Supplement No. 13
to the Southern Pine Inspection
Bureau Grading Rules 2002 Edition

Effective: June 1, 2013

This supplement makes no changes in Table 4a, Table 5, Table 8a, and the Conversion Factors for Determining Spruce Pine and Sand Pine Design Values. They have been included to consolidate visual design values into a single supplement.

The following are the changes made to the design values in the 2002 SPIB Standard Grading Rules:

1. Incorporates Supplement 9 2x4 design values with minor changes in Tables 1a, 3, 6 (2x4 only) and 7 due to rounding factors.

2. Changes design values in Tables 1b, 1c, 1d, 1e, and 6 (2x6 and wider).

3. Appendix A has been rewritten.

Adopted by the Board of Governors of the Southern Pine Inspection Bureau

Approved by the Board of Review of the American Lumber Standard Committee

APPENDIX A
DESIGN VALUES FOR WOOD

Wood is a natural product subject to variations in geography, climate, specific site characteristics, silvacultural practices, and harvesting decisions. Its' strength properties are not only anisotropic (vary by principal axis) but also can vary with proximity to the center of the tree. These characteristics complicate the assignment of individual pieces into design value groups based on the visual appearance.

American Society for Testing and Materials consensus standards D245, D2555 and D1990 are all used to assign design values for bending, tension and compression parallel to grain to visually graded lumber. The particular standard used is dependent upon the species or species grouping under consideration. Design values for horizontal shear and compression perpendicular to grain for visually graded lumber are derived using only the procedures specified in ASTM D245 and ASTM D2555. Design values for Timbers and industrial lumber are also established using only ASTM D245 and ASTM D2555. The use of D245 and D2555 results in design values which are based upon testing clear wood samples of each species or each species within a species grouping. For species groups, the strength values for each species are combined into a single value by using a weighting procedure based on standing timber volume of each species in the group. On the other hand, design values for visually graded dimension lumber for some species such as

Southern pine are established using ASTM D1990. These values are based upon testing a representative sample of lumber meeting the visual requirements of the grade group under consideration. Not every grade group is tested nor is every physical property tested. Interpolations and calculations are used to provide design values for the grade groups. While the Modulus of Elasticity is represented by an average value, other properties such as bending strength and compression parallel to grain are represented by a lower 5% exclusion value. The sample data is adjusted for testing conditions, adjusted to a characteristic size and ranked by value (numerical order). This procedure, following the ASTM D2915, produces a tolerance limit that provides 75% confidence that the true population 5^{th} percentile value is higher than this estimate. This value is then used to establish the design value. Each piece or lot of visually graded lumber is not mechanically tested to verify strength properties. Since the stress ratings are representative of the entire producing region, lots from a specific location may have physical properties at the extremes of the property range or statistical distribution representing that range of strength values.

MIXED SOUTHERN PINE

Southern Pine of the minor species of pond pine and Virginia pine are treated as a separate species group and are so identified on the grade mark. Spruce pine and sand pine are treated as a separate species and are so identified. These species are the only minor species which exist in sufficient volume to find their way into lumber production in certain limited areas, and for which standing timber volume data are published in ASTM D2555.

The characteristics permitted and limiting provisions for grades in the minor species shall be the same as the corresponding grades of the principal species. When the minor species of pond pine and Virginia pine are grade-marked, the mark will indicate the particular species or show "Mixed Southern Pine" and the grades of these species are assigned design values as shown in Tables 6-8a. When spruce pine is grade-marked, the mark will indicate "spruce pine" and sand pine will indicate "sand pine". Design values are assigned according to the procedures on page A15.

Load and Resistance Factor Design Reference Resistance Values

The design values shown in Tables 1a through 8a as well as the design values for MSR and MEL (paragraphs 601 and 604, respectively), Scaffold Plank (paragraphs 500.1, 500.3 and 503.1), and the Decking, Structural, and Industrial lumber covered by SPIB Special Product Rules, are for use with Allowable Stress Design (ASD). Load and Resistance Factor Design (LRFD) is an alternative engineering method. The design values for LRFD, called reference resistance values, can be computed by multiplying the ASD design values by the conversion factors listed in the following table:

CONVERSION FACTORS FOR LRFD USE

Extreme Fiber in Bending "F_b"	Tension Parallel to Grain "F_t"	Horizontal Shear "F_v"	Compression Perpendicular to Grain "$F_{c\perp}$"	Compression Parallel to Grain "$F_{c//}$"	Modulus of Elasticity "E"
2.54	2.70	2.88	2.08	2.40	1.00

These factors have been established in accordance with the procedures set forth in ASTM Standard D5457. The reference resistance values derived using these factors are in units of psi (million psi for "E"). To obtain units of ksi, divide the reference resistance values in psi by 1000.

