



## Hygrothermal Properties of Cross Laminated Timber and Moisture Response of Wood at High Relative Humidity

<https://research.thinkwood.com/en/permalink/catalogue12>

Author: AISayegh, George  
 Organization: Carleton University  
 Year of Publication: 2012  
 Format: Thesis  
 Material: CLT (Cross-Laminated Timber)  
 Topic: Moisture  
 Keywords: Hygrothermal  
 Durability  
 Envelope  
 Testing  
 Moisture Content  
 EMC  
 Research Status: Complete

### Summary:

Cross Laminated Timber (CLT) is a new wood-based material composed of cross laminated wood boards that form a structural panel. This study focuses on identifying the appropriate methods to determine the hygrothermal properties of CLTs fabricated with Canadian and European Lumber. The laboratory tests carried out in this study will help establish heat, air and moisture response properties to be used for hygrothermal simulation to assess the durability of CLTs in building envelope construction.

Measurement of water vapour permeability, liquid water absorption, sorption isotherms, thermal conductivity, and air permeability were performed on three Canadian CLT specimens composed of Hem-Fir, Eastern Spruce-Pine-Fir, and Western Spruce-Pine-Fir and one European specimen composed of Spruce.

The hygrothermal properties of CLT, considered in this study, appear to be similar to commonly used wood specimens reported in the literature. However, liquid water absorption coefficients of CLT were found to be generally lower than common wood species, possibly due to the presence of glue between the wood layers which limits the moisture movement across the specimen. On the other hand, the air permeability across the CLT specimens varied due to the glue discontinuity within the specimen which led some CLTs to be permeable, however all the European specimens were found to be impermeable.

This study also critically analyzed the significance of equilibrium moisture content (EMC) of wood at high relative humidity, measured by means of a pressure plate apparatus and humidity chambers, on the moisture management performance of a wood-frame stucco wall, using the hygrothermal simulation tool hygIRC-2D. The simulation results indicate that the prediction of the moisture response of a wood-frame stucco wall assembly depends significantly on the method adopted to derive the EMC of wood at high RH.

Online Access: Free

## Resource Link

---

[https://curve.carleton.ca/system/files/etd/e7ba278b-c830-463d-ad47-5f98ea309c22/etd\\_pdf/ca740d27547d38a996fe4281c15c98ca/alsayegh-hydrothermalpropertiesofcrosslaminatedtimber.pdf](https://curve.carleton.ca/system/files/etd/e7ba278b-c830-463d-ad47-5f98ea309c22/etd_pdf/ca740d27547d38a996fe4281c15c98ca/alsayegh-hydrothermalpropertiesofcrosslaminatedtimber.pdf) 