A New Path Forward for Tall Wood Construction: Code Provisions and Design Steps

Ricky McLain, PE, SE, Senior Technical Director – Tall Wood, WoodWorks – Wood Products Council

Photo: Kaiser+Path
New Building Types

Credit: Susan Jones, atelierjones
Type IV-C

9 STORIES
BUILDING HEIGHT 85'
ALLOWABLE BUILDING AREA 405,000 SF
AVERAGE AREA PER STORY 45,000 SF

Credit: Susan Jones, atelierjones

Photos: Baumberger Studio/PATH
Architecture/Marcus Kauffman
Type IV-C Protection vs. Exposed

All Mass Timber surfaces may be exposed

Exceptions: Shafts, concealed spaces, outside face of exterior walls

Credit: Susan Jones, atelierjones
## Type IV-C Height and Area Limits

<table>
<thead>
<tr>
<th>Occupancy</th>
<th># of Stories</th>
<th>Height</th>
<th>Area per Story</th>
<th>Building Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-2</td>
<td>6</td>
<td>85 ft</td>
<td>56,250 SF</td>
<td>168,750 SF</td>
</tr>
<tr>
<td>B</td>
<td>9</td>
<td>85 ft</td>
<td>135,000 SF</td>
<td>405,000 SF</td>
</tr>
<tr>
<td>M</td>
<td>6</td>
<td>85 ft</td>
<td>76,875 SF</td>
<td>230,625 SF</td>
</tr>
<tr>
<td>R-2</td>
<td>8</td>
<td>85 ft</td>
<td>76,875 SF</td>
<td>230,625 SF</td>
</tr>
</tbody>
</table>

Areas exclude potential frontage increase

In most cases, Type IV-C height allowances = Type IV-HT height allowances, but add’l stories permitted due to enhanced FRR

Type IV-C area = 1.25 * Type IV-HT area
Type IV-B Protection vs. Exposed

NC protection on all surfaces of Mass Timber except limited exposed areas

~20% of Ceiling or ~40% of Wall can be exposed, see code for requirements

Credit: Susan Jones, atelierjones
Limited Exposed MT allowed in Type IV-B for:
- MT beams and columns which are not integral part of walls or ceilings, no area limitation applies
- MT ceilings and beams up to 20% of floor area in dwelling unit or fire area, or
- MT walls and columns up to 40% of floor area in dwelling unit or fire area, or
- Combination of ceilings/beams and walls/columns, calculated as follows:
Mixed unprotected areas, exposing both ceilings and walls:

- In each dwelling unit or fire area, max. unprotected area =
  \[
  \frac{U_{tc}}{U_{ac}} + \frac{U_{tw}}{U_{aw}} \leq 1.0
  \]

- \(U_{tc}\) = Total unprotected MT ceiling areas
- \(U_{ac}\) = Allowable unprotected MT ceiling areas
- \(U_{tw}\) = Total unprotected MT wall areas
- \(U_{aw}\) = Allowable unprotected MT wall areas
Design Example: Mixing unprotected MT walls & ceilings

800 SF dwelling unit

- \( U_{ac} = (800 \text{ SF}) \times (0.20) = 160 \text{ SF} \)
- \( U_{aw} = (800 \text{ SF}) \times (0.40) = 320 \text{ SF} \)
- Could expose 160 SF of MT ceiling,
- OR 320 SF of MT Wall, OR
- If desire to expose 100 SF of MT ceiling in Living Room, determine max. area of MT walls that can be exposed

Credit: AWC
Type IV-B Protection vs. Exposed

Design Example: Mixing unprotected MT walls & ceilings

\[
\frac{U_{tc}}{U_{ac}} + \frac{U_{tw}}{U_{aw}} \leq 1.0
\]

\[
\frac{100}{160} + \frac{U_{tw}}{320} \leq 1.0
\]

\(U_{tw} = 120\ SF\)

- Can expose 120 SF of MT walls in dwelling unit in combination with exposing 100 SF of MT ceiling

