

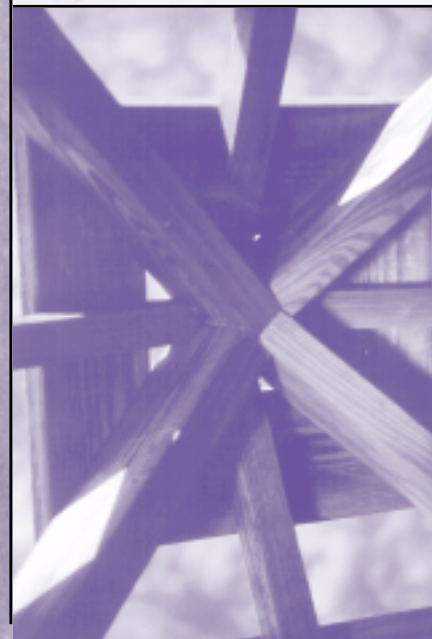


Western Wood Preservers Institute

GUIDE

TO THE CHARACTERISTICS, USE AND SPECIFICATIONS OF

Pressure
Treated
Wood



PURPOSE OF GUIDE

The purpose of this guide is to make available to architects and engineers pressure-treated wood specifications that are recognized and accepted throughout industry. As a service to specifiers, WWPI has assembled information and answers to questions on uses, selection and specifications for pressure-treated wood.

WWPI

WESTERN WOOD PRESERVERS INSTITUTE

WWPI's purpose is to expand the knowledge, acceptance, and use of pressure-treated wood. Established in 1947, the Western Wood Preservers Institute represents the pressure-treated wood industry in western North America. WWPI staff provide information on uses, selection, and specification for pressure-treated wood to consulting engineers, architects, specifiers, contractors, government agencies, port authorities and others.

The Western Wood Preservers Institute believes the information contained herein to be based on up to date scientific and economic information and is intended for general informational purposes. In furnishing this information the Institute makes no warranty or representation, either expressed or implied, as to the reliability or accuracy of such information; nor does the Institute assume any liability resulting from use of or reliance upon the information by any party. This document should not be construed as a specific endorsement of warranty, direct or implied, of treated wood products or preservatives in terms of performance, environmental impact, or safety. The information contained herein should not be construed as a recommendation to violate any federal, state or municipal law, rule or regulation, and any party using or producing pressure-treated wood products should review all such laws, rules or regulations prior to using or producing treated wood products.

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FOUNDATION PILING FOR LAND AND FRESHWATER USE

INTRODUCTION

Timber piles have been used to support structures for more than 6,000 years. In the U.S., there is documentation of pressure-treated timber piling with service life of over 90 years. Today, engineers and contractors depend on pressure-treated wood piling to support commercial and industrial buildings, highway bridges, multi-family housing and many other structures.

Extensive load tests have been performed on pressure-treated timber foundation piles in recent years. Design loads as high as 70 tons have been specified, and ultimate loads as high as 235 tons have been carried.

Many soils have insufficient bearing strength and are able to provide footing support for only lightweight structures. Pressure-treated foundation piles provide an economical solution to these foundation situations.

ALLOWABLE UNIT STRESSES IN TIMBER FOUNDATION PILES

Allowable unit stresses prescribed in the Uniform Building Code are shown for Douglas Fir, treated round timber poles and piles.

Species	Compression Parallel to Grain	Extreme Fiber in Bending	Horizontal Shear	Compression Perpendicular to Grain	Modulus of Elasticity
Pacific Coast Douglas fir	1250	2450	115	230	1,500,000

Design values in compression parallel to the grain for Coastal Douglas Fir may be increased 0.20 percent for each foot of length from the tip of the pile to the critical section up to a maximum of 10 percent for any single pile. This increase in a section property is due to taper from the pile tip to the critical section.

Coastal Douglas Fir includes Douglas Fir from west of the crest of the Cascade Mountains in Oregon, Washington and Northern California and west of the Sierra Nevada Mountains in the rest of California. For fastener design, use Douglas Fir-larch design values.

The form factor for bending members of circular cross section is incorporated in the allowable unit stresses for extreme fiber in bending as listed within the table.

The allowable values for compression parallel to grain and extreme fiber in bending are based on load sharing principals such as occur in a pile cluster. For piling which support their own specific load, an additional safety factor of 1.25 shall be used with compression parallel to grain values and an additional safety factor of 1.30 shall be used with extreme fiber in bending values.

