

**SIZE-ADJUSTED VALUES  
FOR WESTERN LUMBER  
SPECIES GROUPS**

**SIZE-ADJUSTED VALUES**

In the following tables, Base Values for Dimension Lumber (2" to 4" thick) have been adjusted for the appropriate size factors for your convenience.

These tables are intended for those who are more comfortable selecting a size-adjusted number from a table rather than using a Base Value along with a Size Adjustment. These Size-Adjusted Values may be further adjusted for specific conditions of use according to the *Checklist* on the right (refer to Adjustment Factor Tables A-E on page 8).

**WESTERN LUMBER  
SPECIES GROUPS**

The individual species in each species grouping are listed below and in the table headings on the following pages.

DOUGLAS FIR-LARCH Douglas Fir Western Larch	SPRUCE-PINE-FIR (South) Engelmann Spruce Sitka Spruce Lodgepole Pine
DOUGLAS FIR-SOUTH Douglas Fir grown in AZ, CO, NV, NM & UT	Balsam Fir Jack Pine Red Pine Eastern Spruces

HEM-FIR Western Hemlock Noble Fir California Red Fir Grand Fir Pacific Silver Fir White Fir	WESTERN CEDARS Incense Cedar Western Red Cedar Port Orford Cedar Alaska Cedar
	WESTERN WOODS Alpine Fir Ponderosa Pine Sugar Pine Idaho White Pine Mountain Hemlock "White Woods" (see p.7)

**ADJUSTMENT FACTORS**

The Size-Adjusted Values in this publication are derived by using species-group Base Values along with the adjustment factors for each size. Repetitive member  $F_b$  values are also provided. If using 4" thick lumber in a repetitive system, refer to Footnote 2 below each table.

Size-Adjusted Values may be further adjusted for specific conditions of use, e.g. Duration of Load, Flat Use, Compression Perpendicular to Grain, Wet Use and Incising.

These conditions-of-use adjustments are presented in Tables A-E on page 8. The following *Checklist* indicates how these adjustments should be applied to the Size-Adjusted Values in this publication.

**SIZE-ADJUSTED  
DESIGN VALUE EQUATIONS** **Checklist**

Apply to Single or Repetitive Size-Adjusted Values in Tables 1-6.

Single or Repetitive Size-Adjusted Value (Tables 1-6)	x	Conditions of Use Adjustment Factors (Tables A-E, page 8)						= Design Value							
$F_b$	x	$C_D$	x	$C_M$	x	$C_R$	x	$C_t$	x	$C_{fu}$	x	$C_i$	=	$F'_b$	
$F_t$	x	$C_D$	x	$C_M$	x	$C_R$	x	$C_t$				x	$C_i$	=	$F'_t$
$F_v$	x	$C_D$	x	$C_M$	x	$C_R$	x	$C_t$				x	$C_i$	=	$F'_v$
$F_{c_{\perp}}^1$			x	$C_M$	x	$C_R$	x	$C_t$	x	$C_{c_{\perp}}$			=	$F'_{c_{\perp}}$	
$F_c$	x	$C_D$	x	$C_M$	x	$C_R$	x	$C_t$				x	$C_i$	=	$F'_c$
E			x	$C_M$	x	$C_R$	x	$C_t$				x	$C_i$	=	E'

<sup>1</sup> For  $F_{c_{\perp}}$  value of 0.02" deformation basis, see Table C.

**Note:**  $C_D$  = Duration of Load Factor       $C_i$  = Incising Factor  
 $C_{fu}$  = Flat Use Factor                       $C_R$  = Fire Retardant Factor, refer to the National Design Specification  
 $C_M$  = Wet Use Factor  
 $C_{c_{\perp}}$  = Adjustment for Compression Perpendicular to Grain       $C_t$  = Temperature Factor, refer to the National Design Specification

**ADDITIONAL INFORMATION**

Technical information on Western lumber products manufactured by WWPA mills is available through the Association's Online Technical Guide at <http://www.wwpa.org/techguide>. The guide features sections on lumber grades, design values, specifications, properties and environmental information on Western lumber.

For a full description of technical publications available for purchase and a printable order form, go to the WWPA Internet site at <http://www.wwpa.org>.

You also can receive an order form via fax through the WWPA Fax Delivery Service by calling 732-544-2876 and following the recorded instructions.



