



Western Wood Species Book

Volume 1 Dimension Lumber

Western Wood Products Association



Introduction

The *Western Woods Species Book – Vol. 1 Dimension Lumber* is intended to assist buyers and users in identifying and properly specifying grades of lumber for construction.

The example photos are presented as a representation of the typical products for each grade, based on the characteristics allowed. Lumber of the same grade may differ in appearance to the example photos, due to the many combinations of characteristics that are allowed in each grade.

Species

Many Western species share similar performance properties and are grown, harvested, manufactured together. These products are marked as a species combination to simplify marketing, design and engineering and allow design values to be assigned under a group rather than as individual species.

Western dimension lumber is manufactured in both single species and species combinations. Douglas Fir, Ponderosa Pine and White Fir are the most common single species sold as dimension lumber products. The most popular species combinations are:

Douglas Fir-Larch

Douglas Fir, Western Larch

Hem-Fir

Western Hemlock, California Red Fir, Noble Fir, Grand Fir, Pacific Silver Fir, White Fir

Spruce-Pine-Fir (South)

Engelmann Spruce, Sitka Spruce, Lodgepole Pine

Western Woods

Any of the species listed above, plus any or all of the following: Sugar Pine, Ponderosa Pine, Idaho White Pine, Alpine Fir, Mountain Hemlock

Western Cedars

Western Red Cedar, Incense Cedar, Alaskan Yellow Cedar, Port Orford Cedar

Grading

Dimension lumber grading rules limit natural characteristics and manufacturing imperfections that affect the strength of the piece. The grades are based on a visual, mechanical or digital scan evaluation of each piece.

WWPA grades for dimension lumber are established by the American Lumber Standard Committee, Inc., in accordance with Product Standard 20. The grading rules and corresponding design values are published in the *Western Lumber Grading Rules* book, which can be purchased from WWPA.

Specifications

Dimension lumber, also called framing lumber, is most often used in the construction of wood-frame structures, ranging from single-family homes to commercial buildings. This lumber has a nominal thickness of 2" to 4" and is available in grades in four use categories: Light Framing, Structural Light Framing, Studs and Structural Joists and Planks.

Light Framing grades are intended for use where the highest strength values are not required, such as wall framing, plates, sills, cripples and blocking. There are three Light Framing grades, in sizes 2x2 up to 4x4:

Construction
Standard
Utility

These grades may be available in combinations, such as Standard & Better, which include both Standard and Construction grades.

Structural Light Framing grades will fit engineering applications where the highest design values are needed. There are four Structural Light Framing grades, in sizes 2x2 up to 4x4:

Select Structural
No. 1
No. 2
No. 3

These grades may be available in combinations, such as No. 2 & Better, which includes No. 2, No. 1 and Select Structural grades.

Stud grade lumber is for vertical uses, such as load-bearing walls. It is often sold in specified lengths for typical construction uses. Stud grade is the only grade in Stud category, in sizes 2x2 up to 4x18.

Structural Joists and Planks grades are products that are 5" or greater in width. This lumber is for applications where high strength values are required, such as floor joists, rafters, headers, small beams, trusses and general framing. There are four Structural Joists and Planks grades, in sizes 2x5 up to 4x18:

Select Structural
No. 1
No. 2
No. 3

Like Structural Light Framing, this lumber is available in marketing combinations such as No. 2 and Better.

Additional information

WWPA offers a host of publications about Western lumber. For additional information on Western lumber grading rules and technical data, refer to the following publications:

Western Lumber Grading Rules (G-5) provides detailed lumber grading rules for products manufactured from Western species, including Base Design Values.

Western Lumber Product Use Manual (A) is a comprehensive lumber technical manual, featuring basic categories of lumber, grades, sizes, species groups, design values and adjustment factors.

These and other publications can be ordered from the Online Publications Store on the WWPA web site at www.wwpa.org. Many titles also are available in digital format and can be downloaded from the site.

Grade Stamp



The Western Wood Products Association grade stamp contains five elements identifying the manufacturer, grade, species, moisture content and certification mark.

a. WWPA Certification Mark

This symbol indicates that a piece bearing this trademark has been graded under supervision of Western Wood Products Association.

b. Manufacturer

The originating mill is identified by an assigned number or by the firm's name or brand. A WWPA mill number list is available online at www.wwpa.org.

c. Grade

The grade is shown by the grade name or abbreviation. Dimension grades include:

CONST	= Construction
STAND	= Standard
UTIL	= Utility
STUD	= Stud
SEL STR	= Select Structural
1	= No. 1
2	= No. 2
3	= No. 3

d. Species

Indicates species by individual species or species combination.

e. Seasoning

The moisture content or conditioning of the piece at the time of manufacturing:

S-GRN = Surfaced Green, moisture content in excess of 19%.

