Specifying Treated Wood

Paul I Morris, Group Leader – Durability and Protection
Presentation Outline

- Treated wood in the 2010 NBCC and other uses
- Overview of CSA O80 Series: Wood Preservation
- Understanding Use Categories 1 through 5A
- Products and Use Categories for specific exposures
- Treatment requirements for plywood and lumber
- Selecting species for strength, stability and treatability
- Selecting the appropriate preservative
- Pre- and post-treatment conditioning
- Third party quality assurance
- Appropriate and inappropriate product substitution
- Handling of treated wood to maximize durability
- Long term performance
Treated Wood in the 2010 NBCC

- Where wood is required to be treated to resist termites or decay, such treatment shall be in accordance with CSA O80.1-08, “Specification of Treated Wood” Table 2, “Use Categories for Specific Products, Uses and Exposures”

- Wood that is required to be treated to resist termites or decay shall be identified by a mark to indicate the type of preservative being used and conformance to the relevant required use category
In localities where termites are known to occur, clearance between structural wood elements and the finished ground level directly below them shall be not less than 450 mm and, except as provided in Sentence (2), all sides of the supporting elements shall be visible to permit inspection, or

structural wood elements, supported by elements in contact with the ground or exposed over bare soil, shall be pressure-treated with a chemical that is toxic to termites.
Treated Wood in the 2010 NBCC

Termite Infestation in Canada

- Southeast coast
- Vancouver Island,
  Sunshine Coast,
  Okanagan
- Winnipeg
- Southern Ontario
Treated Wood in the 2010 NBCC

- Structural wood elements shall be pressure-treated with a preservative to resist decay, where the vertical clearance between structural wood elements and the finished ground level is less than 150 mm* (see also Articles 9.23.2.2. and 9.23.2.3.), or

*Ground level always rises
Treated Wood in the 2010 NBCC

- Structural wood elements shall be pressure-treated with a preservative to resist decay, where:
  - the wood elements are not protected from exposure to precipitation,
  - the configuration is conducive to moisture accumulation, and
  - the moisture index is greater than 1.00.
Treated Wood in the 2010 NBCC

Canadian Locations with Moisture Index >1

Moisture Index:
- <0.7
- 0.7-0.85
- 0.85-1
- >1 Western BC, Gulf of St. Lawrence, Maritimes
Treated Wood in the 2010 NBCC

- Structural wood elements used in retaining walls and cribbing shall be pressure-treated with a preservative to resist decay, where
  - the retaining wall or cribbing supports ground that is critical to the stability of building foundations or
  - the retaining wall or cribbing is greater than 1.2 m in height.*

* Excludes most raised beds
Treated Wood in the 2010 NBCC

- Where wood is protected in accordance with UC1 or UC2 using an inorganic boron* preservative, the wood shall be
  - protected from direct exposure to water during and after the completion of construction, and
  - separated from permeable supporting materials by a moisture barrier that is resistant to all expected mechanisms of deterioration in the service environment if the vertical clearance to the ground is less than 150 mm.

* Extended exposure to rain causes leaching
Other Uses for Treated Wood

- Any wood structure exposed to rain where design life is more than a few years and
  - Safety is important
  - Appearance is important

- Any wood component in a building that may get wet and stay wet and
  - Is not easy to inspect
  - Is difficult to replace
Climate Change Increasing Decay Hazard

Scheffer Index
(T°, Rain)
1940s – 1970s*

*Scheffer 1971
Setliff 1986
Climate Change Increasing Decay Hazard

Scheffer Index
(T°, Rain)
1970s – 1990s*

*Morris & Wang 2008
Overview of CSA O80 Series

- Originally for industrial products
  - Poles, ties, bridge timbers, docks

- Rise of residential treated wood market required new standards
  - Decks, fences, gazebos
Overview of CSA O80 Series-08

Based on a Use Category System

- Matches level of treatment to decay/termite risk
  - Formalizes some earlier categories. Adds others
- Derived from USA AWPA standards
- Compatible with ISO 21887
  - Committee secretariat and chair were Canadian
- Designed to be more accessible to specifiers
  - Start at Table 1 to understand use categories
  - Go to Table 2 to locate products and uses
Understanding Use Categories