# Douglas Fir-Larch

## Table 1

### SIZE-ADJUSTED VALUES FOR WESTERN DIMENSION LUMBER<sup>1</sup>

Nominal Sizes: 2" to 4" thick by 2" and wider

Douglas Fir  
Western Larch

**Apply other Adjustment Factors, Tables A through E when appropriate. Refer to page 8.**

Grades described in *Western Lumber Grading Rules*, Sections 40.00, 41.00, 42.00 and 62.00

SIZE	GRADE	Extreme Fiber Stress in Bending, $F_b$			Tension Parallel to Grain $F_t$	Hori- zontal shear <sup>3</sup> $F_v$	Compression		Modulus of Elasticity $E$
		2" & 3" thick single	2" & 3" thick repetitive	4" thick single <sup>2</sup>			Perpendicular to Grain $F_{c\perp}$	Parallel to Grain $F_c$	
<b>2"-4" wide</b> (2x2, 2x3, 2x4, 3x3, 3x4, 4x4)	Select Structural	2250	2590	2250	1500	180	625	1955	1,900,000
	No. 1 & Btr	1800	2070	1800	1200	180	625	1785	1,800,000
	No. 1	1500	1725	1500	1015	180	625	1725	1,700,000
	No. 2	1350	1555	1350	865	180	625	1555	1,600,000
	No. 3	790	905	790	490	180	625	890	1,400,000
	Construction	1000	1150	1000	650	180	625	1650	1,500,000
	Standard	575	660	575	375	180	625	1400	1,400,000
	Utility (2x2, 2x3, 3x3)	110	125	—	70	180	625	540	1,300,000
	Utility (2x4, 3x4, 4x4)	275	315	275	175	180	625	900	1,300,000
	Stud	770	885	770	495	180	625	895	1,400,000
<b>6" wide</b> (2x6, 3x6, 4x6)	Select Structural	1950	2245	1950	1300	180	625	1870	1,900,000
	No. 1 & Btr	1560	1795	1560	1040	180	625	1705	1,800,000
	No. 1	1300	1495	1300	880	180	625	1650	1,700,000
	No. 2	1170	1345	1170	750	180	625	1485	1,600,000
	No. 3	685	785	685	425	180	625	855	1,400,000
	Stud	700	805	700	450	180	625	850	1,400,000
<b>8" wide</b> (2x8, 3x8, 4x8)	Select Structural	1800	2070	1950	1200	180	625	1785	1,900,000
	No. 1 & Btr	1440	1655	1560	960	180	625	1630	1,800,000
	No. 1	1200	1380	1300	810	180	625	1575	1,700,000
	No. 2	1080	1240	1170	690	180	625	1420	1,600,000
	No. 3 / Stud	630	725	685	390	180	625	815	1,400,000
<b>10" wide</b> (2x10, 3x10, 4x10)	Select Structural	1650	1900	1800	1100	180	625	1700	1,900,000
	No.1 & Btr	1320	1520	1440	880	180	625	1550	1,800,000
	No.1	1100	1265	1200	745	180	625	1500	1,700,000
	No.2	990	1140	1080	635	180	625	1350	1,600,000
	No. 3 / Stud	580	665	630	360	180	625	775	1,400,000
<b>12" wide</b> (2x12, 3x12, 4x12)	Select Structural	1500	1725	1650	1000	180	625	1700	1,900,000
	No. 1 & Btr	1200	1380	1320	800	180	625	1550	1,800,000
	No. 1	1000	1150	1100	675	180	625	1500	1,700,000
	No. 2	900	1035	990	575	180	625	1350	1,600,000
	No. 3 / Stud	525	605	580	325	180	625	775	1,400,000
<b>14" &amp; wider</b> (2x14 & wider, 3x14 & wider, 4x14 & wider)	Select Structural	1350	1555	1500	900	180	625	1530	1,900,000
	No. 1 & Btr	1080	1240	1200	720	180	625	1395	1,800,000
	No. 1	900	1035	1000	610	180	625	1350	1,700,000
	No. 2	810	930	900	520	180	625	1215	1,600,000
	No. 3 / Stud	475	545	525	295	180	625	700	1,400,000

<sup>1</sup> Design values in pounds per square inch.

<sup>2</sup> If using 4" thick lumber in repetitive systems, multiply the 4" thick single  $F_b$  value by 1.15 to yield the repetitive member value.

