TALL WOOD MASS TIMBER EARLY ADOPTION INITIATIVE

Fire Safety Questions and Answers

The following document is comprised of a list of questions and answers (Q&As) related to the Provincial Tall Wood Mass Timber Early Adoption Initiative. The aim of this document is to provide additional clarity on some of the common questions and potential concerns surrounding this initiative.

The Q&As touch on three different aspects of the initiative that might be of interest to fire safety personnel: process and regulation; fire safety in a completed building; and fire safety during the course of construction.

Two appendices have also been included with this document. The first provides links to National Research Council research findings on flame spread and fire safety testing results on encapsulated mass timber construction (EMTC) which may be referenced for further information, and the second provides links and a guide to the EMTC provisions that were drafted and made available through a national public review process in the Fall/Winter of 2018.

A. Process and regulation

1. What is a jurisdiction specific regulation?

- The *Building Act* provides the Minister with the authority to adopt building regulations that apply to the entire province like the BC Building Code; to a single building using a site-specific regulation; or to one or more local authorities by using a jurisdiction-specific regulation.

2. Which communities are eligible for the jurisdiction-specific regulation?

- Any local government currently regulated under the BC Building Code is eligible for consideration in the jurisdiction-specific regulation, provided:
  - There is Council support for the initiative;
  - The planning, building and fire departments are comfortable with participating in the process;
  - The lead Building Official holds a Level 3 Certification from the Building Officials' Association of BC (BOABC); and
  - The jurisdiction's land use bylaws support buildings greater than six storeys in height.

3. **Where are there opportunities for input?**

   - The Building and Safety Standards Branch will be hosting a webinar and discussion period with fire fighters and fire chiefs to discuss safety issues and mitigation strategies that can be considered in the JSR or through other means.
   - As part of the development of the regulation and post-development, the Building and Safety Standards Branch will be convening working groups to enable peer learning on the JSR so that changes to it can be made and more importantly, knowledge can be gathered and incorporated into the next BC Building Code that will be applied province-wide.

4. **The EMTC provisions in the draft 2020 National Building Code and 2020 National Fire Code are expected to be adopted into the BC Building and Fire Codes in 2022. Why are they being adopted now, in this JSR?**

   - The main driver of this initiative is to work with a smaller number of local governments, so the Province can explore any challenges encountered by building and fire professionals and consider how to address them when drafting the next BC Building and Fire Codes.

5. **Will the JSR amend the Fire Code?**

   - The Fire Code will need to be amended alongside the creation of the JSR. A new section will be created which will be applicable to the contents of the JSR.

B. Fire safety in a completed EMTC building:

6. **What are the principal fire safety features of a completed EMTC building?**

   - Buildings must be sprinklered throughout.
   - EMTC buildings are generally* limited to residential and office ("business and personal services") occupancies. **Some assembly, retail, and storage garage occupancies are permitted up to the fourth storey.*
   - Except for limited areas and locations, mass timber elements and assemblies must be encapsulated with fire resistive materials.
   - "High" buildings of encapsulated mass timber construction have the same additional requirements as "high" buildings of non-combustible construction.

7. **How do the principal fire safety features compare with steel and concrete buildings of a similar height and area?**

   - Though the primary structural materials are different, seven to twelve-storey EMTC and non-combustible buildings share the same principal fire safety features:
     - Two-hour structural fire resistance

- ‘high’ building provisions, and
- fire sprinklers throughout.

8. What is the required fire resistance rating for the structure?

- EMTC buildings require a two-hour structural fire resistance rating.

9. How much wood can be exposed within a suite?

- Maximum 10% of the total wall area of the perimeter of the suite or fire compartment can have exposed wood (i.e., mass timber beams, columns and arches) *.
- The exposed surfaces of mass timber walls within a suite provided they all face the same direction.
- The total exposed wood surface area (i.e., combination of beams, columns, arches and walls) must be less than 35% of the total wall area of the suite perimeter*.
- Exposed mass timber ceilings cannot be more than:
  - 10% of the total ceiling area (flame spread rating of no more than 150); OR
  - 25% of the total ceiling area of the suite (exposed surfaces have a flame spread rating of 75 or less, and there are no exposed mass timber walls).

** Flame spread rating no higher than 150 - Flame spread is primarily a surface burning characteristic of materials, and a flame-spread rating is a way to compare how rapid flame spreads on the surface of one material compared to another (lower flame spread ratings are better and more restrictive than higher ratings).*

C. Fire safety in an EMTC building under construction:

10. What are the principal fire safety features of an EMTC building that is under construction?

- New requirements related to EMTC buildings will be contained in the Fire Code. These include:

  - *Availability of Adequate Water Supply for Firefighting* as soon as combustible or encapsulated mass timber construction material arrives at the construction site.