CSA O80.1 Table 1*
Use categories and associated service conditions

<table>
<thead>
<tr>
<th>Use Category</th>
<th>Service Conditions</th>
<th>Use Environment</th>
<th>Typical Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC1</td>
<td>Interior, above ground, dry</td>
<td>Protected from weather</td>
<td>Interior framing</td>
</tr>
<tr>
<td>UC2</td>
<td>Interior, above ground, damp</td>
<td>Protected but can be exposed to moisture</td>
<td>Sillplates</td>
</tr>
</tbody>
</table>

* Available at www.durable-wood.com
### Understanding Use Categories

CSA O80.1 Table 1
Use categories and associated service conditions

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</tr>
</thead>
<tbody>
<tr>
<td>UC3.1</td>
<td>Exterior above ground, coated</td>
<td>Protected by coating. Free draining</td>
<td>Coated millwork, siding, trim</td>
</tr>
<tr>
<td>UC3.2</td>
<td>Exterior above ground uncoated</td>
<td>Exposed to all weather cycles</td>
<td>Deck boards, joists, railing, fence boards</td>
</tr>
</tbody>
</table>
**CSA O80.1 Table 1**

Use categories and associated service conditions

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<th>Typical Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC4.1</td>
<td>Exterior ground contact</td>
<td>Exposed to all weather cycles</td>
<td>Fence and deck posts</td>
</tr>
<tr>
<td>UC4.2</td>
<td>Exterior ground contact Critical uses</td>
<td>Exposed to all weather. High decay potential</td>
<td>PWF, Utility Poles</td>
</tr>
</tbody>
</table>
Understanding Use Categories

CSA O80.1 Table 1
Use categories and associated service conditions

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<th>Use Environment</th>
<th>Typical Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC5A</td>
<td>Coastal waters including brackish water</td>
<td>Continuous salt water exposure</td>
<td>Piles, bulk-heads and bracing</td>
</tr>
<tr>
<td>UC5B</td>
<td>Not encountered in Canadian Waters</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Understanding Use Categories

- UC 1
- UC 2
- UC 3.2
- UC 4.1
Understanding Residential Product Groups

CSA O80.1 Clause 4.3.2

- Product Group A
- Above Ground, UC 3.2
- Thickness < 25mm
  - a) Easily inspected, light duty, appearance grade. Low decay potential. Design life not limited by decay.
  - b) Construction materials behind cladding such as battens for rainscreen or roofing.

- Products: Fence boards, rainscreen battens
- No contact with untreated wood, unless durable
  - Prevents direct attack by mycelium of decay fungi
Understanding Residential Product Groups

CSA O80.1 Clause 4.3.2

- Product Group B
- Above Ground, UC 3.2
- Thickness < 40mm
  - a) Turned, profiled, easily inspected, appearance grade. Low decay potential. Life not limited by decay.
  - b) Lumber < 150mm wide (excludes sillplates)
- Typical Products: Spindles, deck boards.
- No contact with untreated wood, unless durable
  - Prevents direct attack by mycelium of decay fungi
Understanding Residential Product Groups

CSA O80.1 Clause 4.3.2

- Product Group C
- Above Ground, UC 3.2
- Thickness < 40mm
- Width > 150mm
- Easily inspected (excludes sillplates)

- Typical Products: deck joists, ledger board
Understanding Residential Product Groups

CSA O80.1 Clause 4.3.2

- Product Group D
- Ground Contact, UC 4.1
- Thickness > 40mm < 155
- Easily inspected

- Typical Products: Fence and deck posts
Understanding Residential Product Groups

- Shallow penetration OK for above ground, low decay hazard, if cuts are field-treated.

