

ICC-ES Evaluation Report

ESR-1421

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**DIVISION: 06 00 00—WOOD PLASTICS AND
COMPOSITES**
Section: 06 16 00—Sheathing
REPORT HOLDER:
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EVALUATION SUBJECT:
WARMBOARD™ RADIANT-FLOOR HEATING PANEL
1.0 EVALUATION SCOPE
Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- * ■ ~~2006 *International Residential Code*® (IRC)~~
- * ■ ~~1997 *Uniform Building Code*™ (UBC)~~

Properties evaluated:

- Span rating
- Diaphragm construction

2.0 USES

Subfloor sheathing to accommodate radiant floor tubing.

3.0 DESCRIPTION

Warmboard™ radiant-floor heating panels are used as subfloor sheathing, and have grooves to accommodate radiant-floor tubing. Warmboard™ 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 (28.6 mm) and a minimum thickness of 1.065 inches (27.05 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 channel grooves routed into the face surface, to accommodate radiant-floor tubing. 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. Nine inches (229 mm) from the panel edge, 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 deep and wide) (9.5 mm) are permitted to 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™ is a wood structural panel meeting the requirements of IBC Section 2303.1.4, ~~IRC Section R503.2~~ and ~~UBC Standard 23-3~~, DOC PS-2, and ~~UBC Section 2312~~. The panel single-floor 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 kN/m²) and 100 psf (4.2 kN/m²), respectively. The span rating and allowable loads are based on panels installed with the grooves perpendicular to the joists. Panels must be installed with grooves perpendicular to the joists.

4.2 Allowable Diaphragm Values:

- Warmboard™ panels used in horizontal diaphragms may be used to resist horizontal forces not exceeding those set forth in Table 1 of this report. The general requirements for horizontal diaphragms specified in IBC Sections 2305.2, * 2306.3.1, and 2306.3.2, and ~~UBC Section 2315.4~~, are applicable to Warmboard™ panels.

4.3 Installation:

The dimension of the framing member to which the Warmboard™ panel is attached must be at least 2 inches (nominal). Panel edges must be butted together and centered over the framing members. 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 panel edge bearings; and must be firmly driven into the framing members. A floor finish material recommended by Warmboard, Inc., must be installed over the Warmboard™ panel.

5.0 CONDITIONS OF USE

The Warmboard™ 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™ 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** Allowable spans, loads and diaphragm capacities comply with this report.

5.4 The panels are manufactured for Warmboard™ in Willits, California, under a quality control program with inspections by APA—The Engineered Wood Association (AA-649).

6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with UBC Standard 23-3 and DOC PS-2.
- 6.2 A quality control manual.

7.0 IDENTIFICATION

Each panel must bear a stamp identifying the evaluation report holder (Warmboard, Inc.), product name (Warmboard), span rating (24 o.c.), nominal panel thickness (1 1/8 inches), Exposure 1 rating, evaluation report number (ESR-1421), the mill number (487), and the inspection agency (APA—The Engineered Wood Association). See Figure 2 for details.

TABLE 1—ALLOWABLE SHEAR (in pounds per foot) FOR HORIZONTAL WOOD STRUCTURAL WARMBOARD™ PANEL DIAPHRAGMS WITH FRAMING OF DOUGLAS FIR-LARCH OR SOUTHERN PINE^{1,2,3}

PANEL GRADE	COMMON NAIL SIZE	MINIMUM NAIL PENETRATION INTO FRAMING (inches)	MINIMUM NOMINAL PANEL THICKNESS (inches)	MINIMUM NOMINAL WIDTH OF FRAMING MEMBER (inches)	BLOCKED DIAPHRAGMS				UNBLOCKED DIAPHRAGMS			
					Nail Spacing at Diaphragm Boundaries (all cases), at Continuous Panel Edges Parallel to Load (Cases 3 and 4), and at all Panel Edges (Cases 5 and 6)				Nails Spaced a Maximum of 6 inches at Supported Edges			
					× 25.4 for mm				Case 1 (No unblocked edges or continuous joints parallel to load)		All other configurations (Cases 2, 3, 4, 5 and 6)	
					Nail spacing at other panel edges				Case 1 (No unblocked edges or continuous joints parallel to load)		All other configurations (Cases 2, 3, 4, 5 and 6)	
Warmboard	10d ³	1 5/8	1 1/8	2	6 inches	4 inches	2 1/2 inches ²	2 inches ²	285	215		
				3	320	425	640	730	320	240		