Credit: AWC
## Type IV-B Height and Area Limits

<table>
<thead>
<tr>
<th>Occupancy</th>
<th># of Stories</th>
<th>Height</th>
<th>Area per Story</th>
<th>Building Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-2</td>
<td>12</td>
<td>180 ft</td>
<td>90,000 SF</td>
<td>270,000 SF</td>
</tr>
<tr>
<td>B</td>
<td>12</td>
<td>180 ft</td>
<td>216,000 SF</td>
<td>648,000 SF</td>
</tr>
<tr>
<td>M</td>
<td>8</td>
<td>180 ft</td>
<td>123,000 SF</td>
<td>369,000 SF</td>
</tr>
<tr>
<td>R-2</td>
<td>12</td>
<td>180 ft</td>
<td>123,000 SF</td>
<td>369,000 SF</td>
</tr>
</tbody>
</table>

Areas exclude potential frontage increase

In most cases, Type IV-B height & story allowances = Type I-B height & story allowances

Type IV-B area = 2 * Type IV-HT area

Credit: Susan Jones, atelierjones
Type IV-A

18 STORIES
BUILDING HEIGHT 270'
ALLOWABLE BUILDING AREA 972,000 SF
AVERAGE AREA PER STORY 54,000 SF

Credit: Susan Jones, atelierjones

Photos: Structurlam, naturally:wood, Fast + Epp, Urban One
Type IV-A Protection vs. Exposed

100% NC protection on all surfaces of Mass Timber

Credit: Susan Jones, atelierjones
## Type IV-A Height and Area Limits

<table>
<thead>
<tr>
<th>Occupancy</th>
<th># of Stories</th>
<th>Height</th>
<th>Area per Story</th>
<th>Building Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-2</td>
<td>18</td>
<td>270 ft</td>
<td>135,000 SF</td>
<td>405,000 SF</td>
</tr>
<tr>
<td>B</td>
<td>18</td>
<td>270 ft</td>
<td>324,000 SF</td>
<td>972,000 SF</td>
</tr>
<tr>
<td>M</td>
<td>12</td>
<td>270 ft</td>
<td>184,500 SF</td>
<td>553,500 SF</td>
</tr>
<tr>
<td>R-2</td>
<td>18</td>
<td>270 ft</td>
<td>184,500 SF</td>
<td>553,500 SF</td>
</tr>
</tbody>
</table>

Areas exclude potential frontage increase

In most cases, Type IV-A height & story allowances = 1.5 * Type I-B height & story allowances

Type IV-A area = 3 * Type IV-HT area

Credit: Susan Jones, atelierjones
Minimum sizes for existing Type IV (now IV-HT) apply to the new Type IV-A, IV-B and IV-C.

See
IBC 2018 2304.11
IBC 2015 602.4
Noncombustible Protection (NC)

Noncombustible Protection Required

IV-A
IV-B
IV-C
IV-HT

Credit: LEVER Architecture
Credit: PATH Architecture
Photo: Blaine Brownell
# Tall Wood Fire Resistance Ratings (FRR)

<table>
<thead>
<tr>
<th></th>
<th>IV-A</th>
<th>IV-B</th>
<th>IV-C</th>
<th>IV-HT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Roof Construction</strong></td>
<td>1.5</td>
<td>1</td>
<td>1</td>
<td>HT</td>
</tr>
<tr>
<td><strong>Primary Frame @ Roof</strong></td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>HT</td>
</tr>
<tr>
<td><strong>Floor Construction</strong></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>HT</td>
</tr>
<tr>
<td><strong>Primary Frame</strong></td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>HT</td>
</tr>
<tr>
<td><strong>Exterior Bearing Walls</strong></td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Interior Bearing Walls</strong></td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1 or HT</td>
</tr>
</tbody>
</table>

*Required Fire Resistance Rating in Hours (per Table 601 only)*
### Noncombustible Protection (NC)