GUIDE SPECIFICATION

PRESSURE TREATING AND PILE QUALITY STANDARDS

- A. AWPA C1: All Timber Products, Preservative Treatment by Pressure Process
- B. ASTM D25: Round Timber Piles
- C. AWPA C3: Preservative Treatment of Piles by Pressure Processes
- D. AWPA M4: Standard for the Care of Pressure-treated Wood Products
- E. AWPA M6: Brands used on Forest Products.
- F. AASHTO M-168: Standards Specifications for Structural Timber, Lumber and Piling

MATERIALS

A. Piles: Pressure-treated, freshly clean-peeled Douglas Fir, ASTM D25, pressure impregnated in accordance with AWPA C3 for land and fresh water piles. Piles to be 1250 psi minimum allowable compressive strength parallel to grain. For butt and tip circumferences for friction and end bearing piles, refer to ASTM D25

B. Branding: All piles to be branded. (Normally the company brands cover the requirements of AWPA M6.)

C. Foundation piling to bear approved quality mark by accredited ASLC third party agency to assure treatment is in conformance with appropriate AWPA Standards.

D. Banding: Piles loaded 30 tons or more to be banded after treatment with 1.5" wide and 0.031" thick, cold-rolled, fully heat-treated high-tensile straps having a tensile strength of at least 5,000 pounds. Clips should be 2.5" long, 20-gauge, and the seal crimped twice. Straps should encircle the pile once, be located approximately 18" and 24" from the butt and 6" from the tip, and be tensioned as tightly as possible.

INSTALLATION

- A. Prevent surface damage to treated piles
- B. Treat repairs to treated piles in accordance with AWPA M4
- C. Driving: When there is excessive resistance to driving piles, use jetting, boring, or spudding.

MARINE PILING

INTRODUCTION

Wood has been used in and around salt water for centuries. Various types of pressure treatments assure long-life performance and resistance to corrosive salt water conditions

A resilient material, pressure-treated wood resists battering by wind, waves, storms, tides, and man-imposed loads. Pressure-treated wood also prevents serious ship damage and is frequently used in bulkheads, terminals, marinas, dolphins, wing walls and fenders.

In coastal waters where marine borers are present, the piling must be treated with a preservative that will resist the local borer hazard.

GUIDE SPECIFICATION

PRESSURE TREATING AND PILE QUALITY STANDARDS

- A. AWWA C1: All Fiber Products, Preservative Treatment by Pressure Process
- B. AWWA C3: (Marine Piles) Preservative Treatment of Piles by Pressure Processes
- C. AWWA C18: Standard for Pressure-Treated Material in Marine Construction
- D. AWWA M4: Standard for the Care of Pressure-Treated Wood Products
- E. AWWA M6: Brands Used on Forest Products
- F. ASTM D25: Round Timber Piles
- G. BMPs: Best Management Practices for the Use of Treated Wood in Aquatic Environments (see Section 9)

MATERIALS

A. Quality assurance: All piling to be inspected by an independent inspection agency under the supervision of the American Lumber Standards Committee.

B. Banding: Piles loaded 30 tons or more must be banded after treatment with 1.5" wide and 0.031" thick, cold-rolled, fully heat-treated high tensile straps having a tensile strength of at least 5,000 pounds. Clips must be 2.5" long, 20-gauge, and the seal crimped twice. Straps should encircle the pile once, be located approximately 18" and 24" from the butt and 6" from the tip, and be tensioned as tightly as possible.

INSTALLATION

A. Handling: To conform to the provisions of AWWA Standard M4.

B. Driving: When there is excessive resistance to driving piles, use jetting, boring, or spudding.

NOTE TO SPECIFIERS

1. Moderate Borer Hazard:

On the Pacific Coast north of San Francisco where *Teredo* attack is expected and where *Limnoria tripunctata* is not expected.

2. Severe Borer Hazard:

On the Pacific Coast, San Francisco and south where *Teredo* and *Limnoria tripunctata* are expected and where *pholad* attack is not expected; in tropical waters where *Limnoria tripunctata* and wood-boring *pholad* attack are expected, such as Hawaii, the Caribbean, or off the Mexican coastline.

