TECH NOTES

Western Wood Products Association, 522 S.W. Fifth Ave., Suite 500, Portland, OR 97204 503/224-3930

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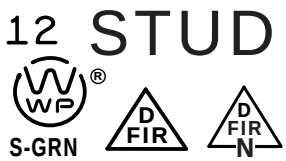
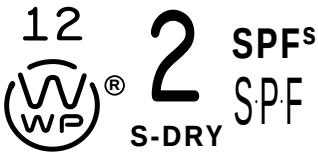
Design Values for U.S. and Canadian Species Group Combinations

The American Lumber Standards Committee, Inc., Board of Review recently approved the combination of lumber species groups from the U.S. and Canada. For example, U.S.and Canadian manufacturers can combine U.S. Douglas Fir/Larch with Canadian Douglas Fir/Larch (North), U.S. Hem-Fir with Canadian Hem-Fir (North), and U.S. Spruce-Pine-Fir (South) with Canadian Spruce-Pine-Fir. The applicable design values for these new species group combinations are the lower of the two species groupings for all grades of dimension lumber under the National Grade Rule (NGR). The U.S. and Canadian species groups that are manufactured separately will continue to carry individual design values.

Prior to this approval, softwood manufacturers producing lumber from both U.S. and Canadian logs were required to separate logs by their origins. In addition to keeping dual inventories, the logs were milled at different schedules and grade stamped accordingly. The new species group combinations eliminate these requirements for logs originating from north and south of the U.S.-Canadian border.

Examples of the new species group combination grade stamps and design values are shown below. The species designation shows the U.S. and Canadian species groups, stacked above one another or side by side. Size-adjusted values for three species group combinations are also part of this Tech Note.





U.S. AND CANADIAN SPECIES GROUP COMBINATIONS BASE VALUES[1,2,3]

	DF-L & DF-L(N)						HF & HF(N)						SPF^S & SPF					
Grade	F_b single	F_t	F_v	$F_{c\perp}$	$F_{c//}$	MOE x10^6	F_b single	F_t	F_v	$F_{c\perp}$	$F_{c//}$	MOE x10^6	F_b single	F_t	F_v	$F_{c\perp}$	$F_{c//}$	MOE x10^6
Sel. Str.	1350	825	180	625	1700	1.9	1300	775	145	370	1500	1.6	1250	575	135	335	1200	1.3
No.1&Btr.	850	500	180	625	1400	1.6	1000	575	145	370	1350	1.5	—	—	—	—	—	—
No. 1	850	500	180	625	1400	1.6	975	575	145	370	1350	1.5	875	400	135	335	1050	1.2
No. 2	850	500	180	625	1350	1.6	850	525	145	370	1300	1.3	775	350	135	335	1000	1.1
No. 3	475	300	180	625	775	1.4	500	300	145	370	725	1.2	450	200	135	335	575	1.0
Const.	950	575	180	625	1650	1.5	975	600	145	370	1550	1.3	875	400	135	335	1200	1.0
Stand.	525	325	180	625	1400	1.4	550	325	145	370	1300	1.2	500	225	135	335	1000	0.9
Utility	250	150	180	625	900	1.3	250	150	145	370	850	1.1	225	100	135	335	675	0.9
Stud	650	400	180	625	850	1.4	675	400	145	370	800	1.2	600	275	135	335	625	1.0

[1] Base Values are in psi
[2] Use with Size-Adjustment Factors (C_f)
[3] Specific Gravity: DF-L & DF-L(N) = 0.49, HF & HF(N) = 0.43, SPF^S & SPF = 0.36

