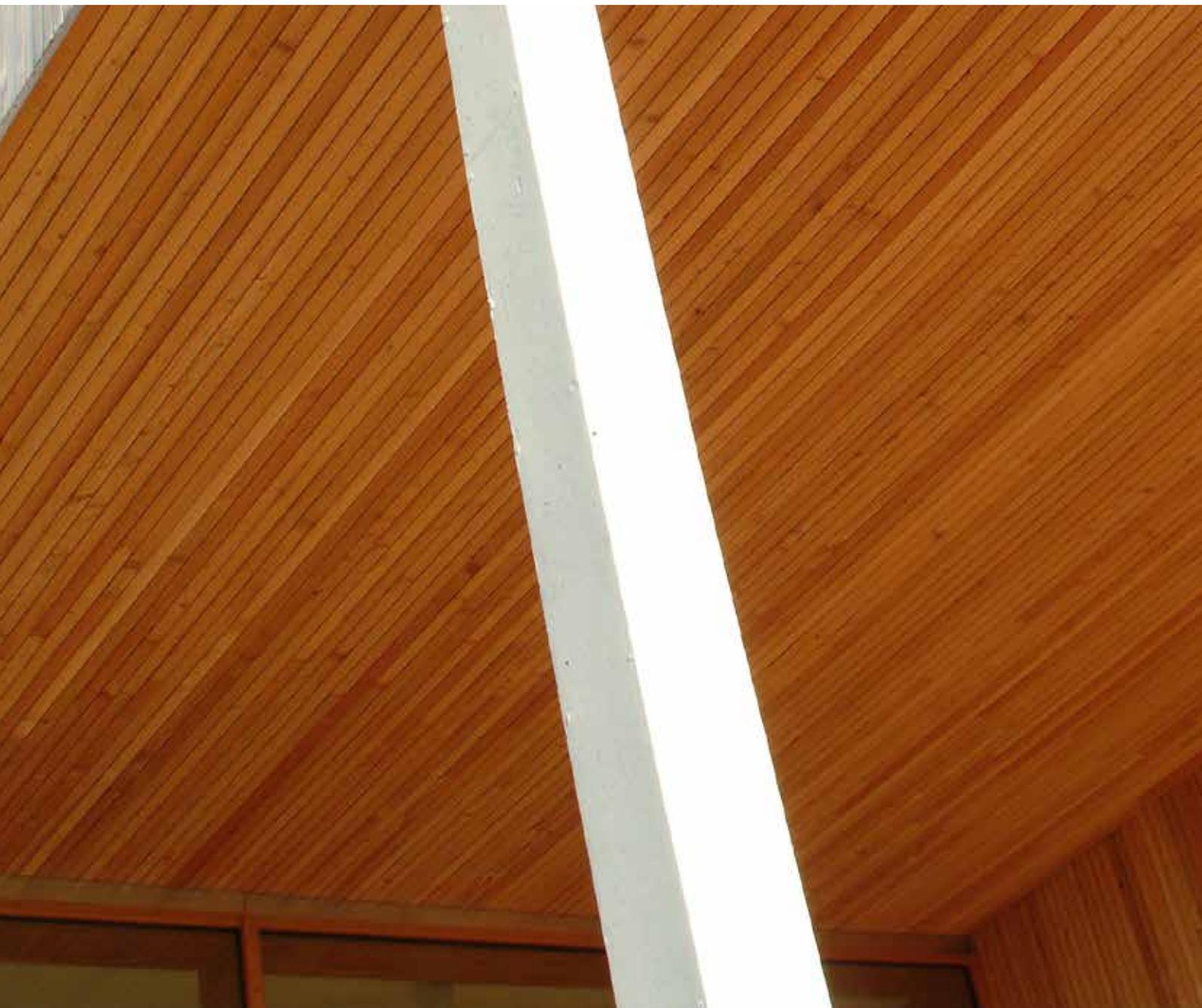




WESTERN SOFTWOOD SPECIES AND GRADES



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 Planer)



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:

1. **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.
2. **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.



