## Table 1B Section Properties of Standard Dressed (S4S) Sawn Lumber (Cont.)

| Nominal Size b x d | Standard Dressed Size (S4S) b x d in. x in. | Area of Section A $in.^2$ | X-X AXIS Section Modulus $S_{xx}$ $in.^3$ | X-X AXIS Moment of Inertia $I_{xx}$ $in.^4$ | Y-Y AXIS Section Modulus $S_{yy}$ $in.^3$ | Y-Y AXIS Moment of Inertia $I_{yy}$ $in.^4$ | Approximate weight in pounds per linear foot (lbs/ft) of piece when density of wood equals: 25 $lbs/ft^3$ | 30 $lbs/ft^3$ | 35 $lbs/ft^3$ | 40 $lbs/ft^3$ | 45 $lbs/ft^3$ | 50 $lbs/ft^3$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Beams & Stringers (see NDS 4.1.3.3 and NDS 4.1.5.3)** | | | | | | | | | | | | |
| 6 x 10 | 5-1/2 x 9-1/2 | 52.25 | 82.73 | 393.0 | 47.90 | 131.7 | 9.071 | 10.89 | 12.70 | 14.51 | 16.33 | 18.14 |
| 6 x 12 | 5-1/2 x 11-1/2 | 63.25 | 121.2 | 697.1 | 57.98 | 159.4 | 10.98 | 13.18 | 15.37 | 17.57 | 19.77 | 21.96 |
| 6 x 14 | 5-1/2 x 13-1/2 | 74.25 | 167.1 | 1128 | 68.06 | 187.2 | 12.89 | 15.47 | 18.05 | 20.63 | 23.20 | 25.78 |
| 6 x 16 | 5-1/2 x 15-1/2 | 85.25 | 220.2 | 1707 | 78.15 | 214.9 | 14.80 | 17.76 | 20.72 | 23.68 | 26.64 | 29.60 |
| 6 x 18 | 5-1/2 x 17-1/2 | 96.25 | 280.7 | 2456 | 88.23 | 242.6 | 16.71 | 20.05 | 23.39 | 26.74 | 30.08 | 33.42 |
| 6 x 20 | 5-1/2 x 19-1/2 | 107.3 | 348.6 | 3398 | 98.31 | 270.4 | 18.62 | 22.34 | 26.07 | 29.79 | 33.52 | 37.24 |
| 6 x 22 | 5-1/2 x 21-1/2 | 118.3 | 423.7 | 4555 | 108.4 | 298.1 | 20.53 | 24.64 | 28.74 | 32.85 | 36.95 | 41.06 |
| 6 x 24 | 5-1/2 x 23-1/2 | 129.3 | 506.2 | 5948 | 118.5 | 325.8 | 22.44 | 26.93 | 31.41 | 35.90 | 40.39 | 44.88 |
| 8 x 12 | 7-1/2 x 11-1/2 | 86.3 | 165.3 | 950.5 | 107.8 | 404.3 | 14.97 | 17.97 | 20.96 | 23.96 | 26.95 | 29.95 |
| 8 x 14 | 7-1/2 x 13-1/2 | 101.3 | 227.8 | 1538 | 126.6 | 474.6 | 17.58 | 21.09 | 24.61 | 28.13 | 31.64 | 35.16 |
| 8 x 16 | 7-1/2 x 15-1/2 | 116.3 | 300.5 | 2327 | 145.3 | 544.9 | 20.18 | 24.22 | 28.26 | 32.29 | 36.33 | 40.36 |
| 8 x 18 | 7-1/2 x 17-1/2 | 131.3 | 382.8 | 3350 | 164.1 | 615.2 | 22.79 | 27.34 | 31.90 | 36.46 | 41.02 | 45.57 |
| 8 x 20 | 7-1/2 x 19-1/2 | 146.3 | 475.3 | 4634 | 182.8 | 685.5 | 25.39 | 30.47 | 35.55 | 40.63 | 45.70 | 50.78 |
| 8 x 22 | 7-1/2 x 21-1/2 | 161.3 | 577.8 | 6211 | 201.6 | 755.9 | 27.99 | 33.59 | 39.19 | 44.79 | 50.39 | 55.99 |
| 8 x 24 | 7-1/2 x 23-1/2 | 176.3 | 690.3 | 8111 | 220.3 | 826.2 | 30.60 | 36.72 | 42.84 | 48.96 | 55.08 | 61.20 |
| 10 x 14 | 9-1/2 x 13-1/2 | 128.3 | 288.6 | 1948 | 203.1 | 984.5 | 22.27 | 26.72 | 31.17 | 35.63 | 40.08 | 44.53 |
| 10 x 16 | 9-1/2 x 15-1/2 | 147.3 | 380.4 | 2948 | 233.1 | 1107 | 25.56 | 30.68 | 35.79 | 40.90 | 46.02 | 51.13 |
| 10 x 18 | 9-1/2 x 17-1/2 | 166.3 | 484.9 | 4243 | 263.2 | 1250 | 28.86 | 34.64 | 40.41 | 46.18 | 51.95 | 57.73 |
| 10 x 20 | 9-1/2 x 19-1/2 | 185.3 | 602.1 | 5870 | 293.3 | 1393 | 32.16 | 38.59 | 45.03 | 51.46 | 57.89 | 64.32 |
| 10 x 22 | 9-1/2 x 21-1/2 | 204.3 | 731.9 | 7868 | 323.4 | 1536 | 35.46 | 42.55 | 49.64 | 56.74 | 63.83 | 70.92 |
| 10 x 24 | 9-1/2 x 23-1/2 | 223.3 | 874.4 | 10274 | 353.5 | 1679 | 38.76 | 46.51 | 54.26 | 62.01 | 69.77 | 77.52 |
| 12 x 16 | 11-1/2 x 15-1/2 | 178.3 | 460.5 | 3569 | 341.6 | 1964 | 30.95 | 37.14 | 43.32 | 49.51 | 55.70 | 61.89 |
| 12 x 18 | 11-1/2 x 17-1/2 | 201.3 | 587.0 | 5138 | 385.7 | 2218 | 34.94 | 41.93 | 48.91 | 55.90 | 62.89 | 69.88 |
| 12 x 20 | 11-1/2 x 19-1/2 | 224.3 | 728.8 | 7106 | 429.8 | 2471 | 38.93 | 46.72 | 54.51 | 62.29 | 70.08 | 77.86 |
| 12 x 22 | 11-1/2 x 21-1/2 | 247.3 | 886.0 | 9524 | 473.9 | 2725 | 42.93 | 51.51 | 60.10 | 68.68 | 77.27 | 85.85 |
| 12 x 24 | 11-1/2 x 23-1/2 | 270.3 | 1058 | 12437 | 518.0 | 2978 | 46.92 | 56.30 | 65.69 | 75.07 | 84.45 | 93.84 |
| 14 x 16 | 13-1/2 x 15-1/2 | 209.3 | 540.7 | 4189 | 400.9 | 2305 | 36.33 | 43.60 | 50.86 | 58.13 | 65.39 | 72.66 |
| 14 x 18 | 13-1/2 x 17-1/2 | 236.3 | 689.1 | 6029 | 531.6 | 3568 | 41.02 | 49.22 | 57.42 | 65.63 | 73.83 | 82.03 |
| 14 x 20 | 13-1/2 x 19-1/2 | 263.3 | 855.6 | 8342 | 592.3 | 3968 | 45.70 | 54.84 | 63.98 | 73.13 | 82.27 | 91.41 |
| 14 x 22 | 13-1/2 x 21-1/2 | 290.3 | 1040 | 11181 | 653.1 | 4408 | 50.39 | 60.47 | 70.55 | 80.63 | 90.70 | 100.8 |
| 14 x 24 | 13-1/2 x 23-1/2 | 317.3 | 1243 | 14600 | 713.8 | 4818 | 55.08 | 66.09 | 77.11 | 88.13 | 99.14 | 110.2 |
| 16 x 20 | 15-1/2 x 19-1/2 | 302.3 | 982.3 | 9578 | 780.8 | 6051 | 52.47 | 62.97 | 73.46 | 83.96 | 94.45 | 104.9 |
| 16 x 22 | 15-1/2 x 21-1/2 | 333.3 | 1194 | 12837 | 860.9 | 6672 | 57.86 | 69.43 | 81.00 | 92.57 | 104.1 | 115.7 |
| 16 x 24 | 15-1/2 x 23-1/2 | 364.3 | 1427 | 16763 | 941.0 | 7293 | 63.24 | 75.89 | 88.53 | 101.2 | 113.8 | 126.5 |
| 18 x 22 | 17-1/2 x 21-1/2 | 376.3 | 1348 | 14493 | 1097 | 9602 | 65.32 | 78.39 | 91.45 | 104.5 | 117.6 | 130.6 |
| 18 x 24 | 17-1/2 x 23-1/2 | 411.3 | 1611 | 18928 | 1199 | 10495 | 71.40 | 85.68 | 99.96 | 114.2 | 128.5 | 142.8 |
| 20 x 24 | 19-1/2 x 23-1/2 | 458.3 | 1795 | 21089 | 1489 | 14521 | 79.56 | 95.47 | 111.4 | 127.3 | 143.2 | 159.1 |

1. According to the Southern Pine Inspection Bureau's (SPIB) Standard Grading Rules for Southern Pine Lumber: Section 285 stress rated boards:
   - Industrial 55 (IND 55) shall be graded as per No. 1 dimension
   - Industrial 45 (IND 45) shall be graded as per No. 2 dimension
   - Industrial 26 (IND 26) shall be graded as per No. 3 dimension

   See Table 4B for Southern Pine dimension lumber design values.

2. Neither Redwood nor Southern Pine are classified as Beams and Stringers or Posts and Timbers.

## Table 4B Reference Design Values for Visually Graded Southern Pine Dimension Lumber (2" - 4" thick)[1,2,3,4,5]

(Tabulated design values are for normal load duration and dry service conditions, unless specified otherwise. See NDS 4.3 for a comprehensive description of design value adjustment factors.)

