 50 % relative humidity on the face of the board, and 0 % relative humidity on the back (foil-covered) side of the board.

5.2 *Dimensions and Tolerances of Gypsum Wallboard, Predecorated Gypsum Board, and Laminated Gypsum Board:*

5.2.1 *Thickness*—The thickness shall be from 1/4 to 3/4 in. [6.4 to 19.0 mm] with tolerances of  $\pm 0.015$  in. [ $\pm 0.40$  mm], and with local variations of  $\pm 0.030$  in. [ $\pm 0.80$  mm].

5.2.2 *Width*—The width shall be up to 48 in. [1220 mm], or up to 54 in. [1370 mm], with a tolerance of 3/32 in. [3 mm] under the specified width.

5.2.3 *End Squareness*—Corners shall be square with a tolerance of  $\pm 1/8$  in. [ $\pm 3$  mm] in the full width of the board.

5.3 *Edges:*

5.3.1 The edges of gypsum wallboard or laminated gypsum board shall be either square, beveled, featured, tapered, or featured and tapered.

5.3.2 The edges of predecorated gypsum board shall be either square, beveled, or featured.

**6. Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board**

6.1 *Physical Properties of Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board:*

6.1.1 *Flexural Strength*—The specimens shall be tested face up and face down. The average breaking load shall be not less than the following:

Thickness, in. [mm]	Method A	Method A	Method B	Method B
	Bearing Edges Perpendicular to Panel Length, lbf [N]	Bearing Edges Parallel to Panel Length, lbf [N]	Bearing Edges Perpendicular to Panel Length, lbf [N]	Bearing Edges Parallel to Panel Length, lbf [N]
1/4 [6.4]	50 [222]	20 [89]	46 [205]	16 [71]
3/8 [9.5]	80 [356]	30 [133]	77 [343]	26 [116]
1/2 [12.7]	110 [489]	40 [178]	107 [476]	36 [160]
5/8 [15.9]	140 [622]	50 [222]	137 [609]	46 [205]
3/4 [19.0]	170 [756]	60 [267]	167 [743]	56 [249]
1 [25.4]	230 [1023]	80 [356]	228 [1014]	77 [343]

6.1.2 *Humidified Deflection*—The specimens shall have an average deflection of not more than the following:

Thickness, in. [mm]	Deflection, eighths of an inch [mm]
1/4 [6.4]	not required
3/8 [9.5]	15 [48]
1/2 [12.7]	10 [32]
5/8 [15.9]	5 [16]
3/4 [19.0]	not required
1 [25.4]	not required

6.1.3 *Nail Pull Resistance*—The specimens shall have an average nail-pull resistance of not less than the following:

Thickness, in. [mm]	Method A, lbf [N]	Method B, lbf [N]
¼ [6.4]	40 [178]	36 [160]
⅜ [9.5]	60 [267]	56 [249]
½ [12.7]	80 [356]	77 [343]
⅝ [15.9]	90 [400]	87 [387]
¾ [19.0]	not required	not required
1 [25.4]	not required	not required

6.1.4 *Foil-Backed Gypsum Backing Board, Foil-Backed Gypsum Coreboard, and Foil-Backed Gypsum Shaftliner Board:*

6.1.4.1 Foil-backed gypsum backing board, foil-backed gypsum coreboard, and foil-backed gypsum shaftliner board shall meet all of the requirements for gypsum backing board, gypsum coreboard, and gypsum shaftliner board.

6.1.4.2 When tested in accordance with Test Methods E96/E96M, the permeance of foil-backed gypsum backing board and foil-backed gypsum coreboard shall be not more than 0.30 perm [17 ng/Pa·s·m<sup>2</sup>] (Desiccant Method) for the condition of 50 % relative humidity on the face of the board, and 0 % relative humidity on the back (foil-covered) side of the board.

6.2 *Dimensions and Tolerances of Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board:*

6.2.1 *Thickness*—The thickness shall be from ¼ to 1 in. [6.4 to 25.4 mm] with tolerances of ± 0.030 in. [± 0.80 mm], and with local variations of ± 0.060 in. [± 1.6 mm].

6.2.2 *Width*—The width shall be from 16 to 48 in. [406 to 1220 mm] with a tolerance of ⅛ in. [3.2 mm] under the specified width.

6.2.3 *End Squareness*—Corners shall be square with a tolerance of ± ⅛ in. [± 3 mm] in the full width of the board.