U.S. and Canadian Species Group Combination Span

FLOOR JOISTS

Loading Conditions: 40# LIVE LOAD 10# DEAD LOAD L/360 DOL=1.0

Species Combo	Grade	2 x 8				2 x 10				2 x 12			
		spacing on center											
		12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"
DF-L & DF-L(N)	Sel.Str.	15-0	13-7	12-10	11-11	19-1	17-4	16-4	15-2	23-3	21-1	19-10	18-1
	No.1&Btr.	14-2	12-5	11-4	10-2	17-6	15-2	13-10	12-5	20-4	17-7	16-1	14-4
	No. 1	14-2	12-5	11-4	10-2	17-6	15-2	13-10	12-5	20-4	17-7	16-1	14-4
	No. 2	14-2	12-5	11-4	10-2	17-6	15-2	13-10	12-5	20-4	17-7	16-1	14-4
	No. 3	10-9	9-3	8-6	7-7	13-1	11-4	10-4	9-3	15-2	13-2	12-0	10-9
HF & HF(N)	Sel.Str	14-2	12-10	12-1	11-3	18-0	16-5	15-5	14-4	21-11	19-11	18-9	17-5
	No.1&Btr.	13-10	12-7	11-10	11-0	17-8	16-0	15-0	13-5	21-6	19-1	17-5	15-7
	No. 1	13-10	12-7	11-10	10-10	17-8	16-0	14-10	13-3	21-6	18-10	17-2	15-5
	No. 2	13-2	12-0	11-3	10-2	16-10	15-2	13-10	12-5	20-4	17-7	16-1	14-4
	No. 3	11-0	9-6	8-8	7-9	13-5	11-8	10-7	9-6	15-7	13-6	12-4	11-0
SPF^S & SPF	Sel. Str.	13-2	12-0	11-3	10-6	16-10	15-3	14-5	13-4	20-6	18-7	17-6	16-3
	No. 1	12-10	11-8	11-0	10-2	16-5	14-11	14-0	12-7	19-11	17-10	16-3	14-7
	No. 2	12-6	11-4	10-8	9-8	15-11	14-6	13-3	11-10	19-4	16-10	15-4	13-9
	No. 3	10-5	9-0	8-3	7-5	12-9	11-0	10-1	9-0	14-9	12-10	11-8	10-5

FLOOR JOISTS

Loading Conditions: 30# LIVE LOAD 10# DEAD LOAD L/360 DOL=1.0

Species Combo	Grade	2 x 8				2 x 10				2 x 12			
		spacing on center											
		12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"
DF-L & DF-L(N)	Sel.Str.	16-6	15-0	14-1	13-1	21-0	19-1	18-0	16-8	25-7	23-3	21-10	20-3
	No.1&Btr.	15-7	13-11	12-8	11-4	19-7	16-11	15-6	13-10	22-8	19-8	17-11	16-1
	No. 1	15-7	13-11	12-8	11-4	19-7	16-11	15-6	13-10	22-8	19-8	17-11	16-1
	No. 2	15-7	13-11	12-8	11-4	19-7	16-11	15-6	13-10	22-8	19-8	17-11	16-1
	No. 3	12-0	10-5	9-6	8-6	14-8	12-8	11-7	10-4	17-0	14-8	13-5	12-0
HF & HF(N)	Sel.Str	15-7	14-2	13-4	12-4	19-10	18-0	17-0	15-9	24-2	21-11	20-8	19-2
	No.1&Btr.	15-3	13-10	13-0	12-1	19-5	17-8	16-7	15-0	23-7	21-4	19-6	17-5
	No. 1	15-3	13-10	13-0	12-1	19-5	17-8	16-7	14-10	23-7	21-1	19-3	17-2
	No. 2	14-6	13-2	12-5	11-4	18-6	16-10	15-6	13-10	22-6	19-8	17-11	16-1
	No. 3	12-4	10-8	9-9	8-8	15-0	13-0	11-10	10-7	17-5	15-1	13-9	12-4
SPF^S & SPF	Sel. Str.	14-6	13-2	12-5	11-6	18-6	16-10	15-10	14-8	22-6	20-6	19-3	17-11
	No. 1	14-2	12-10	12-1	11-3	18-0	16-5	15-5	14-1	21-11	19-11	18-3	16-3
	No. 2	13-9	12-6	11-9	10-10	17-6	15-11	14-9	13-3	21-4	18-9	17-2	15-4
	No. 3	11-8	10-1	9-3	8-3	14-3	12-4	11-3	10-1	16-6	14-4	13-1	11-8

