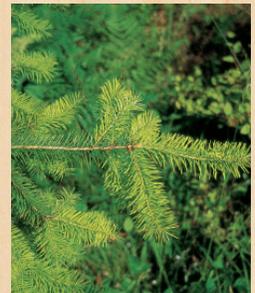


# Douglas Fir & Western Larch

*Pseudotsuga menziesii* &  
*Larix occidentalis*





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## RANGE, GROWTH HABITS and PRODUCTION

Douglas Fir (*Pseudotsuga menziesii*) is not a true fir at all, nor a pine or spruce. It is a distinct species named after Archibald Menzies, a Scottish physician and naturalist who first discovered the tree on Vancouver Island in 1791, and David Douglas, the Scottish botanist who later identified the tree in the Pacific Northwest in 1826. The species is known by a number of common names including Oregon Pine, British Columbian Pine, Red Fir and even Douglastree; however, the U.S. Forest Service settled on Douglas Fir some years ago. Douglas Fir is North America's most plentiful softwood species, accounting for one fifth of the continent's total softwood reserves.

Western Larch (*Larix occidentalis*), sometimes called Mountain Larch or Western Tamarack, was discovered in 1806 in western Montana. However, it remained for the botanist Thomas Nuttall to recognize and describe the tree as a previously unclassified species in 1834. It is one of only two conifers that sheds its needles in the winter, with new needles developing in spring. Western Larch is native to eastern Oregon and Washington, Idaho, Montana, and southern interior British Columbia. Like Douglas Fir, it is among the strongest and hardest softwood species.

Douglas Fir timberlands are the most productive softwood timberlands\* in the U.S. in terms of volume per acre. More softwood lumber is produced in Oregon than in any other state due in large part to the predominance of Douglas Fir in its coastal forests. Known as the "timber basket," where systematic replanting has been documented since 1912, the Northwestern region is governed by some of the world's toughest environmental laws providing protection for habitat, watersheds, soils and biological diversity, thus fostering a multiplicity of forest values in perpetuity. Reforestation and management practices are not voluntary, they are enforced by law.

In the West, timber for products is managed primarily in natural stands, on long rotations. There are approximately 34.6 million acres of Douglas Fir managed primarily in natural stands. Although production is much greater in Douglas Fir, the two species account for more than 45 percent of all Western softwood produced annually.

Each year, more than 1.5 billion tree seedlings are planted in the U.S.—some five new trees for each American. Nationally, annual forest growth has continually exceeded harvest since the 1940s. In the West, forest growth exceeds harvest by 35 percent or more each year.

Douglas Fir lumber products are identified by region. Products from trees growing west of the Cascade Crest to the Pacific Ocean, the most abundant region for Douglas Fir, are simply identified as "DF" on the grade stamp. East of the Cascades, Western Larch grows intermixed with Douglas Fir. The two species are often kept separate in appearance grade products but are combined in dimension products and marketed as "DF-L". Because Douglas Fir and Western Larch share nearly identical structural characteristics and physical working properties, the two species are interchangeable in dimension products.

A smaller volume of products originates from Douglas Fir growing in Arizona, Colorado, Nevada, New Mexico and Utah. These are identified on the grade stamp as "DF<sup>S</sup>". Douglas Fir grown in Canada is identified as Douglas Fir North or "D Fir (N)" as shown on the grade stamp.



Douglas Fir and Western Larch lumber users may look to the registered grade mark of the Western Wood Products Association (WWPA) for quality, accountability and performance assurance on lumber produced from the Western Woods region.

\* Timberland is forested area producing or capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation. Any reference to standing volumes of sawtimber or acres of multiple-use timberland available for timber products in this text do not include any of the forested land that is permanently set aside, protected from harvesting.



Douglas Fir trees are among the tallest on the continent, second only to coastal redwoods. They average from 150' to 200' in height, from 2' to 6' in diameter and are found at elevations ranging from sea level to 6,000 feet.



<b>Coast DF 74%</b>	
<b>Inland DF-L 25%</b>	
<b>South DF<sup>S</sup> 1%</b>	

In 2000, "Coast" Douglas Fir (DF) from Washington, Oregon and northern California, the primary growth area, accounted for 74% of the species' production; combined production of Douglas Fir and Western Larch (DF-L) from the northern "Inland Empire" area, east of the crest of the Cascade Mountains, accounted for 25%; and production in Douglas Fir South (DF<sup>S</sup>) from the southern inland area accounted for 1%.

Cover: Douglas Fir french doors courtesy of Simpson Mastermark Doors.



Douglas Fir



Douglas Fir-Western Larch



Western Larch



Douglas Fir-South



The bark of a young Douglas Fir is smooth, gray and thin, but turns brownish red, thick and deeply fissured as the tree ages.



Western Larch typically grows up to 200 feet high, diameter up to five feet. The bark is thick and scaly, and the needles pale or bright green, turning yellow in autumn. While classified as a resinous wood, it contains only scattered resin ducts, pitch streaks, and pitch pockets. It has a fine, uniform straight grain with a slightly oily appearance. Western Larch has a bright reddish-brown heartwood and the sapwood is whitish, with a slightly rosy to straw-brown cast.