Table 1-a – STRUCTURAL LIGHT FRAMING, STRUCTURAL JOISTS AND PLANKS, AND STUDS -2" TO 4" THICK (Each width has a separate set of design values)

GRADE	Extreme Fiber in Bending "F_b"	Tension Parallel to Grain "F_t"	Horizontal Shear "F_v"	Compression Perpendicular to Grain "$F_{c\perp}$"	Compression Parallel to Grain "$F_{c//}$"	Modulus of Elasticity (million psi) "E"
Kiln Dried or S-Dry, MC 15, MC 19						
APPLIES TO 2" - 4" THICK – 2" - 4" WIDE ONLY						
Dense Select Structural	2700	1900	175	660	2050	1.9
Select Structural	2350	1650	175	565	1900	1.8
Non Dense Select Structural	2050	1450	175	480	1800	1.6
No. 1 Dense	1650	1100	175	660	1750	1.8
No. 1	1500	1000	175	565	1650	1.6
No. 1 Non Dense	1300	875	175	480	1550	1.4
No. 2 Dense	1200	750	175	660	1500	1.6
No. 2	1100	675	175	565	1450	1.4
No. 2 Non Dense	1050	600	175	480	1450	1.3
No. 3 and Stud	650	400	175	565	850	1.3

Table 1-b – STRUCTURAL LIGHT FRAMING, STRUCTURAL JOISTS AND PLANKS, AND STUDS -2" TO 4" THICK
(Each width has a separate set of design values)

GRADE	Extreme Fiber in Bending "F_b"	Tension Parallel to Grain "F_t"	Horizontal Shear "F_v"	Compression Perpendicular to Grain "$F_{c\perp}$"	Compression Parallel to Grain "$F_{c//}$"	Modulus of Elasticity (million psi) "E"
Kiln Dried or S-Dry, MC 15, MC 19						
APPLIES TO 2" - 4" THICK – 5" - 6" WIDE ONLY						
Dense Select Structural	2400	1650	175	660	1900	1.9
Select Structural	2100	1450	175	565	1800	1.8
Non Dense Select Structural	1850	1300	175	480	1700	1.6
No. 1 Dense	1500	1000	175	660	1650	1.8
No. 1	1350	875	175	565	1550	1.6
No. 1 Non Dense	1200	775	175	480	1450	1.4
No. 2 Dense	1050	650	175	660	1450	1.6
No. 2	1000	600	175	565	1400	1.4
No. 2 Non Dense	950	525	175	480	1350	1.3
No. 3 and Stud	575	350	175	565	800	1.3

Table 1-c – STRUCTURAL LIGHT FRAMING, STRUCTURAL JOISTS AND PLANKS, AND STUDS -2" TO 4" THICK
(Each width has a separate set of design values)

GRADE	Extreme Fiber in Bending "F_b"	Tension Parallel to Grain "F_t"	Horizontal Shear "F_v"	Compression Perpendicular to Grain "$F_{c\perp}$"	Compression Parallel to Grain "$F_{c//}$"	Modulus of Elasticity (million psi) "E"
Kiln Dried or S-Dry, MC 15, MC 19						
APPLIES TO 2" - 4" THICK – 8" WIDE ONLY (1)						
Dense Select Structural	2200	1550	175	660	1850	1.9
Select Structural	1950	1350	175	565	1700	1.8
Non Dense Select Structural	1700	1200	175	480	1650	1.6
No. 1 Dense	1350	900	175	660	1600	1.8
No. 1	1250	800	175	565	1500	1.6
No. 1 Non Dense	1100	700	175	480	1400	1.4
No. 2 Dense	975	600	175	660	1400	1.6
No. 2	925	550	175	565	1350	1.4
No. 2 Non Dense	875	500	175	480	1300	1.3
No. 3 and Stud	525	325	175	565	775	1.3

