



PRESSURE-TREATED SOUTHERN PINE

Standards · Specifications · Applications







SouthernPine.com



FOREWORD

Southern Pine's superior treatability makes it the preferred species when pressure treatment with wood preservatives is required. That is why nearly 85% of all pressure-treated wood used in the U.S. is Southern Pine.

This publication provides information to assist with the proper specification and use of pressure-preservative treated Southern Pine products, simply referred to here as "pressure-treated Southern Pine". Information on other species, treatment processes and preservatives is not included. The Product Locator on SouthernPine.com includes suppliers of pressure-preservative-treated, preservative-treated and fire-retardant-treated Southern Pine.

The information in this brochure has been compiled as a service from the members of the Southern Forest Products Association. Sources include the Book of Standards (2013 edition) published by the American Wood Protection Association (AWPA), the 2012 International Residential Code (IRC) and International Building Code (IBC) published by the International Code Council (ICC), Evaluation Reports (ESR) published by the ICC Evaluation Service (ICC-ES), and the Standard Grading Rules for Southern Pine Lumber (2014 edition) published by the Southern Pine Inspection Bureau (SPIB).





SFPA is a nonprofit trade association that has represented manufacturers of Southern Pine lumber since 1915.

2900 Indiana Ave • Kenner, LA 70065 504/443-4464 • Fax 504/443-6612 info@southernpine.com SouthernPine.com

CONTENTS

Introduction to Pressure-Treated Southern Pine Pressure-Treating Process Code Acceptance Identification	2
Wood Preservative Systems	4
Table 1: Preservatives for the Pressure Treatment of Southern Pine	5
Specification Guidelines and Examples	6
Simplified Specification Guidelines	7
Table 2: Simplified Specification Guide Detailed Specification Guidelines	7
Detailed Specification duidefilles	
Common Preservatives & Retentions by Product and End I	Jse
Table 3-1: SAWN PRODUCTS Used in Outdoor Construction Projects	10
Residential/Business, Exterior	44
Table 3-2: SAWN PRODUCTS Used in the Construction of Buildings Residential/Business, Interior/Exterior	11
Table 3-3: SAWN PRODUCTS Used in Agricultural, Highway & Industrial Nonresidential/Nonbuildings, Exterior	12
Table 4: ROUND POSTS, POLES & TIMBER PILINGS,	13
plus GLUED-LAMINATED UTILITY POLES	
Table 5: ENGINEERED WOOD PRODUCTS	14
Table 6: MARINE, Brackish & Saltwater Applications	15
Long-Term Performance	16
Fasteners and Connectors Dried After Treatment Design Values	
Storage Field Treatments Installation, Finishing & Maintenance	
Applications	19
Safe and Environmentally Friendly	21
Additional Resources	BC



The Southern Forest Products Association (SFPA) does not grade, test, manufacture nor treat lumber products. The primary purpose of this publication is to provide a convenient reference for pressure-treated Southern Pine products based on information from other sources. Neither SFPA, nor its members, warrant that the data from such sources on which the recommended uses of Southern Pine contained herein are correct, and disclaim responsibility for injury or damage resulting from the use of such information.

The conditions under which lumber is used in construction may vary widely, as does the quality of workmanship and construction. Neither the Southern Forest Products Association, nor its members, have knowledge of the quality of materials, workmanship or construction methods used on any construction project, and, accordingly, do not warrant the technical data, design or performance of the lumber in completed structures.

INTRODUCTION

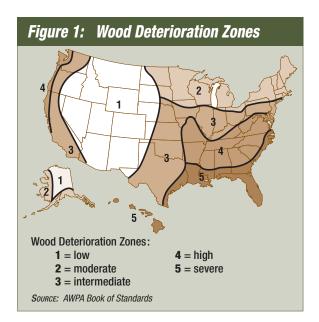
Wood can be subject to attack by insects, microorganisms and decay fungi, especially in high-moisture conditions. Preservatives help ensure long-term structural performance by protecting wood used in a wide range of service conditions. Pressure-treated Southern Pine wood products are an economical and renewable building material.

There is a variety of processes used to protect wood products, including pressure, non-pressure, thermal, nonbiocidal and fire-retardant treatments. There is also a variety of preservatives used for each treatment process. The best preservative for any particular project largely depends upon the product, species and end-use application.

Only information on the most common and versatile treated wood in the marketplace today – pressure-preservative treated Southern Pine, simply referred to as "pressure-treated Southern Pine" – is included in this publication.

Pressure treatment with preservatives protects wood exposed to high-moisture conditions and potential deterioration. Treated wood must meet minimum requirements for preservative penetration and retention for use in a particular service condition. But not all wood treats the same. Most wood species do not easily accept preservatives and must first be "incised", or perforated along the surface, reducing the wood's strength and stiffness. Southern Pine's unique cellular structure easily permits the deep penetration of preservatives, rendering the wood useless as a food source for fungi, termites and micro-organisms without the need for incising. Southern Pine's superior treatability has made it the preferred species when pressure treatment with wood preservatives is required.

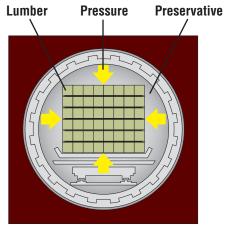
Figure 1 indicates five wood deterioration zones in the United States, ranging from low to severe. Untreated



wood can deteriorate when four conditions required for decay and insect attack occur: high moisture, a favorable temperature, oxygen and a food source (wood fiber). If any one of these conditions is removed, deterioration cannot occur. Pressure treating Southern Pine products to eliminate wood fiber as a food source is an effective solution. Treatment with preservatives protects wood exposed to the elements, subjected to high humidity, and in contact with the ground, water or other moisture sources.

PRESSURE-TREATING PROCESS

Pressure-treated Southern Pine is the product of a carefully monitored and controlled process. Within a pressurized cylinder, preservatives are forced deep into the wood cells. The treatment process bonds the preservative within the wood fiber.



Cross-section of pressure cylinder





CODE ACCEPTANCE

The American Wood Protection Association (AWPA) is the standards-writing organization for the U.S. wood treating industry. AWPA's *Book of Standards* provides consensus-based guidance on methods, preservatives and other technologies that protect wood products. Wood preservatives are accepted for model building code compliance by reference to the AWPA *Book of Standards*, or by *Evaluation Reports* issued by the ICC-Evaluation Service. Acceptance of a preservative into the AWPA *Book of Standards*, or by ICC evaluation, ensures that properly treated wood products perform satisfactorily for their intended service condition.

Model building codes have specific requirements for wood protection by use of approved naturally-durable wood, or wood that is preservative treated in accordance with AWPA *Standard U1* for the species, product, preservative and end use. The codes recognize that not all preservative-treated wood is pressure treated. Non-pressure treatments typically involve borate-based preservatives that are sprayed on untreated lumber to provide a surface barrier coating. These non-pressure treatments are marketed as a defense against mold, fungal decay and/or termite attack, and are intended only for enclosed, interior framing; non-pressure treatments cannot be substituted for approved naturally durable or pressure preservative-treated wood in exterior applications.

The *International Residential Code*® (IRC), Sections R317 and R318, provides specific requirements for protection against decay and subterranean termites. Some common applications to check for building code requirements for wood protection include:

- · Wood in contact with the ground or water
- · Sills and sleepers on a concrete or masonry slab
- Wood used above ground where specified distances from exposed ground are not met

Example: Wood joists closer than 18 inches or wood girders closer than 12 inches

• Structural members exposed to the weather without adequate protection

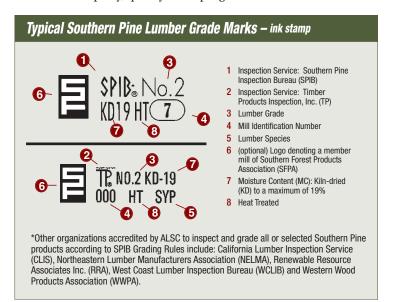
Whenever practical, boring, machining, trimming or surfacing should be done prior to treatment. Field-cut ends, notches and drilled holes of preservative-treated wood should be treated in accordance with AWPA *Standard M4*. See Field Treatments on page 18 for additional information.

IDENTIFICATION - GRADE & QUALITY MARKS

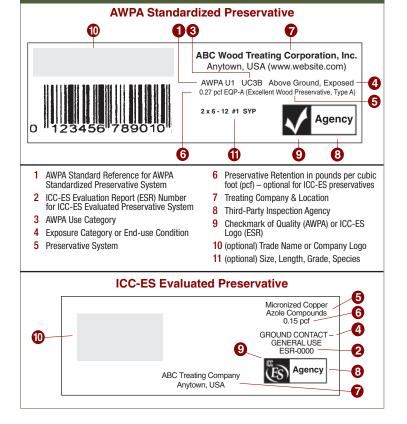
Southern Pine is recognized by building codes and regulatory agencies for use in construction and must be properly identified. Each piece of lumber must be grade marked by an agency accredited by the American Lumber Standard Committee (ALSC), and manufactured in accordance with *Product Standard PS 20* published by the U.S. Department of Commerce. Southern Pine lumber is graded in accordance with the Grading Rules published by the Southern Pine Inspection Bureau (SPIB). SPIB, Timber Products Inspection Inc. (TP) and other organizations* are accredited to inspect and grade mark Southern Pine lumber in accordance with SPIB Grading Rules.

In addition, all treated Southern Pine must be identified with a treated quality mark – either plastic end tag or ink stamp – conforming to building code standards. Quality marks identify wood products treated with preservatives standardized by AWPA or evaluated by ICC-ES. Use of such marks provides assurance that:

- the preservative is EPA-approved for the end-use application
- the wood product is treated in compliance with federal law
- the preservative retention and penetration meets the manufacturing specifications
- the pressure-treated wood product has been inspected by a third-party, quality-audit program



Typical Treated Lumber Quality Marks – plastic end tag or ink stamp



Wood Preservative Systems

There are three broad classifications of preservatives used for the pressure treatment of wood products:

Waterborne preservatives serve a wide variety of uses including residential, commercial, marine, agricultural, recreational and industrial applications. They are most often specified because they are clean in appearance, odorless, paintable and registered with the EPA for both interior and exterior use without a sealer.

Creosote preservatives, including creosote/coal tar mixtures, protect railroad ties, marine pilings and utility poles.

Oilborne preservatives are used primarily for utility crossarms and poles, piling, posts and glulam.

Wood preservatives are registered with the Environmental Protection Agency (EPA) for their safe use. There are numerous preservatives available in the marketplace today, many approved by AWPA while others have ICC-ES Evaluation Reports (ESR). These preservatives can be expected to provide excellent protection for wood products when appropriate preservative retention levels are applied. 1

Table 1 lists preservative systems used for the pressure treatment of Southern Pine products, and includes the trade names of the treated wood, preservative producers and code acceptance (AWPA and/or ESR number). The preservatives in Table 1 are grouped by classification (waterborne, creosote and oilborne), with the waterborne classification further divided into four categories for clarification:

- Copper Based, Dissolved
- Copper Based, Micronized
- Carbon Based
- Borates

WATERBORNE PRESERVATIVES, COPPER BASED

Copper has been used for centuries to control fungi. Copper-based preservatives rely on the well-established effectiveness of copper to provide most of the protection to the wood; co-biocides complete the formulations by adding protection against copper-tolerant fungi. Copper-based preservatives can generally be used in both interior and exterior applications, even in the most-severe service conditions. There are two main methods to prepare copper-based preservatives for pressure treatment:

Dissolved copper-based preservative solutions are very
effective in penetrating the cells in the wood fiber during
the pressure-treatment process, and provide long-term
protection from fungal decay and termite attack. They
were developed to protect wood products exposed to
exterior conditions.