WWPA is the leading association of lumber manufacturers in the West and one of the largest lumber trade associations in the world. WWPA is the only lumber agency in the U.S. recognized by the Japanese Ministry of Agriculture, Forestry and Fisheries (MAFF) as a Foreign Testing Organization (FTO) and is authorized to certify mills and provide quality control supervision for gradestamping to Japanese Agricultural Standards: JAS 600–Japanese Dimension Grades, JAS 702–Japanese MSR grades, and JAS 143 & JAS 1842/1892–Japanese traditional post-and-beam construction grades. In addition, WWPA gradestamped National Grade Rule (NGR) Dimension lumber is recognized by the Japanese Ministry of Land, Infrastructure and Transportation (formerly Ministry of Construction) for use in wood-frame construction.

WWPA is an approved Certification Body under the United Kingdom (UK) Timber Grading Committee. Therefore, WWPA gradestamped MSR lumber, NGR Dimension lumber, WWPA Heavy Timber grades and UK structural grades are accepted for use in timber construction in the UK and many other European countries.

### Moisture Content and Seasoning

As wood loses or gains moisture, it will shrink or swell until it reaches equilibrium with the constantly changing level of moisture in the air of its immediate environment. All lumber benefits from some degree of “seasoning,” i.e. letting it adjust to the humidity conditions of its surrounding atmosphere before it is installed. Because of its cell structure, wood shrinks primarily in width and thickness and very little in length.

Douglas Fir is unique among all softwood species in that it is naturally dimensionally stable, having the ability to season well in position. Many builders prefer to cut, nail and fasten Douglas Fir in the “green” or unseasoned condition, allowing it to air dry during construction. As a result, Coastal Douglas Fir structural lumber is often shipped unseasoned (indicated by S-GRN on the grade stamp). Framing lumber 2” and less (nominal size) in thickness can be shipped after seasoning to a moisture content of 19% or less, which is indicated by S-DRY, KD or KD-HT on the grade stamp. S-DRY can mean kiln dried or air seasoned, while KD and KD-HT specifically mean kiln dried. Regional market conditions and building trade preferences dictate local availability of dry or green products.

For millwork, remanufacturing applications or glued products, Douglas Fir is dried in temperature and humidity-controlled kilns or stacked and air dried until its moisture content (MC) reaches the desired level for an intended purpose.

The term “dry” can be confusing in lumber terminology. In structural grades, “DRY” indicates a product was either kiln- or air-dried to a 19% or less moisture content level prior to surfacing. However, in appearance products (e.g. the FINISH and SELECT grades), “DRY” is defined in the *Western Lumber Grading Rules* as being a maximum of 15% MC and in these grades, 85% of the items will be shipped with a MC level of 12% or less.

For additional information refer to WWPA’s *Western Lumber Product Use Manual*, *Natural Wood Siding*, *Lumber Storage*, and *Dimensional Stability* publications.

### GRADING

The WWPA grade stamp assures conformance of the graded piece with its applicable WWPA *Western Lumber Grading Rules*. WWPA is an accredited lumber rules-writing and grading agency of the American Lumber Standard Committee (ALSC) under the jurisdiction of the U.S. Department of Commerce. The Association is certified to grade and inspect lumber according to its own *Western Lumber Grading Rules*, and also to the West Coast Lumber Inspection Bureau’s (WCLIB) *West Coast Lumber Standard Grading Rules*, the Pacific Lumber Inspection Bureau’s *Export R List Rules*, the National Lumber Grading Authority’s (NLGA) *Standard Grading Rules for Canadian Lumber*, the Redwood Inspection Service’s (RIS) *Standard Specifications for Grades of California Lumber* and the Southern Pine Inspection Bureau’s (SPIB) *NGR and Scaffold Plank portion of the Standard Grading Rules for Southern Pine Lumber*. These rules provide lumber users with a dependable measure for determining the quality and uniformity of lumber as well as its performance capabilities.



Lumber grades, assigned on the basis of visual inspection and/or mechanical testing, are divided into three basic classifications which reflect the intended end uses:

**Structural lumber** for residential, commercial and industrial uses is graded for its performance in load bearing or load-carrying applications. Physical working characteristics are the primary considerations and appearance is secondary. These products are typically gradestamped with the following information:

- |     |                 |     |  |
|-----|-----------------|-----|--|
| (2) | <b>12 STAND</b> | (5) | 1. registered trademark or logo of WWPA,                           |
|     |                 |     | 2. mill name or mill number identifying the origin of the product, |
|     | <b>S-DRY</b>    | (4) | 3. moisture content designation at the time of surfacing,          |
| (1) |                 |     | 4. species or species combination, and                             |
|     |                 |     | 5. grade name.   |

**Appearance grades** are assigned to lumber intended for applications where appearance is the most important factor. These grades cover products ranging from the exquisitely beautiful to the most utilitarian. They may be sold as SELECTS, FINISH or COMMON boards, run-to-pattern for siding and paneling products, or used for a variety of purposes. The grades of appearance products are often certified by written documentation rather than marked on the lumber. Some products may be identified or gradestamped on the back side or ends, but the highest grades are rarely stamped to avoid marring the beauty of the wood.

