

MASS TIMBER AND INSURANCE - Q&A

BACKGROUND

Mass Timber has created opportunities for designers and builders to consider innovative, sustainable and more appealing buildings for their clients. Mass Timber is a category of large-section wood-based building materials including products such as Cross-Laminated Timber (CLT), Nail Laminated Timber (NLT) and other panels made with Engineered Wood. For more information about these products refer to the links on the following page.

As a result of rigorous testing and examination by a balanced committee of building & fire officials, architects, fire protection engineers, and industry experts, the 2020 editions of the National Building Code and National Fire Code of Canada are expected to contain requirements permitting “Encapsulated Mass Timber Construction” (EMTC) in buildings up to 12 storeys in height. In the United States, buildings up to 18 stories will be permitted with Mass Timber elements in the 2021 edition of the International Building Code.

For insurance companies, Mass Timber’s inclusion in the Building Code is only one of several items to be considered when assessing risks and determining rates for builders or occupants seeking insurance coverage. To facilitate these assessments, this document is intended to provide information on common questions about Mass Timber.

Example questions in this series:

- Fire Tests and Mass Timber
- Facts on Adhesives
- How Big is the Mass Timber Market Expected to be?
- Mass Timber and ISO Construction Classification
- Can Mass Timber be repaired after a Flood or Fire?
- How Durable is a Mass Timber Building?

Photography: Nordic Structures ,FP Innovations

CAN MASS TIMBER MEET 2HR or 3HR FIRE TEST REQUIREMENTS?

Yes. Numerous tests have been conducted on Mass Timber components and assemblies, including full-scale fire tests completed by FPInnovations and funded by Natural Resources Canada and others¹. These have demonstrated that Mass Timber elements can meet two and three hours of fire resistance with and without gypsum protection.

In association with a 13-story mass timber demonstration project, the Quebec provincial government funded full-scale CLT fire tests to prove CLT’s equivalence to 2-hour-rated noncombustible construction. Tests included a three-story encapsulated CLT apartment simulation that ran for 3 hours. One of the tests focused on a 25-foot CLT stair/ elevator shaft (exposed on the inside face with two layers of gypsum protection on the fire side)². The test ran for 2 hours, and evaluated smoke propagation and leakage as well as shaft structural stability - requirements for a fire exit. At the conclusion of the 2hr test, the report indicated there was no sign of smoke or heat penetration into the shaft.

See the following page for additional information.



Fire Shaft 2hr Test: No sign of smoke or heat penetration into the shaft.

Fire Stop and Sealant Testing - Mass Timber

Research recently completed by FPInnovations and funded by Natural Resources Canada & The Canadian Forest Service evaluated the ability of selected fire stops and sealing joints in CLT assemblies, both for panel joints and around through-penetrations to prevent the passage of hot gasses and limit heat transfer. Results showed that products commercially available for use in light-frame and concrete construction are also feasible for CLT applications (Dagenais 2014)³.

CAN MASS TIMBER BE REPAIRED AFTER A FIRE OR FLOOD EVENT?

Yes. There are options for remediation of mass timber that has been exposed to fire or flood. Options depend on the severity/ and or duration of the exposure. See below for a list of resources.^{5,6,7}

There have been a few select fire or water exposure events in mass timber buildings. This may be partially attributed to the rigorous fire safety design of these buildings.

The insulating properties of mass timber enable the core of large timber elements to retain their structural properties, and the remaining sections can be inspected and reinforced if necessary once any charred surfaces are removed (generally with by sand blasting and planing). Techniques such as this have been employed with larger heavy timber elements for decades.

Research is on-going into the most cost effective methods for remediation and reinforcement of fire-damage panels.

Remediation may not be required after a fire event: one such case occurred in October 2018, when a fire broke out on a third storey balcony at one of the Arbora buildings in Montreal, QC.⁴ The building is an 8-storey mass timber building above a 1-storey concrete podium. The fire was confined to the balcony, but there was damage to the interior after a window broke. Interior damage from the fire was limited, but water did enter the structure through the window. The structure and fire safety features were effective at preventing further fire spread.

After the fire, the residual water was cleaned up and any affected gypsum board within the compartment was removed. Flooring in the affected area was also removed.



Inspectors cut a section of the concrete topping to assess whether any water had reached the mass timber substrate. It was determined that water did not penetrate the concrete slab and the mass timber was not affected. The prompt removal of water following the fire, and the presence of a concrete topping prevented water from reaching the mass timber beneath.

Had the mass timber elements been found to be wet, drying procedures could have been implemented prior to re-installing gypsum and other finishes. For more information on the evaluation and remediation of flood-damaged mass timber elements refer to the other sections of this Q&A series.

Condition Assessment & Rehabilitation

There are many helpful resources available related to the assessment and repair of wood structures after a fire. See references 5,6,7 for a partial list.

REFERENCES & MORE INFORMATION

- 1 ThinkWood.com - Research - Fire <https://research.thinkwood.com/>
- 2 FP Innovations, Full-scale Mass Timber Shaft Demonstration Fire. 2015
- 3 FP Innovations, Fire Stops and Sealing Joints in Cross-Laminated Timber Construction. Dagenais, 2014
- 4 FP Innovations, Rehabilitation of Mass Timber following Fire and Sprinkler Activation. Ranger, 2019
- 5 Forest Products Laboratory, Wood and Timber Condition Assessment Manual, Ch 5. Ross, White, 2014
- 6 Woodhead Publishing, Inspection, Testing and Monitoring of Buildings and Bridges. Ch. 6 Ross, Wang, Bradshaw 2005
- 7 Woodhead Publishing, RIA Guidelines for Fire & Smoke Damage Repair - 2nd Edition, 2002

