Submit a comment

Proposed Change 1872

Code Reference(s):	**NFC20 Div.B 5.6.4.3. (first printing)**
Subject:	Encapsulated Mass Timber Construction
Title:	Revisions to Protection Requirements for EMTC During Construction
Description:	This proposed change revises the minimum requirements for and exceptions to the encapsulation of mass timber elements.
Related Code Change Request(s):	CCR 1381
Related Proposed Change(s):	PCF 1870, PCF 1963

This change could potentially affect the following topic areas:

- ☐ Division A
- ☐ Division C
- ☐ Building operations
- ☐ Small Buildings
- ☑ Fire Protection
- ☐ Accessibility
- ☐ Building Envelope
- ☐ Heating, Ventilating and Air Conditioning
- ☑ Division B
- ☑ Design and Construction
- ☐ Housing
- ☑ Large Buildings
- ☐ Occupant safety in use
- ☐ Structural Requirements
- ☐ Energy Efficiency
- ☐ Plumbing
- ☑ Construction and Demolition Sites

Problem

Article 5.6.4.3. of Division B of the 2020 edition of the National Fire Code of Canada (NFC) provides requirements related to the type and degree of encapsulation protection of mass timber elements necessary in encapsulated mass timber construction (EMTC) while the building is under construction. This proposed change is related to PCFs 1870 and 1963, which describe proposed changes to Articles 3.1.6.4. and 3.1.6.6., respectively, of Division B of the National Building Code of Canada (NBC) 2020. PCFs 1870 and 1963 address the requirements for and exceptions to the encapsulation of mass timber elements in finished buildings of EMTC.

PCFs 1870 and 1963 include proposed changes, based on the most recent fire research, to allow 100% of the underside of each mass timber floor assembly to be exposed within a suite. Consequently, there is a need to propose the alignment of the

requirements for mass timber protection for ceilings during construction in NFC Article 5.6.4.3. to avoid the waste of time and resources encapsulating mass timber construction where no such encapsulation is required in the finished building.

Further, during current EMTC projects, difficulties have been encountered when reconciling the requirements of NFC Article 5.6.4.3. during construction with measures to control moisture and mould affecting the wood that is being encapsulated.

Justification

PCFs 1870 and 1963 include proposed changes, based on the most recent fire research, to allow 100% of the underside of each mass timber floor assembly within a suite to be left exposed in the finished building, expanding the NBC provisions related to encapsulation of mass timber elements within buildings permitted to be of EMTC.

The rationales supporting both PCFs 1870 and 1963 explain how recent fire research was performed that supports the proposed changes to the permitted percentage exposure of mass timber elements. With that, this proposed change revises the degree of protection of mass timber ceiling elements in EMTC while a building is under construction. This proposed change would harmonize the NFC requirements with those of the NBC for finished buildings of EMTC.

The proposed new Sentence 5.6.4.3.(2)-2025 introduces an exception to the requirements described in Clause 5.6.4.3.(1)(a) for encapsulating the underside of each mass timber floor assembly and introduces new fire protection measures to address safety during construction. These new measures include:

- the protection of openings through floor assemblies to limit the potential for fire spread through the openings to upper storeys,
- the protection of perimeter joints between the edge of floor assemblies and exterior walls to limit the potential for fire spread through the joint to upper storeys,
- the installation of hose stations with hose lines on standpipe systems for occupant use in extinguishing or controlling any fires that may occur, and
- the need for a fire watch on all storeys at certain times during the workday and afterwards to ensure the fire safety plan is followed.

The proposed new Sentence 5.6.4.3.(3)-2025 introduces an exception to the requirements described in Clauses 5.6.4.3.(1)(a), (c) and (d), and in Sentence 5.6.4.3.(2)-2025. New Sentence (3)-2025 introduces an alternative approach to the passive fire protection requirements by providing for an operational automatic sprinkler system that is installed progressively during construction in buildings of EMTC.