**Factory and Shop grades** are assigned to lumber intended to be recut, to recover the clear portions in the piece for manufacturing into other wood products such as windows, doors and cabinets, and for moulding, trim and specialty products.

While there are special categories within each of these broad classifications, nearly all lumber grades fall within them. Douglas Fir products are available in all three classifications, Western Larch is available in structural and appearance grades, and many Douglas Fir products are available in special grades and sizes for international markets.

Douglas Fir is a shade-intolerant species, meaning full sunlight is required for survival. West of the Cascade mountain range, DF dominates the vast stands of timber accounting for 90% or more of the trees in a forested area. Disturbance in the form of wildfires, volcanic eruptions, earthquakes and landslides has perpetuated these forests in Douglas Fir for centuries. Today, foresters mimic the cycles of natural disturbance and renewal, managing these abundant timberlands primarily in natural stands for a variety of forest values. The commercial timberlands of the Pacific Northwest are among the most productive in the world. They are also governed by some of the world's toughest forest practice laws fostering their sustainability in perpetuity.



Grade stamp abbreviations related to the moisture content level of lumber at the time of surfacing include:

MC15 or KD15 for a moisture content of 15% or less;

S-DRY, KD or KD-HT for a moisture content of 19% or less;

S-GRN for unseasoned with a moisture content of more than 19%.



Douglas Fir and Western Larch dimension products are the ideal framing material. The combination of high MOE and  $F_b$  design values provides a high degree of stiffness which is particularly desirable in floor systems. The higher grades in this exceptionally strong species group perform competitively with many engineered products and are more economical.

## PRODUCTS GRADED for STRUCTURAL APPLICATIONS

### Characteristics and Attributes

When architects and engineers look for the best in structural lumber, their first choice repeatedly is Douglas Fir. It is dimensionally stable and universally recognized for its superior strength-to-weight ratio. Its high specific gravity provides excellent nail and plate-holding ability. The species also enjoys a documented superior performance against strong forces resulting from natural phenomena such as winds, storms and earthquakes. It is truly the ideal structural and general purpose wood for framing lumber in residential, light commercial, multistory and industrial construction.

The Douglas Fir/Western Larch species combination is rated as one of the highest in modulus of elasticity (E or MOE) of the North American softwood species. This is the ratio of the amount a piece of lumber will deflect in proportion to an applied load. It is a reflection of the species' high degree of stiffness, an important consideration in the design of floors and other systems.

In strength properties, Douglas Fir/Western Larch is rated the highest of any Western softwood for extreme fiber stress in bending ( $F_b$ ); for tension parallel-to-grain ( $F_t$ ); for horizontal shear ( $F_v$ ); for compression perpendicular-to-grain ( $F_{c\perp}$ ); and for compression parallel-to-grain ( $F_c//$ ).

These physical working properties, as well as the moderate durability of its heartwood and its excellent dimensional stability, provide the reasons many builders use Douglas Fir as the standard against which all other framing lumber is judged. It is also tight knotted and close-grained, adding the bonus of beauty to its structural capabilities.

Refer to WWPA's *Product Use Manual* and *Western Lumber Span Tables* for additional design information and to WWPA's *Vol.1 Species Book: Dimension Lumber* for color photographs of structural grades.

### Dimension Lumber

Dimension lumber structural grades include surfaced softwood products of nominal thickness from 2" to 4" in thickness by 2" and wider. These grades are intended for use as general framing members, including beams, joists, planks, rafters and studs.

The National Grading Rule for Dimension Lumber, published in the grading rules of all ALSC-accredited rules-writing agencies, classifies dimension lumber into several basic size categories related to intended end uses. Products are available in a variety of lengths, beginning at six feet and increasing in multiples of two feet.

#### 2x2 through 4x4:

**Structural Light Framing** grades in 2x2 through 4x4 of Douglas Fir and Western Larch fit applications where the highest design values are needed in light framing sizes for engineered systems, trusses and multistory projects.

**Light Framing** grades in 2x2 through 4x4 are the building stalwarts of residential and light commercial construction. These grades are well suited for general framing applications such as wall framing, plates, sills, cripples and blocking.

**STUD** grade is the backbone for most interior and exterior wall framing. Characteristics affecting strength and stiffness values are limited, making STUD grade products perfectly suited for vertical uses such as load-bearing walls. Douglas Fir and Western Larch studs can be manufactured to the full basic length and double-end trimmed or may be precision-end trimmed to exact length. Some WWPA Member companies produce "wane-free" studs.

#### 2x5 through 4x18:

**Structural Joists and Planks** is a category of dimension lumber products (2x5 through 4x18) intended to fit structural applications for lumber 5" and wider, such as floor joists, ceiling joists, roof rafters, headers, small beams, trusses and general framing. Because of its structural performance benefits, which rival many fabricated products, dry Douglas Fir is also often selected for horizontal framing in multistory wood-frame buildings. Its combination of high  $F_b$  and MOE values make it ideal for floor framing when stiffness is a critical factor.