Table 1-d – STRUCTURAL LIGHT FRAMING, STRUCTURAL JOISTS AND PLANKS, AND STUDS -2" TO 4" THICK
(Each width has a separate set of design values)

GRADE	Extreme Fiber in Bending "F_b"	Tension Parallel to Grain "F_t"	Horizontal Shear "F_v"	Compression Perpendicular to Grain "$F_{c\perp}$"	Compression Parallel to Grain "$F_{c//}$"	Modulus of Elasticity (million psi) "E"
Kiln Dried or S-Dry, MC 15, MC 19						
APPLIES TO 2" - 4" THICK – 10" WIDE ONLY (1)						
Dense Select Structural	1950	1300	175	660	1800	1.9
Select Structural	1700	1150	175	565	1650	1.8
Non Dense Select Structural	1500	1050	175	480	1600	1.6
No. 1 Dense	1200	800	175	660	1550	1.8
No. 1	1050	700	175	565	1450	1.6
No. 1 Non Dense	950	625	175	480	1400	1.4
No. 2 Dense	850	525	175	660	1350	1.6
No. 2	800	475	175	565	1300	1.4
No. 2 Non Dense	750	425	175	480	1250	1.3
No. 3 and Stud	475	275	175	565	750	1.3

Table 1-e – STRUCTURAL LIGHT FRAMING, STRUCTURAL JOISTS AND PLANKS, AND STUDS -2" TO 4" THICK
(Each width has a separate set of design values)

GRADE	Extreme Fiber in Bending "F_b"	Tension Parallel to Grain "F_t"	Horizontal Shear "F_v"	Compression Perpendicular to Grain "$F_{c\perp}$"	Compression Parallel to Grain "$F_{c//}$"	Modulus of Elasticity (million psi) "E"
Kiln Dried or S-Dry, MC 15, MC 19						
APPLIES TO 2" - 4" THICK – 12" WIDE ONLY (1), (2)						
Dense Select Structural	1800	1250	175	660	1750	1.9
Select Structural	1600	1100	175	565	1650	1.8
Non Dense Select Structural	1400	975	175	480	1550	1.6
No. 1 Dense	1100	750	175	660	1500	1.8
No. 1	1000	650	175	565	1400	1.6
No. 1 Non Dense	900	575	175	480	1350	1.4
No. 2 Dense	800	500	175	660	1300	1.6
No. 2	750	450	175	565	1250	1.4
No. 2 Non Dense	700	400	175	480	1250	1.3
No. 3 and Stud	450	250	175	565	725	1.3

Table 3 – LIGHT FRAMING – 2" TO 4" THICK

GRADE	Extreme Fiber in Bending "F_b"	Tension Parallel to Grain "F_t"	Horizontal Shear "F_v"	Compression Perpendicular to Grain "$F_{c\perp}$"	Compression Parallel to Grain "$F_{c//}$"	Modulus of Elasticity (million psi) "E"
Kiln Dried or S-Dry, MC 15, MC 19						
APPLIES TO 2" - 4" THICK – 2" - 4" WIDE						
Construction	875	500	175	565	1600	1.4
Standard	475	275	175	565	1300	1.2
Utility *	225	125	175	565	850	1.2

*Design values apply to 4" widths only.

Table 4-a – TIMBERS – 5" x 5" AND LARGER

GRADE	Extreme Fiber in Bending "F_b"	Tension Parallel to Grain "F_t"	Horizontal Shear "F_v"	Compression Perpendicular to Grain "$F_{c\perp}$"	Compression Parallel to Grain "$F_{c//}$"	Modulus of Elasticity (million psi) "E"
APPLIES TO 5" x 5" AND LARGER						
Dense Select Structural	1750	1200	165	440	1100	1.6
Select Structural	1500	1000	165	375	950	1.5
No. 1 Dense	1550	1050	165	440	975	1.6
No. 1	1350	900	165	375	825	1.5
No. 2 Dense	975	650	165	440	625	1.3
No. 2	850	550	165	375	525	1.2

Table 5 – DECKING – 2" TO 4" THICK, 2" AND WIDER
(For flatwise use only. See footnote 4.)