Copper Azole (CA) and Alkaline Copper Quat (ACQ) are commonly used to treat Southern Pine wood products in a wide variety of exterior residential, commercial and agricultural construction applications.

Chromated Copper Arsenate (CCA) is no longer used in consumer applications, but remains an EPA-approved preservative for use in non-consumer industrial, commercial, marine and agricultural applications.

Typical applications for CCA-treated Southern Pine include:

- Agricultural Timbers & Poles
- Foundation Piling
- Highway Construction
- Marine, Brackish & Saltwater
- Permanent Wood Foundations
- Utility Poles
- Micronized copper-based preservatives are formulated with micron-sized particles of copper suspended in water. They were developed to reduce impact on aquatic and terrestrial environments, and are less corrosive to fasteners.

Micronized Copper Azole (μ CA and MCA) is commonly used to treat Southern Pine wood products in both interior and exterior applications.

WATERBORNE PRESERVATIVES, NON-COPPER BASED

Preservatives without copper provide a lower environmental impact, a natural appearance and are not corrosive. They were developed for use in less-severe service conditions.

Carbon-based preservatives (PTI and EL2) are approved for interior and exterior above-ground uses; this includes the bulk of exterior wood products used in residential construction – everything except ground-contact applications.

The most common **borate preservative** is inorganic boron (SBX). SBX is standardized by AWPA for interior uses, such as sill plates, furring strips, joists, studs, roof trusses, blocking, rafters, beams and other framing applications. *ESR-2667* provides acceptance for exterior construction, above ground, coated and rapid water runoff uses (e.g. fascia, siding, trim) when continuously protected from direct wetting with a minimum of one coat of primer and two coats of finish paint.

CREOSOTE-BASED PRESERVATIVES

Creosote is a tar oil distillate and one of the oldest wood preservatives. Creosote is an effective preservative for severe exposure conditions in commercial, industrial and marine applications, including marine borers in saltwater. It is also commonly used by the railroad industry to treat crossties and switchties. Creosote is not generally used in consumer applications due to its odor and oily surface appearance. Creosote-based preservatives include Creosote Preservative (CR), Creosote Solution (CR-S) and Creosote-Petroleum Solution (CR-PS).

OILBORNE PRESERVATIVES

Oilborne preservatives include Pentachlorophenol (Penta), Copper Naphthenate and Oxine Copper. Penta is commonly used to treat utility poles; it is approved for above-ground and ground contact end uses, but is not generally used in consumer applications due to its odor and oily surface appearance. Copper naphthenate is used to treat field cuts and holes per AWPA *Standard M4*; it is also used to treat glulam (after gluing) and utility poles. Oxine copper is low in toxicity and approved for above-ground end uses, including glulam beams (after gluing) and certain applications where food is harvested, transported or stored. Oxine copper can also be used to treat field cuts and holes per AWPA *Standard M4*.

¹ Comparison of Wood Preservatives in Stake Tests – 2011 Progress Report, Forest Products Laboratory; Research Note FPL-RN-02; U.S. Department of Agriculture.

Classification	Name of Preservative System	Code – Type	Trade Name of Treated wood	Preservative Producer	Website	Codes & Standards	Common Uses
Waterborne, Copper Based,	Alkaline Copper Betaine	KDS	Impralit®-KDS	Ruetgers Organics	Ruetgers-Organics.com	AWPA U1, P55, ESR-2500	Not commonly used to treat Southern Pine.
Dissolved		KDS-B	Impralit®-KDS-B			AWPA U1, P56, ESR-2500	
	Alkaline Copper Quat	ACQ-A ACQ-D	Naturewood® (ACQ)	Osmose	OsmoseWood.com	AWPA U1, P5, P28, P29, ESR-1980	Used in above ground, ground contact and freshwater applications.
			Preserve® ACQ	Viance	TreatedWood.com	AWPA U1 P5, P28, P29	
	Ammoniacal Copper Zinc Arsenate	ACZA	Chemonite®	Arch Wood Protection (Lonza)	Chemonite.com	AWPA U1, P5, P22	Not commonly used to treat Southern Pine.
	Chromated Copper Arsenate	CCA-C	Wolmanized® Heavy Duty™	Arch Wood Protection (Lonza)	WolmanizedWoodHD.com	AWPA U1, P5, P23	Used in heavy-duty industrial, highway, saltwater marine and
			SupaTimber®	Viance	TreatedWood.com		utility applications. CCA is not approved for residential use, except
			K-33®	Osmose	OsmoseWood.com		for Permanent Wood Foundations.
	Copper Azole	CA-C	NatureWood® CA	Osmose	OsmoseWood.com	AWPA U1, P5, P48	Used in above ground, ground contact
			Preserve® CA	Viance	TreatedWood.com	AWPA U1, P5, P48	and fresh water applications.
			Wolmanized® Outdoor®	Arch Wood Protection (Lonza)	WolmanizedWood.com	AWPA U1, P5, P48, ESR-1721	
	Copper Naphthenate, Waterborne	CuN-W	QNap™-5w	Nisus	Nisuscorp.com	AWPA U1, P5, P34	Used to field treat cuts and holes per AWPA M4.
Waterborne, Copper Based,	Micronized Copper Azole	µСА-С	Wolmanized® Outdoor®	Arch Wood Protection (Lonza)	WolmanizedWood.com	ESR-1721	Used in above ground, ground contact and freshwater applications.
Micronized	Micronized Copper Azole	MCA	MicroPro® / LifeWood®	Osmose	OsmoseWood.com	ESR-2240	
Waterborne, Carbon Based	DCOI/Imidacloprid/Stabilizer, Waterborne	EL2	Ecolife™ II	Viance	TreatedWood.com	AWPA U1, P5, P47	Used in above-ground applications.
	Propiconazole Tebuconazole Imidacloprid	PTI	Wolmanized EraWood®	Arch Wood Protection (Lonza)	WolmanizedWood.com	AWPA U1, P5, P45 ESR-1477	
			NexWood™	Osmose	OsmoseWood.com	AWPA U1, P5, P45	
Waterborne,	Inorganic Boron	SBX	SillBor®	Arch (Lonza)	SillBor.com	AWPA U1, P5, P25	Used in interior applications and other
Borates			Advance Guard®/ Hi-bor®	Osmose	OsmoseWood.com	AWPA U1, P5, P25, ESR-2667	above-ground uses continuously protected from liquid water. Can also be used to pretreat poles, piles and railroad
			TimberSaver®	Viance	TreatedWood.com	AWPA U1, P5, P25	ties.
			Cellutreat	Nisus	CelluTreat.com	AWPA U1, P5, P25	
Creosote	Creosote Preservative	CR		Coopers Creek	CoopersCreekChemical.com	AWPA U1, P1/P13	Used to treat railroad ties, marine piles
	Creosote Solution	CR-S		Koppers KMG-Bernuth	Koppers.com KMGchemicals.com	AWPA U1, P2	and utility poles.
	Creosote-Petroleum Solution	CR-PS	-	Lone Star Specialties	LoneStarSpecialties.net	AWPA U1, P3	
				Ruetgers Stella-Jones	Ruetgers-Group.com Stella-Jones.net CreosoteCouncil.org		
Oilborne	Copper Naphthenate	CuN	Cop-Guard®		FRTW.com	AWPA U1, P8, P36	Used to field treat cuts and holes per AWPA M and to treat glulam beams and utility poles.
	Oxine Copper (Copper 8 Quinolinolate)	Cu8	Cop-8®		FRTW.com	AWPA U1, P8, P37	Used to treat glulam beams for above ground applications and to field treat cuts and holes per AWPA M4.
	Pentachlorophenol	PCP-A PCP-C PCP-G		KMG-Bernuth	KMGchemicals.com	AWPA U1, P8, P35	Used to treat utility poles and glulam beams.

⁽¹⁾ Not all of the preservatives approved by the American Wood Protection Association (AWPA) or by Evaluation Reports (ESR) from the International Code Council's Evaluation Service (ICC-ES) are produced or commonly used to pressure treat Southern Pine lumber products. Approved preservatives not included in this table include: ACC, ACQ-B, ACQ-C, CDDC, CX-A and a number of oilborne preservatives. Refer to the AWPA Book of Standards and ICC-ES ESRs for complete information on all approved preservatives.

SPECIFICATION GUIDELINES & EXAMPLES

The information presented here is summarized from the AWPA *Book of Standards* and ICC-ES *Evaluation Reports*. The specification guidelines, examples and tables included in this publication are only intended to be a guide. Specifiers and users should use their best judgment to determine the appropriate specification for a particular use.

AWPA Standard U1 is the primary standard for specifiers, end users and building code officials. This standard is based on the Use Category System (UCS), a simplified approach to selecting the best treated wood products. The UCS includes five major Use Categories (UC) that clearly describe various exposure conditions. The five UCs range from the least-severe exposure that wood products can be subjected to in service (UC1 Interior/Dry), to the most severe exposure (UC5 Marine/Brackish and Saltwater). There are also several subcategories, such as UC3A and UC3B for Above Ground, Exterior applications in Protected or Exposed conditions, respectively. There is a sixth and separate UC for fire retardant applications which are not covered in this publication.

The AWPA Use Category System and Use Categories described in AWPA *Standard U1* are trademarks of the American Wood Protection Association. The Service Conditions for treated products approved through ICC-ES *Evaluation Reports* are similar but identified differently.

Different end-use applications may require different amounts of preservative protection. There are many approved preservatives with different penetration and retention levels depending upon the species, product, end-use application and exposure hazard. Penetration refers to the depth a preservative must permeate into the wood fiber during the pressure-treating process. Retention level refers to the amount of preservative that remains in the wood after the process is complete and is expressed in pounds per cubic foot (pcf). Retention requirements can be different based on the wood preservative system used to pressure treat the wood product and its intended end use (Above Ground, Ground Contact, etc.).

Specifiers may choose to provide detailed specifications that include all pertinent information including the appropriate preservative treatment and retention level for the end use of the product. Or, a more simplified approach is to provide the most important information – the end-use application and service condition (exposure hazard) – which then allows suppliers to provide a preservative and corresponding retention level that complies with those requirements.

This section provides introductory information with a Simplified Specification Guide and Example for a basic approach, followed by more data and Specification Examples to assist with more detailed specifications. Special emphasis is placed on sawn lumber products which are most commonly specified by users of this publication.

SIMPLIFIED SPECIFICATION GUIDELINES

Table 2 is a simplified guide for selecting pressure-treated Southern Pine products. This table provides specification information for the most common treated applications, but is not meant to be an all-inclusive reference.

- The **Service Conditions** column describes common exposure hazards.
- The **Applications** column lists products typically exposed to each service condition.
- The **Preservative Systems** column lists the most costeffective and readily-available preservatives used for each service condition and end-use application.

Simplified Specification Example – Residential Decks:
Simplified specifications can be written using the information provided in Table 2. When considering a residential deck for example, Table 2 shows that the decking, joists, beams, cross bracing, railing components and stair stepping are typically an Above Ground, Exterior end-use (Use Category 3B), while the supporting posts and stair stringers are typically a Ground Contact/ Freshwater, General Use (Use Category 4A) application. Thus, a simple specification for Southern Pine residential decks that permits the use of all appropriate preservatives (and their corresponding retention levels) could be written as:

All Southern Pine for the decking, joists, beams, cross bracing, railing components and stair stepping shall be treated with preservatives to the requirements for an Above Ground, Exposed service condition (UC3B) in accordance with AWPA Standard U1 or ICC-ES Evaluation Reports.