#### Noncombustible Protection Required

<table>
<thead>
<tr>
<th></th>
<th>IV-A</th>
<th>IV-B</th>
<th>IV-C</th>
<th>IV-HT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof below Mass Timber</td>
<td>60 min</td>
<td>40 min*</td>
<td>Not Req.</td>
<td>Not Req.</td>
</tr>
<tr>
<td>Primary Frame @ Roof</td>
<td>80 min</td>
<td>40 min*</td>
<td>Not Req.</td>
<td>Not Req.</td>
</tr>
<tr>
<td>Primary Frame</td>
<td>120 min</td>
<td>80 min*</td>
<td>Not Req.</td>
<td>Not Req.</td>
</tr>
<tr>
<td>Below Mass Timber Floor</td>
<td>80 min</td>
<td>80 min*</td>
<td>Not Req.</td>
<td>Not Req.</td>
</tr>
<tr>
<td>Above Mass Timber Floor</td>
<td>1” Min NC Material</td>
<td>1” Min NC Material</td>
<td>Not Req.</td>
<td>Not Req.</td>
</tr>
</tbody>
</table>

Requirements Per new 602.4. * Some MT permitted to be exposed.
In Type IV-A and IV-B, the floor assembly shall contain a noncombustible material not less than one inch in thickness above the mass timber.
MT Fire Resistance Ratings (FRR)

IBC 722.7
The fire resistance rating of the mass timber elements shall consist of the fire resistance of the unprotected element (MT) added to the protection time of the noncombustible (NC) protection.

MT + NC = FRR

Credit: Urban One
# Noncombustible Protection (NC)

## TABLE 722.7.1(a)
PROTECTION REQUIRED FROM NONCOMBUSTIBLE COVERING MATERIAL

<table>
<thead>
<tr>
<th>Required Fire Resistance Rating of Building Element per Tables 601 and 602 (hours)</th>
<th>Minimum Protection Required from Noncombustible Protection (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>80</td>
</tr>
<tr>
<td>3 or more</td>
<td>120</td>
</tr>
<tr>
<td>1 layer 5/8 Type X</td>
<td></td>
</tr>
<tr>
<td>2 layers 5/8 Type X</td>
<td></td>
</tr>
<tr>
<td>3 layers 5/8 Type X</td>
<td></td>
</tr>
</tbody>
</table>

## TABLE 722.7.1(b)
PROTECTION PROVIDED BY NONCOMBUSTIBLE COVERING MATERIAL

<table>
<thead>
<tr>
<th>Noncombustible Protection</th>
<th>Protection Contribution (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 inch Type X Gypsum Board</td>
<td>25</td>
</tr>
<tr>
<td>5/8 inch Type X Gypsum Board</td>
<td>40</td>
</tr>
</tbody>
</table>

Credit: ICC
Type IV-B Fire Resistance Ratings (FRR)

Primary Frame (2 HR) + Floor Panel Example (2 HR):

*Applicable to most locations. Limited exposed MT permitted

40 minutes of MT FRR* + 2 layers 5/8” type X gypsum*

Glulam Beam (Primary Structural Frame)

Min. 1” NC

Mass Timber Floor Panel

40 minutes of MT FRR* + 2 layers 5/8” type X gypsum*
MT Fire Resistance Ratings (FRR)

How do you determine FRR of MT?
2 Options:
1. Calculations in Accordance with IBC 722 → NDS Chapter 16
2. Tests in Accordance with ASTM E119
MT Fire Resistance Ratings (FRR)

NDS Chapter 16 includes calculation of fire resistance of NLT, CLT, Glulam, Solid Sawn and SCL wood products.
MT Fire Resistance Ratings (FRR)

Nominal char rate of 1.5”/HR is recognized in NDS. Effective char depth calculated to account for duration, structural reduction in heat-affected zone.
Table 1: North American Fire Resistance Tests of Mass Timber Floor / Roof Assemblies