3. On the eastern seaboard the line between moderate and severe borer hazard is usually drawn at Norfolk, Virginia.

4. For size of piling refer to ASTM D25. Consult your supplier for the most economical sizes available.



BUILDING POLES

INTRODUCTION

Pole construction makes building on difficult sites economically feasible. Pressure-treated poles can help provide dramatic design solutions to building problems on hillsides, and anywhere there is a desire to maintain the natural setting and reduce building costs.

The performance and extended service life of pole frame buildings have been widely documented by farmers across the land. In the past fifty years, pole structures have been used extensively in agricultural construction. Uses include warehouses, bulk storage buildings, barns and equipment storage, as well as residential construction.

Wood pole structures are resilient and provide resistance to high wind loads, earthquakes and hurricanes. Building costs are reduced as less site preparation is required.

GUIDE SPECIFICATION

PRESSURE TREATING STANDARDS

- A. AWPA C1: All Timber Products, Preservative Treatment by Pressure Process
- B. AWPA C16: Wood Used on Farms — Pressure Treatment
- C. AWPA C23: Round Poles and Posts used in Building Construction — Pressure Treatment

MATERIALS

A. Poles or posts in building construction (see Note 1): Poles or posts to meet the physical requirements of ANSI Standard O5.1 and the supplemental requirements of AWPA C23. Poles or posts to be Douglas Fir or Ponderosa Pine and are to be treated in accordance with AWPA C23.

B. Poles or posts for less restrictive uses (see Note 2): Poles or posts to meet the physical requirements of ANSI Standard O5.1. Poles and posts to be Douglas Fir, Ponderosa Pine or Lodgepole Pine and are to be treated in accordance with AWPA C16.

C. Poles or posts to bear approved quality mark by accredited ALSC third party inspection agency to assure treatment is in conformance with appropriate AWPA standards.

NOTES TO SPECIFIERS

1. Use in construction, where replacement would be difficult or impossible, or anticipated use of the building requires exceptional durability.
2. For less restrictive applications refer to AWPA C16.
3. Building pole sizes are classified by top diameter and length. Top diameters shall be specified in 1" increments, lengths in 2' increments in poles 30' with 5' increments in poles over 30'.
4. Butts and tips will be cut square unless otherwise specified. When measured at their extreme ends, poles will not be shorter than specified, but may be up to 3" longer.
5. Handling, fabrication, field treating and disposal of cutoffs shall be in conformance with AWPA M4.

LUMBER AND PLYWOOD

INTRODUCTION

Damage from decay and insect attack can affect a building's structural system. The most critical areas for decay and termite protection are those near or in contact with the ground or where excessive moisture is present in the structure.

Building codes recognize pressure-treated wood as a permanent material. Building codes require that wood embedded in the ground or in direct earth contact and used for support of permanent structures be pressure-treated.

GUIDE SPECIFICATION

PRESSURE TREATING STANDARDS

- A. AWPA C1: All Timber Products, Preservative Treatment by Pressure Process
- B. AWPA C2: Lumber, Timbers, Bridge and Mine Ties — Pressure Treatment
- C. AWPA C9: Plywood — Pressure Treatment
- D. AWPA C31: Lumber used out of contact with ground and continuously protected from liquid water — Pressure Treatment

MATERIALS

A. Lumber: Specify species and grade. Treatment to be in accordance with AWPA C2 or C31.

B. Plywood: Specify exterior type plywood meeting PS-1 and grade for end use required. Treatment to be in accordance with AWPA C9.

C. Pressure-treated lumber and plywood to bear approved quality mark by an accredited ALSC third party inspection agency to assure treatment is in conformance with appropriate AWPA standards.

NOTES TO SPECIFIERS

1. Treating standards require all lumber except Ponderosa, Red or Southern Pine, 2" or greater in thickness, to be incised prior to treating. Incising is a process in which wood is perforated to increase penetration of the preservative.
2. To the extent possible, specify material to be cut to finished dimensions before treatment.
3. With waterborne preservatives, it may be desirable to specify kiln-drying after treatment to a 19% moisture content or less.
4. Refer to Recommended Retentions for materials exposed to salt water conditions.
5. Handling, fabrication, field treating and disposal of cutoffs shall be in conformance with AWPA M4.

