Designation: C1658/C1658M – 13

Standard Specification for Glass Mat Gypsum Panels[1]

This standard is issued under the fixed designation C1658/C1658M; 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 the glass mat gypsum panels described in 1.1.1 – 1.1.3.

1.1.1 *Glass mat interior gypsum panel,* designed for use on walls, ceilings, or partitions and that affords a surface suitable to receive decoration.

1.1.2 *Glass mat coreboard gypsum panel, and glass mat shaftliner gypsum panel,* designed for use as a base in multilayer systems or as gypsum studs or cores in semisolid or solid gypsum board partitions, or in shaftwall assemblies.

1.1.3 *Glass mat water-resistant gypsum panel,* designed 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. (*This is distinct from a coated glass mat water-resistant gypsum panel ASTM 1178.*)

1.2 Specifications applicable to all glass mat gypsum panels are located in Sections 1 – 4 and 8 – 10. Specifications applicable to specific glass mat gypsum panels are located in the following sections:

	Section
Glass mat interior gypsum panel	5
Glass mat coreboard gypsum panel, and glass mat shaftliner gypsum panel	6
Glass mat water-resistant gypsum panel	7

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

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C11 Terminology Relating to Gypsum and Related Building Materials and Systems

C22 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

E84 Test Method for Surface Burning Characteristics of Building 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 *glass mat, n*—a mat of glass fibers with or without a binder.

4. Materials and Manufacture

4.1 Glass mat gypsum panel shall consist of a noncombustible core, essentially gypsum complying with Specification C22, surfaced with glass mat partially or completely embedded in the core.

4.1.1 Glass mat interior gypsum panel shall consist of a noncombustible core, essentially gypsum complying with Specification C22, surfaced on both the face and back with glass mat partially or completely embedded into the core.

4.1.2 Glass mat coreboard gypsum panel, and glass mat shaftliner gypsum panel shall be either a single panel or composed of two factory-laminated gypsum panels to provide up to 1 in. [25.4 mm] total nominal thickness, surfaced on both face and back with glass mat partially or completely embedded into the core.

4.1.3 Glass mat gypsum water-resistant panel shall consist of a noncombustible water-resistant core, essentially gypsum complying with Specification C22, surfaced on the face with water-resistant glass mat partially or completely embedded into the core.

4.2 *Glass Mat Interior Gypsum panel, and Glass Mat Water-Resistant gypsum panel, type X (special fire-resistant)*

[1] This test method 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.

Current edition approved Oct. 1, 2013. Published October 2013. Originally approved in 2006. Last previous edition approved in 2012 as E841 – 12. DOI: 10.1520/C1658_C1658M-13.

[2] 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**

designates glass mat gypsum panel complying with this specification that provide not less than 1 h fire resistance for panel 5⁄8 in. [15.9 mm] thick or 3⁄4 h fire resistance for panel 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 glass mat 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 manufacturers for independent test data on assembly details and fire resistance classifications for other types of construction. See fire test reports or listings from recognized fire testing laboratories for assembly particulars, materials, and classifications.

4.3 *Glass Mat Shaftliner gypsum panel,* type X, designates glass mat gypsum shaftliner panel complying with this specification that meets the acceptance criteria for temperature rise for not less than panels 1-in. [25.4 mm] thick, when applied in a double layer solid non-load bearing partition as described in 4.3.2 and tested in accordance with Test Methods E119 with thermocouple locations as specified in 4.3.2.

4.3.1 Two layers of glass mat gypsum shaftliner panel applied vertically and friction fit into vertical 25-gauge steel "H" members, 2-in. [50.8 mm] deep for panels 1-in. [25.4 mm] thick, spaced 24-in. [610 mm] on centers and 25-gauge 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.

4.3.2 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 Glass mat gypsum panels 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 Glass Mat Gypsum Panel:*

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 or by Method B.

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

4.5.4 *Length*—The tolerance in length shall be ± 1⁄4 in. [± 6 mm].

4.5.5 *Tapered Edge Depth*—The average thickness of the edge of recessed or tapered edge glass mat gypsum panel 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 glass mat gypsum panel.

5. Glass Mat Interior Gypsum Panel

5.1 *Physical Properties of Glass Mat Interior Gypsum Panel:*

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]	Load, lbf [N] Bearing edges perpendicular to the panel edge	Method A or B Load, lbf [N] Bearing edges parallel to the panel edge
1⁄4 [6.4]	50 [222]	40 [178]
3⁄8 [9.5]	75 [334]	60 [267]
1⁄2 [12.7]	100 [445]	80 [356]
5⁄8 [15.9]	140 [623]	100 [445]

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

Thickness, in. [mm]	Deflection, sixteenths of an in. [mm]
1⁄4 [6.4]	not required
3⁄8 [9.5]	not required
1⁄2 [12.7]	5 [8]
5⁄8 [15.9]	4 [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 A or B lbf [N]
1⁄4 [6.4]	40 [178]
3⁄8 [9.5]	60 [267]
1⁄2 [12.7]	80 [356]
5⁄8 [15.9]	90 [400]

5.2 *Dimensions and Tolerances of Glass Mat Interior Gypsum Panel:*

5.2.1 *Thickness*—The nominal thickness shall be from 1⁄4 to 5⁄8 in. [6.4 to 15.9 mm] with tolerances in the nominal thickness of ± 1⁄64 in. [± 0.4 mm], and with local variations of ± 1⁄32 in. [± 0.8 mm] from the nominal thickness.

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 ± 1⁄8 in. [± 3 mm] in the full width of the board.