A minor editorial revision is also proposed to clarify the intent of the existing requirement regarding the four uppermost storeys in Sentence 5.6.4.3.(4)-2025.

Because this proposed change to NFC requirements aligns with the proposed changes to the NBC in PCFs 1870 and 1963, builders would not need to encapsulate the underside of floors during construction, only to remove the encapsulation when the building is finished, as would be permitted in the NBC as a result of PCFs 1870 and 1963.

PROPOSED CHANGE

NFC20 Div.B 5.6.4.3. (first printing)

[5.6.4.3.] 5.6.4.3. Protective Encapsulation and Fire Protection

[1] 1) Except as provided in ~~Sentences (2) and (3)~~Sentences (2) to (4) and (6)-2025, to address safety during construction, a protective encapsulation material or an assembly of materials providing an *encapsulation rating* of not less than 25 min, as determined in accordance with Sentence 3.1.6.5.(1) of Division B of the NBC, shall be installed

[a] a) such that not more than 20% of the area of the underside of each mass timber floor assembly on each *storey* is exposed during construction,

[b] b) on the interior side of stairways required by Sentence 5.6.3.7.(3) and of *vertical service spaces* where the enclosures are constructed of mass timber elements,

[c] c) on each face of solid lumber or mass timber *partitions* not less than 38 mm thick and on each face of *partitions* containing wood framing as permitted by Article 3.1.6.15. of Division B of the NBC, and

[d] d) such that not more than 35% of the total area of structural mass timber walls within the *storey* is exposed during construction.

(See Note A-5.6.4.3.(1).)

[2] --) Except as provided in Sentence (5)-2025, a protective encapsulation material or assembly of materials need not be installed as described in Clause (1)(a), provided

[a] --) penetrations or openings through the floor assembly on any *storey* are

[i] --) protected with a firestop conforming to Sentence 3.1.9.1.(1) of Division B of the NBC,

[ii] --) filled with noncombustible insulation that is supported in place, or

[iii] --) protected, from the top of the floor assembly, with a single layer of not less than 12.7 mm thick Type X gypsum board mechanically fastened to not less than 12.7 mm thick plywood or OSB with the gypsum board facing the penetration (see Note A-5.6.4.3.(2)(a)-2025),

[b] --) joints located in a horizontal plane between the floor and an exterior wall on any *storey* are

[i] --) protected with a firestop conforming to Sentence 3.1.8.3.(4)

of Division B of the NBC, or

[ii] --) filled with noncombustible insulation that is supported in place,

[c] --) a standpipe system is installed in accordance with Articles 5.6.1.6. and 5.6.4.2., and is provided with hose stations for occupant use that are equipped with a hose line having

[i] --) a diameter of either 25 mm or 38 mm, and

[ii] --) a length sufficient to cover all parts of the storey with a hose stream of not less than 5 m

(see Note A-5.6.4.3.(2)(c)-2025), and

[d] --) a fire watch is conducted on all *storeys*

[i] --) at intervals of not more than 1 h when workers are present in the *building*, and

[ii] --) not less than 1 h after workers leave the *building*

(see Note A-5.6.4.3.(2)(d)-2025).

[3] --) Except as provided in Sentence (4)-2025, a protective encapsulation material or assembly of materials need not be installed as described in Clauses (1)(a), (c) and (d), provided an automatic sprinkler system

[a] --) is progressively installed during construction in accordance with NFPA 13, "Standard for the Installation of Sprinkler Systems" (see Note A-5.6.4.3.(3)(a)), and

[b] --) is in an operable condition at all times on any *storey* where it is not actively being worked on, until the automatic sprinkler system is completed.

[4] 2) ~~Not more than t~~The four uppermost ~~contiguous~~ *storeys* ~~are permitted to be unprotected as required by~~ need not conform to the requirements of Sentence (1) or the conditions of Sentence (3)-2025 during construction.