**Example:** DF-L No. 1 4x8 repetitive  $F_b$  is  $1300 \times 1.15 = 1495$  psi

<sup>3</sup> The Shear Stress Factors ( $C_{ij}$ ) for splits, checks and shakes do not apply to the  $F_v$  values tabulated.

**Note:** Due to rounding to the nearest 5, some numbers in this table are slightly different from those derived when SIZE and REPETITIVE MEMBER adjustments (from tables A & B in the WWPA Product Use Manual) are applied to BASE VALUES for dimension lumber.

# Douglas Fir-South

Table 2

## SIZE-ADJUSTED VALUES FOR WESTERN DIMENSION LUMBER<sup>1</sup>

Nominal Sizes: 2" to 4" thick by 2" and wider

Douglas Fir  
grown in AZ, CO,  
NV, NM & UT

Apply other Adjustment Factors, Tables A through E when appropriate. Refer to page 8.

Grades described in *Western Lumber Grading Rules*, Sections 40.00, 41.00, 42.00 and 62.00

SIZE	GRADE	Extreme Fiber Stress in Bending, $F_b$			Tension Parallel to Grain $F_t$	Hori- zontal shear <sup>3</sup> $F_v$	Compression		Modulus of Elasticity $E$
		2" & 3" thick single	2" & 3" thick repetitive	4" thick single <sup>2</sup>			Perpendicular to Grain $F_{c\perp}$	Parallel to Grain $F_c$	
<b>2"-4" wide</b> (2x2, 2x3, 2x4, 3x3, 3x4, 4x4)	Select Structural	2025	2330	2025	1350	180	520	1840	1,400,000
	No. 1	1390	1595	1390	900	180	520	1670	1,300,000
	No. 2	1275	1465	1275	790	180	520	1555	1,200,000
	No. 3	750	865	750	450	180	520	890	1,100,000
	Construction	975	1120	975	600	180	520	1650	1,200,000
	Standard	550	635	550	350	180	520	1400	1,100,000
	Utility (2x2, 2x3, 3x3)	100	115	—	60	180	520	540	1,000,000
	Utility (2x4, 3x4, 4x4)	250	290	250	150	180	520	900	1,000,000
	Stud	745	855	745	470	180	520	895	1,100,000
<b>6" wide</b> (2x6, 3x6, 4x6)	Select Structural	1755	2020	1755	1170	180	520	1760	1,400,000
	No. 1	1205	1385	1205	780	180	520	1595	1,300,000
	No. 2	1105	1270	1105	685	180	520	1485	1,200,000
	No. 3	650	750	650	390	180	520	855	1,100,000
	Stud	675	775	675	425	180	520	850	1,100,000
<b>8" wide</b> (2x8, 3x8, 4x8)	Select Structural	1620	1865	1755	1080	180	520	1680	1,400,000
	No. 1	1110	1275	1205	720	180	520	1525	1,300,000
	No. 2	1020	1175	1105	630	180	520	1420	1,200,000
	No. 3 / Stud	600	690	650	360	180	520	815	1,100,000
<b>10" wide</b> (2x10, 3x10, 4x10)	Select Structural	1485	1710	1620	990	180	520	1600	1,400,000
	No. 1	1020	1170	1110	660	180	520	1450	1,300,000
	No. 2	935	1075	1020	580	180	520	1350	1,200,000
	No. 3 / Stud	550	635	600	330	180	520	775	1,100,000
<b>12" wide</b> (2x12, 3x12, 4x12)	Select Structural	1350	1555	1485	900	180	520	1600	1,400,000
	No. 1	925	1065	1020	600	180	520	1450	1,300,000
	No. 2	850	980	935	525	180	520	1350	1,200,000
	No. 3 / Stud	500	575	550	300	180	520	775	1,100,000
<b>14" &amp; wider</b> (2x14 & wider, 3x14 & wider, 4x14 & wider)	Select Structural	1215	1395	1350	810	180	520	1440	1,400,000
	No. 1	835	955	925	540	180	520	1305	1,300,000
	No. 2	765	880	850	475	180	520	1215	1,200,000
	No. 3 / Stud	450	520	500	270	180	520	700	1,100,000

<sup>1</sup> Design values in pounds per square inch.

<sup>2</sup> If using 4" thick lumber in repetitive systems, multiply the 4" thick single  $F_b$  value by 1.15 to yield the repetitive member value.

**Example:** DF-S No. 1 4x8 repetitive  $F_b$  is  $1205 \times 1.15 = 1385$  psi

<sup>3</sup> The Shear Stress Factors ( $C_{H\perp}$ ) for splits, checks and shakes do not apply to the  $F_v$  values tabulated.