All Southern Pine for the deck posts and stair stringers shall be treated with preservatives to the requirements for a Ground Contact/ Freshwater, General Use service condition (UC4A) in accordance with AWPA Standard U1 or ICC-ES Evaluation Reports.



Service Conditions ²	Typical End-Use Applications ²	Commonly-Used Preservative Systems ^{1,3}
Above Ground, Interior: Dry UC1	Sawn interior framing, flooring, furniture, millwork & trim; roof trusses	Borates, Carbon based, Copper azoles & quats
Above Ground, Interior: Damp UC2	Sawn interior framing, flooring, furring strips, millwork & trim, sill plates; roof trusses; subflooring	Borates, Carbon based, Copper azoles & quats
Above Ground, Exterior: Protected with coating & rapid water runoff UC3A	Sawn painted/coated fascia, fence pickets, gazebo material, millwork & trim, siding	Carbon based, Borates, Copper azoles & quats
Above Ground, Exterior: Exposed UC3B	Sawn decking, deck joists & beams (not subject to frequent wetting — see TIP on page 8), deck cross bracing, railing components & stair stepping; unpainted fascia, fencing, gazebo material, millwork & trim, siding; floor trusses; freshwater pier, dock, walkway and boardwalk decking, joists & beams (not subject to frequent wetting — see TIP on page 8); lattice; outdoor furniture; porch flooring	Copper azoles & quats, Carbon based
	Glulam beams for boardwalks, decks, gazebos, raised floor construction etc.	Copper Naphthenate, Oxine Copper
	Shakes & shingles	CCA, Copper azoles & quats
	Utility crossarms (general use)	Penta, CCA
Ground Contact/ Freshwater: General Use UC4A Non-critical components	Sawn deck, fence, agricultural/farm & general-use posts; deck joists & beams (ground contact) & stair stringers; agricultural stakes; freshwater floating dock platforms; freshwater pier, dock, walkway & boardwalk decking, joists & beams (subject to frequent wetting); freshwater pier cross bracing; freshwater pier, dock, walkway & boardwalk supports; gazebo & veranda supports; landscape timbers; outdoor furniture; pergolas; playground equipment; retaining walls (not critical); skirtboard; highway structural (general)	Copper azoles & quats
	Sawn bulkhead sheeting (freshwater); round, ½ and ¼ round highway (guide, sign and sight) & fence (farm) posts; stockyard fence rail	CCA, Copper azoles & quats
	Glulam deck posts	Copper Naphthenate, Copper azoles & quats
	Railroad crossties & switchties (general), mine & bridge ties; brine storage	Creosote, Copper Naphthenate
	Utility crossarms (critical or hard to replace)	Penta, CCA
	Utility poles (low decay)	CCA, Creosote, Oilborne
Ground Contact/ Freshwater: Heavy Duty UC4B	Sawn agricultural posts; building supports; marine out-of-water saltwater splash (above ground); Permanent Wood Foundations; structural support sawn poles & piles	Copper azoles & quats, CCA
- Critical components or difficult replacement	Crib walls; greenhouse; retaining walls (critical)	Copper azoles & quats
High decay potentialIncludes saltwater splash	Glulam for bridges, sound barrier walls	Copper Naphthenate, CCA, Copper azoles & quate
	Highway bridge, guardrails & spacer blocks, structural (important)	CCA, Copper azoles & quats
	Railroad crossties & switchties	Creosote
	Utility poles (moderate decay)	CCA, Creosote, Oilborne
Ground Contact/ Freshwater: Extreme Duty UC4C - Critical structural components	Foundation piles; highway bridge, cribbing, piles & structural (critical); marine out-of-water saltwater splash (ground contact); sawn building posts (important structural); sawn poles & piles (critical structural support)	CCA, Creosote
- Severe environments	Railroad crossties & switchties (structural)	Creosote
Extreme decay potentialIncludes saltwater splash	Utility poles (severe decay)	CCA, Creosote, Oilborne
Marine/ Brackish & Saltwater UC5A Northern Waters UC5B Central Waters UC5C Southern Waters	Marine piling, bulkheads, seawalls, pier cross bracing; aqua/mariculture; highway; boats	CCA, Creosote

⁽¹⁾ This table provides specification information for only the most common treated end-use applications and is not meant to be an all-inclusive reference. There are numerous approved preservatives, but not all of them are suitable or commonly used for a specific end use. To provide the most practical information possible, only the preservatives that specifiers, users and producers have established as present market leaders for pressure-treated Southern Pine are included in this table. Refer to the American Wood Protection Association (AWPA) Book of Standards and International Code Council-Evaluation Service (ICC-ES) Evaluation Reports (ESRs) for complete information on all approved preservatives.

⁽²⁾ Service conditions and end-use applications are based on AWPA Standard U1 (Tables 2-1 and 3-1) and ICC-ES ESRs.

⁽³⁾ Borates include SBX and DOT; Carbon based includes PTI and EL2; Copper azoles & quats includes dissolved and micronized preservative systems; Oilborne includes Penta and CuN. See Table 1 for a more complete list of preservatives and producers.

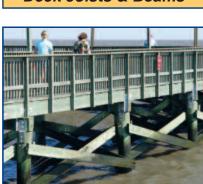
TIP: Use Ground Contact for Long-Term Performance

The two most common service conditions for pressure-treated Southern Pine lumber are Above Ground, Exposed (UC3B) and Ground Contact, General Use (UC4A); the term "Ground Contact" also includes contact with freshwater. Specifying the proper end-use application is very important for long-term performance because higher retention levels are typically required for Ground Contact (UC4A) as compared to Above Ground (UC3B). In addition, different preservatives may be used for Above Ground (e.g. carbon-based preservatives) as compared to Ground Contact (e.g. copper azoles & quats).

The most common misapplications occur when lumber treated for Above Ground Use Only is used where the actual service condition simulates a Ground/ Freshwater Contact end use. For longer-term performance, specify and verify Ground Contact (UC4A) for applications such as:

- Deck joists and beams in close proximity to the ground
- Deck decking, joists and beams subject to frequent wetting from moisture sources such as hot tubs or air-conditioning units
- · Freshwater pier cross bracing
- Freshwater dock platforms and freshwater pier joists and beams subject to water immersion or frequent wetting from wind, waves, water-level changes or other factors
- Stair stringers in ground contact or in close proximity to the ground
- Walkway and boardwalk decking, joists and beams in close proximity to the ground or subject to water immersion or frequent wetting

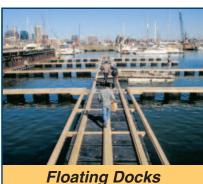






Cross Bracing







ON THE JOB SITE

Treated wood products should be used for their intended service condition. Make sure wood products on the job site have been treated for the particular project or application by reading the plastic end tags or ink stamps on each piece. (See the typical grade marks and quality marks on page 3.) Specifically look for the **Checkmark of Quality** for AWPA standardized preservatives OR the **ICC-ES logo** for preservatives evaluated with ESRs, AND the **Third-party Inspection Agency** (e.g. SPIB, TP); treated wood without these identifications does not meet building code requirements. Also look for the proper **End-Use Application**, such as:



ABOVE GROUND

Above Ground Use Only
Continuously Protected from Liquid Water
Decking Use Only
General Use Framing Lumber
Vertical Use Fence Boards
UC1 (Interior, Dry)
UC2 (Interior, Damp)
UC3A (Above Ground, Protected)
UC3B (Above Ground, Exposed)

FOUNDATION

Basement Studs Permanent Wood Foundation (PWF, FDN) Stud Use Only

GROUND CONTACT/ FRESHWATER

Ground Contact Ground Contact (Freshwater) UC4A (Ground Contact, General Use) UC4B (Ground Contact, Heavy Duty) UC4C (Ground Contact, Extreme Duty)

MARINE, BRACKISH/ SALTWATER

Marine Seawall (This Side Seaward) UC5A (Marine Use, Northern Waters) UC5B (Marine Use, Central Waters) UC5C (Marine Use, Southern Waters)

DETAILED SPECIFICATION GUIDELINES

Detailed specification information for pressure-treated Southern Pine wood products can be obtained from the AWPA *Book of Standards*, ICC-ES *Evaluation Reports* and from preservative producers and wood treaters.

The index below lists additional specification tables included in this publication. These tables include the most readily available preservatives used to pressure-treat Southern Pine and are organized by wood product and enduse application. Minimum retention requirements are from AWPA *Standard U1* and/or ICC-ES *Evaluation Reports*.

Table 3-1: SAWN PRODUCTS Used in Outdoor Construction Projects

Residential/Business. Exterior

Table 3-2: SAWN PRODUCTS Used in the Construction of Buildings

Residential/Business. Interior/Exterior

Table 3-3: SAWN PRODUCTS Used in Agricultural, Highway & Industrial Construction

Nonresidential/Nonbuildings, Exterior

Table 4: ROUND POSTS, POLES & TIMBER PILING, plus GLUED-LAMINATED UTILITY POLES

Table 5: ENGINEERED WOOD PRODUCTS **Table 6:** MARINE, Brackish & Saltwater

Specification Examples: Various levels of complexity are common for specifications.

1) For example, a simplified specification permitting the use of all appropriate species and preservative combinations for sill plates in residential construction could be written as:

All lumber for sill plates shall be treated with waterborne preservatives to the requirements for Above Ground, Interior, Damp (Use Category 2) in accordance with AWPA Standard U1 or ICC-ES Evaluation Reports. Dry after treatment to a maximum moisture content of 19%.

- 2) If a particular species and preservative is desired, the specification can be slightly more detailed, such as:

 All lumber for sill plates shall be Southern Pine treated with inorganic boron (SBX) to the requirements for Use Category 2 (UC2) in accordance with AWPA Standard U1. Dry after treatment to a maximum moisture content of 19%.
- 3) More complete specifications include pertinent Standard number(s), such as:
 - AWPA Standard U1 Use Category System: User Specification for Treated Wood the primary reference when specifying a wood product treated with a preservative system approved by AWPA. Standard U1 explains and defines the various Use Categories, lists different products and recommended Use Categories based on their end-uses and exposures, lists AWPA-standardized preservatives for each wood species, and includes Commodity Specifications for specific product types such as sawn products, utility poles, piling, plywood and glulam. The Commodity Specifications contain retention requirements for the preservative systems, plus any special requirements that may apply.
 - AWPA Standard T1 Use Category System: Processing and Treatment Standard governs the preservative retention and penetration requirements, processing limitations, quality control and inspection requirements for treated wood

- AWPA Standard M1 Standard for the Purchase of Treated Wood Products – guidance for purchasers of treated wood products
- AWPA Standard M4 Standard for the Care of Preservative-Treated Wood Products – requirements for care of preservative-treated poles, piles, lumber and ties in plants, storage yards and on job sites, plus requirements for field fabrication and management of used treated wood products
- AWPA Preservative Standards, such as P25 Standard for Inorganic Boron (SBX), and/or ICC-ES Evaluation Report Numbers

More complete specifications also include the following:

Commodity Deck Support Posts
Service Condition Ground/ Freshwater Contact,

General Use (UC4A)

Wood Product Type Sawn Products
Species Southern Pine
Preservative Copper Azole (CA-C)

Retention *0.15 pcf*

Special Requirements* No special requirements. Drying after

treatment is not required.