High-performance visually- and mechanically-graded products are well suited for multistory and pre-engineered applications.



Heavy framing applications may be designed in both conventional and pre-engineered systems.



### Large Sizes

Douglas Fir is one of the few species available in large sizes from managed timberlands. It is preferred for heavy timber framing and large members are available in a variety of grades manufactured for construction uses where larger material is needed to meet the engineering requirements of the design.

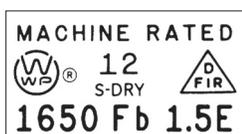
**Beams & Stringers** include products that are 5" and thicker (nominal) with a width more than 2" greater than the thickness (i.e., 6x10, 8x12, etc.).

**Posts & Timbers** are 5x5 and larger (nominal) with a width not more than 2" greater than the thickness (i.e., 6x6, 6x8, etc.).

Douglas Fir timbers are best known for their tough fiber, dense grain structure and strength. They are additionally valuable for their rustic beauty and excellent "Heavy Timber" fire ratings in the model building codes. Timbers are shipped unseasoned and may be specified rough cut or surfaced four sides (S4S).

### Engineered Lumber

#### Machine Stress-Rated (MSR) Lumber



Machine Stress-Rated (MSR) lumber is distinguished from visually stress-graded dimension lumber in that each piece is nondestructively tested with mechanical stress-rating equipment to measure its stiffness and other physical working properties before it is subjected to visual inspection. Standard sizes are 2" and less in thickness and 2" and wider with lengths 6' and longer in multiples of two feet.



The grade stamp on MSR lumber indicates the machine stress-rating system used meets requirements of the grading agency's certification and quality control procedures. The grade stamp includes the phrase "Machine Rated" along with the E and  $F_b$  ratings. The stamp will also include the allowable tensile stress parallel-to-grain ( $F_t$ ),

the horizontal shear ( $F_v$ ) or compression perpendicular-to-grain ( $F_{c\perp}$ ) design values when any of these properties are specifically qualified. WWP is one of the leading agencies certifying MSR lumber.

Refer to WWP's *MSR Lumber TIP Sheet* for additional information.



Exposed, load-bearing glulam beams bring handsome elegance and a sense of warmth to engineered heavy-timber framing.



### **Truss and Component Applications**

Douglas Fir MSR lumber is often selected for metal plate-connected trusses and other engineered applications. However, it is also used for floor and ceiling joists, rafters and other structural purposes where mechanically assessed strength and connection capabilities are primary considerations. MSR lumber is available both seasoned and unseasoned.

Douglas Fir and Western Larch, in both visual and MSR grades, are used in roof and floor trusses, for gable ends and wall panels, pre-cut wall framing packages, wall sub-components, corners, doors, beams and frames. The exceptional stiffness, strength-to-weight ratio and plate-holding superiority are well recognized by component manufacturers.

### **Structural-Glued Lumber Products**



Western manufacturers produce a variety of Douglas Fir/Western Larch glued products from dry and unseasoned lumber, including end-jointed or finger-jointed lumber, end- and edge-glued boards, millwork and mouldings, face-glued lumber and laminated stock. These products make excellent use of short lengths, increasing utilization of available timber resources.

Structural-glued dimension lumber has gained wide acceptance in the building and construction industry. It has been accepted for use under all model codes and is interchangeable with solid-sawn dimension lumber of the same size, grade and species. WWPA provides testing and quality control inspections for glued products and certifies the manufacture of Douglas Fir and Western Larch structural-glued dimension lumber under the following classifications: Light Framing and STUDS, Structural Light Framing, Decking, Stress-Rated Boards and Structural Joists and Planks.

Refer to WWPA's *Structural Glued Lumber TIP Sheet* for additional information.

### **Stock for Laminated Beams**

Structural performance is the hallmark of Douglas Fir, but the species is also visually beautiful. When a design calls for large beams, long spans or unusually shaped arches as in churches, bridges and stadiums, Douglas Fir is often specified. Structural-glued laminated Douglas Fir and Western Larch beams are engineered for use as load-carrying horizontal framing for roofs, floors and columns in residential, commercial, industrial and institutional structures as well as for towers and marine installations. These glu-lam beams can be depended upon in industrial plants, warehouses and factories, as well as in highly visual architectural settings that demand uncompromising beauty.



Laminating stock is 2" and thinner and 3" and wider and comes in five grades. It's also available as E-Rated structural laminations, which meets the visual grade requirements of L3 or better structural lamination grades and is mechanically tested for long-span flatwise modulus of elasticity (E). Structural laminations are specified rough or surfaced at various widths and thicknesses up to 2" full. The wood is intended to be laid up longitudinally and bonded with adhesives.

#### Structural Decking/Subflooring

Structural decking is 2" to 4" thick by 4" and wider. This is primarily an industrial or residential or commercial roof or floor product and should not be confused with grades intended for exterior residential decks. It is available in two grades: SELECTED DECKING (for fine visual aesthetics) and COMMERCIAL DECKING (when appearance is not of primary importance). Both grades can be used so that the face, or better side, will show the beauty of the wood, such as in exposed ceilings. Decking is manufactured either at 19% (S-DRY, KD, or KD-HT) or 15% (MC15 or KD15) moisture content.

