



# ICC-ES Evaluation Report

## ESR-1159

Reissued May 2022

Revised January 2023

This report is subject to renewal May 2024.

**DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES**  
**Section: 06 05 73.13—Fire-Retardant Wood Treatment**

**REPORT HOLDER:**

CHEMCO, INC.

**EVALUATION SUBJECT:**

SAFERWOOD-FX, THERMEX-FR, FRX, MATAVERDE, FLAME REPEL AND FIRELINE FIRE-RETARDANT-TREATED WOOD PRODUCTS

**ADDITIONAL LISTEE:**

FSR TREATMENT, INC.

### 1.0 EVALUATION SCOPE

**Compliance with the following codes:**

- 2018, 2015, 2012, 2009 and 2006 *International Building Code*® (IBC)
- 2018, 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:**

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

### 2.0 USES

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

### 3.0 DESCRIPTION

#### 3.1 General:

The Chemco, Inc., SaferWood-FX, Thermex-FR, and FRX fire-retardant-treated wood are solid sawn lumber and plywood pressure-impregnated with Chemco's fire-retardant chemicals, and the Mataverde, Flame Repel and Fireline fire-retardant-treated wood are solid sawn lumber pressure-impregnated with Chemco's fire-retardant chemicals. The pressure-impregnation of the lumber and plywood is performed in accordance with approved quality control procedures at the facility listed in Section 5.8 of this report.

SaferWood-FX, Thermex-FR, FRX, Flame Repel and Fireline fire-retardant-treated lumber may be one of the following species: structural-grade southern pine, Douglas fir, Spruce-pine-fir, western red cedar, Redwood or western hem-fir. Mataverde fire-retardant-treated lumber includes only structural grade western hem-fir. SaferWood-FX, Thermex-FR and FRX fire-retardant-treated plywood fabricated with face and back veneers of the following species have been evaluated 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:

SaferWood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline 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 Section 2303.2 of the IBC, Section R802.1.5 of the 2018 and 2015 IRC, or Section R802.1.3 of the 2012, 2009, and 2006 IRC.

#### 3.3 Structural Strength:

The structural performance of SaferWood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline 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 SaferWood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline 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 and stiffness design properties of lumber treated with SaferWood-FX, Thermex-FR, Mataverde, FRX, Flame Repel and Fireline fire-retardant chemicals used in applications at ambient temperatures up to 100°F (38°C) are subject to the design value adjustment factors shown in Table 1.

The strength and stiffness design properties of lumber, when treated with SaferWood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline 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 allowable live loads and spans for SaferWood-FX, Thermex-FR and FRX fire-retardant-treated plywood for roof applications given in Table 3 applicable to all species in Section 3.1.

#### 3.4 Corrosion:

The corrosion rate of the metals specified in Section 2304.10.5 of the 2018 and 2015 IBC, Section 2304.9.5 of the 2012, 2009 and 2006 IBC, Section R317.3 of the 2018, 2015, 2012, and 2009 IRC, or Section R319.3 of the 2006 IRC, in contact lumber treated with SaferWood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline fire-retardant-treated wood products, is not increased by the treatment. For interior applications, where there is no potential moisture present, the SaferWood-FX, Thermex-FR and FRX fire-retardant-treated wood may be used with uncoated metals. For all other applications, where there is a potential of moisture, the products described in this evaluation report must be used with coated metals or as otherwise required by the applicable code.

#### 3.5 Hygroscopicity:

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

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

The allowable load and span properties of plywood, when treated with SaferWood-FX, Thermex-FR and FRX fire-

retardant chemicals and used in roof applications at service temperatures up to 170°F (77°C), are subject to the span and load limitations as set forth in Table 3.

#### 4.2 Fasteners:

Fasteners used with SaferWood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline fire-retardant-treated wood must be manufactured from the materials specified in Section 2304.10.5 of the 2018 and 2015 IBC, Section 2304.9.5 of the 2012, 2009 and 2006 IBC, Section R317.3 of the 2018, 2015, 2012 and 2009 IRC, or Section R319.3 of the 2006 IRC, and are subject to the design value adjustment factors indicated in Table 1 and Table 2.

