# Wetting and Drying Performance of Cross-Laminated Timber Related to On-Site Moisture Protections: Field Measurements and Hygrothermal Simulations

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Summary:

Cross-laminated timber (CLT) panels are increasingly used in mid-rise buildings or even taller structures in North America. However, prolonged exposure to moisture during construction and in service is a durability concern for most wood products including CLT. To investigate practical solutions for reducing on-site wetting of mass timber construction, CLT specimens with a range of moisture protection measures, in six groups were tested in the backyard of FPInnovations' Vancouver laboratory from Oct. 2017 to Jan. 2018. This study investigates the wetting and drying behaviours of the tested CLT specimens through 2-D hygrothermal simulations. The simulations are performed for base specimens (no protection measures) of group 1 (without joint or plywood spline) and group 2 (with a butt joint and plywood spline). For group 1, three data sources of material properties are used to create the models, and the data that led to the best agreement between simulations and measurement are used for creating the models of group 2. For group 2, two types of hygrothermal models are created with or without considering the differences in water absorption between the transverse and the longitudinal grain orientations. In addition, rain penetration is taken into account for the joint area. It is found that the model with considering the differences between transverse and longitudinal grain orientations shows a better agreement than that without considering such differences.



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