



Designation: C1278/C1278M – 17

# Standard Specification for Fiber-Reinforced Gypsum Panel<sup>1</sup>

This standard is issued under the fixed designation C1278/C1278M; 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 (ε) indicates an editorial change since the last revision or reapproval.

## 1. Scope\*

1.1 This specification covers fiber-reinforced gypsum panels described in 1.1.1 – 1.1.4.

1.1.1 *Interior Fiber-Reinforced Gypsum Panels* are designed to be used for walls, ceilings, or partitions and affords a suitable surface to receive decoration.

1.1.2 *Water-Resistant Fiber-Reinforced Gypsum Backing Panels* are 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.

1.1.3 *Exterior Fiber-Reinforced Gypsum Soffit Panels* are designed for use on exterior soffits and carport ceilings that are completely protected from contact with liquid water.

1.1.4 *Water-Resistant Exterior Fiber-Reinforced Gypsum Sheathing Panels* are designed for use as sheathing on buildings.

1.1.5 *Interior Fiber-Reinforced Gypsum Underlayment Panels* are designed for use as a base for application of finished flooring materials.

1.1.6 *Fiber-Reinforced Gypsum Board Panels* are designed for use in roofing systems.

1.2 Specifications applicable to all fiber-reinforced gypsum panels are located in Sections 1 – 4 and 11 – 13 except as modified by applicable product sections. Specifications applicable to specific panels are located in the following sections:

Interior Fiber-Reinforced Gypsum Panels	5
Water-Resistant Fiber-Reinforced Gypsum Backing Panels	6
Exterior Fiber-Reinforced Gypsum Soffit Panels	7
Water-Resistant Exterior Fiber-Reinforced Gypsum Sheathing Panels	8
Interior Fiber-Reinforced Gypsum Underlayment Panels	9
Fiber-Reinforced Gypsum Roof Board Panels	10

1.3 The values stated in either inch-pound units or SI (metric) are to be regarded separately as the standard. Within the text, the SI units are shown in brackets. The values stated in each system shall be used independently of the other. Values from the two systems shall not be combined.

<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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1.4 The text of this specification references notes and footnotes that provide explanatory material. These notes and footnotes shall not be considered as requirements of the standard.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 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

C1264 Specification for Sampling, Inspection, Rejection, Certification, Packaging, Marking, Shipping, Handling, and Storage of Gypsum Panel Products

D1037 Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials

D3273 Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

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*—Definitions of terms shall be in accordance with Terminology C11.

<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

3.1.1 *nominal thickness, n*—the manufacturer-stated fractional value of thickness of the gypsum panel product expressed in decimal value to the nearest one-thousandth (0.001) of an inch.

#### 4. Materials and Manufacture

4.1 Fiber-reinforced gypsum panels shall consist essentially of gypsum with fibers dispersed throughout.

4.1.1 *Gypsum*—Specification C22/C22M.

4.1.2 *Fibers*—Cellulose, derived from paper, paperboard stock, wood, or other organic material.

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

4.3 Water-resistant fiber-reinforced gypsum panels shall be treated with a material that imparts water resistance throughout.

4.4 Fiber-reinforced gypsum panels, mold resistant, designates fiber-reinforced gypsum panels having not more than 20 % mold growth, based on surface area coverage, when tested in accordance with Test Method D3273.

4.5 Fiber-reinforced gypsum panels, type X (special fire-resistant) designates fiber-reinforced gypsum panels complying with this specification that provide not less than 1-h fire resistance rating for panels 5/8-in. [15.9-mm] thick or 3/4-h fire resistance rating for panels 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 center with 6d coated nails, 1 7/8-in. [48-mm] long, 0.0915-in. [2.3-mm] diameter shank, 1/4-in. [6.4-mm] diameter heads, spaced 7 in. [178 mm] on center with fiber-reinforced gypsum panel joints staggered 16 in. [406 mm] on each side of the partition and tested in accordance with Test Methods E119.

NOTE 1—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.

4.6 Fiber-reinforced gypsum panels shall have a flame spread index of not more than 25 when tested in accordance with Test Method E84.

4.7 *Physical Properties, Dimensions, and Tolerances of Gypsum Panel:*

4.7.1 Specimens shall be taken from samples obtained in accordance with Specification C1264.

4.7.1.1 Specimens shall be tested in accordance with Test Methods C473.

4.7.2 *Core, End, and Edge Hardness*—The specimens shall have an average hardness of not less than 20 lbf [90 N] when tested in accordance with Method B.