Identification Suppliers shall provide treated

material which includes a quality mark that identifies the following on

each piece:

Inspection agencyTreated standard

- Treating facility

- Preservative and retention

- Suitable end use

There are many preservative/retention options that could be supplied for the Deck Support Post example above. Some common choices for UC4A based on Tables 1, 2, 3-1 and 5 are shown below. Note that some service conditions may require a Heavy Duty (UC4B) retention for posts (e.g. 0.60 pcf ACQ).

Solid-	Sawn Deck Suppor	t Posts					
Common Preservatives (from Tables 1 & 2)	Trade Names (from Table 1)	Retention (pcf) (from Table 3-1)					
Waterborne, Copper Based, Dissolved							
	NatureWood® CA	0.15					
Copper Azole (CA-C)	Preserve® CA	0.15					
(,	Wolmanized® Outdoor®	0.15					
Alkaline Copper Quat	NatureWood® (ACQ)	0.40					
(ACQ)	Preserve® ACQ	0.40					
Water	rborne, Copper Based, Micro	nized					
Micronized Copper Azole	Wolmanized® Outdoor®	0.14					
(μCA-C, MCA)	MicroPro® / LifeWood®	0.15					
Glula	am Deck Support F	Posts					
Common Preservatives (from Tables 1 & 2)	Trade Names (from Table 1)	Retention (pcf) (from Table 5)					
	Oilborne						
Copper Naphthenate (CuN)	Cop-Guard®	0.060					

^{*} Pre- or post-treatment preparation, including conditioning and drying such as Kiln-Dried After Treatment (KDAT)

COMMON PRESERVATIVES & RETENTIONS BY PRODUCT AND END USE

Tables 3-1 through 6 are organized by wood product and end-use application.

Table 3-1: SAWN PRODUCTS Used in Outdoor Construction Projects¹ Residential/Business, Exterior

End Uses ⁴	Service Condition – Use Category	Southern Pin	e Waterborne	Preservatives ²	& Minimum Re	etentions³ (pcf)	by End Use 4
	or ESR ^{4,5}	PTI6	EL2	μ CA-C 7	MCA ⁷	CA-C	ACQ-A,D8
Decking Decking, subject to wetting – see TIP on page 8 Decking, subject to wetting – see TIP on page 8 Decking & Specialties Joists, Beams, above ground Joists, Beams, close ground proximity – see TIP Joists, Beams, ground contact Posts, ground contact Railing Components, above ground Stair Stepping, above ground Stair Stringers, ground contact – see TIP	3B 4A ESR ^{5,5,1} 3B 4A 4A 4A 3B 3B 3B	0.018 0.013+ 0.018 0.018 0.018	0.019 0.019 0.019 0.019 0.019	0.050 0.14 0.050 0.050 0.14 0.14 0.14 0.050 0.050 0.14	0.060 0.15 0.060 0.060 0.15 0.15 0.15 0.060 0.060	0.060 0.15 0.060 0.060 0.15 0.15 0.15 0.060 0.060	0.15 0.40 0.15 0.15 0.40 0.40 0.40 0.15 0.15
Fences Pickets, Rail, Slats, Trim, coated Pickets, Rail, Slats, Trim, uncoated Fence Boards & Pickets Fencing Posts, ground contact	3A 3B ESR ^{5,5,2} ESR ^{5,5,1} 4A	0.013 0.018 0.013 0.013	0.019 0.019 0.019 0.019	0.050 0.050 0.050 0.050 0.050 0.14	0.060 0.060 0.060 0.060 0.15	0.060 0.060 0.060 0.060 0.15	0.15 0.15 0.15 0.15 0.15 0.40
Freshwater, see Piers & Docks, Walkways & Boardwalks							
Furniture, outdoor Above ground Ground contact	3B 4A	0.018	0.019	0.050 0.14	0.060 0.15	0.060 0.15	0.15 0.40
Gazebos Above ground, painted/coated Above ground, unpainted Ground contact	3A 3B 4A	0.013 0.018	0.019 0.019	0.050 0.050 0.14	0.060 0.060 0.15	0.060 0.060 0.15	0.15 0.15 0.40
Landscape Timbers, S4S, ground contact	4A			0.14	0.15	0.15	0.40
Lattice, above ground, exterior	3B	0.018	0.019	0.050	0.060	0.060	0.15
Lumber, Boards, Timbers, general use, exterior Above ground, painted/coated Above ground, unpainted Above ground, general use Ground contact or freshwater, not critical Compost, Plant and Mushroom Boxes, Bender Board, Edging, Flumes, Retaining Walls, not critical Ground contact, general use	3A 3B ESR ⁵ 4A	0.013 0.018 0.013+	0.019 0.019 0.019	0.050 0.050 0.050 0.14	0.060 0.060 0.060 0.15	0.060 0.060 0.060 0.15	0.15 0.15 0.20 0.40
Pergolas	4A			0.14	0.15	0.15	0.40
Piers & Docks, freshwater Decking, Joists, Beams Decking, Joists, Beams, frequent wetting – see TIP Floating dock platforms – see TIP Pier cross bracing – see TIP Supports	3B 4A 4A 4A 4A	0.018	0.019	0.050 0.14 0.14 0.14 0.14	0.060 0.15 0.15 0.15 0.15	0.060 0.15 0.15 0.15 0.15	0.15 0.40 0.40 0.40 0.40
Playground Equipment, ground contact	4A			0.14	0.15	0.15	0.40
Posts, Sawn, ground contact or freshwater Deck, Fence, General and Playground Equip. Posts Pier, Dock, Walkway and Boardwalk Posts	4A 4A			0.14 0.14	0.15 0.15	0.15 0.15	0.40 0.40
Walkways & Boardwalks, freshwater Decking, Joists, Beams Decking, Joists, Beams, frequent wetting – see TIP Posts	3B 4A 4A	0.018	0.019	0.050 0.14 0.14	0.060 0.15 0.15	0.060 0.15 0.15	0.15 0.40 0.40

Footnotes for Tables 3-1, 3-2, 3-3, 4, 5 and 6:

- (1) Tables 3-1 thru 6 include only the most readily-available preservatives used to pressure treat Southern Pine wood products by end use. See Table 1 for a more complete list of preservative systems, their names and additional information.
- (2) Not all preservatives are approved or used for all end uses or service conditions. To provide the most practical information possible, these tables provide minimum retention levels for only the most common preservatives for each specific end use. Refer to the American Wood Protection Association (AWPA) Book of Standards and International Code Council-Evaluation Service (ICC-ES) Evaluation Reports (ESRs) for complete information on all approved preservatives.
- (3) Minimum retention requirements are from AWPA Standard U1 (Commodity Specifications A through G) and ICC-ES ESRs, and are given in pounds per cubic foot (pcf).
- (4) End Uses are based on AWPA Standard U1 (Tables 2-1 and 3-1) and ICC-ES ESRs. See AWPA Standard U1 for a more complete list of commodities, uses, exposures, use categories, commodity specifications and special requirements.

- (5) Use Categories (UC) are trademarks of AWPA. The service conditions for treated products evaluated through ICC-ES ESRs are similar but identified differently. Some retention levels required by ICC-ES ESRs are different than required by AWPA Standard U1.
- $\textbf{(5.1)} \ \, \text{Above ground decking and other specialties (railing, spindles, trim, fencing, fascia, lattice)}$
- (5.2) Above ground vertical use fence boards and pickets
- (5.3) Critical structural members and wood foundation systems (5.4) Above ground continuously protected from liquid water
- (6) For UC3B, PTI is required to have a minimum retention of 0.013 pcf plus a 0.24 pcf water repellent, or 0.018 pcf without a water repellent.
- (7) Code acceptance for micronized copper azole is through ICC-ES ESRs; other preservatives are standardized by AWPA.
- (8) ACQ-A is not approved for retentions exceeding 0.40 pcf. ESR-1980 requires a minimum retention of 0.20 pcf for ACQ in above ground, general use applications.
- (9) 0.17/0.28 (B_2O_3 basis) equals 0.25/0.40 (DOT basis). SBX is required to have a minimum retention of 0.28 (B_2O_3) or 0.40 (DOT) pcf in areas subject to Formosan subterranean termite activity. Listed retentions for the other preservatives are suitable for exposure to Formosan termites.
- (10) SBX is standarized by AWPA for interior use only; ESR-2667 provides acceptance for exterior construction, above ground, coated & rapid water runoff when continuously protected from direct wetting with a minimum of one coat of primer and two coats of finish paint.
- (11) CCA is EPA-approved for use in non-consumer agricultural, foundation, highway, marine and utility pole applications. CCA is not approved for residential use, except for Permanent Wood Foundations.
- (12) Crossties and Switchties can be pre-treated with SBX (DOT) and then secondarily treated with CR. CR-S. CR-PS or CuN.
- (13) Outer zone/inner zone.
- (14) Can also be treated with CR-PS.
- (15) CR only.

Table 3-2: SAWN PRODUCTS Used in the Construction of Buildings¹ Residential/Business, Interior/Exterior

