



ICC-ES Evaluation Report

ESR-4634

Reissued April 2022

Revised August 2023

This report is subject to renewal April 2024.

DIVISION: 06 00 00—Wood, Plastics and Composites

Section: 06 16 00—Sheathing

Section: 06 16 23—Subflooring

DIVISION: 09 00 00—Finishes

Section: 09 28 15—Magnesium Oxide Backing Panels

REPORT HOLDER:

HUBER ENGINEERED WOODS, LLC

EVALUATION SUBJECT:

**EXACOR® NOMINAL ¾-INCH (20 MM) THICK
MAGNESIUM OXIDE SHEATHING PANEL**

1.0 EVALUATION SCOPE

Compliance with the following codes:

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

For evaluation for compliance with codes adopted by Los Angeles Department of Building and Safety (LADBS), see [ESR-4634 LABC and LARC Supplement](#).

Properties evaluated:

- Structural
- Durability
- Surface-burning characteristics

2.0 USES

EXACOR® Nominal ¾ inch (20 mm) thick sheathing panels are intended for the following uses:

- 2.1** The panels are suitable for use as subfloor in Type III and V construction.
- 2.2** The panels are suitable for use as floor underlayment in Types III and Type V construction.
- 2.3** The panels are suitable for use as floor underlayment in Types IV-C and IV-HT construction under the 2021 IBC (2021 IBC Sections 602.4.3 and 602.4.4),

3.0 DESCRIPTION

3.1 General:

EXACOR® panels are nominally ¾ inch (20 mm actual) thick magnesium-oxide sheets reinforced with multiple embedded fiberglass mesh layers. The panels have a

smooth-side and a rough-side. The panels are available with square or profiled edges in the long direction of the panel. The panels are available in nominal 4-foot (1.22 m) widths at a nominal length of 8 feet (2.44 m).

3.2 Surface-burning Characteristics:

EXACOR® panels achieve a Class A surface burning classification in accordance with IBC Section 803.1.2.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 Single Floor Application: For use of EXACOR® panels in single floor applications, installation shall be in accordance with Section 4.2.1 of this report. See Table 1 for allowable uniform floor loads.

4.1.2 Floor Underlayment Application: EXACOR® panels may be used as floor underlayment on top of wood structural panels and framing sized and constructed to meet the applicable building code requirements.

4.1.3 Floor Diaphragm Application: When installed in accordance with Section 4.2.3 of this report, EXACOR® panels may be used as part of a simple beam diaphragm assembly. See Table 2 for diaphragm lateral load capacities.

4.1.3.1 Diaphragm design must comply with the applicable requirements of IBC Chapter 16. The length to width aspect ratio must be no greater than 3:1.

4.1.3.2 Diaphragm lateral load capacities are applicable when the lateral load is applied parallel or perpendicular to the framing members as indicated in Table 2.

4.1.3.3 Diaphragm classification as flexible or rigid must be determined in accordance with Section 12.3.1 of ASCE 7.

4.1.3.4 Simple beam diaphragm deflection with loading parallel to the framing must be calculated as follows:

$$\Delta = \left(\frac{5vL^3}{8EAW} \right) + \left(\frac{0.25vL}{Ga} \right)$$

Where:

Δ = Total diaphragm deflection (in)

v = Unit Shear parallel or perpendicular (?) to the framing (plf)

L = Diaphragm Length parallel or perpendicular to the direction of applied load (ft)

W = Diaphragm width parallel or perpendicular to the direction of the applied load (ft)

$A = 5.25 \text{ in}^2$ (Minimum area of diaphragm chord member)

For load application parallel to joists (see Figure 1):

$G_a = 10,512 \text{ lb/in}$ (apparent shear modulus of diaphragm based on test data)

$E = 2000000 \text{ psi}$ (Modulus of Elasticity diaphragm chord member)

For load application perpendicular to joists (see Figure 2):

$G_a = 4,724 \text{ lb/in}$ (apparent shear modulus of diaphragm based on test data)