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

4.7.4 *Length*—The nominal length shall be from 6 to 24 ft [1830 to 7320 mm], with a tolerance of  $\pm 1/4$  in. [6 mm] from the specified length.

4.7.5 *Tapered Edge Depth*—The average thickness of the edge of recessed or tapered edge 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 fiber-reinforced gypsum panel.

#### 5. Interior Fiber-Reinforced Gypsum Panels

5.1 *Physical Properties of Interior Fiber-Reinforced Gypsum Panels:*

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 B, lbf [N]
1/2 [12.7]	110 [490]
5/8 [15.9]	155 [690]

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]
1/2 [12.7]	3 [10]
5/8 [15.9]	2 [6]

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 B, lbf [N]
1/2 [12.7]	120 [535]
5/8 [15.9]	145 [645]

5.2 *Dimensions and Tolerances of Interior Fiber-Reinforced Gypsum Panel:*

5.2.1 Specimens shall be taken from samples in accordance with Specification C1264.

5.2.1.1 Specimens shall be tested in accordance with Test Methods C473.

5.2.2 *Thickness*—The thickness shall be 1/2 or 5/8 in. [12.7 or 15.9 mm] with tolerances of  $\pm 0.015$  in. [ $\pm 0.40$  mm], and with a local tolerance of  $\pm 0.030$  in. [ $\pm 0.80$  mm].

5.2.3 *Width*—The width shall be up to 54 in. [1370 mm], with a tolerance of  $\pm 3/32$  in. [3 mm] under the specified width.

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

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

5.4 *Foil-Backed Fiber-Reinforced Gypsum Panels:*

5.4.1 Foil-backed fiber-reinforced gypsum panels shall meet all of the requirements for fiber-reinforced gypsum panels. In addition, aluminum foil shall be bonded to the back surface.

5.4.2 When tested in accordance with Test Methods E96/E96M, the permeance of foil-backed fiber-reinforced gypsum panels 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 panel and 0 % relative humidity on the foil-covered back side of the panel.

#### 6. Water-Resistant Fiber-Reinforced Gypsum Backing Panels

6.1 *Physical Properties of Water-Resistant Fiber-Reinforced Gypsum Backing Panels:*

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 B, lbf [N]
1/2 [12.7]	110 [490]
5/8 [15.9]	155 [690]

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]
1/2 [12.7]	3 [10]
5/8 [15.9]	2 [6]

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 B, lbf [N]
1/2 [12.7]	120 [535]
5/8 [15.9]	145 [645]

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

6.1.5 *Surface Water Absorption*—The specimens shall have an average face surface water absorption of not more than 1.6 g after two hours of elapsed time.

6.2 *Dimensions and Tolerances of Water-Resistant Fiber-Reinforced Gypsum Backing Panel:*

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

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

6.2.2 *Thickness*—The nominal thickness shall be 1/2 or 5/8 in. [12.7 or 15.9 mm] with tolerances of  $\pm 1/64$  in. [ $\pm 0.4$  mm], and with a local tolerance of  $\pm 1/32$  in. [ $\pm 0.8$  mm].

6.2.3 *Width*—The width shall be up to 54 in. [1370 mm], with a tolerance of  $\pm 3/32$  in. [3 mm] under the specified width.

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

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

## 7. Exterior Fiber-Reinforced Gypsum Soffit Panels

7.1 *Physical Properties of Exterior Fiber-Reinforced Gypsum Soffit Panels:*

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 B, lbf [N]
1/2 [12.7]	110 [490]
5/8 [15.9]	155 [690]

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]
1/2 [12.7]	3 [10]
5/8 [15.9]	2 [6]

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 B, lbf [N]
1/2 [12.7]	120 [535]
5/8 [15.9]	145 [645]

7.2 *Dimensions and Tolerances of Exterior Fiber-Reinforced Gypsum Soffit Panel:*

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

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

7.2.2 *Thickness*—The nominal thickness shall be 1/2 or 5/8 in. [12.7 or 15.9 mm] with tolerances in the thickness of  $\pm 1/64$  in. [ $\pm 0.4$  mm], and with a local tolerance of  $\pm 1/32$  in. [ $\pm 0.8$  mm].

