

# ICC-ES Evaluation Report

**ESR-1791**
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*This report is subject to re-examination in two years.*
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*A Subsidiary of the International Code Council®*
**DIVISION: 06—WOOD AND PLASTICS**  
**Section: 06070—Wood Treatment**
**REPORT HOLDER:**
**HOOVER TREATED WOOD PRODUCTS, INC.**  
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**EVALUATION SUBJECT:**
**PYRO-GUARD® FIRE-RETARDANT-TREATED WOOD**
**1.0 EVALUATION SCOPE**
**Compliance with the following codes:**

- 2006 *International Building Code*® (IBC)
- 2006 *International Residential Code*® (IRC)

**Properties evaluated:**

- Flame spread
- Structural
- Corrosion
- Hygroscopicity

**2.0 USES**

PYRO-GUARD® fire-retardant-treated wood is used in areas not exposed to the weather or wetting where the code permits the use of wood or fire-retardant-treated wood.

**3.0 DESCRIPTION**
**3.1 General:**

PYRO-GUARD® fire-retardant-treated wood is lumber and plywood that is pressure impregnated with the Hoover Treated Wood Products, Inc., fire retardant chemical PYRO-GUARD®. PYRO-GUARD® fire-retardant-treated lumber and plywood is produced in accordance with an approved quality control procedure at facilities listed in Section 5.6 of this report.

PYRO-GUARD® treated lumber of the following species is recognized as being fire-retardant-treated wood: alpine fir, balsam fir, black spruce, Douglas fir, Englemann spruce, hem-fir, jack pine, lodgepole pine, ponderosa pine, red spruce, southern pine, spruce-pine-fir (SPF), western hemlock, white fir, and white spruce.

PYRO-GUARD® treated plywood fabricated with face and back veneers of the following species is recognized as being fire-retardant-treated wood: southern pine and Douglas fir for structural applications, and lauan for interior applications.

**3.2 Flame Spread:**

PYRO-GUARD® fire-retardant-treated lumber and plywood have a flame-spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84, as modified by IBC Section 2303.2 and IRC Section R802.1.

**3.3 Structural Strength:**

The structural performance of PYRO-GUARD® fire-retardant-treated wood has been evaluated using ASTM D 5516 and D 6305 for plywood and ASTM D 5664 and D 6841 for lumber. The effects of the PYRO-GUARD® chemical treatment on the strength of treated lumber must be accounted for in the design of wood members and their connections. Load-duration factors greater than 1.6 must not be used in design.

**3.3.1 Lumber:** The design value adjustments in Table 2 must be used to modify the design values for untreated lumber found in the AF&PA National Design Specification (NDS) Supplement Design Values for Wood Construction, for the applicable species, use and property. Southern pine and Douglas fir have been evaluated for use in roof framing and must be subjected to the adjustments indicated in Table 2 for roof framing. Other softwood species described in Section 3.1 must be subjected to the design adjustments indicated in Table 2 for service temperatures up to 100°F (38°C).

**3.3.2 Plywood:** The maximum loads and spans shown in Table 1 must be used to modify the panel span rating for untreated plywood described in the applicable codes, as determined by thickness and construction. The adjusted maximum loads and spans are based on tests of southern pine and Douglas fir and are applicable to all softwood species.

**3.4 Corrosion:**

The corrosion rate of aluminum, carbon steel, galvanized steel, copper or red brass in contact with wood is not increased by PYRO-GUARD® fire-retardant treatment when the product is used as recommended by Hoover Treated Wood Products, Inc.

**3.5 Hygroscopicity:**

The moisture content of PYRO-GUARD® fire-retardant-treated lumber and plywood is less than 28 percent when

evaluated in accordance with ASTM D 3201 at 92 percent relative humidity (Section 2303.2.4 of the IBC). PYRO-GUARD® is suitable for use in interior conditions where sustained relative humidity is 92 percent or less and condensation does not occur.

#### 4.0 DESIGN AND INSTALLATION

##### 4.1 General:

Structural systems that include PYRO-GUARD® fire-retardant-treated lumber or plywood must be designed and installed in accordance with the applicable code using the appropriate lumber design value adjustment factors and plywood spans from Tables 1 and 2 of this report. Ventilation must be provided in compliance with the applicable codes.

The design value adjustment factors and plywood spans in Tables 1 and 2 of this report are applicable under elevated temperatures resulting from cyclic climatic conditions in the continental United States. They are not applicable under continuous elevated temperatures resulting from manufacturing or other processes which must require special consideration in design. Such conditions are outside the scope of this report.

