Preservative-Treated Wood: Copper Azole Treatment
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Upon completion of this course the designer will be able to:

1. Describe the pressure preservation process
2. Explain the evolution of copper azole preservative
3. Discuss the features and proper use of copper azole treated wood
4. List environmental benefits of preserved wood
Agenda

• Introduce copper azole (CA) and explain:
  – Types of wood treating preservatives available
  – How it is made
  – What it protects against
  – Where it is used
  – What drives decision on proper treatment retentions
  – Environmental benefits
What is Treated Wood?

- It is lumber or plywood that has been pressure-impregnated with a preservative, which makes the wood resistant to attack by termites and decay fungi.

- The preservative:
  - Reacts with the wood to resist leaching
  - Renders the wood less attractive as a food substance for wood-destroying organisms
  - Has been used effectively around the world for decades
History of Copper Azole

• Research and product development since the mid-1980s
• Commercially introduced in Germany in 1992
• Used commercially in more than 20 countries
• Available throughout North America
• Most widely used preservative worldwide
Copper Azole Preservative

Active ingredients:
• Copper (protects against termites and fungal decay)
• Azole (carbon-based protection against copper-tolerant fungi)
Regulation of Copper Azole Treated Wood

- Preservative not classified as a restricted use pesticide
- No special EPA precautions for handling the wood
- Can be disposed of in normal trash
Who has Recognized Copper Azole Treated Wood?

- American Wood Protection Association (AWPA) Standards and its Use Category System (UCS)
- Local building codes, evaluation reports
  - IRC – International Residential Code
  - IBC – International Building Code
- Internationally approved by government & trade agencies throughout Europe, Australia, New Zealand & Japan
Evolution of Copper Azole

- **CBA-A** (Copper Boron Azole type A)
  - Included boron
- **CA-B** (Copper Azole type B)
  - Copper + one azole as co-biocide
- **CA-C** (Copper Azole type C)
  - Copper + combination of two synergistic azoles
- **CA-C +**
  - CA-C + performance enhancers

**Type A** ➔ **Type B** ➔ **Type C**

Progression of development toward more desirable protection
Two Forms of Copper for CA-C

Copper in the preservative can be either dissolved in the solution or ground into fine particles (about micron size, one millionth of a meter) which are dispersed in the treating solution.

- **Dissolved copper — CA-C**
  Historical form of copper, it is dissolved into solution. This form, listed in Standards of American Wood Protection Association.

- **Micronized copper — MCA-C**
  Copper is finely ground and suspended in liquid. Wood treated with this form has been issued a code evaluation report.
For any preservative treatment, two measurements are especially important. They determine the amount of preservative protection and its depth.

- **Retention**
  Amount of preservative retained in wood in a specified assay zone (measured in pounds per cubic foot)

- **Penetration**
  Depth to which preservative enters wood

It is usually not essential for treatment to penetrate 100% of the cross-section of lumber.
Primary Requirements of any Preservative Treatment

• Know the use of the product when specifying the amount of preservative retention
  – Wood in above-ground usage may need less preservative

• Know the type of wood when specifying the amount of penetration
  – Some wood accepts preservatives more readily

• All wood species treated with CA-C chemistries must have an end cut solution applied during construction
For the two types of CA-C (dissolved and micronized), the following slide shows the minimum retention levels which are accepted by either AWPA or an evaluation report by third-party evaluator, ICC-ES. Retention of other preservatives will differ.

Different formulations need different amounts to do the same job. In general, less CA-C is needed than other current preservatives, resulting in less chemicals in the wood.
Retention Standards/Evaluations

<table>
<thead>
<tr>
<th>Application</th>
<th>Dissolved CA-C</th>
<th>Micronized CA-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above Ground</td>
<td>0.060 pcf</td>
<td>0.050 pcf</td>
</tr>
<tr>
<td>Ground and Freshwater Contact</td>
<td>0.15 pcf</td>
<td>0.14 pcf</td>
</tr>
<tr>
<td>Sawn Poles &amp; Posts</td>
<td>0.31 pcf</td>
<td>0.23 pcf</td>
</tr>
<tr>
<td>Permanent Wood Foundations</td>
<td>0.31 pcf</td>
<td>0.23 pcf</td>
</tr>
<tr>
<td>Accepted Standards/ Evaluations</td>
<td>AWPA U1</td>
<td>ICC-ES ESRs</td>
</tr>
</tbody>
</table>
Above Ground vs Ground Contact