S-DRY = Surfaced Dry, moisture content of 19% or less.

KD-HT = Kiln dried – heat treated, moisture content of 19% or less, heated in a kiln to meet international standards.

MC 15 = Dried to a moisture content of 15% or less.

HT = Heat treated to core temperature of 56 degrees C for at least 30 minutes to meet international standards.

Natural Characteristics and Manufacturing Imperfections

Grades are determined primarily by the natural characteristics of the log which appear in a given piece of lumber and which have an effect upon its strength, stiffness and appearance. Manufacturing imperfections, no matter what the cause, also affect the grade.

The grade is assessed by considering the type, size, closeness, frequency and

location of all characteristics and imperfections within the piece. It is the responsibility of the grader to judge the total effect of the various combinations according to the limitations set forth in the grading rules for each grade and species.

Some of the more common characteristics are shown below.

Knots are the most frequently encountered characteristic. Six of the more

common kinds are shown as they appear on the lumber face.

Wane is the presence of bark or lack of wood from any cause on the edge or corner of a piece of lumber.

Checks are separations of the wood fibers, normally occurring across or through the annual growth rings, usually as a result of seasoning.



Checked Knot



Tight Black Knot



Intergrown Knot



Not-firmly Fixed Knot



Spike Knot



Unsound Knot



Wane



Pitch Streak



Checks



Bark Pocket

Splits are similar to checks except the separations of the wood fibers extend completely through a piece, usually at the ends.

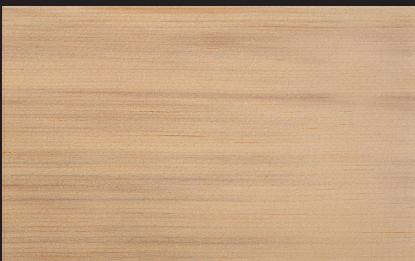
Crook is a deviation from a flat plane of the narrow face of a piece of lumber from end to end.

Bow is a deviation from a flat plane of the wide face of a piece of lumber from end to end.

Twist is a deviation from the flat planes of all four faces by a spiraling or torsional action, usually the result of seasoning.

Cup is a deviation from a flat plane, edge to edge.

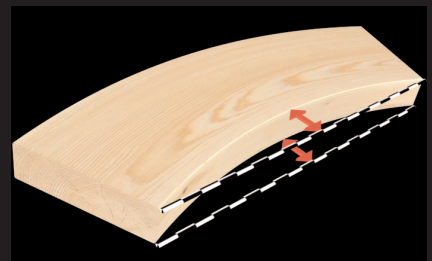
Manufacturing imperfections include chipped, torn, raised or loosened grain, skips in surfacing, undersize, mismatch, wavy dressing and machine caused burn, dips, bite or knife marks.



Brown Stain



Machine Burn



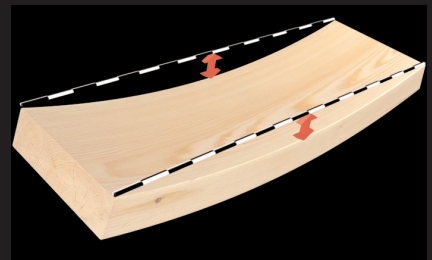
Crook



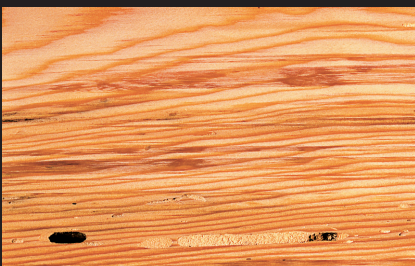
Blue Stain



Skip



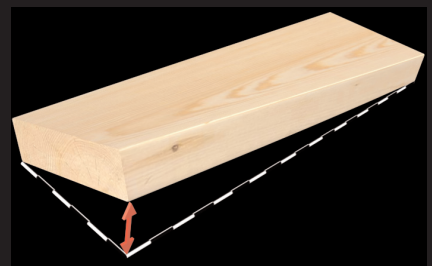
Bow



Grub Hole



Torn Grain



Twist



Honeycomb



Machine Gouge



Cup

Structural Light Framing

Douglas Fir-Larch

Select Structural



Sound, firm, encased and pith knots are limited up to 7/8", and are tight and well-spaced. Unsound or loose knots or holes are limited up to 3/4", one per 4 lineal feet.