PERMANENT WOOD FOUNDATION

INTRODUCTION

Wood foundations save time and money and permit construction in cold weather. The system is simple with foundation stud and plywood walls made from pressure-treated wood and usually supported on gravel.

Even in freezing conditions, foundation construction can continue without delays. Some installers have reported construction cost savings as high as 25% over concrete or masonry foundations.

This engineered system has been extensively tested and proven with almost three decades of research and use. It is recognized by all of the major model building codes. Some 300,000 structures around the country are now anchored on Permanent Wood Foundations.

GUIDE SPECIFICATION

PRESSURE TREATING STANDARDS

- A. All Timber Products, Preservative Treatment by Pressure Process
- B. AWPA C22: Lumber and Plywood for Permanent Wood Foundation -- Pressure Treatment

MATERIALS

A. Plywood: Exterior- or interior-type bonded with exterior glue. Each piece to bear an inspection grademark showing manufacturing compliance with U.S. Product Standard PS 1.

B. Lumber: Specify species and grade (see Note 1). All lumber to bear an inspection agency grademark showing species and grade. All lumber species except Ponderosa, Red or Southern Pine, 2" or greater in thickness to be incised.

C. Pressure Treatment: Use only Ammoniacal Copper Zinc Arsenate (ACZA), Chromated Copper Arsenate (CCA) or Ammoniacal Copper Quat (ACQ) for treatment. Treatment with these preservatives to meet requirements of AWPA Standard C22. Kiln-drying after treatment is required to moisture content of 19% for each piece of lumber and 18% for plywood. All lumber and plywood to be free of visible surface deposits.

D. Each piece of lumber and plywood to bear approved quality mark by an accredited ALSC third party agency to assure treatment is in conformance with appropriate AWPA Standards.

NOTES TO SPECIFIERS

1. Lumber species that may be used are the following: Douglas Fir, Western Hemlock, Ponderosa Pine, Lodgepole Pine, Red Pine, Alpine Fir, Southern Pine.

2. Additional information on the PWF including design, fabrication, installation, preservative treatment, quality assurance, and code acceptance may be found in the following publications:

- APA Design/Construction Guide
- AFPA Design Fabrication & Installation Manual
- AFPA Technical Report No. 7
- AWPA Book of Standards
- Uniform Building Code

3. Handling, fabrication, field treating and disposal of cutoffs shall be in conformance with AWPA M4.

GLUED LAMINATED TIMBERS

INTRODUCTION

The desire for a better and more attractive environment has increased the need for wood structural members in parks, marinas, footbridges and other outdoor applications. Wood light standards, walkways, footbridges and bridges for vehicular traffic in parks or forest locations are important uses of pressure-treated wood. These uses are increasingly satisfied with glued laminated members.

The Uniform Building Code requires structural glued laminated timbers exposed to the weather to be preservative treated. Where high humidity exists, such as swimming pool enclosures, wood structural members should also have pressure-treated glulam members.

GUIDE SPECIFICATION

PRESSURE TREATING STANDARDS

- A. All timber Products, Preservative Treatment by Pressure Process
- B. AWPA Standard C28: Pressure Treatment of Structural Glued Laminated Members

MATERIALS

A. Structural laminated timbers: Conform to the manufacturing and inspection requirements of the appropriate UBC or ANSI/ATTC standards. Pressure treatment to be in accordance with AWPA C28.



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FIRE RETARDANTS EXTERIOR AND INTERIOR USE

INTRODUCTION

Fire-retardant (FRT) wood offers the designer an attractive and safe alternative to steel and concrete. Fire retardant treatments provide immediate protection from a fire source without reliance on water pressure, electrical sensors or relays that may fail to activate fire suppression systems.

Interior fire retardants meet Class I ratings which are required by codes in vertical exitways and special areas. With limited exceptions, untreated wood will not meet Class II provisions, and Class II is required in horizontal exitways.

FRT lumber and plywood is frequently recognized as a suitable substitute for noncombustible materials by insurance rating organizations. Many codes will also accept FRT wood products for a variety of applications.

