ICC-ES Evaluation Report

ESR-3840

Reissued March 2024

Subject to renewal March 2025

DIVISION: 09 00 00—FINISHES Section: 09 28 15—Magnesium Oxide Backing Panels	REPORT HOLDER: MULTI-PANELS CORPORATION	EVALUATION SUBJECT: M4 BOARD	

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, 2015, and 2012 *International Building Code®* (IBC)
- 2021, 2018, 2015, and 2012 *International Residential Code®* (IRC)

Properties evaluated:

- Structural
- Durability
- Construction Types I-IV
- Surface-burning characteristics
- Fire-resistance-rated construction

2.0 USES

M4 Board is used on interior surfaces as defined in IBC Section 202, as substrate sheets suitable for decoration with paint, wallpaper, ceramic tile, natural stone or dimensional stone on walls in interior dry areas and on walls and ceilings as permitted in IBC Section 2509.2 and IRC Section 702.4.2. M4 Board [½-inch (12.7 mm) thick and greater] can be used as structural sheathing applied to interior and exterior walls when constructed in accordance with Section 4.1 of this report, to resist uniform transverse loads and racking shear loads. The boards are suitable for use in all construction types under the IBC and in buildings constructed under the IRC.

3.0 DESCRIPTION

M4 boards are $^{1}/_{4}$-inch (6 mm), $^{3}/_{8}$-inch (9.5 mm), ½-inch (12.7 mm), $^{5}/_{8}$-inch (15.9 mm), and ¾-inch (19 mm) thick magnesium-oxide sheets, reinforced with fiberglass mesh on both faces, available with a 4-foot (1219 mm) width and lengths of either 8, 10, or 12 feet (2.4, 3.0 or 3.6 m). The boards exhibit a maximum deflection of $^{1}/_{16}$ inch (1.6 mm) in humidified deflection testing in accordance with ASTM C473. M4 Boards have a flame spread Index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84. The boards are classified as noncombustible building materials in accordance with ASTM E136.

4.0 DESIGN AND INSTALLATION

4.1 Installation:

4.1.1 Wood Framing: M4 Boards must be installed on wood framing members spaced not more than 16 inches (406 mm) on center on nominal 2-by-4 studs. The framing members must have a minimum specific

gravity of 0.42 for transverse load resistance and racking shear resistance. The panel joints must occur over framing. The M4 Boards must be installed using staples (ESR-1539) having a minimum ½-inch (12.7 mm) crown width and 1½-inch (39 mm) length installed at 4 inches (100 mm) maximum on center spacing around the board perimeter, and 8 inches (200 mm) maximum on center spacing in the field. Staples are to be installed with a minimum of 3/8-inch (6 mm) edge distance, and minimum 2 inches (51 mm) from M4 Boards' corners.

4.1.2 Steel Framing: M4 Boards must be installed on minimum 18 gauge (43 mils, 1.09 mm) steel framing members spaced not more than 16 inches (406 mm) on center, of minimum size 1 1/2-inch (38 mm) width and 3 5/8-inch depth (92 mm) complying with ESR-3064P or equivalent. The panel joints must occur over framing members. The boards must be installed using ITW 8-18 x 1¼" #2 PW S-12 Rock-On fasteners (PN:6310), installed at 4 inches (100 mm) maximum on center spacing around the board perimeter, and 8 inches (200 mm) maximum on center spacing in the field. Fasteners are to be installed with a minimum of 3/8-inch (6 mm) edge distance, and a minimum distance of 2 inches (51 mm) from M4 Board corners.

4.2 Design:

4.2.1 Transverse Load Resistance: When installed in accordance with Section 4.1.1 of this report the maximum transverse load must not exceed 25 psf (1197 Pa) for walls sheathed with 1/2-inch (12.7 mm) and thicker M4 Boards. When installed in accordance with Section 4.1.2 of this report the maximum transverse load must not exceed of 35 psf (1675 Pa) for walls sheathed with 1/2 inch (12.7 mm) and thicker M4 Boards.

4.2.2 Racking Shear Resistance: When 1/2 inch (12.7 mm) and thicker M4 Boards are installed in accordance with Section 4.1.1 of this report, the maximum racking shear must not exceed 186 plf (2714 N/m) for a maximum wall height of 8 feet (2.4 m) and a shearwall height-to-length aspect ratio of 1-to-1.

When 1/2 inch (12.7 mm) and thicker M4 Boards are installed in accordance with Section 4.1.2 of this report, the maximum racking shear must not exceed of 243 plf (3646 N/m) for a maximum wall height of 8 feet (2.4 m) and a shearwall height-to-length aspect ratio of 1-to-1. Use of the M4 boards as shearwall sheathing is limited to resisting wind loads and seismic loads in Seismic Design Categories A, B and C.