$E = 1800000 \text{ psi}$ (Modulus of Elasticity diaphragm chord member)

4.2 Installation:

4.2.1 Single Floor Construction:

EXACOR® single floor panels must be installed with the smooth finish side up on minimum nominal 2-by-4 lumber joists, having a specific gravity of 0.42 or greater. Joists shall be spaced no more than 16 inches (406.4 mm) on center. Square edges must be located over framing members. EXACOR® subflooring panel edges that are not supported by a tongue and groove profile shall be supported in accordance with IBC Table 2304.8(3) footnote C. Panels shall be fastened to framing using 0.113 inch x 2 inch (2.9 mm x 50.8 mm) galvanized ring shank nails spaced 6 inches (152.4 mm) on center around the perimeter with a 1/2 inch (12.7 mm) edge distance and 12 inches (304.8 mm) on center in the field of the panel. No fastener shall be within 2 inches (50.4 mm) of a panel corner.

4.2.2 Floor Underlayment Construction:

EXACOR® underlayment floor panels must be installed with the smooth finish side up on top of structural sheathing designed to limit the deflection, including live and dead loads, to $L/360$ of the span, in accordance with the applicable code. The EXACOR® underlayment panels may have square or tongue and groove edges. Panels shall be fastened to sheathing using 0.113 inch (2.9 mm) galvanized ring shank nails with a minimum 1/2 inch (12.7 mm) edge distance and no fastener shall be within 2 inches (50.4 mm) of a panel corner. Any flatness or surface quality requirements of the structural subflooring shall be addressed prior to installing the EXACOR® underlayment top layer.

4.2.3 Floor Diaphragm Construction:

Floor framing must be supported on a foundation that is uniform and level.

Diaphragm boundary elements shall be provided to transfer the design tension and compression forces. Design of the boundary elements shall be performed by a Registered Design Professional and is outside of the scope of this report.

Diaphragm sheathing shall not be used to splice boundary elements.

Floor framing must be provided at a maximum spacing of 16 inches (406.4 mm) on center. Additional framing must be provided under parallel partitions and around all openings that interrupt one or more spanning members. Framing which sheathing is attached to must be a minimum nominal 2-by-4 lumber with a minimum specific gravity of 0.55. Framing members must be fastened to the supporting walls or structure in accordance with the approved plans.

Web stiffeners must be provided at reaction points and or concentrated loads as specified in the approved plans, based on the framing manufacturer's requirements and the applicable ICC-ES evaluation report on the framing members. End blocking must be provided where joists ends are not otherwise restrained from rotation.

All blocking or bridging for the framing should be installed prior to the installation of the panels.

As needed, the panels must be cut to proper length and width in accordance with installation instructions. All cut-out ends and edges exceeding 6 inches (152.4 mm) in any dimension must be supported by framing.

For diaphragms resisting load either parallel or perpendicular to joists, EXACOR® Sheathing shall be oriented with the 8 foot (2.44 m), tongue and groove edge perpendicular to the joists with the sheathing joints staggered 4 ft (1.22 m) as shown in Figure 1 and Figure 2 or stacked as shown in Figure 3.

Sheathing must be attached using 0.131 inch x 3 inch (3.3 mm x 76.2 mm) Galvanized Ring Shank Nails with a minimum 0.283 inch (7.2 mm) diameter round head and a minimum bending yield strength of 100,000 psi. Fasteners shall be installed 6 inches (152.4 mm) on center around the perimeter with a 1/2 inch (12.7 mm) edge distance and 12 inches (304.8 mm) on center in the field of the panel. No fastener shall be within 2 inches (50.8 mm) of a panel corner.

Sheathing used at the ends of diaphragm assemblies resisting lateral loads perpendicular to framing shall have a minimum width of 24 inches (609.6 mm).

5.0 CONDITIONS OF USE

5.1 EXACOR® sheathing panels 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 Support framing shall be designed for a maximum allowable assembly deflection of $L/360$ under live loads for ceilings supported by floor framing.

