

## ABSTRACT

Engineered wood products (EWP) are susceptible to early failure during fire exposure due to thermal degradation of thin section components or rapid loss in strength of some adhesives used for laminating or finger jointing. Different approaches to protecting combustible wood structures were developed over the years. Intumescent coating can serve as a complementary protective treatment to other approaches such as use of gypsum board and sprinkler systems in an integrated fire protection approach. Such a treatment will result in a thick uniform foamed char layer that excludes oxygen and insulates the wood from high temperatures during a fire, helping it maintain its load bearing capacity for an extended time. Thus, the long term goal of this project was to evaluate coating products to enhance protection of wooden building components from fire. The specific objectives were: i) to identify effective intumescent coatings to protect susceptible components of Engineered Wood Products (EWP) from thermal degradation; ii) to develop appropriate quality control procedures to ensure that the coatings meet the target performance and iii) to evaluate the weathering behavior and resistance to mechanical damage of the coatings. To reach these objectives four intumescent coating were applied on laminated veneer lumber (LVL) at 3 basis weight levels (120g/m<sup>2</sup>, 240g/m<sup>2</sup>, 360g/m<sup>2</sup>). To improve their behavior in the weather, a fifth painting was also applied. TGA and DSC analyses showed that the four studied coatings improved the thermal properties of the LVL samples. Cone calorimeter and 2-foot tunnel tests showed that all Intumescent coatings improved the fire resistance properties of LVL. Opaque coatings led to better fire resistance properties than clear coatings. Although all thermal and fire resistance tests indicated substantial improvement of the fire resistance of the EWP, the correlation between parameters from thermal tests (TGA, DSC) and those from fire resistance tests (2-feet tunnel and cone tests) were not always high. Finally, the weathering behaviour of opaque coatings was excellent but that of clear coatings was relatively poor.

**Keywords:** Engineered wood products, Intumescent coating, flame spread; thermal properties; Cone calorimeter; thermal degradation.