

Learning Objectives

At the end of this program, participants will be able to:

1. Why wood is the natural choice
2. Understanding what is fire-retardant treated wood (FRTW)
3. Uses in building construction
4. Benefits of constructing with FRTW
5. How to identify FRTW

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FIRE RETARDANT TREATED WOOD

Jim Gogolski

• Hoover Treated Wood Products, Marketing Representative
• Member: International Codes Council and National Fire Protection Association

PROGRAM BASED ON

2006 INTERNATIONAL BUILDING CODE
2009 INTERNATIONAL BUILDING CODE

KEY WORDS

➢ Fire Retardant Treated ➢ E84 Extended Test
➢ Pressure Treated ➢ Sustainable Design
➢ Flame Spread ➢ Carbon Sequestration
➢ Smoke Developed ➢ Renewable Resource
HOW DO TREES PRODUCE WOOD?

The sun provides energy to combine carbon dioxide gas (from the air) with water (from the soil.)

\[ \text{CO}_2 + \text{H}_2\text{O} = \text{glucose} \] (sugar)

Glucose units link in long chains to form cellulose – the primary component of wood fibers.

COMPARISON OF FORESTS

NATURAL FOREST SUCCESSION—
FOLLOWING FIRE
SUSTAINABLE FORESTRY CARBON CYCLE

• COST
  – Of delivered raw material
  – To convert to end use
  – In dollars, energy, social acceptance, other

• AVAILABILITY
  – When and where needed
  – Quantity and quality

Wood Homes Have a Smaller Carbon Footprint

<table>
<thead>
<tr>
<th></th>
<th>Wood</th>
<th>Steel</th>
<th>Difference</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minneapolis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embodied Energy (GJ)</td>
<td>651</td>
<td>764</td>
<td>113</td>
<td>17</td>
</tr>
<tr>
<td>Carbon Footprint (CO₂ kg)</td>
<td>37,047</td>
<td>46,826</td>
<td>9,779</td>
<td>26</td>
</tr>
<tr>
<td>Atlanta</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embodied Energy (GJ)</td>
<td>398</td>
<td>461</td>
<td>63</td>
<td>16</td>
</tr>
<tr>
<td>Carbon Footprint (CO₂ kg)</td>
<td>21,367</td>
<td>28,004</td>
<td>6,637</td>
<td>31</td>
</tr>
</tbody>
</table>

The energy difference would be many time more significant when comparing only those materials substituted.

Comparative Energy Consumed
Wood Vs. Steel-framed Interior Wall (GJ)

<table>
<thead>
<tr>
<th></th>
<th>WOOD STUD</th>
<th>STEEL STUD</th>
</tr>
</thead>
<tbody>
<tr>
<td>WALL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extraction</td>
<td>.7</td>
<td>1.2</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>2.1</td>
<td>9.7</td>
</tr>
<tr>
<td>Construction</td>
<td>.6</td>
<td>.6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3.4</td>
<td>11.5</td>
</tr>
</tbody>
</table>
THE TREATING PROCESS

- Dry wood is loaded into cylinder
- Initial vacuum pulls out air
- Liquid fire retardants fill cylinder
- Pressure forces liquid into wood
- Remaining liquid emptied for later use
- Final vacuum removes excess liquid
PROPERTIES OF FRTW
HEAVY TIMBER vs. STEEL
TESTING OF FRTW

FLAME SPREAD

- E84
  - extended for 20 additional minutes

- UL 723
  - extended for 20 additional minutes

FLAMESpread Classification/Time

Based on ASTM E-84 Tunnel Test

![Graph showing flame spread classification and time]

- Class C: FSC 70-210
- Class B: FSC 36-75
- Class A: FSC 0-25
- Fire Retardant Treated Wood: FSC 25 or Less
- PYRO-GUARD FSC 15 or Less

10 Minutes, 20 Minutes, 30 Minutes

Test Duration in Minutes
ASTM E84

There is more to FRTW

Pressure Impregnated

4 minutes
Fire Tube ASTM E69

3 minutes
Crib Test ASTM E160
withdrawn 2003

Coated Product

4 minutes
Fire Tube ASTM E69

3 minutes
Crib Test ASTM E160
withdrawn 2003

Coated Products

Paint

Cementitious
CHARACTERISTICS
- Flame spread 25 or less
- Self extinguishing

Does not spread fire!