**USE WITH TABLE 4B ADJUSTMENT FACTORS**

| Species and commercial grade | Size classification | Design values in pounds per square inch (psi) | | | | | | | Specific Gravity[6] | Grading Rules Agency |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Bending | Tension parallel to grain | Shear parallel to grain | Compression perpendicular to grain | Compression parallel to grain | Modulus of Elasticity | | | |
| | | $F_b$ | $F_t$ | $F_v$ | $F_{c\perp}$ | $F_c$ | E | $E_{min}$ | G | |
| **SOUTHERN PINE** | | | | | | | | | | |
| Dense Select Structural | 2" - 4" wide | 2,700 | 1,900 | 175 | 660 | 2,050 | 1,900,000 | 690,000 | 0.55 | SPIB |
| Select Structural | | 2,350 | 1,650 | 175 | 565 | 1,900 | 1,800,000 | 660,000 | | |
| Non-Dense Select Structural | | 2,050 | 1,450 | 175 | 480 | 1,800 | 1,800,000 | 590,000 | | |
| No.1 Dense | | 1,850 | 1,100 | 175 | 660 | 1,750 | 1,800,000 | 660,000 | | |
| No.1 | | 1,500 | 1,000 | 175 | 565 | 1,650 | 1,800,000 | 590,000 | | |
| No.1 Non-Dense | | 1,300 | 975 | 175 | 480 | 1,550 | 1,400,000 | 510,000 | | |
| No.2 Dense | | 1,300 | 750 | 175 | 660 | 1,500 | 1,800,000 | 590,000 | | |
| No.2 | | 1,100 | 675 | 175 | 565 | 1,450 | 1,400,000 | 510,000 | | |
| No.2 Non-Dense | | 1,050 | 600 | 175 | 480 | 1,450 | 1,300,000 | 470,000 | | |
| No.3 and Stud | | 650 | 400 | 175 | 565 | 850 | 1,200,000 | 470,000 | | |
| Construction | 4" wide | 675 | 500 | 175 | 565 | 1,600 | 1,400,000 | 510,000 | 0.55 | |
| Standard | | 475 | 275 | 175 | 565 | 1,300 | 1,200,000 | 440,000 | | |
| Utility | | 225 | 125 | 175 | 565 | 850 | 1,200,000 | 440,000 | | |
| Dense Select Structural | 3" - 6" wide | 2,400 | 1,650 | 175 | 660 | 1,900 | 1,900,000 | 690,000 | 0.55 | |
| Select Structural | | 2,100 | 1,450 | 175 | 565 | 1,800 | 1,800,000 | 660,000 | | |
| Non-Dense Select Structural | | 1,850 | 1,300 | 175 | 480 | 1,700 | 1,800,000 | 590,000 | | |
| No.1 Dense | | 1,500 | 1,000 | 175 | 660 | 1,650 | 1,800,000 | 660,000 | | |
| No.1 | | 1,350 | 875 | 175 | 565 | 1,550 | 1,800,000 | 590,000 | | |
| No.1 Non-Dense | | 1,300 | 775 | 175 | 480 | 1,450 | 1,400,000 | 510,000 | | |
| No.2 Dense | | 1,050 | 850 | 175 | 660 | 1,450 | 1,800,000 | 590,000 | | |
| No.2 | | 1,000 | 600 | 175 | 565 | 1,400 | 1,400,000 | 510,000 | | |
| No.2 Non-Dense | | 950 | 525 | 175 | 480 | 1,350 | 1,300,000 | 470,000 | | |
| No.3 and Stud | | 575 | 350 | 175 | 565 | 800 | 1,300,000 | 470,000 | | |
| Dense Select Structural | 8" wide | 2,300 | 1,550 | 175 | 660 | 1,850 | 1,900,000 | 690,000 | 0.55 | |
| Select Structural | | 1,950 | 1,350 | 175 | 565 | 1,700 | 1,800,000 | 660,000 | | |
| Non-Dense Select Structural | | 1,700 | 1,200 | 175 | 480 | 1,650 | 1,800,000 | 590,000 | | |
| No.1 Dense | | 1,350 | 900 | 175 | 660 | 1,600 | 1,800,000 | 660,000 | | |
| No.1 | | 1,250 | 800 | 175 | 565 | 1,500 | 1,800,000 | 590,000 | | |
| No.1 Non-Dense | | 1,100 | 700 | 175 | 480 | 1,400 | 1,400,000 | 510,000 | | |
| No.2 Dense | | 975 | 800 | 175 | 660 | 1,400 | 1,800,000 | 590,000 | | |
| No.2 | | 925 | 550 | 175 | 565 | 1,350 | 1,400,000 | 510,000 | | |
| No.2 Non-Dense | | 875 | 500 | 175 | 480 | 1,300 | 1,300,000 | 470,000 | | |
| No.3 and Stud | | 525 | 325 | 175 | 565 | 775 | 1,300,000 | 470,000 | | |
| Dense Select Structural | 10" wide | 1,950 | 1,300 | 175 | 660 | 1,800 | 1,900,000 | 690,000 | 0.55 | |
| Select Structural | | 1,700 | 1,150 | 175 | 565 | 1,650 | 1,800,000 | 660,000 | | |
| Non-Dense Select Structural | | 1,500 | 1,050 | 175 | 480 | 1,600 | 1,800,000 | 590,000 | | |
| No.1 Dense | | 1,200 | 800 | 175 | 660 | 1,550 | 1,800,000 | 660,000 | | |
| No.1 | | 1,050 | 700 | 175 | 565 | 1,450 | 1,800,000 | 590,000 | | |
| No.1 Non-Dense | | 950 | 625 | 175 | 480 | 1,400 | 1,400,000 | 510,000 | | |
| No.2 Dense | | 850 | 525 | 175 | 660 | 1,350 | 1,800,000 | 590,000 | | |
| No.2 | | 800 | 475 | 175 | 565 | 1,300 | 1,400,000 | 510,000 | | |
| No.2 Non-Dense | | 750 | 425 | 175 | 480 | 1,250 | 1,300,000 | 470,000 | | |
| No.3 and Stud | | 475 | 275 | 175 | 565 | 750 | 1,300,000 | 470,000 | | |
| Dense Select Structural | 12" wide | 1,800 | 1,200 | 175 | 660 | 1,750 | 1,900,000 | 690,000 | 0.55 | |
| Select Structural | | 1,600 | 1,100 | 175 | 565 | 1,650 | 1,800,000 | 660,000 | | |
| Non-Dense Select Structural | | 1,400 | 975 | 175 | 480 | 1,550 | 1,800,000 | 590,000 | | |
| No.1 Dense | | 1,100 | 750 | 175 | 660 | 1,500 | 1,800,000 | 660,000 | | |
| No.1 | | 1,000 | 650 | 175 | 565 | 1,400 | 1,800,000 | 590,000 | | |
| No.1 Non-Dense | | 900 | 575 | 175 | 480 | 1,350 | 1,400,000 | 510,000 | | |
| No.2 Dense | | 800 | 500 | 175 | 660 | 1,300 | 1,800,000 | 590,000 | | |
| No.2 | | 750 | 450 | 175 | 565 | 1,250 | 1,400,000 | 510,000 | | |
| No.2 Non-Dense | | 700 | 400 | 175 | 480 | 1,250 | 1,300,000 | 470,000 | | |
| No.3 and Stud | | 450 | 250 | 175 | 565 | 725 | 1,300,000 | 470,000 | | |

## Table 4B (Cont.) Reference Design Values for Visually Graded Southern Pine Dimension Lumber (2" - 4" thick)[1,2,3,4,5]

(Tabulated design values are for normal load duration and dry service conditions, unless specified otherwise. See NDS 4.3 for a comprehensive description of design value adjustment factors.)

**USE WITH TABLE 4B ADJUSTMENT FACTORS**

| Species and commercial grade | Size classification | Design values in pounds per square inch (psi) | | | | | | | Specific Gravity[6] | Grading Rules Agency |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Bending | Tension parallel to grain | Shear parallel to grain | Compression perpendicular to grain | Compression parallel to grain | Modulus of Elasticity | | | |
| | | $F_b$ | $F_t$ | $F_v$ | $F_{c\perp}$ | $F_c$ | E | $E_{min}$ | G | |
| **SOUTHERN PINE** | | (Surfaced Dry - Used in dry service conditions - 19% or less moisture content) | | | | | | | | |
| Dense Structural 86 | 2" & wider | 2,600 | 1,750 | 175 | 880 | 2,000 | 1,800,000 | 880,000 | 0.55 | SPIB |
| Dense Structural 72 | | 2,200 | 1,450 | 175 | 880 | 1,850 | 1,800,000 | 880,000 | | |
| Dense Structural 65 | | 2,000 | 1,300 | 175 | 880 | 1,500 | 1,800,000 | 880,000 | | |
| **SOUTHERN PINE** | | (Surfaced Green - Used in any service condition) | | | | | | | | |
| Dense Structural 86 | 2-1/2" & wider | 2,100 | 1,400 | 165 | 440 | 1,300 | 1,600,000 | 580,000 | 0.55 | SPIB |
| Dense Structural 72 | | 1,750 | 1,200 | 165 | 440 | 1,100 | 1,600,000 | 580,000 | | |
| Dense Structural 65 | 2-1/2"-4" thick | 1,600 | 1,050 | 165 | 440 | 1,000 | 1,600,000 | 580,000 | | |
| **MIXED SOUTHERN PINE** | | | | | | | | | | |
| Select Structural | 2" - 4" wide | 2,050 | 1,200 | 175 | 565 | 1,800 | 1,600,000 | 580,000 | 0.51 | SPIB |
| No.1 | | 1,450 | 875 | 175 | 565 | 1,650 | 1,500,000 | 550,000 | | |
| No.2 | | 1,100 | 675 | 175 | 565 | 1,450 | 1,400,000 | 510,000 | | |
| No.3 and Stud | | 850 | 400 | 175 | 565 | 850 | 1,200,000 | 440,000 | | |
| Construction | 4" wide | 850 | 500 | 175 | 565 | 1,800 | 1,300,000 | 470,000 | 0.51 | |
| Standard | | 475 | 275 | 175 | 565 | 1,300 | 1,200,000 | 440,000 | | |
| Utility | | 225 | 125 | 175 | 565 | 850 | 1,100,000 | 400,000 | | |
| Select Structural | 5" - 8" wide | 1,850 | 1,100 | 175 | 565 | 1,750 | 1,600,000 | 580,000 | 0.51 | |
| No.1 | | 1,300 | 750 | 175 | 565 | 1,550 | 1,500,000 | 550,000 | | |
| No.2 | | 1,000 | 600 | 175 | 565 | 1,400 | 1,400,000 | 510,000 | | |
| No.3 and Stud | | 575 | 350 | 175 | 565 | 775 | 1,200,000 | 440,000 | | |
| Select Structural | 8" wide | 1,750 | 1,000 | 175 | 565 | 1,650 | 1,600,000 | 580,000 | 0.51 | |
| No.1 | | 1,200 | 700 | 175 | 565 | 1,450 | 1,500,000 | 550,000 | | |
| No.2 | | 925 | 550 | 175 | 565 | 1,350 | 1,400,000 | 510,000 | | |
| No.3 and Stud | | 525 | 325 | 175 | 565 | 800 | 1,200,000 | 440,000 | | |
| Select Structural | 10" wide | 1,650 | 875 | 175 | 565 | 1,600 | 1,600,000 | 580,000 | 0.51 | |
| No.1 | | 1,050 | 600 | 175 | 565 | 1,450 | 1,500,000 | 550,000 | | |
| No.2 | | 800 | 475 | 175 | 565 | 1,300 | 1,400,000 | 510,000 | | |
| No.3 and Stud | | 475 | 275 | 175 | 565 | 750 | 1,200,000 | 440,000 | | |
| Select Structural | 12" wide | 1,400 | 825 | 175 | 565 | 1,550 | 1,600,000 | 580,000 | 0.51 | |
| No.1 | | 975 | 575 | 175 | 565 | 1,400 | 1,500,000 | 550,000 | | |
| No.2 | | 750 | 450 | 175 | 565 | 1,250 | 1,400,000 | 510,000 | | |
| No.3 and Stud | | 450 | 250 | 175 | 565 | 725 | 1,200,000 | 440,000 | | |

1. **LUMBER DIMENSIONS.** Tabulated design values are applicable to lumber that will be used under dry conditions such as in most covered structures. For 2" to 4" thick lumber the DRY dressed sizes shall be used (see Table 1A) regardless of the moisture content at the time of manufacture or use. In calculating design values, the natural gain in strength and stiffness that occurs as lumber dries has been taken into consideration as well as the reduction in size that occurs when unseasoned lumber shrinks. The gain in load carrying capacity due to increased strength and stiffness resulting from drying more than offsets the design effect of size reductions due to shrinkage.
2. **STRESS-RATED BOARDS.** Information for various grades of Southern Pine stress-rated boards of nominal 1", 1-1/4", and 1-1/2" thickness, 2" and wider is available from the Southern Pine Inspection Bureau (SPIB) in the *Standard Grading Rules for Southern Pine Lumber*.
3. **SPRUCE PINE.** To obtain recommended design values for Spruce Pine graded to SPIB rules, multiply the appropriate design values for Mixed Southern Pine by the corresponding conversion factor shown below and round to the nearest 100,000 psi for E; to the nearest 10,000 psi for $E_{min}$; to the next lower multiple of 5 psi for $F_t$, and $F_{c\perp}$; to the next lower multiple of 50 psi for $F_b$, $F_v$, and $F_c$ if 1,000 psi or greater, 25 psi otherwise.

**CONVERSION FACTORS FOR DETERMINING DESIGN VALUES FOR SPRUCE PINE**

| | Bending $F_b$ | Tension parallel to grain $F_t$ | Shear parallel to grain $F_v$ | Compression perpendicular to grain $F_{c\perp}$ | Compression parallel to grain $F_c$ | Modulus of Elasticity E and $E_{min}$ |
|---|---|---|---|---|---|---|
| Conversion Factor | 0.78 | 0.78 | 0.98 | 0.73 | 0.78 | 0.82 |

4. **SIZE FACTOR.** For sizes wider than 12", use size factors for $F_b$, $F_t$, and $F_c$ specified for the 12" width. Use 100% of the $F_v$, $F_{c\perp}$, E, and $E_{min}$ specified for the 12" width.
5. When individual species or species groups are combined, the design values to be used for the combination shall be the lowest design values for each individual species or species group for each design property.
6. Specific gravity, G, based on weight and volume when oven-dry.

# 7.1 Universal Span Tables

The tables in this Section provide joist and rafter spans for design criteria listed at the top of each table. Span tables are provided for the following commonly used load and deflection criteria:

| Applications | Live Load (psf) | Dead Load (psf) | Deflection Limit | Table No. |
|---|---|---|---|---|
| Floor joists | 40 | 10 | span/360 | 7.1 |
| | 30 | 10 | span/360 | 7.2 |
| Ceiling joists | 10 | 5 | span/240 | 7.3 |
| | 20 | 10 | span/240 | 7.4 |
| Roof rafters | 20 | 15 | span/240 | 7.5 |
| | 30 | 15 | span/240 | 7.6 |
| | 40 | 15 | span/240 | 7.7 |
| | 20 | 10 | span/240 | 7.8 |
| | 20 | 10 | span/180 | 7.9 |

The applications and associated load and deflection criteria listed above are commonly encountered in designs of residential wood structures. The use of the tables is not limited to the applications listed.

These span tables for joists and rafters are calculated on the basis of a series of modulus of elasticity (E) and allowable bending design values ($F_b'$). The range of values in the tables provides allowable spans for all species and grades of nominal 2-in. framing lumber customarily used in construction. These span tables assume installation of at least three joists or rafters that are spaced not more than 24 in. o.c. The calculated spans assume fully laterally supported members, properly sheathed and nailed on the top edge of the joist or rafter.

### Lumber Design Values

Use of these span tables requires reference to the applicable tabulated design values for the various species and grades of lumber. These tabulated design values are found in Tables 4A, 4B, 4C, and 4F of the *NDS Supplement*.

### Span Measurement

The tabulated spans are shown in feet and inches. The spans are the distance from face to face of supports which does not include one-half the required bearing length at each end. For sloping rafters, the span is measured along the horizontal projection.