The American Wood Protection Association passed changes to standards requiring pressure treated wood used in many physically above-ground applications be treated to Ground Contact requirements. International Code Council Evaluation Service (ICC-ES) will include these changes in its evaluation report. International Residential Code (IRC) requires treated wood to comply with AWPA standards.
Above Ground vs Ground Contact

Standards require the user (builder, consumer, or inspector) to select Ground Contact Treatment for physically above-ground material when:

- soil or other debris may build up and stay in contact with the wood
- there is insufficient ventilation to allow air circulation around the wood
- material is installed <6 inches above the ground on permeable building materials
- material is installed in contact with non-durable untreated or older construction with any evidence of decay
- wood is subject to frequent or recurring wetting
- used in tropical climates
- the wood is both:
  — difficult to maintain, repair or replace and
  — critical to the performance and safety of the entire system
Choose wood based upon the conditions of its intended use.

<table>
<thead>
<tr>
<th>Above Ground</th>
<th>Ground Contact</th>
<th>Ground Contact Heavy Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>above ground use</td>
<td>in ground or in contact with the ground or in instances where wood is expected to stay wet or not ventilated</td>
<td>for critical applications such as posts supporting permanent houses or other structures</td>
</tr>
<tr>
<td>applications where wood is expected to readily dry out between times it gets wet</td>
<td>in contact with debris and in fresh water</td>
<td>for areas with a severe decay hazard</td>
</tr>
<tr>
<td>areas of low or moderate decay hazard</td>
<td>for all critical supporting components (joists, etc.)</td>
<td>for critical structural applications where replacement is difficult</td>
</tr>
</tbody>
</table>
Treatable Species

- Southern Pine
- Ponderosa Pine
- Red Pine
- Hem-Fir
- Douglas Fir
- Western Hemlock
- Caribbean Pine
- Radiata Pine
- White Pine

Usually only one or two species available in a particular locale
For some of those species, a “penetration improvement method,” such as incising, may be necessary. Incising involves cutting a pattern of slits into the wood surface. It is mostly western and northern species which require incising.

The manufacturer incises the wood prior to treatment based on the absorption properties of a particular species.
Copper azole treatment imparts less color than traditional treatments. Some treating companies add a colorant to the treating solution to distinguish treated from untreated lumber.

Primary Characteristics

- Long-lasting
- Odorless
- Clean appearance
- Weathers to a honey brown and eventually grays
Applications for CA-Treated Wood

- Agricultural
- Commercial
- Residential
  - Decks & fences
  - Landscaping
  - Boardwalks
  - Access ramps
  - Park shelters, gazebos
  - Pedestrian bridges
  - Docks and freshwater structures
Is It Economical?

• Less expensive than:
  − Wood/plastic composites
  − Plastics
  − Tropical hardwoods
  − Naturally resistant grades of redwood & cedar
Options

• Grade of lumber
  Grades differ. Specify grade or appearance desired. Clear, knot-free lumber is rarer and more expensive than rustic grades, but has performance and appearance benefits.

• Built-in water repellent
  Helps prevent early moisture damage, cracking, warping.

• Re-drying after treatment
  Removes moisture under controlled conditions at treating plant and allows for immediate painting. May be KDAT (Kiln Dried After Treatment) or ADAT (Air Dried After Treatment).
Production of CA-Treated Wood

As with other treatments, common species of lumber, timbers and plywood are loaded onto trams and pushed into a large horizontal treating cylinder.
The Treating Plant

Step 1
Dry wood is loaded into cylinder

Step 2
Initial vacuum pulls out air

Step 3
Liquid preservative fills cylinder
Step 4
Pressure forces preservatives into wood

Step 5
Remaining liquid emptied for later use

Step 6
Final vacuum removes excess liquid
Quality Control

There are several measures, taken by the treating companies and by outside agencies, to make sure that wood is properly treated. Borings are drilled from each batch of wood and used to determine if requirements for retention and penetration were met.
Quality Control throughout Entire Process

- Treating plant treats to required AWPA standards and ICC-ES evaluations
- In-plant analysis of borings at treating facility to determine if the requirements for retention and penetration are met
- Independent third-party audit program
How Do I Specify?

