Selection and Use of Preservative-Treated Wood
Copyright

This presentation is protected by US and International copyright laws. Reproduction, distribution, display and use of the presentation without written permission of the speaker is strictly prohibited.
Learning Objectives

Upon completion of this course the designer will be able to:

1. Identify the characteristics of treated wood products
2. Understand the standards governing the proper use of treated wood
3. Identify the correct material for any outdoor project
4. Discuss specific requirements for installation of treated wood
Agenda

- Characteristics of Wood
- Understanding Treated Wood Standards
- How to Select the Right Treated Wood
- How to Properly Install Treated Wood
Characteristics of Wood

Environmental Features

- Renewable resource
- Plentiful, rapidly replenished species
- Reduced greenhouse gases
- Grown on managed timberlands
- Less energy to produce
- Greater insulation
- Lighter weight
Characteristics of Wood

- Multiple rings
- Cross-oriented fibers
- Natural taper
Characteristics of Wood

Heartwood

Sapwood
What is Treated Wood?

Lumber or plywood that has been pressure-impregnated with a preservative, which makes the wood resistant to attack by termites and decay fungi.
Residential Treatment Products
Timeline

- **1933**: Introduction of CCA
- **1940**: Development of CBA
- **1984**: Introduction of CBA
- **1990**: Withdrawal of CCA from residential market
- **2000**: Introduction of CA-C & µCA-C
- **2003**: Development of enhanced technology
- **2008**: Introduction of CA-C and µCA-C with enhanced technology
- **2011**: Development of enhanced technology
- **2014**: Introduction of CA-C and µCA-C with enhanced technology
Treated Wood Standards

- **Building codes** – local codes based on model codes, International Residential Code (IRC) and International Building Code (IBC), from International Code Congress

- **American Wood Protection Association (AWPA)** – ANSI-accredited voluntary, consensus-based organization that sets wood preservation and treated wood standards

- **Evaluation Reports (ICC-ES)** – provide technical evaluation of code compliance for review by local officials
Treated Wood Standards

For any preservative treatment, two measurements are especially important

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

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

*An assay zone as defined by the American Wood Protection Association is the portion of a treated wood item where the minimum quantity of preservative is specified and is to be determined.
Treated Wood Standards
Retentions

- Minimum retention levels are set by either AWPA or an ICC-ES evaluation report
- Retention will differ depending on the preservative used
- Different formulations need different amounts to do the same job
- Different retentions are set for different uses
Treated Wood Standards
Use Categories

- Each piece of treated wood has an end tag that lets you know which use category the wood is meant to be used in.
- Wood is treated with different amounts of preservative (retentions) for different uses.

**AWPA**: set forth in standard U1
**ICC-ES**: set forth in Evaluation Service Reports
Treated Wood Standards
Reading the Label

- **Use category**
- **Preservative**
- **Trademark of ALSC-accredited agency**
- **Retention level**
- **Treating company & plant location**

**Limited Warranty**

**Product Logo**

**UC4A GROUND CONTACT GENERAL USE**

- 0.15 pcf CA-C
- AWPA U1
  
**PLANT NAME Location**

**2016**

**2017**
Treated Wood Standards

AWPA Use Categories for Exterior Applications

The Use Category System (UCS) of the American Wood Protection Association (AWPA) designates what preservative systems and retentions have been determined to be effective in protecting wood products under specified exposure conditions.

- **UC3A / Above Ground - Protected**
  Wood and wood-based materials used in exterior construction that are coated and not in contact with the ground. Such products may be exposed to the full effects of weather, such as vertical exterior walls or other types of construction that allows water to quickly drain from the surface.

- **UC3B / Above Ground - Exposed**
  Wood and wood-based materials used in exterior construction and not in contact with the ground. Materials do not require an exterior coating, but may be finished to achieve a desired aesthetic appearance. See Note regarding components that may be required to be treated for Ground Contact even though they are installed above ground.

- **UC4A / Ground Contact - General Use**
  Wood and wood-based materials (1) used in contact with the ground, fresh water, or other situations favorable to deterioration; (2) used above ground but are difficult to maintain, repair or replace and are critical to the performance and safety of the entire system / construction; or (3) used above ground but may end up in ground contact or are subject to hazards comparable to ground contact due to climate, artificial or natural processes or construction. See Note regarding physically above ground components that shall be treated to Ground Contact or higher.