<table>
<thead>
<tr>
<th>CLT Panel</th>
<th>Manufacturer or Major x Minor Grades</th>
<th>Ceiling Protection</th>
<th>Panel Connection in Test</th>
<th>Floor Tapping</th>
<th>Lead Rating</th>
<th>Fire Resistance Achieved (Hours)</th>
<th>Source</th>
<th>Testing Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-ply CLT (114mm x 4.88&quot;)</td>
<td>Nordic</td>
<td>None</td>
<td>Half-Lap</td>
<td>None</td>
<td>Reduced 10% Moment Capacity</td>
<td>1</td>
<td>NRC Fire Laboratory</td>
<td></td>
</tr>
<tr>
<td>5-ply CLT (114mm x 4.88&quot;)</td>
<td>Nordic</td>
<td>None</td>
<td>Topside Splice</td>
<td>2 staggered layers of 0.75&quot; cement board</td>
<td>Reduced 7% Moment Capacity</td>
<td>1</td>
<td>NRC Fire Laboratory</td>
<td></td>
</tr>
<tr>
<td>5-ply CLT (177mm x 7.87&quot;)</td>
<td>Nordic</td>
<td>El</td>
<td>Topside Splice</td>
<td>2 staggered layers of 0.75&quot; cement board</td>
<td>Loaded, Man Manufacturers</td>
<td>2</td>
<td>NRC Fire Laboratory</td>
<td></td>
</tr>
<tr>
<td>5-ply CLT (177mm x 7.87&quot;)</td>
<td>Nordic</td>
<td>El</td>
<td>Topside Splice</td>
<td>1/4 in proprietary gypsum over Mason's mat over proprietary sound board</td>
<td>Reduced 10% Moment Capacity</td>
<td>3</td>
<td>UL</td>
<td></td>
</tr>
<tr>
<td>5-ply CLT (177mm x 7.87&quot;)</td>
<td>Nordic</td>
<td>El</td>
<td>Topside Splice</td>
<td>1/4 in proprietary gypsum over Mason's mat over proprietary sound board</td>
<td>Reduced 10% Moment Capacity</td>
<td>3</td>
<td>UL</td>
<td></td>
</tr>
<tr>
<td>5-ply CLT (177mm x 7.87&quot;)</td>
<td>Nordic</td>
<td>El</td>
<td>Half-Lap</td>
<td>None</td>
<td>Loaded, Man Manufacturers</td>
<td>2</td>
<td>InteriArch 8/24/2012</td>
<td></td>
</tr>
<tr>
<td>5-ply CLT (177mm x 7.87&quot;)</td>
<td>Nordic</td>
<td>El</td>
<td>Half-Lap &amp; Topside Splice</td>
<td>2&quot; gypsum capping</td>
<td>Loaded, Man Manufacturers</td>
<td>2</td>
<td>InteriArch 2/22/2016</td>
<td></td>
</tr>
<tr>
<td>5-ply CLT (177mm x 7.87&quot;)</td>
<td>DR Johnson</td>
<td>V1</td>
<td>Half-Lap</td>
<td>None</td>
<td>Reduced 10% Moment Capacity</td>
<td>3</td>
<td>NRC Fire Laboratory</td>
<td></td>
</tr>
<tr>
<td>5-ply CLT (177mm x 7.87&quot;)</td>
<td>Nordic</td>
<td>El</td>
<td>Half-Lap</td>
<td>None</td>
<td>Unreduced 105% Moment Capacity</td>
<td>3</td>
<td>NRC Fire Laboratory</td>
<td></td>
</tr>
<tr>
<td>5-ply CLT (177mm x 7.87&quot;)</td>
<td>Smartlam</td>
<td>V1</td>
<td>Half-Lap</td>
<td>None</td>
<td>Reduced 10% Moment Capacity</td>
<td>3</td>
<td>NRC Fire Laboratory</td>
<td></td>
</tr>
<tr>
<td>5-ply CLT (177mm x 7.87&quot;)</td>
<td>Smartlam</td>
<td>V1</td>
<td>Half-Lap</td>
<td>None</td>
<td>Reduced 10% Moment Capacity</td>
<td>3</td>
<td>NRC Fire Laboratory</td>
<td></td>
</tr>
<tr>
<td>5-ply CLT (177mm x 7.87&quot;)</td>
<td>Smartlam</td>
<td>V1</td>
<td>Half-Lap</td>
<td>None</td>
<td>Reduced 10% Moment Capacity</td>
<td>3</td>
<td>NRC Fire Laboratory</td>
<td></td>
</tr>
<tr>
<td>5-ply CLT (177mm x 7.87&quot;)</td>
<td>Smartlam</td>
<td>V1</td>
<td>Half-Lap</td>
<td>None</td>
<td>Reduced 10% Moment Capacity</td>
<td>3</td>
<td>NRC Fire Laboratory</td>
<td></td>
</tr>
<tr>
<td>5-ply CLT (177mm x 7.87&quot;)</td>
<td>Smartlam</td>
<td>V1</td>
<td>Half-Lap</td>
<td>None</td>
<td>Reduced 10% Moment Capacity</td>
<td>3</td>
<td>NRC Fire Laboratory</td>
<td></td>
</tr>
</tbody>
</table>
MT Fire Resistance Ratings (FRR)