5.3 Fasteners and metal components in contact with EXACOR® sheathing panels shall be inherently resistant to corrosion, coated for corrosion resistance or permanently separated by a non-metallic material.

5.4 EXACOR® sheathing panels used in single floor applications shall either have tongue-and-groove edges or shall be installed with edges supported by blocking or covered with one of the materials described in footnote c of IBC Table 2304.8(3), or footnote j of IRC Table R503.2.1.1(1) as applicable.

5.5 Calculations and details showing that the applied gravity and uplift loads do not exceed the applicable uniform load capacity, and that the applied diaphragm loads do not exceed the available diaphragm strengths specified in this report, must be submitted to the code official for approval. The calculations must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.6 Use of EXACOR® sheathing panels in fire-resistance-rated construction is outside the scope of this report.

5.7 EXACOR® sheathing must not be used in applications where exposed to the weather such as breezeways, balconies, or similar applications and must not be used in wet areas as defined in IBC Section 2509.

- 5.8 Use of EXACOR® flooring panels in construction types I or II has not been evaluated and is outside the scope of this report.
- 5.9 Use of EXACOR® subfloor panels with metal framing is outside the scope of this report.
- 5.10 EXACOR® sheathing panels may not be used in single span applications and may not be cut to a width less than 24 inches (609.6 mm).
- 5.11 EXACOR® sheathing panels are manufactured under a quality-control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with the ICC-ES Acceptance Criteria for Fiber-reinforced Magnesium-oxide-based Sheets (AC386), dated July 2023.
- 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 Fiber-Reinforced Cement Sheet Structural Floor Sheathing (AC367), dated October 2020.
- 6.4 Test Data in accordance with ASTM E84 extended for an additional 20 minute period where the flame front did not progress more than 10.5 ft (3.05 m).

7.0 IDENTIFICATION

- 7.1 Product labeling shall include, the name of the report holder or listee, and the ICC-ES mark of conformity. The listing or evaluation report number (ICC-ES ESR-4634) may be used in lieu of the mark of conformity. Each EXACOR® Sheathing panel shall be identified by a stamp or label on the board bearing the name of the report holder (Huber Engineered Woods, LLC), identification of the manufacturing facility, production date or lot number, the product name (EXACOR®) and the evaluation report number (ESR-4634).
- 7.2 The report holder's contact information is the following:

HUBER ENGINEERED WOODS, LLC
10925 DAVID TAYLOR DRIVE, SUITE 300
CHARLOTTE, NORTH CAROLINA 28262
(800) 933-9220
www.huberwood.com

TABLE 1—ALLOWABLE UNIFORM TRANSVERSE LOADS¹

EXACOR® 3/4 Inch Sheathing Panel ²	Allowable Uniform Load (supports spaced 16 inches o.c. max.)
	130 (psf)

For SI: 1 psf = 47.88 Pa

¹Load is applicable for Panel Parallel or Perpendicular to Supports. Minimum 2 spans.

²Load values are based on L/360 deflection limits with maximum load controlled by bending and shear capacity. Table does not consider the influence of joists on deflection.

TABLE 2—DIAPHRAGM DESIGN CAPACITIES

Diaphragm Assembly Construction	Lateral Load Application Direction	ASD capacity (lb/ft)	LRFD capacity (lb/ft)	G _a (Apparent Shear Modulus, lb/in.)
As described in Section 4.2.2 ^a	Parallel to Framing	363	579	10,512
	Perpendicular to Framing	321	512	4,724

For SI: 1 in = 25.4 mm, 1 lb/ft = 14.6 N/m and 1 lb/in = 0.18 N/mm.

^aThe sheathing panels located at the ends of diaphragm assemblies where loading will occur perpendicular to framing, must be a minimum of 24 inches wide.