4.3 Fire-resistance-rated Wall Assemblies:

One-hour Fire-resistance-rated Load-bearing Wall: The ½-inch-thick (12.7 mm) M4 Boards must be installed horizontally to the exterior face of a wood-frame wall constructed with minimum nominal 2-by-4 studs spaced at 16 inches (406 mm) on center. The M4 Boards must be installed with horizontal joints staggered from the Type X gypsum boards installed on the opposite side of the wall. The M4 Boards must be installed with staples (ESR-1539) having a minimum ½-inch (12.7 mm) crown width and 1 1/2-inch (39 mm) length installed at 4 inches (100 mm) maximum on center spacing around the board perimeter, and 8 inches (200 mm) maximum on center spacing in the field. Staples must be installed with a minimum of 3/8-inch (6 mm) edge distance, and minimum 2 inches (51 mm) from M4 Boards' corners.

The 5/8-inch-thick (15.9 mm) Type X gypsum wall boards must be installed on the interior face of wood-frame wall, attached with #6 1 5/8-inch-long (41 mm) coarse thread drywall screws, spaced at 8 inches (203 mm) on center at edges and 12 inches (305 mm) along intermediate studs. The gypsum wall board joints must be mudded and taped.

Mineral wool insulation batts, complying with ASTM C612, having a thickness of 3 1/2 inches (89 mm) and a minimum nominal density of 2.8 pcf (44.8 kg/m^3), must be installed friction-fit into the stud cavity. Allowable bearing loads must not exceed 100% allowable F'_c, or 100% of the calculated stress with studs having a slenderness ratio, or l_e/d, of 33, whichever is less.

5.0 CONDITIONS OF USE:

M4 Board described in this report complies with, or is a suitable alternative to what is specified in those codes listed in Section 1.0 of his report, subject to the following conditions:

5.1 The M4 Boards must be installed in accordance with this report and the manufacturer's published installation instructions. In the event of a conflict between this report and the manufacturer's published installation instructions, this report governs.

5.2 When used as a component of shear walls (racking shear), the M4 Boards have been evaluated for use in Seismic Design Categories A, B and C under the IBC and IRC.

5.3 The support framing must be designed for a maximum allowable deflection of L/360 under seismic or wind loads for exterior or interior areas.

5.4 Use of M4 Board in fire-resistance-rated construction shall comply with Section 4.3 of this report.

5.5 Use of M4 Board as floor sheathing or floor underlayment is outside of the scope of this report.

5.6 Installation of a vapor retarder in M4 Board sheathed exterior walls must be in accordance with code requirements.

5.7 M4 Board must not be exposed to the weather and must not be used in wet areas as defined in IBC Section 2509. Under the IRC, the substrate sheets must not be used in showers.

5.8 Use of the M4 Boards in horizontal diaphragms is outside of the scope of this report.

5.9 The M4 Boards are manufactured under a quality-control program with inspections by ICC-ES.

5.10 Under 2021 and 2018 IBC Section 1402.5 (2015 and 2012 IBC Section 1403.5), use of the M4 boards in exterior walls of types I, II, III, or IV construction containing a combustible water-resistive barrier is limited to walls up to 40 feet in height above the grade plane.

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Fiber-reinforced Magnesium-oxide-based Sheets (AC386), dated February 2021 (editorially revised August 2021).

6.2 Data in accordance with the ICC-ES Acceptance Criteria for Reinforced Cementitious Sheets Used as Wall and Ceiling Sheathing and Floor Underlayment (AC376), dated August 2012 (editorially revised January 2021).

6.3 Data in accordance with the ICC-ES Acceptance Criteria for Racking Shear Evaluation of Proprietary Sheathing Materials Attached to Light-framed Walls with Proprietary Fasteners (AC269.2), dated October 2013 (editorially revised October 2021).

6.4 Data in accordance with the ICC-ES Acceptance Criteria for Fiber-cement Interior Substrate Sheets Used in Wet and Dry Areas (AC378), dated August 2012 (editorially revised January 2021).

6.5 Reports of tests on a fire-resistance-rated wall assembly in accordance with ASTM E119.

7.0 IDENTIFICATION

7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-3840) along with the name, registered trademark, or registered logo of the report holder [and/or listee] must be included in the product label.

7.2 In addition, each M4 Board shall be identified by a stamp or label on the board bearing the name and address of the report holder (Multi-Panel), the product name (M4 Board), and the evaluation report number (ESR-3840).

7.3 The report holder's contact information is the following:

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