

A Guide to American Softwood Species

Sustainability - Quality - Versatility

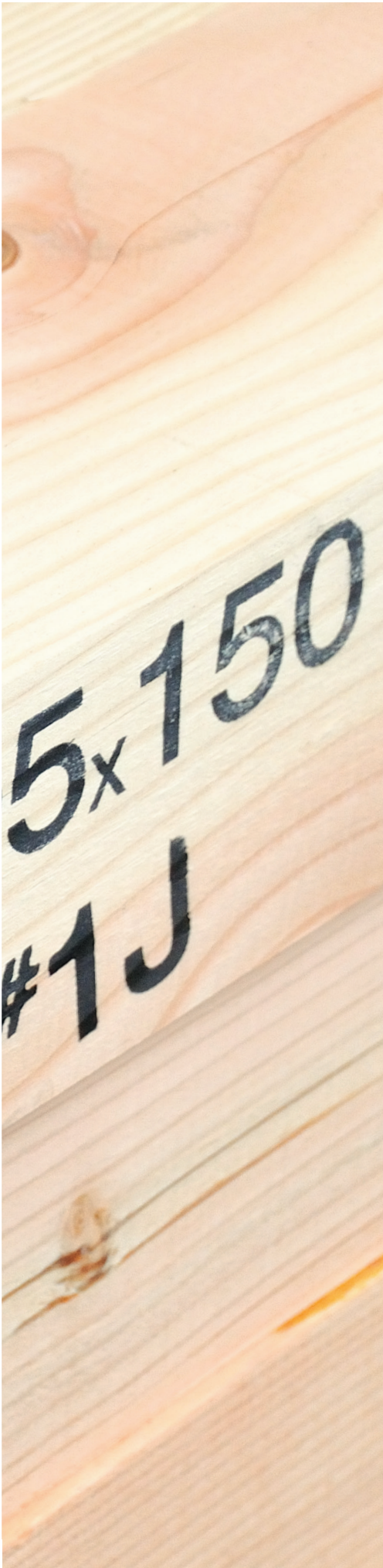


AmericanSoftwoods.com

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Introduction

Softwoods have been exported from the United States for over 400 years. Today, America is recognized world-wide as a sustainable source of top quality timber. This popularity is based on:

- Standardization of sizes and stress ratings
- Quality control through the enforcement of a single unified grading system
- Strength and durability
- Suitability for preservative and fire-retardant treatments
- Construction standardization

The simple cell structure of softwoods' long, uniformly packed fibres gives them a high strength-to-weight ratio, making them flexible and capable of bearing heavy loads. American softwoods have the strength to sustain longer spans for trusses and joists, as well as the clear, fine-grained timber that is in demand for joinery applications, such as panelling, door frames, windows, flooring and furniture. The various species of softwoods from Southern and Western America provide a wide range of choices.

This guide presents details of the botanical classification, properties and uses of the most commercially important American softwood species. Because of their versatility, most species can be used for a wide range of applications.

American softwood timber is marketed by members of the Softwood Export Council (SEC) and the Southern Forest Products Association (SFPA), known jointly as American Softwoods.

A sustainable resource

America's forests currently produce over 80 million cubic metres of sawn timber a year, making them the largest producers in the world. About 10 per cent of this timber is exported overseas.

Modern forest management ensures not only that felled trees are replaced, but that every year more wood is grown in US forests than is harvested. As a result, the US has more trees today than 70 years ago. 1.6 billion seedlings are planted in the US every year, the equivalent of 4.4 million trees every single day of the year.





The low carbon choice

Help tackle climate change - use more wood

No other material can match wood's unique benefits. It is light, strong, easy to work, affordable and good-looking. But, as sustainability and carbon reduction become increasingly important to all building activity, wood's compelling environmental benefits are helping to make it today's building material of choice:

- It is the world's only naturally renewable mainstream building material
- It is the only building material to provide third party verification of sustainability, through international forest certification programmes such as the Forest Stewardship Council (FSC), the Programme for the Endorsement of Forest Certification (PEFC), Sustainable Forestry Initiative (SFI) and schemes such as the American Tree Farm System
- It is reusable, recyclable, can be used as biomass fuel and is biodegradable
- It has better insulation properties than other building materials
- Trees require less energy (and therefore CO₂ emissions) to harvest and convert into finished products than any other construction material
- Growing trees remove CO₂ from the atmosphere and give off life-sustaining oxygen
- Wood products store CO₂ keeping it out of the atmosphere while stimulating the expansion of managed forests, which absorb yet more CO₂



Southern Yellow Pine

Pinus palustris, *Pinus elliottii*, *Pinus echinata* and *Pinus taeda*

General description

The four main species of Southern Yellow Pine are Longleaf (*Pinus palustris*), Slash (*Pinus elliottii*), Shortleaf (*Pinus echinata*) and Loblolly pine (*Pinus taeda*). The wood has a distinctive colour and grain, its sapwood ranging from white to yellowish and heartwood from yellow to reddish-brown. It combines looks, strength, and extreme ease of treatment with the highest nail-holding ability.

Main uses

Most is used structurally, for floor and roof trusses, joists, rafters and carcassing. Ease of treatment makes it particularly good for decking and outdoor use. Character and impact resistance make it suitable for flooring, panelling and joinery.

Distribution and availability

Grown on 78 million hectares of forest land in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North and South Carolina, Oklahoma, Tennessee, Texas and Virginia. Widely available.

Physical & mechanical properties

See chart on pages 54/55. Medium texture. Weight ranges from 537 to 626 kg per cubic metre. High density gives it natural strength, weight, and impact and wearing resistance. It has a higher specific gravity than European

Redwood and, although easy to work with, stands up well to rough treatment.

Durability

Slightly durable. Easy to treat.



Working properties

Machining	★★★★☆
Splitting resistance	★★★★☆
Screw/nail-holding	★★★★★
Gluing	★★★★☆



Douglas Fir

Pseudotsuga menziesii

General description

Straight-grained and moderately heavy, with limited resin, this is one of the most attractive and strongest of the Western softwood species. The wood has a slight rosy cast; the sapwood generally a light straw colour and the heartwood a deep russet brown.

Main uses

Its appearance is prized for joinery, panelling, cabinets, flooring, windows and cladding. Its strength, straightness and ease of fabrication make it the perfect high-performance timber for structural uses, such as metal plate-connected trusses, framing, bridges and large heavy members.

Distribution and availability

One of the tallest on the continent, this species accounts for a fifth of North America's total softwood reserves and is grown on 14 million hectares of forest in the Western Woods region. Readily available.

Physical & mechanical properties

See chart on pages 54/55. Medium texture, with a weight of 540 kg per cubic metre, and a high density, specific gravity and strength-to-weight ratio. Very stiff, with high strength values in bending, tension, horizontal sheer and compression. High shrinkage when seasoned from a green

state, but minimal shrinkage and swelling once seasoned.

Durability

Moderately durable. Difficult to treat - incising is recommended for maximum penetration of preservative.



Working properties

Machining	★★★★☆
Splitting resistance	★★★★☆
Screw/nail-holding	★★★★☆
Gluing	★★★★☆



Eastern White Pine

Pinus strobus

General description

A creamy straw-colour that will darken with age to a deep rich tan. Available in a wide range of grades and sizes.

Main uses

A mainstay of quality construction and fine woodworking, Eastern white pine is a favourite for cladding, panelling, mouldings and furniture.

Distribution and availability

Eastern white pine forests cover much of Northeast America. Widely available.

Physical & mechanical properties

See chart on pages 54/55. Medium texture. Weight ranges from 390-415 kg/cubic metre. With its fine grain and uniform texture, it has good manufacturing qualities and holds finishes well.

Durability

Slightly durable. Easy to treat.



Working properties

Machining	★★★★☆
Splitting resistance	★★★★☆
Screw/nail-holding	★★☆☆☆
Gluing	★★★★☆



Western Pines

Pinus spp.

General description

Often referred to as the White pines, this is a commercially important group, known for its resinous odour and light colour.

Main uses

Ponderosa pine (*Pinus ponderosa*)¹, Sugar pine (*Pinus lambertiana*)² and Idaho White pine (*Pinus monticola*)³ are valued primarily for their appearance. Ponderosa pine is suitable for any application that requires a light to moderately strong, splinter-free, stable wood, such as jointed drawers, windows, shutters and stairs. Sugar pine is prized for precision woodworking: patterns, piano keys, doors and cabinetwork. Idaho White pine is ideal for architectural mouldings and turned items.

Distribution and availability

Ponderosa pine has a range that extends from Canada to Mexico and from the Pacific Ocean to South Dakota and is widely available. Sugar pine grows mainly in the Sierra Nevada mountains of central and northern California, with good availability. Idaho White pine grows intermixed with other species from Colorado through Wyoming, Idaho, Montana and eastern Washington. Supply is limited.

Physical & mechanical properties

See chart on pages 54/55. Ponderosa pine is light and soft-textured, with a uniform, close, straight grain that is delicately figured after dressing. It seasons well, with

a minimum of warping and cupping. Sugar pine has low volumetric shrinkage and a uniform texture. Idaho White pine has exceptional workability with and across the grain.