**Note:** Due to rounding to the nearest 5, some numbers in this table are slightly different from those derived when SIZE and REPETITIVE MEMBER adjustments (from tables A & B in the WWPA Product Use Manual) are applied to BASE VALUES for dimension lumber.

# Hem-Fir

## Table 3

### SIZE-ADJUSTED VALUES FOR WESTERN DIMENSION LUMBER<sup>1</sup>

Nominal Sizes: 2" to 4" thick by 2" and wider

Apply other Adjustment Factors, Tables A through E when appropriate. Refer to page 8.

Grades described in *Western Lumber Grading Rules*, Sections 40.00, 41.00, 42.00 and 62.00

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

SIZE	GRADE	Extreme Fiber Stress in Bending, $F_b$			Tension Parallel to Grain $F_t$	Hori- zontal shear <sup>3</sup> $F_v$	Compression		Modulus of Elasticity $E$
		2" & 3" thick single	2" & 3" thick repetitive	4" thick single <sup>2</sup>			Perpendicular to Grain $F_{c\perp}$	Parallel to Grain $F_c$	
2"-4" wide thick by	Select Structural	2100	2415	2100	1390	150	405	1725	1,600,000
	(2x2, 2x3 No. 1 & Btr	1650	1900	1650	1090	150	405	1555	1,500,000
	2x4, 3x3, No. 1	1465	1680	1465	940	150	405	1555	1,500,000
	3x4, 4x4) No. 2	1275	1465	1275	790	150	405	1495	1,300,000
	No. 3	750	865	750	450	150	405	835	1,200,000
	Construction	975	1120	975	600	150	405	1550	1,300,000
	Standard	550	635	550	325	150	405	1300	1,200,000
	Utility (2x2, 2x3, 3x3)	100	115	—	60	150	405	510	1,100,000
	Utility (2x4, 3x4, 4x4)	250	290	250	150	150	405	850	1,100,000
	Stud	745	855	745	440	150	405	840	1,200,000
6" wide	Select Structural	1820	2095	1820	1205	150	405	1650	1,600,000
	(2x6, 3x6, No. 1 & Btr	1430	1645	1430	945	150	405	1485	1,500,000
	4x6) No. 1	1270	1460	1270	815	150	405	1485	1,500,000
	No. 2	1105	1270	1105	685	150	405	1430	1,300,000
	No. 3	650	750	650	390	150	405	800	1,200,000
	Stud	675	775	675	400	150	405	800	1,200,000
8" wide	Select Structural	1680	1930	1820	1110	150	405	1575	1,600,000
	(2x8, 3x8, No. 1 & Btr	1320	1520	1430	870	150	405	1420	1,500,000
	4x8) No. 1	1170	1345	1270	750	150	405	1420	1,500,000
	No. 2	1020	1175	1105	630	150	405	1365	1,300,000
	No. 3 / Stud	600	690	650	360	150	405	760	1,200,000
10" wide	Select Structural	1540	1770	1680	1020	150	405	1500	1,600,000
	(2x10, 3x10, No.1 & Btr	1210	1390	1320	800	150	405	1350	1,500,000
	4x10) No. 1	1075	1235	1170	690	150	405	1350	1,500,000
	No. 2	935	1075	1020	580	150	405	1300	1,300,000
	No. 3 / Stud	550	635	600	330	150	405	725	1,200,000
12" wide	Select Structural	1400	1610	1540	925	150	405	1500	1,600,000
	(2x12, 3x12, No. 1 & Btr	1100	1265	1210	725	150	405	1350	1,500,000
	4x12) No. 1	975	1120	1075	625	150	405	1350	1,500,000
	No. 2	850	980	935	525	150	405	1300	1,300,000
	No. 3 / Stud	500	575	550	300	150	405	725	1,200,000
14" & wider	Select Structural	1260	1450	1400	835	150	405	1350	1,600,000
	(2x14 & wider, No. 1 & Btr	990	1140	1100	655	150	405	1215	1,500,000
	3x14 & wider, No. 1	880	1010	975	565	150	405	1215	1,500,000
	4x14 & wider) No. 2	765	880	850	475	150	405	1170	1,300,000
	No. 3 / Stud	450	520	500	270	150	405	655	1,200,000

<sup>1</sup> Design values in pounds per square inch.