All of the wood species listed in Section 3.1 of this report are permitted for interior applications and have been evaluated for structural performance for interior applications where the service temperature does not exceed 100°F (37.8°C). Southern pine and Douglas fir have been evaluated for structural performance for roof framing applications as indicated in Table 2 of this report. Southern pine and Douglas fir plywood are permitted for structural applications limited to the spans and loads indicated in Table 1 of this report.

Exposure to precipitation during storage or installation must be avoided. If material does become wet, it must be replaced or permitted to dry (maximum 19 percent moisture content for lumber and 15 percent moisture content for plywood) prior to covering or enclosure by wallboard or other construction materials (except for protection during construction).

##### 4.2 Fasteners:

Fasteners used in PYRO-GUARD® fire-retardant-treated wood must be in accordance with IBC Section 2304.9.5, IRC Section R319.3, or other corrosion-resistant materials that are manufactured from materials listed in Section 3.4 of this report, and must be subject to the design value adjustments indicated in Table 2 of this report.

#### 5.0 CONDITIONS OF USE

The PYRO-GUARD fire-retardant-treated wood 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 Strength calculations must be subject to the design value adjustment factors and span ratings shown in Tables 1 and 2 of this report.
- 5.2 The design value adjustment factors and span ratings given in this report must only be used for unincised dimensional lumber and plywood of the species noted in this report.
- 5.3 PYRO-GUARD treated wood must not be installed where it will be exposed to weather or damp or wet conditions.
- 5.4 PYRO-GUARD treated wood must not be used in contact with the ground.
- 5.5 Except for the following, PYRO-GUARD lumber must not be ripped or milled, as this will alter the surface-burning characteristics and invalidate the flame-spread classification: end cuts, holes, and joints such as tongue and groove, bevel, scarf and lap. PYRO-GUARD plywood may be cut or ripped in any direction.
- 5.6 Treatment is at the facilities of Hoover Treated Wood Products, Inc., in Thomson, Georgia; Pine Bluff, Arkansas; Milford, Virginia; Detroit, Michigan; and Winston, Oregon; under a quality control program with inspections by Timber Products Inspection Inc. (AA-696).

#### 6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Fire-retardant-treated Wood (AC66), dated February 2006.

#### 7.0 IDENTIFICATION

Lumber and plywood treated with PYRO-GUARD® fire-retardant chemicals must be identified by the structural grade mark of an approved agency. In addition, all treated lumber and plywood must be stamped with the name of the inspection agencies [Underwriters Laboratories Inc. (AA-668) and Timber Products Inspection Inc. (AA-696)], the Hoover Treated Wood Products, Inc. or listee, name and treatment location, labeling information in accordance with Section 2303.2.1 of the IBC, and the evaluation report number (ESR-1791).

TABLE 1— MAXIMUM LOADS AND SPANS FOR PYRO-GUARD® TREATED PLYWOOD

PLYWOOD <sup>9</sup> THICKNESS (inches)	UNTREATED ROOF/SUBFLOOR SPAN RATING	PYRO-GUARD <sup>® 1,2,3,4,5,8,11,12</sup> ROOF SHEATHING MAX. LIVE LOAD (psf)				PYRO-GUARD <sup>®2,10</sup> SUBFLOOR
		Span (inches)	Climate Zone <sup>6,7</sup>			
			1A	1B	2	
<sup>15</sup> / <sub>32</sub> , <sup>1</sup> / <sub>2</sub>	32/16	24	19	30	43	16
<sup>19</sup> / <sub>32</sub> , <sup>5</sup> / <sub>8</sub>	40/20	24 32	42 20	64 32	87 45	20 20
<sup>23</sup> / <sub>32</sub> , <sup>3</sup> / <sub>4</sub>	48/24	32 48	34 10	51 18	71 27	24 24
<sup>7</sup> / <sub>8</sub>	—	48	12	20	30	—
<sup>1</sup> / <sub>8</sub>	—	48	21	33	47	48

For SI: 1 inch = 25.4 mm, 1 psf = 48 N/m<sup>2</sup>.