GUIDE SPECIFICATION

PRESSURE TREATING STANDARDS

A. AWPA C20: Structural Lumber, Fire-Retardant Pressure Treatment

B. AWPA C27: Plywood, Fire-Retardant Pressure Treatment

MATERIALS

Fire-retardant-treated lumber and plywood. Specify species (see Note 3). Plywood or laminated materials to be manufactured with exterior type adhesives. Treatment type (see Note 2) for (specify end-use). After treatment, lumber 2" or less in thickness to be kiln dried to a moisture content of 19% and plywood to 15% (see Note 4). All species to comply with Underwriters Laboratories' surface-burning characteristics "FR-S" classification and to bear the UL identification showing "FR-S" classification and type of fire retardant.

NOTES TO SPECIFIERS

1. FR-S listing applies only to treated products having UL-723 (ASTM E-84) flame and smoke classifications not exceeding 25 in a 30-minute test. The classification is confined to species tested and does not pertain to the structures in which they are installed.

2. The fire-retardant-treated material in AWPA C20 and C27 is Interior Type A: for weather protected applications. It may be used in interior environments of high humidity not exceeding 95% relative humidity.

3. Douglas Fir, Western Hemlock, Hem-fir, Redwood and Western Pine are among species that bear a UL label showing FR-S" classification. The UL Directory should be checked for other listed species.

4. Fire retardant chemicals are in aqueous solutions. Lumber 2" thick and less will be kiln dried after treatment to 19% moisture content plywood to 15%. Lower moisture may be specified for specific applications. Separators (kiln stickers) used during drying may cause marks. These marks may be reduced through special handling when so specified.

5. Fire-retardant lumber and plywood can be given a light sanding for cosmetic cleaning after treatment. Treated lumber may be end cut, but ripping and extensive surfacing may void the UL label. Therefore, all materials should be pre-cut to the extent possible before treating. Milling after treatment may be arranged by contacting treaters.

6. Where humidity conditions are such that moisture may condense between hardware and treated wood, the hardware should be back-primed with a corrosive-inhibitive sealer. Such conditions are not recommended for Interior Type B fire retardants without manufacturer's recommendation.

7. When fire retardant framing members are used in metal buildings, protection should be made at all contact points and fasteners to prevent electrolysis.

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USE AND HANDLING RECOMMENDATIONS AND FIELD TREATMENTS

The following requirements and recommendations are according to AWPA Standard M4 as they apply to jobsite care, handling, and field treatment of pressure-treated wood products.

FABRICATION

Whenever practical, all fabrication (boring, ripping, planing, sanding, trimming) shall be specified and accomplished prior to pressure treating.

JOB SITE CARE AND STORAGE

Storage areas shall be free of debris, weeds and dry vegetation and shall have drainage to prevent treated material from being subjected to standing water. Material shall be stored off the ground on solid timbers of size and so arranged as to support treated materials without producing noticeable distortion. Treated lumber having a specified moisture content shall be stored under shelter.

FIELD TREATING METHODS

Environmental regulations require a "certified applicator" license to field apply Pentachlorophenol or Creosote on treated wood. Copper Naphthenate solutions may be used for field treatment of material originally treated with Pentachlorophenol, Creosote, or waterborne preservatives as specified in AWPA Standard M4. The preservatives concentration shall contain no less than 2% copper metal.

APPLICATION OF FIELD PRESERVATIVES

Newly exposed surfaces resulting from field fabrication and/or handling abuse shall be field treated by brushing, dipping or soaking. Protective clothing and face and hand protection shall be worn when applying preservatives.

PROTECTING PILE AND POLE CUT ENDS

Piling cut off to grade in which the end surfaces will not be exposed shall be field treated by saturating with preservative. The end shall be further sealed with a heavy application of coal tar mastic. Piling that will have cutoff surfaces exposed in the structure shall have the surfaces saturated with preservative and then protected by covering the ends with caps consisting of two thicknesses of tar-saturated fabric or tar paper, fiberglass cloth, or a 20-gauge aluminum or galvanized metal cap.

Building poles shall not be field fabricated in the groundline area. Poles shall not be cut off at the butt end after treatment. Poles shall have newly cut ends, bored holes, and surface fabrication field treated with preservatives as recommended for other wood products.

DISPOSAL

The preferred option for handling treated wood removed from service is to reuse the material in a manner consistent with the use of similar treated wood products. Material originally used for structural applications can often be used for non-structural purposes such as landscaping timbers or parking bumpers.

Treated wood should never be burned in open fires of any kind, stoves, fireplaces, or residential boilers.

