



ICC-ES Evaluation Report ESR-1421

Reissued January 2023

Revised October 2023

This report is subject to renewal January 2025.

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 16 00—Sheathing

REPORT HOLDER:

WARMBOARD, INC.

EVALUATION SUBJECT:

WARMBOARD-S RADIANT-FLOOR HEATING PANEL

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)

For evaluation for compliance with codes adopted by the Los Angeles Department of Building and Safety (LADBS), see [ESR-1421 LABC and LARC Supplement](#).

Properties evaluated:

- Span rating
- Diaphragm construction

2.0 USES

Warmboard-S radiant-floor heating panels are used as subfloor sheathing to accommodate radiant floor tubing. For structures regulated under the IRC, the panels may be used when an engineered design is submitted in accordance with IRC Section R301.1.3.

3.0 DESCRIPTION

Warmboard-S panels are manufactured from APA-rated Sturd-I-Floor plywood from approved sources identified in Warmboard's quality documentation. The panels have a nominal thickness of 1¹/₈ inches (29 mm) and a minimum thickness of 1.065 inches (27 mm). The panels are 4 feet by 8 feet (1219 mm by 2438 mm) and have tongue-and-groove edges. One face of each panel has grooves routed into the face surface, to accommodate radiant-floor tubing. The grooves are approximately 0.69 inch (17.5 mm) deep and 0.68 inch (17.3 mm) wide and are spaced 12 inches (305 mm) on center, parallel to the length of the panel, and

6 inches from the panel edge. Nine inches (229 mm) from the panel end, the grooves bend at 90 degrees and 180 degrees to permit the radiant-floor tubing to return to the field of the panel. Panels have an overlay of 0.025-inch-thick (0.64 mm) aluminum bonded to the grooved surface.

Two square-profile slots [³/₈ inch (9.5 mm) deep and wide] may be factory-routed into the back side of the panels at both ends. Each slot is 5¹/₂ inches (139.7 mm) long and located 11⁵/₈ inches (295.3) from each edge.

4.0 DESIGN

4.1 Allowable Spans and Loads:

Warmboard-S is a wood structural panel meeting the requirements of IBC Section 2303.1.5 (2012 IBC Section 2303.1.4) and IRC Section R503.2. The single-floor panel span rating is 24 inches (610 mm) on center. The span rating applies to panels at least 24 inches (610 mm) wide. The allowable total and live loads at the maximum 24-inch (610 mm) span are 110 psf (5.3 MPa) and 100 psf (4.8 MPa), respectively. The span rating and allowable loads are based on panels installed with the grooves and the panel strength axis perpendicular to the joists. Panels must be installed with grooves perpendicular to the joists.

4.2 Allowable Diaphragm Values:

Warmboard-S panels used in horizontal diaphragms may be used to resist horizontal forces not exceeding those set forth in Table 1. Diaphragm deflection must be determined in accordance with Section 4.2 of the AWC Special Design Provisions for Wind and Seismic (SDPWS), using the G_a values for ¹⁹/₃₂-inch thick rated sheathing.

4.3 Installation:

Warmboard-S panels must be installed in accordance with the manufacturer's published installation instructions. When there is a conflict between the published installation instructions and this report, the more restrictive requirements govern.

The dimension of the framing member to which the Warmboard-S panel is attached must be at least 2 inches nominal [1.5 inches (38 mm) wide]. Joints between panel ends (narrow edges) must be centered over the framing members and gapped ¹/₈ inch (3.2 mm). Nails must be placed not less than ³/₈ inch (9.5 mm) in from the panel edge; must be spaced not more than 6 inches (152 mm)

on center along the supported panel edges; and must be installed where the panel thickness is not less than 19/32-inch (15 mm) thick. A floor finish material recommended by Warmboard, Inc., must be installed over the Warmboard-S panel.

5.0 CONDITIONS OF USE

The Warmboard-S radiant-floor heating panel described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The Warmboard-S panels are limited to use as structural subflooring or as combined subfloor underlayment.
- 5.2 The panels are installed in accordance with this report.
- 5.3 Calculations demonstrating compliance with the allowable spans, loads and diaphragm capacities shown 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 constructed.
- 5.4 The panels are manufactured under a quality-control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with DOC PS-2.
- 6.2 Quality documentation in accordance with the ICC-ES Acceptance Criteria for Quality Documentation (AC10).

7.0 IDENTIFICATION

- 7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-1421) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.
- 7.2 In addition, each panel must bear a stamp identifying the product name (Warmboard-S), span rating (24 o.c.), nominal panel thickness (1 1/8 inches), Exposure 1 rating, the mill number (487), and the inspection agency (ICC-ES). See Figure 2 for details.
- 7.3 The report holder's contact information is the following:

WARMBOARD, INC.
100 ENTERPRISE WAY, SUITE G300
SCOTT VALLEY, CALIFORNIA 95066
(800) 775-5591
www.warmboard.com
info@warmboard.com