End Uses ⁴	Service Condition – Use Category	South	ern Pine Wa	terborne Pro	eservatives ²	& Minimum	Retentions	g (pcf) by End	I Use 4
	or ESR 4,5	SBX9,10	PTI6	EL2	μ CA-C ⁷	MCA7	CA-C	ACQ-A,D8	CCA ¹¹
Cant Strips, above ground	3B		0.018	0.019	0.050	0.060	0.060	0.15	
Fascia Boards , above ground, exterior Painted, coated Unpainted	3A 3B	0.17/0.28	0.013 0.018	0.019 0.019	0.050 0.050	0.060 0.060	0.060 0.060	0.15 0.15	
Fire Escapes, exterior exposed	4A				0.14	0.15	0.15	0.40	
Flooring , above ground Interior Exterior	1, 2 3B	0.17/0.28	0.013 0.018	0.019 0.019	0.050 0.050	0.060 0.060	0.060 0.060	0.15 0.15	
Framing, interior, above ground Joists, Rafters, Purlins, Studs, Headers, Beams Sill Plates	1, 2 2	0.17/0.28 0.17/0.28	0.013 0.013	0.019 0.019	0.050 0.050	0.060 0.060	0.060 0.060	0.15 0.15	
Furniture, indoor	1	0.17/0.28	0.013	0.019	0.050	0.060	0.060	0.15	
Furring Strips , above ground Indoor Outdoor	2 3B	0.17/0.28	0.013 0.013	0.019 0.019	0.050 0.050	0.060 0.060	0.060 0.060	0.15 0.15	
Interior, above ground	ESR5,5.4	0.17/0.28	0.018	0.019	0.050	0.060	0.060	0.20	
Above ground, interior, dry Above ground, interior, damp Above ground, interior, damp Above ground, general use Above ground, exterior, painted/coated Above ground, exterior, unpainted Ground contact or freshwater Ground contact, general use Ground contact or freshwater, critical Ground contact, critical/ heavy duty/ foundation Ground contact or freshwater, severe Ground contact, extreme duty	1 2 ESR ⁵ 3A 3B 4A ESR ⁵ 4B ESR ^{5,5,3} 4C ESR ⁵	0.17/0.28 0.17/0.28 0.17/0.28	0.013 0.013 0.013+ 0.013 0.018	0.019 0.019 0.019 0.019 0.019	0.050 0.050 0.050 0.050 0.050 0.14 0.14 0.23 0.23	0.060 0.060 0.060 0.060 0.060 0.15 0.15 0.23 0.23	0.060 0.060 0.060 0.060 0.060 0.15 0.15 0.31 0.25 0.31	0.15 0.15 0.20 0.15 0.15 0.40 0.40 0.60 0.60 0.60	0.60 0.60 0.60 0.60
Millwork, Trim , above ground Interior Exterior, <i>painted</i> Exterior, <i>unpainted</i>	1, 2 3A 3B	0.17/0.28 0.17/0.28	0.013 0.013 0.018	0.019 0.019 0.019	0.050 0.050 0.050	0.060 0.060 0.060	0.060 0.060 0.060	0.15 0.15 0.15	
Permanent Wood Foundation	4B		0.010	0.010	0.23	0.23	0.31	0.60	0.60
Piles, Sawn, ground contact or freshwater Structural Support Structural Support, critical	4B 4C				0.23	0.23	0.31 0.31	0.60 0.60	0.60 0.60
<i>Poles, Sawn</i> , ground contact or freshwater Structural Building Support , <i>moderate decay</i>	4B				0.23	0.23	0.31	0.60	0.60
Posts, Sawn, ground contact or freshwater Important Building Structural	4C						0.31	0.60	0.60
Porch Flooring, above ground, exterior	3B		0.018	0.019	0.050	0.060	0.060	0.15	
Roof Decking, above ground, exterior	3B		0.018	0.019	0.050	0.060	0.060	0.15	
Shakes and Shingles, above ground, exterior	3B						0.060	0.15	0.25
Siding , above ground, exterior Painted, coated Unpainted	3A 3B	0.17/0.28	0.013 0.018	0.019 0.019	0.050 0.050	0.060 0.060	0.060 0.060	0.15 0.15	
Skirtboard , Post-Frame Construction	4A				0.14	0.15	0.15	0.40	
Structural Supports, ground contact or freshwater Veranda Supports Residential/Business Supports Residential/Business Supports Critical Supports	4A 4B 4C 4C				0.14 0.23	0.15 0.23	0.15 0.31 0.31 0.31	0.40 0.60 0.60 0.60	0.60 0.60 0.60
Trusses Roof Trusses, interior Floor Trusses, above ground	1, 2 3B	0.17/0.28	0.013 0.018	0.019 0.019	0.050 0.050	0.060 0.060	0.060 0.060	0.15 0.15	

⁽¹⁾ This table includes only the most readily-available preservatives used to pressure treat Southern Pine solid-sawn products by end use. See Table 1 for a more complete list of preservative systems, their names and additional information.

See additional footnotes on page 10.

⁽²⁾ Not all preservatives are approved or used for all end uses or service conditions. To provide the most practical information possible, this table provides minimum retention levels for only the most common preservatives for each specific end use. Refer to the American Wood Protection Association (AWPA) Book of Standards and International Code Council-Evaluation Service (ICC-ES) Evaluation Reports (ESRs) for complete information on all approved preservatives.

⁽³⁾ Minimum retention requirements are from AWPA Standard U1 (Commodity Specifications A (Sawn Products), B (Posts) and D (Poles)) and ICC-ES ESRs, and are given in pounds per cubic foot (pcf).

⁽⁴⁾ End Uses are based on AWPA Standard U1 (Tables 2-1 and 3-1) and ICC-ES ESRs. See AWPA Standard U1 for a more complete list of commodities, uses, exposures, use categories, commodity specifications and special requirements.

Table 3-3: SAWN PRODUCTS Used in Agricultural, Highway and Industrial Construction¹
Nonresidential/Nonbuildings, Exterior

	Service		Southe	ern Pine Pi	reservativ	es² & Min	imum Ret	entions³ (pcf) by En	d Use 4	
End Uses ⁴	Condition – Use Category				Waterborn	ne			Oilborne	Creo	sote
	or ESR 4,5	PTI6	EL2	μ CA-C 7	MCA7	CA-C	ACQ-A,D8	CCA ¹¹	PCP-A,C	CR, CR-S	CR-PS
Agriculture/Farms Agriculture/Mariculture, ground contact Fence Posts, sawn four sides, ground contact Food Contact, above ground, exterior Food Harvest & Storage, above ground, exterior Grape/Agricultural Stakes, sawn, ground contact	4A 4A 3B 3B 4A 4A	0.018 0.018	0.019 0.019	0.14 0.14	0.15 0.15	0.15 0.15	0.40 0.40	0.40			
Greenhouse, ground contact or freshwater Poles, Sawn, agricultural/farm Posts, Sawn, agricultural use, moderate decay Stockyard Fence Rail, above ground, exterior	4B 4A 4B 4A 4C			0.23 0.14 0.23 0.14	0.23 0.15 0.23 0.15	0.31 0.15 0.31 0.15	0.60 0.40 0.60 0.40 0.60	0.40 0.60			
Aquaculture, freshwater Bridges, Lumber, Timber & Decking, UC4C retentions						0.31	0.60	0.60		12	12
Cooling Towers, freshwater contact	4A			0.14	0.15	0.15		0.40		12	12
Crib Walls, ground contact or freshwater	4B			0.23	0.23	0.31	0.60	01.10			
Cribbing & Culverts	4C					0.31		0.60		12	12
Crossarms, Sawn, above ground, exterior General Use Critical or hard to replace	3B 4A					0.060 0.15		0.25 0.40	0.40 0.50		
Crossties & Switchties12	4A									8.0	8.0
Highway Construction, exterior Ground contact or freshwater Brackish or saltwater, single treatment Brackish or saltwater, single treatment Brackish or saltwater, dual treatment, esp. UC5C Brine Storage, ground contact or freshwater	4B 5A 5B, 5C 5C, 5B, 5A 4A			0.23	0.23	0.31	0.60	0.60 1.5 2.5 1.5 (1st)		20 25 20 (2nd) 10	10
Cribbing, ground contact or freshwater Handrails, Guardrails, above ground, exterior Posts, Sawn, ground contact or freshwater Sign Posts, Fence Posts, Handrails, general Guardrails, Spacer Blocks, critical, moderate decay	4C 3B 4A 4B			0.050 0.14 0.23	0.060 0.15 0.23	0.31 0.060 0.15 0.31	0.60 0.15 0.40 0.60	0.60 0.40 0.60		12	12
Lumber, Timber, Boards, General Use, exterior Above ground, unpainted/uncoated Above ground, general use Ground contact or freshwater Boats, Bulkhead Sheeting, freshwater Expansion Boards	3B ESR⁵ 4A	0.018 0.013+	0.019 0.019	0.050 0.050 0.14	0.060 0.060 0.15	0.060 0.060 0.15	0.15 0.15 0.40	0.25 0.25 0.40			
Ground contact, general use Ground contact or freshwater, critical Ground contact, critical/ heavy duty/ foundation Ground contact, saltwater splash Ground contact, extreme duty	ESR ⁵ 4B ESR ^{5,5,3} 4C ESR ⁵			0.14 0.23 0.23	0.15 0.23 0.23	0.15 0.31 0.25 0.31	0.40 0.60 0.60 0.60 0.60	0.40 0.60 0.60 0.60 0.60		10 12	10 12
Lumber, Timbers and Decking, UC4C retentions for Bridges, Structural Members, Cribbing & Culverts	4C					0.31		0.60		12	12
Marine, Out-of-Water, Saltwater Splash Above Ground Ground contact	4B 4C			0.23	0.23	0.31 0.31	0.60 0.60	0.60 0.60		10 12	10 12
Marine, Brackish or Saltwater Aquaculture/Mariculture, Seawalls Boats, Bulkhead Sheeting, marine Brackish or saltwater, single treatment Brackish or saltwater, single treatment Brackish or saltwater, dual treatment, esp. UC5C	5A 5B, 5C 5C, 5B, 5A							1.5 2.5 1.5 (1st)		20 25 20 (2nd)	
Posts, Sawn, ground contact or freshwater, general	4A			0.14	0.15	0.15	0.40	0.40			
Retaining Walls, ground contact or freshwater, critical	4B			0.23	0.23	0.31	0.60				
Ties, Mine & Bridge Ground contact or freshwater Brackish or saltwater, single treatment Brackish or saltwater, single treatment Brackish or saltwater, dual treatment, esp. UCSC	4A 5A 5B, 5C 5C, 5B, 5A			0.14	0.15	0.15	0.40	1.5 2.5 1.5 (1st)		10 20 25 20 (2nd)	10

⁽¹⁾ This table includes only the most readily-available preservatives used to pressure treat Southern Pine solid-sawn products by end use. See Table 1 for a more complete list of preservative systems, their names and additional information.

See additional footnotes on page 10.

⁽²⁾ Not all preservatives are approved or used for all end uses or service conditions. To provide the most practical information possible, this table provides minimum retention levels for only the most common preservatives for each specific end use. Refer to the American Wood Protection Association (AWPA) Book of Standards and International Code Council-Evaluation Service (ICC-ES) Evaluation Reports (ESRs) for complete information on all approved preservatives.

⁽³⁾ Minimum retention requirements are from AWPA Standard U1 (Commodity Specifications A (Sawn Products), B (Posts), C (Crossties and Switchties) D (Poles) and G (Marine)) and ICC-ES ESRs, and are given in pounds per cubic foot (pcf).

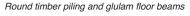
⁽⁴⁾ End Uses are based on AWPA Standard U1 (Tables 2-1 and 3-1) and ICC-ES ESRs. See AWPA Standard U1 for a more complete list of commodities, uses, exposures, use categories, commodity specifications and special requirements.

	Service		Southern P	tions³ (pcf)	tions³ (pcf) by End Use 4				
End Uses ⁴	Condition – Use Category			Water	borne		Oilb	orne	Creosote
	or ESR ^{4,5}	μ CA-C	MCA	CA-C	ACQ-A,D8	CCA	PCP-A,C	CuN	CR, CR-S
Round, Half-	Round and C	uarter-Rour	d Posts (len	gths < 16 fee	et), ground c	ontact or fre	sh water		
Agricultural (Farm), Round Structural Members	4B	0.23	0.23	0.31	0.60	0.60			
Building Construction, Round Posts	4B	0.23	0.23	0.31		0.60			
Fence, Round, 1/2 & 1/4 Round	4A	0.14	0.15	0.15	0.40	0.40			
General	4A	0.14	0.15	0.15	0.40	0.40			
Highway Construction Brine Storage, moderate decay Guardrail Posts, Spacer Blocks, moderate decay Fence, Guide, Sign & Sight Posts	4B 4B 4A	0.23 0.14	0.23 0.15	0.25 0.15	0.50 0.40	0.50 0.40			1015
Playground Equipment	4A	0.14	0.15	0.15	0.40				
Round and	Glued-Lamin	ated (Glulan	n) Poles (leng	ths ≥ 16 fee	t), ground co	ntact or free	sh water		
Agricultural Use, Round Poles Low decay Moderate decay	4A 4B	0.14 0.23	0.15 0.23	0.31 0.31		0.60 0.60	0.30 0.38	0.060 0.080	6.0 7.5
Building Construction, Structural Round Poles	4B	0.23	0.23	0.31		0.60	0.45		9.0
Highway Construction, Round Poles, moderate decay	4B	0.23	0.23	0.31		0.60	0.38	0.080	7.5
Lighting Poles, Round Moderate decay High decay	4B 4C	0.23	0.23	0.31 0.31		0.60 0.60	0.38 0.45	0.080 0.13	7.5 9.0
Utility Poles, Round Low decay Moderate decay High decay	4A 4B 4C	0.14 0.23	0.15 0.23	0.31 0.31 0.31		0.60 0.60 0.60	0.30 0.38 0.45	0.060 0.080 0.13	6.0 7.5 9.0
Utility Poles, Laminated - Distribution, Transmission General, low decay Important, moderate or high decay Critical, high or severe decay	4A 4B 4C	0.14 0.23	0.15 0.23				0.45/0.23 ¹³ 0.45/0.23 ¹³ 0.60/0.30 ¹³	0.095/0.048 ¹³ 0.095/0.048 ¹³ 0.15/0.075 ¹³	9.0/4.5 ^{13,15} 9.0/4.5 ^{13,15} 12/6.0 ^{13,15}
			Round Timb	er Piling					
Building Construction, Foundation Piles Completely embedded in soil, ground contact	4C			0.41		0.80			12
Highway Construction, Round Timber Piling Ground contact or freshwater Brackish or saltwater, single treatment Brackish or saltwater, single treatment	4C 5A 5B, 5C			0.41		0.80 1.5/0.9 ¹³ 2.5/1.5 ¹³			12 16 20
Marine, Round Timber Piling , brackish or saltwater Northern waters Central and Southern waters	5A 5B, 5C					1.5/0.9 ¹³ 2.5/1.5 ¹³			16 20
Marine, Round Timber Piling, dual treatment	5C, 5B					1.0 (1st)			20 (2nd)