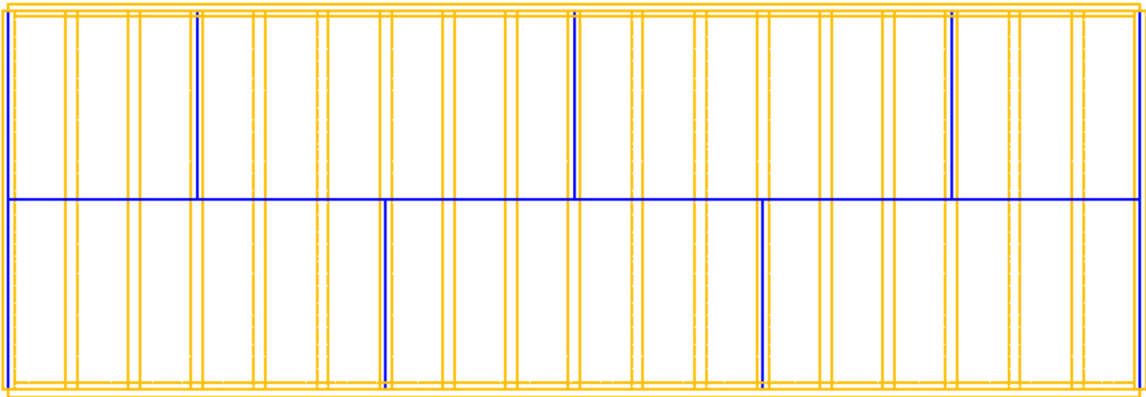


Figure 1: Sheathing Orientation for Force Applied Parallel to Joists



Figure 2: Sheathing Orientation for Force Applied Perpendicular to Joists

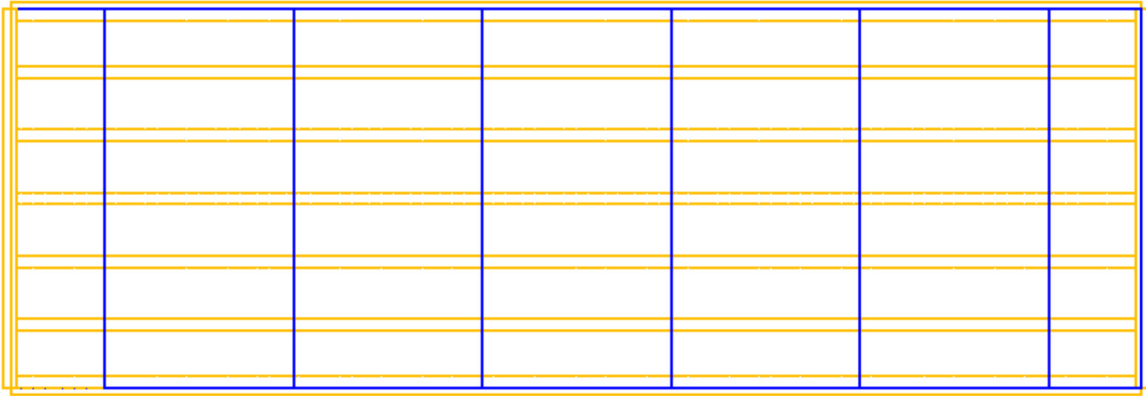


Figure 3: Stacked Sheathing Diaphragm Configuration Force Applied Perpendicular to Joists

DIVISION: 06 00 00—Wood, Plastics and Composites**Section: 06 16 00—Sheathing****Section: 06 16 23—Subflooring****DIVISION: 09 00 00—Finishes****Section: 09 28 15—Magnesium Oxide Backing Panels****REPORT HOLDER:****HUBER ENGINEERED WOODS, LLC****EVALUATION SUBJECT:****EXACOR® NOMINAL ¾-INCH (20 MM) THICK MAGNESIUM OXIDE SHEATHING PANEL****1.0 REPORT PURPOSE AND SCOPE****Purpose:**

The purpose of this evaluation report supplement is to indicate that EXACOR® Nominal ¾-inch (20 mm) thick magnesium oxide sheathing panels, described in ICC-ES evaluation report [ESR-4634](#), have also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