TABLE 1—ALLOWABLE SHEAR (POUNDS PER FOOT) FOR HORIZONTAL DIAPHRAGMS WITH WARMBOARD-S PANELS AND FRAMING OF DOUGLAS FIR-LARCH OR SOUTHERN PINE FOR WIND OR SEISMIC LOADING^{1,2,3,4,5,6}

| COMMON NAIL SIZE ⁷ | MINIMUM NOMINAL WIDTH OF FRAMING MEMBERS AT ADJOINING PANEL EDGES AND BOUNDARIES (inches) | BLOCKED DIAPHRAGMS | | | | UNBLOCKED DIAPHRAGMS | |
|-------------------------------|---|---|-----|-------|-----|---|--|
| | | Fastener Spacing (inches) at diaphragm boundaries (all cases), at continuous panel edges parallel to load (Cases 3 & 4), and at all panel edges (Cases 5 & 6) | | | | Fasteners spaced 6 max. at diaphragm boundaries and supported edges | |
| | | 6 | 4 | 2 1/2 | 2 | Case 1 (No unblocked edges or continuous joints parallel to load) | All other configurations (Cases 2, 3, 4, 5, and 6) |
| | | Fastener spacing (inches) at other panel edges (Cases 1, 2, 3, and 4) | | | | | |
| | | 6 | 6 | 4 | 3 | | |
| 10d (0.148 X 3 inches) | 2 | 320 | 425 | 640 | 730 | 285 | 215 |
| | 3 | 360 | 480 | 720 | 820 | 320 | 240 |

For SI: 1 inch = 25.4 mm; 1 plf = 14.6 N/m

¹Diaphragm construction must be in accordance with the requirements for 19/32-inch sheathing in Sections 4.2.7 and 4.2.8 of the 2021 ANSI/AWC Special Design Provisions for Wind and Seismic (SPDWS) (Sections 4.2.6 and 4.2.7 of the 2015 and 2008 SDPWS for the 2018, 2015 and 2012 IBC), as applicable. See Figure 1 for Case diagrams.

²The panel thickness at the point of nailing must not be less than 19/32 inch.

³For wind design, the values from table above are permitted to be increased 40 percent.

⁴Tabulated values are for short-time loading due to seismic activity. The tabulated values must be reduced by 37 percent and 44 percent for normal and permanent load duration, respectively.

⁵The tabulated values are for fasteners installed in Douglas Fir-Larch or Southern Pine framing. For framing of other species: (1) Find the assigned specific gravity for the applicable species of lumber in NDS Table 12.3.3A (NDS Table 11.3.3A for the 2012 IBC). (2) Multiply the applicable value tabulated above by the following adjustment factor: Specific Gravity Adjustment Factor = [1-(0.5-SG)], where SG = Assigned Specific Gravity of the framing lumber. This adjustment factor must not be greater than 1.

⁶Diaphragm deflection must be determined in accordance with SDPWS Section 4.2 using the G_a values for 19/32-inch thick rated sheathing.

⁷Nails must be bright or galvanized carbon steel.

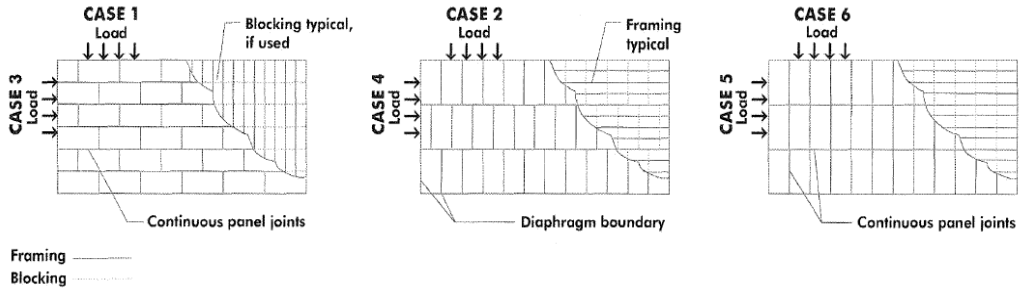


FIGURE 1

warmboard[®]

APA

CUSTOM PRODUCT V-180
 RADIANT HEAT
 FLOOR SYSTEM
24oc
 EXPOSURE 1

487

1-1/8 CATEGORY
 ICC-ES ESR-1421
 BASE PANEL
 CSA 0325-07 1F24
 PS2-10 SINGLE FLOOR 24oc
 EXTERIOR TYPE
 ADHESIVE

FIGURE 2

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 16 23—Sheathing

REPORT HOLDER:**WARMBOARD, INC.****EVALUATION SUBJECT:****WARMBOARD-S RADIANT-FLOOR HEATING PANEL****1.0 REPORT PURPOSE AND SCOPE****Purpose:**

The purpose of this evaluation report supplement is to indicate that Warmboard Inc. Warmboard-S radiant-floor heating panels described in ICC-ES evaluation report [ESR-1421](#), 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

The Warmboard Inc. Warmboard-S radiant-floor heating panels, described in Sections 2.0 through 7.0 of the evaluation report [ESR-1421](#), comply with the LABC Chapter 23, and the LARC, and are subjected to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The Warmboard Inc. Warmboard-S radiant-floor heating panels, described in this evaluation report must comply with all of the following conditions:

- All applicable sections in the evaluation report [ESR-1421](#).
- The design, installation, conditions of use and labeling are in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report [ESR-1421](#).
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16, 17 and 23, as applicable.
- Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.
- The hillside building provisions in LABC Section 2301.1 are outside the scope of this supplement report.

This supplement expires concurrently with the evaluation report, reissued January 2023 and revised October 2023.