### 5.0 CONDITIONS OF USE

The SaferWood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline 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 and load values shown in Tables 1, 2 and 3.
- 5.3 The design value adjustment factors and span and load values 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 in Tables 1 and 2, and plywood allowable loads and spans in Table 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 SaferWood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline lumber and plywood are treated in Ferndale, WA under a quality control program with inspections by ICC-ES and QAI Laboratories. (AA-635).

### 6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Fire-retardant-treated Wood (AC66), dated June 2015 (editorially revised April 2018).

**7.0 IDENTIFICATION**

7.1 Lumber and plywood treated with SaferWood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline 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 (QAI Laboratories); 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 and Figure 2 for typical labels).

7.2 The report holder’s contact information is the following:

**CHEMCO, INC.**  
**POST OFFICE BOX 875**  
**FERNDALE, WASHINGTON 98248**  
**(360) 366-3500**  
[www.chemco.orgwww.saferwood.com](http://www.chemco.orgwww.saferwood.com)  
[info@chemco.org](mailto:info@chemco.org)

7.3 The Additional Listee contact information is the following:

**FSR TREATMENT, INC.**  
**9486 288<sup>th</sup> STREET**  
**MAPLE RIDGE, BRITISH COLUMBIA V2W 1L1**  
**CANADA**

**TABLE 1—DESIGN VALUE ADJUSTMENT FACTORS FOR SAFERWOOD-FX, THERMEX-FR, FRX, MATAVERDE, FLAME REPEL & FIRELINE FIRE- RETARDANT-TREATED LUMBER COMPARED TO UNTREATED LUMBER [APPLICABLE AT SERVICE TEMPERATURES UP TO 100°F (38°C)]<sup>1,2</sup>**

PROPERTY	SPECIES			
	SOUTHERN PINE	DOUGLAS FIR	SPRUCE-PINE -FIR	WESTERN RED CEDAR / REDWOOD / WESTERN HEM-FIR
Bending MOR	0.81	0.99	0.94	0.81
Bending MOE	0.97	1.0	1.0	0.97
Tension Parallel to Grain	0.76	0.80	0.88	0.76
Shear Parallel to Grain	0.95	0.95	0.89	0.89
Compression Parallel to Grain	1.0	1.0	0.94	0.94
Compression Perpendicular to Grain	0.95	0.95	0.95	0.95
Fasteners/connectors	0.90	0.90	0.89	0.89

<sup>1</sup>Duration of load adjustments for snow loads, seven-day (construction) loads, and wind loads specified in the IBC are permissible.

<sup>2</sup>Mataverde fire-retardant-treated lumber only includes western hem-fir lumber species.

**TABLE 2—DESIGN VALUE ADJUSTMENT FACTORS FOR SAFERWOOD-FX, THERMEX-FR, FRX, MATAVERDE, FLAME REPEL & FIRELINE FIRE-RETARDANT-TREATED LUMBER COMPARED TO UNTREATED LUMBER [APPLICABLE AT SERVICE TEMPERATURES UP TO 150°F (66°C)]<sup>1</sup>**

PROPERTY	SPECIES											
	SOUTHERN PINE			DOUGLAS-FIR			SPRUCE-PINE-FIR			WESTERN RED CEDAR / REDWOOD / WESTERN HEM-FIR		
	CLIMATE ZONE			CLIMATE ZONE			CLIMATE ZONE			CLIMATE ZONE		
	1A	1B	2	1A	1B	2	1A	1B	2	1A	1B	2
Bending MOR	0.24	0.47	0.73	0.84	0.90	0.97	0.76	0.84	0.91	0.24	0.47	0.73
Bending MOE	0.94	0.95	0.97	0.95	0.99	1.0	0.99	1.0	1.0	0.94	0.95	0.97
Tension Parallel to Grain	0.34	0.54	0.71	0.8	0.8	0.8	0.65	0.77	0.87	0.34	0.54	0.71
Shear Parallel to Grain	0.51	0.73	0.91	0.83	0.91	0.98	0.65	0.77	0.89	0.51	0.73	0.89
Compression Parallel to Grain	0.56	0.78	0.96	0.84	0.92	0.99	0.70	0.82	0.94	0.56	0.78	0.94
Compression Perpendicular to Grain,	0.95			0.95			0.95			0.95		
Fasteners/connectors	0.51	0.73	0.91	0.83	0.90	0.90	0.65	0.77	0.89	0.51	0.73	0.89

<sup>1</sup> Mataverde fire-retardant-treated lumber only includes western hem-fir lumber species.