CEILING JOISTS

Loading Conditions: 20# LIVE LOAD 10# DEAD LOAD L/240 DOL=1.0

Species Combo	Grade	2 x 6				2 x 8				2 x 10			
		spacing on center											
		12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"
DF-L & DF-L(N)	Sel.Str.	16-4	14-11	14-0	13-0	21-7	19-7	18-5	16-6	27-6	24-8	22-6	20-2
	No.1&Btr.	14-7	12-8	11-7	10-4	18-6	16-0	14-8	13-1	22-7	19-7	17-10	16-0
	No. 1	14-7	12-8	11-7	10-4	18-6	16-0	14-8	13-1	22-7	19-7	17-10	16-0
	No. 2	14-7	12-8	11-7	10-4	18-6	16-0	14-8	13-1	22-7	19-7	17-10	16-0
	No. 3	10-11	9-6	8-8	7-9	13-10	12-0	10-11	9-9	16-11	14-8	13-4	11-11
HF & HF(N)	Sel.Str	15-6	14-1	13-3	12-3	20-5	18-6	17-5	16-2	26-0	23-8	22-1	19-9
	No.1&Btr.	15-2	13-9	12-6	11-2	19-11	17-5	15-10	14-2	24-6	21-3	19-5	17-4
	No. 1	15-2	13-7	12-4	11-1	19-10	17-2	15-8	14-0	24-3	21-0	19-2	17-1
	No. 2	14-5	12-8	11-7	10-4	18-6	16-0	14-8	13-1	22-7	19-7	17-10	16-0
	No. 3	11-2	9-8	8-10	7-11	14-2	12-4	11-3	10-0	17-4	15-0	13-8	12-3
SPF^S & SPF	Sel. Str.	14-5	13-1	12-4	11-5	19-0	17-3	16-3	15-1	24-3	22-1	20-9	19-3
	No. 1	14-1	12-9	11-9	10-6	18-6	16-3	14-10	13-3	22-11	19-10	18-2	16-3
	No. 2	13-8	12-1	11-0	9-10	17-8	15-4	14-0	12-6	21-7	18-8	17-1	15-3
	No. 3	10-8	9-3	8-5	7-6	13-6	11-8	10-8	9-6	16-5	14-3	13-0	11-8

Italicized numbers are deflection governed spans.

Combined Douglas Fir-Larch and Douglas Fir-Larch (North)

SIZE-ADJUSTED VALUES FOR DIMENSION LUMBER[1]

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

Apply other Adjustments, Tables A through E when appropriate.

