Fire Retardant-Treated Wood: The Basics

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Disclaimer: This presentation was developed by a third party and is not funded by WoodWorks or the Softwood Lumber Board
Course Description

For some applications — such as exterior walls in Type III Construction — building codes allow the use of wood providing it is fire-retardant-treated (FRT). This presentation offers an overview of FRT wood in the United States, including specific references under the International Building Code, available products and examples of typical use. This session will explore how treatments are impregnated into the wood, how the preservatives offer fire protection and the testing required to confirm fire-retardant capabilities. Topics will also include understanding the labels on FRT wood products for interior and exterior uses, and occupant safety.
Learning Objectives

• Discover how fire-retardant-treated (FRT) wood products are produced and tested, and how they provide fire protection.

• Discuss how to identify and specify FRT wood products

• Consider appropriate interior and exterior applications of FRT wood.

• Learn where FRT wood is required under the International Building Code.
Western Wood Preservers Institute

• Represents preservative treated wood producers, chemical manufacturers and others serving the industry throughout western North America

• Mission
Increase awareness of the proper use of treated wood products by providing information to:

  • Homeowners
  • Builders
  • Architects, Specifiers

  • Bldg. Material Dealers
  • Code Officials
  • Ports and Marinas
History of Fire Retardants
Protecting against fire

- Ancient civilizations
- Romans
  - Protect siege towers from fire
- Greeks
  - Alum to protect structures
Protecting against fire

• Modern times
  • Joseph Louis Gay-Lussac, 1820
    • Use of ammonium phosphates and borax

• New York
  • Building codes, 1902
  • World’s Fair, 1939
Protecting against fire

- US Navy
  - Controlling fires on ships
- Blimp hangers
  - 15 constructed
    - Length: 1,072 ft.
    - Covering over 7 acres
  - Fire-retardant treated Douglas Fir timbers
  - Still in service in Tillamook, Ore. and Tustin, Calif.
Producing Fire Retardant Treated Wood
Pressure treating process

Wood is loaded into cylinder

Initial vacuum pulls out air

Cylinder filled with preservatives
Pressure treating process

Pressure forces preservatives into wood

Remaining preservative Emptied for later use

Final vaccum removes excess liquid
Code requirements for fire retardant

- 2303.2.1 Pressure process. The process shall be performed in closed vessels under pressures not less than 50 pounds per square inch gauge.
2303.2.2 Other means during manufacture. The treatment shall be an integral part of the manufacturing process of the wood product. ... The use of paints, coating, stains or other surface treatments are not an approved method of protection as required in this section.

*Added in 2018 IBC*
Drying after treatment

• All fire retardant treated lumber and plywood must be dried after treatment
  • Required by code, IBC Section 2303.2.5
  • Must be dry when put into service
Fire retardant treatments

- Four major fire retardant treatment manufacturers
- Third-party testing, certification, inspection
  - ASTM
  - NFPA
  - AWPA UCF
  - ICC-ES
  - Underwriters Lab
  - TPI
Purpose of fire retardants

- Reduce damage, injuries from fires
  - Allows time to leave
  - Slows impact of fire on structure
  - Increases time for help to arrive

- Slows smoke, flames
  - Smoke inhalation primary cause of death in fires
Purpose of fire retardants

• Meet code requirements
  • Approved substitute for non-combustible material
  • Alternative to sprinkling
  • Keeps fire contained in multifamily, commercial structures

• Economics
  • Cost-effective way to add fire protection
  • Lower installed costs vs. non-combustible materials
How fire retardant treatments work

• Fires need 3 things
  • Oxygen
  • Heat
  • Fuel

• Fire retardants remove the fuel
  • Changes the chemical, physical mechanisms that contribute to fire
Breaking the combustion cycle

• Heat produces flammable gases from wood
• Gases combine with oxygen, ignite and burn
Breaking the combustion cycle

- Fire retardants disrupt the cycle
- Changing the volatile gasses
  - Releases carbon dioxide, water vapor

\[ \text{CO}_2 \quad \text{H}_2\text{O} \]
Fire retardant required characteristics

- Flame spread of 25 or less
- Self extinguishing
  - Won’t spread fire
- Reduced heat release
  - Disrupts volatile gasses
  - Releases carbon dioxide, water vapor
Flame Spread Ratings

- Measures how fast flames advance on a material
- Based on fire tunnel testing
- Fire retardant wood ranks as Class A
  - Same as rating for drywall/gypsum board
  - Only material tested for full 30 minutes
Testing for fire retardant wood

• **Interior**
  - Steiner Tunnel test
  - Strength testing

• **Exterior**
  - Accelerated weathering
    - Simulate 80 inches of annual rainfall over 10 years
  - Shakes & shingles
    - Burning brands, intermittent flames

Photo courtesy of Southwest Research Institute
What color is fire retardant wood?

