



Don't Get Burned

Emerging Technology Simplifies Fire-Rated Floor/Ceiling Assemblies in Wood-Framed Buildings

By Glen Robak, P.E., SECB

Fire-resistant building materials provide crucial “passive” protection for buildings by limiting the damaging effects of fire. It is especially important that designers select materials and assemblies that protect a building’s structural elements—thereby extending the time for occupants to escape a burning building and for firefighters to enter safely and put-out the flames.

In wood-framed buildings, codes require various forms of fire protection for wall assemblies and floor/ceiling assemblies. Typically, floor/ceiling assemblies in multi-family buildings using engineered wood I-joists must include a protective “membrane” to provide a one-hour fire-resistance rating. The typical membrane is two layers of gypsum attached to the joist flange or resilient channels. For single-family homes with unfinished basements, the *International Residential Code* (IRC) requires a single-layer of gypsum board.

One-hour Fire-rated Assemblies

Chapter 7 of the *International Building Code* (IBC) contains prescriptive one-hour fire-resistance protection for wood I-joists (see especially Table 721.1(3), rows 21 – 28). These prescriptive one-hour assemblies generally fall into two category types: 1) Assemblies that require two layers of gypsum board, and 2) single-layer assemblies requiring a minimum 2x4 flange size with the addition of mineral wool.

Emerging Technology

One wood I-joist innovation introduced in 2012 is a product with a specialty coating that helps simplify design and construction of one-hour fire-rated floor/ceiling assemblies. Specifically, for multi-family buildings, the joists can provide a one-hour fire-rated floor/ceiling assembly with only a single layer of gypsum (versus double layer) and no mineral wool. In single-family homes with unfinished basements, these joists can also be approved for installation without the gypsum layer.

This particular I-joist has an intumescent coating applied to the joists’ web surfaces

and edges of the bottom flange. The coating swells in a fire, thereby decreasing heat transfer to the joists’ wood fiber. The result is enhanced fire resistance and a longer time to burn than uncoated I-joists.

For this product, the factory-applied intumescent is durable and does not reduce the structural properties of the engineered wood I-joists. The intumescent action occurs at high temperatures and is thus not activated by temperature ranges of typical building mechanical systems. Finally, these fire-resistant engineered wood I-joists do not require special tools or training to use. Builders can cut and drill them similar to other I-joists, and use standard hangers for quick and smooth installation.



Cost/Benefit

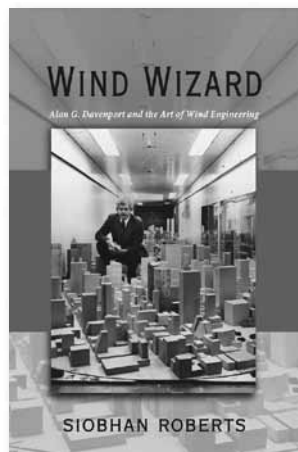
Engineered wood I-joists with factory-applied fire resistive coatings will likely have a higher unit cost than uncoated I-joists, yet a net savings is possible from eliminating the material and labor costs of installing one of the gypsum layers in multi-family residences and eliminating the gypsum membrane in single-family homes.■

ICC-Evaluation Services (AC14)

These types of products are being evaluated and approved through code evaluation reports such as those developed by ICC-Evaluation Services AC14 *Acceptance Criteria for Prefabricated Wood I-Joists*. Product testing is in compliance with ASTM E-119 *Standard Test Methods for Fire Tests of Building Construction and Materials*.

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