For SI: 1 inch = 25.4 mm, 1 pound/foot = 14.6 N/m.

¹These values are for short-term loads due to wind or earthquake and shall be reduced 25 percent for normal loading. Space nails 12 inches on center along intermediate framing members. For framing of other species: (1) Find specific gravity for species of lumber in AFPA National Design Specification. (2) Find shear value from table above for nail size for actual grade and multiply value by the following adjustment factor: Specific Gravity Adjustment Factor = [1-(0.5-SG)], where SG = Specific Gravity of the framing member. This adjustment factor shall not be greater than 1.

²Framing at adjoining panel edges shall be 3 inches nominal or wider, and nails shall be staggered where nails are spaced 2 inches or 2 1/2 inches on center.

³Framing at adjoining panel edges shall be 3 inches nominal or wider, and nails shall be staggered where 10d nails having penetration of more than 1 5/8 inches into framing are spaced 3 inches or less on center.

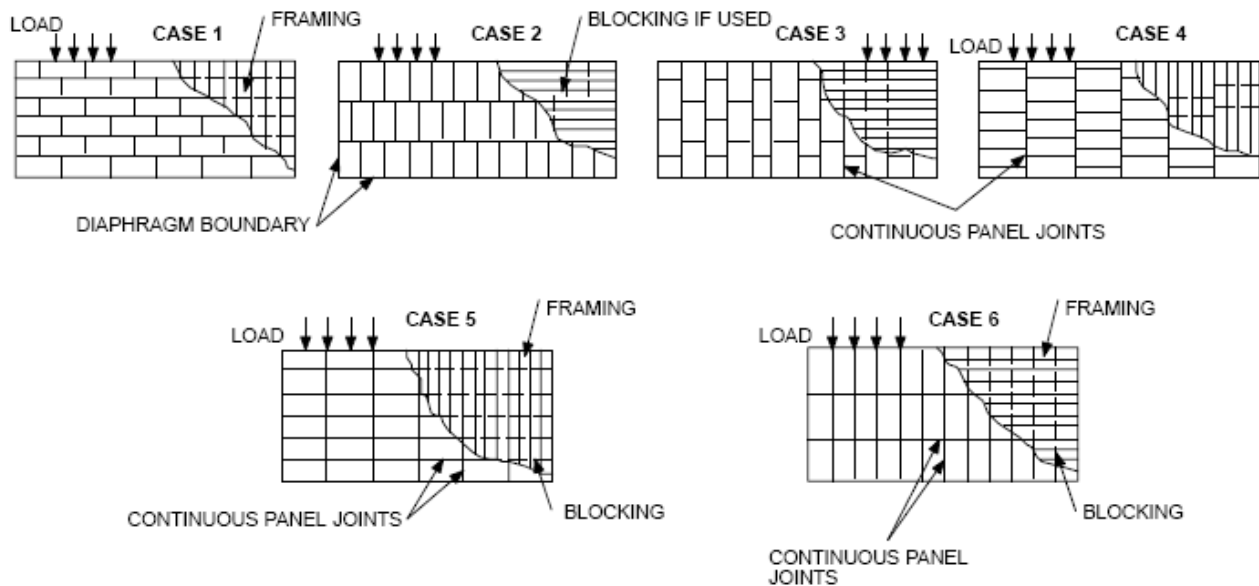


FIGURE 1



FIGURE 2