Treated wood from commercial or industrial uses can generally be disposed of as a non-hazardous material. However, one should assure conformance with Federal, State and local regulations. Individuals may dispose of treated wood by ordinary trash collection. For a guide to the *Management of Used Treated Wood Products* contact WWPI.

USE SITE PRECAUTIONS

Do not use pressure-treated wood where it will be in frequent or prolonged contact with bare skin or under circumstances where preservative may become a component of food for either humans or animals.

Treated wood should not be used where it may come into direct or indirect contact with public drinking water except for uses such as docks and bridges. Wood treated with Pentachlorophenol or Creosote should not be used where it may come into contact with drinking water for domestic animals or livestock. Waterborne preservatives are approved for this use. Do not use treated wood for cutting boards or countertops.

Only treated wood that is visibly clean and free of surface residue should be used for patios, decks and walkways.

Wood treated with waterborne preservatives may be exposed in residential interiors, provided clean up is performed after construction.

Material to be placed in or near the water should be treated in accordance with the *Best Management Practices for Use of Treated Wood in Aquatic Environments*, available from WWPI.

HANDLING PRECAUTIONS

Users should follow the instructions in the Consumer Information Sheet available from the supplier of the treated wood material.

When handling treated wood, wear protective clothing such as long-sleeved shirts and long pants and use gloves.

When sawing or machining wood, wear a dust mask and, if possible, work outdoors to avoid inhalation of sawdust.

When power-sawing and machining, wear goggles to protect eyes from flying particles.

After working with wood, wash exposed skin areas thoroughly before eating, drinking, or using tobacco products.

If material or sawdust accumulates on clothing, launder before reuse. Wash clothes separately from other clothing.

These basic safety and hygiene habits are also applicable to untreated wood.



9

PRESSURE TREATED WOOD IN AQUATIC ENVIRONMENTS - BEST MANAGEMENT PRACTICES

INTRODUCTION

WWPI and its members are committed to the protection of our valuable water resources and the diverse life forms it supports in lakes, streams, estuaries, bays and wetlands. Because pressure treated wood is an important building material in the construction of piers, docks, walkways and decks, the western treating industry wants to assure its products are manufactured and installed in a manner which minimizes the potential for any adverse impact to these important environments. To meet this objective, the industry has developed and encourages the use of Best Management Practices or BMPs.

There are a variety of treatments and treated wood products approved for use in or above aquatic environments. Because of inherent differences in the treatment chemicals and processes, there are a number of BMPs. While the goal of the BMPs are common — minimize the impact from migration of treating chemicals into the environment — the methods for achieving the goal vary and are discussed in detail in *Best Management Practices For The Use Of Treated Wood In Aquatic Environments*.

For a copy of the BMPs, go to www.wwpinstitute.org, or contact WWPI.

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QUALITY ASSURANCE

INTRODUCTION

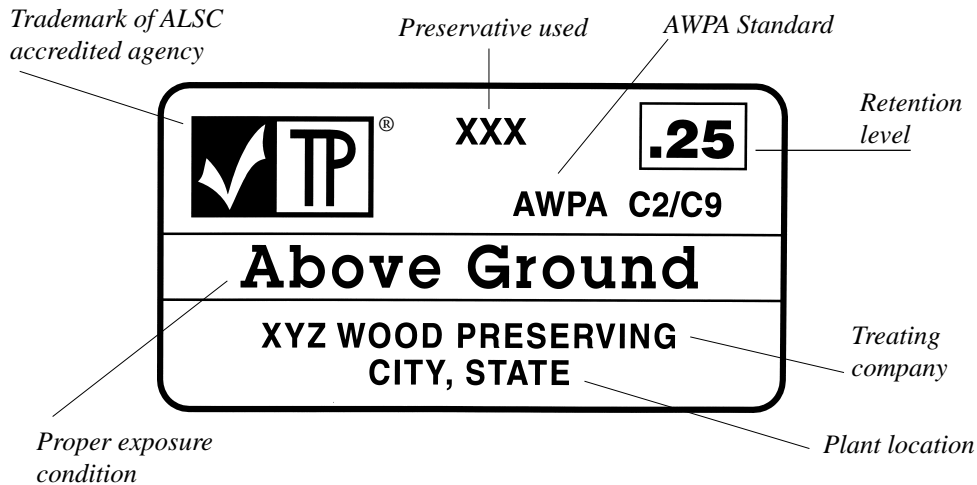
The American Lumber Standards Committee (ALSC) is responsible for the oversight and accreditation of third party inspection agencies for treated wood. In order to comply with the Uniform Building Code, (UBC), treated wood must be marked with the quality stamp or end tag of an accredited ALSC agency.

