Designation: C 442/C 442M – 04

Standard Specification for Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board[1]

This standard is issued under the fixed designation C 442/C 442M; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope*

1.1 This specification covers gypsum board designed to be used as a base in multilayer systems, as a gypsum stud or core in semi-solid or solid gypsum board partitions, or in shaftwall assemblies.

NOTE 1—Specification C 840 contains application procedures for gypsum backing board, gypsum coreboard, and gypsum shaftliner board.

1.2 The values stated in inch-pound units are to be regarded 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.

1.3 The terms "backing board," "coreboard," and "shaftliner board," refer to different end uses of the gypsum board specified in this specification. The term "gypsum backing board," in this specification, shall include gypsum coreboard and gypsum shaftliner board unless otherwise stated.

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

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 840 Specification for Application and Finishing of Gypsum Board

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

E 84 Test Method for Surface Burning Characteristics of Building Materials

E 96 Test Methods for Water Vapor Transmission of Materials

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

3. Terminology

3.1 Definitions—Definitions of terms shall be in accordance with Terminology C 11.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *gypsum backing board*, *n*—a ¼ to ⅝-in. [6.4 to 15.9-mm] gypsum board used as a backing for gypsum wallboard, acoustical tile, or other dry cladding.

3.2.2 *gypsum coreboard*, *n*—a ¾ or 1-in. [19.0 to 25.4-mm] gypsum board used as a gypsum stud or core in semisolid or solid gypsum board partitions.

3.2.3 *gypsum shaftliner board*, *n*—a ¾ or 1-in. [19.0 or 25.4-mm] gypsum board used in shaftwall assemblies.

4. Materials and Manufacture

4.1 Gypsum backing board shall consist of a noncombustible core, essentially gypsum, surfaced with paper bonded to the core.

4.2 Gypsum coreboard is a single ¾-in. [19.0-mm] or 1-in. [25.4-mm] thick board or is composed of two factory laminated boards to provide ¾-in. [19.0-mm] or 1-in. [25.4-mm] total nominal thickness.

4.3 Gypsum shaftliner board is a single ¾-in. [19.0-mm] or 1-in. [25.4-mm] thick board.

4.4 Foil-backed gypsum backing board shall consist of gypsum backing board with a layer of aluminum foil laminated to the back surface.

4.5 *Gypsum Backing Board, Type X (Special Fire-Resistant)*:

4.5.1 Gypsum backing board, type X, designates gypsum backing board, except gypsum coreboard and gypsum shaftliner board, complying with this specification that provides not

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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.

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

less than 1-h fire-resistance for boards ⅝-in. [15.9-mm] thick or ¾-h fire-resistance for boards ½-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, 1⅞-in. [48-mm] long, 0.0915-in. [2.3-mm] diameter shank, ¼-in. [6.4-mm] diameter heads, spaced 7-in [178-mm] on center with gypsum backing board joints staggered 16-in. [406-mm] on each side of the partition and tested in accordance with Test Methods E 119.

4.5.2 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 1½ h for boards ¾-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 4.5.2.1 and tested in accordance Test Methods E 119 fire endurance exposure with thermocouple locations as specified in 4.5.2.2.

4.5.2.1 Two layers of gypsum shaftliner board applied vertically and friction fit into vertical 25-gage steel "H" members, 1½-in. [38.1-mm] deep for boards ¾-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 25-in. [610-mm] on centers.

4.5.2.2 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.

NOTE 2—Consult gypsum backing board producers 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.

4.6 Gypsum backing board shall have a flame spread index of not more than 25 when tested in accordance with Test Method E 84.

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 Test Methods C 473.

