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ICC-ES Evaluation Report

ESR-1159
Reissued May 2014
This report is subject to renewal May 1, 2015.

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

REPORT HOLDER:

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EVALUATION SUBJECT:

FRX AND THERMEX-FR FIRE-RETARDANT-TREATED WOOD PRODUCTS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2009 and 2006 *International Building Code*® (IBC)
- 2009 and 2006 *International Residential Code*® (IRC)
- Other Codes (see Section 8.0)

Properties evaluated:

- Structural
- Durability
- Surface-burning characteristics
- Hygroscopic properties
- Corrosion

2.0 USES

Chemco, Inc., FRX and Thermex-FR fire-retardant-treated wood are used in interior and exterior applications (exposed to weather, damp or wet locations), as permitted by IBC Section 603.1 and IRC Section R802.

3.0 DESCRIPTION

3.1 General:

The Chemco, Inc., FRX and Thermex-FR fire-retardant-treated wood are solid sawn lumber and plywood pressure-impregnated with Chemco's fire-retardant chemicals in accordance with approved quality control procedures at the facilities listed in Section 5.8 of this report.

FRX and Thermex-FR fire-retardant-treated lumber may be one of the following species: structural-grade southern yellow pine, Douglas fir, white spruce, western red cedar or western hem-fir. FRX and Thermex-FR fire-retardant-treated plywood fabricated with face and back veneers of the following species are recognized as being fire-retardant-treated wood: structural-grade southern yellow pine, Douglas fir, white spruce, western red cedar or western hem-fir. The plywood is Structural I grade, exterior plywood complying with PS1.

3.2 Flame Spread:

FRX and Thermex-FR 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 E84 as modified by IBC Section 2303.2 and IRC Section R802.1.3.

3.3 Structural Strength:

The structural performance of FRX and Thermex-FR fire-retardant wood products has been evaluated using ASTM D5516 and D6305 for plywood and ASTM D5664 and D6841 for lumber. The effects of the FRX and Thermex-FR fire-retardant-treated treatment on the strength of the treated lumber and plywood must be accounted for in the design of wood members and their connections.

3.3.1 Lumber: The strength properties of lumber treated with FRX and Thermex-FR fire-retardant chemicals used in applications at ambient temperatures up to 100°F (38°C) are subject to the strength adjustment factors shown in Table 1.

The strength properties of lumber, when treated with FRX and Thermex-FR fire-retardant chemicals that are subject to elevated temperatures up to 150°F (66°C), are subject to the design value adjustment factors shown in Table 2.

3.3.2 Plywood: The maximum loads and spans given in Table 3 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 loads and spans are applicable to all species in Section 3.1.

3.4 Corrosion:

The corrosion rate of the metals specified in 2009 and 2006 IBC Section 2304.9.5, 2009 IRC Section R317.3, or 2006 IRC Section R319.3 in contact lumber treated with FRX and Thermex-FR fire-retardant-treated wood products is not increased by the treatment. For interior applications, where there is no potential moisture present, the products recognized in this evaluation report may be used with uncoated metals. For all other applications, where there is a potential of moisture, the products must be used with coated metals or as otherwise required by the applicable code.

3.5 Hygroscopicity:

FRX and Thermex-FR fire-retardant-treated wood products are suitable for 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 FRX and Thermex-FR fire-retardant-treated wood must be designed and installed in accordance with the applicable code, using the appropriate

lumber design value adjustment factors and allowable total sheathing loads as set forth in this section (Section 4.1).

The effects of FRX and Thermex-FR fire-retardant treatment on the strength of the treated lumber and plywood must be accounted for in the design of wood members and their connections. Ventilation, when required, must be provided in accordance with the applicable code.

The strength properties of lumber, when treated with FRX and Thermex-FR fire-retardant chemicals and used in applications at service temperatures up to 100°F (38°C), are subject to the design adjustment factors as set forth in Table 1.

The strength properties of lumber, when treated with FRX and Thermex-FR fire-retardant chemicals and used in applications at service temperatures up to 150°F (66°C), are subject to design factors as set forth in Table 2.

The strength properties of plywood, when treated with FRX and Thermex-FR fire-retardant chemicals and used in applications at service temperatures up to 170°F (77°C), are subject to span limitations as set forth in Table 3.