Standard decking patterns, in nominal 2" single tongue-and-groove (T&G) and 3" and 4" double T&G, are available with "V" or rounded edges, striated, grooved or in other patterns to meet discriminating architectural requirements.

Douglas Fir factory floors, manufactured from dry decking, result in a smooth, even surface so hand trucks won't hang up and cracks and splintering won't appear after heavy and continuous use.

Some T&G decking is manufactured to pattern from NO.2 & BTR or NO.3, 2x6 or 2x8, S-GRN framing lumber. These products are generally used for concealed residential subfloors in crawl-space construction.

Resistant to wear and easy to maintain, Douglas Fir appearance-grade products enhance both residential and commercial interior spaces.



Structural decking grades are available for exposed applications (primarily ceilings) and for use as floors or subfloors.



COURTESY HOOD RIVER CHAIRS, OR.

Clear, vertical grain DF is often considered unsurpassed for its combination of beauty and performance in joinery. It also lends itself well to a variety of finishes.



Douglas Fir is in demand for its appearance and ability to accept adhesives, hold fasteners and resist the effects of scuffing, abrasion and jarring under movement in casework applications.

*Right:* Richly-stained, solid-sawn DF was used to fabricate the sliding panels and doors in this elegantly remodeled home. Portions of the micro-lam beams of the ceiling light soffits were encased with solid sawn DF, other portions relied on DF veneers to achieve the design.

## PRODUCTS GRADED for APPEARANCE

### Characteristics and Grades

For versatility and beauty, few woods in the world match the magnificence of Douglas Fir and Western Larch. Unlike the structural grades, appearance lumber is milled and graded according to aesthetic rather than structural performance criteria. Color, grain pattern, texture, knot type and size are the factors that influence the grade. For this reason Douglas Fir and Western Larch are usually separated in the appearance grades and marketed as distinct species to allow a larger range of visual choices for discriminating end users.

Douglas Fir's light rosy color is set off by its remarkably straight and handsome grain pattern. While similar, Western Larch is slightly darker in color. Of the two species, Douglas Fir is more widely available in the appearance grades. Both species will "redden" over time when exposed to light. Their tough fiber make both species difficult to work with hand tools. However, both respond admirably to sharp power tools and machine to an exceptionally smooth, glossy surface. Both paint easily and can hold all types of stains and finishes.

Moisture content levels are carefully controlled in the highest grades to ensure these premium products will meet the strict dimensional stability requirements of finish carpenters, furniture manufacturers and cabinet makers. The less "perfect" grades are an economical choice for many utilitarian applications.

Many designers and consumers agree the aesthetic appeal of clear, light, straight, vertical-grain Douglas Fir is unsurpassed among the world's softwood species. However, the highest appearance grades of Douglas Fir and Western Larch are manufactured from trees older than those which yield primarily structural framing products. And while substantial volumes of clear and nearly clear Douglas Fir are available from long-rotation, managed Western timberlands, the clear grades are less abundant and considerably more expensive than knotty grades.

Refer to WWPA's *Vol.2 Species Book: Boards and Commons* for additional information and color photographs of appearance grades in a variety of Western species.

### Interior and Exterior Trim, and Finish Board Materials

Appearance and dimensional stability are critical in interior and exterior trim and finish boards, whether in the clear or knotty grades. Douglas Fir's characteristics make it ideal for joinery: doors, millwork, window and door casings, mantels, stairs and baseboards. When dry, it retains its shape and size and won't check or show a raised grain. Additionally, Douglas Fir has an excellent performance record when used in exposed applications for exterior trim without ground contact.

### Clear and Knotty Grades

The highest grade categories, "Finish" and "Selects," include the grades for clear and nearly clear lumber in either vertical or flat grain. (If grain pattern is not specified, these grades will be shipped as a mixed grain combination of vertical and flat grain.) Finish and Select grades of Douglas Fir are recommended for interior trim and cabinet work with either natural, stain or enamel finishes where the finest appearance is important.

Douglas Fir "Commons" (WWPA Rules) or "Alternate Boards" (WCLIB Rules) are typically used for shelving, sheathing or run-to-pattern for siding and paneling. These products are nominal 1" thickness, surfaced to 3/4," and are generally gradestamped on the back or ends.

The highest grades are used where fine appearance in a knotty material is required, such as for soffits, fascia, cornices, shelving or run-to-pattern for siding and paneling. Depending on the criteria for the application, other grades in knotty products are used primarily in housing and light construction where wood is exposed for its beauty and character (e.g. shelving, paneling, siding, fences, boxes) or for its utility and serviceability in crating, subfloors, roof and wall sheathing and concrete forms. The lowest grades are useful in applications where economy is the basic requirement.