- Structural and ground contact needs incising
Understanding Use Categories

- UC 1
- UC 2
- UC 3.2
- UC 4.1

Group A
Group C
Group B
Group D
Determining the Use Category for Products

- CSA O80.1 Table 2* (alphabetical)

<table>
<thead>
<tr>
<th>Product</th>
<th>End Use</th>
<th>Exposure</th>
<th>UC</th>
<th>Clause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batten-plywood</td>
<td>Rainscreen cavity</td>
<td>Above ground</td>
<td>3.2</td>
<td>9.7</td>
</tr>
<tr>
<td>Batten-sawn</td>
<td>Rainscreen cavity</td>
<td>Above ground</td>
<td>3.2</td>
<td>9.2.2.5</td>
</tr>
<tr>
<td>Bender board</td>
<td>General</td>
<td>Ground contact</td>
<td>4.1</td>
<td>9.2</td>
</tr>
</tbody>
</table>

* Available at www.durable-wood.com
Requirements for Plywood and Lumber

- Ten years ago it was simple
  - Preservative CCA
  - Penetration 10mm
  - Retention
    - Above ground: 4.0 kg/m³
    - Ground contact: 6.4 kg/m³
- New preservatives have various retentions
- New standards have various penetrations
- Today, don’t worry about penetration/retention
Specify

- Use Category ✔
- Residential product Group (if applicable) ✔
  - Excludes CCA
- Wood Species
- Preservative (ACQ and CA interchangeable)
- Post treatment conditioning (if applicable)
- Labeling as CSA compliant
- 3rd Party quality assurance (if available)
Selecting the Appropriate Wood Species

- **Strength**
  - Douglas fir is very strong but not very treatable

- **Stability**
  - Lodgepole pine is stable but not very treatable

- **Treatability**
  - Hemlock is treatable but not very stable
  - Pacific silver fir is very treatable but not as strong
Selecting the preservative

- Interior framing: SBX (borate)
- Residential lumber: ACQ or CA
- Shingles: CCA
- Plywood: CCA
- PWF: CCA
- Utility poles: CCA
- Bridge timbers: Pentachlorophenol
- Railroad ties: Creosote
- Piling: Creosote
Pre- and post-treatment conditioning

- Drying
  - Ideally air drying to 25% MC
  - Kiln drying can be too aggressive
- Incising
  - Perforation improves penetration
- Fixation
  - Required for CCA treated wood
- Re-drying
  - Normally required for borate treated framing
Quality Assurance

- November 2010: none of the material in the stores is certified as meeting CSA standards
- NBCC requires marking for CSA compliance
- QA available from various inspection agencies
- Third party QA by
  - Canadian Wood Preservers Bureau (Ontario)
  - CLSAB (Abandoned)
# Product Substitution

<table>
<thead>
<tr>
<th>Product</th>
<th>Substitute</th>
<th>OK</th>
<th>Not OK</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACQ</td>
<td>CA</td>
<td>Always</td>
<td></td>
</tr>
<tr>
<td>ACQ or CA</td>
<td>CCA</td>
<td>Plywood Shingles</td>
<td>Other residential</td>
</tr>
<tr>
<td>ACQ or CA</td>
<td>Borate</td>
<td>Indoors</td>
<td>Outdoors</td>
</tr>
<tr>
<td>CCA</td>
<td>ACQ or CA</td>
<td>Plywood Shingles</td>
<td>PWF</td>
</tr>
</tbody>
</table>
Care and Handling to Ensure Durability

- Where possible fabricate prior to treatment
- Ideally allow to air dry before installation
- Place uncut ends in ground contact
- Field treat all cut ends
- Cap tops of posts to shed water
- Apply water repellant if checking is a concern
Long Term Performance

How long does it last?

- Documented life in FPInnovations field tests when treated to CSA O80 Standards
  - CCA treated jack pine roundwood posts >>60 years
  - CCA treated WRC shingles/shakes >>30 years
  - CCA treated unincised hem-fir decking >>30 years
  - CCA treated incised SPF lumber in soil >>25 years
Long Term Performance

![Graph showing the long-term performance of different types of wood under various treatments. The graph displays the AWPA (American Wood Preservers Association) ratings over years of exposure for untreated white spruce, untreated western red cedar, and ACQ-D 6.4 kg/m³ treated wood. The ratings decrease linearly with increasing years of exposure for all treatments.]

- Untreated white spruce
- Untreated western red cedar
- ACQ-D 6.4 kg/m³
Any Questions