Mass Timber Fire Design Resource
- Code compliance options for demonstrating FRR
- Updated as new tests are completed
- Free download at woodworks.org

Credit: WoodWorks
Concealed Spaces in Type IV

What if I have a dropped ceiling? Can I have a dropped ceiling?

• Impact on FRR, NC placement, sprinkler requirements
Concealed Spaces in Type IV

Previous Type IV (now IV-HT) provisions prohibited concealed spaces
Concealed Spaces in Type IV-HT – 2021 IBC

Option 1
Sprinklers in concealed spaces

Option 2
Noncombustible insulation

Option 3
5/8” Type X gypsum on all MT surfaces
Concealed Spaces in Type IV-A, IV-B

- **Min. 1” NC**
- Mass Timber Floor Panel

  - w/o dropped ceiling
  - 2 layers 5/8” type X gypsum*

*Applicable to most locations. Limited exposed MT permitted in IV-B

- w/ dropped ceiling
  - 2 layers 5/8” type X gypsum

  - Mass Timber Floor Panel
Concealed Spaces in Type IV-C

No NC req’d

Mass Timber Floor Panel

w/o dropped ceiling

1 layer 5/8” type X gypsum

w/ dropped ceiling

No NC req’d

Mass Timber Floor Panel

No NC req’d
Tall Wood Shaft Enclosures

- When can shaft enclosures be MT?
- What FRR requirements exist?
- If shaft enclosure is MT, is NC req’d?
### Tall Wood Shaft Enclosures

#### IV-A
- **Up to 12 Stories or 180 ft:** MT protected with 2 layers 5/8” type X gyp (if 2 HR req’d) or 3 layers 5/8” type X gyp (if 3 HR req’d) both sides
- **Above 12 Stories or 180 ft:** Noncombustible shafts (IBC 2021 602.4)

#### IV-B
- NC or MT protected with 2 layers 5/8” type X gyp (IBC 2021 602.4.2.6) both sides

#### IV-C
- NC or MT protected with 1 layer 5/8” type X gyp (IBC 602.4.3.6) both sides

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**Exit & Hoistway Enclosures**

**E&H Enclosures FRR**

**2 HR (not less than FRR of floor assembly penetrated, IBC 713.4)**
PENETRATIONS IN RATED ASSEMBLIES
Penetration Fire Protection

Although not a new code requirement or specific to tall wood, more testing & information is becoming available on firestopping of penetrations through MT assemblies.
Penetration Fire Protection

Most firestopping systems include combination of fire safing (eg. noncombustible materials such as mineral wool insulation) plus fire caulk
## Penetration Fire Protection

