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ESR-1626

Reissued 02/2016
This report is subject to renewal 02/2018.

DIVISION: 06 00 00—WOOD, PLASTICS, AND COMPOSITES
SECTION: 06 05 73.33—FIRE-RETARDANT WOOD TREATMENT

REPORT HOLDER:

ARCH TREATMENT TECHNOLOGIES, INC.

360 INTERSTATE NORTH PARKWAY SE, SUITE 450
ATLANTA, GEORGIA 30339

EVALUATION SUBJECT:

DRICON® FIRE-RETARDANT-TREATED WOOD

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ICC-ES Evaluation Report

ESR-1020

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DIVISION: 06 00 00—WOOD, PLASTICS, AND COMPOSITES
Section: 06 05 73.33—Fire–Retardant Wood Treatment

REPORT HOLDER:

ARCH TREATMENT TECHNOLOGIES, INC.
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EVALUATION SUBJECT:

DRICON® FIRE-RETARDANT-TREATED WOOD

ADDITIONAL LISTEES:

BIEWER LUMBER COMPANY
524 EAST UNION STREET
SENECA, ILLINOIS 61360-9493

(ADDITIONAL MANUFACTURING LOCATION)
BIEWER OF LANSING
611 WEST MOUNT HOPE HIGHWAY
LANSING, MICHIGAN 48917

EXTERIOR WOOD, INC.
2685 INDEX STREET
WASHOUGAL, WASHINGTON 98671

FORTRESS WOOD PRODUCTS
899 FOREMAN BUNDY ROAD
ELIZABETH CITY, NORTH CAROLINA 27906

MID-STATES WOOD PRESERVERS
147 SHELBY ROAD
SIMSBORO, LOUISIANA 71275-0560

NORTHEAST TREATERS, INC.
796 SCHOHARIE TURNPIKE
ATHENS, NEW YORK 12015

RIDGE CREEK INDUSTRIES, INC.
7520 WASHINGTON STREET
COVINGTON, GEORGIA 30014

SHAW/STEWART LUMBER COMPANY
645 JOHNSON STREET NORTHEAST
MINNEAPOLIS, MINNESOTA 55413

STELLA-JONES, INC.
321 LANDSDOWNE STREET, EAST
PETERBOROUGH, ONTARIO K9J 7X6
CANADA

UFP HAMILTON, LLC (UNIVERSAL FOREST PRODUCTS)
115 DISTRIBUTION DRIVE
HAMILTON, OHIO 45015

WOOD PRESERVERS, INC.
15939 HISTORY LAND HIGHWAY
WARSAW, VIRGINIA 22572

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2015, 2012, 2009 and 2006 *International Building Code®* (IBC)
- 2015, 2012, 2009 and 2006 *International Residential Code®* (IRC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)†

†The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

Properties evaluated:

- Flame spread
- Structural
- Corrosion
- Hygroscopicity

2.0 USES

Dricon® fire-retardant-treated wood is used in areas that are not exposed to the weather or wetting, but may be exposed to dampness where the code permits the use of wood or fire-retardant-treated wood.

3.0 DESCRIPTION

3.1 General:

Dricon® fire-retardant-treated wood is lumber and plywood impregnated with Dricon® fire-retardant chemicals by a pressure process.

Dricon® treatment of lumber of the following species is recognized as being fire retardant:

Douglas fir	Spruce-pine-fir
Redwood	Spruce
White pine	Ponderosa pine
Hem-fir	Western red cedar
Southern pine	White fir
Red pine	Western hemlock

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Dricon® treatment of plywood fabricated from Group 1 species with both face veneers of the following species is recognized as being fire retardant:

Southern pine	Douglas fir	Spruce-pine-fir
Lauan	Redwood	

3.2 Flame Spread:

Dricon® fire-retardant-treated wood has a flame-spread index of 25 or less when subjected to ASTM E84 tests of 30 minutes duration without evidence of significant progressive combustion.

3.3 Structural Strength and Durability:

3.3.1 General: The effects of the Dricon® fire-retardant treatment on the strength of the treated lumber and plywood must be accounted for in the design of the wood members and their connections. Load duration factors greater than 1.6 are not permitted to be used in the design.