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

SIZE 2" to 4" thick by	GRADE	Extreme Fiber Stress in Bending, F_b 2" & 3" thick single	2" & 3" thick repetitive	4" thick single[2]	Tension Parallel to Grain F_t	Horizontal shear[3] F_v	Compression Perpendicular $F_{c\perp}$	Compression Parallel to Grain $F_{c//}$	Modulus of Elasticity E
2"-4" wide	Select Structural	2025	2330	2025	1240	180	625	1955	1,900,000
(2x2, 2x3,	No. 1 & Btr.	1275	1465	1275	750	180	625	1610	1,600,000
2x4, 3x3,	No. 1	1275	1465	1275	750	180	625	1610	1,600,000
3x4, 4x4)	No. 2	1275	1465	1275	750	180	625	1555	1,600,000
	No. 3	715	820	715	450	180	625	890	1,400,000
	Construction	950	1095	950	575	180	625	1650	1,500,000
	Standard	525	605	525	325	180	625	1400	1,400,000
	Utility (2x2, 2x3, 3x3)	100	115	—	60	180	625	540	1,300,000
	Utility (2x4, 3x4, 4x4)	250	290	250	150	180	625	900	1,300,000
	Stud	715	820	715	440	180	625	895	1,400,000
6" wide	Select Structural	1755	2020	1755	1075	180	625	1870	1,900,000
(2x6, 3x6,	No.1 & Btr.	1105	1270	1105	650	180	625	1540	1,600,000
4x6)	No.1	1105	1270	1105	650	180	625	1540	1,600,000
	No. 2	1105	1270	1105	650	180	625	1485	1,600,000
	No. 3	620	710	620	390	180	625	855	1,400,000
	Stud	650	750	650	400	180	625	850	1,400,000
8" wide	Select Structural	1620	1865	1755	990	180	625	1785	1,900,000
(2x8, 3x8,	No. 1 & Btr.	1020	1175	1105	600	180	625	1470	1,600,000
4x8)	No. 1	1020	1175	1105	600	180	625	1470	1,600,000
	No. 2	1020	1175	1105	600	180	625	1420	1,600,000
	No. 3 / Stud	570	655	620	360	180	625	815	1,400,000
10" wide	Select Structural	1485	1710	1620	910	180	625	1700	1,900,000
(2x10, 3x10,	No. 1 & Btr.	935	1075	1105	550	180	625	1400	1,600,000
4x10)	No. 1	935	1075	1020	550	180	625	1400	1,600,000
	No. 2	935	1075	1020	550	180	625	1350	1,600,000
	No. 3 / Stud	525	600	570	330	180	625	775	1,400,000
12" wide	Select Structural	1350	1555	1485	825	180	625	1700	1,900,000
(2x12, 3x12,	No. 1 & Btr.	850	980	935	500	180	625	1400	1,600,000
4x12)	No. 1	850	980	935	500	180	625	1400	1,600,000
	No. 2	850	980	935	500	180	625	1350	1,600,000
	No. 3 / Stud	475	545	525	300	180	625	775	1,400,000
14" & wider	Select Structural	1215	1395	1350	745	180	625	1530	1,900,000
(2x14 & wider,	No. 1 & Btr.	765	880	850	450	180	625	1260	1,600,000
3x14 & wider,	No. 1	765	880	850	450	180	625	1260	1,600,000
4x14 & wider)	No. 2	765	880	850	450	180	625	1215	1,600,000
	No. 3 / Stud	430	490	475	270	180	625	700	1,400,000

[1] Design values in pounds per square inch.

[2] **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: No. 1 4x8 repetitive F_b is 1105 x 1.15 = 1270 psi

[3] 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.*

Combined Hem-Fir and Hem-Fir (North)

SIZE-ADJUSTED VALUES FOR DIMENSION LUMBER[1]

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

Apply other Adjustments, Tables A through E when appropriate.

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

SIZE 2" to 4" thick by	GRADE	Extreme Fiber Stress in Bending, F_b 2" & 3" thick single	2" & 3" thick repetitive	4" thick single[2]	Tension Parallel to Grain F_t	Horizontal shear[3] F_v	Compression Perpendicular $F_{c\perp}$	Compression Parallel to Grain $F_{c//}$	Modulus of Elasticity E
2"-4" wide	Select Structural	1950	2245	1950	1165	145	370	1725	1,600,000
(2x2, 2x3,	No. 1 & Btr.	1500	1725	1500	865	145	370	1555	1,500,000
2x4, 3x3,	No. 1	1465	1680	1465	865	145	370	1555	1,500,000
3x4, 4x4)	No. 2	1275	1465	1275	790	145	370	1495	1,300,000
	No. 3	750	865	750	450	145	370	835	1,200,000
	Construction	975	1120	975	600	145	370	1550	1,300,000
	Standard	550	635	550	325	145	370	1300	1,200,000
	Utility (2x2, 2x3, 3x3)	100	115	—	60	145	370	510	1,100,000
	Utility (2x4, 3x4, 4x4)	250	290	250	150	145	370	850	1,100,000
	Stud	745	855	745	440	145	370	840	1,200,000
6" wide	Select Structural	1690	1945	1690	1010	145	370	1650	1,600,000
(2x6, 3x6,	No. 1 & Btr.	1300	1495	1300	750	145	370	1485	1,500,000
4x6)	No. 1	1270	1460	1270	750	145	370	1485	1,500,000
	No. 2	1105	1270	1105	685	145	370	1430	1,300,000
	No. 3	650	750	650	390	145	370	800	1,200,000
	Stud	675	775	675	400	145	370	800	1,200,000
8" wide	Select Structural	1560	1795	1690	930	145	370	1575	1,600,000
(2x8, 3x8,	No. 1 & Btr.	1200	1380	1300	690	145	370	1420	1,500,000
4x8)	No. 1	1170	1345	1270	690	145	370	1420	1,500,000
	No. 2	1020	1175	1105	630	145	370	1365	1,300,000
	No. 3 / Stud	600	690	650	360	145	370	760	1,200,000
10" wide	Select Structural	1430	1645	1560	855	145	370	1500	1,600,000
(2x10, 3x10,	No. 1 & Btr.	1100	1265	1300	635	145	370	1350	1,500,000
4x10)	No. 1	1075	1235	1170	635	145	370	1350	1,500,000
	No. 2	935	1075	1020	580	145	370	1300	1,300,000
	No. 3 / Stud	550	635	600	330	145	370	725	1,200,000
12" wide	Select Structural	1300	1495	1430	775	145	370	1500	1,600,000
(2x12, 3x12,	No. 1 & Btr.	1000	1150	1100	575	145	370	1350	1,500,000
4x12)	No. 1	975	1120	1075	575	145	370	1350	1,500,000
	No. 2	850	980	935	525	145	370	1300	1,300,000
	No. 3 / Stud	500	575	550	300	145	370	725	1,200,000
14" & wider	Select Structural	1170	1345	1300	700	145	370	1350	1,600,000
(2x14 & wider,	No. 1 & Btr.	900	1035	1000	520	145	370	1215	1,500,000
3x14 & wider,	No. 1	880	1010	975	520	145	370	1215	1,500,000
4x14 & wider)	No. 2	765	880	850	475	145	370	1170	1,300,000
	No. 3 / Stud	450	520	500	270	145	370	655	1,200,000