⁽¹⁾ This table includes only the most readily-available preservatives used to pressure treat Southern Pine round posts, round timber piling and glulam utility poles by end use. See Table 1 for a more complete list of preservative systems, their names and additional information.

⁽⁴⁾ End Uses are based on AWPA Standard U1 (Tables 2-1 and 3-1) and ICC-ES ESRs. See AWPA Standard U1 for a more complete list of commodities, uses, exposures, use categories, commodity specifications and special requirements.







Round timber piling



Round timber piling – marine application

⁽²⁾ Not all preservatives are approved or used for all end uses or service conditions. To provide the most practical information possible, this table provides minimum retention levels for only the most common preservatives for each specific end use. Refer to the American Wood Protection Association (AWPA) Book of Standards for complete information on all approved preservatives.

⁽³⁾ Minimum retention requirements are from AWPA Standard U1 (Commodity Specifications B (Posts), D (Poles), E (Round Timber Piling) and G (Marine)) and ICC-ES ESRs, and are given in pounds per cubic foot (pcf). Commodity Specification B includes playground equipment (both sawn & round), round building posts & poles and modified exposures for farm use, plus states that creosote is the preferred treatment for brine storage.

	Service	Southern Pine Preservatives ² & Minimum Retentions ³ (pcf) by End Use ⁴										
End Uses ⁴ by Product	Condition – Use Category			1	Waterborne				Oilborne			Creosote
	or ESR4	PTI6	EL2	μ CA-C 7	MCA7	CA-C	ACQ-A,D8	CCA11	PCP-A,C	Cu8	CuN	CR, CR-S
				Plywo	od							
Above ground, exterior Roof decking, Flooring, Subflooring General, including Agricultural/Farms	3B 3B	0.018 0.018	0.019 0.019	0.050 0.050	0.060 0.060	0.060 0.060	0.15 0.15	0.25				
Ground contact or freshwater General, including Highway Construction	4A			0.14	0.15	0.15	0.40	0.40	0.50			10 ¹⁴
Saltwater splash, Marine	4B			0.23	0.23	0.31	0.60	0.60				1214
Brackish or saltwater Marine, Highway Construction, Boat Building	5A, 5B, 5C							2.5				25
Permanent Wood Foundation, ground contact & above	4B			0.23	0.23	0.31	0.60	0.60				
Subflooring, interior, damp	2	0.013	0.019	0.050	0.060	0.060	0.15					
			Glula	m, treated	after glui	ng						
Above ground, interior	1-2											
Above ground, exterior, structural	3B								0.30	0.020	0.040	8.014
Ground contact or freshwater, low decay General structural, including Highway <i>non-critical</i>	4A								0.60		0.060	10 ¹⁴
Ground contact or freshwater, high decay Highway , <i>important structural</i>	4B								0.60		0.075	12
Ground contact or freshwater, severe decay Highway , <i>critical structural</i>	4C								0.60		0.075	12
Utility Poles, Laminated - Distribution, Transmission General Important, high decay Critical, severe decay	4A 4B 4C								0.45/0.23 ¹³ 0.45/0.23 ¹³ 0.60/0.30 ¹³		0.095/0.048 ¹³ 0.095/0.048 ¹³ 0.15/0.075 ¹³	9.0/4.5 ¹³ 9.0/4.5 ¹³ 12/6.0 ¹³
		Gli	ulam, lami	nations tr	eated befo	re gluing	ļ					
Above ground, interior	1-2	0.013		0.050	0.060	0.060	0.15					
Above ground, exterior, structural	3B	0.018		0.050	0.060	0.060	0.15					
Ground contact or freshwater, low decay General structural, including Highway non-critical	4A			0.14	0.15	0.15	0.40	0.40				
			Pai	rallel Strar	id Lumber							
Above ground, exterior, structural	3B					0.060		0.25	0.40		0.040	8.014
Highway, structural, ground contact or freshwater General Important or high decay Critical or severe decay	4A 4B 4C					0.15 0.31 0.31		0.40 0.60 0.60	0.50 0.60 0.60		0.060 0.075 0.075	10 ¹⁴ 10 12
			Lami	inated Ven	eer Lumb	er						
Above ground, exterior, structural	3B											8.0
Highway, structural, ground contact or freshwater General Important or high decay Critical or severe decay	4A 4B 4C											10 12 12

⁽¹⁾ This table includes only the most readily-available preservatives used to pressure treat Southern Pine engineered wood products including plywood, glulam, PSL and LVL by end use. See Table 1 for a more complete list of preservative systems, their names and additional information.

Pressure-Treated Engineered Wood Products

Many engineered wood products, referred to as wood composites by AWPA, can be pressure treated to resist decay and insects. This includes plywood structural wood sheathing, glued-laminated (glulam) timber, parallel strand lumber and laminated veneer lumber. Glulam can be treated before or after gluing. Visit apawood.org for additional information.



Pressure-treated glulam beam



Pressure-treated plywood

⁽²⁾ Not all preservatives are approved or used for all end uses or service conditions. To provide the most practical information possible, this table provides minimum retention levels for only the most common preservatives for each specific end use. Refer to the American Wood Protection Association (AWPA) Book of Standards and International Code Council-Evaluation Service (ICC-ES) Evaluation Reports (ESRs) for complete information on all approved preservatives.

⁽³⁾ Minimum retention requirements are from AWPA Standard U1 (Commodity Specification F (Wood Composites)) and ICC-ES ESRs, and are given in pounds per cubic foot (pcf).

⁽⁴⁾ End Uses are based on AWPA Standard U1 (Tables 2-1 and 3-1). See AWPA Standard U1 for a more complete list of commodities, uses, exposures, use categories, commodity specifications and special requirements. See additional footnotes on page 10.

Table 6: Marine (Brackish & Saltwater) Applications¹

End Uses ⁴	Service Condition – Use Category ⁴
Marine Out-of-Water, Saltwater Splash	
Above Ground	4B
Ground Contact	4C
Marine, Brackish or Saltwater	
Long Island, NY, North; San Francisco, North	5A
Long Island to GA So. Border, San Francisco, South	5B
South of GA, Gulf Coast, Hawaii & Puerto Rico	5C

Southern Pine Preservatives² & Minimum Retentions³ (pcf) by End Use ⁴

End Uses4 by Product	Service Condition –	Waterborne	Creosote
Liid 0363 · by i roduct	Use Category ⁴	CCA	CR, CR-S
Marine Lumber, Timbers & Boards, Sawn Single treatment Single treatment Dual treatment - 1st CCA, 2nd Creosote Highway Construction, Aquaculture/Mariculture, Boats, Bulkhead Sheeting, Seawalls, Pier Cross Bracing, Piles, Mine Ties, Bridge Ties	5A 5B, 5C 5C, 5B	1.5 2.5 1.5 (1st)	20 25 20 (2nd)
Marine Piles, Round Single treatment Single treatment Dual treatment - 1st CCA, 2nd Creosote	5A 5B, 5C 5C, 5B	1.5/0.9 ¹³ 2.5/1.5 ¹³ 1.0 (1st)	16 20 20 (2nd)
Marine Plywood Single treatment	5A, 5B, 5C	2.5	25

- (1) This table includes only the most readily-available preservatives used to pressure treat Southern Pine wood products in marine construction. See Table 1 for a more complete list of preservative systems, their names and additional information.
- (2) Not all preservatives are approved or used for all end uses or service conditions. To provide the most practical information possible, this table provides minimum retention levels for only the most common preservatives used for Southern Pine. Refer to the American Wood Protection Association (AWPA) Book of Standards for complete information on all approved preservatives.
- (3) Minimum retention requirements are from AWPA Standard U1 (Commodity Specification G (Marine)), and are given in pounds per cubic foot (pcf).
- (4) End Uses are based on AWPA Standard U1 (Tables 2-1 and 3-1). See AWPA Standard U1 for a more complete list of commodities, uses, exposures, use categories, commodity specifications and special requirements.

TIP: Use Marine and Seawall Grades

The SPIB Standard Grading Rules for Southern Pine Lumber include two grade categories specifically for marine applications. Both require pressure treatment by an approved treating process and preservative for marine usage.

Marine requires that all four longitudinal faces must be free of pith and/or heartwood. It can be specified in sizes 1"

to 20" thick and 2" to 20" wide in any grade of Dimension Lumber or Timbers.

Seawall requires that one wide face and both adjacent narrow faces must be free of pith and/or heartwood. It can be specified in sizes 2" to 4" thick and 6" to 14" wide in any grade of Dimension Lumber. Seawall is intended for bulkhead sheeting applications and must have the sapwood face stamped THIS SIDE SEAWARD.

For additional information on specifications and design concepts for marine applications, refer to SFPA publication *Marine Construction Guide*.



TP SEAWALL, MFG. OOO FROM NO.2 SYP THIS SIDE SEAWARD

MARINE USE CATEGORIES FOR U.S. COASTAL WATERS

Coastal zones and corresponding Use Categories for saltwater marine exposure are shown here. Use Category

requirements for particular zones are based on the presence of specific marine organisms. The degree of hazard posed by these organisms in a specific coastal zone will determine the appropriate preservative loading. This map is only a general guide and should be



supplemented with local information where there is doubt concerning the nature of marine borer activity and selection of an appropriate preservative.