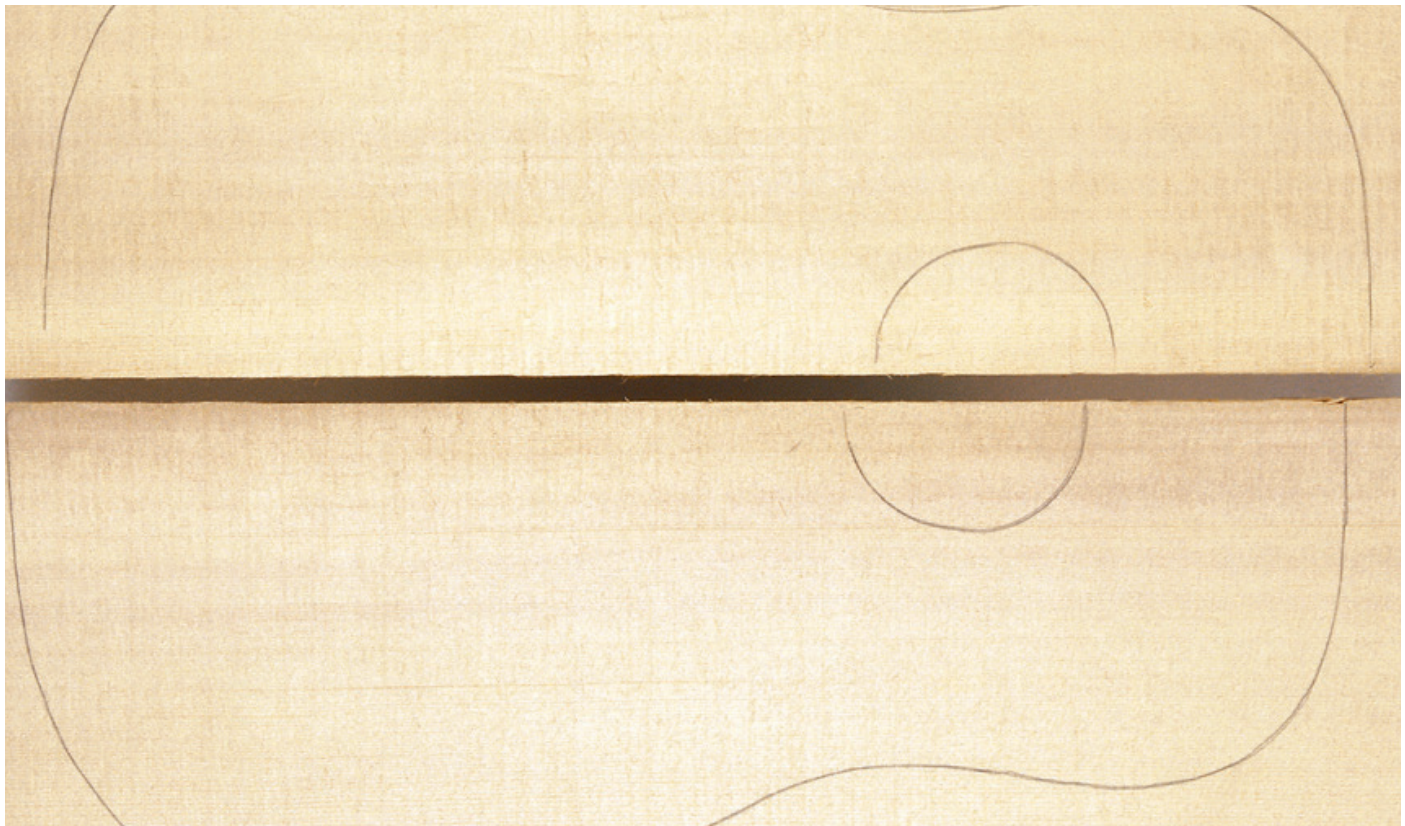
Durability

Slightly durable. Easy to treat.



Working properties

Machining	★★★★☆
Splitting resistance	★★★★☆
Screw/nail-holding	★★★☆☆
Gluing	★★★★☆



Sitka Spruce

Picea sitchensis

General description

The creamy white to light yellow sapwood blends gradually into its pinkish-yellow to light-brown heartwood. It is marketed and sold separately or in the Spruce-Pine-Fir (south) species combination.

Main uses

High quality pianos, stringed instruments, joinery and boats. It is also used for light framing in structural applications, ladder rails, scaffolding and other uses where its high strength-to-weight ratio is important.

Distribution and availability

Its natural home is a narrow belt of the Pacific Northwest coast of North America, from Alaska, through Washington and Oregon to Northern California. Readily available.

Physical & mechanical properties

See chart on pages 54/55. Weighs 349 kg per cubic metre. A clear, straight-grained wood, classed moderate in many of its properties, including weight and hardness. It has the highest strength-to-weight ratio of any species.

Durability

Not durable. Difficult to treat.



Working properties

Machining	★★★★☆
Splitting resistance	★★★★☆
Screw/nail-holding	★★★☆☆
Gluing	★★★★☆

Spruce-Pine-Fir south (SPFs)

This species combination, classed as moderately strong, is cross-continental in origin. Because of similar design values, the combination includes Engelmann and Sitka spruces and Lodgepole pine from the West, along with Balsam fir, Jack pine, Red pine and several species of spruce from the US Northeast. Spruce-Pine-Fir (south) design values make it appropriate for general framing applications. In the higher, structural light framing grades, dimension products are appropriate for light trusses and other engineered applications.



Engelmann Spruce

Picea engelmannii

General description

Among the lightest of the commercially important softwoods, although strong in relation to weight. It is nearly white, with a reddish tinge, and odourless. Structural framing grades are marketed and sold in the Spruce-Pine-Fir (south) species combination; appearance grades are often marketed in the ES-LP (Engelmann spruce/Lodgepole pine) combination.

Main uses

Framing, wall panelling and some joinery.

Distribution and availability

A major component of the high-elevation Rocky Mountain forests, growing in the Rocky Mountains of Southwestern Alberta, south through the high mountains of Eastern Washington and Oregon, Idaho, and Western Montana to Western and Central Wyoming, and in the high mountains of Southern Wyoming, Colorado, Utah, Eastern Nevada, New Mexico and Northern Arizona. Readily available.

Physical & mechanical properties

See chart on pages 54/55. Medium to fine textured and straight grained, with good workability. Weighing 368 kg per cubic metre, it is low in strength as a beam or post, soft, low in shock resistance, and has moderately small shrinkage. Relatively small, uniformly distributed knots.

Durability

Not durable. Difficult to treat.



Working properties

Machining	★★★★☆
Splitting resistance	★★★★☆
Screw/nail-holding	★★★☆☆
Gluing	★★★★☆



Western Hemlock

Tsuga heterophylla

General description

Among the harder, stronger Western softwoods, it is marketed and sold separately as well as in the Hem-fir species combination. Springwood is whitish to light yellow-brown; summerwood frequently has a purplish or reddish-brown tinge; heartwood not distinct. Small black streaks often appear in the wood.

Main uses

It is used for framing and architectural members and is a prime species for mouldings, millwork and panelling.

Distribution and availability

Grows best in the Pacific Northwest between sea level and 1850 metres. Readily available.

Physical & mechanical properties

See chart on pages 54/55. Weight 465 kg per cubic metre. Straight grain and fine texture.

Durability

Slightly durable. Moderately easy to treat.



Working properties

Machining	★★★★☆
Splitting resistance	★★★★☆
Screw/nail-holding	★★☆☆☆
Gluing	★★★★☆



Western Larch

Larix occidentalis

General description

Distinct among commercial softwoods for its fine, uniform, straight grain, Western larch is one of the harder, stronger and heavier softwoods. Heartwood is russet or reddish brown; sapwood is straw brown. Usually marketed and sold as Douglas fir-Larch.

Main uses

Used principally as structural framing timber; when rotary cut, for veneer and plywood sheathing.

Distribution and availability

Native to the high mountains of the upper Columbia River Basin in Southeastern British Columbia, Northwestern Montana, Northern and Central Idaho, Washington and Northern and Northeastern Oregon.

Physical & mechanical properties

See chart on pages 54/55. Tough fibred and somewhat oily in appearance, the wood weighs 577 kg per cubic metre and is stiff, moderately strong and hard, with moderately large shrinkage. The wood is usually straight grained, splits easily, and is subject to ring shake. Knots are common but generally small and tight.

Durability

Slightly durable. Moderately easy to treat.



Working properties

Machining	★★★★☆
Splitting resistance	★★★★☆
Screw/nail-holding	★★★★☆
Gluing	★★★★☆



Western Red Cedar

Thuja plicata

General description

A slow-growing, long-lived tree, whose aromatic wood is highly decay-resistant. The sapwood, usually less than 2.5 centimetres wide, is almost pure white, while the heartwood varies from a dark reddish brown to light yellow.

Main uses

Cladding, shingles and other exterior applications, such as greenhouses. Boatbuilding and marine structures. Interior panelling, window sashes and built-in furniture.

Distribution and availability

Found in the Pacific Northwest and inland to the Rocky Mountains in stands totalling 48.7 million cubic metres. Exceptional coastal area trees reach a height of 60 metres, a diameter of 4.9 metres and an age of 1,000 years or more. Readily available.

Physical & mechanical properties

See chart on pages 54/55. A coarse-textured softwood, weighing 376 kg per cubic metre, with a close, uniform, straight grain and an extreme resistance to decay. Dimensionally stable, it takes paint, stains or varnishes easily. Untreated, it weathers to a silvery-grey.

Durability

Durable. Difficult to treat with preservative.



Working properties

Machining	★★★★☆
Splitting resistance	★★★★☆
Screw/nail-holding	★★☆☆☆
Gluing	★★★★☆



Hem-Fir

Tsuga heterophylla and *Abies* spp.

General description

A species combination of the five true firs: California Red fir (*Abies magnifica*)¹, Grand fir (*Abies grandis*), White fir (*Abies concolor*)², Noble fir (*Abies procera*)³ and Pacific Silver fir (*Abies amabilis*)⁴ with Western hemlock (*Tsuga heterophylla*)⁵. Fine-grained and with interchangeable structural performance, these trees are marketed together as an elegant softwood, classified as a white wood, combining beauty and strength. A very light colour, from creamy white spring wood to a light straw-brown (hemlock) or reddish-brown (firs).

Main uses

Joinery that requires precision machining, a pale colour and excellent gluing, such as mouldings, exposed ceilings, doors, louvres, windows, furniture, flooring and laminated structural and non-structural products. Structural products, such as framing and engineered systems.

Distribution and availability

Second only to Douglas fir in abundance, Hem-fir accounts for 22 per cent of solid sawn production from the Western Woods region. The species grow in stands along the Pacific Coast from Northern California to Alaska and inland along the US/Canadian border as far as Montana. Readily available.

Physical & mechanical properties

See chart on pages 54/55. Straight grain and fine texture. Sands to a silky smoothness with virtually no tendency to split. Weight ranges from 537 to 626 kg per cubic metre. Knotty appearance grades for joinery; lower knotty grades for general construction. Good strength and stiffness. Good insulating properties. Holds its original colour well.

Durability

Slightly durable. Moderately easy to treat.