3.3.2 Lumber: The strength properties of lumber when treated with Dricon® fire-retardant chemicals and used in applications at ambient temperatures up to 100°F (38°C), are subject to the design factors shown in Table 1 of this report. The strength properties of lumber, when treated with Dricon® fire-retardant chemicals and used in applications at elevated temperatures up to 150°F (66°C), are subject to the design factors shown in Table 2 of this report.

3.3.3 Plywood: The strength properties of plywood, when treated with Dricon® fire-retardant chemicals and used in applications at temperatures up to 170°F (77°C), are subject to the span and load limitations shown in Table 3 of this report.

3.4 Corrosion:

The corrosion rate of aluminum, carbon steel, galvanized steel, copper or red brass in contact with wood is not increased by Dricon® fire-retardant treatment when the product is used as recommended by the manufacturer.

3.5 Hygroscopicity:

Dricon® treated wood qualifies as an Interior Type A (HT) fire-retardant wood in accordance with the American Wood Protection Association (AWPA) Standard U1, Commodity Specification H, Use Category UCFA. Dricon® treated Douglas fir, southern pine and spruce-pine-fir lumber, and Douglas fir, southern pine and spruce-pine-fir plywood, qualify as Interior Type A (HT) fire-retardant-treated wood when tested at 95 percent relative humidity.

4.0 DESIGN AND INSTALLATION

4.1 General:

Structural systems that include Dricon® 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, 2 and 3 of this report. Ventilation must be provided in accordance with the applicable codes.

The strength design factors and plywood spans noted in Tables 2 and 3 of this report are applicable under elevated temperatures resulting from cyclic climatic conditions. They are not applicable under continuous elevated temperatures resulting from manufacturing or other processes that require special consideration in design.

The treated lumber and plywood must only be used in areas (including attic spaces) where the lumber is exposed to temperatures of 150°F (66°C) or less and the ply exposed to temperatures of 170°F (77°C) or less.

Exposure to precipitation during storage or ins must be avoided. If material does become wet, it 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 Dricon® fire-retardant-treated wood must be galvanized steel, stainless steel, silicon bronze or copper, in accordance with Section 2304.10.5 of the 2015 IBC, 2304.9.5 of the 2012, 2009 and 2006 IBC, Section 317.3 of the 2015, 2012, and 2009 IRC and Section 319.3 of the 2006 IRC, or, and must be subject to the design value adjustments indicated in Table 4 of this report.

4.3 Plywood Shear Walls:

Wood-frame shear walls must be constructed in accordance with Section 2306.3 of the IBC (2306.4 of the 2009 and 2006 IBC).

When Dricon® fire-retardant-treated plywood is used in a shear wall, the thickness must be one standard size thicker than that determined in the tabulated allowable shear values contained in Section 4.3 of ANSI/AWC Special Design Provisions for Wind and Seismic (SDPWS) or as shown in the tables referenced in Section 2306.3 of the IBC (2306.4 of the 2009 and 2006 IBC). Thickness to be used for FRT plywood compared to untreated plywood shear walls are shown below:

Dricon® FRT Plywood Thickness (inches)	Untreated Plywood Thickness (inches)
$^{3}/_{8}$	$^{5}/_{16}$
$^{7}/_{16}$	$^{3}/_{8}$
$^{15}/_{32}$	$^{7}/_{16}$
$^{1}/_{2}$	$^{15}/_{32}$

5.0 CONDITIONS OF USE

The Dricon® 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 factors or span ratings shown in Tables 1, 2 and 3 of this report.

5.2 The strength design factors and span ratings given in this report must only be used for unincised dimension lumber and plywood of the species noted in this report.

5.3 Dricon® treated wood must not be installed where it will be exposed to precipitation, direct wetting or regular condensation.

5.4 Dricon® treated wood must not be used in contact with the ground.

5.5 Except as listed below, Dricon® lumber must not be ripped or milled as this will alter the surface-burning characteristics and invalidate the flame spread classification:

- Western red cedar lumber may be surfaced $^{1}/_{32}$ inch (0.79 mm).

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- Framing, end cuts, holes, joints such as tongue and groove, bevel, scarf and lap may be used.