- Treatments are typically clear
- Some producers may add a light dye
  - Color is for marketing, not indicator of treatment or performance
- Look for quality mark, not color
Code approved stamps - Interior
Code approved stamps - Exterior

Diagram showing the layout of code approved stamps with details such as FRTW BRAND, treating company, treating standard, referenced rain test, and approval agency name & logo.
Know your fire retardant wood labels

- FireSpec: Code Compliant Labels
- Covers interior, exterior fire retardants
- Available for download at FireResistantWood.org
Adjustments for design values

• Design values must be adjusted for fire retardants
  • Lumber, plywood
  • 3% - 20% reduction, depending on design value, treatment formulation

• Consult treatment manufacturers for adjustments
Fire Retardant Wood in the Building Codes
International Building Code reference

• Section 2303.2
  Any wood product impregnated with chemicals by a pressure process or other means during manufacture with a flame spread index of 25 or less
Code recognized uses

- Used in lieu of non-combustible materials
- Substituted for hourly ratings
Fire retardant treatments available

- **Interior**
  - Protected from weather
  - Can be unconditioned space

- **Exterior**
  - Exposed to weather
  - In wet, damp areas
Common interior applications

- Roof trusses
- Rafters
- Plywood roof sheathing
- Floor joists
- Mezzanines
- Shelving
- Steps
- Stairways
- Studs

- Exterior load-bearing walls
- Interior non-load bearing partitions
- Floor sheathing
- Plywood subflooring
- Partition walls
- Beams & purlins
- Blocking & furring

- Blocking
- Platforms
- Stages
- Wall sheathing & paneling
- Joists
- Architectural millwork & trim
- Telecomm/electrical panels
IBC – Roof framing, trusses, panelized roofs

• Section 603.1 – 1.3
  Roof construction, including girders, trusses, framing and decking
  • Exception: Not permitted in Type 1A construction over 2 stories unless roof is more than 20 ft. above upper floor

• Often specified to avoid adding sprinklers in concealed spaces
IBC – Exterior walls

- Section 602.3 Type III Exterior wall assemblies
- Section 602.4 Type IV Heavy timber
IBC – Interior platforms

• Section 410.4
  Type I, II and IV
  Platform construction
IBC – Kiosks, indoor playgrounds

- Section 402.6.2 Kiosks located in covered mall
- Section 424.2 Children’s play structures inside all occupancies
Common exterior applications

- Balconies
- Decks
- Stairways
- Fences
- Sheds
- Gazebos
- Roof coverings
- Open-air roof systems
- Canopies & awnings
- Storefronts & facades
- Eaves, soffits & facia
- Agricultural buildings & horse stalls
- Scaffolding & scaffold planks
- Construction staging
IBC – Exterior wall coverings

• Section 1405.4
  Type I, II, III and IV
  Architectural trim
• Up to 60 ft.
IBC – Projections

• Section 705.2.3
  Type I, II, III, IV and V
  • Extending within 5 ft. of fire separation distance
IBC – Balconies and similar projections

• Section 1406.3
  Length of projection not to exceed 50% of building’s perimeter
IBC – Wood shakes and shingles

- Table 1505.1
  Section 1505.6
  Class A, B, C roofs
IBC – Gas station canopies

• Section 406.7.2
  Motor fuel-dispensing stations
Fire Retardant Treated Wood Handling and FAQs
Safe use of fire retardant wood

- Precautions for treated wood same as for non-treated wood
- Avoid frequent or prolonged exposure to sawdust; dusk mask recommended
- Consumer info sheets, SDS available from manufacturers
Disposal of fire retardant wood

- Reusing treated wood is preferred option
- Do not mulch
- Do not burn, unless in commercial or industrial incinerators
- Not considered hazardous waste, can be disposed at a landfill
Common questions about fire retardant wood

*Will fire retardant treated wood burn?*

Yes, with sufficient heat, duration of exposure and oxygen. But it will not support a fire.

*Can fire retardant treated wood be painted?*

Maybe. The flammability of the finish should be considered before coating is applied. In most cases, the finish will void the fire retardant warranty. Check with the manufacturer.
Common questions about fire retardant wood

Do fire retardant treatments offer protection against decay and insects?

Many fire retardant treatments include borates, which are also used as a preservative. Check with the manufacturer to determine if the treatment protects against insects and decay as well as fire.
Common questions about fire retardant wood

*What fasteners should be used for fire retardant treated wood?*

High quality, hot dipped galvanized steel or stainless steel fasteners are recommended.

*What if interior for fire retardant treated wood is exposed to rain on the job site?*

In most cases, incidental exposure to rain does not affect the performance of the retardant. If significant wetting occurs, lumber should be dried to 19% and plywood to 15% before enclosure.
Thank You!
Questions?

This concludes
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Course

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