- **UC4B / Ground Contact - Heavy Duty**
  Wood and wood-based material used in contact with the ground either in severe environments, such as horticultural sites, in climates with a high potential for deterioration, in critically important components such as utility poles, building poles and permanent wood foundations, and wood used in salt water splash zones. This category includes utility poles used in moist temperate climates.
Treated Wood Standards
ICC-ES Acceptance Criteria

- ICC-ES utilizes the same definitions for its end use categories
  - Categories are listed in their Acceptance Criteria for treated wood - AC326
  - Incorporated into individual ICC-ES Evaluation Reports
Treated Wood Standards

Use Categories

- The same use categories apply to all treated wood, regardless of which preservative system is used

- Use categories define **conditions** in which wood is intended to perform, not locations
  
  - Our use categories are currently *named* based on commonly used words for physical locations
  
  - BUT, they are intended to refer to a set of conditions or hazards
  
  - Titles are not physical descriptions of how the material can be used
How to Properly Choose Treated Wood

To obtain the maximum performance out of treated wood, you need to choose material that is appropriate for the conditions in which it will be used.
How to Properly Choose Treated Wood

Understanding Above Ground and Ground Contact Use Categories

- Wood preservatives are tested for their ability to protect wood from decay in a specified set of conditions.

- Wood treated to **Above Ground** retentions:
  - Is only tested to perform in environments with a lower risk of decay
    - Material is exposed only to fungal spores, not direct fungal hyphae attack
  - Is limited in how and where it can be used

- Wood treated to **Ground Contact** retentions:
  - Is designed to perform in environments with more severe decay or termite attack
    - Material is exposed to direct fungal hyphae attack
  - Can be used in many more applications
How to Properly Choose Treated Wood
Traditional Ground Contact Uses

- Fence, deck or dock posts
- Stair stringers
- Planter boxes
Proper Selection of Treated Wood
Critical and Difficult to Replace Components

UC4A (Ground Contact) definition:

Wood and wood-based materials used ... above ground but are difficult to maintain, repair or replace and are critical to the performance and safety of the entire system.

“joists and beams for decks and freshwater docks” are examples of critical and difficult to replace materials.

AWPA Table 2-1 references “joists and beams for decks and freshwater docks” as a typical application in both the UC3B (Above Ground) and UC4A (Ground Contact) Use Categories.

Footnote gives guidance on when these items should be treated to UC3B or UC4A:

“Joists and beams shall be treated to requirements for UC4A when they are difficult to maintain, repair or replace and are critical to the performance and safety of the entire system/construction.”
Proper Selection of Treated Wood

Critical and Difficult to Replace Components

Joists, beams and ledger boards supporting decks and docks and many other structures are both difficult to maintain, repair or replace and are critical to the performance and safety of a structure and should be treated to Ground Contact retention.
Proper Selection of Treated Wood
Ground Contact Type Hazards

UC4A (Ground Contact) treatment is required for a number of physically above-ground uses that present ground contact type decay hazards, including:

1. When soil or other debris may build up and stay in contact with the wood
2. When there is insufficient ventilation to allow air circulation around the wood
3. When installed <6 inches above ground on permeable building materials
4. When installed in contact with non-durable untreated or older construction with any evidence of decay
5. When subject to frequent or recurring wetting
6. When used in tropical climates
Debris that builds up over time can block air flow & be a source of decay

Examples:

- Leaves, raised bedding where the soil is allowed to contact the wood
- Bottom of a fence where mulch accumulates
- Low level walkways that get covered by dirt, leaves, grass, etc.
Proper Selection of Treated Wood

Ground Contact Type Hazards

Insufficient ventilation

- Ventilation can only be evaluated on a project-specific basis depending on construction practices
- Common culprits: wrapped decks, low level decks
- Also of concern: some under deck systems that do not have allowance for ventilation (e.g., hanging 4-5” below rafters)
Proper Selection of Treated Wood
Ground Contact Type Hazards

Material <6 inches above ground on permeable building materials

- “Permeable building materials” includes treated or untreated wood, concrete block, masonry
- “Ground” includes water, concrete slab
- Examples:
  - decking on low level docks or decks
  - stair stringers that land on concrete
  - posts supported by concrete bases
Proper Selection of Treated Wood
Ground Contact Type Hazards

Material in contact with non-durable, untreated, or older construction with any evidence of decay

- Decks attached to older construction if the original structure does not have treated material surrounding the floor joists (rim boards)
- Deck rebuilds – new joists installed next to old ones with decay (including cedar, treated, or other material)
- Evidence of decay: obvious fungal bracts, soft & punky, covered with white or black mold
Proper Selection of Treated Wood
Ground Contact Type Hazards

Frequent or recurring wetting

- If the material will not readily dry out after it gets wet, it is considered a ground contact hazard
  - Wood treated to Above Ground retention is not preserved to last in situations where it is constantly wet
- Examples of possible frequent wetting:
  - Constant soaking or malfunction from sprinklers, large planters that do not have a catch pan to collect draining liquids
  - Any low level or floating dock
  - Decking on docks that have the potential to be submerged in a storm event or frequently wet by waves or wakes
Proper Selection of Treated Wood
Ground Contact Type Hazards