5.2.1 *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 B	
	Bearing Edges Across Fiber of Surfacing Load, lbf [N]	Bearing Edges Parallel to Fiber of Sur-facing Load, lbf [N]	Bearing Edges Across Fiber of Surfacing Load, lbf [N]	Bearing Edges Parallel to Fiber of Sur-facing Load, lbf [N]
¼ [6.4]	50 [222]	20 [89]	46 [205]	16 [71]
⅜ [9.5]	80 [356]	30 [133]	77 [343]	26 [116]
½ [12.7]	110 [489]	40 [178]	107 [476]	36 [160]
⅝ [15.9]	140 [622]	50 [222]	137 [609]	46 [205]
¾ [19]	170 [756]	60 [267]	167 [743]	56 [249]
1 [25.4]	230 [1023]	80 [356]	228 [1010]	77 [343]

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

Thickness, in. [mm]	Humidified Deflection, in. [mm]
¼ [6.4]	not required
⅜ [9.5]	1⅝ [48]
½ [12.7]	1⅜ [32]
⅝ [15.9]	⅝ [16]
¾ [19.0]	not required
1 [25.4]	not required

5.2.3 *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.

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

Thickness, in. [mm]	Test Method A Nail Pull Resistance, lbf [N]	Test Method B Nail Pull Resistance, 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]	not required	not required
1 [25.4]	not required	not required

5.3 *Foil-Backed Gypsum Backing Board*:

5.3.1 Foil-backed gypsum backing board shall meet all the requirements for gypsum backing board. In addition, aluminum foil shall be bonded to the back surface.

5.3.2 When tested in accordance with Test Methods E 96 (Desiccant Method), the permeance of foil-backed gypsum backing board shall be not more than 0.30 perm [17 ng/Pa · s · m^2] for the condition of 50 % relative humidity on the face of the board and 0 % relative humidity on the foil-covered side of the board.

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 , ⅜ , ½ , ⅝ , ¾ , and 1 in. [6.4, 9.5, 12.7, 15.9, 19.0, and 25.4-mm] with tolerances in the nominal thickness of ±1/32 in. [±0.8 mm] and with a local tolerance of ±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], and widths up to 54 in. [1370 mm], with a tolerance of ⅛ in. [3 mm] under the specified width.

6.2.3 *Length*—The nominal length shall be from 4 to 16 ft [1220 to 4866 mm] with a tolerance of ±¼ in. [±6 mm] from the specified length.

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

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

7. Finish, and Appearance

7.1 The surfaces of the gypsum backing board shall be true and free from imperfections that render it unfit for use.

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

8.1 Sampling, inspection, rejection, certification, packaging, marking, shipping, handling, and storage shall be in accordance with Specification C 1264.

9. Keywords

9.1 backing board; coreboard; gypsum; shaftliner; type X

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 4.5 and the alternate definitions given in this appendix are intended only as tests to define gypsum backing board, gypsum coreboard, or gypsum shaftliner 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 lath 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 GYPSUM BACKING BOARD

X1.1 Gypsum backing board, type X (special fire-resistant) designates gypsum sheathing board providing a greater fire resistance than regular gypsum backing board of the same thickness. Type X (special fire-resistant) gypsum backing board, 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-load bearing galvanized steel studs complying with Specification C 645, spaced 24 in. [610 mm] on center. The ⅝-in. [15.9-mm] thick gypsum backing 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. All joints shall be filled with joint compound, covered with joint tape and covered with an additional coat of joint compound. All screw heads shall be covered with joint compound, 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-load bearing galvanized steel studs complying with Specification C 645, 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-mm] wide face layer shall be attached using 1⅝-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. All joints in the face layer shall be filled with joint compound, covered with joint tape and covered with an additional coat of joint compound. All screw heads in the face layer shall be covered with two coats of joint compound.

SUMMARY OF CHANGES

Committee C11 has identified the location of selected changes to this specification since the last issue, C 442/C 442M – 01, that may impact the use of this specification. (Approved January 1, 2004)

(*1*) Paragraph 6.3 was revised.

Committee C11 has identified the location of selected changes to this specification since the last issue, C 442/C 442M – 99a, that may impact the use of this specification. (Approved June 10, 2001)

(*1*) Note 1 was revised.

(*2*) Definition of type X statement in Appendix was revised.