



Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing¹

This standard is issued under the fixed designation C 1177/C 1177M; 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 glass mat gypsum substrate, which is designed to be used as an exterior substrate for a weather barrier.

1.2 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 independently of the other. Values from the two systems shall not be combined.

1.3 The text of this standard references notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

2. Referenced Documents

2.1 ASTM Standards:²

C 11 Terminology Relating to Gypsum and Related Building Materials and Systems

C 473 Test Methods for Physical Testing of Gypsum Panel Products

C 645 Specification for Nonstructural Steel Framing Members

C 1264 Specification for Sampling, Inspection, Rejection, Certification, Packaging, Marking, Shipping, Handling, and Storage of Gypsum Board.

E 119 Test Methods for Fire Tests of Building Construction and Materials

3. Terminology

3.1 Definitions shall be in accordance with Terminology C 11.

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.

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

3.2.3 *weather barrier, n*—a material that prevents the passage of rain, sleet and snow.

4. Materials and Manufacture

4.1 *Glass Mat Gypsum Substrate* shall consist of a noncombustible water-resistant core, essentially gypsum, surfaced with glass mat partially, or completely embedded in the core.

4.2 *Glass Mat Gypsum Substrate, type X (special fire-resistant)* designates glass mat gypsum substrate complying with this specification that provide not less than 1 h fire resistance for substrate $\frac{5}{8}$ in. [15.9 mm] thick or $\frac{3}{4}$ h fire resistance for substrate $\frac{1}{2}$ 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 center with 6d coated nails, $1\frac{7}{8}$ 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 center with glass mat gypsum substrate joints staggered 16 in. [406 mm] on each side of the partition and tested in accordance with Test Methods E 119.

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.

5. Physical Properties

5.1 Specimens shall be taken from the samples obtained in accordance with Specification C 1264.

5.2 Specimens shall be tested in accordance with Methods C 473.

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

Method B		
Thickness, in. [mm]	Load, lbf [N] Bearing edges perpendicular to the substrate edge	Load, lbf [N] Bearing edges parallel to the substrate edge
$\frac{1}{4}$ [6.4]	50 [222]	40 [178]
$\frac{1}{2}$ [12.7]	100 [445]	80 [356]
$\frac{5}{8}$ [15.9]	140 [623]	100 [445]

5.2.2 *Humidified Deflection*—Specimens shall have an average deflection of not more than the following:

Thickness, in. [mm]	Humidified deflection, eighths of an in. [mm]
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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.



¼ [6.4]	not required
½ [12.7]	2 [6]
⅝ [15.9]	1 [3]

5.2.3 *Core, End and Edge Hardness*—Specimens shall have an average hardness of not less than 15 lbf [67 N] when tested in accordance with Method B:

5.2.4 *Nail-Pull Resistance*—Specimens shall have an average nail-pull resistance of not less than the following when tested in accordance with Method B:

Thickness, in. [mm]	Nail pull resistance, lbf [N]
¼ [6.4]	40 [178]
½ [12.7]	80 [356]
⅝ [15.9]	90 [400]

5.2.5 *Water Resistance*—The three specimens selected shall have an average water absorption of not more than 10 weight % after a 2-h immersion.

6. Dimensions and Tolerances

6.1 Specimens shall be taken from the samples obtained in accordance with Specification C 1264.

6.2 *Thickness, width, length and end squareness* shall be determined in accordance with Test Methods C 473.

6.2.1 *Thickness*—The nominal thickness shall be ¼, ½ or ⅝ in. [6.4, 12.7 or 15.9 mm], with tolerances in the nominal thickness of $\pm \frac{1}{32}$ in. [± 0.8 mm], and with local variations of $\pm \frac{1}{16}$ in. [± 1.6 mm] from the nominal thickness.

6.2.2 *Width*—The nominal width shall be up to 48 in. [1220 mm], with tolerance of $\frac{1}{8}$ in. [3 mm] under the specified width.

6.2.3 *Length*—The nominal length and tolerance shall be as follows:

Thickness, in. [mm]	Length ft [mm]	Variation in. [mm]
¼ [6.4]	4 to 8 [1220 to 2440]	$\pm \frac{1}{4}$ [6]
½ [12.7]	6 to 12 [1840 to 3660]	$\pm \frac{1}{4}$ [6]
⅝ [15.9]	6 to 12 [1840 to 3660]	$\pm \frac{1}{4}$ [6]

6.2.4 *End Squareness*—Corners shall be square with a tolerance of ± 1.8 in. [± 3 mm] in the full width of the substrate.

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

7. Finish and Appearance

7.1 Glass mat gypsum substrate shall be free of any cracks and imperfections that would render it unfit for its designed use.

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

8.1 Shall be in accordance with Specification C 1264.

9. Keywords

9.1 core; exterior substrate; fire resistant classification; flexural strength; glass mat; glass mat gypsum substrate; gypsum; hardness; humidified deflection; nail pull resistance; noncombustible; sheathing; substrate; type X; water resistance; weather barrier

APPENDIX

(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 definitions of type X as given in 4.2 and the alternate definition given in this appendix, are intended only as a test to define glass mat gypsum substrate for use as sheathing 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 related 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 Glass mat gypsum substrate, type X (special fire-resistant) designates glass mat gypsum substrate providing a greater fire resistance than regular glass mat gypsum substrate of the same thickness. Type X (special fire-resistant) glass mat gypsum substrate, when tested in accordance with Test Methods E 119, shall provide the following minimum fire resistance for the assemblies described:

X1.1.1 One hour for a ⅝ in. [15.9 mm] thickness applied to a partition in a single layer application on each side of 3⅝ in. [92 mm] deep non-loadbearing galvanized steel studs complying with Specification C 645 spaced 24 in. [610 mm] on center. The ⅝ in. [15.9 mm] thick glass mat gypsum substrate 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 ½ in. [12.7 mm] thickness applied to a partition in a double layer application on each side of 2½ in. [64 mm] deep non-loadbearing galvanized steel studs complying with Specification C 645 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 substrate 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 1½ in. [41 mm] long drywall screws spaced 12 in. [305 mm] along substrate 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, C 1177/C 1177M – 01, that may impact the use of this specification. (Approved January 1, 2004)

(I) Revised paragraph 6.3 (formerly paragraph 6.2.5).

Committee C11 has identified the location of selected changes to this specification since the last issue, C 1177/C 1177M – 99, that may impact the use of this specification. (Approved May 10, 2001)

(I) Note 1 was revised.

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