### Use of Universal Span Tables

Spans for floor and ceiling joists are calculated on the basis of the modulus of elasticity (E) with the required allowable bending design value ($F_b'$) listed below each span. Spans for rafters are calculated on the basis of allowable bending design value ($F_b'$) with the required modulus of elasticity (E) listed below each span. Values determined from the span tables should be compared to values from Tables 4A, 4B, 4C, and 4F of the *NDS Supplement* modified appropriately by the adjustment factors. Species and grades with allowable bending design values and modulus of elasticity values greater than or equal to those shown in the span tables are appropriate.

## Table 7.1 Floor Joist With L/360 Deflection Limits

### Design Criteria

**Deflection: For 40 psf live load**
**Limited to span in inches divided by 360**
**Strength: Live load of 40 psf plus dead load of 10 psf determines the required bending design value**

| Joist Size (in.) | Spacing (in.) | Modulus of Elasticity, E, in 1,000,000 psi | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 | 2.0 | 2.1 | 2.2 | 2.3 | 2.4 |
| 2×6 | 12.0 | 8-6 | 8-10 | 9-2 | 9-6 | 9-9 | 10-0 | 10-3 | 10-6 | 10-9 | 10-11 | 11-2 | 11-4 | 11-7 | 11-9 | 11-11 | 12-1 | 12-3 |
| | 16.0 | 7-9 | 8-0 | 8-4 | 8-7 | 8-10 | 9-1 | 9-4 | 9-6 | 9-9 | 9-11 | 10-2 | 10-4 | 10-6 | 10-8 | 10-10 | 11-0 | 11-2 |
| | 19.2 | 7-3 | 7-7 | 7-10 | 8-1 | 8-4 | 8-7 | 8-9 | 9-0 | 9-2 | 9-4 | 9-6 | 9-8 | 9-10 | 10-0 | 10-2 | 10-4 | 10-6 |
| | 24.0 | 6-9 | 7-0 | 7-3 | 7-6 | 7-9 | 7-11 | 8-2 | 8-4 | 8-6 | 8-8 | 8-10 | 9-0 | 9-2 | 9-4 | 9-6 | 9-7 | 9-9 |
| 2×8 | 12.0 | 11-3 | 11-8 | 12-1 | 12-6 | 12-10 | 13-2 | 13-6 | 13-10 | 14-2 | 14-5 | 14-8 | 15-0 | 15-3 | 15-6 | 15-9 | 15-11 | 16-2 |
| | 16.0 | 10-2 | 10-7 | 11-0 | 11-4 | 11-8 | 12-0 | 12-3 | 12-7 | 12-10 | 13-1 | 13-4 | 13-7 | 13-10 | 14-1 | 14-3 | 14-6 | 14-8 |
| | 19.2 | 9-7 | 10-0 | 10-4 | 10-8 | 11-0 | 11-3 | 11-7 | 11-10 | 12-1 | 12-4 | 12-7 | 12-10 | 13-0 | 13-3 | 13-5 | 13-8 | 13-10 |
| | 24.0 | 8-11 | 9-3 | 9-7 | 9-11 | 10-2 | 10-6 | 10-9 | 11-0 | 11-3 | 11-5 | 11-8 | 11-11 | 12-1 | 12-3 | 12-6 | 12-8 | 12-10 |
| 2×10 | 12.0 | 14-4 | 14-11 | 15-5 | 15-11 | 16-5 | 16-10 | 17-3 | 17-8 | 18-0 | 18-5 | 18-9 | 19-1 | 19-5 | 19-9 | 20-1 | 20-4 | 20-8 |
| | 16.0 | 13-0 | 13-6 | 14-0 | 14-6 | 14-11 | 15-3 | 15-8 | 16-0 | 16-5 | 16-9 | 17-0 | 17-4 | 17-8 | 17-11 | 18-3 | 18-6 | 18-9 |
| | 19.2 | 12-3 | 12-9 | 13-2 | 13-7 | 14-0 | 14-5 | 14-9 | 15-1 | 15-5 | 15-9 | 16-0 | 16-4 | 16-7 | 16-11 | 17-2 | 17-5 | 17-8 |
| | 24.0 | 11-4 | 11-10 | 12-3 | 12-8 | 13-0 | 13-4 | 13-8 | 14-0 | 14-4 | 14-7 | 14-11 | 15-2 | 15-5 | 15-8 | 15-11 | 16-2 | 16-5 |
| 2×12 | 12.0 | 17-5 | 18-1 | 18-9 | 19-4 | 19-11 | 20-6 | 21-0 | 21-6 | 21-11 | 22-5 | 22-10 | 23-3 | 23-7 | 24-0 | 24-5 | 24-9 | 25-1 |
| | 16.0 | 15-10 | 16-5 | 17-0 | 17-7 | 18-1 | 18-7 | 19-1 | 19-6 | 19-11 | 20-4 | 20-9 | 21-1 | 21-6 | 21-10 | 22-2 | 22-6 | 22-10 |
| | 19.2 | 14-11 | 15-6 | 16-0 | 16-7 | 17-0 | 17-6 | 17-11 | 18-4 | 18-9 | 19-2 | 19-6 | 19-10 | 20-2 | 20-6 | 20-10 | 21-2 | 21-6 |
| | 24.0 | 13-10 | 14-4 | 14-11 | 15-4 | 15-10 | 16-3 | 16-8 | 17-0 | 17-5 | 17-9 | 18-1 | 18-5 | 18-9 | 19-1 | 19-4 | 19-8 | 19-11 |
| $F_b$ | 12.0 | 718 | 777 | 833 | 888 | 941 | 993 | 1043 | 1092 | 1140 | 1187 | 1233 | 1278 | 1323 | 1367 | 1410 | 1452 | 1494 |
| | 16.0 | 790 | 855 | 917 | 977 | 1036 | 1093 | 1148 | 1202 | 1255 | 1306 | 1357 | 1407 | 1456 | 1504 | 1551 | 1598 | 1644 |
| | 19.2 | 840 | 909 | 975 | 1039 | 1101 | 1161 | 1220 | 1277 | 1333 | 1388 | 1442 | 1495 | 1547 | 1598 | 1649 | 1698 | 1747 |
| | 24.0 | 905 | 979 | 1050 | 1119 | 1186 | 1251 | 1314 | 1376 | 1436 | 1496 | 1554 | 1611 | 1667 | 1722 | 1776 | 1829 | 1882 |

Note: The required bending design value, $F_b$, in pounds per square inch is shown at the bottom of each table and is applicable to all lumber sizes shown.
Spans are shown in feet-inches. Check sources of supply for availability of lumber in lengths greater than 20'.

## Table 7.2 Floor Joist With L/360 Deflection Limits

### Design Criteria

**Deflection: For 30 psf live load**
**Limited to span in inches divided by 360**
**Strength: Live load of 30 psf plus dead load of 10 psf determines the required bending design value**

| Joist Size (in.) | Spacing (in.) | Modulus of Elasticity, E, in 1,000,000 psi | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 | 2.0 | 2.1 | 2.2 | 2.3 | 2.4 |
| 2×6 | 12.0 | 9-4 | 9-9 | 10-1 | 10-5 | 10-9 | 11-0 | 11-3 | 11-7 | 11-10 | 12-0 | 12-3 | 12-6 | 12-9 | 12-11 | 13-1 | 13-4 | 13-6 |
| | 16.0 | 8-6 | 8-10 | 9-2 | 9-6 | 9-9 | 10-0 | 10-3 | 10-6 | 10-9 | 10-11 | 11-2 | 11-4 | 11-7 | 11-9 | 11-11 | 12-1 | 12-3 |
| | 19.2 | 8-0 | 8-4 | 8-8 | 8-11 | 9-2 | 9-5 | 9-8 | 9-10 | 10-1 | 10-4 | 10-6 | 10-8 | 10-10 | 11-1 | 11-3 | 11-5 | 11-7 |
| | 24.0 | 7-5 | 7-9 | 8-0 | 8-3 | 8-6 | 8-9 | 8-11 | 9-2 | 9-4 | 9-7 | 9-9 | 9-11 | 10-1 | 10-3 | 10-5 | 10-7 | 10-9 |
| 2×8 | 12.0 | 12-4 | 12-10 | 13-4 | 13-9 | 14-2 | 14-6 | 14-11 | 15-3 | 15-7 | 15-10 | 16-2 | 16-6 | 16-9 | 17-0 | 17-4 | 17-7 | 17-10 |
| | 16.0 | 11-3 | 11-8 | 12-1 | 12-6 | 12-10 | 13-2 | 13-6 | 13-10 | 14-2 | 14-5 | 14-8 | 15-0 | 15-3 | 15-6 | 15-9 | 15-11 | 16-2 |
| | 19.2 | 10-7 | 11-0 | 11-4 | 11-9 | 12-1 | 12-5 | 12-9 | 13-0 | 13-4 | 13-7 | 13-10 | 14-1 | 14-4 | 14-7 | 14-9 | 15-0 | 15-3 |
| | 24.0 | 9-10 | 10-2 | 10-7 | 10-11 | 11-3 | 11-6 | 11-10 | 12-1 | 12-4 | 12-7 | 12-10 | 13-1 | 13-4 | 13-6 | 13-9 | 13-11 | 14-2 |
| 2×10 | 12.0 | 15-9 | 16-5 | 17-0 | 17-6 | 18-0 | 18-6 | 19-0 | 19-5 | 19-10 | 20-3 | 20-8 | 21-0 | 21-5 | 21-9 | 22-1 | 22-5 | 22-9 |
| | 16.0 | 14-4 | 14-11 | 15-5 | 15-11 | 16-5 | 16-10 | 17-3 | 17-8 | 18-0 | 18-5 | 18-9 | 19-1 | 19-5 | 19-9 | 20-1 | 20-4 | 20-8 |
| | 19.2 | 13-6 | 14-0 | 14-6 | 15-0 | 15-5 | 15-10 | 16-3 | 16-7 | 17-0 | 17-4 | 17-8 | 18-0 | 18-3 | 18-7 | 18-10 | 19-2 | 19-5 |
| | 24.0 | 12-6 | 13-0 | 13-6 | 13-11 | 14-4 | 14-8 | 15-1 | 15-5 | 15-9 | 16-1 | 16-5 | 16-8 | 17-0 | 17-3 | 17-6 | 17-9 | 18-0 |
| 2×12 | 12.0 | 19-2 | 19-11 | 20-8 | 21-4 | 21-11 | 22-6 | 23-1 | 23-7 | 24-2 | 24-8 | 25-1 | 25-7 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 |
| | 16.0 | 17-5 | 18-1 | 18-9 | 19-4 | 19-11 | 20-6 | 21-0 | 21-6 | 21-11 | 22-5 | 22-10 | 23-3 | 23-7 | 24-0 | 24-5 | 24-9 | 25-1 |
| | 19.2 | 16-5 | 17-0 | 17-8 | 18-3 | 18-9 | 19-3 | 19-9 | 20-2 | 20-8 | 21-1 | 21-6 | 21-10 | 22-3 | 22-7 | 22-11 | 23-3 | 23-7 |
| | 24.0 | 15-2 | 15-10 | 16-5 | 16-11 | 17-5 | 17-11 | 18-4 | 18-9 | 19-2 | 19-7 | 19-11 | 20-3 | 20-8 | 21-0 | 21-4 | 21-7 | 21-11 |
| $F_b$ | 12.0 | 696 | 753 | 808 | 861 | 912 | 962 | 1011 | 1058 | 1105 | 1150 | 1195 | 1239 | 1282 | 1324 | 1366 | 1407 | 1448 |
| | 16.0 | 766 | 829 | 889 | 947 | 1004 | 1059 | 1112 | 1165 | 1216 | 1266 | 1315 | 1364 | 1411 | 1458 | 1504 | 1549 | 1593 |
| | 19.2 | 814 | 881 | 945 | 1007 | 1067 | 1125 | 1182 | 1238 | 1292 | 1345 | 1398 | 1449 | 1499 | 1549 | 1598 | 1646 | 1693 |
| | 24.0 | 877 | 949 | 1018 | 1084 | 1149 | 1212 | 1273 | 1333 | 1392 | 1449 | 1506 | 1561 | 1615 | 1669 | 1721 | 1773 | 1824 |

Note: The required bending design value, $F_b$, in pounds per square inch is shown at the bottom of each table and is applicable to all lumber sizes shown.
Spans are shown in feet-inches and are limited to 26 feet. Check sources of supply for availability of lumber in lengths greater than 20'.