Working properties

Machining	★★☆☆☆
Splitting resistance	★★★★☆
Screw/nail-holding	★★★☆☆
Gluing	★★★★☆

Other Species

California Redwood

Sequoia sempervirens

Found exclusively in Northern California, this coastal redwood is grown commercially in natural stands. The sapwood is cream-coloured and the durable heartwood a reddish brown. Dimensionally stable with a refined texture and grain, redwood is world-renowned for its superb performance in exposed conditions: outdoor decks, garden

structures, cladding, fascia, fences, benches. It weighs from 394-448 kg per cubic metre and is marketed and sold separately.

Bald Cypress

Taxodium distichum

Most cypress trees are native to the South. They are found primarily in wet, swampy areas. Cypress trees are conifers, but unlike most American softwoods, they are deciduous, shedding foliage in autumn like hardwoods. Although cypress is a softwood, it grows

alongside hardwoods and traditionally has been grouped and manufactured with hardwoods. The oils in cypress' heartwood make it one of the most durable woods when exposed to moisture conditions causing decay.

Alaskan Yellow Cedar

Chamaecyparis nootkatensis

The lightest in colour of the naturally durable American softwoods. Fine, uniform texture and straight grain; silvers on exposure. Strongly aromatic, moderately strong and hard. Used where weather-resistance, stability and workability are needed: park benches, exterior

cabinetwork, stage construction, foundry patterns, marine and landscape installations. It weighs 497 kg per cubic metre and is marketed and sold separately.

Port Orford Cedar

Chamaecyparis lawsoniana

Found in a small area of Southern Oregon and Northern California, Port Orford cedar is finely textured with a pungent, ginger-like odour. Its heartwood is light yellow to pale brown, the sapwood is thin and hard to distinguish. Easily worked and polished, it is often substituted in Japan

for Hinoki when appearance is important. Also used in woodenware, novelties and toys. It weighs 465 kg per cubic metre and is marketed and sold separately; limited availability.

Incense Cedar

Libocedrus decurrens

Fine and uniformly textured with a distinctly spicy odour. Its sapwood is white or cream-coloured, while the extremely durable heartwood is light brown, often tinged with red. A highly workable wood, it machines and weathers well. It is used outdoors as landscape material, decking and fencing,

as well as for panelling, louvres and pencils. It weighs 384 kg per cubic metre and is marketed and sold separately or in the Western cedars combination.

Working properties

Machining	★★★★☆
Splitting resistance	★★★★☆
Screw/nail-holding	★★★☆☆
Gluing	★★★★☆



Working properties

Machining	★★★☆☆
Splitting resistance	★★★★☆
Screw/nail-holding	★★★★☆
Gluing	★★★☆☆



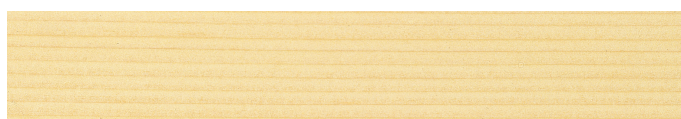
Working properties

Machining	★★★★☆
Splitting resistance	★★★★☆
Screw/nail-holding	★★★☆☆
Gluing	★★★★☆



Working properties

Machining	★★★★☆
Splitting resistance	★★★★☆
Screw/nail-holding	★★★☆☆
Gluing	★★★☆☆



Working properties

Machining	★★★★☆
Splitting resistance	★★★★☆
Screw/nail-holding	★★★☆☆
Gluing	★★★★☆



Southern Yellow Pine

The name Southern Yellow Pine represents a group of four principal species of pine: longleaf, shortleaf, loblolly, and slash, that grow in a wide belt from East Texas to Virginia. Timber from all four species is marketed as Southern Yellow Pine and graded in accordance with the grading rules of the Southern Pine Inspection Bureau (SPIB), approved by the American Softwood Lumber Standards Committee.

The natural characteristics that distinguish Southern Yellow Pine as a versatile and durable building material are:

- **High strength** - Design values are among the highest of all softwoods. It has earned a reputation as the 'Supreme Structural Wood of the World'.
- **Durability** - Highly resistant to wear, it is ideally suited for high-traffic applications such as pathways, decks and flooring.
- **Fastener holding** - Its ability to hold nails and other fasteners is among the highest of all softwoods. Drying (or seasoning) further enhances this capability.
- **Treatability** - It has long been a preferred species when pressure treatment with preservatives is required. Its unique cellular structure permits deep, uniform penetration of preservatives, making it one of the few species not requiring incising prior to treatment.





A natural asset

Wood has so many cost and construction advantages over other building materials, it's easy to forget what an environmental asset it is. Wood is naturally reusable, recyclable and biodegradable; it's the best insulator of all structural building materials, conserving finite fossil fuel and coal by requiring less energy to heat and cool a home built with wood; it takes far less energy to transform trees into wood products than it does to manufacture steel, aluminum, masonry or plastic products - and less pollution of the air and water, too. And, of course, a growing forest removes carbon dioxide from the atmosphere, while giving off life-sustaining oxygen. Can you think of a better environmental exchange than that?

Ample resources

Southern forests are among the largest and most readily accessible in the world. The growing stock of Southern Yellow Pine has more than doubled since the 1950s; by 2040, it will have increased in volume by about 20% to 120 billion cubic feet (3.4 billion cubic metres).

Stable supply chain

Expanding forests mean long-term confidence in the supply chain. Southern foresters use sustainable forest management practices to guarantee an abundant resource for future generations and to protect the environment.

Strong infrastructure

The US South is a global leader in exporting timber and finished products. Landowners, loggers, foresters and value-added industries create a dynamic and efficient supply chain, with Southern Yellow Pine reaching international markets through a network of Southeastern shipping ports.

Certified wood

Increasing amounts of Southern Yellow Pine forest are being certified by third-party auditing programmes, such as the Sustainable Forestry Initiative, American Tree Farm System and the Forest Stewardship Council. Contact your supplier for details.

Southern Yellow Pine Grades

Southern Yellow Pine is produced in different grades as well as sizes. Each grade limits certain characteristics such as knots, checks and splits. Grades are assigned by visual inspection of each piece at the mill. For U.S. construction markets, this inspection is more a judgement of the relative strength properties within a piece than of its appearance. For exports, appearance, as well as relative strength properties, is often a deciding factor. Timber exported for appearance is typically shipped rough and is not grade marked.

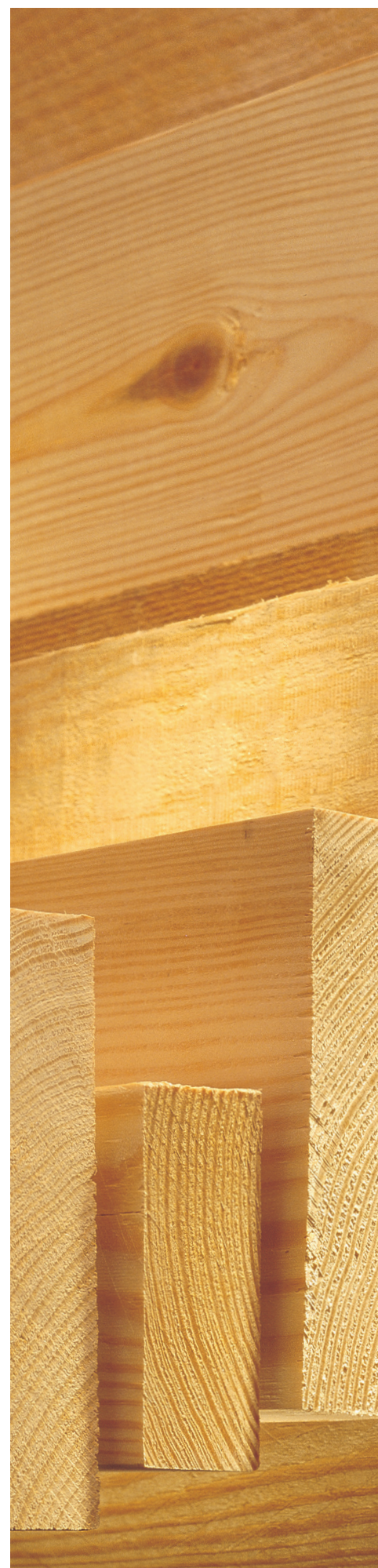
Quality Southern Yellow Pine is graded in accordance with the grading rules of the Southern Pine Inspection Bureau (SPIB). SPIB, Timber Products Inspection, Inc. (TP), Renewable Resource Associates, Inc. (RRA) and other organizations are accredited by American Lumber Standard Committee, Inc. (ALSC) to inspect and grade mark Southern Yellow Pine in accordance with SPIB rules.

The sample photos in this publication show allowable characteristics within each grade, as described in SPIB's 2014 Standard Grading Rules, and SPIB's Export Grading Rules, 1982 Edition, approved by the ALSC, in accordance with Product Standard PS 20. Photographs of dressed and rough timber are shown for each grade. Although not all thicknesses are shown, they are available in the same grades and have a similar appearance.

A complete grade description should be included with any buyer's order, and is considered an agreement between buyer and seller of specific characteristics allowed within each grade purchased.

An authorized grade mark on each piece assures the buyer that the product is manufactured to the correct specification. The inspection agency is identified (SPIB, TP or RRA among others**) along with the grade of the piece, its moisture content, and a mill number identifying the manufacturer.

****NOTE:** Other agencies are accredited by ALSC to inspect and grade all or selected Southern Yellow Pine products according to SPIB Grading Rules, including: California Lumber Inspection Service (CLIS); Northeastern Lumber Manufacturers Association (NELMA); West Coast Lumber Inspection Bureau (WCLIB); and Western Wood Products Association (WWPA).



SFPA members can include the association's logo in the grade mark if they wish to.



1. Inspection Service: Southern Pine Inspection Bureau (SPIB)
2. Inspection Service: Timber Products Inspection, Inc. (TP)
3. Inspection Service: Renewable Resource Associates, Inc. (RRA)
4. Timber Grade
5. Mill Identification Number
6. Timber Species
7. (optional) Logo denoting a member mill of Southern Forest Products Association (SFPA)
8. Moisture Content (MC): Kiln-dried (KD) to a maximum of 19%
9. Heat Treated





Kiln-drying assures dimensional stability

The vast majority of Southern Yellow Pine is kiln-dried to a maximum moisture content of 19%. This improves dimensional stability, strength and appearance, minimizes shrinkage in service and is also an accepted method of sterilizing the timber to prevent the transfer of micro-organisms.