<sup>2</sup> If using 4" thick lumber in repetitive systems, multiply the 4" thick single  $F_b$  value by 1.15 to yield the repetitive member value.

**Example:** Hem-Fir No. 1 4x8 repetitive  $F_b$  is  $1270 \times 1.15 = 1460$  psi

<sup>3</sup> The Shear Stress Factors ( $C_H$ ) for splits, checks and shakes do not apply to the  $F_v$  values tabulated.

**Note:** Due to rounding to the nearest 5, some numbers in this table are slightly different from those derived when SIZE and REPETITIVE MEMBER adjustments (from tables A & B in the WWP A Product Use Manual) are applied to BASE VALUES for dimension lumber.

# Spruce-Pine-Fir (South)<sup>4</sup>

Table 4

## SIZE-ADJUSTED VALUES FOR WESTERN DIMENSION LUMBER<sup>1</sup>

Nominal Sizes: 2" to 4" thick by 2" and wider

Apply other Adjustment Factors, Tables A through E when appropriate. Refer to page 8.

Grades described in *Western Lumber Grading Rules*, Sections 40.00, 41.00, 42.00 and 62.00

Engelmann Spruce,  
Sitka Spruce,  
Lodgepole Pine

SIZE	GRADE	Extreme Fiber Stress in Bending, $F_b$			Tension Parallel to Grain $F_t$	Hori- zontal shear <sup>3</sup> $F_v$	Compression		Modulus of Elasticity $E$
		2" & 3" thick single	2" & 3" thick repetitive	4" thick single <sup>2</sup>			Perpendicular- to Grain $F_{c\perp}$	Parallel to Grain $F_c$	
<b>2"-4" wide</b> (2x2, 2x3, 2x4, 3x3, 3x4, 4x4)	Select Structural	1950	2245	1950	865	135	335	1380	1,300,000
	No. 1	1315	1510	1315	600	135	335	1210	1,200,000
	No. 2	1165	1335	1165	525	135	335	1150	1,100,000
	No. 3	675	775	675	300	135	335	660	1,000,000
	Construction	875	1005	875	400	135	335	1200	1,000,000
	Standard	500	575	500	225	135	335	1000	900,000
	Utility (2x2, 2x3, 3x3)	90	105	—	40	135	335	405	900,000
	Utility (2x4, 3x4, 4x4)	225	260	225	100	135	335	675	900,000
Stud	660	760	660	305	135	335	655	1,000,000	
<b>6" wide</b> (2x6, 3x6, 4x6)	Select Structural	1690	1945	1690	750	135	335	1320	1,300,000
	No. 1	1140	1310	1140	520	135	335	1155	1,200,000
	No. 2	1010	1160	1010	455	135	335	1100	1,100,000
	No. 3	585	675	585	260	135	335	635	1,000,000
	Stud	600	690	600	275	135	335	625	1,000,000
<b>8" wide</b> (2x8, 3x8, 4x8)	Select Structural	1560	1795	1690	690	135	335	1260	1,300,000
	No. 1	1050	1210	1140	480	135	335	1105	1,200,000
	No. 2	930	1070	1010	420	135	335	1050	1,100,000
	No. 3 / Stud	540	620	585	240	135	335	605	1,000,000
<b>10" wide</b> (2x10, 3x10, 4x10)	Select Structural	1430	1645	1560	635	135	335	1200	1,300,000
	No. 1	965	1105	1050	440	135	335	1050	1,200,000
	No. 2	855	980	930	385	135	335	1000	1,100,000
	No. 3 / Stud	495	570	540	220	135	335	575	1,000,000
<b>12" wide</b> (2x12, 3x12, 4x12)	Select Structural	1300	1495	1430	575	135	335	1200	1,300,000
	No. 1	875	1005	965	400	135	335	1050	1,200,000
	No. 2	775	890	855	350	135	335	1000	1,100,000
	No. 3 / Stud	450	520	495	200	135	335	575	1,000,000
<b>14" &amp; wider</b> (2x14 & wider, 3x14 & wider, 4x14 & wider)	Select Structural	1170	1345	1300	520	135	335	1080	1,300,000
	No. 1	790	905	875	360	135	335	945	1,200,000
	No. 2	700	800	775	315	135	335	900	1,100,000
	No. 3 / Stud	405	465	450	180	135	335	520	1,000,000

<sup>1</sup> Design values in pounds per square inch.