Locations considered “tropical climates”

- Most commonly in our region:
  - Hawaii
  - Caribbean
  - Central America
  - Northern parts of South America
  - None in the continental US or Canada

- Would apply to similar climates elsewhere across the globe

- In regions with both tropical and non-tropical climates, supply to tropical standards to ensure the proper product is available
Ground Contact, Heavy Duty / UC4B treated wood should be used for:

- Posts supporting buildings and other permanent structures (house, sunroom, barn, garage)
- Permanent wood foundations
- Saltwater splash applications
How to Properly Choose Treated Wood

- Standards permit treaters to treat and label any piece of wood for Above Ground, Ground Contact or Ground Contact Heavy Duty.

- Language requires a decision by the user as to whether one of these conditions applies.

- Unless using wood as a post supporting a permanent structure, when in doubt, use Ground Contact.
  - If treated wood is used in more hazardous conditions than it was intended for, it may not perform as expected.
  - Risk of misuse, and therefore lack of performance is higher with Above-Ground treated wood.
How to Properly Choose Treated Wood

Additional Options and Features

Grade of lumber

Grades differ. Specify grade or appearance desired. Clear, knot-free lumber is harder to find and more expensive than rustic grades, but has performance and appearance benefits.
How to Properly Choose Treated Wood
Additional Options and Features

Built-in water repellent
Helps reduce early moisture damage, cracking, warping

Moisture causes wood to swell. Then, as the wood dries, it shrinks. This ongoing cycle causes stresses in the wood, which lead to warping and cracking.
How to Properly Choose Treated Wood
Additional Options and Features

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)
How to Properly Install Treated Wood Fencing

- Provide adequate spacing under the fence boards to ensure airflow and drying
- Fencing should not contact the ground, debris, or vegetation
- Fence posts should be treated to Ground Contact retention

Examples of improper installation and use in fencing.
How to Properly Install Treated Wood

Installation Practices

- Separate deck boards to allow for expansion and contraction:
  - Heavy and wet: ~1/16”
  - Light and dry: ~1/8”-1/4”
- Reduce splitting by pre-drilling holes
- Avoid excessive spans between joists to minimize springiness and warping
- Check building codes for maximum cantilevers allowed
- Ensure sufficient under deck ventilation for Above Ground treated deck boards
- Place only original factory treated ends of posts in contact with the ground
- Cover upper ends of posts with post caps or cut them at an angle to shed water (and treat with end cut solution)
How to Properly Install Treated Wood

Recommended Hardware

IRC 2012
R317.3: Fasteners and connectors in contact with preservative-treated and fire-retardant-treated wood. Fasteners, including nuts and washers, and connectors in contact with preservative-treated wood and fire-retardant-treated wood shall be in accordance with this section. The coating weights for zinc-coated fasteners shall be in accordance with ASTM A 153.

R317.3.1 Fasteners for preservative-treated wood. Fasteners, including nuts and washers, for preservative treated wood shall be of hot-dipped, zinc-coated galvanized steel, stainless steel, silicon bronze or copper. Coating types and weights for connectors in contact with preservative-treated wood shall be in accordance with the connector manufacturer’s recommendations. In the absence of manufacturer’s recommendations, a minimum of ASTM A 653 type G185 zinc-coated galvanized steel, or equivalent, shall be used.

Exceptions:
1. One-half-inch-diameter (12.7 mm) or greater steel bolts.
2. Fasteners other than nails and timber rivets shall be permitted to be of mechanically deposited zinc-coated steel with coating weights in accordance with ASTM B 695, Class 55 minimum.
3. Plain carbon steel fasteners in SBX/DOT and zinc borate preservative-treated wood in an interior, dry environment shall be permitted.

R317.3.2 Fastenings for wood foundations. Fastenings, including nuts and washers, for wood foundations shall be as required in AF&PA PWF.
How to Properly Install Treated Wood

Field Treatment

Building codes reference AWPA standard M4 for field treatment of all end cuts during construction

- Liberally coat all cut ends, holes or other intrusions into the wood with a suitable wood preservative product
- Use a product containing a minimum of 0.675% copper as oxine copper or 1% copper as copper naphthenate

6.2 Lumber and timbers.
Lumber, timber and decking used in structural applications shall be field treated in accordance with Section 6.1 when cut or drilled during construction. For best durability it is recommended that all cut surfaces be field treated, regardless of application.
How to Properly Install Treated Wood

Maintenance

- No maintenance is needed for resistance to fungi and termites
- Apply water repellent periodically (every year or two) for protection against moisture damage
- Paint or stain treated wood when it is thoroughly dry – follow coatings manufacturers’ recommendations
- To revitalize a dingy appearance caused by dirt and mildew, use deck brightener or a pressure washer