Grading rules restrict the moisture content of timber 50mm (2") or less in thickness to a maximum of 19% (KD19). Moisture content restrictions apply at the time of shipment, as well as at the time of dressing.

A certified grade mark is evidence that the Southern Yellow Pine has been properly seasoned and is considered sterilized by most importing countries.

Timber absorbs or loses moisture depending on the surrounding temperature and humidity. Within a typical shipment, Southern Yellow Pine dried to a maximum moisture content of 19% will average 15%, and if dried to a maximum moisture content of 15%, will average 12%. Once kiln-dried shipments are delivered, proper storage is essential to maintain dimensional stability.

Southern Yellow Pine Grades

Dressed No.1

This grade is recommended for general use and construction where high strength, stiffness, and good appearance are desired. Typical uses may include the bottom chord of an engineered truss - where highest strength is required - or for long-span floor joists.



Sample photo
2"x 6" (38mm x 140mm)
Length: 10' (3.048m)

Dressed No.2

This is the most commonly available grade, recommended for most general uses where moderately high design values are required.



Sample photo
2"x 6" (38mm x 140mm)
Length: 10' (3.048m)



Sample photo

2"x 6" (38mm x 140mm)
Length: 10' (3.048m)

Dressed No.3

This grade is assigned design values to meet a wide range of design requirements. It is recommended for general construction where appearance is not a controlling factor. Many pieces would qualify as No.2 except for a single limiting characteristic. Commonly used for truss webs, or for non-building applications such as pallets, concrete forming, and other industrial uses.



Sample photo

2"x 6" (38mm x 140mm)
Length: 10' (3.048m)

Dressed No.4 (Economy)

Dressed, kiln-dried, and manufactured to full dimension sizes in thickness and width. Primarily used for a variety of industrial purposes.

Southern Yellow Pine Grades

Rough Sawn Saps

Rough sawn, and kiln-dried to a maximum moisture content of 19%, this material measures 7/8" x 3" and wider to 3"x 3" and wider. Saps are primarily used in re-saw and re-manufacturing operations to produce items for joinery, mouldings, furniture, panelling, and cladding.



Sample photo
1"x 4" (25mm x 100mm)
Length: 10' (3.048m)

Rough Sawn Prime

Rough sawn and kiln-dried to a maximum moisture content of 19%, this material measures 1½" x 4" and wider, to 4"x 4" and wider. Prime material can be remanufactured into thicker sizes, similar to dimension. It may be suitable for structural uses, such as exposed rafters. It is also ideal for furniture, flooring, and joinery applications.



Sample photo
2"x 8" (50mm x 200mm)
Length: 10' (3.048m)

NOTE: Prior to shipment, the buyer and seller should establish what constitutes a complete grade description of this material.



Sample photo
2"x 8" (50mm x 200mm)
Length: 10' (3.048m)

Rough Sawn Merchantable

This material is suitable for re-manufacturing operations requiring finished material of large sizes.



Sample photo
2"x 6" (50mm x 150mm)
Length: 10' (3.048m)

Rough Sawn No.2

Rough sawn, kiln-dried, and manufactured to full dimension sizes in thickness and width.

Southern Yellow Pine Grades

Boards

Boards are classified as having a thickness of 1" to 1½" and a width of 2" or more. This material, surfaced four sides (S4S), is available in a wide range of sizes and grades to suit most requirements for utility, economy or appearance. Uses include shelving, packaging and formwork. Boards may also be re-manufactured into a variety of patterns.

Dressed thickness will vary by manufacturer, with ¾" (19mm) and 1" (25mm) the most common. Boards specified as 1" have an actual thickness of ¾"; those specified as 5/4" have an actual thickness of 1". Nominal standard widths range from 2" (50mm) to 12" (305mm). Lengths range from 8' (2.44m) to 16' (4.88m).



C&Btr Grade

This is most commonly specified for optimum appearance and a high quality finish. Flooring grades are based on appearance criteria, limiting defects such as tight knots, splits or wane.



No.2 Grade

1"x 6" (19mm x 150mm) Boards

For general purpose uses, such as sheathing, fencing, packaging and shelving.

Radius Edge Decking (R.E.D.)

This material is available in two grades: Premium and Standard. Premium offers better appearance characteristics. It features a rounded surface on all four edges; the rounding is on a radius of $\frac{1}{4}$ " or 6.35mm. The dressed thickness is 1" or 25mm in all widths. Typically, this product is pressure-treated with a waterborne preservative for outdoor deck surfaces, planters, benches and steps.

Sample photo

$\frac{5}{4}$ " x 6" (25mm x 140mm)

Length: 10' (3.048m)

Pressure treated with a waterborne preservative

NOTE: This product is graded according to SPIB's Special Product Rules for Radius Edge Decking, 1986 Edition. The product designation "R.E.D." is included within the certified grade mark.



Premium Grade

SPIB® PREMIUM
R.E.D. KO 15 (7)



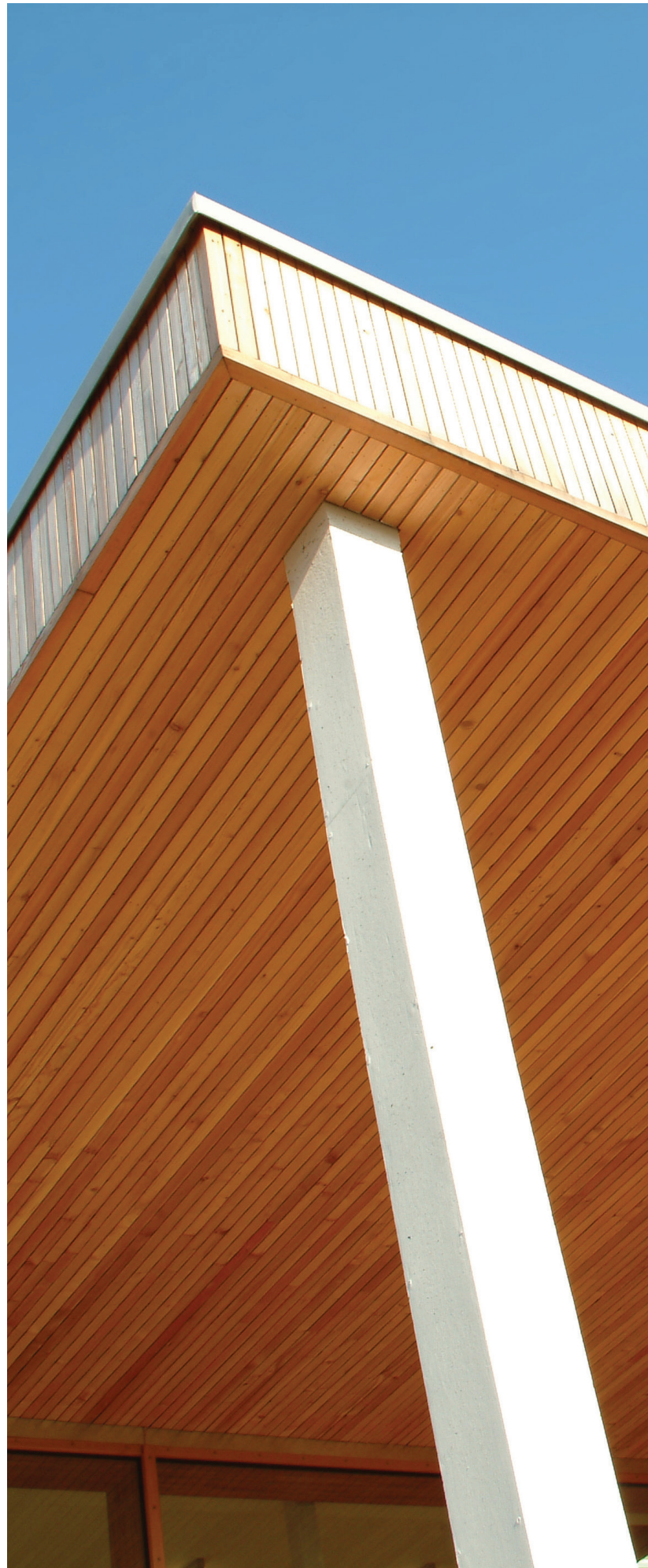
Standard Grade

TP® STAND. S-DRY
000 R.E.D. SYP

Western Softwoods

Western timberlands

The Western United States is home to over 213 million acres of some of the most abundant and productive forests in the world. Of this, just 126 million acres are available for commercial timber production, with the rest reserved for wilderness, watershed protection, wildlife, parks and other not-for-profit activities. Western commercial timber harvesting is governed by some of the toughest and most progressive state Forest Practices Acts and Best Management Practices of any timber-growing region on the planet, producing over 15 commercially important softwood species. This guide features five of the most prominent species available to timber buyers: Douglas Fir, Hem-Fir, Ponderosa Pine, Idaho White Pine and Engelmann Spruce.





Timber Grades In Brief

To understand U.S. softwood grades, it's best to start by looking at the three broad categories in which they are evaluated, each determined by end-use:

- **Structural Lumber** is used in construction and is graded for its strength.
- **Appearance Lumber** is used in visible applications and is graded according to the number of characteristics that might detract from the appearance of the piece.
- **Factory and Shop Lumber** is used for windows, doors and furniture, and is graded for the percentage of smaller cuttings that can be recovered from a single piece.

Each of these categories has its own special grading rules and organizational structures, which this guide will explore, providing information on popular grades within the category.

The most important thing to know when choosing a lumber grade is the application it will be used for. If the lumber you require is structural, how much weight will it need to bear? If the lumber you require will be visible, how important is clear grain? Ultimately, knowing the details of your end-use will allow you to select the right grade for your project.