<sup>2</sup> If using 4" thick lumber in repetitive systems, multiply the 4" thick single  $F_b$  value by 1.15 to yield the repetitive member value.

**Example:** SPF<sup>S</sup> No. 1 4x8 repetitive  $F_b$  is  $1140 \times 1.15 = 1310$  psi

<sup>3</sup> The Shear Stress Factors ( $C_{H\parallel}$ ) for splits, checks and shakes do not apply to the  $F_v$  values tabulated.

<sup>4</sup> The Spruce-Pine-Fir (South) species combination also includes the Eastern species of Balsam Fir, Jack Pine, Red Pine and Eastern Spruces represented by NELMA and NSLB.

**Note:** Due to rounding to the nearest 5, some numbers in this table are slightly different from those derived when SIZE and REPETITIVE MEMBER adjustments (from tables A & B in the WWPA Product Use Manual) are applied to BASE VALUES for dimension lumber.

# Western Cedars

## Table 5

### SIZE-ADJUSTED VALUES FOR WESTERN DIMENSION LUMBER<sup>1</sup>

Nominal Sizes: 2" to 4" thick by 2" and wider

**Apply other Adjustment Factors, Tables A through E when appropriate. Refer to page 8.**

Grades described in *Western Lumber Grading Rules*, Sections 40.00, 41.00, 42.00 and 62.00

Incese Cedar,  
Western Red Cedar,  
Port Orford Cedar,  
Alaska Cedar

SIZE	GRADE	Extreme Fiber Stress in Bending, $F_b$			Tension Parallel to Grain $F_t$	Hori- zontal shear <sup>3</sup> $F_v$	Compression		Modulus of Elasticity $E$
		2" & 3" thick single	2" & 3" thick repetitive	4" thick single <sup>2</sup>			Perpendicular to Grain $F_{c\perp}$	Parallel to Grain $F_c$	
<b>2"-4" wide</b> (2x2, 2x3, 2x4, 3x3, 3x4, 4x4)	Select Structural	1500	1725	1500	900	155	425	1150	1,100,000
	No. 1	1090	1250	1090	640	155	425	950	1,000,000
	No. 2	1050	1210	1050	640	155	425	750	1,000,000
	No. 3	600	690	600	375	155	425	430	900,000
	Construction	800	920	800	475	155	425	850	900,000
	Standard	450	520	450	275	155	425	650	800,000
	Utility (2x2, 2x3, 3x3)	90	105	—	50	155	425	255	800,000
	Utility (2x4, 3x4, 4x4)	225	260	225	125	155	425	425	800,000
	Stud	605	695	605	360	155	425	420	900,000
<b>6" wide</b> (2x6, 3x6, 4x6)	Select Structural	1300	1495	1300	780	155	425	1100	1,100,000
	No. 1	945	1085	945	555	155	425	910	1,000,000
	No. 2	910	1045	910	555	155	425	715	1,000,000
	No. 3	520	600	520	325	155	425	415	900,000
	Stud	550	635	550	325	155	425	400	900,000
<b>8" wide</b> (2x8, 3x8, 4x8)	Select Structural	1200	1380	1300	720	155	425	1050	1,100,000
	No. 1	870	1000	945	510	155	425	865	1,000,000
	No. 2	840	965	910	510	155	425	685	1,000,000
	No. 3 / Stud	480	550	520	300	155	425	395	900,000
<b>10" wide</b> (2x10, 3x10, 4x10)	Select Structural	1100	1265	1200	660	155	425	1000	1,100,000
	No. 1	800	915	870	470	155	425	825	1,000,000
	No. 2	770	885	840	470	155	425	650	1,000,000
	No. 3 / Stud	440	505	480	275	155	425	375	900,000
<b>12" wide</b> (2x12, 3x12, 4x12)	Select Structural	1000	1150	1100	600	155	425	1000	1,100,000
	No. 1	725	835	800	425	155	425	825	1,000,000
	No. 2	700	805	770	425	155	425	650	1,000,000
	No. 3 / Stud	400	460	440	250	155	425	375	900,000
<b>14" &amp; wider</b> (2x14 & wider, 3x14 & wider, 4x14 & wider)	Select Structural	900	1035	1000	540	155	425	900	1,100,000
	No. 1	655	750	725	385	155	425	745	1,000,000
	No. 2	630	725	700	385	155	425	585	1,000,000
	No. 3 / Stud	360	415	400	225	155	425	340	900,000

<sup>1</sup> Design values in pounds per square inch.