BUILDING CODE ACCEPTANCE
- Choice of building material
- Uses of FRTW
- Testing
- Code Requirements
- Third Party Inspection
- Labeling
RECOGNIZED BY CODE

- Used in lieu of noncombustible materials
- Substituted for hourly ratings

(Section 704.2, combustible Projections; Section 1406.3, Balconies and similar projections)
**USES OF FIRE-RETARDANT-TREATED WOOD**

<table>
<thead>
<tr>
<th>Uses of Fire-Retardant-Treated Wood</th>
<th>IBC 2006</th>
<th>IBC 2009</th>
<th>NFPA 5000 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural trim, exterior.</td>
<td>1406.2.2</td>
<td>1406.2.2</td>
<td>37.2.1</td>
</tr>
<tr>
<td>Awnings &amp; canopies</td>
<td>3109.5</td>
<td>3109.5</td>
<td>33.4.7.149</td>
</tr>
<tr>
<td>Balconies and similar appendages.</td>
<td>1406.3</td>
<td>1406.3</td>
<td>37.2.2.1</td>
</tr>
<tr>
<td>Bay and clerestory windows.</td>
<td>1406.4</td>
<td>1406.4</td>
<td>37.2.2.1</td>
</tr>
<tr>
<td>Children playground structures in malls.</td>
<td>402.11.141</td>
<td>402.12.141</td>
<td></td>
</tr>
<tr>
<td>Exterior bearing and nonbearing walls in Type III construction.</td>
<td>602.5</td>
<td>602.5</td>
<td>7.2.4.2.1</td>
</tr>
<tr>
<td>Exterior bearing and nonbearing walls in heavy timber construction.</td>
<td>602.4</td>
<td>602.4</td>
<td>7.2.5.6.7</td>
</tr>
<tr>
<td>Exterior nonbearing walls in Type I and Type II construction.</td>
<td>603.1.1.2</td>
<td>603.1</td>
<td>7.2.5.12.1</td>
</tr>
<tr>
<td>Fuel dispensing station (marine and motor vehicles).</td>
<td>406.5.2</td>
<td>406.5.3</td>
<td>32.4.5.2</td>
</tr>
<tr>
<td>Kiosks in covered mall buildings.</td>
<td>402.10.1</td>
<td>402.11.1</td>
<td>27.4.4.12.1</td>
</tr>
<tr>
<td>Interior finish with flame spread index ≤ 25 (Class A material).</td>
<td>T803.5</td>
<td>T803.5</td>
<td>10.3.2.1</td>
</tr>
<tr>
<td>Townhouses: on exterior and common wall when using FRTW roof sheathing within 4 ft. of such walls.</td>
<td><strong>International Residential Code</strong></td>
<td>22.5.4</td>
<td></td>
</tr>
<tr>
<td>Partitions (2hr. or less) in Type I and Type II construction.</td>
<td>602.3.1</td>
<td>603.1</td>
<td>7.2.3.11.2</td>
</tr>
<tr>
<td>Roof construction in Type I and Type II building.</td>
<td>603.141</td>
<td>603.1</td>
<td>7.2.3.5.9.2</td>
</tr>
<tr>
<td>Shakes and shingled Class A, B, and C roofs.</td>
<td>T1505.1</td>
<td>T1505.1</td>
<td>38.5.2</td>
</tr>
<tr>
<td>Walls and ceilings furred and dropped more than 1 1/2 inch.</td>
<td>805.4.2</td>
<td>805.11.2</td>
<td></td>
</tr>
</tbody>
</table>
CONNECTED BUILDINGS

Pedestrian Walkways:
Roof Construction-FRTW
- At grade level
- Above grade level

ELIMINATE PARAPETS

- Townhouses
- Exterior Walls
- Fire Walls
COMBUSTIBLE PROJECTIONS

FRTW permitted in lieu of 1-hour rating where:

- Openings are not permitted
- Protection of openings required

EXTERIOR BEARING WALLS
<table>
<thead>
<tr>
<th>Occupancies</th>
<th>Type IIIA</th>
<th>Type IIIB</th>
<th>Type VA</th>
<th>Type VB</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-1 &amp; R-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No sprinklers</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Stories</td>
<td>100% increase</td>
<td>128% increase</td>
<td></td>
<td>7,000</td>
</tr>
<tr>
<td>Area/floor</td>
<td>24,000</td>
<td>16,000</td>
<td>12,000</td>
<td></td>
</tr>
<tr>
<td>Sprinklers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stories</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Area/floor</td>
<td>48,000</td>
<td>32,000</td>
<td>24,000</td>
<td>14,000</td>
</tr>
<tr>
<td>Business</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No sprinklers</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Stories</td>
<td>28,500</td>
<td>19,000</td>
<td>18,000</td>
<td>9,000</td>
</tr>
<tr>
<td>Area/floor</td>
<td>58% increase</td>
<td>111% increase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sprinklers</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Stories</td>
<td>57,000</td>
<td>28,000</td>
<td>36,000</td>
<td>18,000</td>
</tr>
<tr>
<td>Area/floor</td>
<td>58% increase</td>
<td>111% increase</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RESIDENTIAL (R1 or R2)

With fire sprinklers
END USE

- Interior High Temperature
- Exterior

TESTING - INTERIOR

- ASTM D 5664 – Lumber = 150°F
- ASTM D 5516 – Plywood = 170°F
- Humidity = minimum of 50% (used 65%)

TESTING - EXTERIOR

- EXPOSED TO
  - The weather
  - Wet or damp locations
- Meets ASTM D2898
- NOT A PRESERVATIVE TREATMENT
CODE REQUIREMENTS