Member grading agencies

This publication offers a representative sampling of western softwood grades provided by the member agencies of the Softwood Export Council (SEC):



Pacific Lumber
Inspection Bureau
(PLIB)



West Coast Lumber
Inspection Bureau
(WCLIB)



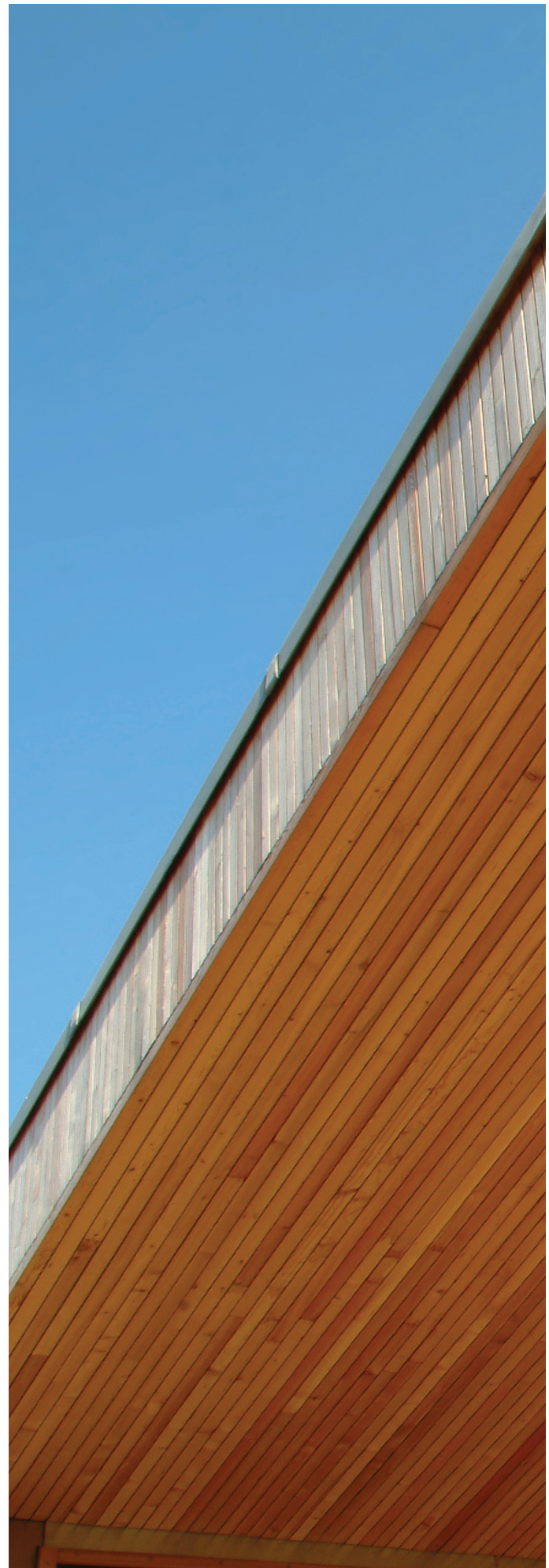
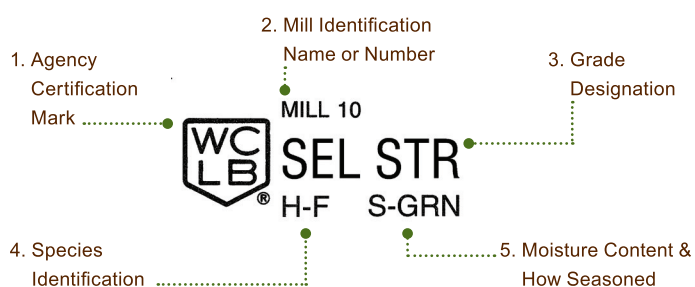
Western Wood
Products Association
(WWPA)

Each of these agencies is accredited by the American Lumber Standard Committee, Inc. (ALSC) under the U.S. Department of Commerce. Together they are responsible for 85% of the western region's total softwood timber production. Softwood Export Council may be contacted at any time for information on its member organizations or the products of their member companies. Please refer to the SEC website: www.softwood.org

Understanding Grade Stamps

Most certified U.S. lumber shipments include a grade stamp, although grade-stamping requirements for appearance timber differ from those for structural timber. The important elements of any stamp are:

1. **Certification Mark:** registered by a grading agency, attesting to quality control supervision.
2. **Mill Identification:** showing the manufacturing mill's identity, either as a name or an assigned mill number.
3. **Grade Designation:** grade name, number, or abbreviation.
4. **Species Identification:** indicating species or species combination.
5. **Moisture Content & How Seasoned:**
 - MC15 or KD15: 15% maximum moisture content (KD indicates "Kiln Dried")
 - S-DRY or KD: 19% maximum moisture content
 - S-GRN: over 19% moisture content
 - HT: the core temperature of the wood is heated to a minimum of 56° C for a minimum of 30 minutes (HT indicates "Heat Treated")



Natural characteristics and manufacturing imperfections

Natural characteristics or manufacturing imperfections that may occur during processing affect not only the appearance of a piece of lumber, but also its structural integrity and load-bearing capacity. Grades are determined by criteria such as the type, size, closeness, frequency and location of all characteristics and imperfections within a piece. Some of the more common characteristics and manufacturing imperfections referenced later are shown below:



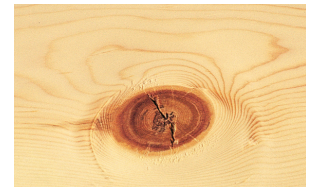
Bark Pocket



Blue Stain



Brown Stain



Checked Knot



Intergrown Knot



Machine Burn



Machine Gouge



Not-firmly Fixed Knot



Pitch Streak



Skips in Dressing



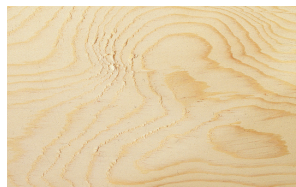
Sloughed Knot



Spike Knot



Tight Black Knot



Torn Grain (From



Unsound Knot



Wane

Structural timber

Structural pieces are evaluated visually, mechanically, or by digital scanning, with grades assigned on the basis of each member's strength, not appearance. Grading rules limit the natural characteristics and manufacturing imperfections that affect strength and influence the end uses appropriate to each grade, species and size.

Grades are determined on the full size of the board - if a graded piece of lumber is resawn, its grade no longer applies; you now have two un-graded pieces of lumber, and one might have more characteristics, and therefore potentially a different grade, than the other.

Each grade has unique design values that relate to the stiffness and strength of the piece and vary by species. Some western species share these performance properties and are thus grouped together, which simplifies marketing, design and engineering. By combining similar species, design values may be developed and assigned per combination rather than individually. Some common Western Species Combinations include:

- Douglas Fir-Larch: Douglas Fir and Western Larch
- Hem-Fir: Western Hemlock, Noble Fir, California Red Fir, Grand Fir, Pacific Silver Fir and White Fir
- Spruce-Pine-Fir (SPF): Sitka Spruce, Engelmann Spruce and Lodgepole Pine
- Western woods: Any combination of Western species except Cedar, e.g. Alpine Fir, Ponderosa Pine, Sugar Pine, Idaho White Pine and Mountain Hemlock
- Western Cedars: Incense Cedar, Western Red Cedar, Port Orford Cedar and Alaska Cedar.





Dimension Lumber grades, based on the National Grading Rule, are divided into four categories:

- **Structural Light Framing (SLF)** grades are intended to fit engineering applications where the highest design values are needed. SLF grades include Select Structural, No. 1, No. 2 and No. 3. They are available in sizes from 38mm x 38mm to 89mm x 89mm.
- **Light Framing (LF)** grades are intended for framing uses where highest strength values are not required, such as for wall framing, plates, sills, cripples, blocking, etc. LF grades include Construction, Standard and Utility in sizes from 38mm x 38mm to 89mm x 89mm.
- **Stud Grade** is an optional, all-purpose grade for vertical installations in load-bearing applications, such as for wall framing. There is only one grade, Stud, available in sizes from 38mm x 38mm to 89mm x 337mm.
- **Structural Joists & Planks (SJ&P)** grades are intended to fit engineering applications for timber 114mm and wider, such as floor joists, rafters, headers, small beams, trusses and general framing. SJ&P grades include Select Structural, No. 1, No. 2 and No. 3 and are available in sizes from 38mm x 114mm to 89mm x 483mm.

Additional **Special Dimension** structural products include Structural Glued and Machine Stress-Rated (MSR) timber.

On the following pages, we will take a closer look at the underlined grades above. These are commonly produced grades that will allow us a representative view of the Structural Grade. For more information on any of the above grades, please contact us at www.softwood.org.



Structural Light Framing Grades





Select Structural Douglas Fir

- Recommended for use where high strength, stiffness and good appearance are required
- Tight limitations are placed on characteristics affecting strength
- Allows sound, firm, encased and pith knots no larger than 22mm, tight and well-spaced
- Unsound or loose knots or holes no larger than 19mm, with one per 1.2 metres allowed
- Wane is restricted to $\frac{1}{4}$ the thickness and width of the full length
- Piece 5 depicts allowable heart pith.



No. 2 Douglas Fir

- Recommended for most general construction uses
- Allows well-spaced knots of any quality in sizes up to 51mm
- Holes no larger than 32mm, with one per 610mm allowed
- Wane allowable up to $\frac{1}{3}$ the thickness and width of the full length, or equivalent on each face, provided that wane not exceed $\frac{2}{3}$ the thickness or $\frac{1}{2}$ the width for up to $\frac{1}{4}$ the length; depicted in piece 4
- Piece 1 appears above grade, however a full-length machine skip makes it a No. 2.



Select Structural Hem-Fir

- Recommended for use where high strength, stiffness and good appearance are required
- Tight limitations are placed on characteristics affecting strength
- Allows sound, firm, encased and pith knots no larger than 22mm, tight and well-spaced
- Unsound or loose knots or holes no larger than 19mm, with one per 1.2 metres allowed
- Wane is restricted to $\frac{1}{4}$ the thickness and width of the full length
- Piece 4 depicts allowable centerline knots up to 22mm.



No. 2 Hem-Fir

- Recommended for most general construction uses
- Allows well-spaced knots of any quality in sizes up to 51mm
- Holes no larger than 32mm, with one per 610mm allowed
- Wane allowable up to $\frac{1}{3}$ the thickness and width of the full length, or equivalent on each face, provided that wane not exceed $\frac{2}{3}$ the thickness or $\frac{1}{2}$ the width for up to $\frac{1}{4}$ the length; depicted in pieces 1 and 5.