The UBC reads: "All preservatively treated wood required to be treated under Section 2306 shall be identified by the quality mark of an inspection agency which has been accredited by accreditation body which complies with the requirements of the American Lumber standard committee Treated Wood Program, or equivalent."

WWPI recognizes quality marks for treated wood are sometimes confusing with much product information including proprietary brands, warranties, etc. To help clarify the situation, WWPI has introduced the CheckMark identification Program to easily recognize and distinguish ALSC accredited agency's trademarks. Look for the CheckMark on the stamp or end-tag to quickly find the ALSC accredited agency's logo.

The treating industry also produces products to do not require ALSC oversight; such products include landscape timbers for non structural applications, decking products which carry their own manufacturer's warranty, etc.

INTERPRETING A QUALITY MARK



MINIMUM NET RETENTIONS

By Assay procedure⁸ —pounds per cubic feet

USE	ACZA ¹	CCA ²	ACQ ³	CBA ⁴	CC ⁵	DOT ⁶
LUMBER AND PLYWOOD						
Above ground use						
Lumber, Timber	.25	.25 ⁷	.25	.204	.25	NL
Plywood	.25	.25	.25	.204	.25	NL
Ground contact or fresh water use						
Lumber, Timber	.40	.40 ⁷	.40	.408	.40	NL
Plywood	.40	.40	.40	.408	.40	NL
Out of contact with ground and continuously protected from liquid water						
Lumber	NL	NL	NL	NL	NL	0.25
Plywood	NL	NL	NL	NL	NL	0.25
Marine use						
Out of water not subject to splash	.40	.40 ⁷	.40	NL	NL	NL
Out of water and subject to splash	.60	.60 ⁷	.60	NL	NL	NL
In salt water						
Single Treatment	2.50	2.50 ⁷	NL	NL	NL	NL
Dual Treatment	1.50	1.50 ⁷	NL	NL	NL	NL
Bridges-important structural members	.60	.60 ⁷	.60	NL	NL	NL
Permanent Wood Foundations: Kiln-dried after treatment						
Lumber	.60	.60 ⁷	.60	NL	NL	NL
Plywood	.60	.60	.60	NL	NL	NL
GLUED LAMINATED BEAMS						
Above Ground Use	.25	.25 ⁷	NL	NL	NL	NL
Ground or fresh water contact	.40	.40 ⁷	NL	NL	NL	NL
POLES						
Agricultural-Round	.60	.60 ⁷	.60	.61	NL	NL
Agricultural-Sawn	.60	.60	.60	.61	NL	NL
Construction-Round	.60	.60 ⁷	NL	NL	NL	NL
Construction-Sawn	.80	.80 ⁷	NL	NL	NL	NL
Utility-electric/telephone/lighting	.60	.60	.60	NL	NL	NL
PILING						
Foundation use-Round	.80-1.00	.80-1.00	NL	NL	NL	NL
Foundation use-Sawn	.80	NR	NL	NL	NL	NL
Freshwater use	.80-1.00	.80-1.00	NL	NL	NL	NL
Salt water use						
Moderate borer hazard	1.5/2.5 ⁹	1.5/2.5 ⁹	NL	NL	NL	NL
Severe borer hazard	2.5	2.5 ⁷	NL	NL	NL	NL
Dual treatment ⁸	1.0	1.0	NL	NL	NL	NL
POSTS						
Fence-Round, Half Round, Quarter Round	.40	.40	.40	NL	.40	NL
Construction-Sawn	.40	.40	.40	NL	NL	NL
Agricultural-Round	.60	.60	.60	NL	NL	NL
Agricultural-Sawn	.60	.60	.60	NL	NL	NL
Guard Rail (including blocks)						
Round	.50	.50	.50	NL	NL	NL
Sawn four sides	.60	.50	.50	NL	NL	NL

(1) Ammonical Copper Zinc Arsenate.

(2) Chromated Copper Arsenate.

(3) Ammonical Copper Quat.

(4) Copper Boron Azole.

(5) Copper Citrate.