Source: AWPA Book of Standards

UC5C







LONG-TERM PERFORMANCE

Wood products are preservative treated to provide the required longevity for their intended use. This section addresses a variety of topics pertinent to the proper use and long-term performance of pressure-treated wood products. This includes consideration of the following:

- using the right fasteners and connectors for corrosion protection
- re-drying after treatment with waterborne preservatives for dimensional stability
- structural design, including use of the latest design values and appropriate adjustment factors
- on-site job storage for moisture protection
- treatment for field-cut ends, notches and drilled holes
- proper installation, finishing and maintenance

FASTENERS & CONNECTORS

Metal used in construction must be properly protected from corrosion. The potential for corrosion of fasteners (e.g. nails, screws, bolts, nuts and washers) and connectors (e.g. joist hangers, straps, hinges, post anchors and truss plates) in contact with pressure-treated wood varies by preservative

system and end-use exposure. For example, wood treated with non-copper based waterborne preservatives, such as SBX, PTI and EL2, is less corrosive overall than wood treated with copper-based preservatives. Also, wood treated with micronized copper preservatives, such as MCA and uCA. is



less corrosive overall than wood treated with dissolved copper preservatives, such as ACQ, CA and CCA. In addition, interior, dry environments are less conducive to corrosion than exterior, wet environments. Particularly severe environments include swimming pools, below-grade foundations, saltwater exposure, trapped water and other environments that allow for constant, repetitive or long periods of wet conditions.

It is important to follow specific recommendations from preservative and hardware manufacturers, but following is some general guidance:

- Model building code requirements are provided in Section 2304.9.5 of the *International Building Code*® and Section R317.3 of the *International Residential Code*®.
- In general, the codes require fasteners to be of hotdipped, zinc-coated galvanized steel in accordance with *ASTM A153*, type 304 or 316 stainless steel, silicon bronze or copper.
- An exception allows the use of plain carbon-steel fasteners for wood treated with borates and used in an interior, dry environment.
- Connectors should conform with ASTM A653.
- Fasteners and connectors used together must be of the same metallic composition to avoid galvanic corrosion; for example, use hot-dip galvanized nails with hot-dip galvanized joist hangers and stainless-steel nails with stainless-steel joist hangers.

- Aluminum fasteners and aluminum building products (e.g. window and door trim, flashing, siding, roofing and gutters) should not be placed in direct contact with wood products treated with dissolved copper preservatives. Direct contact with aluminum may be allowed for wood products treated with borates, carbon-based and micronized copper preservatives when used for interior and exterior, above-ground applications that do not trap moisture or allow the wood to be exposed to standing water or to water immersion.
- Stainless-steel fasteners are required for Permanent Wood Foundations below grade and other severe environments.
- Electroplated galvanized fasteners and connectors are typically not accepted for use in exterior applications, regardless of the preservative system.
- Other coatings or metal products may be available so follow the hardware manufacturers' recommendations for compatibility with wood treated with the various preservative systems and end-use exposures.
- Construction adhesives are not a replacement for metal fasteners, but can be added for extra holding power. Be sure the product label states the adhesive is "for use with treated lumber" and follow the adhesive manufacturer's instructions.

DRIED AFTER TREATMENT

As the name implies, waterborne preservatives use water to carry preservatives deep into the wood's fiber. Treating standards require wood products to be dry prior to treatment, with the moisture content percent requirement varying by product and size. For example, the moisture content for dimension lumber must be 19% or less prior to treatment, and can exceed 50% when removed from the treating cylinder.

Most pressure-treated Southern Pine is delivered without being redried, but drying after treatment – either KDAT (kiln dried after treatment) or ADAT (air dried after treatment) – can be specified to return the wood to its dry condition.

Drying after treatment may be required for structural strength or dimensional stability. For example, AWPA *Standard U1* requires pressure-treated lumber and plywood for Permanent Wood Foundations to be dried after treatment.

Building codes may also require drying after treatment where wood treated with waterborne preservatives is used in enclosed locations where drying in service cannot readily be



achieved. Examples include interior products and framing such as cant strips, flooring, joists, millwork & trim, roof & floor trusses, sill plates and studs.

In addition, drying after treatment is recommended when dimensional stability and tightness of fit are important to the end-use application. Examples include, decking, playground equipment, porch flooring and siding where superior long-term performance is desired.

Design Values for Pressure-Treated Applications

Reference design values for Southern Pine lumber are tabulated in the *Design Values for Wood Construction Supplement* of the *National Design Specification*® (*NDS*)® published by the American Wood Council. Reference design values for untreated lumber also



apply to lumber pressure treated by an approved process and preservative. As a result, new design values that became effective June 1, 2013 also apply to visually graded Southern Pine dimension lumber that is pressure-treated.

Reference design values are based on normal load duration under the moisture service conditions specified; they must be multiplied by applicable adjustment factors to determine adjusted design values. Adjustment factors for untreated lumber also apply to pressure-treated lumber with one exception – in Allowable Stress Design applications allowing an increase with the Load Duration Factor, C_D, that factor cannot exceed 1.6 for structural members pressure treated with waterborne preservatives.



As an example, common adjustment factors to consider when sizing pressure-treated joists for an exterior application include:

Wet Service Factor, C_M – A reduction required for lumber used under conditions where the moisture content of the wood in service will exceed 19% for an extended period of time, such as for uncovered outdoor decks regularly exposed directly to rain or other sources of moisture. Members that are protected from the weather by roofs or other means but are occasionally subjected to windblown moisture, such as for covered porches, are generally considered dry applications.

Repetitive Member Factor, C_r – An increase allowed when at least three joists are in contact or spaced not more than 24" on center and are joined by a load distributing element such as decking.

Incising Factor, C_i — A reduction required for difficult-to-treat species that must be incised to meet AWPA treating standards. This reduction does not apply to Southern Pine because of its ease of treatability.

Refer to SFPA publication *Southern Pine Use Guide* and *Maximum Spans for Southern Pine Joists & Rafters* for more information.

STORAGE

All wood products, including pressure-treated products, will continue to lose or gain moisture until they adjust to the conditions of their end-use environment. As a result, proper storage before and during construction is important. Treated lumber should be stacked and stored in the same manner as untreated wood. Follow these simple rules to help ensure proper storage and product performance at the job site:

Inspect lumber upon delivery for proper grade-marking and moisture content, plus other conditions that may require attention, such as mold.

Unload lumber in a dry place – not in wet or muddy areas.

Elevate lumber on stringers to prevent absorption of ground moisture and to allow air circulation. Do not store lumber in direct contact with the ground.

Cover lumber stored in an open area with a material that provides protection from the elements. Polyethylene or similar non-porous covers act as a vapor barrier, so it is important to allow ventilation around the material to prevent condensation on the underside of the covering.

Enclose framing lumber under roof as soon as possible.

Store exterior products (e.g. decking, porch flooring, siding) in a covered outdoor area to allow acclimation prior to installation. Layering the material on stringers to permit air circulation will help promote drying.

Store interior products (e.g. flooring, millwork) in the enclosed, conditioned area where installation will occur.

Use lumber in the order in which it is received. Inventory rotation is important.



Proper job site storage

Additional protection is provided when lumber is paper-wrapped or has been treated with a weather-protective coating. However, availability is limited and weather-protective coatings are effective for only three to six months. Damage to the paper during transportation can reduce its effectiveness, and protection is lost when paper wrappings are removed. For more details, refer to SFPA publications *Southern Pine Use Guide* and *Managing Moisture and Mold*.

FIELD TREATMENTS

Whenever practical, complete all required fabrication prior to treatment. Otherwise, any cuts and holes that penetrate the treated zone must be field treated in



accordance with AWPA Standard M4, Standard for the Care of Preservative-Treated Wood Products.

Southern Pine lumber and timbers less than 6" thick and used in above-ground applications, generally do not require field treatment to provide a good service life, but it is still considered good practice for satisfactory long-term performance. Material with narrow sapwood faces or heavy heartwood cross-sections should be field treated when cut or drilled. Bored holes for fasteners and connectors can be field treated with coal-tar roofing cement conforming to ASTM D5643.



AWPA M4 includes the following additional requirements:

- Apply field-treatment preservatives in accordance with the product label.
- Clean excessive preservative from the product's surface prior to use.
- Treat timber piles used to support structures, or used as foundation piling, with a liberal application of copper naphthenate with a minimum 2.0% copper metal.
- Cap marine piling exposed to the weather with a permanently fixed coating or caps attached to the piles. The appropriate preservative for field treatment depends

on the preservative system originally used to treat the product as shown below.

Recommended	Recommended Preservative for Field Treatment										
Original Preservative	End-Use Application	Field Treatment Preservative	Requirement								
Waterborne preservatives, copper naphthenate, pentachlorophenol, creosote or creosote solution	All, as appropriate for the original preservative system	Copper Naphthenate	Minimum 2.0% copper metal is recommended; minimum 1.0% can be used if the higher concentration is not readily available								
Waterborne preservatives	Above ground and continuously protected from water only	Inorganic Boron	Minimum 1.5% (B ₂ O ₃ basis)								
Waterborne preservatives, copper naphthenate, pentachlorophenol, creosote or creosote solution	Above ground only	Oxine Copper	Minimum 0.675% oxine copper (0.12% copper metal)								

FINISHING

As with other building materials, the satisfactory long-term performance of pressure-treated Southern Pine is dependent upon proper design, installation, finishing and maintenance.

Finishing recommendations vary by preservative type and end-use application, so be sure to follow the paint or stain manufacturer's instructions for specific projects. In general, waterborne preservatives are clean in appearance and can be painted or stained. Creosote and oilborne pentachlorophenol, on the other hand, have an oily surface appearance and are not paintable on a practical basis. Southern Pine treated with waterborne preservatives accepts a finish similar to untreated Southern Pine. Most importantly, the treated wood should be dry before applying the finish.

Pressure-treated wood is most often used in outdoor environments that would be challenging to any building material. As an example, outdoor decks present a particularly severe exposure for both the wood and its finish. Pressuretreated decking is exposed to both sun and rain, greatly accelerating the natural weathering process. The wood shrinks and swells as repeated cycles of drying and wetting

occur, subjecting its finish to excessive stress. Furthermore, the finish on the top surface of the decking is subjected to abrasive wear. particularly in high-traffic areas. The key to



satisfactory long-term performance of pressure-treated decking is to minimize its dimensional changes. This can be accomplished by including a water repellant in the treatment process, drying after treatment and re-applying a waterrepellant finish when needed. For additional information on finishing and maintaining decks, refer to SFPA publication Southern Pine Decks and Porches and visit SouthernPineDecks.com.

APPLICATIONS

Decks & Porches



Decks extend the living space of the home and offer many different design choices from simple, compact structures to elaborate multi-level decks with built-in planters, benches and railings. Pressure-treated Southern Pine is the most popular choice for real wood decking because of its inherent strength and ease of treatability, value, along with its visual appeal. And, the newest generation of preservatives is environmentally friendly and safe for use around people, plants and pets.

The porch has withstood the test of time as an American architectural icon, adding comfort, distinction and value. Today's home designs incorporate the porch as a natural extension of the family's living area. With its built-in resistance to decay and termites, pressure-treated Southern Pine porch flooring provides decades of satisfying service.

Visit SouthernPineDecks.com or refer to SFPA publication Southern Pine Decks and Porches.

Marine Structures

Marine structures include a wide range of residential and commercial applications such as fishing piers, floating docks, marinas, bulkheads and boardwalks. These structures, especially those in brackish and saltwater, are exposed to especially harsh environmental conditions. Southern Pine's ease of treatability, allowing for the deep penetration and retention of preservatives without incising, make it the ideal choice for marine applications.

Southern Pine is available in large sizes, heavy treatments and in two grade categories developed specifically for marine applications. Marine requires all four longitudinal faces to be free of pith and/or heartwood. Seawall requires one wide face and both adjacent narrow faces to be free of pith and/or heartwood. Seawall is intended for bulkhead sheeting and must have the sapwood face stamped THIS SIDE SEAWARD.

