FIRESPEC

Guidance for properly specifying and using fire retardant wood products

Fire-Retardant-Treated Wood: what it is and what it isn't

In the wake of recent large-scale wildfires, jurisdictions throughout the country are developing building regulations that require greater use of fire-resistant materials, such as fire-retardant-treated wood (FRTW). This has encouraged companies to introduce alternative products purported to provide the level of protection against fire that is required in current codes. Promoters of these unproven products have been known to use misleading terms such as "code-compliant," "Class A fire-rated" and "ASTM E84 tested" to convince buyers they are acceptable alternatives for use where building codes call for FRTW.

What is Fire-Retardant-Treated Wood?

The International Building Code (IBC) is explicit in its definition of FRTW for use in structural applications. Section 2303.2 of the 2024 IBC states fire-retardant-treated wood must be, *"impregnated with chemicals by a pressure process or other means during manufacture."* When tested in accordance with ASTM E84 or UL 723 it must achieve a flame spread index of 25 or less and, *"The ASTM E84 or UL 723 test shall be continued for an additional 20 minute period and the flame front shall not progress more than 10.5 feet beyond the centerline of the burners at any time during the test."*

The phrase "or other means" allows for the advent of new products or technologies that might work without using pressure to impregnate the wood with fire-retardant chemicals. Section 2303.2.1 makes clear, however, that the performance testing requirements remain.

In Section 2303.2.2 the code dictates that for wood impregnated by a pressure process, *"the process shall be performed in closed vessels under pressures not less than 50 pound per square inch gauge..."* Section 2303.2.3 then states, *"For wood products impregnated with chemicals by other means during manufacture, the treatment shall be an integral part of the manufacturing process (and) the treatment shall provide permanent protection to all surfaces..."*

What is not FRTW

In Section 2303.2.3 the IBC provides a qualifying statement: *"The use of paints, coating, stains or other surface treatments is not an approved method of protection as required in this section."*

Thus, if the fire retardant chemicals used to treat the wood were in the form of a paint, coating, stain or other surface treatment, then it is not FRTW.

It also is not FRTW if the treatment process was not an integral part of the manufacturing process, if the fire retardant formula fails to impregnate the wood or if the process does not provide permanent protection to all faces. Finally, if when tested in accordance with ASTM E2768, the flame front progresses beyond 10.5 feet from the centerline of the burners at any time during the test, then it's not FRTW.

Why it Matters

Building and fire safety codes are intended to ensure that in the event of a fire building occupants have time to escape and firefighters will be able to enter safely to douse the flames. The language and testing requirements in the building codes are deliberately specific. The products governed by this part of the code are structural. If a fire causes them to fail prematurely, the building could collapse, potentially trapping occupants and first responders inside.

Healthy Skepticism

It's imperative that the eifficacy of building products used in these applications be verified. Skeptical of the claims promoting non-pressure applied products, in 2023 WWPI, with support from the Southern Forest Products Association (SFPA), conducted a testing program to determine if the non-pressure applied fire retardants are able to achieve the test results required for FRTW used in structural applications. Achieving the required results from ASTM E2768 testing is not enough to meet the codes' provisions for FRTW. But failure to do so results in disqualification.

The program involved performing ASTM E2768 tests on a mix of southern yellow pine and Douglas fir lumber and plywood products treated with six different fire-retardant formulations—three that were pressure applied and three that were non-pressure applied. Testing was performed at an accredited ICC-ES test lab in Bryan, TX. In all, 32 tests were perfomed — 10 on pressure treated products and 21 on non-pressure treated products for which the fire retardant formula was applied according to the manufacturers' instructions.

All 10 of the tests performed on the pressure-treated products met the objective of ASTM E2768 — at no point during the tests did the flame front progress beyond 10.5 feet.