5.6 Treatment is at the facilities of the listees noted in this report under a quality-control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Fire-retardant-treated Wood (AC66), dated June 2015.

7.0 IDENTIFICATION

Lumber and plywood treated with Dricon® fire-retardant chemicals must be identified by the structural grade mark of an approved agency. In addition, all treated lum plywood must be stamped with the listee compar and address; the production plant identification; information in accordance with Section 2303.2.4 2015, 2012 and 2009 IBC, Section 2303.2.1 of tl IBC or Section 802.1.5.4 of the 2015 IRC or Section R802.1.3.4 of the 2012 and 2009 IRC or Section R802.1.3.1 of the 2006 IRC; and the evaluation report number (ESR-1626). Refer to Figure 1.

TABLE 1—STRENGTH DESIGN FACTORS FOR DRICON® FIRE RETARDANT TREATED LUMBER COMPARED TO UNTREATED LUMBER APPLICABLE AT SERVICE TEMPERATURES UP TO 100°F (38°C)

STRENGTH DESIGN FACTORS	SPECIES			
	Southern Pine	Douglas Fir	Spruce	Other Species
Compression Parallel, Fc	0.94	0.91	0.95	0.91
Horizontal Shear, Fv	0.95	0.94	0.95	0.94
Tension Parallel, Ft	0.92	0.87	0.98	0.87
Modulus of Elasticity, E	0.98	0.98	0.98	0.98
Extreme Fiber Stress, Fb	0.89	0.90	0.98	0.89

TABLE 2—STRENGTH DESIGN FACTORS FOR DRICON® FIRE RETARDANT TREATED LUMBER COMPARED TO UNTREATED LUMBER APPLICABLE AT SERVICE TEMPERATURES UP TO 150° F (66° C)

STRENGTH DESIGN FACTORS	SPECIES											
	Southern Pine			Douglas Fir			Spruce			Other Species		
	Climate Zone			Climate Zone			Climate Zone			Climate Zone		
	1A	1B	2	1A	1B	2	1A	1B	2	1A	1B	2
Compression Parallel, Fc	0.87	0.89	0.91	0.84	0.86	0.88	0.87	0.89	0.91	0.84	0.86	0.88
Horizontal Shear, Fv	0.87	0.89	0.91	0.86	0.88	0.90	0.87	0.89	0.91	0.86	0.88	0.90
Tension Parallel, Ft	0.87	0.89	0.91	0.82	0.84	0.86	0.87	0.89	0.91	0.82	0.84	0.86
Modulus of Elasticity, E	0.94	0.95	0.96	0.94	0.95	0.96	0.94	0.95	0.96	0.94	0.95	0.96
Extreme Fiber Stress, Fb	0.87	0.89	0.91	0.87	0.89	0.91	0.87	0.89	0.91	0.87	0.89	0.91

Climate Zone definitions:

1. Minimum design roof load or maximum ground snow load up to 20 psf
   a. Southwest Arizona, Southeast Nevada (Las Vegas-Yuma-Phoenix-Tucson triangle)
   b. All other qualifying areas of the continental United States
2. Minimum ground snow load over 20 psf

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TABLE 3—TOTAL ALLOWABLE LOADS AND SPANS FOR DRICON® FIRE RETARDANT TREATED PLYWOOD[1,2] COMPARE UNTREATED PLYWOOD APPLICABLE AT SERVICE TEMPERATURES UP TO 170° F (77° C)

PLYWOOD THICKNESS (INCHES)[9, 10]	UNTREATED SPAN RATING ROOF/ SUBFLOOR	DRICON® ROOF SHEATHING[3]				DRICON® SUB SPAN RATING (INCHES)
		SPAN [6] (INCHES)	Total Allowable Loads (psf)[4,5]			
			Climate Zone[8]			
			1A	1B	2	
$^5/_{16}$[9]	12/0	12	69	93	126	0
$^5/_{16}$, $^3/_8$[9]	16/0	16	39	52	71	0
$^5/_{16}$, $^3/_8$[9]	20/0	20	25	33	45	0
$^3/_8$[9], $^1/_2$	24/0	24	27	36	49	0
$^{15}/_{32}$, $^1/_2$	32/16	24	38	51	70	16
$^{19}/_{32}$, $^5/_8$[10]	40/20	24	60	80	109	20
$^{19}/_{32}$, $^5/_8$[10]	40/20	32	34	45	61	20
$^{23}/_{32}$, $^3/_4$[10]	48/24	32	43	57	77	24
$^7/_8$	60/32	48	24	32	43	32
$1^1/_8$	60/48	48	40	53	73	48

Notes:

[1]Total allowable loads and spans apply only to performance rated plywood for Structural 1, Exposure1 or Exterior, unsanded and treated with Dricon® Fire Retardant according to AWPA standards.