[5] --) The first four *storeys* need not conform to the conditions of Sentence (2)-2025 during construction, until the ceiling assembly of the fifth *storey* is installed. (See Note A-5.6.4.3.(5)-2025.)

[6] 3) The encapsulation material or assembly of materials used to meet the requirements of Sentence (1) is permitted to consist of a single layer of Type X gypsum board not less than 12.7 mm thick conforming to Clauses 3.1.6.6.(4)(a) and (c)-2025 of Division B of the NBC (PCF 1963).~~Clauses 3.1.6.6.(2)(a), (c) and (d) of Division B of the NBC.~~

Note A-5.6.4.3.(2)(a)-2025

Until permanent protection is provided, the fire protection of any penetrations or openings through the floor assembly can be temporary. Beyond those described in Clause 5.6.4.3.(2)(a)-2025, other forms of protection should have a noncombustible or other protective layer that will resist fire for a minimum of 30 min. Furthermore, any such protective layer should be structurally adequate over the penetrations or openings for the safety of occupants.

The fire protection of large penetrations or openings through floor assemblies, such as

openings associated with convenience stairs, elevators or interconnected floor spaces, should address additional fire protection considerations, including structural support.

Note A-5.6.4.3.(2)(c)-2025

The length of hose should be sufficient to allow for adequate nozzle pressure and will depend on the chosen hose diameter. Typically, 38 mm diameter hose should have a length of not more than 30.5 m.

If construction reaches a height at which the public waterworks system can no longer provide the required flow and pressure, a temporary or permanent fire pump must be installed to adequately protect the uppermost storey of the building, unless the fire safety plan specifies an alternative approach that is permitted by the authority having jurisdiction.

Note A-5.6.4.3.(2)(d)-2025

The person conducting the fire watch should be familiar with all fire safety features of the building, including the fire safety plan, as provided in conformance with Section 2.8.

Note A-5.6.4.3.(3)(a)-2025

Even though NFPA 13, "Standard for the Installation of Sprinkler Systems", does not include specific provisions for installation of sprinklers during construction, it is expected that the requirements of NFPA 13 will be fully implemented as appropriate for the conditions that exist in the building under construction.

Note A-5.6.4.3.(5)-2025

It is intended that all storeys meet the conditions of Sentence 5.6.4.3.(2)-2025 once the ceiling assembly of the fifth storey has been installed.

Impact analysis

This proposed change provides additional options for fire protection during building construction, which may reduce costs. As the existing compliance options would remain in the NFC, this proposed change would not entail any additional costs.

By aligning the NFC requirements for the protection of mass timber elements during construction with those proposed for the NBC 2025 for the finished building, the expectation is that costs would either remain the same or be reduced due to the harmonization of requirements.

As the installation of encapsulation materials during the construction process can be challenging in terms of managing moisture and related mould, having the option not to install encapsulation materials could help avoid this potential issue and the costs of fixing any moisture-related damage.

Enforcement implications

There are no anticipated enforcement implications as this proposed change could be enforced by the existing Code enforcement infrastructure.

Who is affected

Architects, designers, developers, owners, and engineers would benefit from the increased flexibility provided by this proposed change.

Authorities having jurisdiction, including fire departments, would need to continue to evaluate their operating procedures in response to the requirements for EMTC.

OBJECTIVE-BASED ANALYSIS OF NEW OR CHANGED PROVISIONS

NFC20 Div.B 5.6.4.3. (first printing)

[5.6.4.3.] 5.6.4.3. ([1] 1) [F02-OS1.2]

[5.6.4.3.] 5.6.4.3. ([1] 1) [F02-OP1.2]

[5.6.4.3.] 5.6.4.3. ([1] 1) [F02-OP3.1]

[5.6.4.3.] -- ([2] --) no attributions

[5.6.4.3.] -- ([3] --) no attributions

[5.6.4.3.] 5.6.4.3. ([4] 2) no attributions

[5.6.4.3.] -- ([5] --) no attributions

[5.6.4.3.] 5.6.4.3. ([6] 3) no attributions