Douglas Fir-Larch is grade-stamped in the "Structural Light Framing" grades of SELECT STRUCTURAL, NO.1 & BTR, NO.1, NO.2 and NO.3. "Light Framing" grades include CONSTRUCTION, STANDARD and UTILITY. STUD grade applies only to studs and "Structural Joists and Planks" including SELECT STRUCTURAL, NO.1 & BTR, NO.1, NO.2 and NO.3. DF-L is the strongest of the Western softwoods and marketed both S-GRN and DRY for framing applications.

Figure 1: SELECT STRUCTURAL is the highest Structural Light Framing grade — sound, firm, encased and pith knots are limited, tight and well spaced.

Figure 2: STUD grade, suitable for all load-bearing walls, places limitations on crook, wane and edge knots.

Appearance grades are based on aesthetics. Highest quality appearance grades include "Selects" (B&BTR SELECT, C SELECT, and D SELECT) and "Finish" (SUPERIOR, PRIME, E). General purpose grades include the "Common" Boards (1 COMMON, 2 COMMON, 3 COMMON, 4 COMMON, and 5 COMMON) and "Alternate Boards" graded under WCLIB rules (SELECT MERCHANTABLE, CONSTRUCTION, STANDARD, UTILITY and ECONOMY).

Figure 3: SUPERIOR is the highest grade (WWPA Rules) in the Finish category of the appearance grades. Many pieces are absolutely clear. It is recommended and widely used for interior trim and cabinet work. Natural characteristics and manufacturing imperfections are restricted, products are always kiln dried.

Figure 4: SELECT MERCHANTABLE is the highest grade among the Alternate Board grades (WCLIB Rules) for general purpose boards of a knotty appearance. This grade is intended for use in housing and general construction where finest appearance in a knotty product is desired.



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5

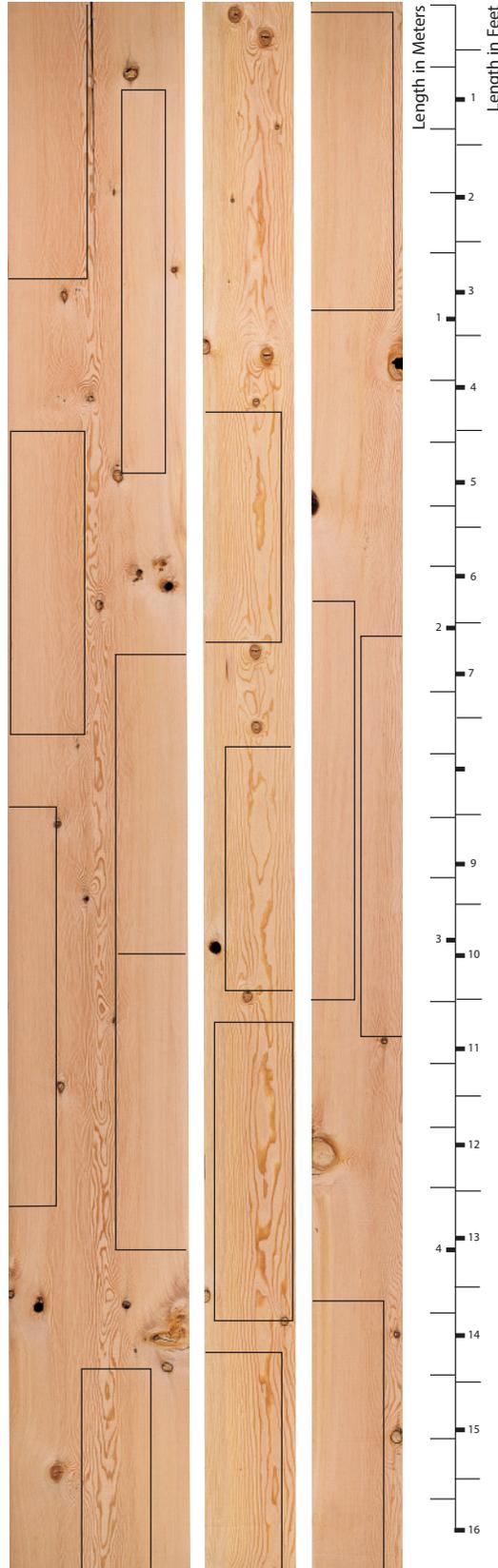


Figure 6



Douglas Fir sapwood is white to pale yellow while the heartwood is russet or orange-red; the timber often has a slight rosy cast with distinct growth rings. When freshly milled, timber has a characteristic resinous odor.

Factory and Shop lumber grades are intended to be ripped and/or crosscut to recover desirable pieces of standard sizes for remanufacturing purposes. Products are graded according to WWPA, WCLIB and Export R-List rules with other options available through buyer/seller agreement. Products are carefully seasoned prior to surfacing.

Figure 5: NO.4 CLEAR, Export R-List Rules, is a grade recommended and widely used internationally as a general purpose remanufacturing product. Each piece is well manufactured. Irregularities on reverse face can be slightly in excess of those allowed on the face.