## Table 7.3 Ceiling Joist With L/240 Deflection Limits

### Design Criteria

**Deflection: For 10 psf live load**
**Limited to span in inches divided by 240**
**Strength: Live load of 10 psf plus dead load of 5 psf determines the required bending design value**

| Joist Size (in.) | Spacing (in.) | Modulus of Elasticity, E, in 1,000,000 psi | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 | 2.0 | 2.1 | 2.2 | 2.3 | 2.4 |
| 2×4 | 12.0 | 9-10 | 10-3 | 10-7 | 10-11 | 11-3 | 11-7 | 11-10 | 12-2 | 12-5 | 12-8 | 12-11 | 13-2 | 13-4 | 13-7 | 13-9 | 14-0 | 14-2 |
| | 16.0 | 8-11 | 9-4 | 9-8 | 9-11 | 10-3 | 10-6 | 10-9 | 11-0 | 11-3 | 11-6 | 11-9 | 11-11 | 12-2 | 12-4 | 12-6 | 12-9 | 12-11 |
| | 19.2 | 8-5 | 8-9 | 9-1 | 9-4 | 9-8 | 9-11 | 10-2 | 10-4 | 10-7 | 10-10 | 11-0 | 11-3 | 11-5 | 11-7 | 11-9 | 12-0 | 12-2 |
| | 24.0 | 7-10 | 8-1 | 8-5 | 8-8 | 8-11 | 9-2 | 9-5 | 9-8 | 9-10 | 10-0 | 10-3 | 10-5 | 10-7 | 10-9 | 10-11 | 11-1 | 11-3 |
| 2×6 | 12.0 | 15-6 | 16-1 | 16-8 | 17-2 | 17-8 | 18-2 | 18-8 | 19-1 | 19-6 | 19-11 | 20-3 | 20-8 | 21-0 | 21-4 | 21-8 | 22-0 | 22-4 |
| | 16.0 | 14-1 | 14-7 | 15-2 | 15-7 | 16-1 | 16-6 | 16-11 | 17-4 | 17-8 | 18-1 | 18-5 | 18-9 | 19-1 | 19-5 | 19-8 | 20-0 | 20-3 |
| | 19.2 | 13-3 | 13-9 | 14-3 | 14-8 | 15-2 | 15-7 | 15-11 | 16-4 | 16-8 | 17-0 | 17-4 | 17-8 | 17-11 | 18-3 | 18-6 | 18-10 | 19-1 |
| | 24.0 | 12-3 | 12-9 | 13-3 | 13-8 | 14-1 | 14-5 | 14-9 | 15-2 | 15-6 | 15-9 | 16-1 | 16-4 | 16-8 | 16-11 | 17-2 | 17-5 | 17-8 |
| 2×8 | 12.0 | 20-5 | 21-2 | 21-11 | 22-8 | 23-4 | 24-0 | 24-7 | 25-2 | 25-8 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 |
| | 16.0 | 18-6 | 19-3 | 19-11 | 20-7 | 21-2 | 21-9 | 22-4 | 22-10 | 23-4 | 23-10 | 24-3 | 24-8 | 25-2 | 25-7 | 25-11 | 26-0 | 26-0 |
| | 19.2 | 17-5 | 18-1 | 18-9 | 19-5 | 19-11 | 20-6 | 21-0 | 21-6 | 21-11 | 22-5 | 22-10 | 23-3 | 23-8 | 24-0 | 24-5 | 24-9 | 25-2 |
| | 24.0 | 16-2 | 16-10 | 17-5 | 18-0 | 18-6 | 19-0 | 19-6 | 19-11 | 20-5 | 20-10 | 21-2 | 21-7 | 21-11 | 22-4 | 22-8 | 23-0 | 23-4 |
| 2×10 | 12.0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 |
| | 16.0 | 23-8 | 24-7 | 25-5 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 |
| | 19.2 | 22-3 | 23-1 | 23-11 | 24-9 | 25-5 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 |
| | 24.0 | 20-8 | 21-6 | 22-3 | 22-11 | 23-8 | 24-3 | 24-10 | 25-5 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 |
| $F_b$ | 12.0 | 711 | 769 | 825 | 880 | 932 | 983 | 1033 | 1082 | 1129 | 1176 | 1221 | 1266 | 1310 | 1354 | 1396 | 1438 | 1480 |
| | 16.0 | 783 | 847 | 909 | 968 | 1026 | 1082 | 1137 | 1191 | 1243 | 1294 | 1344 | 1394 | 1442 | 1490 | 1537 | 1583 | 1629 |
| | 19.2 | 832 | 900 | 965 | 1029 | 1090 | 1150 | 1208 | 1265 | 1321 | 1375 | 1429 | 1481 | 1533 | 1583 | 1633 | 1682 | 1731 |
| | 24.0 | 896 | 969 | 1040 | 1108 | 1174 | 1239 | 1302 | 1363 | 1423 | 1481 | 1539 | 1595 | 1651 | 1706 | 1759 | 1812 | 1864 |

Note: The required bending design value, $F_b$, in pounds per square inch is shown at the bottom of each table and is applicable to all lumber sizes shown.
Spans are shown in feet-inches and are limited to 26 feet. Check sources of supply for availability of lumber in lengths greater than 20'.

## Table 7.4 Ceiling Joist With L/240 Deflection Limits

### Design Criteria

**Deflection: For 20 psf live load**
**Limited to span in inches divided by 240**
**Strength: Live Load of 20 psf plus dead load of 10 psf determines the required bending design value**

| Joist Size (in.) | Spacing (in.) | Modulus of Elasticity, E, in 1,000,000 psi | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 | 2.0 | 2.1 | 2.2 | 2.3 | 2.4 |
| 2×4 | 12.0 | 7-10 | 8-1 | 8-5 | 8-8 | 8-11 | 9-2 | 9-5 | 9-8 | 9-10 | 10-0 | 10-3 | 10-5 | 10-7 | 10-9 | 10-11 | 11-1 | 11-3 |
| | 16.0 | 7-1 | 7-5 | 7-8 | 7-11 | 8-1 | 8-4 | 8-7 | 8-9 | 8-11 | 9-1 | 9-4 | 9-6 | 9-8 | 9-9 | 9-11 | 10-1 | 10-3 |
| | 19.2 | 6-8 | 6-11 | 7-2 | 7-5 | 7-8 | 7-10 | 8-1 | 8-3 | 8-5 | 8-7 | 8-9 | 8-11 | 9-1 | 9-3 | 9-4 | 9-6 | 9-8 |
| | 24.0 | 6-2 | 6-5 | 6-8 | 6-11 | 7-1 | 7-3 | 7-6 | 7-8 | 7-10 | 8-0 | 8-1 | 8-3 | 8-5 | 8-7 | 8-8 | 8-10 | 8-11 |
| 2×6 | 12.0 | 12-3 | 12-9 | 13-3 | 13-8 | 14-1 | 14-5 | 14-9 | 15-2 | 15-6 | 15-9 | 16-1 | 16-4 | 16-8 | 16-11 | 17-2 | 17-5 | 17-8 |
| | 16.0 | 11-2 | 11-7 | 12-0 | 12-5 | 12-9 | 13-1 | 13-5 | 13-9 | 14-1 | 14-4 | 14-7 | 14-11 | 15-2 | 15-5 | 15-7 | 15-10 | 16-1 |
| | 19.2 | 10-6 | 10-11 | 11-4 | 11-8 | 12-0 | 12-4 | 12-8 | 12-11 | 13-3 | 13-6 | 13-9 | 14-0 | 14-3 | 14-6 | 14-8 | 14-11 | 15-2 |
| | 24.0 | 9-9 | 10-2 | 10-6 | 10-10 | 11-2 | 11-5 | 11-9 | 12-0 | 12-3 | 12-6 | 12-9 | 13-0 | 13-3 | 13-5 | 13-8 | 13-10 | 14-1 |
| 2×8 | 12.0 | 16-2 | 16-10 | 17-5 | 18-0 | 18-6 | 19-0 | 19-6 | 19-11 | 20-5 | 20-10 | 21-2 | 21-7 | 21-11 | 22-4 | 22-8 | 23-0 | 23-4 |
| | 16.0 | 14-8 | 15-3 | 15-10 | 16-4 | 16-10 | 17-3 | 17-9 | 18-1 | 18-6 | 18-11 | 19-3 | 19-7 | 19-11 | 20-3 | 20-7 | 20-11 | 21-2 |
| | 19.2 | 13-10 | 14-5 | 14-11 | 15-5 | 15-10 | 16-3 | 16-8 | 17-1 | 17-5 | 17-9 | 18-1 | 18-5 | 18-9 | 19-1 | 19-5 | 19-8 | 19-11 |
| | 24.0 | 12-10 | 13-4 | 13-10 | 14-3 | 14-8 | 15-1 | 15-6 | 15-10 | 16-2 | 16-6 | 16-10 | 17-2 | 17-5 | 17-9 | 18-0 | 18-3 | 18-6 |
| 2×10 | 12.0 | 20-8 | 21-6 | 22-3 | 22-11 | 23-8 | 24-3 | 24-10 | 25-5 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 | 26-0 |
| | 16.0 | 18-9 | 19-6 | 20-2 | 20-10 | 21-6 | 22-1 | 22-7 | 23-1 | 23-8 | 24-1 | 24-7 | 25-0 | 25-5 | 25-10 | 26-0 | 26-0 | 26-0 |
| | 19.2 | 17-8 | 18-4 | 19-0 | 19-7 | 20-2 | 20-9 | 21-3 | 21-9 | 22-3 | 22-8 | 23-1 | 23-7 | 23-11 | 24-4 | 24-9 | 25-1 | 25-5 |
| | 24.0 | 16-5 | 17-0 | 17-8 | 18-3 | 18-9 | 19-3 | 19-9 | 20-2 | 20-8 | 21-1 | 21-6 | 21-10 | 22-3 | 22-7 | 22-11 | 23-4 | 23-8 |
| $F_b$ | 12.0 | 896 | 969 | 1040 | 1108 | 1174 | 1239 | 1302 | 1363 | 1423 | 1481 | 1539 | 1595 | 1651 | 1706 | 1759 | 1812 | 1864 |
| | 16.0 | 986 | 1067 | 1145 | 1220 | 1293 | 1364 | 1433 | 1500 | 1566 | 1631 | 1694 | 1756 | 1817 | 1877 | 1936 | 1995 | 2052 |
| | 19.2 | 1048 | 1134 | 1216 | 1296 | 1374 | 1449 | 1522 | 1594 | 1664 | 1733 | 1800 | 1866 | 1931 | 1995 | 2058 | 2120 | 2181 |
| | 24.0 | 1129 | 1221 | 1310 | 1396 | 1480 | 1561 | 1640 | 1717 | 1793 | 1866 | 1939 | 2010 | 2080 | 2149 | 2217 | 2283 | 2349 |

Note: The required bending design value, $F_b$, in pounds per square inch is shown at the bottom of each table and is applicable to all lumber sizes shown.
Spans are shown in feet-inches and are limited to 26 feet. Check sources of supply for availability of lumber in lengths greater than 20'

## Table 7.5 Rafters With L/240 Deflection Limitation

### Design Criteria

**Deflection: For 20 psf live load**
**Limited to span in inches divided by 240**
**Strength: Live load of 20 psf plus dead load of 15 psf determines the required bending design value**