(6) DOT (Disodium Octaborate Tetrahydrate)

(7) It is generally recognized that Douglas fir is extremely difficult to treat with CCA to penetration and retention requirements, even when incised. Coastal Douglas fir, from a few geographical areas, has been found suitable for treatment with CCA. Douglas fir treated with CCA is not recommended for Permanent Wood Foundations or Piling.

(8) Dual treatment for marine use involves two separate preservatives; a waterborne preservative followed by a creosote treatment.

(9) The lower preservative retention for creosote and ACZA for marine piling is used in areas from New Jersey northward on the East coast of the United States and North of San Francisco Bay on the West coast.

(10) Assay zone for lumber sizes up to 2 inches thick.

(11) Assay zone for lumber sizes over 2 inches thick.

MINIMUM NET RETENTIONS By Assay procedure⁸ —pounds per cubic feet

USE	AWPA Standard	Creosote	Penta-chlorophenol	Copper Naphthenate
LUMBER AND PLYWOOD				
Above ground use				
Lumber, Timber	C1,C2	8	.40	.040
Plywood	C1,C9	8	.40	NL ⁹
Ground contact or fresh water use				
Lumber, Timber	C1,C2	10	.50	.060
Plywood	C1,C9	10	.50	NL
Out of contact with ground and continuously protected from liquid water				
Lumber	C1,C31	NL	NL	NL
Plywood	C1,C31	NL	NL	NL
Marine use				
Out of water not subject to splash	C1,C2,C18	10	.50	NL
Out of water and subject to splash	C1,C2,C18	12	.60	NL
In salt water				
Single Treatment	C1,C2,C18	25	NR	NL
Dual Treatment	C1,C2,C18	20	NR	NL
Bridges-important structural members	C1,C2,C14	12	.60	.075
Permanent Wood Foundations: Kiln-dried after treatment				
Lumber	C1,C22	NR	NR	NL
Plywood	C1,C22	NR	NR	NL
GLUED LAMINATED BEAMS				
Above Ground Use	C1,C28	8	.30	.040
Ground or fresh water contact	C1,C28	10	.60	.060
POLES				
Agricultural-Round	C1,C16	7.5-16	.38-.60	NL ⁹
Agricultural-Sawn	C1,C16	12	.60	.075
Construction-Round	C1,C23	12	.60	NL
Construction-Sawn	C1,C24	12	.60	NL
Utility-electric/telephone/lighting	C1,C4	9-16	.30-.80	.075-.150
PILING				
Foundation use-Round	C1,C3	12-17	.60-.85	NL
Foundation use-Sawn	C1,C24	12	.60	NL
Freshwater use	C1,C3	12-17	.60-.85	NL
Salt water use				
Moderate borer hazard	C1,C3,C18	16/20 ⁹	NR	NL
Severe borer hazard	C1,C3,C18	NR	NR	NL
Dual treatment ⁸	C1,C3,C18	20	NR	NL
POSTS				
Fence-Round, Half Round, Quarter Round	C1,C5	8	.40	.055
Construction-Sawn	C1,C15	10	.50	NL
Agricultural-Round	C1,C16	7.5-16	.38-.60	.055
Agricultural-Sawn	C1,C16	10-12	.50-.60	.060
Guard Rail (including blocks)				
Round	C1,C14	10	.50	.169
Sawn four sides	C1,C14	12	.60	.072

(1) Ammonical Copper Zinc Arsenate.

(2) Chromated Copper Arsenate.

(3) Ammonical Copper Quat.

(4) Copper Boron Azole.

(5) Copper Citrate.

(6) DOT (Disodium Octaborate Tetrahydrate)

(7) It is generally recognized that Douglas fir is extremely difficult to treat with CCA to penetration and retention requirements, even when incised. Coastal Douglas fir, from a few geographical areas, has been found suitable for treatment with CCA. Douglas fir treated with CCA is not recommended for Permanent Wood Foundations or Piling.

(8) Dual treatment for marine use involves two separate preservatives; a waterborne preservative followed by a creosote treatment.

(9) The lower preservative retention for creosote and ACZA for marine piling is used in areas from New Jersey northward on the East coast of the United States and North of San Francisco Bay on the West coast.

(10) Assay zone for lumber sizes up to 2 inches thick.

(11) Assay zone for lumber sizes over 2 inches thick.



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