No. 1



Knots must be of same type as in Select Structural grade, up to 1 1/2". Unsound or loose knots or holes are limited up to 1", one per 3 lineal feet. Wane is allowable.

No. 2



Well-spaced knots of any quality are allowable up to 2", with one hole up to 1 1/4" per 2 lineal feet. Wane is allowable.



Structural Light Framing

Hem-Fir

Select Structural

Sound, firm, encased and pith knots are limited up to $\frac{7}{8}$ ", and are tight and well-spaced. Unsound or loose knots or holes are limited up to $\frac{3}{4}$ ", one per 4 lineal feet.



No. 1

Knots must be of same type as in Select Structural grade, up to $1\frac{1}{2}$ ". Unsound or loose knots or holes are limited up to 1", one per 3 lineal feet. Wane is allowable.



No. 2

Well-spaced knots of any quality are allowable up to 2", with one hole up to $1\frac{1}{4}$ " per 2 lineal feet. Wane is allowable.



Structural Light Framing

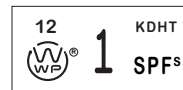
Select Structural

Sound, firm, encased and pith knots are limited up to $\frac{7}{8}$ ", and are tight and well-spaced. Unsound or loose knots or holes are limited up to $\frac{3}{4}$ ", one per 4 lineal feet.



No. 1

Knots must be of same type as in Select Structural grade, up to $1\frac{1}{2}$ ". Unsound or loose knots or holes are limited up to 1", one per 3 lineal feet. Wane is allowable.



No. 2

Well-spaced knots of any quality are allowable up to 2", with one hole up to $1\frac{1}{4}$ " per 2 lineal feet. Edge knots are allowable up to $1\frac{1}{4}$ ".



Light Framing

Construction

Sound, firm, encased and pith knots are limited to no larger than 1 1/2". Unsound or loose knots or holes are limited up to 1", one per 3 lineal feet.



Standard

Knots are not restricted as to quality up to 2" anywhere on the wide face. Holes are limited up to 1 1/4", one per 2 lineal feet.



Stud

Knots are not restricted as to quality but must be well-spaced and of sizes up to what is allowed in Utility (2x4) grade. Holes are limited up to 1 1/2", one per lineal foot.



Light Framing

Hem-Fir

Construction

Sound, firm, encased and pith knots are limited to no larger than 1 1/2". Unsound or loose knots or holes are limited up to 1", one per 3 lineal feet.



Standard

Knots are not restricted as to quality up to 2" anywhere on the wide face. Holes are limited up to 1 1/4", one per 2 lineal feet.



Stud

Knots are not restricted as to quality but must be well-spaced and of sizes up to what is allowed in Utility (2x4) grade. Holes are limited up to 1 1/2", one per lineal foot.



Light Framing

Construction

Sound, firm, encased and pith knots are limited to no larger than 1 1/2". Unsound or loose knots or holes are limited up to 1", one per 3 lineal feet.



Standard

Knots are not restricted as to quality up to 2" anywhere on the wide face. Holes are limited up to 1 1/4", one per 2 lineal feet.



Spruce-Pine-Fir (South)

Stud

Knots are not restricted as to quality but must be well-spaced and of sizes up to what is allowed in Utility (2x4) grade. Holes are limited up to 1 1/2", one per lineal foot.



Structural Joists & Planks

Douglas Fir-Larch

Select Structural

Knots are limited to sound, firm, encased and pith knots, if tight and well-spaced, with one unsound or loose knot or hole per 4 lineal feet. Centerline knots range from maximums of $1\frac{1}{2}$ " on 5" widths to $3\frac{1}{4}$ " on 14" widths. Edge knots range from maximums of 1" on 5" widths to $2\frac{3}{8}$ " on 14" widths.



No. 1

Centerline knots range from maximums of $1\frac{7}{8}$ " on 5" widths to 4" on 14" widths. Edge knots range from maximums of $1\frac{1}{4}$ " on 5" widths to $3\frac{1}{8}$ " on 14" widths. Unsound or loose knots or holes range from maximums of $1\frac{1}{8}$ " on 5" widths to $1\frac{1}{2}$ " on 14" widths.