- All loads are based on two-span condition with panels 24 inches wide or wider, strength axis perpendicular to supports.
- Fastener size and spacing must be as required in the applicable building code for untreated plywood of the same thickness; except that roof sheathing must be fastened with (1) minimum 8d common or 8d deformed shank nails spaced a maximum 6 inches o.c. at edges and a maximum of 12 inches o.c. at intermediate supports for panels on 24- and 32-inch spans and spaced a maximum of 6 inches o.c. on all supports for panels on a 48-inch span, or (2) other fasteners with comparable withdrawal and lateral load capacities at the same maximum spacings. For <sup>1</sup>/<sub>8</sub>-inch roof sheathing panels, minimum 10d common or deformed shank nails must be used.
- Roof spans and loads apply to roof systems having the minimum ventilation areas required by the applicable building code. Fifty percent of required vent area must be located on upper portion of sloped roofs to provide natural air flow.
- For low-sloped or flat roofs with membrane or built-up roofing having a perm rating less than 0.2, use rigid insulation having a minimum R value of 4.0 between sheathing and roofing, or use next thicker panel than tabulated for the span and load (e.g., <sup>19</sup>/<sub>32</sub> for 24 inches, <sup>23</sup>/<sub>32</sub> for 32 inches); and use a continuous ceiling air barrier and vapor retarder with a perm rating less than 0.2 on the bottom of the roof framing above the ceiling finish.
- For unblocked roof diaphragms panel edge clips are required for roof sheathing: one midway between supports for 24-inch and 32-inch spans, two at <sup>1</sup>/<sub>3</sub> points between supports for 48-inch span. Clips must be specifically manufactured for the plywood thickness used.
- Tabulated loads for Zone 1A are based on a duration of load adjustment for 7-day (construction) loads of 1.25. Tabulated loads for Zone 1B and Zone 2 are based on a duration of load adjustment for snow of 1.15. All values within the table are based on a dead load (DL) of 8 psf. If the DL is less than or greater than 8 psf, the tabulated live load may be increased or decreased by the difference. Applicable material weights, psf: asphalt shingles - 2.0, <sup>1</sup>/<sub>2</sub>-inch plywood - 1.5, <sup>5</sup>/<sub>8</sub>-inch plywood - 1.8, <sup>3</sup>/<sub>4</sub>-inch plywood - 2.2.
- Climate Zone definition:
  - Minimum design roof live load or maximum ground snow load up to 20 psf:
    - Southwest Arizona, Southeast Nevada (area bounded by Las Vegas-Yuma-Phoenix-Tucson)
    - All other qualifying areas of the continental United States
  - Minimum ground snow load over 20 psf
- PYRO-GUARD<sup>®</sup> treated plywood must not be used as roof sheathing if a radiant shield is used beneath the roof sheathing.
- The <sup>19</sup>/<sub>32</sub>-inch and <sup>5</sup>/<sub>8</sub>-inch thickness are limited to performance rated 4-ply or 5-ply. <sup>23</sup>/<sub>32</sub>- and <sup>3</sup>/<sub>4</sub>-inch thicknesses are limited to performance rated 5-ply or 7-ply.
- Subfloor applications are limited to 100 psf maximum live load, except <sup>1</sup>/<sub>8</sub>-inch thickness on 48-inch span limited to 65 psf total load.
- Deflection of roof sheathing at tabulated maximum live load is less than <sup>1</sup>/<sub>240</sub> of the span, and under maximum live load plus dead load is less than <sup>1</sup>/<sub>180</sub> of the span.
- Staples used to attach asphalt shingles must be minimum <sup>15</sup>/<sub>16</sub>-inch crown and minimum 1-inch leg, or otherwise comply with the applicable code, with the quantity of fasteners adjusted in accordance with Table 2 of this report.