<sup>2</sup> If using 4" thick lumber in repetitive systems, multiply the 4" thick single  $F_b$  value by 1.15 to yield the repetitive member value.

**Example:** Western Cedar No. 1 4x8 repetitive  $F_b$  is  $945 \times 1.15 = 1085$  psi

<sup>3</sup> The Shear Stress Factors ( $C_H$ ) for splits, checks and shakes do not apply to the  $F_v$  values tabulated.

**Note:** Due to rounding to the nearest 5, some numbers in this table are slightly different from those derived when SIZE and REPETITIVE MEMBER adjustments (from tables A & B in the WWPA Product Use Manual) are applied to BASE VALUES for dimension lumber.

# Western Woods (and White Woods<sup>4</sup>)

Table 6

## SIZE-ADJUSTED VALUES FOR WESTERN DIMENSION LUMBER<sup>1</sup>

Nominal Sizes: 2" to 4" thick by 2" and wider

**Apply other Adjustment Factors, Tables A through E when appropriate. Refer to page 8.**

Grades described in *Western Lumber Grading Rules*, Sections 40.00, 41.00, 42.00 and 62.00

Alpine Fir, Ponderosa Pine, Sugar Pine, Idaho White Pine, Mountain Hemlock, any combination of Western Softwood species except Western Cedars and Redwood

SIZE	GRADE	Extreme Fiber Stress in Bending, $F_b$			Tension Parallel to Grain $F_t$	Horizontal shear <sup>3</sup> $F_v$	Compression		Modulus of Elasticity $E$
		2" & 3" thick single	2" & 3" thick repetitive	4" thick single <sup>2</sup>			Perpendicular to Grain $F_{c\perp}$	Parallel to Grain $F_c$	
<b>2"-4" wide</b> (2x4, 3x3, 2x4, 3x3, 3x4, 4x4)	Select Structural	1350	1555	1350	600	135	335	1210	1,200,000
	No. 1	1015	1165	1015	450	135	335	1095	1,100,000
	No. 2	1015	1165	1015	450	135	335	1035	1,000,000
	No. 3	565	645	565	265	135	335	605	900,000
	Construction Standard	775	890	775	350	135	335	1100	1,000,000
	Standard	425	490	425	200	135	335	925	900,000
	Utility (2x2, 2x3, 3x3)	80	90	—	40	135	335	360	800,000
	Utility (2x4, 3x4, 4x4)	200	230	200	100	135	335	600	800,000
Stud	580	665	580	250	135	335	605	900,000	
<b>6" wide</b> (2x6, 3x6, 4x6)	Select Structural	1170	1345	1170	520	135	335	1155	1,200,000
	No. 1	880	1010	880	390	135	335	1045	1,100,000
	No. 2	880	1010	880	390	135	335	990	1,000,000
	No. 3	490	560	490	230	135	335	580	900,000
	Stud	525	605	525	225	135	335	575	900,000
<b>8" wide</b> (2x8, 3x8, 4x8)	Select Structural	1080	1240	1170	480	135	335	1105	1,200,000
	No. 1	810	930	880	360	135	335	1000	1,100,000
	No. 2	810	930	880	360	135	335	945	1,000,000
	No. 3 / Stud	450	520	490	210	135	335	550	900,000
<b>10" wide</b> (2x10, 3x10, 4x10)	Select Structural	990	1140	1080	440	135	335	1050	1,200,000
	No. 1	745	855	810	330	135	335	950	1,100,000
	No. 2	745	855	810	330	135	335	900	1,000,000
	No. 3 / Stud	415	475	450	195	135	335	525	900,000
<b>12" wide</b> (2x12, 3x12, 4x12)	Select Structural	900	1035	990	400	135	335	1050	1,200,000
	No. 1	675	775	745	300	135	335	950	1,100,000
	No. 2	675	775	745	300	135	335	900	1,000,000
	No. 3 / Stud	375	430	415	175	135	335	525	900,000
<b>14" &amp; wider</b> (2x14 & wider, 3x14 & wider, 4x14 & wider)	Select Structural	810	930	900	360	135	335	945	1,200,000
	No. 1	610	700	675	270	135	335	855	1,100,000
	No. 2	610	700	675	270	135	335	810	1,000,000
	No. 3 / Stud	340	390	375	160	135	335	475	900,000

<sup>1</sup> Design values in pounds per square inch.