| Rafter Size (in.) | Spacing (in.) | Bending Design Value, $F_b$ (psi) | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 | 1700 | 1800 | 1900 | 2000 | 2100 | 2200 | 2300 | 2400 | 2500 | 2600 | 2700 |
| 2×6 | 12.0 | 6-7 | 7-7 | 8-6 | 9-4 | 10-0 | 10-9 | 11-5 | 12-0 | 12-7 | 13-2 | 13-8 | 14-2 | 14-8 | 15-2 | 15-8 | 16-1 | 16-7 | 17-0 | 17-5 | 17-10 | 18-2† | 18-2† | 18-2† | 18-2† | 18-2† |
| | 16.0 | 5-8 | 6-7 | 7-4 | 8-1 | 8-8 | 9-4 | 9-10 | 10-5 | 10-11 | 11-5 | 11-10 | 12-4 | 12-9 | 13-2 | 13-7 | 13-11 | 14-4 | 14-8 | 15-1 | 15-5 | 15-9 | 16-1 | 16-5 | 16-6† | 16-6† |
| | 19.2 | 5-2 | 6-0 | 6-9 | 7-4 | 7-11 | 8-6 | 9-0 | 9-6 | 9-11 | 10-5 | 10-10 | 11-3 | 11-7 | 12-0 | 12-4 | 12-9 | 13-1 | 13-5 | 13-9 | 14-1 | 14-5 | 14-8 | 15-0 | 15-4 | 15-7† |
| | 24.0 | 4-8 | 5-4 | 6-0 | 6-7 | 7-1 | 7-7 | 8-1 | 8-6 | 8-11 | 9-4 | 9-8 | 10-0 | 10-5 | 10-9 | 11-1 | 11-5 | 11-8 | 12-0 | 12-4 | 12-7 | 12-10 | 13-2 | 13-5 | 13-8 | 13-11 |
| 2×8 | 12.0 | 8-8 | 10-0 | 11-2 | 12-3 | 13-3 | 14-2 | 15-0 | 15-10 | 16-7 | 17-4 | 18-0 | 18-9 | 19-5 | 20-0 | 20-8 | 21-3 | 21-10 | 22-4 | 22-11 | 23-6 | 24-0† | 24-0† | 24-0† | 24-0† | 24-0† |
| | 16.0 | 7-6 | 8-8 | 9-8 | 10-7 | 11-6 | 12-3 | 13-0 | 13-8 | 14-4 | 15-0 | 15-7 | 16-3 | 16-9 | 17-4 | 17-10 | 18-5 | 18-11 | 19-5 | 19-10 | 20-4 | 20-9 | 21-3 | 21-8 | 21-9† | 21-9† |
| | 19.2 | 6-10 | 7-11 | 8-10 | 9-8 | 10-6 | 11-2 | 11-10 | 12-6 | 13-1 | 13-8 | 14-3 | 14-10 | 15-4 | 15-10 | 16-4 | 16-9 | 17-3 | 17-8 | 18-1 | 18-7 | 19-0 | 19-5 | 19-9 | 20-2 | 20-6† |
| | 24.0 | 6-2 | 7-1 | 7-11 | 8-8 | 9-4 | 10-0 | 10-7 | 11-2 | 11-9 | 12-3 | 12-9 | 13-3 | 13-8 | 14-2 | 14-7 | 15-0 | 15-5 | 15-10 | 16-3 | 16-7 | 17-0 | 17-4 | 17-8 | 18-0 | 18-5 |
| 2×10 | 12.0 | 11-1 | 12-9 | 14-3 | 15-8 | 16-11 | 18-1 | 19-2 | 20-2 | 21-2 | 22-1 | 23-0 | 23-11 | 24-9 | 25-6 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 16.0 | 9-7 | 11-1 | 12-4 | 13-6 | 14-8 | 15-8 | 16-7 | 17-6 | 18-4 | 19-2 | 19-11 | 20-8 | 21-5 | 22-1 | 22-10 | 23-5 | 24-1 | 24-9 | 25-4 | 25-11 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 19.2 | 8-9 | 10-1 | 11-3 | 12-4 | 13-4 | 14-3 | 15-2 | 15-11 | 16-9 | 17-6 | 18-2 | 18-11 | 19-7 | 20-2 | 20-10 | 21-5 | 22-0 | 22-7 | 23-1 | 23-8 | 24-2 | 24-9 | 25-3 | 25-9 | 26-0* |
| | 24.0 | 7-10 | 9-0 | 10-1 | 11-1 | 11-11 | 12-9 | 13-6 | 14-3 | 15-0 | 15-8 | 16-3 | 16-11 | 17-6 | 18-1 | 18-7 | 19-2 | 19-8 | 20-2 | 20-8 | 21-2 | 21-8 | 22-1 | 22-7 | 23-0 | 23-5 |
| 2×12 | 12.0 | 13-5 | 15-6 | 17-4 | 19-0 | 20-6 | 21-11 | 23-3 | 24-7 | 25-9 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 16.0 | 11-8 | 13-5 | 15-0 | 16-6 | 17-9 | 19-0 | 20-2 | 21-3 | 22-4 | 23-3 | 24-3 | 25-2 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 19.2 | 10-8 | 12-3 | 13-9 | 15-0 | 16-3 | 17-4 | 18-5 | 19-5 | 20-4 | 21-3 | 22-2 | 23-0 | 23-9 | 24-7 | 25-4 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 24.0 | 9-6 | 11-0 | 12-3 | 13-5 | 14-6 | 15-6 | 16-6 | 17-4 | 18-2 | 19-0 | 19-10 | 20-6 | 21-3 | 21-11 | 22-8 | 23-3 | 23-11 | 24-7 | 25-2 | 25-9 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| E | 12.0 | 0.12 | 0.19 | 0.26 | 0.35 | 0.44 | 0.54 | 0.64 | 0.75 | 0.86 | 0.98 | 1.11 | 1.24 | 1.37 | 1.51 | 1.66 | 1.81 | 1.96 | 2.12 | 2.28 | 2.44 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| | 16.0 | 0.11 | 0.16 | 0.23 | 0.30 | 0.38 | 0.46 | 0.55 | 0.65 | 0.75 | 0.85 | 0.96 | 1.07 | 1.19 | 1.31 | 1.44 | 1.56 | 1.70 | 1.83 | 1.97 | 2.11 | 2.26 | 2.41 | 2.56 | 2.60 | 2.60 |
| | 19.2 | 0.10 | 0.15 | 0.21 | 0.27 | 0.35 | 0.42 | 0.51 | 0.59 | 0.68 | 0.78 | 0.88 | 0.98 | 1.09 | 1.20 | 1.31 | 1.43 | 1.55 | 1.67 | 1.80 | 1.93 | 2.06 | 2.20 | 2.34 | 2.48 | 2.60 |
| | 24.0 | 0.09 | 0.13 | 0.19 | 0.25 | 0.31 | 0.38 | 0.45 | 0.53 | 0.61 | 0.70 | 0.78 | 0.88 | 0.97 | 1.07 | 1.17 | 1.28 | 1.39 | 1.50 | 1.61 | 1.73 | 1.85 | 1.97 | 2.09 | 2.22 | 2.35 |

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million pounds per square inch, and is applicable to all lumber sizes shown.

* Spans are shown in feet-inches and are limited to 26 feet. Check sources of supply for availability of lumber in lengths greater than 20'.

† Spans are controlled by maximum E value of 2.6 million psi.

## Table 7.6 Rafters With L/240 Deflection Limitation

### Design Criteria

**Deflection: For 30 psf live load**
**Limited to span in inches divided by 240**
**Strength: Live load of 30 psf plus dead load of 15 psf determines the required bending design value**

| Rafter Size (in.) | Spacing (in.) | Bending Design Value, $F_b$ (psi) | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 | 1700 | 1800 | 1900 | 2000 | 2100 | 2200 | 2300 | 2400 | 2500 | 2600 | 2700 |
| 2×6 | 12.0 | 5-10 | 6-8 | 7-6 | 8-2 | 8-10 | 9-6 | 10-0 | 10-7 | 11-1 | 11-7 | 12-1 | 12-6 | 13-0 | 13-5 | 13-10 | 14-2 | 14-7 | 15-0 | 15-4 | 15-8 | 15-11† | 15-11† | 15-11† | 15-11† | 15-11† |
| | 16.0 | 5-0 | 5-10 | 6-6 | 7-1 | 7-8 | 8-2 | 8-8 | 9-2 | 9-7 | 10-0 | 10-5 | 10-10 | 11-3 | 11-7 | 11-11 | 12-4 | 12-8 | 13-0 | 13-3 | 13-7 | 13-11 | 14-2 | 14-5† | 14-5† | 14-5† |
| | 19.2 | 4-7 | 5-4 | 5-11 | 6-6 | 7-0 | 7-6 | 7-11 | 8-4 | 8-9 | 9-2 | 9-6 | 9-11 | 10-3 | 10-7 | 10-11 | 11-3 | 11-6 | 11-10 | 12-2 | 12-5 | 12-8 | 13-0 | 13-3 | 13-6 | 13-7† |
| | 24.0 | 4-1 | 4-9 | 5-4 | 5-10 | 6-3 | 6-8 | 7-1 | 7-6 | 7-10 | 8-2 | 8-6 | 8-10 | 9-2 | 9-6 | 9-9 | 10-0 | 10-4 | 10-7 | 10-10 | 11-1 | 11-4 | 11-7 | 11-10 | 12-1 | 12-4 |
| 2×8 | 12.0 | 7-8 | 8-10 | 9-10 | 10-10 | 11-8 | 12-6 | 13-3 | 13-11 | 14-8 | 15-3 | 15-11 | 16-6 | 17-1 | 17-8 | 18-2 | 18-9 | 19-3 | 19-9 | 20-3 | 20-8 | 20-11† | 20-11† | 20-11† | 20-11† | 20-11† |
| | 16.0 | 6-7 | 7-8 | 8-7 | 9-4 | 10-1 | 10-10 | 11-6 | 12-1 | 12-8 | 13-3 | 13-9 | 14-4 | 14-10 | 15-3 | 15-9 | 16-3 | 16-8 | 17-1 | 17-6 | 17-11 | 18-4 | 18-9 | 19-0† | 19-0† | 19-0† |
| | 19.2 | 6-0 | 7-0 | 7-10 | 8-7 | 9-3 | 9-10 | 10-6 | 11-0 | 11-7 | 12-1 | 12-7 | 13-1 | 13-6 | 13-11 | 14-5 | 14-10 | 15-2 | 15-7 | 16-0 | 16-4 | 16-9 | 17-1 | 17-5 | 17-9 | 17-11† |
| | 24.0 | 5-5 | 6-3 | 7-0 | 7-8 | 8-3 | 8-10 | 9-4 | 9-10 | 10-4 | 10-10 | 11-3 | 11-8 | 12-1 | 12-6 | 12-10 | 13-3 | 13-7 | 13-11 | 14-4 | 14-8 | 15-0 | 15-3 | 15-7 | 15-11 | 16-3 |
| 2×10 | 12.0 | 9-9 | 11-3 | 12-7 | 13-9 | 14-11 | 15-11 | 16-11 | 17-10 | 18-8 | 19-6 | 20-4 | 21-1 | 21-10 | 22-6 | 23-3 | 23-11 | 24-6 | 25-2 | 25-10 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 16.0 | 8-5 | 9-9 | 10-11 | 11-11 | 12-11 | 13-9 | 14-8 | 15-5 | 16-2 | 16-11 | 17-7 | 18-3 | 18-11 | 19-6 | 20-1 | 20-8 | 21-3 | 21-10 | 22-4 | 22-10 | 23-5 | 23-11 | 24-3† | 24-3† | 24-3† |
| | 19.2 | 7-8 | 8-11 | 9-11 | 10-11 | 11-9 | 12-7 | 13-4 | 14-1 | 14-9 | 15-5 | 16-1 | 16-8 | 17-3 | 17-10 | 18-4 | 18-11 | 19-5 | 19-11 | 20-5 | 20-10 | 21-4 | 21-10 | 22-3 | 22-8 | 22-10† |
| | 24.0 | 6-11 | 8-0 | 8-11 | 9-9 | 10-6 | 11-3 | 11-11 | 12-7 | 13-2 | 13-9 | 14-4 | 14-11 | 15-5 | 15-11 | 16-5 | 16-11 | 17-4 | 17-10 | 18-3 | 18-8 | 19-1 | 19-6 | 19-11 | 20-4 | 20-8 |
| 2×12 | 12.0 | 11-10 | 13-8 | 15-4 | 16-9 | 18-1 | 19-4 | 20-6 | 21-8 | 22-8 | 23-9 | 24-8 | 25-7 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 16.0 | 10-3 | 11-10 | 13-3 | 14-6 | 15-8 | 16-9 | 17-9 | 18-9 | 19-8 | 20-6 | 21-5 | 22-2 | 23-0 | 23-9 | 24-5 | 25-2 | 25-10 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 19.2 | 9-4 | 10-10 | 12-1 | 13-3 | 14-4 | 15-4 | 16-3 | 17-1 | 17-11 | 18-9 | 19-6 | 20-3 | 21-0 | 21-8 | 22-4 | 23-0 | 23-7 | 24-2 | 24-10 | 25-5 | 25-11 | 26-0* | 26-0* | 26-0* | 26-0* |
| | 24.0 | 8-5 | 9-8 | 10-10 | 11-10 | 12-10 | 13-8 | 14-6 | 15-4 | 16-1 | 16-9 | 17-5 | 18-1 | 18-9 | 19-4 | 20-0 | 20-6 | 21-1 | 21-8 | 22-2 | 22-8 | 23-3 | 23-9 | 24-2 | 24-8 | 25-2 |
| E | 12.0 | 0.13 | 0.19 | 0.27 | 0.36 | 0.45 | 0.55 | 0.66 | 0.77 | 0.89 | 1.01 | 1.14 | 1.28 | 1.41 | 1.56 | 1.71 | 1.86 | 2.02 | 2.18 | 2.34 | 2.51 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| | 16.0 | 0.11 | 0.17 | 0.24 | 0.31 | 0.39 | 0.48 | 0.57 | 0.67 | 0.77 | 0.88 | 0.99 | 1.10 | 1.22 | 1.35 | 1.48 | 1.61 | 1.75 | 1.89 | 2.03 | 2.18 | 2.33 | 2.48 | 2.60 | 2.60 | 2.60 |
| | 19.2 | 0.10 | 0.15 | 0.22 | 0.28 | 0.36 | 0.44 | 0.52 | 0.61 | 0.70 | 0.80 | 0.90 | 1.01 | 1.12 | 1.23 | 1.35 | 1.47 | 1.59 | 1.72 | 1.85 | 1.99 | 2.12 | 2.26 | 2.41 | 2.55 | 2.60 |
| | 24.0 | 0.09 | 0.14 | 0.19 | 0.25 | 0.32 | 0.39 | 0.46 | 0.54 | 0.63 | 0.72 | 0.81 | 0.90 | 1.00 | 1.10 | 1.21 | 1.31 | 1.43 | 1.54 | 1.66 | 1.78 | 1.90 | 2.02 | 2.15 | 2.28 | 2.41 |

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million pounds per square inch, and is applicable to all lumber sizes shown.

* Spans are shown in feet-inches and are limited to 26 feet. Check sources of supply for availability of lumber in lengths greater than 26'.

† Spans are controlled by maximum E value of 2.6 million psi.