Light Framing & Stud Grades





Standard Douglas Fir

- Characteristics limited to provide good strength and excellent serviceability. Used for the same purposes as, or in conjunction with, construction grade
- Allows knots of any quality in sizes up to 51mm anywhere in the wide face
- Holes are no larger than 32mm, with one per 610mm allowed
- Limitations on wane apply.



Stud Douglas Fir

- Intended for vertical installations in load-bearing applications
- Knots of any quality in sizes up to 38mm, with one per 310mm allowed
- Limitations on crook, splits, shake and edge knots
- Wane allowable up to $\frac{1}{3}$ the thickness and $\frac{1}{2}$ the width of the full length or equivalent on each face, provided that wane not exceed $\frac{1}{2}$ the thickness and $\frac{3}{4}$ the width for up to $\frac{1}{4}$ the length; depicted in pieces 3 & 4.



Standard Hem-Fir

- Recommended and widely used for general construction purposes
- Graded for strength and utility
- Knots of any quality in sizes up to 51mm anywhere in the wide face
- Holes no larger than 32mm, with one per 610mm allowed
- Piece 5 depicts white speck.



Stud Hem-Fir

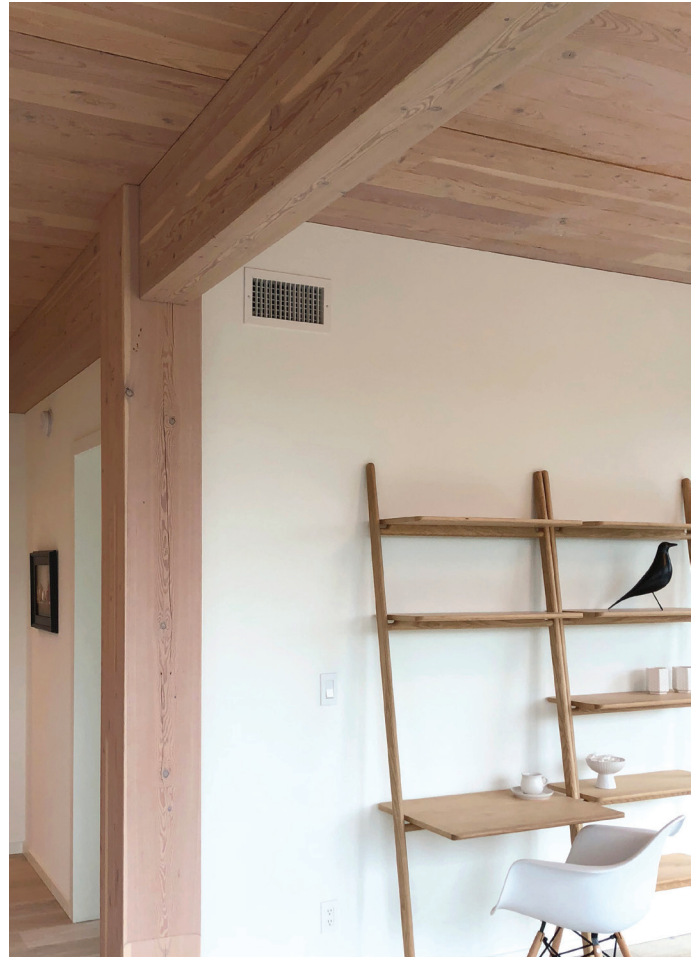
- Intended for vertical installations in load-bearing applications
- May be manufactured to the full basic length and double-end trimmed or precision end-trimmed to exact lengths
- Knots of any quality in sizes up to 38mm, with one per 310mm allowed
- Limitations on crook, splits, shake and edge knots
- Wane allowable up to $\frac{1}{3}$ the thickness and $\frac{1}{2}$ the width of the full length, or equivalent on each face, provided that wane not exceed $\frac{1}{2}$ the thickness and $\frac{3}{4}$ the width for up to $\frac{1}{4}$ the length; depicted in pieces 1 & 4.

Appearance Grade Timber

Appearance Grade timber is graded almost exclusively by visual inspection, and assigned grades are a judgment of appearance, not strength. Products range from the extraordinarily rare and exquisite to the most utilitarian boards intended for applications where price is the most important consideration.

While sometimes marketed in combinations based on similar appearance, species in the Appearance Grade are usually marketed separately. Appearance grades can be species-specific, reflecting their origins in different ecological sub-regions of the Western United States.

For instance, there are special grades for Idaho white pine and Californian redwoods because of regional variations in the species. There is one set of “Board” grades for pine originating from the inland West where ponderosa, lodgepole, and sugar pines grow; and another for fir products, originating from the coastal region of the Pacific Northwest where Douglas fir and Western hemlock dominate.



However, all appearance grades can be divided into two broad categories:

Highest quality appearance grades are often absolutely clear, free of natural characteristics, blemishes and manufacturing imperfections. These are the most perfect pieces possible, priced accordingly, and intended for applications where only the finest appearance is essential. Products in these grades are carefully manufactured and usually kiln-dried.

General purpose board grades are applied to knotty products, with limitations for the types and quality of allowable characteristics and manufacturing imperfections determined by the range of individual grades. These products are more widely available and well suited to a variety of high and low-end applications.

The tables opposite provides a partial list of Western species' appearance grades:



Product categories	Grades	Equivalent grades in Idaho White Pine
Highest Quality Appearance		
R-List Clears Applied primarily to Douglas fir, Western hemlock, Sitka spruce and Western red cedar	No. 2 Clear & Btr No. 3 Clear No. 4 Clear	
Selects Applied to all species but used primarily for pine products	B & Btr Select <u>C Select</u> <u>D Select</u>	Supreme <u>Choice</u> <u>Quality</u>
Finish Grades Usually available only in Douglas fir & Hem-Fir species	WWPA Rules <u>Superior</u> <u>Prime</u> <u>E</u> WCLIB Rules <u>C & Btr</u> <u>D</u>	
Redwood Architectural Grades RIS Rules Only for redwood species	Heartwood Grades: Clear All Heart <u>Heart B</u> Sapwood Grades: Clear <u>B Grade</u>	
Special Western red cedar Pattern Grades Only for cedar species	Clear Heart A Grade B Grade	
General Purpose Boards		
R-List Merchantable Primarily in Douglas fir, Western hemlock, Sitka spruce and Western red cedar	Select Merchantable No. 1 Merchantable No. 2 Merchantable No. 3 Common	
Common Boards (WWPA Rules) Primarily in pines, spruces and cedars	<u>1 Common</u> <u>2 Common</u> <u>3 Common</u> 4 Common 5 Common	Colonial Sterling Standard Utility Industrial
Board Grades (WCLIB Rules) Primarily in Douglas fir and Hem-Fir species	<u>Select Merchantable</u> Construction Standard Utility Economy	
Redwood Garden Grades RIS Grades Only for redwood species	Heartwood Grades: <u>Construction Heart</u> Sapwood Grades: Construction Common/Deck Common Merchantable	
Special Western red cedar Pattern Grades Only for cedar	Select Knotty Quality Knotty	

Once again, we will be taking a closer look at the underlined grades above on the following pages for a representative view of the Appearance Grade. For more information on any of these grades, please contact us at www.softwood.org

Select Grades





12 C&BTR SEL
® KD 15 

C & Btr Select
Ponderosa Pine

- Can be applied to any species, but usually reserved for Western pines
- Recommended where fine appearance is essential; virtually clear, and nearly blemish-free
- Allows few characteristics and graded on the full length of the better face
- Roughly equivalent to No. 2 Clear & Btr (Export R-list rules), Superior (WWPA rules) and C & Btr (WCLIB rules).



12 CHOICE & BTR
® KD 15 

Choice & Btr
Idaho White Pine

- Light in colour, even-textured, virtually free of any tendency to split or sliver, and famous for its workability with or across the grain
- IWP has its own set of grades that serve to identify this specific species in the marketplace
- Includes pieces that would make Supreme grade, but otherwise identical to the C & Btr Select grade used for other Western pines.



12 D SEL
® KD 15 

D Select
Ponderosa Pine

- Recommended where requirements for finishing are less exacting
- Timber has appearance features of the C Select grade
- Characteristics requirements generally less restrictive, and graded on full length on the best face
- Between higher grades for clear wood and Board grades applied to knotty products.



12 QUALITY
® KD 15 

Quality
Idaho White Pine

- IWP has its own set of grades that serve to identify this specific species in the marketplace
- Identical to the D Select grade used for other Western pines.

Finish & Board Grades





**Superior or C & Btr
Douglas Fir**

- Intended for all applications demanding only the finest quality
- Recommended for interior trim and cabinet work with natural, stain or enamel finishes, where refined appearance is desired
- Virtually clear, limited in availability and priced accordingly
- VG (vertical grain) may be specified
- Superior: WWPA rules; C & Btr: WCLIB rules.



**Prime or D
Douglas Fir**

- Species exhibits fine appearance, with slightly less restrictive characteristic requirements
- Grades usually applied to Douglas fir and Hem-Fir
- Prime permits a 76mm cutout at one end, or more than 0.9 metres from the end, in pieces of otherwise high appearance
- Cutouts restricted to 10% of the item in pieces 3.7 metres and longer
- VG (vertical grain) may be specified
- Prime: WWPA rules; D: WCLIB Rules.



**E Finish
Douglas Fir**

- Intended to include products that do not reach the higher FINISH grades (Prime and Superior) due to cross-cutting and/or ripping
- Each piece must contain 2/3 or more of cuttings 50mm or wider and 400mm or longer
- E Finish: WWPA rules.



**Select Merchantable
Douglas Fir**

- Recommended for housing and light construction, such as panelling, shelving, cladding, or any finish application where a knotty type of timber with a refined appearance is desired
- Each piece is of good appearance, close-grained and free from wane on the face with a few, minor characteristics allowed
- Sound and tight knots range from 32mm in 102mm widths, to 64mm in 305mm widths, proportionate in wider widths.