### Inventory of Fire Tested Penetrations in MT Assemblies

<table>
<thead>
<tr>
<th>CLT Panel</th>
<th>Exposed Side Protection</th>
<th>Penetrating Item</th>
<th>Penetration Centrally or Offset in Hole</th>
<th>Firestopping System Description</th>
<th>F Rating</th>
<th>T Rating</th>
<th>Stated Test Protocol</th>
<th>Source</th>
<th>Testing Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-ply (70mm 3.0&quot;)</td>
<td>None</td>
<td>3/4&quot; diameter steel pipe</td>
<td>Centralized</td>
<td>Mineral wool was installed in the 1st. annular space around the data cable to a total depth of approximately 2 - 3/4 in. The remaining 1st. annular space from the top of the mineral wool to the top of the floor assembly was filled with Hilti F-Oh! Max, caulked.</td>
<td>1 hour</td>
<td>0.5 hour</td>
<td>CANULC B113.15</td>
<td>14 hours</td>
<td>Internit, March 30, 2016</td>
</tr>
<tr>
<td>3-ply (70mm 3.0&quot;)</td>
<td>None</td>
<td>2&quot; copper pipe</td>
<td>Centralized</td>
<td>6.77&quot; of steel plate. Pipe was not fastened around the copper pipe to a total depth of approximately 2 - 3/4 in. The remaining 1st. annular space starting at the top of the mineral wool to the top of the floor assembly was filled with Hilti F-Oh! Max, caulked.</td>
<td>1 hour</td>
<td>N.A.</td>
<td>CANULC B113.15</td>
<td>14 hours</td>
<td>Internit, March 30, 2016</td>
</tr>
<tr>
<td>3-ply (70mm 3.0&quot;)</td>
<td>None</td>
<td>3.5&quot; sch. 40 pipe</td>
<td>Centralized</td>
<td>6.92&quot; in diameter hole. Pipe was installed around the schedule 40 pipe to a total depth of approximately 2 - 3/4 in. The remaining 1st. annular space starting at the top of the pipe was filled with Hilti F-Oh! Max, caulked.</td>
<td>1 hour</td>
<td>N.A.</td>
<td>CANULC B113.15</td>
<td>14 hours</td>
<td>Internit, March 30, 2016</td>
</tr>
<tr>
<td>3-ply (70mm 3.0&quot;)</td>
<td>None</td>
<td>6&quot; cast iron pipes</td>
<td>Centralized</td>
<td>6.55&quot; in diameter hole. Mineral wool was installed in the 1st. annular space around the cast iron pipe to a total depth of approximately 2 - 3/4 in. The remaining 1st. annular space starting at the top of the pipe was filled with Hilti F-Oh! Max, caulked.</td>
<td>1 hour</td>
<td>N.A.</td>
<td>CANULC B113.15</td>
<td>14 hours</td>
<td>Internit, March 30, 2016</td>
</tr>
<tr>
<td>3-ply (70mm 3.0&quot;)</td>
<td>None</td>
<td>3&quot; diameter steel pipe</td>
<td>Centralized</td>
<td>9.01&quot; diameter hole. Mineral wool was installed in the 1 - 3/4 in. annular space around the drop-off duct to a total depth of approximately 1 - 3/4 in. and the remaining 1st. annular space from the top of the mineral wool to the top edge of the hole in the CLT was filled with Hilti F-Oh! Max, caulked.</td>
<td>1 hour</td>
<td>0.75 hour</td>
<td>CANULC B113.15</td>
<td>14 hours</td>
<td>Internit, March 30, 2016</td>
</tr>
<tr>
<td>6-ply CLT (155 mm 5.16&quot;)</td>
<td>None</td>
<td>1/2&quot; diameter steel pipe</td>
<td>Centralized</td>
<td>9.57&quot; in diameter hole. Pipe was not fastened around the copper pipe to a total depth of approximately 4 - 3/4 in. The remaining 1st. annular space starting at the top of the mineral wool to the top of the floor assembly was filled with Hilti F-Oh! Max, caulked.</td>
<td>2 hours</td>
<td>1.5 hours</td>
<td>CANULC B113.15</td>
<td>14 hours</td>
<td>Internit, March 30, 2016</td>
</tr>
<tr>
<td>6-ply CLT (155 mm 5.16&quot;)</td>
<td>None</td>
<td>25&quot; copper pipe</td>
<td>Centralized</td>
<td>9.77&quot; in diameter hole. Pipe was not fastened around the copper pipe to a total depth of approximately 4 - 3/4 in. The remaining 1st. annular space starting at the top of the mineral wool to the top of the floor assembly was filled with Hilti F-Oh! Max, caulked.</td>
<td>2 hours</td>
<td>N.A.</td>
<td>CANULC B113.15</td>
<td>14 hours</td>
<td>Internit, March 30, 2016</td>
</tr>
<tr>
<td>6-ply CLT (155 mm 5.16&quot;)</td>
<td>None</td>
<td>3.5&quot; sch. 40 pipe</td>
<td>Centralized</td>
<td>9.92&quot; in diameter hole. Pipe was installed around the schedule 40 pipe to a total depth of approximately 4 - 3/4 in. The remaining 1st. annular space starting at the top of the pipe was filled with Hilti F-Oh! Max, caulked.</td>
<td>2 hours</td>
<td>N.A.</td>
<td>CANULC B113.15</td>
<td>14 hours</td>
<td>Internit, March 30, 2016</td>
</tr>
<tr>
<td>6-ply CLT (155 mm 5.16&quot;)</td>
<td>None</td>
<td>6&quot; cast iron pipes</td>
<td>Centralized</td>
<td>6.55&quot; in diameter hole. Mineral wool was installed in the 1st. annular space around the cast iron pipe to a total depth of approximately 4 - 3/4 in. The remaining 1st. annular space starting at the top of the pipe was filled with Hilti F-Oh! Max, caulked.</td>
<td>2 hours</td>
<td>N.A.</td>
<td>CANULC B113.15</td>
<td>14 hours</td>
<td>Internit, March 30, 2016</td>
</tr>
<tr>
<td>6-ply CLT (155 mm 5.16&quot;)</td>
<td>None</td>
<td>Hilti F-Oh! Max - drop-in system</td>
<td>Centralized</td>
<td>10.87&quot; diameter hole. Mineral wool was installed in the 1 - 3/4 in. annular space around the drop-off duct to a total depth of approximately 1 - 3/4 in. and the remaining 1st. annular space from the top of the mineral wool to the top edge of the hole in the CLT was filled with Hilti F-Oh! Max, caulked.</td>
<td>2 hours</td>
<td>1.5 hours</td>
<td>CANULC B113.15</td>
<td>14 hours</td>
<td>Internit, March 30, 2016</td>
</tr>
<tr>
<td>6-ply CLT (155 mm 5.16&quot;)</td>
<td>None</td>
<td>3&quot; diameter steel pipe</td>
<td>Centralized</td>
<td>10.21&quot; in diameter hole. Pipe was not fastened around the copper pipe to a total depth of approximately 4 - 3/4 in. The remaining 1st. annular space starting at the top of the pipe was filled with Hilti F-Oh! Max, caulked.</td>
<td>2 hours</td>
<td>N.A.</td>
<td>CANULC B113.15</td>
<td>14 hours</td>
<td>Internit, March 30, 2016</td>
</tr>
<tr>
<td>5-ply (70mm 3.0&quot;)</td>
<td>None</td>
<td>1/2&quot; nominal PVC pipe</td>
<td>Centralized</td>
<td>10.21&quot; in diameter hole. Pipe was not fastened around the copper pipe to a total depth of approximately 4 - 3/4 in. The remaining 1st. annular space starting at the top of the pipe was filled with Hilti F-Oh! Max, caulked.</td>
<td>2 hours</td>
<td>N.A.</td>
<td>CANULC B113.15</td>
<td>14 hours</td>
<td>Internit, March 30, 2016</td>
</tr>
</tbody>
</table>
Many More Items not Covered