GRADE	Extreme Fiber in Bending "F_b"	Compression Perpendicular to Grain "$F_{c\perp}$"	Modulus of Elasticity (million psi) "E"
Kiln Dried or S-Dry, MC 15, MC 19			
APPLIES TO 2" TO 4" THICK			
Dense Standard Decking	2000	660	1.8
Select Decking	1400	565	1.6
Dense Select Decking	1650	660	1.6
Commercial Decking	1400	565	1.6
Dense Commercial Decking	1650	660	1.6
MC Over 19%			
APPLIES TO 2-1/2" TO 4" THICKNESSES			
Dense Standard Decking	1600	440	1.6
Select Decking	1150	375	1.4
Dense Select Decking	1350	440	1.4
Commercial Decking	1150	375	1.4
Dense Commercial Decking	1350	440	1.4

Table 6 – MIXED SOUTHERN PINE (Virginia Pine and Pond Pine)
STRUCTURAL LIGHT FRAMING, STRUCTURAL JOISTS AND PLANKS, AND STUDS – 2" TO 4" THICK
(Each width has a separate set of design values)

GRADE	Extreme Fiber in Bending "F_b"	Tension Parallel to Grain "F_t"	Horizontal Shear "F_v"	Compression Perpendicular to Grain "$F_{c\perp}$"	Compression Parallel to Grain "$F_{c//}$"	Modulus of Elasticity (million psi) "E"
Kiln Dried or S-Dry, MC 15, MC 19						
APPLIES TO 2" TO 4" THICK – 2" – 4" WIDE ONLY						
Select Structural	2050	1200	175	565	1800	1.6
No. 1	1450	875	175	565	1650	1.5
No. 2	1100	675	175	565	1450	1.4
No. 3 and Stud	650	400	175	565	850	1.2
APPLIES TO 2" TO 4" THICK – 5" – 6" WIDE ONLY						
Select Structural	1850	1100	175	565	1700	1.6
No. 1	1300	750	175	565	1550	1.5
No. 2	1000	600	175	565	1350	1.4
No. 3 and Stud	575	350	175	565	775	1.2

Table 6 – MIXED SOUTHERN PINE (Virginia Pine and Pond Pine)
STRUCTURAL LIGHT FRAMING, STRUCTURAL JOISTS AND PLANKS, AND STUDS – 2" TO 4" THICK
(Each width has a separate set of design values)

GRADE	Extreme Fiber in Bending "F_b"	Tension Parallel to Grain "F_t"	Horizontal Shear "F_v"	Compression Perpendicular to Grain "$F_{c\perp}$"	Compression Parallel to Grain "$F_{c//}$"	Modulus of Elasticity (million psi) "E"
Kiln Dried or S-Dry, MC 15, MC 19						
APPLIES TO 2" TO 4" THICK – 8" WIDE ONLY (1)						
Select Structural	1750	1000	175	565	1600	1.6
No. 1	1200	700	175	565	1450	1.5
No. 2	925	550	175	565	1400	1.4
No. 3 and Stud	525	325	175	565	800	1.2
APPLIES TO 2" TO 4" THICK – 10" WIDE ONLY (1)						
Select Structural	1500	875	175	565	1600	1.6
No. 1	1050	600	175	565	1450	1.5
No. 2	800	475	175	565	1300	1.4
No. 3 and Stud	475	275	175	565	750	1.2
APPLIES TO 2" TO 4" THICK – 12" WIDE ONLY (1),(2)						
Select Structural	1400	825	175	565	1550	1.6
No. 1	975	575	175	565	1400	1.5
No. 2	750	450	175	565	1250	1.4
No. 3 and Stud	450	250	175	565	725	1.2

Table 7 –MIXED SOUTHERN PINE (Virginia Pine and Pond Pine)
LIGHT FRAMING -- 2" TO 4" THICK

GRADE	Extreme Fiber in Bending "F_b"	Tension Parallel to Grain "F_t"	Horizontal Shear "F_v"	Compression Perpendicular to Grain "$F_{c\perp}$"	Compression Parallel to Grain "$F_{c//}$"	Modulus of Elasticity (million psi) "E"
Kiln Dried or S-Dry, MC 15, MC 19						
APPLIES TO 2" - 4" THICK – 2" - 4" WIDE						
Construction	850	500	175	565	1600	1.3
Standard	475	275	175	565	1300	1.2
Utility *	225	125	175	565	850	1.1

*Design values apply to 4" widths only.