[2]Plywood glue lines shall be exterior glue and veneers shall be Group 1 species with both face veneers of the same species as noted in Section 3.1 of this report.

[3]Panel edge support shall be required for roof sheathing. Panel edge clips when used shall be installed as follows: one midway between supports for 24-inch and 32-inch spans, two at $^1/_3$-points between supports for 48-inch span.

[4]The total allowable load (as shown above) is the sum of the live and dead loads. Dead loads should be subtracted from the above values to determine the live load. Dead loads typically range from 8-10 psf.

[5]The loads shown are based on the most common one and two-span condition with strength axis perpendicular to supports. Other condition-load combinations exist and consult with Arch for the allowable loads for those combinations.

[6]Deflection of roof sheathing tabulated at maximum live load is less than $^1/_{240}$ of the span, and under maximum live load plus dead load is less than $^1/_{180}$ of the span.

[7]Sub floor applications are limited to 100 psf maximum live load.

[8]Climate Zone definitions:

1. Minimum design roof load or maximum ground snow load up to 20 psf
   a. Southwest Arizona, Southeast Nevada (Las Vegas-Yuma-Phoenix-Tucson triangle)
   b. All other qualifying areas of the continental United States
2. Minimum ground snow load over 20 psf.

[9]Arch Wood Protection, Inc. does not recommend $^5/_{16}$ or $^3/_8$ panel thicknesses for roofing applications.

[10] $^{19}/_{32}$- and $^5/_8$-inch-thick plywood shall be limited to performance rated 4 or 5 ply. $^{23}/_{32}$- and ¾-inch-thick plywood shall be limited to performance rated 5 or 7 ply.

TABLE 4—STRENGTH DESIGN FACTORS FOR FASTENERS/CONNECTORS IN DRICON® FIRE RETARDANT TREATED COMPARED TO UNTREATED LUMBER APPLICABLE AT SERVICE TEMPERATURES UP TO 100° F (38° C)

FASTENER/CONNECTORS	STRENGTH DESIGN FACTORS	SPECIES			
		Southern Pine	Douglas Fir	Spruce	Other Species
Nails	Withdrawal	0.91	0.91	1.0	0.91
	Lateral	0.98	0.98	1.0	0.98
Wood Screws	Withdrawal	0.94	0.94	1.0	0.94
Bolted Joints	Parallel to Grain	0.92	0.92	1.0	0.92
	Perpendicular to Grain	0.96	0.96	1.0	0.96

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PROCESS STANDARD D-1 MONITORED BY: AA - ### AGENCY NAME SPECIES / LUMBER FLAMESPREAD/SMOKE DEVELOPED 25 OR LESS ASTM E84 30 MIN TEST AWPA U1 (FR-1) INTERIOR TYPE A (HT) / KDAT	PROCESS STANDARD D-1 MONITORED BY: AA - ### AGENCY NAME SPECIES / PLYWOOD FLAMESPREAD/SMOKE DEVELOPED 25 OR LESS ASTM E84 30 MIN TEST AWPA U1 (FR-1) INTERIOR TYPE A (HT) / KDAT
DRICON® FIRE RETARDANT TREATED WOOD	DRICON® FIRE RETARDANT TREATED WOOD
COMPANY NAME LOCATION YEAR(S) ESR-1626	COMPANY NAME LOCATION YEAR(S) ESR-1626

FIGURE 1—LUMBER AND PLYWOOD STAMPS[1,2,3]

[1]The plant identification number shall be permitted in place of the treating company name and plant location.

[2]All lumber and plywood shall be identified by the grade mark of an approved agency.

[3]Labeling information in accordance with Section 2303.2.1 must be included on the lumber and plywood.