4.2 Fasteners:

Fasteners used with FRX and Thermex-FR fire-retardant-treated wood must be manufactured from the materials specified in 2009 and 2006 IBC Section 2304.9.5 and 2009 IRC Section R317.3, or 2006 IRC Section R319.3, and are subject to the design value adjustment factors indicated in Table 1 and Table 2.

5.0 CONDITIONS OF USE

The FRX and Thermex-FR fire-retardant-treated wood products described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The products are manufactured, identified and installed in accordance with this report and the manufacturer's published installation instructions. If there are any conflicts between the manufacturer's published installation instructions and this report, this report governs.

5.2 Strength calculations must be subject to the design value adjustment factors and span ratings shown in Tables 1, 2 and 3.

5.3 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.

5.4 The fire-retardant-treated wood must not be used in contact with the ground.

5.5 The fire-retardant-treated lumber must not be ripped or milled, since this will alter the surface-burning characteristics and invalidate the flame-spread classification.

5.6 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).

5.7 The design value adjustment factors for lumber and plywood spans in Tables 1, 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 which require special consideration in design, which is not within the scope of this report.

5.8 The FRX and Thermex-FR lumber and plywood are treated under a quality control program with inspections by Fire Tech Services, Inc. (AA-641).

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Fire-retardant-treated Wood (AC66), dated February 2010.

7.0 IDENTIFICATION

Lumber and plywood treated with FRX and Thermex-FR fire-retardant chemicals shall 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 agency (Fire Tech Services, Inc.); the Chemco, Inc. name and address; the name of the fire-retardant treatment; the species of wood treated; the flame-spread and smoke-developed indices; the treating date and method of drying after treatment; and the evaluation report number (ESR-1159). Additionally, the treated lumber and plywood must be identified with the words "Exterior" and/or "Interior" (see Figure 1 for typical labels).

8.0 OTHER CODE

8.1 Evaluation Scope:

In addition to the codes referenced in Section 1.0, the products described in this report were evaluated for compliance with the requirements of the 1997 *Uniform Building Code*™ (UBC). The products comply with the UBC as noted below.

8.2 Uses:

See Section 2.0, except use and application must be in accordance with Section 601 of the UBC.

8.3 Description:

See Section 3.0. FRX and Thermax-FR 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 UBC Standard 8-1 and UBC Section 207.

8.4 Installation:

See Section 4.0, except fasteners must comply with UBC Section 2304.3.

8.5 Conditions of Use:

See Section 5.0.

8.6 Evidence Submitted:

See Section 6.0.

8.7 Identification:

See Section 7.0.

TABLE 1—DESIGN VALUE ADJUSTMENT FACTORS FOR FRX AND THERMEX-FR FIRE-RETARDANT-TREATED LUMBER COMPARED TO UNTREATED LUMBER [APPLICABLE AT SERVICE TEMPERATURES UP TO 100°F (38°C)][1]

PROPERTY	SOUTHERN YELLOW PINE, WESTERN RED CEDAR	DOUGLAS FIR	WHITE SPRUCE, WESTERN HEM-FIR
Compression parallel to grain, Fc	1.0	1.0	0.94
Horizontal shear	0.95	0.95	0.89
Tension parallel to grain	0.76	0.8	0.88
Bending: modulus of elasticity, E	0.97	1.05	1.09
Bending: extreme fiber stress, Fb	0.81	0.99	0.94
Fasteners/connectors	0.90	0.90	0.90

[1]Duration of load adjustments for snowloads, seven-day (construction) loads, and wind loads specified in the IBC are permissible.

TABLE 2—DESIGN VALUE ADJUSTMENT FACTORS FOR FRX AND THERMEX-FR FIRE-RETARDANT-TREATED LUMBER COMPARED TO UNTREATED LUMBER [APPLICABLE AT SERVICE TEMPERATURES UP TO 150°F (66°C)]