Figure 6: 6/4 RWL NO.1 SHOP, WWPA Rules, reflects the grading principles behind typical U.S factory-type lumber. This is a grade that will yield from 50% to 70% of No.1 Door Cuttings, except that pieces containing one or more No.1 Door Cuttings will permit one No.2 Stile. Not over two Muntins are included in any piece. The intended recovery of standard-sized pieces, which influences, along with allowable characteristics, the assigned grade, are indicated by lines on the photograph.

A water-repellent finish helps protect these bathroom cabinets from steam and splashes.



### Wood Paneling, Cabinets and Furniture

Designers appreciate the rich visual quality of Douglas Fir texture and grain as well as its beautiful response to fine craftsmanship and finishing. A favorite wood for custom cabinets, furniture and millwork, it works easily and resists wear. When sawn to expose vertical grain, Douglas Fir is particularly handsome.

Douglas Fir paneling can transform any room into a dramatic, elegant space. The wood's fine appearance is clearly visible in a variety of applications such as edge-grain veneers for formal wall paneling or solid plank paneling for an informal look. When acclimated prior to installation, Douglas Fir retains its shape and size without shrinking, swelling, cupping, warping, bowing or twisting. The uniform grain and tough fiber holds stain well and keeps fasteners firmly in place.

Douglas Fir (and Western Larch to a lesser extent) paneling is run in a variety of patterns. In many cases, the grade of the patterned material reflects the grade of the starting material, adhering to similar requirements for allowable characteristics. Grades for paneling include the Finish grades for highest appearance and the Commons or Alternate Board grades for knotty products.

Refer to WWPA's *Standard Patterns* publication for dimensioned, scaled profiles of standard WWPA siding and paneling patterns.

### Flooring

Wood floors in gyms, factories and homes take an incredible beating. Douglas Fir's strength, beauty and old-fashioned toughness are all prime reasons for choosing this long-lasting wood. Douglas Fir provides a tough surface that will hold a finish, maintain its appearance under extreme wear and remain level without cracking, scuffing or splintering.

Douglas Fir flooring is available in 1x4 (nominal) sizes in standard lengths 4' and longer. Flooring is machined tongue-and-groove and may be finished in any grade. However, the grade specifically developed for flooring is C & BTR FLOORING, which can be sawn vertical grain for a more refined look.

Right: Douglas Fir's clear, vertical grain is revealed in this entertainment center which has been lightened with a white stain to contrast with the ceiling and oak flooring.





Factory and Shop products, also known as the “economical clears” of softwood lumber grades, are prized for doors, windows, shutters and a variety of cabinets, casegoods and furniture.

Right: Douglas Fir’s straight, uniform grain and performance attributes have long been used to advantage for exquisitely handsome doors — from interior paneled doors to elegant French doors with and without leaded or stained glass, and carved entry doors.

## PRODUCTS GRADED for INDUSTRIAL and REMANUFACTURING APPLICATIONS

### Characteristics and Grades

Douglas Fir has an enviable performance record. The species has earned respect from industrial users worldwide because when it comes to high performance demands and extreme stress conditions, Douglas Fir meets the test. With its tough, strong fiber, high strength in relation to its weight and dense grain structure, Douglas Fir is a natural choice for industrial and remanufacturing uses.

Highly resistant to mechanical abrasion and chemical reaction, Douglas Fir is often used in fabricating vats, tanks, containers, flumes, conduits and similar industrial components that call for an inert material with a long life under rigorous service conditions. Truss fabrication and formwork, mining and tunneling, trestles, bridges, railroad ties, stadiums, warehouses, storage facilities and factories all utilize Douglas Fir lumber.

Industrial products include both structural and non-structural grades that are intended for specific applications. Structural grades are used for mining timbers, scaffold plank, foundation lumber and stress-rated boards. Specialized non-structural grades include pickets, lath, battens, stepping and even gutters (used primarily for historic preservation projects). Factory and Shop lumber, one of the three primary grading classifications of Western lumber products, is non-structural, industrial lumber intended for remanufacturing into an enormous array of products.

### Factory and Shop Lumber

Millwork standards require that the wood be easy to machine, be of a consistent grade, have few visible knots, be dimensionally stable and have a smooth surface texture. In addition, the grain must be handsome in appearance, the wood easy to glue, hold fasteners well and readily accept finishes. Three Western softwood species are consistently specified for millwork: Ponderosa Pine, Douglas Fir and Hem-Fir (a species combination of Western Hemlock and the true firs). When hardness is desired, in addition to fine appearance, Douglas Fir rivals many hardwoods.

Factory lumber is produced primarily for doors, windows, furniture, frames, moulding and boxes. The grades are especially well suited for ripping and cross cutting to obtain clear pieces for remanufacturing. Factory grade criteria includes specifications, within the grades, for the percentage of the lumber that is available for cuttings in predetermined sizes and qualities, based on typical U.S. joinery and millwork specifications. Moulding stock, which comes in several thicknesses and widths, is suitable for ripping into strips 1” and wider by 10’ and longer.

Shop lumber, nominal 4/4 thickness to 16/4, is used in remanufacturing for sashes and doors, jambs and door component parts, boxes and specialty goods.

Factory and Shop lumber is usually shipped in large quantities, mill-direct to remanufacturers. Many WWPA Member companies can accommodate special remanufacturing requirements through buyer/seller agreements.