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ASTM E2768 Test Results Summary Table

Treatment	Product	Description	Grade	Species	P/F**
PTFR 1	Lumber	2x6	#2	DF	P
PTFR 1	Lumber	2x6	#2	SYP	P
PTFR 1	Plywood	3/4”	AC	DF	P
PTFR 2	Lumber	2x6	#2	Df	P
PTFR 2	Plywood	3/4”	CDX	DF	P
PTFR 3	Lumber	2x6 (T&G)	#2	DF	P
PTFR 3	Lumber	2x6 (T&G)	#2	SYP	P
PTFR 3	Plywood	3/4”	AC	DF	P
PTFR 3	Plywood	3/4”	CDX	SYP	P
Coating A	Lumber	2x6	#2	DF	F
Coating A	Lumber	2x6	SS	DF	P
Coating A	Lumber	2x6	SS	DF	P
Coating A	Lumber	2x6	#2&BTR	SYP	F
Coating A	Lumber	2x6	#2&BTR	SYP	F
Coating A	Plywood	3/4”	CDX	DF	F
Coating A	Plywood	3/4”	CDX	DF	F
Coating A	Plywood	3/4”	CDX	SYP	F
Coating A	Plywood	3/4”	CDX	SYP	F
Coating B	Lumber	2x6	SS	DF	F
Coating B	Lumber	2x6	SS	DF	F
Coating B	Lumber	2x6	#1	SYP	F
Coating B	Lumber	2x6	#1	SYP	F
Coating B	Plywood	3/4”	CDX	DF	F
Coating B	Plywood	3/4”	CDX	DF	F
Coating B	Plywood	3/4”	CDX	SYP	F
Coating B	Plywood	3/4”	CDX	SYP	F
Coating C	Lumber	2x6	unknown	SYP	F
Coating C	Lumber	2x6	unknown	SYP	F
Coating C	Plywood	3/4”	unknown	SYP	F
Coating C	Plywood	3/4”	unknown	SYP	F
Untreated	Lumber	2x6	SS	DF	F

ASTM E2768 tests demonstrated that wood products treated with non-pressure applied fire retardants are unable to reliably meet the testing criteria required for compliance under Chapter 23 of the IBC.

cont.

For the non-pressure applied products, in 19 of 21 tests the flame front progressed beyond 10.5 feet prior to completion of the 30-minute test duration. For the two test samples that lasted the full 30 minutes without the flame front progressing past 10.5 feet the substrate was Select Structural grade Douglas fir lumber. This grade typically is used in applications requiring higher strength values.

It was surmised the attributes that give Select Structural its high strength might also make it more fire resistant. Further testing supported this hypothesis. A sample of the same formula applied to #2&Btr DF lumber failed to last the full 30 minutes without the flame front progressing past 10.5 feet. An untreated sample of Select Structural Douglas fir was also tested. It lasted 27.3 minutes, more than 90 percent of the test’s full duration.

An independant consultant who reviewed all aspects of the testing and analyzed the results concluded the test results confirm there are clear differences in the fire retardant performance of pressure-treated FRTW compared to wood treated with non-pressure applied formulas.

“This testing program’s findings demonstrate that wood building materials treated with these coating products are unable to reliably meet the fire-testing criteria required by the International Building Code,” the consultant wrote in a report summarizing the testing program and its findings. The complete report is available for download from ***FireRetardantWood.org***.

Key attributes of pressure treated FRTW

For decades pressure treated fire-retardant wood products have played a critical role in the building and fire safety codes’ multi-faceted strategies for protecting buildings and their occupants from fire. The language in Chapter 23 of the IBC is clear in its recognition that pressure treating is the one dependable way to ensure fire-retardant-treated wood will consistently and reliably provide the levels of protection required by the codes.

Advantages offered by pressure treated FRTW include:

Permanent protection
The pressure process causes the fire-retardant formula to bond with the wood, changing its chemistry so it reacts differently to fire. The permanent bond with the wood is also why the formula never needs to be reapplied to maintain its effectiveness.

Long-term warranties
Warranties provided by fire retardant manufacturers typically extend for 40 years or more.

Products designed for both interior and exterior use
Exterior-rated FRTW contains additives to keep the product from being damaged or losing its fire retardant properties due to weather exposure. Before it is fire tested, exterior FRTW must undergo rigorous accelerated weathering tests to prove weather exposure will not impact its effectiveness.

Legitimate test reports and data
Manufacturers of the fire retardants used to pressure treat FRTW regularly test and retest their formulas as required by the codes. They routinely share the results, often in easy to understand ESR reports that include references to applicable code sections.

Proven performance
In addition to lab testing needed for code acceptance, pressure treated FRTW has been used reliably in the field for more than 50 years, including many examples where it has stood up to the ultimate fire test.

For additional information regarding pressure treated FRTW, including detailed code references, labeling requirements, design value adjustment factors, code-approved fire resistant assembly designs, product use guidance and sources of supply visit ***www.FireRetardantWood.org***.

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