Table 8.a – MIXED SOUTHERN PINE (Virginia Pine and Pond Pine) – TIMBERS – 5" x 5" AND LARGER

GRADE	Extreme Fiber in Bending "F_b"	Tension Parallel to Grain "F_t"	Horizontal Shear "F_v"	Compression Perpendicular to Grain "$F_{c\perp}$"	Compression Parallel to Grain "$F_{c//}$"	Modulus of Elasticity (million psi) "E"
APPLIES TO 5" x 5" AND LARGER						
Select Structural	1500	1000	165	375	900	1.3
No. 1	1350	900	165	375	800	1.3
No. 2	850	550	165	375	525	1.0

CONVERSION FACTORS FOR DETERMINING SPRUCE PINE AND SAND PINE DESIGN VALUES

Design Category:	Extreme Fiber in Bending "F_b"	Tension Parallel to Grain "F_t"	Horizontal Shear "F_v"	Compression Perpendicular to Grain "$F_{c\perp}$"	Compression Parallel to Grain "$F_{c//}$"	Modulus of Elasticity (million psi) "E"
Spruce Pine Factor	0.78	0.78	0.98	0.73	0.78	0.82
Sand Pine Factor	1.0	1.0	1.0	1.0	1.0	0.84

To obtain a recommended design value for spruce pine or sand pine, multiply the design value for the corresponding grade of Mixed Southern Pine by the appropriate conversion factor. Resulting values may be rounded to the nearest whole number.

DESIGN VALUES FOOTNOTES (1-12)

(1) For 4" thick material that is 8" or greater in width, the F_b value may be multiplied by 1.1.

(2) For sizes wider than 12", use 90% of the F_b, F_t, and $F_{c//}$ specified for the 12" width. Use 100% of the F_v, $F_{c\perp}$ (perpendicular-to-grain), and MOE specified for the 12" width.

(3) In construction where three or more load-carrying members such as joists, rafters, studs or decking are contiguous or are spaced not more than 24 inches in frame construction and are joined by transverse floor, roof or other load distributing elements, an increase in bending stress of 15 percent for members used in such systems is allowed as a design consideration, as provided in ASTM D1990.

(4) For flatwise use, the following adjustments apply to the F_b values. These adjustments are not applicable to the values listed in Table 5.

Nominal thickness		2" & 3"	4"
Width	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

(5) All stress rated grades under these rules are established on a basis that permits cutting graded members to shorter lengths without impairment of stress ratings in the shorter pieces.

(6) See paragraphs 163-164.4 for conditions applicable to seasoned lumber. In widths of 12" and less in lengths of 24' and less, seasoning is required for all lumber of 2" thickness and less, but has to be specified if desired for other widths and lengths or for thicknesses in excess of 2".

(7) Grade restrictions established under the SPIB Standard Grading Rules apply the entire length of each piece, and each piece therefore is suitable for use in continuous spans, over double spans or under concentrated loads without the necessity of regrading for special shear or other special stress requirements.

(8) The allowable unit stresses for all stress rated grades under these rules are for normal loading conditions and apply in all cases other than those for which special exceptions are to be made. Where a member is to be fully loaded to the maximum design stress for many years, either continuously or cumulatively, working stresses 90% of those indicated herein should be used. The stresses may be modified on a similar basis for railroad bridges and other structures that involve unusually hazardous or severe service conditions.

(9) Compression perpendicular-to-grain values are design stresses for 0.04" deformation. For design stress at 0.02" deformation, use 74% of the corresponding tabulated values.

(10) The allowable unit stresses and adjustments apply to lumber used under conditions continuously dry, as in most covered structures.

(11) Lumber 2-1/2" – 4" nominal thickness above 19% (S-GRN) and lumber in service under wet conditions of use or where the moisture content is at or above the fiber saturation point, as when continuously submerged, the recommended design values shall be multiplied by the following factors:

Property	Factor
F_b £1150 psi	1.0
F_b > 1150 psi	0.85
F_t	1.0
F_v	0.93
$F_{c^\wedge}$	0.67
$F_{c//}$ £ 750 psi	1.0
$F_{c//}$ > 750 psi	0.8
MOE	0.9

(12) Lumber chemically treated may require adjustments to the recommended design values. Reference should be made to the American Wood Protection Association Standards and the National Design Specification of the American Wood Council.