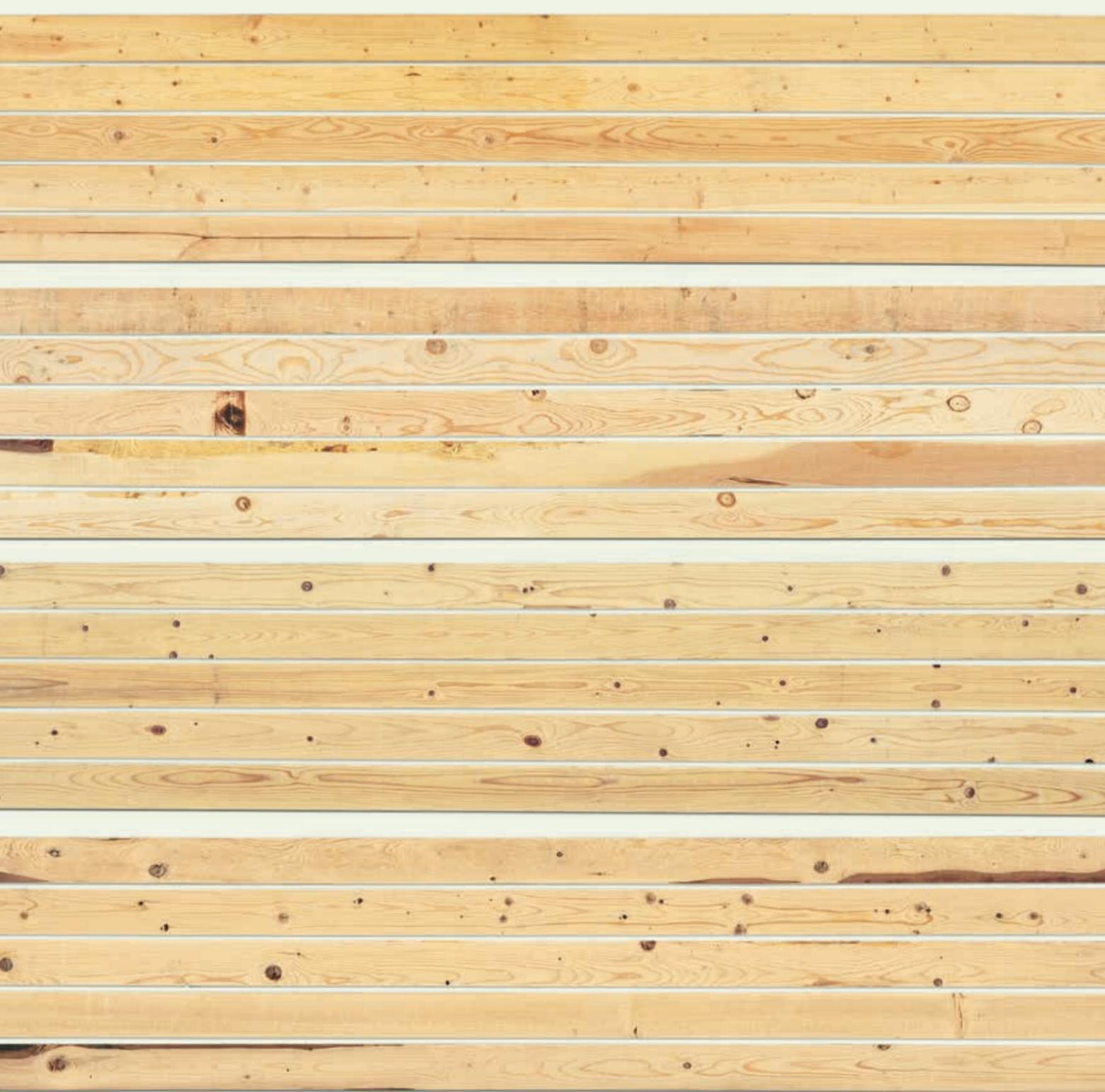
3. **Stud Grade** is an optional, all-purpose grade for vertical installations in load-bearing applications, such as for wall framing. There is only one grade, Stud, available in sizes from 38mm x 38mm to 89mm x 337mm.
4. **Structural Joists & Planks (SJ&P)** grades are intended to fit engineering applications 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.