7.2.3 *Width*—The width shall be up to 54 in. [1370 mm], with a tolerance of  $\pm 3/32$  in. [3 mm] under the specified width.

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

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

## 8. Water-Resistant Exterior Fiber-Reinforced Gypsum Sheathing Panels

8.1 *Physical Properties of Water-Resistant Exterior Fiber-Reinforced Gypsum Sheathing Panels:*

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 B, lbf [N]
1/2 [12.7]	110 [490]
5/8 [15.9]	155 [690]

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]
1/2 [12.7]	3 [10]
5/8 [15.9]	2 [6]

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 B, lbf [N]
1/2 [12.7]	120 [535]
5/8 [15.9]	145 [645]

8.1.4 *Water Resistance of Water-Resistant Exterior Fiber-Reinforced Gypsum Sheathing Panel*—The specimens shall have an average water absorption of not more than 10 weight percentage after 2-h immersion.

8.2 *Dimensions and Tolerances of Water-Resistant Exterior Fiber-Reinforced Gypsum Sheathing Panels:*

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

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

8.2.2 *Thickness*—The nominal thickness shall be from 1/2 or 5/8 in. [12.7 or 15.9 mm] with tolerances of  $\pm 1/32$  in. [ $\pm 0.8$  mm], and with a local tolerance of  $\pm 1/16$  in. [ $\pm 1.6$  mm].

8.2.3 *Width*—The nominal width shall be 24 or 48 in. [610 or 1220 mm], with a tolerance of  $\pm 1/8$  in. [3.2 mm] under the specified width.

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

8.3 *Edges*—The edges shall be either square or V-tongue and groove.

## 9. Interior Fiber-Reinforced Gypsum Underlayment Panels

9.1 *Physical Properties of Interior Fiber-Reinforced Gypsum Underlayment Panels:*

9.1.1 *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 B, lbf [N]
1/4 [6.4]	40 [175]
3/8 [9.5]	70 [310]
1/2 [12.7]	110 [490]

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

Thickness, in. [mm]	Method B, lbf [N]
1/4 [6.4]	70 [310]
3/8 [9.5]	90 [400]
1/2 [12.7]	120 [535]

## 9.2 Dimensions and Tolerances of Interior Fiber-Reinforced Gypsum Underlayment Panels:

9.2.1 Specifications shall be taken from samples in accordance with Specification C1264.

9.2.2 *Thickness*—The nominal thickness shall be 1/4, 3/8, or 1/2 in. [6.4, 9.5, or 12.7 mm] with tolerance of  $\pm 0.015$  in. [ $\pm 0.4$  mm], and with a local tolerance of  $\pm 0.030$  in. [ $\pm 0.8$  mm].

9.2.3 *End Squareness*—Corners shall be square with a tolerance of  $\pm 0.125$  in. [ $\pm 3$  mm] in the full width of the panel.

9.3 *Edges*—Edges shall be square.

9.4 *Water Absorption*

9.4.1 Specimens shall be tested in accordance with Test Methods C473.

9.4.2 Water absorption shall not exceed 10 %.

9.5 *Thickness Swelling*

9.5.1 Specimens shall be tested in accordance with Thickness Swelling in Test Methods D1037.

9.5.2 The specimens shall have an average thickness swelling of no more than the following:

Thickness, in. [mm]	Method A and B
1/4 [6.4]	1 %
3/8 [9.5]	1 %
1/2 [12.7]	1 %

## 10. Fiber-Reinforced Gypsum Roof Board Panels

10.1 *Physical Properties of Fiber-Reinforced Gypsum Roof Board Panels:*

10.1.1 *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 B, lbf [N]
1/4 [6.4]	40 [175]
3/8 [9.5]	70 [310]
1/2 [12.7]	110 [490]
5/8 [15.9]	155 [690]

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

Thickness, in. [mm]	Method B, lbf [N]
1/4 [6.4]	70 [310]
3/8 [9.5]	90 [400]
1/2 [12.7]	120 [535]
5/8 [15.9]	145 [645]

10.2 *Dimensions and Tolerances of Fiber-Reinforced Gypsum Roof Deck Cover Board Panels:*

10.2.1 Specifications shall be taken from samples in accordance with Specification C1264.

10.2.2 *Thickness*—The nominal thickness shall be 1/4, 3/8, 1/2, 5/8 in. [6.4, 9.5, 12.7, 15.9 mm] with tolerance of  $\pm 0.030$  in. [ $\pm 0.4$  mm], and with a local tolerance of  $\pm 0.015$  in. [ $\pm 0.8$  mm].