Refer to WWPA’s *Vol.3 Species Book: Factory Lumber* for additional information and color photographs of the Factory and Shop grades.

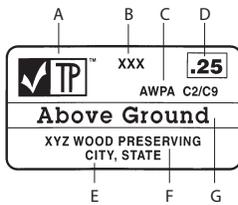
### Stress-Rated Boards

“Stress-Rated Boards” are available in Douglas Fir to provide a range of products suitable for special applications where applied design values are a requirement. Uses include light trusses, belt rails, horizontal bracing, rafters and box beams for factory built homes. When Stress-Rated Boards are gradestamped, the grade name or number for the dimension grade will be shown on the grade stamp along with “SRB” to designate that a board product may be used structurally.





Modern stress-laminated, preservative pressure-treated DF bridges offer cost-effective solutions with low environmental impact in difficult situations.



- A- trademark of ALSC accredited agency
- B- preservation used
- C- AWPA Standard
- D- retention level
- E- treating company
- F- plant location
- G- proper exposure condition



Pressure-treated Douglas Fir pilings and boardwalks were used for this salt-water marina in Newport, OR.

## HIGHWAYS, BRIDGES and RAILROADS

Douglas Fir bridges—either in the solid sawn designs of past years or in today’s glued, stress-laminated forms—span roads and rivers, lead hikers into the wilderness or over gorges and offer access for everything from golf carts to semi-trailers and heavy machinery. Douglas Fir is a top choice when the material must resist slivering and indentation, be strong, durable, functional and yet, at home in its natural surroundings.

While wooden bridges have been around for centuries, today’s engineered bridges of treated wood offer communities some new advantages. They are strong, durable, cost-effective, time efficient to install and reduce the impact of construction on surrounding streamside ecology. Today’s technology for stress-laminated wood bridges is gaining wide acceptance throughout the U.S. and in other countries.

Douglas Fir is also the species of choice for sound barrier walls along freeways or for highway guard rails which demand a wood that is treatable, paintable and strong with excellent fastening capability.

Given its resilience under tremendous loads and vibration, and the ability to take and hold heavy railroad spikes tightly, it’s clear why Douglas Fir still dominates the railway tracks. From rail car linings and track supports to ties and cross-planking, this Western species, treated and untreated, provides long-lasting solutions to very tough jobs.

## TREATED PRODUCTS

Douglas Fir preservative pressure-treated wood pilings provide long-life performance with resistance to the corrosive salt water conditions of wind, waves, storms and tides. When dramatic design solutions are called for on hillsides or in hurricane country, pressure-treated Douglas Fir pole construction is often the best and most economical solution. Design loads as high as 70 tons have been specified and ultimate loads as high as 235 tons have been carried by Douglas Fir lumber. Treated DF products are also consistently found in foundation stud and plywood walls, vehicular bridges, walkways, parks shelters and foot bridges.

In pressure treating, preservatives are forced into the wood cells and become permanently fixed (nonleaching). Because of its cell structure, Douglas Fir requires incising (small slits cut into the wood’s surface before treatment) to improve chemical penetration. Chemical retention is stated in terms of the weight of the chemical retained per cubic foot (pcf) of wood after treatment; the larger the number, the more chemical retained.

All pressure-treated wood should bear the quality control mark of an agency approved by the American Lumber Standard Committee. Look for the check mark <sup>TM</sup> to indicate ALSC accreditation of the quality mark, stamp or end tag.

For more information on treated lumber, contact the Western Wood Preservers Institute at [www.wwpinstitute.org](http://www.wwpinstitute.org).



#### QUALITY CONTROL and WWPA PRODUCT SUPPORT

Lumber buyers may look to WWPA's registered grade mark for the assurance lumber will consistently meet grade specifications and performance standards.

The Association maintains a team of lumber inspectors to monitor lumber grading and product quality control in its Member mills and to provide mill inspection and grading performance reports, lumber grader training and incentive programs, MSR and glued products standards, resource recovery and mill efficiency studies.

In addition, WWPA provides technical and product support services and information on Western lumber end uses for lumber buyers throughout the world and publishes a variety of statistical reports on Western lumber production, distribution and consumption.

A host of Western lumber technical and product information is available online on the WWPA web site at [www.wwpa.org](http://www.wwpa.org). The site features an Online Lumber Technical Guide, an interactive Western Lumber Buyers Guide and digital versions of a number of WWPA literature titles.

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Delancey Street Foundation, in earthquake-prone San Francisco, used structural DF products for its multistory wood framing and appearance grade products for various interior applications, including the sports and fitness center's ceiling on page 8. Treated products were used in courtyard spaces for outdoor amenities.



Douglas Fir and Douglas Fir-Larch products are often preferred in multistory construction, as in the four-story framing of this rehabilitation center in San Francisco. With its unique combination of attributes, Douglas Fir is the ideal species for the most demanding wood-frame projects, particularly in areas where earthquakes are severe. Multiple exterior finishing options are compatible with wood framing. Here, designers specified stucco.



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