No. 2

Well-spaced knots of any quality are allowable. Centerline knots range from maximums of $2\frac{3}{8}$ " on 5" widths to $5\frac{1}{4}$ " on 14" widths. Edge knots range from maximums of $1\frac{5}{8}$ " on 5" widths to $4\frac{1}{8}$ " on 14" widths. Holes from any cause range from maximums of $1\frac{3}{8}$ " on 5" widths to $3\frac{1}{2}$ " on 14" widths, one per 2 lineal feet.



Structural Joists & Planks

Hem-Fir

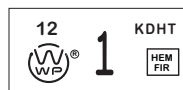
Select Structural

Knots are limited to sound, firm, encased and pith knots, if tight and well-spaced, with one unsound or loose knot or hole per 4 lineal feet. Centerline knots range from maximums of $1\frac{1}{2}$ " on 5" widths to $3\frac{1}{4}$ " on 14" widths. Edge knots range from maximums of 1" on 5" widths to $2\frac{3}{8}$ " on 14" widths.



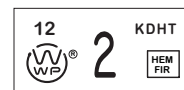
No. 1

Centerline knots range from maximums of $1\frac{7}{8}$ " on 5" widths to 4" on 14" widths. Edge knots range from maximums of $1\frac{1}{4}$ " on 5" widths to $3\frac{1}{8}$ " on 14" widths. Unsound or loose knots or holes range from maximums of $1\frac{1}{8}$ " on 5" widths to $1\frac{1}{2}$ " on 14" widths.



No. 2

Well-spaced knots of any quality are allowable. Centerline knots range from maximums of $2\frac{3}{8}$ " on 5" widths to $5\frac{1}{4}$ " on 14" widths. Edge knots range from maximums of $1\frac{5}{8}$ " on 5" widths to $4\frac{1}{8}$ " on 14" widths. Holes from any cause range from maximums of $1\frac{3}{8}$ " on 5" widths to $3\frac{1}{2}$ " on 14" widths, one per 2 lineal feet.



Structural Joists & Planks

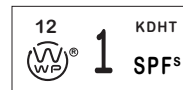
Spruce-Pine-Fir (South)

Select Structural



Knots are limited to sound, firm, encased and pith knots, if tight and well-spaced, with one unsound or loose knot or hole per 4 lineal feet. Centerline knots range from maximums of 1 1/2" on 5" widths to 3 1/4" on 14" widths. Edge knots range from maximums of 1" on 5" widths to 2 3/8" on 14" widths.

No. 1



Centerline knots range from maximums of 1 7/8" on 5" widths to 4" on 14" widths. Edge knots range from maximums of 1 1/4" on 5" widths to 3 1/8" on 14" widths. Unsound or loose knots or holes range from maximums of 1 1/8" on 5" widths to 1 1/2" on 14" widths.

No. 2



Well-spaced knots of any quality are allowable. Centerline knots range from maximums of 2 3/8" on 5" widths to 5 1/4" on 14" widths. Edge knots range from maximums of 1 5/8" on 5" widths to 4 1/8" on 14" widths. Holes from any cause range from maximums of 1 3/8" on 5" widths to 3 1/2" on 14" widths, one per 2 lineal feet.



ABOUT WWPA

Western Wood Products Association provides lumber grading and technical support services for the Western lumber products of its member mills. Approved by the Board of Review of the American Lumber Standard Committee, Inc. (ALSC), which operates under the jurisdiction of the U.S. Department of Commerce, WWPA is certified as a lumber inspection and rules-writing agency.

WWPA is approved to provide mill supervisory services and to grade and inspect lumber according to its own *Western Lumber Grading Rules*, the West Coast Lumber Inspection Bureau's (WCLIB) *West Coast Standard Grading Rules*, the Pacific Lumber Inspection Bureau's (PLIB) *Export R List Rules*, the rules of the Redwood Inspection

Service, the National Lumber Grades Authority's *Standard Grading Rules for Canadian Lumber*, Eastern White Pine Common Board Grades of the Northeastern Lumber Manufacturers Association's *Standard Grading Rules for Northeastern Lumber*, and the National Grading Rule portion of the Southern Pine Inspection Bureau Rules.

WWPA is also approved to provide quality control and certification services for machine stress-rated (MSR) lumber and structural-glued lumber products in all Western species and heat treatment audit services under all ALSC recognized rules.

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

dards. 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.



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