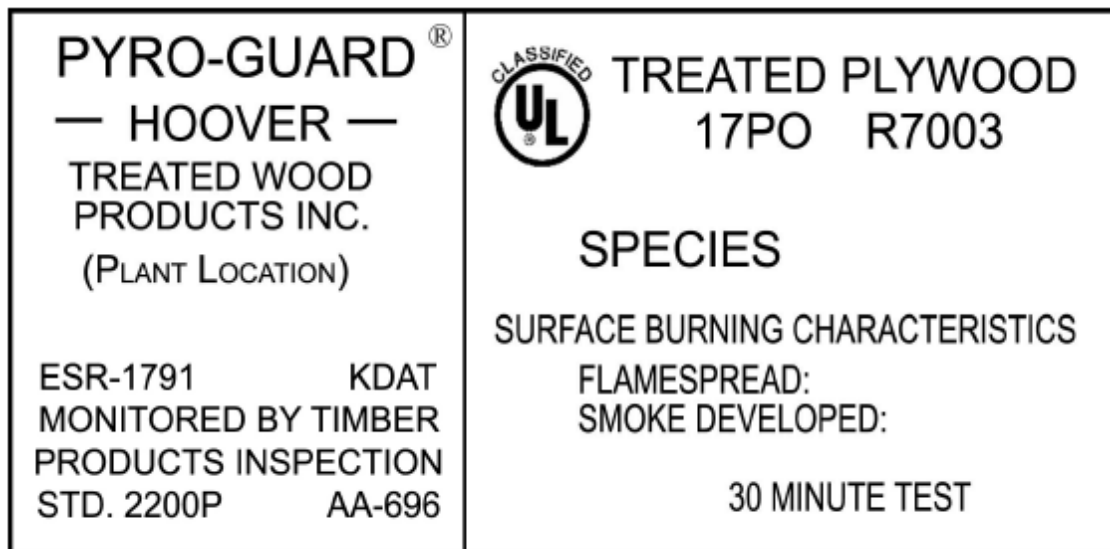


FIGURE 1—PLYWOOD STAMP

TABLE 2—DESIGN VALUE ADJUSTMENTS FOR PYRO-GUARD® TREATED LUMBER

PROPERTY	SERVICE TEMPERATURE <sup>6</sup> TO 100°F/38°C			PYRO-GUARD® ROOF FRAMING, CLIMATE ZONE <sup>1,2,5</sup>					
	SP	DF	Other	1A		1B		2	
				SP	DF	SP	DF	SP	DF
Extreme fiber in bending	0.91	0.97	0.88	0.80	0.90	0.85	0.93	0.89	0.96
Tension parallel to grain	0.88	0.95	0.83	0.80	0.80	0.84	0.87	0.88	0.93
Compression parallel to grain	0.94	1.00	0.94	0.94	0.94	0.94	0.98	0.94	1.00
Horizontal shear	0.95	0.96	0.93	0.92	0.95	0.93	0.95	0.94	0.96
Modulus of elasticity	0.95	0.96	0.94	0.95	0.96	0.95	0.96	0.95	0.96
Compression perp. to grain	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Fasteners/connectors	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90

- Climate Zone definition:
  - Minimum design roof live load or maximum ground snow load up to 20 psf:
    - Southwest Arizona, Southeast Nevada (area bounded by Las Vegas-Yuma-Phoenix-Tucson)
    - All other qualifying areas of the Continental United States
  - Minimum ground snow load over 20 psf
- Duration of load adjustments for snow loads, 7-day (construction) loads, and wind loads given in the National Design Specifications for Wood Construction apply.
- Where lumber decking serves as both exposed ceiling and roof sheathing, extreme fiber in bending adjustments of 0.84, 0.83, and 0.89 must be used for southern pine in zones 1A, 1B, and 2, respectively; 0.92, 0.92, and 0.96 must be used for Douglas fir in zones 1A, 1B, and 2, respectively; except that where insulation having a minimum R value of 4.0 is installed above the decking, extreme fiber in bending adjustments of 0.91 for southern pine and 0.97 for Douglas fir are permitted in all zones.
- Modulus of elasticity values apply to all treated lumber decking.
- Roof framing adjustment factors apply to roof systems with minimum ventilation areas per applicable code. Locate 50 percent of required vent area on upper portion of sloped roofs to provide natural air flow.
- Species: SP - southern pine; DF - Douglas fir; Other softwoods - limited to those species listed in Section 3.1 of this report.

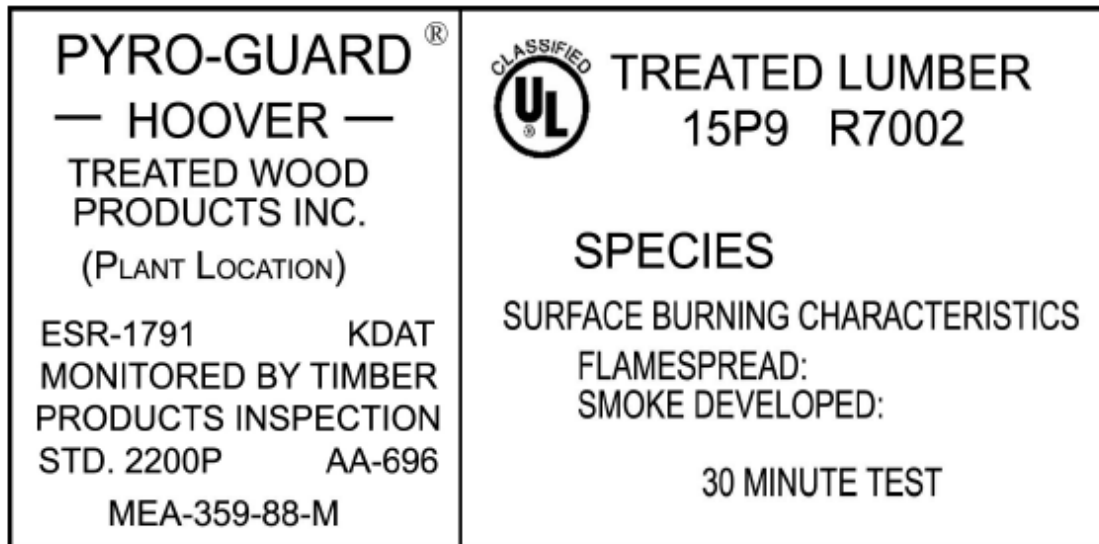


FIGURE 2—LUMBER STAMP