## Table 7.7 Rafters With L/240 Deflection Limitation

### Design Criteria

**Deflection: For 40 psf live load**
**Limited to span in inches divided by 240**
**Strength: Live load of 40 psf plus dead load of 15 psf determines the required bending design value**

| Rafter Size (in.) | Spacing (in.) | Bending Design Value, $F_b$ (psi) | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 | 1700 | 1800 | 1900 | 2000 | 2100 | 2200 | 2300 | 2400 | 2500 | 2600 | 2700 |
| 2×6 | 12.0 | 5-3 | 6-1 | 6-9 | 7-5 | 8-0 | 8-7 | 9-1 | 9-7 | 10-0 | 10-6 | 10-11 | 11-4 | 11-9 | 12-1 | 12-6 | 12-10 | 13-2 | 13-6 | 13-10 | 14-2 | 14-5† | 14-5† | 14-5† | 14-5† | 14-5† |
| | 16.0 | 4-6 | 5-3 | 5-10 | 6-5 | 6-11 | 7-5 | 7-10 | 8-3 | 8-8 | 9-1 | 9-5 | 9-10 | 10-2 | 10-6 | 10-10 | 11-1 | 11-5 | 11-9 | 12-0 | 12-4 | 12-7 | 12-10 | 13-1† | 13-1† | 13-1† |
| | 19.2 | 4-2 | 4-9 | 5-4 | 5-10 | 6-4 | 6-9 | 7-2 | 7-7 | 7-11 | 8-3 | 8-8 | 8-11 | 9-3 | 9-7 | 9-10 | 10-2 | 10-5 | 10-8 | 11-0 | 11-3 | 11-6 | 11-9 | 12-0 | 12-2 | 12-4† |
| | 24.0 | 3-8 | 4-3 | 4-9 | 5-3 | 5-8 | 6-1 | 6-5 | 6-9 | 7-1 | 7-5 | 7-9 | 8-0 | 8-3 | 8-7 | 8-10 | 9-1 | 9-4 | 9-7 | 9-10 | 10-0 | 10-3 | 10-6 | 10-8 | 10-11 | 11-1 |
| 2×8 | 12.0 | 6-11 | 8-0 | 8-11 | 9-9 | 10-7 | 11-3 | 12-0 | 12-7 | 13-3 | 13-10 | 14-5 | 14-11 | 15-5 | 16-0 | 16-5 | 16-11 | 17-5 | 17-10 | 18-3 | 18-9 | 19-0† | 19-0† | 19-0† | 19-0† | 19-0† |
| | 16.0 | 6-0 | 6-11 | 7-9 | 8-6 | 9-2 | 9-9 | 10-4 | 10-11 | 11-6 | 12-0 | 12-6 | 12-11 | 13-5 | 13-10 | 14-3 | 14-8 | 15-1 | 15-5 | 15-10 | 16-3 | 16-7 | 16-11 | 17-3† | 17-3† | 17-3† |
| | 19.2 | 5-6 | 6-4 | 7-1 | 7-9 | 8-4 | 8-11 | 9-6 | 10-0 | 10-6 | 10-11 | 11-5 | 11-10 | 12-3 | 12-7 | 13-0 | 13-5 | 13-9 | 14-1 | 14-6 | 14-10 | 15-2 | 15-5 | 15-9 | 16-1 | 16-3† |
| | 24.0 | 4-11 | 5-8 | 6-4 | 6-11 | 7-6 | 8-0 | 8-6 | 8-11 | 9-4 | 9-9 | 10-2 | 10-7 | 10-11 | 11-3 | 11-8 | 12-0 | 12-4 | 12-7 | 12-11 | 13-3 | 13-6 | 13-10 | 14-1 | 14-5 | 14-8 |
| 2×10 | 12.0 | 8-10 | 10-2 | 11-5 | 12-6 | 13-6 | 14-5 | 15-3 | 16-1 | 16-11 | 17-8 | 18-4 | 19-1 | 19-9 | 20-4 | 21-0 | 21-7 | 22-2 | 22-9 | 23-4 | 23-11 | 24-3† | 24-3† | 24-3† | 24-3† | 24-3† |
| | 16.0 | 7-8 | 8-10 | 9-10 | 10-10 | 11-8 | 12-6 | 13-3 | 13-11 | 14-8 | 15-3 | 15-11 | 16-6 | 17-1 | 17-8 | 18-2 | 18-9 | 19-3 | 19-9 | 20-2 | 20-8 | 21-2 | 21-7 | 22-1† | 22-1† | 22-1† |
| | 19.2 | 7-0 | 8-1 | 9-0 | 9-10 | 10-8 | 11-5 | 12-1 | 12-9 | 13-4 | 13-11 | 14-6 | 15-1 | 15-7 | 16-1 | 16-7 | 17-1 | 17-7 | 18-0 | 18-5 | 18-11 | 19-4 | 19-9 | 20-2 | 20-6 | 20-9† |
| | 24.0 | 6-3 | 7-2 | 8-1 | 8-10 | 9-6 | 10-2 | 10-10 | 11-5 | 11-11 | 12-6 | 13-0 | 13-6 | 13-11 | 14-5 | 14-10 | 15-3 | 15-8 | 16-1 | 16-6 | 16-11 | 17-3 | 17-8 | 18-0 | 18-4 | 18-9 |
| 2×12 | 12.0 | 10-9 | 12-5 | 13-10 | 15-2 | 16-5 | 17-6 | 18-7 | 19-7 | 20-6 | 21-5 | 22-4 | 23-2 | 24-0 | 24-9 | 25-6 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 16.0 | 9-3 | 10-9 | 12-0 | 13-2 | 14-2 | 15-2 | 16-1 | 17-0 | 17-9 | 18-7 | 19-4 | 20-1 | 20-9 | 21-5 | 22-1 | 22-9 | 23-5 | 24-0 | 24-7 | 25-2 | 25-9 | 26-0* | 26-0* | 26-0* | 26-0* |
| | 19.2 | 8-6 | 9-10 | 10-11 | 12-0 | 12-11 | 13-10 | 14-8 | 15-6 | 16-3 | 17-0 | 17-8 | 18-4 | 19-0 | 19-7 | 20-2 | 20-9 | 21-4 | 21-11 | 22-5 | 23-0 | 23-6 | 24-0 | 24-6 | 25-0 | 25-3 |
| | 24.0 | 7-7 | 8-9 | 9-10 | 10-9 | 11-7 | 12-5 | 13-2 | 13-10 | 14-6 | 15-2 | 15-9 | 16-5 | 17-0 | 17-6 | 18-1 | 18-7 | 19-1 | 19-7 | 20-1 | 20-6 | 21-0 | 21-5 | 21-11 | 22-4 | 22-9 |
| E | 12.0 | 0.12 | 0.19 | 0.27 | 0.35 | 0.44 | 0.54 | 0.65 | 0.76 | 0.88 | 1.00 | 1.13 | 1.26 | 1.40 | 1.54 | 1.68 | 1.83 | 1.99 | 2.15 | 2.31 | 2.48 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| | 16.0 | 0.11 | 0.17 | 0.25 | 0.31 | 0.39 | 0.47 | 0.56 | 0.66 | 0.76 | 0.86 | 0.98 | 1.09 | 1.21 | 1.33 | 1.46 | 1.59 | 1.72 | 1.86 | 2.00 | 2.15 | 2.29 | 2.45 | 2.60 | 2.60 | 2.60 |
| | 19.2 | 0.10 | 0.15 | 0.21 | 0.28 | 0.35 | 0.43 | 0.51 | 0.60 | 0.69 | 0.79 | 0.89 | 0.99 | 1.10 | 1.22 | 1.33 | 1.45 | 1.57 | 1.70 | 1.83 | 1.96 | 2.09 | 2.23 | 2.37 | 2.52 | 2.60 |
| | 24.0 | 0.09 | 0.14 | 0.19 | 0.25 | 0.31 | 0.38 | 0.46 | 0.54 | 0.62 | 0.71 | 0.80 | 0.89 | 0.99 | 1.09 | 1.19 | 1.30 | 1.41 | 1.52 | 1.63 | 1.75 | 1.87 | 2.00 | 2.12 | 2.25 | 2.38 |

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million pounds per square inch, and is applicable to all lumber sizes shown.

* Spans are shown in feet-inches and are limited to 26 feet. Check sources of supply for availability of lumber in lengths greater than 20'.
† Spans are controlled by maximum E value of 2.6 million psi.

## Table 7.8 Rafters With L/240 Deflection Limitation

### Design Criteria

**Deflection: For 20 psf live load**
**Limited to span in inches divided by 240**
**Strength: Live load of 20 psf plus dead load of 10 psf determines the required bending design value**

| Rafter Size (in.) | Spacing (in.) | Bending Design Value, $F_b$ (psi) | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 | 1700 | 1800 | 1900 | 2000 | 2100 | 2200 | 2300 | 2400 |
| 2×6 | 12.0 | 7-1 | 8-2 | 9-2 | 10-0 | 10-10 | 11-7 | 12-4 | 13-0 | 13-7 | 14-2 | 14-9 | 15-4 | 15-11 | 16-5 | 16-11 | 17-5 | 17-10 | 18-2† | 18-2† | 18-2† | 18-2† | 18-2† |
| | 16.0 | 6-2 | 7-1 | 7-11 | 8-8 | 9-5 | 10-0 | 10-8 | 11-3 | 11-9 | 12-4 | 12-10 | 13-3 | 13-9 | 14-2 | 14-8 | 15-1 | 15-6 | 15-11 | 16-3 | 16-6† | 16-6† | 16-6† |
| | 19.2 | 5-7 | 6-6 | 7-3 | 7-11 | 8-7 | 9-2 | 9-9 | 10-3 | 10-9 | 11-3 | 11-8 | 12-2 | 12-7 | 13-0 | 13-4 | 13-9 | 14-2 | 14-6 | 14-10 | 15-2 | 15-7 | 15-7 |
| | 24.0 | 5-0 | 5-10 | 6-6 | 7-1 | 7-8 | 8-2 | 8-8 | 9-2 | 9-7 | 10-0 | 10-5 | 10-10 | 11-3 | 11-7 | 11-11 | 12-4 | 12-8 | 13-0 | 13-3 | 13-7 | 13-11 | 14-2 |
| 2×8 | 12.0 | 9-4 | 10-10 | 12-1 | 13-3 | 14-4 | 15-3 | 16-3 | 17-1 | 17-11 | 18-9 | 19-6 | 20-3 | 20-11 | 21-7 | 22-3 | 22-11 | 23-7 | 24-0† | 24-0† | 24-0† | 24-0† | 24-0† |
| | 16.0 | 8-1 | 9-4 | 10-6 | 11-6 | 12-5 | 13-3 | 14-0 | 14-10 | 15-6 | 16-3 | 16-10 | 17-6 | 18-1 | 18-9 | 19-4 | 19-10 | 20-5 | 20-11 | 21-5 | 21-9† | 21-9† | 21-9† |
| | 19.2 | 7-5 | 8-7 | 9-7 | 10-6 | 11-4 | 12-1 | 12-10 | 13-6 | 14-2 | 14-10 | 15-5 | 16-0 | 16-7 | 17-1 | 17-7 | 18-1 | 18-7 | 19-1 | 19-7 | 20-0 | 20-6† | 20-6† |
| | 24.0 | 6-7 | 7-8 | 8-7 | 9-4 | 10-1 | 10-10 | 11-6 | 12-1 | 12-8 | 13-3 | 13-9 | 14-4 | 14-10 | 15-3 | 15-9 | 16-3 | 16-8 | 17-1 | 17-6 | 17-11 | 18-4 | 18-9 |
| 2×10 | 12.0 | 11-11 | 13-9 | 15-5 | 16-11 | 18-3 | 19-6 | 20-8 | 21-10 | 22-10 | 23-11 | 24-10 | 25-10 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 16.0 | 10-4 | 11-11 | 13-4 | 14-8 | 15-10 | 16-11 | 17-11 | 18-11 | 19-10 | 20-8 | 21-6 | 22-4 | 23-1 | 23-11 | 24-7 | 25-4 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 19.2 | 9-5 | 10-11 | 12-2 | 13-4 | 14-5 | 15-5 | 16-4 | 17-3 | 18-1 | 18-11 | 19-8 | 20-5 | 21-1 | 21-10 | 22-6 | 23-1 | 23-9 | 24-5 | 25-0 | 25-7 | 26-0* | 26-0* |
| | 24.0 | 8-5 | 9-9 | 10-11 | 11-11 | 12-11 | 13-9 | 14-8 | 15-5 | 16-2 | 16-11 | 17-7 | 18-3 | 18-11 | 19-6 | 20-1 | 20-8 | 21-3 | 21-10 | 22-4 | 22-10 | 23-5 | 23-11 |
| 2×12 | 12.0 | 14-6 | 16-9 | 18-9 | 20-6 | 22-2 | 23-9 | 25-2 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 16.0 | 12-7 | 14-6 | 16-3 | 17-9 | 19-3 | 20-6 | 21-9 | 23-0 | 24-1 | 25-2 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 19.2 | 11-6 | 13-3 | 14-10 | 16-3 | 17-6 | 18-9 | 19-11 | 21-0 | 22-0 | 23-0 | 23-11 | 24-10 | 25-8 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 24.0 | 10-3 | 11-10 | 13-3 | 14-6 | 15-8 | 16-9 | 17-9 | 18-9 | 19-8 | 20-6 | 21-5 | 22-2 | 23-0 | 23-9 | 24-5 | 25-2 | 25-10 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| E | 12.0 | 0.15 | 0.24 | 0.33 | 0.44 | 0.55 | 0.67 | 0.80 | 0.94 | 1.09 | 1.24 | 1.40 | 1.56 | 1.73 | 1.91 | 2.09 | 2.28 | 2.47 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| | 16.0 | 0.13 | 0.21 | 0.29 | 0.38 | 0.48 | 0.58 | 0.70 | 0.82 | 0.94 | 1.07 | 1.21 | 1.35 | 1.50 | 1.65 | 1.81 | 1.97 | 2.14 | 2.31 | 2.48 | 2.60 | 2.60 | 2.60 |
| | 19.2 | 0.12 | 0.19 | 0.26 | 0.35 | 0.44 | 0.53 | 0.64 | 0.75 | 0.86 | 0.98 | 1.10 | 1.23 | 1.37 | 1.51 | 1.65 | 1.80 | 1.95 | 2.11 | 2.27 | 2.43 | 2.60 | 2.60 |
| | 24.0 | 0.11 | 0.17 | 0.24 | 0.31 | 0.39 | 0.48 | 0.57 | 0.67 | 0.77 | 0.88 | 0.99 | 1.10 | 1.22 | 1.35 | 1.48 | 1.61 | 1.75 | 1.89 | 2.03 | 2.18 | 2.33 | 2.48 |

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million pounds per square inch, and is applicable to all lumber sizes shown.