5.3 *Edges:*

5.3.1 The edges of glass mat interior gypsum panel shall be either square, beveled, featured, tapered, or featured and tapered.

6. Glass Mat Coreboard Gypsum Panel, and Glass Mat Shaftliner Gypsum Panel

6.1 *Physical Properties of Glass Mat Coreboard Gypsum Panel and Glass Mat Shaftliner Gypsum Panel:*

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]	Load, lbf [N] Bearing edges perpendicular to the panel edge	Method A or B Load, lbf [N] Bearing edges parallel to the panel edge
1 [25.4]	230 [1023]	80 [356]

6.2 *Dimensions and Tolerances of Glass Mat Coreboard Gypsum Panel, and Glass Mat Shaftliner Gypsum Panel:*

6.2.1 *Thickness*—The nominal thickness shall be 1 in. [25.4 mm] with tolerances in the nominal thickness of ± 1⁄32 in.

[± 0.8 mm], and with local variations of ± 1⁄16 in. [± 1.6 mm] from the nominal thickness.

6.2.2 *Width*—The width shall be from 16 to 48 in. [406 to 1220 mm] with a tolerance of ± 1⁄8 in. [3 mm] under the specified width.

6.2.3 *End Squareness*—Corners shall be square with a tolerance of ± 1⁄8 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. Glass Mat Water-Resistant Gypsum Panel

7.1 *Physical Properties of Glass Mat Water-Resistant Gypsum Panel:*

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:

		Method A or B
Thickness, in. [mm]	Load, lbf [N] Bearing edges perpendicular to the panel edge	Load, lbf [N] Bearing edges parallel to the panel edge
3⁄8 [9.5]	75 [334]	60 [267]
1⁄2 [12.7]	100 [445]	80 [356]
5⁄8 [15.9]	140 [623]	100 [445]

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

Thickness, in. [mm]	Deflection, sixteenths of an in. [mm]
3⁄8 [9.5]	not required
1⁄2 [12.7]	5 [8]
5⁄8 [15.9]	4 [6]

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

	Method A or B
Thickness, in. [mm]	lbf [N]
3⁄8 [9.5]	60 [267]
1⁄2 [12.7]	80 [356]
5⁄8 [15.9]	90 [400]

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

7.1.5 *Surface Water Absorption*—The specimens shall have an average face surface water absorption of not more than 1.6 g after 2 h of elapsed time.

7.2 *Dimensions and Tolerances of Glass Mat Water-Resistant Gypsum Panel:*

7.2.1 *Thickness*—The nominal thickness shall be 1⁄2 or 5⁄8 in. [12.7 or 15.9 mm] with tolerances in the nominal thickness of ± 1⁄64 in. [± 0.4 mm], and with local variations of ± 1⁄32 in. [± 0.8 mm] from the nominal thickness.

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 3⁄32 in. [3 mm] under the specified width.

7.2.3 *End Squareness*—Corners shall be square with a tolerance of ± 1⁄8 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. Finish and Appearance

8.1 The glass mat gypsum panel surface shall be true and free from imperfections that would render it unfit for use with or without decoration.

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

9.1 Sampling, inspection, rejection, certification, packaging, marking, shipping, handling, and storage of glass mat gypsum panel shall be in accordance with Specification C1264.

10. Keywords

10.1 ceiling; coreboard; glass mat; glass mat gypsum panel; partitions; shaftliner; type X; wall; water-resistant

APPENDIX

(Nonmandatory Information)

X1. ALTERNATE DEFINITION FOR TYPE X

X1.1 The definition of type X as given in 4.2 and 4.3 and the alternate definition given in this appendix, are intended only as a test to define the glass mat gypsum panel as meeting the requirements of type X products. These tests do not indicate a preferred application nor do they limit the use of the product in other fire rated assemblies.

X1.2 This appendix gives general information and also suggestions for inclusions to be made elsewhere by the specifier. They are not part of this specification.

X1.3 All gypsum panel products for which type X is defined, except *shaftliner gypsum panel*, use the same test for type X products, therefore the type X definition indicates a consistent level of fire resistance.

X1.4 Glass mat gypsum panel, type X (special fire-resistant) designates glass mat gypsum panel providing a greater fire-resistance than regular glass mat gypsum panel of the same thickness. Type X (special fire-resistant) glass mat gypsum panel, when tested in accordance with Test Methods E119, shall provide the following minimum fire resistance ratings for the assemblies described:

X1.4.1 One hour for a 5⁄8-in. [15.9-mm] thickness applied to a partition in a single-layer application on each side of 3 5⁄8-in. [92-mm] deep non-load bearing galvanized steel studs complying with Specification C645, spaced 24 in. [610 mm] on center. The 5⁄8-in. [15.9-mm] thick gypsum board 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

X1.4.2 Two hours for a ½-in. [12.7-mm] thickness applied to a partition in a double-layer application on each side of 2 ⅝-in. [64-mm] deep non-load bearing galvanized steel studs complying with Specification C645, spaced 24 in. [610 mm] on center. The 48-in. [1220-mm] wide base layer shall be attached using 1-in. [25-mm] long drywall screws spaced 12 in. [305 mm] on center along board 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 48-in. [1220-m] wide face layer shall be attached using 1 ⅝-in. [41-mm] long drywall screws spaced 12 in. [305 mm] along board 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.

SUMMARY OF CHANGES

Committee C11 has identified the location of selected changes to this specification since the last issue, C1658/C1658M–12, that may impact the use of this specification. (Approved Oct. 1, 2013)

(1) Revised 2.1.

(2) Revised 4.1, 4.1.1, and 4.1.3.