For additional information on specifications and design concepts for piers, docks and bulkheads, refer to SFPA publication *Marine Construction Guide*.



Walkways & Light Vehicular Bridges



Southern Pine provides a warm, natural look that blends beautifully with the surrounding landscape. To meet today's environmental requirements, designers often span sensitive wetland areas with elevated wood boardwalks. Nature trails also lend themselves to wood walkways, providing unrestricted access to rest stops and interpretation stations overlooking impressive vistas. Elevated walkways also provide an environmental-friendly alternative to concrete or asphalt-paved pathways in zoos and nature centers, blending with the habitat and protecting natural terrain.

Golf courses around the country are experiencing success by incorporating cart paths and bridges made of pressure-treated Southern Pine. Cart paths made with real wood appeal to club developers because their natural look blends with the surroundings and can reduce the need for fill, often simplifying the environmental permitting process.

For additional information on specifications and design concepts for pedestrian bridges and walkways, as well as light vehicular bridges, refer to SFPA publication *Marine Construction Guide*.

Timber Bridges

Interest in timber bridges has increased in recent years given the challenges America faces with its aging infrastructure. Timber bridges come in all shapes and sizes, ranging from long-span glulam bridges on primary and secondary roads, to short-span solid-sawn bridges on rural roads. Wood bridges made with pressure-treated Southern Pine offer many advantages due to their cost effectiveness and ease of construction. Sections can be prefabricated offsite, reducing construction schedules and labor costs. These attributes are especially critical for rural road systems with their large number of bridges that are either structurally deficient or functionally obsolete.

Visit the National Center for Wood Transportation Structures (NCWTS) at WoodCenter.org for more information on how timber bridges can improve the transportation structure of America and the world. Also visit SouthernPine.com for standardized bridge plans.



APPLICATIONS (continued)

Permanent Wood Foundations



The Permanent Wood Foundation (PWF) is an innovative, engineered building system for crawlspace, split-level, or full-basement foundations. A PWF consists of loadbearing walls framed with pressure-treated lumber and sheathed with pressure-treated structural panels. The walls are designed to withstand backfill and vertical loading. They are supported laterally at the top by the floor system, at the bottom by a cast-in-place slab or pressure-treated wood basement floor, and at the base by backfill and foundation footings of crushed stone, gravel, coarse sand or poured concrete.

PWF walls are designed to resist and distribute earth, wind, seismic loads and stresses that may crack other types of foundations. The Permanent Wood Foundation is accepted by the major model building codes, by federal agencies, and by lending, home warranty, and fire insurance institutions. And it has been proven by years of success in homes and other structures throughout the U.S.

Refer to SFPA Publication Permanent Wood Foundations: Design & Construction Guide.

Raised Wood Floor Foundations

American homes have been built on raised wood floor systems since Colonial times. Depending on the location, a raised floor system may also be called a crawlspace, raised wood platform floor, or pierand-beam foundation. Regardless of the name, the aesthetic, economic, and practical reasons for building a raised home still apply today.

By design, a raised wood floor system elevates the living space off the ground, isolating it from moisture and pests. Elevating a structure reduces flood insurance premiums and can even prevent flood damage. Porches and decks are natural amenities, adding usable outdoor living spaces. Installation, maintenance and modification of plumbing and utilities are simplified. Any foundation can settle over time, but a raised wood floor system makes easy work out of leveling and repairs. A solid and comfortable floor is one of the most important parts of a home.

Pressure-treated Southern Pine lumber is ideal for all parts of a raised wood floor system, including the foundation walls. Visit RaisedFloorLiving.com or refer to SFPA publication *Raised Wood Floor Foundations*.



Post-Frame Construction



Throughout American history, post-and-beam construction concepts have been used as the model for constructing rural buildings, once referred to as pole barns. Today, it's known as post-frame construction.

Southern Pine's superior treatability and dependable strength makes it a preferred choice among post-frame builders. Post-frame buildings are economical, easy to construct, and code-compliant. They also offer excellent performance under high-wind and seismic loading conditions, making it ideal for demanding applications such as dairy barns, riding arenas, animal housing, and other rural buildings.

Modern technology has updated design concepts, extending the use of post-frame construction to commercial buildings, including auto dealerships and repair shops, retail stores, office buildings, and churches. The design principles of post-frame construction are simple and offer flexibility, which make it popular among architects, engineers, and building designers.

Visit PostFrameAdvantage.com to learn more.

Termite-Resistant Framing

To provide built-in termite protection, smart property owners are choosing entire framing packages of preservative treated lumber. Pressure-treated Southern Pine is a cost-effective and environmental-friendly framing material that resists attack from all termites – including Formosan. This "whole house" termite-resistant framing solution adds a second line of defense when used in conjunction with traditional termite controls such as ground-line treatments and termite barriers.

The alternative cost of repair, eradication, or replacement of framing due to attack by termites in an unprotected structure is almost always exponentially higher than the modest one-time cost of using treated lumber at the time of original construction. Termite-resistant framing is a low-cost "insurance policy" to help protect what is often a homeowner's single largest investment.

AWPA-designated Use Categories for termite-resistant framing applications are UC1, Interior Construction, Above Ground – Dry, and UC2, Interior Construction, Above Ground – Damp. Building codes may require drying after treatment where wood treated with waterborne preservatives is used in enclosed locations where drying in service cannot readily be achieved.



SAFE & ENVIRONMENTALLY FRIENDLY

Pressure-treated building materials add years to the service life of many structures, reducing the need for repairs and replacement. A structure's longer service translates into reduced demands made of our valuable forest resources.

When properly treated, handled and installed, pressure-treated Southern Pine is safe and environmentally friendly. Using some basic handling precautions and personal protection measures – all common building practices, whether using untreated wood or other materials – pressure-treated lumber is safe to use.









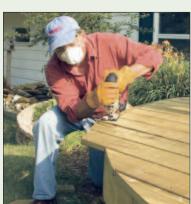
Safe Practices

Suppliers of pressure-treated wood provide Material Safety Data Sheets (MSDS) and/or Consumer Information Sheets listing specific safe practices for particular preservatives. In general, consider the following common-sense practices when using, working with and disposing of pressure-treated wood:

- Only use treated wood where protection against insect attack or fungal decay is necessary or important.
- Only use wood products treated with waterborne preservatives that are visibly clean and free of surface residue.
- Only use wood products treated with oilborne or creosote preservatives that are reasonably free of surface deposits.



- Do not use treated wood where the preservative may become a component of food, animal feed or beehives.
- Do not use pressure-treated wood where it may come in contact with drinking water, except for uses involving incidental contact such as docks and bridges.
- Wear gloves when working with wood to avoid splinters.
- Wear a dust mask when machining wood to reduce the inhalation of wood dust.
- Wear eye protection to reduce the potential for eye injury from wood particles and flying debris during machining.
- Clean up all sawdust and debris.
- Wash hands thoroughly with mild soap and water after working with treated wood.
- Wash work clothes separately from other household clothing before reuse.
- Dispose of treated wood in landfills or commercial/ industrial incinerators or boilers in accordance with federal, state and local regulations.
- Do not burn treated wood in open fires or in stoves, fireplaces or residential boilers.



Safety first. When sawing or machining treated wood, wearing eye protection, a dust mask, and gloves is recommended, a practice applicable when using other sawn or machined building materials.

Treated Wood = Lower Environmental Impact

Life Cycle Assessment (LCA) is an essential part of green building because it offers an objective and consistent way to measure the environmental impacts of building materials and assemblies. LCA confirms the environmental and other advantages of wood construction. Study after study in Europe, North America and elsewhere has shown that wood outperforms other products when considered over its complete life cycle.

But how does wood treated with preservatives compare to other building products used for the same application? Members of the Treated Wood Council wanted to know, and have published a series of life cycle comparisons (ISO 14044 compliant) on a range of treated products, from decking to marine piling. The analyses are conducted using life cycle methodologies following ISO 14044 standards, then published in peer-reviewed scientific journals.

Regardless of the application, analysis clearly shows that preservative-treated wood has a lower environmental impact when compared to steel, concrete, or plastic composites. To learn more, download these LCA summary reports at SouthernPine.com, listed under Publications:



LCA: ACQ-Treated Lumber Decking with Comparisons to Wood Plastic Composite Decking

LCA: Borate-Treated Structural Framing with Comparisons to Galvanized Steel Framing





LCA: Treated Wood Marine Piling with Comparisons to Concrete, Steel and Plastic Piling

LCA: Treated Utility Poles with Comparisons to Steel and Concrete Utility Poles





LCA: Treated Highway Guardrail Posts with Comparisons to Galvanized Steel

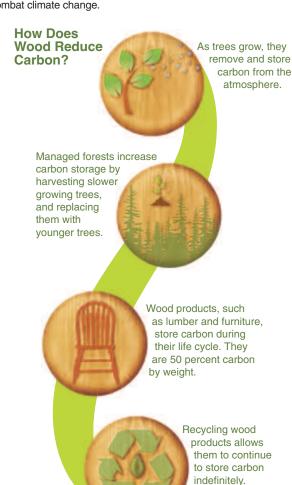
LCA: Creosote-Treated Railroad Crossties with Comparisons to Concrete and Plastic Crossties





Wood products help reduce CO₂ emissions.

Wood is the responsible choice for building professionals. Why? Because wood products require less energy to manufacture – meaning fewer greenhouse gasses, like CO_2 . And trees use CO_2 to grow, changing greenhouse gases into the building blocks we know as wood. That's why wood products are increasingly being recognized as tools to combat climate change.



ADDITIONAL RESOURCES

The Southern Forest Products Association offers a wide variety of helpful publications for design-build professionals. The titles listed below are available online in PDF. Visit SouthernPine.com to download and to see a listing of all publications.

Southern Pine Use Guide (#200)

grade descriptions, design values, applications, specification guidelines

Southern Pine Decks and Porches (#305)

product selection, construction guidelines, maintenance

Marine Construction Guide (#322)

specifications, guidelines and design concepts for bulkheads, piers, docks, walkways and light vehicular bridges

Southern Pine Maximum Spans for Joists and Rafters (#202) span tables, design criteria

Southern Pine Headers & Beams (#207)

size selection and allowable load tables for Southern Pine lumber and glued-laminated timber

Raised Wood Floor Foundations (#411)

foundation types, construction details, floor framing spans, cost-saving strategies

The following two titles can also be downloaded from the Publications page of SouthernPine.com:

Treated Wood in Aquatic Environments

a specification and environmental guide to selecting, installing and managing wood preservation systems in aquatic and wetland environments

Best Management Practices

for the use of wood in aquatic and wetland environments



















Online PRODUCT LOCATOR

Sourcing Southern Pine products?

Visit the online Product Locator at

SouthernPine.com

to find SFPA member producers.

Sources of Treated Wood Product Information

American Wood Council awc.org
American Wood Protection Association awpa.com
APA apawood.org
Creosote Council creosotecouncil.org
ICC Evaluation Service icc-es.org
North American Wood Pole Council woodpoles.org

Railway Tie Association rta.org
Southern Forest Products Association southernpine.com
Southern Pressure Treaters' Association spta.org
Western Wood Preservers Institute wwpinstitute.org
Wood Preservation Canada woodpreservation.ca
Wood Preservative Science Council woodpreservativescience.com



2900 Indiana Ave. Kenner, LA 70065 504/443-4464 • Fax 504/443-6612 mail@sfpa.org **SFPA.org** SouthernPine.com SouthernPineDecks.com RaisedFloorLiving.com