Common Board Grades

1 Common Ponderosa Pine

- Recommended as the ultimate in fine appearance for a knotty material in ponderosa or sugar pine, or spruce and cedar species
- Includes all sound, tight-knotted stock, with size and character of knots as the determining factor in grade
- Not available in large volumes
- Ponderosa pine is known for its creamy colour, refined texture and workability characteristics
- Idaho white pine equivalent: Colonial.



2 Common Engelmann Spruce

- Recommended for panelling, shelving and other applications where refined appearance is desired
- Intended for use in housing and light construction where the wood will remain exposed
- Engelmann spruce is known for extreme strength in relation to its light weight and is nearly white, odourless, tasteless, smooth, soft-textured, and straight grained
- Idaho white pine equivalent: Sterling.



3 Common Ponderosa Pine

- Recommended for a large range of building purposes where appearance and strength are both required
- Characteristics limited to assure a high degree of serviceability, especially well-suited for industrial use
- Idaho white pine equivalent: Standard.



California Redwood Grades



Heart B Redwood

- Quality heartwood grade containing limited knots and other characteristics not permitted in Clear All Heart
- Available dried or unseasoned; surfaced or saw-textured
- Widely used for siding, panelling, trim, fascia, mouldings and other architectural details and structural timbers
- Well suited for quality decking, garden and other structures and use on or near the soil.



B Grade Redwood

- Quality architectural grade containing sapwood, allowing limited knots and other characteristics not permitted in Clear
- Available dried or unseasoned; surfaced or saw-textured
- Widely used for cladding, panelling, trim, fascia, mouldings and other architectural uses
- Appropriate for quality decking, garden structures and other above-ground outdoor applications.



Construction Heart Redwood

- Heartwood grade containing knots of varying sizes and quality
- Available dried or unseasoned; surfaced or rough
- Used for decks, posts, retaining walls, fences, garden and other structures, stairs, structural timbers and any use on or near the soil.

Timber for Remanufacture

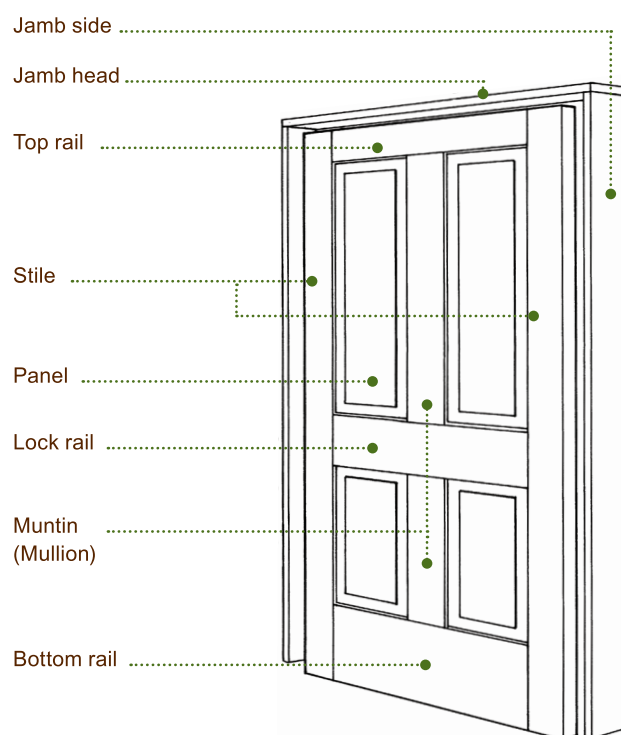
Timber products intended for remanufacturing purposes are generally graded for the percentage of standard-size clear “cuttings” that can be recovered from a piece after processing it to remove defects or other characteristics. These cuttings are used for windows, doors, furniture, mouldings, boxes, cabinetry, and other millwork.

Timber for remanufacturing grades can be applied to most species, including redwood and cedar. However, the species most widely used for Remanufacturing Grades are Douglas fir, ponderosa pine, sugar pine, Western hemlock and the true firs, which are often combined and marketed as Hem-Fir.

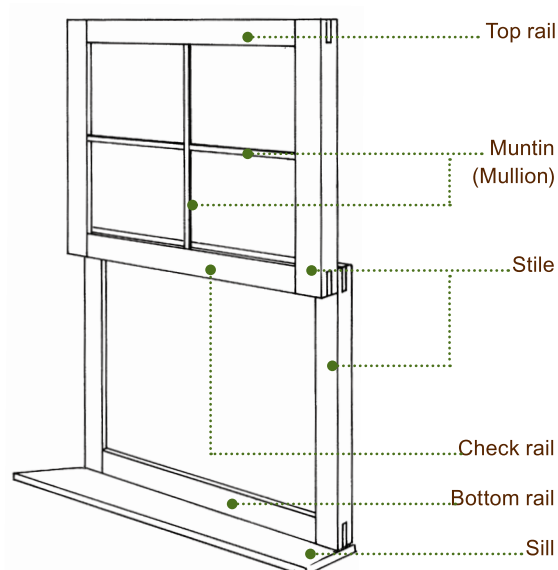
There are many specific grades in this board classification of timber products, but the focus of this guide is on non-structural remanufacturing timber grades from WCLIB, WWPA, and the Export “R” List grades from PLIB. WCLIB and WWPA product categories include:

- **Moulding Stock** grades apply to all species of all lengths and thicknesses, defining timber suitable for ripping into strips 25mm and wider, 3 metres and longer for making mouldings.
- **Shop Timber** grades apply to all species and thicknesses, with reference to the percentage of area in the piece that is recoverable in cuttings for use in window sash and door parts.
- **Door Stock** grades apply to all species except cedar in stock 29mm and thicker, graded for percentage of area in each piece recoverable in cuttings to be used as stiles and glazing bars for window parts.
- **Flush Door Stock** grades include products in Douglas fir and Hem-Fir that are 29mm and thicker, intended for use in the manufacture of flush-type doors to be covered with veneer.
- **Jamb and Head Stock** grades are finished rough or smooth in all species 29mm and thicker, 102 to 203mm wide, graded for the recovery of cuttings suitable for manufacture into door jambs and component parts. Cuttings include Sides, Heads, Moulding Rips, and finger-jointed material in predetermined sizes.

Door Cuttings



Sash Cuttings





PLIB Export “R” List remanufacturing grades include:

- **Clear grades** come in three grades and can be ordered in vertical or random grain. They are sub-divided into three thickness categories: under 76mm, 76mm to 127mm, and 127mm and thicker. Allowable characteristics vary according to grade and thickness. Specific grades include No. 2 Clear, No. 3 Clear and No. 4 Clear.
- **Merchantable grades** come in four grades, sub-divided into three thickness categories: under 38mm, 38mm to 76mm, 76mm to 152mm, and 152mm and over. Allowable characteristics vary according to grade and thickness. Specific grades include Selected Merchantable, No. 1 Merchantable, No. 2 Merchantable and No. 3 Common.

On the following pages we will be looking at some examples of grades from Moulding Stock, Shop Timber, and the Export “R” List to better understand how these boards are graded. For more information on Remanufacture Grades, please contact us at www.softwood.org.



Moulding & Shop Grades



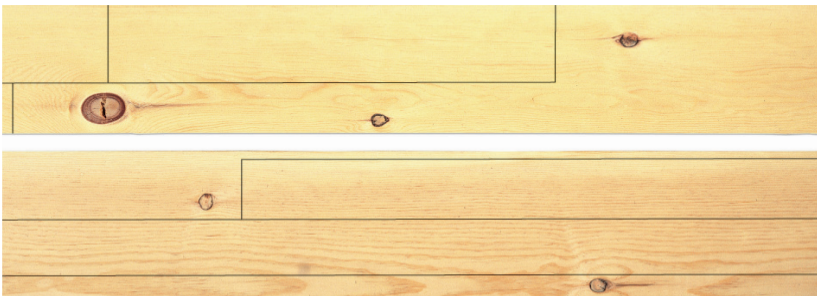
*Random Widths and Lengths
**Dressed All Round



29mm & Thicker RWL*
Moulding Stock

Ponderosa Pine

- In 29, 36 and 40mm wide Moulding Stock, grades of each rip determined from poorest face
- Permits wane, stain, skips in dressing or other characteristics that will 'surface-off' when making mouldings
- Up to 10% of the total cubic metres of any item may be 1.8 to 2.7 metres long, provided each piece contains 66.7% or more of full length Moulding Rips
- Pieces are 4.9 metres long
- Piece 1 is 152mm wide, containing 83.8% acceptable Moulding Rips
- Piece 2 contains 76.2% acceptable Moulding Rips. The mark at the top of the board indicates that 0.09m² surface measure is 'scaled off' due to wane, creating a total loss of 10% or more of the piece's area.



29mm & Thicker RWL
No. 1 Shop

Sugar Pine

- Contains from 50% to 70% of No. 1 Door Cuttings
- Permits a single No. 2 Stile Cutting and maximum 2 mullions from the board
- Each piece is 4.9 metres long
- Piece 1 is 378mm wide and scales 1.9m² surface measure, containing 55.3% acceptable Door Cuttings
- Piece 2 is 356mm wide and scales 1.7m² surface measure, containing 68.2% acceptable Door Cuttings.



19mm S4S DAR**
No. 2 Shop

Ponderosa Pine

- Contains 33.3% or more of cuttings in size and quality permissible to the No. 1 Shop grade
- Each piece is 286mm wide and 4.9 metres long
- Piece 1 contains 40.7% acceptable cuttings, one of which has a very small pitch pocket
- Piece 2 contains 36.4% acceptable cuttings, one of which has a very small pitch pocket and is graded C Select. The mark at the top of the board indicates that 0.185m² surface measure is 'scaled off' due to massed pitch (showing on reverse face) creating a total loss of 5% or more of the piece's area
- Piece 3 contains 40% of acceptable cuttings, one of which contains a 13mm pin knot and is graded C Select.

Export “R” List Grades





No. 2 Clear & Btr Douglas Fir

- Sound, well-manufactured timber of very high appearance quality
- Permits three irregularities on face side, and four on reverse side for each lineal 3.7 metres based on 203mm widths
- Bright sap; knots on reverse side only
- On either end shall average at least 6 rings of annual growth per 25mm
- Stock 127mm and thicker and 5.5 metres or longer permits one larger irregularity showing in 1-2 surfaces, as long as it appears in a cutting 2.4 metres or longer and is otherwise free of irregularities
- Piece 1 is virtually free of irregularities on the face
- Piece 2 has a small pitch pocket
- Piece 3 displays allowable irregularities on the reverse face with one pin knot, one small knot and one very small pitch streak.