- Sealants at panel edges
- Fire safety during construction
- NC protection at occupancy separations
- Reliability of water supply for sprinklers
Tall Wood Buildings in the 2021 IBC
Up to 18 Stories of Mass Timber

In January 2018, the International Code Council (ICC) approved a set of proposals to allow tall wood buildings as part of the 2021 International Building Code (IBC). Based on these proposals, the 2021 IBC will include three new construction types—Type IV-A, IV-B and IV-C—allowing the use of mass timber or noncombustible materials. These new types are based on the previous Heavy Timber construction type (renamed Type IV-HT) but with additional fire-resistance ratings and levels of required noncombustible protection.

The code will include provisions for up to 18 stories of Type IV-A construction for Business and Residential Occupancies.

Based on information first published in the Structural Engineers Association of California (SEACO) 2018 Conference Proceedings, this paper summarizes the background to these proposals, technical research that supported their adoption, and resulting changes to the IBC and product-specific standards.

Background: ICC Tall Wood Building Ad Hoc Committee

Over the past 10 years, there has been a growing interest in tall buildings constructed from mass timber materials (Breneman 2013, Timmers 2016). Around the world there

WoodWorks Tall Wood Design Resource

QUESTIONS?

This concludes The American Institute of Architects Continuing Education Systems Course.

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