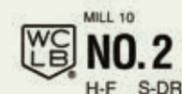
No. 2 Douglas fir

- 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

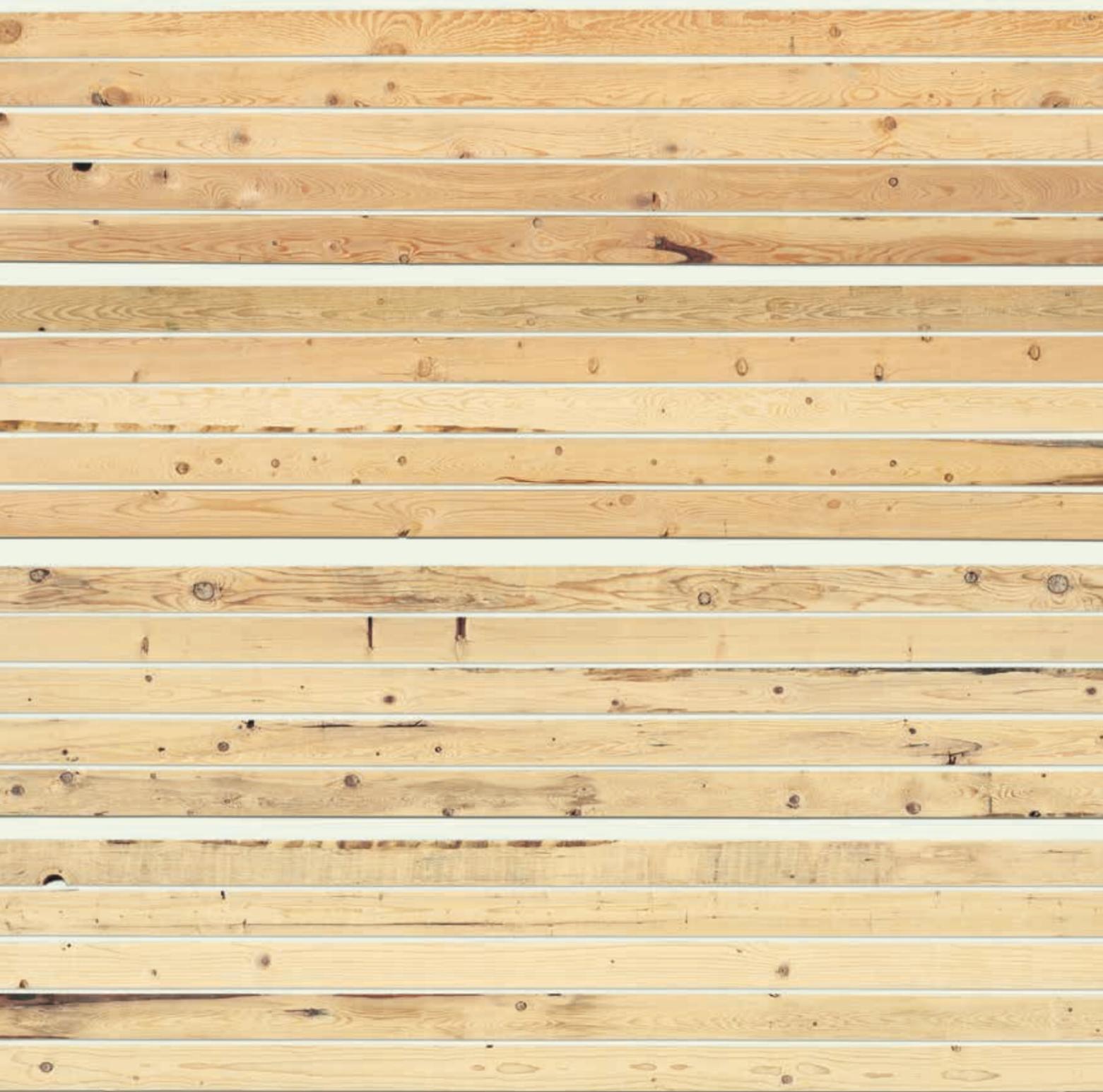
- Recommended for use where high strength, stiffness and good appearance are required
- Tight limitations are placed on characteristics affecting strength
- Allows sound, firm, encased and pith knots no larger than 22mm, tight and well-spaced
- Unsound or loose knots or holes no larger than 19mm, with 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 1/3 the thickness and 1/2 the width of the full length or equivalent on each face, provided that wane not exceed 1/2 the thickness and 3/4 the width for up to 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 1/3 the thickness and 1/2 the width of the full length, or equivalent on each face, provided that wane not exceed 1/2 the thickness and 3/4 the width for up to 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 Choice Quality
Finish Grades Usually available only in Douglas fir & Hem-Fir species	WWPA Rules <u>Superior</u> <u>Prime</u> E	WCLIB Rules <u>C & Btr</u> D
Redwood Architectural Grades RIS Rules Only for redwood species	Heartwood Grades: Clear All Heart <u>Heart B</u> Sapwood Grades: Clear B Grade	
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.