PROPERTY	SOUTHERN YELLOW PINE, WESTERN RED CEDAR			DOUGLAS FIR			WHITE SPRUCE, WESTERN HEM-FIR		
	CLIMATE ZONE			CLIMATE ZONE			CLIMATE ZONE		
	1A	1B	2	1A	1B	2	1A	1B	2
Compression parallel to grain, Fc (UCS)	0.56	0.78	0.96	0.84	0.92	0.99	0.7	0.82	0.94
Horizontal shear (USS)	0.51	0.73	0.91	0.83	0.91	0.98	0.65	0.77	0.89
Tension parallel to grain (UTS)	0.34	0.54	0.71	0.8	0.8	0.8	0.65	0.77	0.87
Bending: modulus of elasticity, E (MOE)	0.94	0.95	0.97	0.95	0.99	1.04	0.99	1.03	1.08
Bending: extreme fiber stress, Fb (MOR)	0.24	0.47	0.73	0.84	0.9	0.97	0.76	0.84	0.91
Fasteners/connectors	0.90			0.90			0.90		

Climate Zone definitions:

Zone 1 - Where minimum roof live load or maximum ground snow load ≤ 20 psf (960 Pa)
Zone 1A - Southwest Arizona, southeast Nevada (Las Vegas, Yuma-Phoenix,Tucson triangle)
Zone 1B- All other qualifying areas on the continental United States
Zone 2 - Minimum ground snow load ≥ 20 psf (960 Pa)

TABLE 3—ALLOWABLE TOTAL LOAD (psf) FOR FRX AND THERMEX-FR FIRE-RETARDANT-TREATED PLYWOOD APPLICABLE AT SERVICE TEMPERATURES UP TO 170°F (77°C) [1,2,3,4,5]

CLIMATE ZONE 1A										
PLYWOOD THICKNESS (inch)	PLYWOOD SPAN RATING (AFTER TREATMENT)	SPAN (inches) CENTER-TO CENTER OF SUPPORTS								
		12	16	19.2	24	30	32	36	40	48
15/32, 1/2	20/0	164	93	64	41	26	23	-	-	-
19/32, 5/8	24/0	258	145	101	64	41	36	23	-	-
23/32, 3/4	32/16	324	182	126	81	52	46	29	23	-
CLIMATE ZONE 1B										
PLYWOOD THICKNESS (inch)	PLYWOOD SPAN RATING (AFTER TREATMENT)	SPAN (inches) CENTER-TO CENTER OF SUPPORTS								
		12	16	19.2	24	30	32	36	40	48
3/8	20/0	178	100	69	44	28	25	-	-	-
15/32, 1/2	24/0	254	143	99	64	41	36	23	-	-
19/32, 5/8	32/16	398	224	155	100	64	56	35	29	-
23/32, 3/4	40/20	500	281	195	125	80	70	45	36	25
CLIMATE ZONE 2										
PLYWOOD THICKNESS (inch)	PLYWOOD SPAN RATING (AFTER TREATMENT)	SPAN (inches) CENTER-TO CENTER OF SUPPORTS								
		12	16	19.2	24	30	32	36	40	48
5/16	20/0	167	94	65	42	27	23	-	-	-
3/8	24/0	258	145	101	65	41	36	23	-	-
15/32, 1/2	32/16	369	208	144	92	59	52	32	27	-
19/32, 5/8	40/20	578	325	226	145	93	81	51	42	29
23/32, 3/4	48/24	726	409	284	182	116	102	65	52	36

For **SI:** 1 inch = 25.4 mm, 1 psf = 47.9 N/m^2.

[1]Fastener size and spacing must be as required in the applicable code for untreated plywood of the same thickness.
[2]Plywood must be Structural I grade, exterior plywood.
[3]Span ratings meet or exceed the minimum published values (bending) in Table 1 of the APA Load Span Tables for PS-1 Plywood.
[4]Allowable loads in table are based on plywood panel size of (4' by 8') with plywood face grain across (perpendicular to) the supports.
[5]Tabulated loads for Zone 1A are based on duration of load adjustment for 7-day (construction) loads of 1.25.Tabulated loads for Zone 1B and Zone 2 are based on duration of load adjustment for snow of 1.15.

Climate Zone definitions:

Zone 1 - Where minimum roof live load or maximum ground snow load ≤ 20 psf (960 Pa)
Zone 1A - Southwest Arizona, southeast Nevada (Las Vegas, Yuma-Phoenix, Tucson triangle)
Zone 1B- All other qualifying areas on the continental United States

Chemco Exterior Lumber

Chemco Exterior Plywood

Chemco Interior Lumber

Chemco Interior Plywood