* Spans are shown in feet-inches and are limited to 26 feet. Check sources of supply for availability of lumber in lengths greater than 26'.

† Spans are controlled by maximum E value of 2.6 million psi.

## Table 7.9 Rafters With L/180 Deflection Limitation

### Design Criteria

**Deflection: For 20 psf live load**
**Limited to span in inches divided by 180**
**Strength: Live load of 20 psf plus dead load of 10 psf determines the required bending design value**

| Rafter Size (in.) | Spacing (in.) | Bending Design Value, $F_b$ (psi) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 | 1700 | 1800 | 1900 | 2000 | 2100 | 2200 | 2300 | 2400 | 2500 | 2600 | 2700 | 2800 | 2900 | 3000 |
| 2×4 | 12.0 | 3-8 | 4-6 | 5-3 | 5-10 | 6-5 | 6-11 | 7-5 | 7-10 | 8-3 | 8-8 | 9-0 | 9-5 | 9-9 | 10-1 | 10-5 | 10-9 | 11-1 | 11-4 | 11-8 | 11-11 | 12-3 | 12-6 | 12-9† | 12-9* | 12-9* | 12-9† | 12-9† | 12-9* | 12-9* |
| | 16.0 | 3-2 | 3-11 | 4-6 | 5-1 | 5-6 | 6-0 | 6-5 | 6-9 | 7-2 | 7-6 | 7-10 | 8-2 | 8-5 | 8-9 | 9-0 | 9-4 | 9-7 | 9-10 | 10-1 | 10-4 | 10-7 | 10-10 | 11-1 | 11-4 | 11-6 | 11-7† | 11-7† | 11-7† | 11-7† |
| | 19.2 | 2-11 | 3-7 | 4-1 | 4-7 | 5-1 | 5-5 | 5-10 | 6-2 | 6-6 | 6-10 | 7-2 | 7-5 | 7-9 | 8-0 | 8-3 | 8-6 | 8-9 | 9-0 | 9-3 | 9-5 | 9-8 | 9-11 | 10-1 | 10-4 | 10-6 | 10-9 | 10-11† | 10-11† | 10-11† |
| | 24.0 | 2-7 | 3-2 | 3-8 | 4-1 | 4-6 | 4-11 | 5-3 | 5-6 | 5-10 | 6-1 | 6-5 | 6-8 | 6-11 | 7-2 | 7-5 | 7-7 | 7-10 | 8-0 | 8-3 | 8-5 | 8-8 | 8-10 | 9-0 | 9-3 | 9-5 | 9-7 | 9-9 | 9-11 | 10-1 |
| 2×6 | 12.0 | 5-10 | 7-1 | 8-2 | 9-2 | 10-0 | 10-10 | 11-7 | 12-4 | 13-0 | 13-7 | 14-2 | 14-9 | 15-4 | 15-11 | 16-5 | 16-11 | 17-5 | 17-10 | 18-4 | 18-9 | 19-3 | 19-8 | 20-0* | 20-0† | 20-0† | 20-0* | 20-0* | 20-0† | 20-0* |
| | 16.0 | 5-0 | 6-2 | 7-1 | 7-11 | 8-8 | 9-5 | 10-0 | 10-8 | 11-3 | 11-9 | 12-4 | 12-10 | 13-3 | 13-9 | 14-2 | 14-8 | 15-1 | 15-6 | 15-11 | 16-3 | 16-8 | 17-0 | 17-5 | 17-9 | 18-1 | 18-5* | 18-5* | 18-5† | 18-5* |
| | 19.2 | 4-7 | 5-7 | 6-6 | 7-3 | 7-11 | 8-7 | 9-2 | 9-9 | 10-3 | 10-9 | 11-3 | 11-8 | 12-2 | 12-7 | 13-0 | 13-4 | 13-9 | 14-2 | 14-6 | 14-10 | 15-2 | 15-7 | 15-11 | 16-2 | 16-6 | 16-10 | 17-1† | 17-1† | 17-1† |
| | 24.0 | 4-1 | 5-0 | 5-10 | 6-6 | 7-1 | 7-8 | 8-2 | 8-8 | 9-2 | 9-7 | 10-0 | 10-5 | 10-10 | 11-3 | 11-7 | 11-11 | 12-4 | 12-8 | 13-0 | 13-3 | 13-7 | 13-11 | 14-2 | 14-6 | 14-9 | 15-1 | 15-4 | 15-7 | 15-11 |
| 2×8 | 12.0 | 7-8 | 9-4 | 10-10 | 12-1 | 13-3 | 14-4 | 15-3 | 16-3 | 17-1 | 17-11 | 18-9 | 19-6 | 20-3 | 20-11 | 21-7 | 22-3 | 22-11 | 23-7 | 24-2 | 24-9 | 25-4 | 25-11 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 16.0 | 6-7 | 8-1 | 9-4 | 10-6 | 11-6 | 12-5 | 13-3 | 14-0 | 14-10 | 15-6 | 16-3 | 16-10 | 17-6 | 18-1 | 18-9 | 19-4 | 19-10 | 20-5 | 20-11 | 21-5 | 21-11 | 22-5 | 23-11 | 23-5 | 23-10 | 24-0* | 24-0* | 24-0† | 24-0* |
| | 19.2 | 6-0 | 7-5 | 8-7 | 9-7 | 10-6 | 11-4 | 12-1 | 12-10 | 13-6 | 14-2 | 14-10 | 15-5 | 16-0 | 16-7 | 17-1 | 17-7 | 18-1 | 18-7 | 19-1 | 19-7 | 20-0 | 20-6 | 20-11 | 21-4 | 21-9 | 22-2 | 22-7† | 22-7† | 22-7† |
| | 24.0 | 5-5 | 6-7 | 7-8 | 8-7 | 9-4 | 10-1 | 10-10 | 11-6 | 12-1 | 12-8 | 13-3 | 13-9 | 14-4 | 14-10 | 15-3 | 15-9 | 16-3 | 16-8 | 17-1 | 17-6 | 17-11 | 18-4 | 18-9 | 19-1 | 19-6 | 19-10 | 20-3 | 20-7 | 20-11 |
| 2×10 | 12.0 | 9-9 | 11-11 | 13-9 | 15-5 | 16-11 | 18-3 | 19-6 | 20-8 | 21-10 | 22-10 | 23-11 | 24-10 | 25-10 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 16.0 | 8-5 | 10-4 | 11-11 | 13-4 | 14-8 | 15-10 | 16-11 | 17-11 | 18-11 | 19-10 | 20-8 | 21-6 | 22-4 | 23-1 | 23-11 | 24-7 | 25-4 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 19.2 | 7-8 | 9-5 | 10-11 | 12-2 | 13-4 | 14-5 | 15-5 | 16-4 | 17-3 | 18-1 | 18-11 | 19-8 | 20-5 | 21-1 | 21-10 | 22-6 | 23-1 | 23-9 | 24-5 | 25-0 | 25-7 | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* | 26-0* |
| | 24.0 | 6-11 | 8-5 | 9-9 | 10-11 | 11-11 | 12-11 | 13-9 | 14-8 | 15-5 | 16-2 | 16-11 | 17-7 | 18-5 | 18-11 | 19-6 | 20-1 | 20-8 | 21-3 | 21-10 | 22-4 | 22-10 | 23-5 | 23-11 | 24-5 | 24-10 | 25-4 | 25-10 | 26-0* | 26-0* |
| E | 12.0 | 0.06 | 0.12 | 0.18 | 0.25 | 0.33 | 0.41 | 0.51 | 0.60 | 0.71 | 0.82 | 0.93 | 1.05 | 1.17 | 1.30 | 1.43 | 1.57 | 1.71 | 1.85 | 2.00 | 2.15 | 2.31 | 2.47 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 |
| | 16.0 | 0.05 | 0.10 | 0.15 | 0.22 | 0.28 | 0.35 | 0.44 | 0.52 | 0.61 | 0.71 | 0.80 | 0.91 | 1.01 | 1.13 | 1.24 | 1.36 | 1.48 | 1.60 | 1.73 | 1.86 | 2.00 | 2.14 | 2.28 | 2.42 | 2.57 | 2.60 | 2.60 | 2.60 | 2.60 |
| | 19.2 | 0.05 | 0.09 | 0.14 | 0.20 | 0.26 | 0.33 | 0.40 | 0.48 | 0.56 | 0.64 | 0.73 | 0.83 | 0.93 | 1.03 | 1.13 | 1.24 | 1.35 | 1.46 | 1.58 | 1.70 | 1.82 | 1.95 | 2.08 | 2.21 | 2.34 | 2.48 | 2.60 | 2.60 | 2.60 |
| | 24.0 | 0.04 | 0.08 | 0.13 | 0.18 | 0.23 | 0.29 | 0.36 | 0.43 | 0.50 | 0.58 | 0.66 | 0.74 | 0.83 | 0.92 | 1.01 | 1.11 | 1.21 | 1.31 | 1.41 | 1.52 | 1.63 | 1.74 | 1.86 | 1.98 | 2.10 | 2.22 | 2.34 | 2.47 | 2.60 |

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million pounds per square inch, and is applicable to all lumber sizes shown.

*Spans are shown in feet-inches and are limited to 26 feet. Check sources of supply for availability of lumber in lengths greater than 20'.

† Spans are controlled by maximum E value of 2.6 million psi.

# 7.2 Species Specific Span Tables

The tables in this Section provide joist and rafter spans for design criteria listed at the top of each table. These span tables are based on the most commonly available softwood lumber species used in construction and include:

- Douglas Fir-Larch
- Hem-Fir
- Southern Pine
- Spruce-Pine-Fir

Tables have been developed for the following applications:

| Applications | Live Load (psf) | Dead Load (psf) | Deflection Limit | Table No. |
|---|---|---|---|---|
| Floor joists | 40 | 10 & 20 | Span/360 | 7.10 |
| Ceiling joists | 20 | 10 | Span/240 | 7.11 |
| Rafters | 20 | 10 & 20 | Span/240 | 7.12 |