For any given project, the design professional specifies treated wood. The manufacturer and supplier will be able to assist the professional with specification for Copper Azole water-borne preservatives based on AWPA, NIST and ICC requirements.

For quality assurance, the design professional should specify that the treatment facility will provide the treated materials produced under an inspection program conducted by an ALSC-recognized agency.
Environmental Benefits of Treated Wood

- Wood is a renewable resource
- Treated wood is made from plentiful, fast-growing trees grown in managed timberlands
- Preservatives extend forest resources
- Low-energy requirements for forest growth
- Growing trees absorb carbon dioxide and wood products embody carbon – reducing greenhouse gas
- Preservative made in part from recycled materials
- Tread wood can be recycled for several uses
• CA-treated wood can be an environmentally sound strategy for pest management.

• CA-treated wood increases the longevity and durability of wood.

• CA-treated wood is sustainable and reduces carbon footprint.

• CA-treated wood provides thermal, acoustic, and electrical insulation value.
Warranty for Residential Uses

• Limited to original owner
• Residential and agricultural applications
• Full replacement of wood for failure due to fungal decay or termite attack when proper retention is used for intended application
• Does not cover warping, cracking, or other effects of moisture
• Does not cover lumber used improperly
• Other terms and conditions apply
General Safety and Handling
Precautions for Wood Products

- Do not burn treated wood except in approved commercial incinerators
  - Ordinary trash disposal
- Treated sawdust and shavings not recommended for composting, mulching or animal bedding
- Wear dust mask and goggles when cutting or sanding wood
- Wear gloves when working with wood
- Wash hands after working with wood
Construction Tips

• Butt boards together during construction to allow for initial shrinkage of treated wood (unless wood is kiln dried after treatment)

• Reduce splitting by pre-drilling holes

• Avoid excessive spans to minimize springiness and warping

• Liberally coat all end cuts, holes or other intrusions in the wood with end cut solution
Maintenance

• No maintenance needed for resistance to fungi and termites
• Apply water repellent periodically for protection against moisture damage
• You can paint or stain copper azole treated wood when it is thoroughly dry
• Coatings manufacturers’ recommendations should be followed
• To revitalize a dingy appearance caused by dirt and mildew, use deck cleaner or pressure washer
The copper-based preservatives can be somewhat more corrosive to hardware because of the galvanic reaction between dissimilar metals. However, with properly protected fasteners and connectors, this need not be a problem.

- Fastener manufacturer recommendations should be followed
- Hardware should be hot-dipped galvanized steel or equally well-protected, meeting ASTM A 153 (fasteners) and ASTM A 653 Class G185 (connectors)
Fasteners

• For Permanent Wood Foundations use 304 or 316 stainless steel
• 2” lumber: 12d nails or 3” screws
• 5/4 decking: 10d nails or 2 1/2” screws
• Screws should be used for added stability
• Check with manufacturers concerning direct contact with aluminum
• Wet applications as well as near salt water or air should use stainless fasteners
• Heavy retention may require stainless hangers as well as fasteners
Aluminum and Copper

Dissimilar metals such as Aluminum and Copper will react to each other and cause premature corrosion. To avoid this natural galvanic reaction between treated wood products and aluminum flashings, fasteners, etc., a water proof barrier may be specified to separate these surfaces.

Aluminum flashing (3015 or similar alloy) may be used in contact with MCA-C treated wood in interior or exterior, above ground applications that are damp or intermittently wet.
Summary

• Copper Azole provides long-lasting protection against termites and fungal decay
• Proven around the world
• Clean, odorless
• Economical
• Ideal for residential, commercial, and institutional projects
• Environmentally sound
In Conclusion

Now, the designer will be able to:
1. Discuss the features and uses of Copper Azole treated wood
2. Describe the pressure preservation process
3. List environmental benefits of preserved wood
4. Have a clear understanding of where to use both Above Ground and Ground Contact wood