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

10.3 *Edges*—Edges shall be square.

10.4 *Water Absorption*

10.4.1 Specimens shall be tested in accordance with Test Methods C473.

10.4.2 Water absorption shall not exceed 10 %.

## 11. Finish and Appearance

11.1 The surfaces of the fiber-reinforced gypsum panels shall be true and free from imperfections that would render the panels unfit for use with or without decoration.

## 12. Sampling, Inspection, Rejection, Certification, Packaging, Marking, Shipping, Handling, and Storage

12.1 Shall be in accordance with Specification C1264.

## 13. Keywords

13.1 ceiling; fiber-reinforced gypsum panels; foil-backed; FRGP; gypsum; gypsum panel products; partition; sheathing; soffit; type X; wall; water-resistant





## APPENDIXES

### (Nonmandatory Information)

This Appendix gives general information and also suggestions for inclusions to be made elsewhere by the specifier. They are not part of this specification.

The definition of type X as given in 4.5, and the alternate definition given in this appendix, are intended only as a test to define the gypsum board as meeting the requirements of type X. These tests do not indicate a preferred application, nor do they limit the use of the product in other fire-rated assemblies.

All gypsum panel products for which type X is defined, except gypsum lath and gypsum shaftliner board, use the same test for type X products, therefore the type X designation indicates a consistent level of fire resistance.

#### X1. ALTERNATE DEFINITION FOR TYPE X

X1.1 Fiber-reinforced gypsum panels, type X (special fire-resistant) designates fiber-reinforced gypsum panels providing a greater fire resistance than regular fiber-reinforced gypsum panels of the same thickness. Type X (special fire-resistant) fiber-reinforced gypsum panels, when tested in accordance with Test Methods E119, shall provide the following minimum fire resistance ratings for the assemblies described:

X1.1.1 One hour for a 5/8-in. [15.9-mm] thickness applied to a partition in a single layer application on each side of 35/8-in. [92-mm] deep non-loadbearing galvanized steel studs complying with Specification C645 spaced 24 in. [610 mm] on center. The 5/8-in. [15.9-mm] thick fiber-reinforced gypsum panels 48-in. [1220-mm] wide shall be attached using 1-in. [25-mm] long drywall screws spaced 8 in. [203 mm] on center along the edges and ends, and 12 in. [305 mm] along intermediate studs. All joints shall be oriented parallel to and located over studs and staggered on opposite sides of the assembly, and

X1.1.2 Two hours for a 1/2-in. [12.7-mm] thickness applied to a partition in a double layer application on each side of 21/2-in. [64-mm] deep non-loadbearing galvanized steel studs complying with Specification C645 spaced 24 in. [610 mm] on center. The base layer 48-in. [1220-mm] wide shall be attached using 1-in. [25-mm] long drywall screws spaced 12 in. [305 mm] on center along panel edges, ends and along intermediate studs. Joints shall be oriented parallel to and located over studs and staggered on opposite sides of the assembly. The face layer 48-in. [1220-mm] wide shall be attached using 15/8-in. [41-mm] long drywall screws spaced 12 in. [305 mm] along panel edges, ends and along intermediate studs. Joints shall be oriented parallel to and located over studs, offset 24 in. [610 mm] from the base layer joints, and staggered on opposite sides of the assembly.

#### X2. INSTALLATION RECOMMENDATIONS

X2.1 Installation guidelines for Interior Fiber-Reinforced Gypsum Underlayment Panels are outlined in manufacturer literature. For more information on best installation practice contact Tile Council of North America.

X2.2 Installation guidelines for Fiber-Reinforced Gypsum Roof Board Panels may be obtained by contacting National Roofing Council of America.



## SUMMARY OF CHANGES

Committee C11 has identified the location of selected changes to this standard since the last issue (C1278/C1278M – 07a (2015)) that may impact the use of this standard. (Approved May 1, 2017.)

(1) Added Test Method D3273 to Section 2 (“Referenced Documents”). (2) Added new 4.4.

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