    There are also Standpipe provisions, set testing, installation, warning systems and other requirements for fire department connections for each new level with hose valves

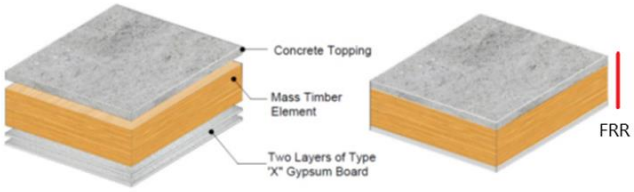
  - *Secondary stairwell and stairwell requirements for worker egress -* 30-minute fire protection rating

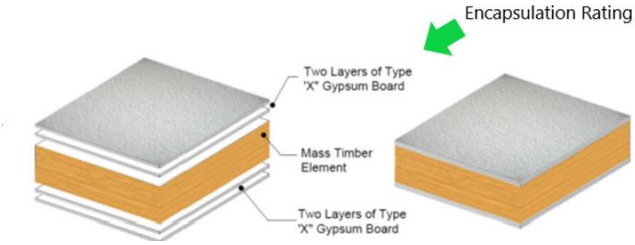
- *Specific doors assemblies* to increase fire protection: 45 mm solid core wood doors, hollow metal doors, door of minimum 12.7 mm thick gypsum board - 20 minutes fire protection rating.

- *Limitations on Exposed Wood*
  - Additional requirements for encapsulation materials which delay the time it takes for fire to reach mass timber by 50 minutes (encapsulation rating).
  - Not more than 20% of the underside area of each mass timber floor may be exposed during construction.
  - Not more than 35% of total area of structural mass timber walls within each storey may be exposed during construction.
  - Not more than four of the uppermost adjoining storeys may be unprotected during construction
  - Additional guidance for the "Protection of Adjacent Buildings" with respect to the development of a fire safety plan

11. What's the difference between a fire resistance rating and an encapsulation rating?

- A fire resistance rating (FRR) represents the time that an assembly of materials will withstand the passage of flame or transmission of heat.
- An encapsulation rating represents the time that a material will delay ignition and combustion of an encapsulated mass timber element.





12. What types of materials are used for encapsulation?

- Type X gypsum board, gypsum concrete topping or any noncombustible material with an encapsulation rating of no less than 50 minutes can be used for encapsulation.

13. What is the role of the fire safety plan?

- As for all buildings, a fire safety plan will be required for all buildings. The process for enabling tall wood construction will require local authorities ensure that there is an enforced holistic strategy to address exposed mass timber during the course of construction in the fire safety plan. Additional protective measures can be included in the fire plan.

APPENDIX I

The following link is to the National Research Council's (NRC) publications specific to Joseph Su. Joseph has been the key researcher for Cross-Laminated Timber (CLT) testing in Canada.

In reviewing the list of Joseph's publications, an interested party would be able to find key research documents (including testing reports) and general publications explaining key issues surrounding mass timber, including a review of the technical and testing basis for the current 2020 National Building Code requirements for encapsulated mass timber construction (EMTC).

URL: https://nrc-publications.canada.ca/eng/search/?q=Su%2C+Joseph

APPENDIX II

Details on Encapsulated Mass Timber Construction in the Draft National Building Code (2020)

Proposed changes to the National Codes were circulated for public comment between November 7, 2018 and January 4, 2019. After the Canadian Commission on Building and Fire Codes (CCBFC) reviews the submissions, it will either withdraw a proposed change; recommend that it be reviewed further for possible re-submission; or recommend it be approved by the CCBFC, with or without modification. If a change is approved by the CCBFC, it will be published in the 2020 National Building Code.

British Columbia's jurisdiction specific regulation will be modeled on the proposed changes to the National Codes.

This is a link to the proposed changes to the National Codes:

https://www.nrc-cnrc.gc.ca/obj/doc/solutions-solutions/advisory-consultatifs/codes_centre-centre_codes/public_review-examen_public/public_review_PDF-examen_public_PDF/2018/NRC_PublicReview_2018_NBC_NFC_NPC_combined.2018-11-29.pdf

The proposed changes related to Encapsulated Mass Timber Construction can be found on the following pages:

- Proposed Change 1024 (pages 21-44)
- Proposed change 1033 (pages 45-49)
- Proposed change 1036 (pages 74-80)
- Proposed change 1322 (pages 88-91)
- Proposed change 1294 (pages 112-115)
- Proposed change 1211 (pages 782-787)
- Proposed change 1198 (pages 788-789)
- Canadian Commission on Fire Codes overview (pages 943-946)

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