No. 4 Clear Douglas Fir

- A quality appearance grade that allows limited knots on the face
- Well-manufactured, permitting one or more irregularities below the No. 3 Clear grade
- Irregularities in reverse face may be slightly in excess of those on the face side, unless otherwise specified
- Grade descriptions are based on a piece 203mm wide and 3.7 metres long
- In all thicknesses, occasional pieces may have a 102mm cutout 1.2 metres or more from either end
- Piece 1 contains six knots ranging from 10mm to 25mm
- Piece 2 contains three knots with the maximum size 25mm, three 19mm knots, several pin knots and a very small pitch pocket
- Piece 3 contains five knots, ranging from 10mm to 19mm and a medium heart stain.



51mm x 245 & 305mm No. 1 Merchantable Douglas Fir

- Well-manufactured, medium grain; suitable for a wide variety of purposes where utility is more important than appearance
- Permits sound and tight knots ranging from 44mm in 102mm widths, to 76mm in 305mm widths, proportionate in wider widths
- Piece 1 contains sound and tight knots up to 68mm with sapwood less than half the area
- Piece 2 contains sapwood including blue stain less than half the area with sound and tight knots up to 64mm
- Piece 3 has sound and tight knots up to 64mm and allowable wane on one end.

Comparative Table

Species	Botanical name	Specific gravity ³	Modulus of rupture (kPa)	Modulus of elasticity (Mpa) ⁴	Compressive strength parallel to grain (kPa)	Shear parallel to grain (kPa)	Side hardness (N)	Durability ⁷
Southern Yellow Pine (US)								Slightly durable
Longleaf	Pinus Palustris	0.59	100,000	13,700	58,400	10,400	3,900	
Slash	Pinus Elliottii	0.59	112,000	13,700	56,100	11,600		
Shortleaf	Pinus Echinata	0.51	90,000	12,100	50,100	9,600	3,100	
Loblolly	Pinus Taeda	0.51	88,000	12,300	49,200	9,600	3,100	
Eastern White Pine (US)	Pinus Strobus	0.35	59,000	8,500	33,100	6,200	1,700	Slightly durable
Western Pines (US)								Slightly durable
Ponderosa	Pinus Ponderosa	0.40	65,000	8,900	36,700	7,800	2,000	
Sugar	Pinus Lambertiana	0.36	57,000	8,200	30,800	7,800	1,700	
Idaho White	Pinus Monticola	0.35	67,000	10,100	34,700	7,200	1,900	
Scots Pine (EU) ⁵	Pinus Sylvestris	0.43	83,000	10,000	45,000	11,300		Slightly durable
Radiata Pine	Pinus Radiata		80,700	10,200	41,900	11,000	3,300	Not durable
Caribbean Pine	Pinus Caribaea		115,100	15,400	59,000	14,400	5,500	Moderately durable
Hem-Fir (US)								Slightly durable
Western Hemlock	Tsuga Heterophylla	0.45	78,000	11,300	49,000	8,600		
California Red Fir	Abies Magnifica	0.38	72,400	10,300	37,600	7,200		
Grand Fir	Abies Grandis	0.37	61,400	10,800	36,500	6,200		
White Fir	Abies Concolor	0.39	68,000	10,300	40,000	7,600		
Noble Fir	Abies Procera	0.39	74,000	11,900	42,100	7,200		
Pacific Silver Fir	Abies Amabilis	0.43	75,800	12,100	44,200	8,400		
Douglas Fir (US)	Pseudotsuga Menziesii	0.46-0.50	82-90,000	10,300-13,400	43,000-51,200	7,800-10,400		Moderately durable
Douglas Fir (UK) ⁵	Pseudotsuga Menziesii	0.44	91,000	10,500	48,300	11,600		Slightly durable
Douglas Fir (EU) ⁶	Pseudotsuga Menziesii	0.54	91,000	16,800	50,000	n/a		Slightly durable
Western Larch (US)	Larix Occidentalis	0.52	90,000	12,900	52,500	9,400	3,700	Slightly durable
European Larch (EU) ⁶	Larix Decidua	0.60	90,000	11,800	52,000	n/a		Slightly durable
S-P-F South (US)								Not durable
Sitka Spruce	Picea Sitchensis	0.40	70,000	10,800	38,700	7,900	2,300	
Engelmann Spruce	Picea Engelmannii	0.35	64,000	8,900	30,900	8,300	1,750	
Black Spruce	Picea Mariana	0.42	74,000	11,100	41,100	8,500	2,400	
Red Spruce	Picea Rubens	0.40	74,000	11,400	38,200	8,900	2,200	
White Spruce	Picea Glauca	0.36	65,000	9,600	35,700	6,700	1,800	
Balsam Fir	Abies Balsamea	0.35	63,000	10,000	36,400	6,500	1,700	
Jack Pine	Pinus Banksiana	0.43	68,000	9,300	39,000	8,100	2,500	
Red Pine	Pinus Resinosa	0.38	72,400	10,300	37,600	7,200	2,200	
Lodgepole Pine	Pinus Contorta	0.41	65,000	9,200	37,000	6,100	2,100	
Whitewood (EU) ⁵	Picea Abies	0.38	72,000	10,200	36,500	9,800		Slightly durable
Sitka Spruce (UK) ⁵	Picea Sitchensis	0.34	67,000	8,100	36,100	8,700		Not durable
Cedar (US)								
Western Red	Thuja Plicata	0.32	51,700	7,700	31,400	6,800	1,600	Durable
Alaskan Yellow	Chamaecyparis Nootkatensis	0.44	77,000	9,800	43,500	7,800	2,600	Durable
Port Orford	Chamaecyparis Lawsoniana	0.43	88,000	11,700	43,100	9,400	2,800	Durable
Incense	Libocedrus Decurrens	0.37	55,000	7,200	35,900	6,100	2,100	Durable
California Redwood	Sequoia Sempervirens	0.35-0.40	54-69,000	7,600-9,200	36-42,400	6,500-7,600	1,900-2,100	Durable
Bald Cypress	Taxodium distichum	0.46	73,000	9,900	43,900	6,900	2,300	Durable

Major softwood species, commonly exported - mechanical and working properties (metric)^{1,2}

	Treatability ⁸	Working qualities			
		Machining	Splitting resistance	Screw/nail-holding	Gluing
	Easy				
		★★★★☆	★★★★☆	★★★★★	★★★★☆
		★★★★☆	★★★★☆	★★★★★	★★★★☆
		★★★★☆	★★★★☆	★★★★★	★★★★☆
		★★★★☆	★★★★☆	★★★★★	★★★★☆
	Easy	★★★★☆	★★★★☆	★★★☆☆	★★★★☆
	Easy				
		★★★★☆	★★★★☆	★★★☆☆	★★★★☆
		★★★★☆	★★★★☆	★★★☆☆	★★★★☆
		★★★★☆	★★★★☆	★★★☆☆	★★★★☆
	Easy				
	Easy				
	Easy				
	Moderately easy				
		★★★★☆	★★★★☆	★★★★☆	★★★★☆
		★★★☆☆	★★★★☆	★★★★☆	★★★★☆
		★★★☆☆	★★★★☆	★★★★☆	★★★★☆
		★★★☆☆	★★★★☆	★★★★☆	★★★★☆
		★★★☆☆	★★★★☆	★★★★☆	★★★★☆
		★★★☆☆	★★★★☆	★★★★☆	★★★★☆
	Difficult	★★★★☆	★★★★☆	★★★★☆	★★★★☆
	Difficult				
	Difficult				
	Moderately easy	★★★★☆	★★★★☆	★★★★☆	★★★★☆
	Moderately easy				
	Difficult				
		★★★★☆	★★★★☆	★★★☆☆	★★★★☆
		★★★★☆	★★★★☆	★★★☆☆	★★★★☆
		★★★★☆	★★★★☆	★★★☆☆	★★★★☆
		★★★★☆	★★★★☆	★★★☆☆	★★★★☆
		★★★★☆	★★★★☆	★★★☆☆	★★★★☆
		★★★★☆	★★★★☆	★★★☆☆	★★★★☆
		★★★★☆	★★★★☆	★★★☆☆	★★★★☆
	Difficult				
	Difficult				
	Difficult	★★★★☆	★★★★☆	★★★☆☆	★★★★☆
	Difficult	★★★★☆	★★★★☆	★★★☆☆	★★★★☆
	Moderately easy	★★★★☆	★★★★☆	★★★☆☆	★★★☆☆
	Difficult	★★★★☆	★★★★☆	★★★☆☆	★★★★☆
	Difficult	★★★★☆	★★★★☆	★★★☆☆	★★★★☆
	Difficult				
	Difficult	★★★★☆	★★★★☆	★★★★☆	★★★★☆
	Difficult				
	Difficult	★★★★☆	★★★★☆	★★★★☆	★★★★☆
	Difficult				

- 1 Source: USDA Forest Products Laboratory, Wood Handbook – Wood as an Engineering Material, 2010.
- 2 Results of tests on clear specimens at 12% moisture content in air-dried conditions, from Table 5–3a of the Wood Handbook, 2010. Definition of properties: compression parallel to grain is also called maximum crushing strength; compression perpendicular to grain is fibre stress at proportional limit; shear is maximum shearing strength.
- 3 Specific gravity is based on weight when oven-dry and volume when at 12% moisture content.
- 4 Modulus of elasticity measured from a simply supported, centre-loaded beam, on a span depth ratio of 14/1. To correct for shear deflection, the modulus can be increased by 10%.
- 5 Source: Lavers, Strength Properties of Timber, 1983.
- 6 Source: CIRAD (French Agricultural Research for Development) website.
- 7 Durability refers to decay resistance of the heartwood.
- 8 Treatability refers to the ease of treating sapwood.

European durability classes (BS EN 350-1)

Class	Description	Mean life (years)
1	Very durable	25+
2	Durable	15-25
3	Moderately durable	10-15
4	Slightly durable	5-10
5	Not durable	less than 5



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