[1] Design values in pounds per square inch.

[2] **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: No. 1 4x8 repetitive F_b is 1270 x 1.15 = 1460 psi

[3] 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.*

Combined Spruce-Pine-Fir (South)[4] and Spruce-Pine-Fir

SIZE-ADJUSTED VALUES FOR DIMENSION LUMBER[1]

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

Apply other Adjustments, Tables A through E when appropriate.

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

SIZE 2" to 4" thick by	GRADE	Extreme Fiber Stress in Bending, F_b 2" & 3" thick single	2" & 3" thick repetitive	4" thick single[2]	Tension Parallel to Grain F_t	Horizontal shear[3] F_v	Compression Perpendicular $F_{c\perp}$	Compression Parallel to Grain $F_{c//}$	Modulus of Elasticity E
2"-4" wide	Select Structural	1875	2155	1875	865	135	335	1380	1,300,000
(2x2, 2x3,	No. 1	1315	1510	1315	600	135	335	1210	1,200,000
2x4, 3x3,	No. 2	1165	1335	1165	525	135	335	1150	1,100,000
3x4, 4x4)	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
6" wide	Select Structural	1625	1870	1625	750	135	335	1320	1,300,000
(2x6, 3x6,	No. 1	1140	1310	1140	520	135	335	1155	1,200,000
4x6)	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
8" wide	Select Structural	1500	1725	1625	690	135	335	1260	1,300,000
(2x8, 3x8,	No. 1	1050	1210	1140	480	135	335	1105	1,200,000
4x8)	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
10" wide	Select Structural	1375	1580	1500	635	135	335	1200	1,300,000
(2x10, 3x10,	No. 1	965	1105	1050	440	135	335	1050	1,200,000
4x10)	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
12" wide	Select Structural	1250	1440	1375	575	135	335	1200	1,300,000
(2x12, 3x12,	No. 1	875	1005	965	400	135	335	1050	1,200,000
4x12)	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
14" & wider	Select Structural	1125	1295	1250	520	135	335	1080	1,300,000
(2x14 & wider,	No. 1	790	905	875	360	135	335	945	1,200,000
3x14 & wider,	No. 2	700	800	775	315	135	335	900	1,100,000
4x14 & wider)	No. 3 / Stud	405	465	450	180	135	335	520	1,000,000

[1] Design values in pounds per square inch.

[2] **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: No. 1 4x8 repetitive F_b is 1140 x 1.15 = 1310 psi

[3] The Shear Stress Factors (C_H) for splits, checks and shakes do not apply to the F_v values tabulated.

[4] 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.*