



Cross-Laminated Timber Failure Modes for Fire Conditions

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Summary:

Tall timber building designs have utilized cross-laminated timber (CLT) significantly over the past decade due to the sustainable nature of timber and the many advantages of using an engineered mass timber product. Several design methods have been established to account for the composite action between the orthogonally adhered timber plies. These methods assume perfect bonding of the adjacent plies by the adhesive. CLT design methods for timber in fire have also been formulated. These methods rely on the relatively constant charring rate of timber to calculate a sacrificial layer to be added onto the cross-sectional area. While these methods focus on the timber failure mode of reduced cross section by charring, the failure mode of ply delamination is often overlooked and understudied. Due to the reduction of shear and normal strength in the adhesive, the perfect bond assumption can be questioned and a deeper look into the mechanics of CLT composite action and interfacial stress needs to be conducted. This paper seeks to highlight the various design methods for CLT design and identify the failure mode of delamination not present in the current design codes.

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