**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 LIVE LOADS FOR ROOF SHEATHING (PSF) FOR SAFERWOOD-FX, THERMEX-FR AND FRX FIRE-RETARDANT-TREATED PLYWOOD APPLICABLE UP TO 170°F (77°C)**

**CLIMATE ZONE 1A**

Thickness (inch)	SPAN (inches)									
	12	16	19.2	24	30	32	36	40	48	60
5/16	64	32	-	-	-	-	-	-	-	-
3/8	105	55	35	-	-	-	-	-	-	-
15/32, 1/2	154	82	54	31	-	-	-	-	-	-
19/32, 5/8	247	135	91	54	31	-	-	-	-	-
23/32, 3/4	314	172	116	71	42	35	-	-	-	-
7/8	397	219	149	92	55	47	-	-	-	-
1	533	296	202	126	77	66	38	-	-	-
1 1/8	676	376	258	161	100	86	51	39	-	-

**CLIMATE ZONE 1B**

Thickness (inch)	SPAN (inches)									
	12	16	19.2	24	30	32	36	40	48	60
5/16	105	55	35	-	-	-	-	-	-	-
3/8	158	80	49	34	-	-	-	-	-	-
15/32, 1/2	244	133	89	54	31	-	-	-	-	-
19/32, 5/8	388	214	146	90	54	46	-	-	-	-
23/32, 3/4	490	271	185	115	70	60	35	-	-	-
7/8	619	344	236	147	91	78	46	35	-	-
1	830	463	318	200	124	108	65	50	-	-
1 1/8	1051	587	404	255	160	139	84	66	43	-

**CLIMATE ZONE 2**

Thickness (inch)	SPAN (inches)									
	12	16	19.2	24	30	32	36	40	48	60
5/16	157	84	55	32	-	-	-	-	-	-
3/8	248	135	91	55	31	-	-	-	-	-
15/32, 1/2	359	198	134	82	49	42	-	-	-	-
19/32, 5/8	568	315	216	135	83	71	41	-	-	-
23/32, 3/4	717	399	274	172	106	92	55	42	-	-
7/8	903	504	347	218	136	118	71	56	36	-
1	1210	676	507	295	185	162	98	78	51	-
1 1/8	1530	856	592	375	236	207	127	101	67	39

For **Sl**: 1 inch = 25.4 mm, 1 psf = 47.9 N/m<sup>2</sup>

**NOTES:**

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. Live loads in table are based on plywood panel size of 4' by 8' with plywood face grain across (perpendicular to) the supports.
4. Tabulated loads are based on bending. Live 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.
5. A dead load of 10 psf was used to determine the allowable live loads.
6. Span not to exceed pre-treatment span rating.
7. Chemco does not recommend 5/16" or 3/8" panel thicknesses for roofing applications.