Applicable code editions:

- 2023 *City of Los Angeles Building Code* (LABC)
- 2023 *City of Los Angeles Residential Code* (LARC)

2.0 CONCLUSIONS

EXACOR® Nominal ¾-inch (20mm) thick magnesium oxide sheathing panels described in Sections 2.0 through 7.0 of the evaluation report [ESR-4634](#), comply with the LABC Chapters 8 and 23 and the LARC, Chapter 5, and are subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

EXACOR® Nominal ¾-inch (20mm) thick magnesium oxide sheathing panels described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report [ESR-4634](#).
- The design, installation, conditions of use and identification of the panels are in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report [ESR-4634](#).
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16, 17 and 23, or LARC Chapter 5, as applicable.

This supplement expires concurrently with the evaluation report, reissued April 2022 and revised August 2023.

ICC-ES Evaluation Report

ESR-4634 CBC and CRC Supplement

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A Subsidiary of the International Code Council®

DIVISION: 06 00 00—Wood, Plastics and Composites

Section: 06 16 00—Sheathing

Section: 06 16 23—Subflooring

DIVISION: 09 00 00—Finishes

Section: 09 28 15—Magnesium Oxide Backing Panels

REPORT HOLDER:

HUBER ENGINEERED WOODS, LLC

EVALUATION SUBJECT:

EXACOR® NOMINAL ¾-INCH (20 MM) THICK MAGNESIUM OXIDE SHEATHING PANEL

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that EXACOR® Nominal ¾-inch (20 mm) thick magnesium oxide sheathing panels, described in ICC-ES evaluation report ESR-4634, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2022 *California Building Code* (CBC)

For evaluation of applicable Chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI) and the Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

- 2022 *California Residential Code* (CRC)

2.0 CONCLUSIONS

2.1 CBC:

The EXACOR® Nominal ¾-inch (20 mm) thick magnesium oxide sheathing panels described in Sections 2.0 through 7.0 of the evaluation report ESR-4634, comply with CBC Chapters 8 and 23 provided the design and installation are in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of CBC Chapters 16, 17 and 23 as applicable.

2.1.1 OSHPD: The applicable OSHPD Sections and Chapters of the CBC are beyond the scope of this supplement.

2.1.2 DSA: The applicable DSA Sections and Chapters of the CBC are beyond the scope of this supplement.

2.2 CRC:

The EXACOR® Nominal ¾-inch (20 mm) thick magnesium oxide sheathing panels described in Sections 2.0 through 7.0 of the evaluation report ESR-4634, comply with CRC Chapter 5, provided the design and installation are in accordance with the 2021 *International Residential Code*® (IRC) provisions noted in the evaluation report and the additional requirements of CRC Chapter 5.

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ICC-ES Evaluation Report

ESR-4634 FBC Supplement

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REPORT HOLDER:

HUBER ENGINEERED WOODS, LLC

EVALUATION SUBJECT:

EXACOR® NOMINAL ¾-INCH (20 MM) THICK MAGNESIUM OXIDE SHEATHING PANELS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that EXACOR® ¾-inch thick Sheathing Panels, described in ICC-ES evaluation report ESR-4634, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2023 *Florida Building Code—Building*
- 2023 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The EXACOR® Nominal ¾-inch thick sheathing panels, described in Sections 2.0 through 7.0 of ICC-ES evaluation report ESR-4634, complies with the *Florida Building Code—Building* or the *Florida Building Code—Residential*. The design requirements must be determined in accordance with the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable. The installation requirements noted in ICC-ES evaluation report ESR-4634 for the 2021 *International Building Code®* meet the requirements of the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable, with the following conditions:

- Use as floor underlayment in Type IV construction is not permitted.

Use of the EXACOR® panels for compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* or the *Florida Building Code—Residential* has not been evaluated and is outside the scope of this supplemental report.

For products falling under Florida Rule 61G20-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

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