LABELING
THIRD PARTY INSPECTION

INTERIOR
LOW HYGROSCOPIC, HIGH TEMPERATURE

PYRO-GUARD®
— HOOVER —
TREATED WOOD PRODUCTS INC.
(PLANT LOCATION)

ESR-1791
KDAT
MONITORED BY TIMBER
PRODUCTS INSPECTION
STD. 2200P
AA-090

TREATED PLYWOOD
17PO R7003

SPECIES
SURFACE BURNING CHARACTERISTICS
FLAMESPREAD:
SMOKE DEVELOPED
30 MINUTE TEST

EXTERIOR

EXTERIOR FIRE-X®
HOOVER
TREATED WOOD PRODUCTS INC.
PINE BLUFF, AR

UNDERWRITERS LABORATORIES INC.
CLASSIFIED
TREATED LUMBER
15P9 R7002
EXTERIOR FIRE-X, TYPE II
FLAME SPREAD
SMOKE DEVELOPED

SPECIES - 30 MIN. TEST
++NO INCREASE IN THE LISTED
CLASSIFICATION WHEN SUBJECTED TO
THE STANDARD RAIN TEST

How is a label / listing maintained?
THIRD PARTY INSPECTION

- CHEMICAL PURCHASES
- MIXING PROCESS
- TREATING PROCESS
- DRYING RECORDS
- APPLICATION OF LABELS

Witnesses mixing and accompanying paperwork

Checks calibration of instrumentation and meters
No Quality Control Agency (Underwriters Lab)  
Self Certified  

No reference to testing for 30 minutes using the E84. E84 is a 10 minute test.

What is the species of wood?

RESEARCH  
EFFECTS OF TREATMENT  
EFFECTS OF TEMPERATURE
PYRO-GUARD TEST RESULTS

- LUMBER
- PLYWOOD

<table>
<thead>
<tr>
<th>Plywood thickness (inches)</th>
<th>Untreated roof/subfloor Span Rating</th>
<th>Roof Sheathing Maximum Live Load, (psf) Climate Zone</th>
<th>Wall &amp; Subfloor Span (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15/32, 1/2</td>
<td>32/16 40/20</td>
<td>24</td>
<td>19</td>
</tr>
<tr>
<td>19/32, 5/8</td>
<td>32/16 40/20</td>
<td>24</td>
<td>42</td>
</tr>
<tr>
<td>23/32, 3/4</td>
<td>48/24</td>
<td>32</td>
<td>20</td>
</tr>
<tr>
<td>7/8</td>
<td>-</td>
<td>32</td>
<td>34</td>
</tr>
<tr>
<td>1-1/8</td>
<td>-</td>
<td>48</td>
<td>10</td>
</tr>
</tbody>
</table>

MAXIMUM LOADS AND SPANS FOR PYRO-GUARD TREATED PLYWOOD

DESIGN VALUE ADJUSTMENTS FOR PYRO-GUARD TREATED LUMBER

<table>
<thead>
<tr>
<th>Property</th>
<th>Service Temperature To 100°F/38°C</th>
<th>Pyro-Guard Roof Framing, Climate Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SP</td>
<td>DF</td>
</tr>
<tr>
<td>Extreme fiber in bending</td>
<td>0.91</td>
<td>0.97</td>
</tr>
<tr>
<td>Tension parallel to grain</td>
<td>0.88</td>
<td>0.95</td>
</tr>
<tr>
<td>Compression parallel to grain</td>
<td>0.04</td>
<td>1.00</td>
</tr>
<tr>
<td>Horizontal shear</td>
<td>0.95</td>
<td>0.96</td>
</tr>
<tr>
<td>Modulus of Elasticity</td>
<td>0.95</td>
<td>0.96</td>
</tr>
<tr>
<td>Compression perp. to grain</td>
<td>0.95</td>
<td>0.96</td>
</tr>
<tr>
<td>Fasteners/connectors</td>
<td>0.90</td>
<td>0.90</td>
</tr>
</tbody>
</table>

INSURANCE RECOGNITION
The ISO gives buildings constructed with FRTW the same fire insurance rating as non-combustible buildings.
RECOMMENDATIONS

VENTILATION
USES
SPECIFICATIONS

STORAGE

PROTECT FROM THE WEATHER AND STANDING WATER

VENTILATION
USES

- Where ever untreated wood can be used
- Uses contained in building codes as substitute for noncombustible material or fire resistance rating

SPECIFICATION

OTHER CODES RECOGNIZING FRTW

SUMMARY

- CHARACTERISTICS
  - Minimal flame spread
  - Minimal smoke developed
  - Reduced heat release rate
  - Self extinguishing
  - No progressive combustion
AVAILABLE TREATMENTS

DISTANCE LEARNING

www.LearnAboutFRTW.com
1 Hour Credit

ADVANTAGES

➢ PRESSURE IMPREGNATED
➢ THIRD PARTY QUALITY CONTROL
➢ SPECIES SPECIFIC TESTING
➢ REDUCED INSURANCE RATES
➢ READILY AVAILABLE

Questions?

This concludes The American Institute of Architects Continuing Education Systems Course

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