**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)



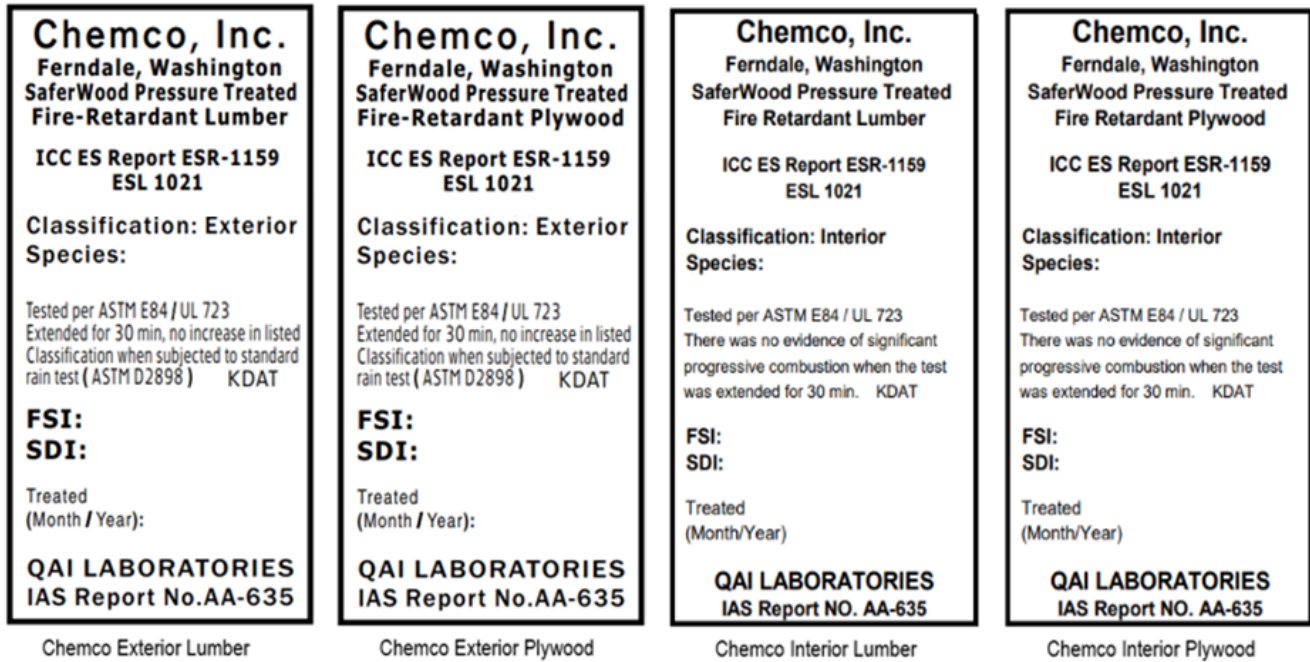


FIGURE 1—TYPICAL LABELS FOR SAFERWOOD-FX, THERMEX-FR AND FRX FIRE-RETARDANT LUMBER AND PLYWOOD

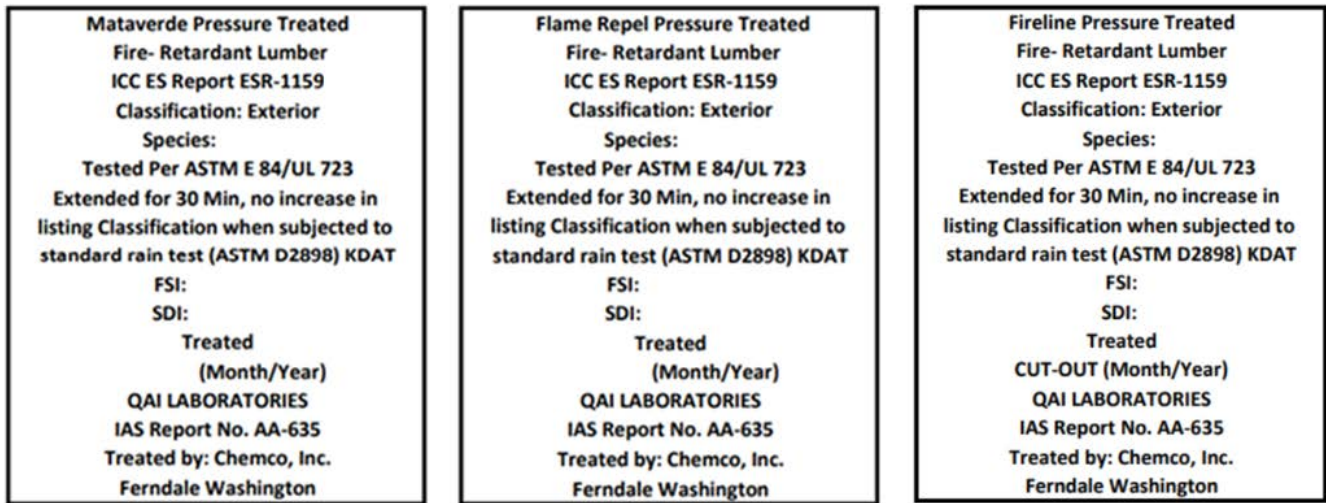


FIGURE 2—TYPICAL LABELS FOR MATAVERDE, FLAME REPEL AND FIRELINE FIRE-RETARDANT-TREATED EXTERIOR LUMBER

**DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES**  
**Section: 06 05 73.13—Fire-Retardant Wood Treatment**

**REPORT HOLDER:**

CHEMCO, INC.

