Fire Retardants and Truss Design

Design Guide

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SBCA has been the voice of the structural building components industry since 1983, providing educational programs and technical information, disseminating industry news, and facilitating networking opportunities for manufacturers of roof trusses, wall panels and floor trusses. **SBCA** endeavors to expand component manufacturers' market share and enhance the professionalism of the component manufacturing industry.

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Introduction

- Fire retardant treatments (FRT) were developed to be applied to building materials, such as dimension lumber (FRTW) and plywood, to reduce the ability of the wood to fuel a fire.

- This treatment can allow FRT materials to be used as an acceptable alternative for building code requirements that specify noncombustible material in specific applications.

Introduction

- While reducing flammability, FRT may also degrade the structural properties of the wood.
- Trusses designed with FRT lumber may require:
  - A reduction in the design values of the wood materials, and/or
  - A reduction in the capacity of connectors used
- The following steps describe how to properly design trusses using FRT lumber.

Step 1: Accredited Product Certification Report

- Obtain the Accredited Product Certification Report for the FRT lumber product

- Make sure the report is from an accredited ISO/IEC 17065 Product Certification Body

Step 2: Reduction Values

- The evaluation report should contain reduction values for lumber and connectors for the FRT product

TABLE 2—DESIGN VALUE ADJUSTMENT FACTORS FOR PYRO-GUARD® TREATED LUMBER

PROPERTY	PYRO-GUARD® WALL/FLOOR SERVICE TEMPERATURE TO 100°F/38°C			PYRO-GUARD® ROOF FRAMING, SERVICE TEMPERATURE TO 150° F/66° C,					
				Douglas fir			Southern pine		
	Douglas fir	Southern pine	Other species	Climate Zone			Climate Zone		
				1A	1B	2	1A	1B	2
Extreme fiber stress in bending, F_b	0.97	0.91	0.88	0.90	0.93	0.96	0.80	0.85	0.89
Tension parallel to grain F_t	0.95	0.88	0.83	0.80	0.87	0.93	0.80	0.84	0.88
Compression parallel to grain, F_c	1.00	0.94	0.94	0.94	0.98	1.00	0.94	0.94	0.94
Horizontal shear F_v	0.96	0.95	0.93	0.95	0.95	0.96	0.92	0.93	0.94
Modulus of elasticity, E	0.96	0.95	0.94	0.96	0.96	0.96	0.95	0.95	0.95
Compression perp. to grain $F_{c\perp}$	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Fasteners/connectors	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90

1. Climate Zone definition:
   1 - Minimum design roof live load or maximum ground snow load up to 20 psf:
      A - Southwest Arizona, Southeast Nevada (area bounded by Las Vegas-Yuma-Phoenix-Tucson)
      B - All other qualifying areas of the Continental United States
   2 - Minimum ground snow load over 20 psf
2. Duration of load adjustments for snow loads, 7-day (construction) loads, and wind loads given in the National Design Specifications for Wood Construction apply.
3. Where lumber decking serves as both exposed ceiling and roof sheathing, extreme fiber in bending adjustments of 0.84, 0.83, and 0.89 must be used for southern pine in zones 1A, 1B, and 2, respectively; 0.92, 0.92, and 0.96 must be used for Douglas fir in zones 1A, 1B, and 2, respectively; except that where insulation having a minimum R value of 4.0 is installed above the decking, extreme fiber in bending adjustments of 0.91 for southern pine and 0.97 for Douglas fir are permitted in all zones.
4. Modulus of elasticity values apply to all treated lumber decking.
5. Roof framing adjustment factors apply to roof systems with minimum ventilation areas per applicable code. Locate 50 percent of required vent area on upper portion of sloped roofs to provide natural air flow.
6. Other species - species other than southern pine and Douglas fir listed in Section 3.1 of this report.

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Step 3: Apply to Truss Design

- Most truss design software applies FRT lumber and plate reductions to the truss design via a reduction of the lumber and plate DOL values.

- Example:
  - Typical roof DOL * Reduction value = Reduced DOL
  - 1.15 * 0.8 = 0.92

- Verify that the reduced DOL has been used for the truss design.