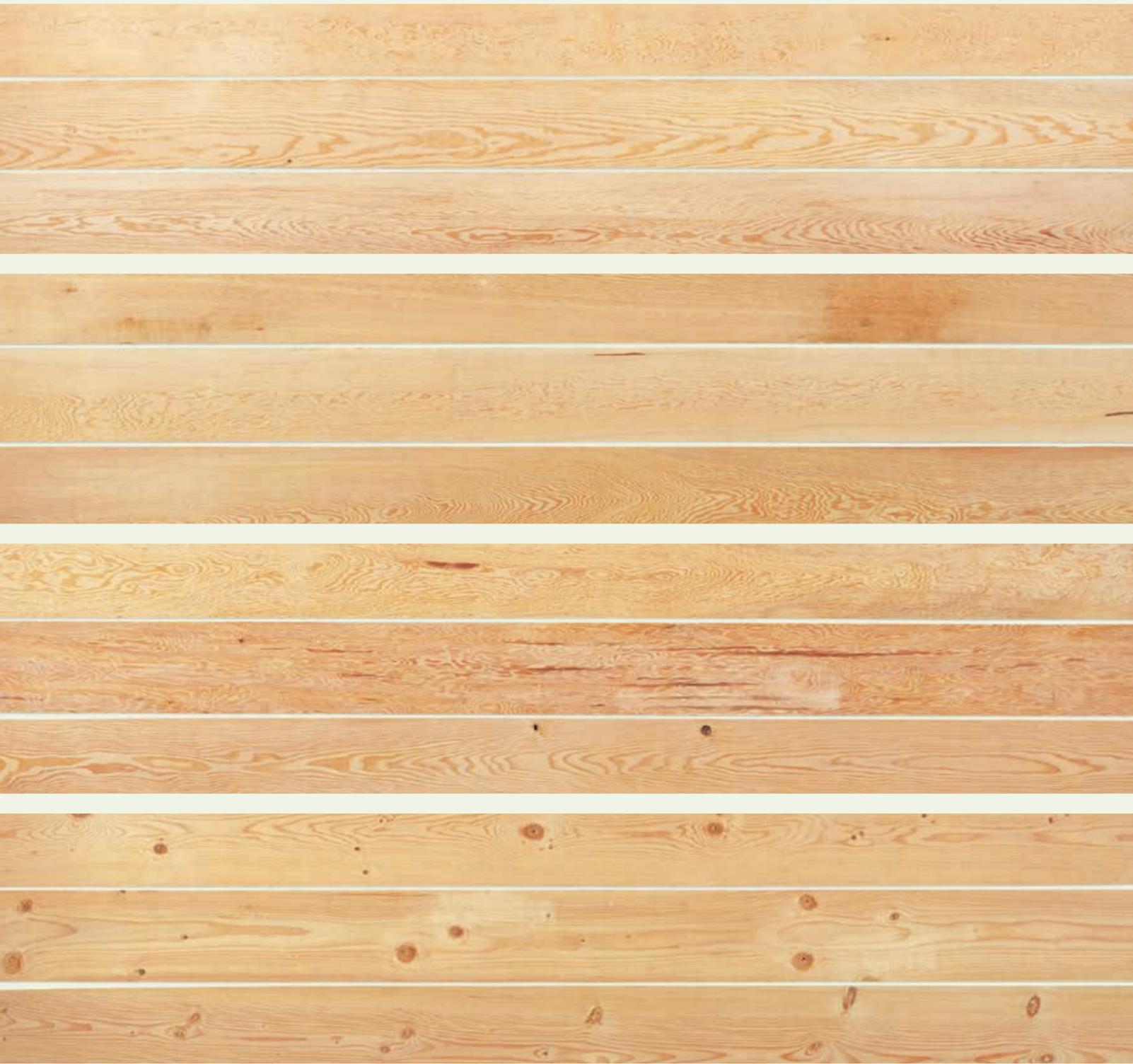


12 QUALITY
 KD 15 

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: W/WPA 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: W/WPA 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: W/WPA 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

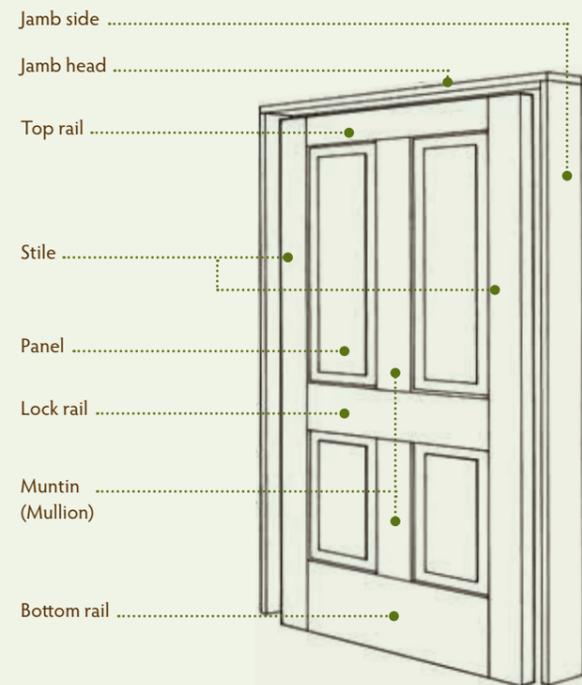
Timber products intended for remanufacturing purposes are generally graded for the percentage of standard-size clear "cuttings" that can be recovered from a piece after processing it to remove defects or other characteristics. These cuttings are used for windows, doors, furniture, mouldings, boxes, cabinetry,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

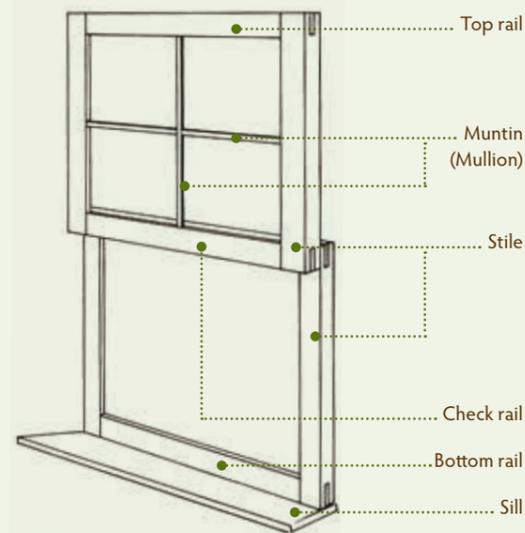
There are many specific grades in this board classification of timber products, but the focus of this guide is on non-structural remanufacturing timber grades from WCLIB, WWPA, and the Export "R" List grades from PLIB. WCLIB and WWPA product categories include:

- **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



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.



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The Softwood Export Council (SEC) is a non-profit trade council of U.S. softwood grading agencies, industry trade associations, state export development agencies and others interested in the promotion of U.S. softwood products internationally.

SEC coordinates overseas market development activities with the U.S. Foreign Agricultural Service, its member organizations' agents and with importers and users of U.S. softwood products in international markets.

International field offices and SEC representatives are located in Japan, Korea, China, Mexico and England. Details are provided on the SEC website.

The SEC website also provides information on member organizations, services and companies as well as a directory of literature and supporting information on products. Most product support publications, many in multiple languages, may be ordered directly from SEC international field offices.

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