**EVALUATION SUBJECT:****SAFERWOOD-FX, THERMEX-FR, FRX, MATAVERDE, FLAME REPEL AND FIRELINE FIRE-RETARDANT-TREATED WOOD PRODUCTS****1.0 REPORT PURPOSE AND SCOPE****Purpose:**

The purpose of this evaluation report supplement is to indicate that Saferwood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline fire-retardant-treated wood, described in ICC-ES evaluation report ESR-1159, has also been evaluated for compliance with the codes noted below:

**Applicable code editions:**

- 2019 *California Building Code* (CBC)

For evaluation of applicable chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI) and the Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below:

- 2019 *California Residential Code* (CRC)

**2.0 CONCLUSIONS****2.1 CBC:**

The Saferwood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline fire-retardant-treated wood, described in Sections 2.0 through 7.0 of the evaluation report ESR-1159, complies with CBC Chapters 8 and 23, provided the design and installation are in accordance with the 2018 *International Building Code*® (IBC) provisions, as applicable, noted in the evaluation report.

The Saferwood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline fire-retardant-treated wood may be used in the exterior design and construction of new buildings located in a Fire Hazard Severity Zone within a State Responsibility Areas or any Wildland–Urban Interface Fire Area, provided installation is in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of Section 701A.3 and 703A of the CBC. This fire-retardant-treated wood complies with the performance requirements of CBC Section 703A.5.2.1 and Section 704A.3 items 1 and 2.

**2.1.1 OSHPD:**

The applicable OSHPD Sections and Chapters of the CBC are beyond the scope of this supplement.

**2.1.2 DSA:**

The applicable DSA Sections and Chapters of the CBC are beyond the scope of this supplement.

**2.2 CRC:**

The Saferwood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline fire-retardant-treated wood, described in Sections 2.0 through 7.0 of the evaluation report ESR-1159, complies with the CRC, provided the design and installation are in accordance with the 2018 *International Residential Code*® (IRC) provisions, as applicable, noted in the evaluation report.

The Saferwood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline fire-retardant-treated wood may be used in the exterior design and construction of new buildings a located in a Fire Hazard Severity Zone within State Responsibility Areas or any Wildland–Urban Interface Fire Area, provided installation is in accordance with the 2018 *International Residential Code*<sup>®</sup> (IRC) provisions noted in the evaluation report and the additional requirements of Section R337.1.3.1 and R337.3 of the CRC. This fire-retardant-treated wood complies with the performance requirements of CRC Section R337.3.5.2.1 and Section R337.4.3 items 1 and 2.

This supplement expires concurrently with the evaluation report ESR-1159, reissued May 2022 and revised January 2023.

**DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES**  
**Section: 06 05 73.13—Fire-Retardant Wood Treatment**

**REPORT HOLDER:**

CHEMCO, INC.

**EVALUATION SUBJECT:****SAFERWOOD-FX, THERMEX-FR, FRX, MATAVERDE, FLAME REPEL AND FIRELINE FIRE-RETARDANT-TREATED WOOD PRODUCTS****1.0 REPORT PURPOSE AND SCOPE****Purpose:**

The purpose of this evaluation report supplement is to indicate that Saferwood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline fire-retardant-treated wood, described in ICC-ES evaluation report ESR-1159, has also been evaluated for compliance with the codes noted below:

**Applicable code editions:**

- 2018, 2015, 2012 and 2009 *International Wildland-Urban Interface Code* (IWUIC)

**2.0 CONCLUSIONS**

The Saferwood-FX, Thermex-FR, FRX, Mataverde, Flame Repel and Fireline fire-retardant-treated wood, described in Sections 2.0 through 7.0 of the evaluation report ESR-1159, complies with *International Wildland-Urban Interface Code* Section 503.2, Item 3 as an ignition-resitant building material; and may be used in the exterior design and construction of buildings under the *International Wildland-Urban Interface Code* where an ignition-resistant material is required, provided the design and installation are in accordance with the 2018, 2015, 2012 and 2009 *International Building Code*® (IBC) provisions noted in the evaluation report.

This supplement expires concurrently with the evaluation report ESR-1159, reissued May 2022 and revised January 2023.