<sup>2</sup> **If using 4" thick lumber in repetitive systems**, multiply the 4" thick single  $F_b$  value by 1.15 to yield the repetitive member value.

**Example:** Western Woods No. 1 4x8 repetitive  $F_b$  is  $880 \times 1.15 = 1010$  psi

<sup>3</sup> The Shear Stress Factors ( $C_H$ ) for splits, checks and shakes do not apply to the  $F_v$  values tabulated.

<sup>4</sup> White Woods species group includes any species or combination of true firs, spruces, hemlocks or pines. Design values are the same as those assigned to Western Woods.

**Note:** Due to rounding to the nearest 5, some numbers in this table are slightly different from those derived when SIZE and REPETITIVE MEMBER adjustments (from tables A & B in the WWPA Product Use Manual) are applied to BASE VALUES for dimension lumber.

CONDITIONS-OF-USE  
ADJUSTMENT FACTORS

DURATION OF LOAD FACTORS ( $C_D$ ) Table A

Apply to size-adjusted values

Wood has the property of carrying substantially greater maximum loads for short durations than for long durations of loading. Tabulated size-adjusted values apply to normal load duration. (Factors do not apply to MOE or  $F_{c\perp}$ )

Load Duration	Factor
Permanent	0.9
Ten Years (Normal Load)	1.0
Two Months (Snow Load)	1.15
Seven Day	1.25
One Day	1.33
Ten Minutes (Wind and Earthquake Loads)	1.6
Impact	2.0

Confirm load requirements with local code authorities.

FLAT USE FACTORS ( $C_{Fu}$ ) Table B

Apply to size-adjusted  $F_b$

Nominal Width	Nominal Thickness	
	2" & 3"	4"
2" & 3"	1.00	—
4"	1.10	1.00
5"	1.10	1.05
6"	1.15	1.05
8"	1.15	1.05
10" & wider	1.20	1.10

ADJUSTMENTS FOR COMPRESSION PERPENDICULAR TO GRAIN ( $C_{C\perp}$ ) Table C

For deformation basis of 0.02". Apply to  $F_{c\perp}$  values

Design values for compression perpendicular to grain ( $F_{c\perp}$ ) are established in accordance with the procedures set forth in ASTM Standards D 2555 and D 245. ASTM procedures consider deformation under bearing loads as a serviceability limit state comparable to bending deflection because bearing loads rarely cause structural failures. Therefore, ASTM procedures for determining compression perpendicular to grain values are based on a deformation of 0.04" and are considered adequate for most classes of structures. Where more stringent measures need to be taken in design, the following formula permits the designer to adjust design values to a more conservative deformation basis of 0.02":  $Y_{02} = 0.73 Y_{04} + 5.60$

**Example:** Douglas Fir-Larch:  $Y_{04} = 625$  psi  
 $Y_{02} = 0.73 (625) + 5.60 = 462$  psi

WET USE FACTORS ( $C_M$ ) Table D

Apply to size-adjusted values

The design values shown in Tables 1-6 are for routine construction applications where the moisture content of the wood does not exceed 19% in use. When use conditions are such that the moisture content of Dimension lumber will exceed 19% in use, the Wet Use Factors below are recommended.

Property	Adjustment Factor
$F_b$	0.85 <sup>1</sup>
$F_t$	1.0
$F_c$	0.8 <sup>2</sup>
$F_v$	0.97
$F_{c\perp}$	0.67
E	0.9

<sup>1</sup> Wet Use Factor 1.0 for size-adjusted  $F_b$  (single member) not exceeding 1150 psi.

<sup>2</sup> Wet Use Factor 1.0 for size-adjusted  $F_c$  not exceeding 750 psi.

INCISING FACTORS ( $C_i$ ) Table E

Apply to size-adjusted values

Tabulated size-adjusted values shall be multiplied by the following incising factor ( $C_i$ ), when dimension lumber is incised parallel to grain to a maximum depth of 0.4 inch, a maximum length of  $\frac{3}{8}$ ", and density of incisions up to 1100/ft<sup>2</sup>. Incising factors for incising patterns exceeding these limits shall be determined by test or by using reduced section properties.

Property	Adjustment Factor
E	0.95
$F_b, F_t, F_c, F_v$	0.80
$F_{c\perp}$	1.00

Refer to model building codes or the *National Design Specification* for high-temperature or fire-retardant treated adjustment factors.



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