6.3 *Edges*—The edges shall be either square, beveled, round, V-tongue and groove, or featured.

## 7. Water-Resistant Gypsum Backing Board

7.1 *Physical Properties of Water-Resistant Gypsum Backing Board:*

7.1.1 *Flexural Strength*—The specimens shall be tested face up and face down. The average breaking load shall be not less than the following:

Thickness, in. [mm]	Method A	Method A	Method B	Method B
	Bearing Edges Perpendicular to Panel Length, lbf [N]	Bearing Edges Parallel to Panel Length, lbf [N]	Bearing Edges Perpendicular to Panel Length, lbf [N]	Bearing Edges Parallel to Panel Length, lbf [N]
½ [12.7]	110 [489]	40 [178]	107 [476]	36 [160]
⅝ [15.9]	150 [667]	50 [222]	147 [654]	46 [205]

7.1.2 *Humidified Deflection*—The specimens shall have an average deflection of not more than the following:

Thickness, in. [mm]	Deflection, eighths of an inch [mm]
½ [12.7]	10 [32]
⅝ [15.9]	5 [16]

7.1.3 *Nail Pull Resistance*—The specimens shall have an average nail-pull resistance of not less than the following:

Thickness, in. [mm]	Method A, lbf [N]	Method B, lbf [N]
½ [12.7]	80 [356]	77 [343]
⅝ [15.9]	90 [400]	87 [387]

7.1.4 *Water Resistance*—The specimens shall have an average water absorption of not more than 5 weight % after 2-h immersion.

7.2 *Dimensions and Tolerances of Water-Resistant Gypsum Backing Board:*

7.2.1 *Thickness*—The thickness shall be ½ or ⅝ in. [12.7 or 15.9 mm] with tolerances of ± 0.015 in. [± 0.40 mm], and with local variations of ± 0.030 in. [± 0.80 mm].

7.2.2 *Width*—The width shall be up to 48 in. [1220 mm], or up to 54 in. [1370 mm], with a tolerance of ⅜ in. [3 mm] under the specified width.

7.2.3 *End Squareness*—Corners shall be square with a tolerance of ± ⅛ in. [± 3 mm] in the full width of the board.

7.3 *Edges*—The edges shall be either square, beveled, featured, tapered, or featured and tapered.

## 8. Exterior Gypsum Soffit Board

8.1 *Physical Properties of Exterior Gypsum Soffit Board:*

8.1.1 *Flexural Strength*—The specimens shall be tested face up and face down. The average breaking load shall be not less than the following:

Thickness, in. [mm]	Method A	Method A	Method B	Method B
	Bearing Edges Perpendicular to Panel Length, lbf [N]	Bearing Edges Parallel to Panel Length, lbf [N]	Bearing Edges Perpendicular to Panel Length, lbf [N]	Bearing Edges Parallel to Panel Length, lbf [N]
½ [12.7]	110 [489]	40 [178]	107 [476]	36 [160]
⅝ [15.9]	150 [667]	50 [222]	147 [654]	46 [205]

8.1.2 *Humidified Deflection*—The specimens shall have an average deflection of not more than the following:

Thickness, in. [mm]	Deflection, eighths of an inch [mm]
½ [12.7]	7 [22]
⅝ [15.9]	4 [13]

8.1.3 *Nail Pull Resistance*—The specimens shall have an average nail-pull resistance of not less than the following:

Thickness, in. [mm]	Method A, lbf [N]	Method B, lbf [N]
½ [12.7]	80 [356]	77 [343]
⅝ [15.9]	90 [400]	87 [387]

8.2 *Dimensions and Tolerances of Exterior Gypsum Soffit Board:*

8.2.1 *Thickness*—The thickness shall be ½ or ⅝ in. [12.7 or 15.9 mm] with tolerances of ± 0.015 in. [± 0.40 mm], and with local variations of ± 0.030 in. [± 0.80 mm].

8.2.2 *Width*—The width shall be up to 48 in. [1220 mm] with a tolerance of ⅜ in. [3 mm] under the specified width.

8.2.3 *End Squareness*—Corners shall be square with a tolerance of ± ⅛ in. [± 3 mm] in the full width of the board.

8.3 *Edges*—The edges shall be either square, beveled, featured, tapered, or featured and tapered.

## 9. Gypsum Sheathing Board

9.1 *Physical Properties of Gypsum Sheathing Board:*