## Table 7.10 Floor Joist Spans for Common Lumber Species

(Residential Areas, Live Load = 40 psf, L/Δ = 360)

| | | | Dead Load = 10 psf | | | | Dead Load = 20 psf | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2x6 | 2x8 | 2x10 | 2x12 | 2x6 | 2x8 | 2x10 | 2x12 |
| | | | Maximum Floor Joist Spans | | | | | | | |
| Joist Spacing | Species and Grade | | (ft.-in.) | (ft.-in.) | (ft.-in.) | (ft.-in.) | (ft.-in.) | (ft.-in.) | (ft.-in.) | (ft.-in.) |
| 12 in. | Douglas Fir-Larch | SS | 11-4 | 15-0 | 19-1 | 23-3 | 11-4 | 15-0 | 19-1 | 23-3 |
| | Douglas Fir-Larch | #1 | 10-11 | 14-5 | 18-5 | 22-0 | 10-11 | 14-2 | 17-4 | 20-1 |
| | Douglas Fir-Larch | #2 | 10-9 | 14-2 | 18-0 | 20-11 | 10-8 | 13-6 | 16-5 | 19-1 |
| | Douglas Fir-Larch | #3 | 8-11 | 11-3 | 13-9 | 16-0 | 8-1 | 10-3 | 12-7 | 14-7 |
| | Hem-Fir | SS | 10-9 | 14-2 | 18-0 | 21-11 | 10-9 | 14-2 | 18-0 | 21-11 |
| | Hem-Fir | #1 | 10-6 | 13-10 | 17-8 | 21-6 | 10-6 | 13-10 | 17-1 | 19-10 |
| | Hem-Fir | #2 | 10-0 | 13-2 | 16-10 | 20-4 | 10-0 | 13-1 | 16-0 | 18-6 |
| | Hem-Fir | #3 | 8-9 | 11-0 | 13-5 | 15-7 | 7-11 | 10-0 | 12-2 | 14-3 |
| | Southern Pine | SS | 11-2 | 14-8 | 18-9 | 22-10 | 11-2 | 14-8 | 18-9 | 22-10 |
| | Southern Pine | #1 | 10-11 | 14-5 | 18-5 | 22-5 | 10-11 | 14-5 | 18-5 | 22-5 |
| | Southern Pine | #2 | 10-9 | 14-2 | 18-0 | 21-9 | 10-9 | 14-2 | 16-11 | 19-10 |
| | Southern Pine | #3 | 9-4 | 11-11 | 14-0 | 16-8 | 8-6 | 10-10 | 12-10 | 15-1 |
| | Spruce-Pine-Fir | SS | 10-6 | 13-10 | 17-8 | 21-6 | 10-6 | 13-10 | 17-8 | 21-6 |
| | Spruce-Pine-Fir | #1 | 10-3 | 13-6 | 17-3 | 20-7 | 10-3 | 13-3 | 16-3 | 18-10 |
| | Spruce-Pine-Fir | #2 | 10-3 | 13-6 | 17-3 | 20-7 | 10-3 | 13-3 | 16-3 | 18-10 |
| | Spruce-Pine-Fir | #3 | 8-8 | 11-0 | 13-5 | 15-7 | 7-11 | 10-0 | 12-2 | 14-3 |
| 16 in. | Douglas Fir-Larch | SS | 10-4 | 13-7 | 17-4 | 21-1 | 10-4 | 13-7 | 17-4 | 21-1 |
| | Douglas Fir-Larch | #1 | 9-11 | 13-1 | 16-5 | 19-1 | 9-8 | 12-4 | 15-0 | 17-5 |
| | Douglas Fir-Larch | #2 | 9-9 | 12-9 | 15-7 | 18-1 | 9-3 | 11-8 | 14-3 | 16-6 |
| | Douglas Fir-Larch | #3 | 7-8 | 9-9 | 11-11 | 13-10 | 7-0 | 8-11 | 10-11 | 12-7 |
| | Hem-Fir | SS | 9-9 | 12-10 | 16-5 | 19-11 | 9-9 | 12-10 | 16-5 | 19-11 |
| | Hem-Fir | #1 | 9-6 | 12-7 | 16-0 | 18-10 | 9-6 | 12-2 | 14-10 | 17-2 |
| | Hem-Fir | #2 | 9-1 | 12-0 | 15-2 | 17-7 | 8-11 | 11-4 | 13-10 | 16-1 |
| | Hem-Fir | #3 | 7-6 | 9-6 | 11-6 | 13-6 | 6-10 | 8-8 | 10-7 | 12-4 |
| | Southern Pine | SS | 10-2 | 13-4 | 17-0 | 20-9 | 10-2 | 13-4 | 17-0 | 20-9 |
| | Southern Pine | #1 | 9-11 | 13-1 | 16-9 | 20-4 | 9-11 | 13-1 | 16-4 | 19-6 |
| | Southern Pine | #2 | 9-9 | 12-10 | 16-1 | 18-10 | 9-6 | 12-4 | 14-8 | 17-2 |
| | Southern Pine | #3 | 8-1 | 10-3 | 12-2 | 14-6 | 7-4 | 9-5 | 11-1 | 13-2 |
| | Spruce-Pine-Fir | SS | 9-6 | 12-7 | 16-0 | 19-6 | 9-6 | 12-7 | 16-0 | 19-6 |
| | Spruce-Pine-Fir | #1 | 9-4 | 12-3 | 15-5 | 17-10 | 9-1 | 11-8 | 14-1 | 16-3 |
| | Spruce-Pine-Fir | #2 | 9-4 | 12-3 | 15-5 | 17-10 | 9-1 | 11-8 | 14-1 | 16-3 |
| | Spruce-Pine-Fir | #3 | 7-6 | 9-6 | 11-8 | 13-6 | 6-10 | 8-8 | 10-7 | 12-4 |
| 19.2 in. | Douglas Fir-Larch | SS | 9-8 | 12-10 | 16-4 | 19-10 | 9-8 | 12-10 | 16-4 | 19-6 |
| | Douglas Fir-Larch | #1 | 9-4 | 12-4 | 15-6 | 17-5 | 8-10 | 11-3 | 13-8 | 15-11 |
| | Douglas Fir-Larch | #2 | 9-2 | 11-8 | 14-3 | 16-6 | 8-5 | 10-8 | 13-0 | 15-1 |
| | Douglas Fir-Larch | #3 | 7-0 | 8-11 | 10-11 | 12-7 | 6-5 | 8-2 | 9-11 | 11-6 |
| | Hem-Fir | SS | 9-3 | 12-1 | 15-5 | 18-9 | 9-2 | 12-1 | 15-5 | 18-9 |
| | Hem-Fir | #1 | 9-0 | 11-10 | 14-10 | 17-2 | 8-9 | 11-1 | 13-6 | 15-8 |
| | Hem-Fir | #2 | 8-7 | 11-3 | 13-10 | 16-1 | 8-2 | 10-4 | 12-8 | 14-8 |
| | Hem-Fir | #3 | 6-10 | 8-8 | 10-7 | 12-4 | 6-3 | 7-11 | 9-8 | 11-3 |
| | Southern Pine | SS | 9-6 | 12-7 | 16-0 | 19-6 | 9-6 | 12-7 | 16-0 | 19-6 |
| | Southern Pine | #1 | 9-4 | 12-4 | 15-9 | 19-2 | 9-4 | 12-4 | 14-11 | 17-9 |
| | Southern Pine | #2 | 9-2 | 12-1 | 14-8 | 17-2 | 8-8 | 11-3 | 13-5 | 15-8 |
| | Southern Pine | #3 | 7-4 | 9-5 | 11-1 | 13-2 | 6-9 | 8-7 | 10-1 | 12-1 |
| | Spruce-Pine-Fir | SS | 9-0 | 11-10 | 15-1 | 18-4 | 9-0 | 11-10 | 15-1 | 17-9 |
| | Spruce-Pine-Fir | #1 | 8-9 | 11-6 | 14-1 | 16-3 | 8-3 | 10-6 | 12-10 | 14-10 |
| | Spruce-Pine-Fir | #2 | 8-9 | 11-6 | 14-1 | 16-3 | 8-3 | 10-6 | 12-10 | 14-10 |
| | Spruce-Pine-Fir | #3 | 6-10 | 8-8 | 10-7 | 12-4 | 6-3 | 7-11 | 9-8 | 11-3 |
| 24 in. | Douglas Fir-Larch | SS | 9-0 | 11-11 | 15-2 | 18-5 | 9-0 | 11-11 | 15-0 | 17-5 |
| | Douglas Fir-Larch | #1 | 8-8 | 11-0 | 13-5 | 15-7 | 7-11 | 10-0 | 12-2 | 14-3 |
| | Douglas Fir-Larch | #2 | 8-3 | 10-5 | 12-9 | 14-9 | 7-6 | 9-6 | 11-8 | 13-6 |
| | Douglas Fir-Larch | #3 | 6-3 | 8-0 | 9-9 | 11-3 | 5-9 | 7-3 | 8-11 | 10-4 |
| | Hem-Fir | SS | 8-8 | 11-3 | 14-6 | 17-5 | 8-6 | 11-3 | 14-6 | 16-10 |
| | Hem-Fir | #1 | 8-4 | 10-10 | 13-3 | 15-5 | 7-10 | 9-11 | 12-1 | 14-0 |
| | Hem-Fir | #2 | 7-11 | 10-2 | 12-5 | 14-4 | 7-4 | 9-3 | 11-4 | 13-1 |
| | Hem-Fir | #3 | 6-2 | 7-9 | 9-6 | 11-0 | 5-7 | 7-1 | 8-8 | 10-1 |
| | Southern Pine | SS | 8-10 | 11-8 | 14-11 | 18-1 | 8-10 | 11-8 | 14-11 | 18-1 |
| | Southern Pine | #1 | 8-8 | 11-5 | 14-7 | 17-5 | 8-8 | 11-3 | 13-6 | 15-11 |
| | Southern Pine | #2 | 8-6 | 11-0 | 13-1 | 15-2 | 7-8 | 10-0 | 12-0 | 14-0 |
| | Southern Pine | #3 | 6-7 | 8-5 | 9-11 | 11-10 | 6-0 | 7-8 | 9-1 | 10-9 |
| | Spruce-Pine-Fir | SS | 8-4 | 11-0 | 14-0 | 17-0 | 8-4 | 11-0 | 13-8 | 15-11 |
| | Spruce-Pine-Fir | #1 | 8-1 | 10-7 | 12-7 | 14-7 | 7-5 | 9-5 | 11-6 | 13-4 |
| | Spruce-Pine-Fir | #2 | 8-1 | 10-3 | 12-7 | 14-7 | 7-5 | 9-5 | 11-6 | 13-4 |
| | Spruce-Pine-Fir | #3 | 6-2 | 7-9 | 9-6 | 11-0 | 5-7 | 7-1 | 8-8 | 10-1 |

Check sources for availability of lumber in lengths greater than 20 feet.

7

SPAN TABLES

## Table 7.11 Ceiling Joist Spans for Common Lumber Species

(Uninhabitable Attics With Limited Storage, Live Load = 20 psf, L/Δ = 240)

| | | | Dead Load = 10 psf | | | |
|---|---|---|---|---|---|---|
| | | | 2x4 | 2x6 | 2x8 | 2x10 |
| | | | Maximum Ceiling Joist Spans[1] | | | |
| Joist Spacing | Species and Grade | | (ft.-in.) | (ft.-in.) | (ft.-in.) | (ft.-in.) |
| 12 in. | Douglas Fir-Larch | SS | 10 - 3 | 16 - 4 | 21 - 7 | * |
| | Douglas Fir-Larch | #1 | 10 - 0 | 15 - 8 | 20 - 1 | 24 - 6 |
| | Douglas Fir-Larch | #2 | 9 - 10 | 15 - 0 | 19 - 1 | 23 - 3 |
| | Douglas Fir-Larch | #3 | 7 - 10 | 11 - 6 | 14 - 7 | 17 - 9 |
| | Hem-Fir | SS | 9 - 10 | 15 - 6 | 20 - 5 | * |
| | Hem-Fir | #1 | 9 - 8 | 15 - 2 | 19 - 10 | 24 - 3 |
| | Hem-Fir | #2 | 9 - 2 | 14 - 5 | 18 - 6 | 22 - 7 |
| | Hem-Fir | #3 | 7 - 8 | 11 - 2 | 14 - 2 | 17 - 4 |
| | Southern Pine | SS | 10 - 3 | 16 - 1 | 21 - 2 | * |
| | Southern Pine | #1 | 10 - 0 | 15 - 9 | 20 - 10 | * |
| | Southern Pine | #2 | 9 - 10 | 15 - 6 | 20 - 1 | 24 - 0 |
| | Southern Pine | #3 | 8 - 2 | 12 - 0 | 15 - 4 | 18 - 1 |
| | Spruce-Pine-Fir | SS | 9 - 8 | 15 - 2 | 19 - 11 | 23 - 5 |
| | Spruce-Pine-Fir | #1 | 9 - 5 | 14 - 9 | 18 - 9 | 22 - 11 |
| | Spruce-Pine-Fir | #2 | 9 - 5 | 14 - 8 | 18 - 9 | 22 - 11 |
| | Spruce-Pine-Fir | #3 | 7 - 8 | 11 - 2 | 14 - 2 | 17 - 4 |
| 16 in. | Douglas Fir-Larch | SS | 9 - 6 | 14 - 11 | 19 - 7 | 23 - 0 |
| | Douglas Fir-Larch | #1 | 9 - 1 | 13 - 8 | 17 - 5 | 21 - 3 |
| | Douglas Fir-Larch | #2 | 8 - 11 | 13 - 0 | 16 - 6 | 20 - 2 |
| | Douglas Fir-Larch | #3 | 6 - 10 | 9 - 11 | 12 - 7 | 15 - 5 |
| | Hem-Fir | SS | 8 - 11 | 14 - 1 | 18 - 6 | 23 - 8 |
| | Hem-Fir | #1 | 8 - 8 | 13 - 7 | 17 - 2 | 21 - 0 |
| | Hem-Fir | #2 | 8 - 4 | 12 - 8 | 16 - 0 | 19 - 7 |
| | Hem-Fir | #3 | 6 - 8 | 9 - 8 | 12 - 4 | 15 - 0 |
| | Southern Pine | SS | 9 - 4 | 14 - 7 | 19 - 3 | 24 - 7 |
| | Southern Pine | #1 | 9 - 1 | 14 - 4 | 18 - 11 | 23 - 1 |
| | Southern Pine | #2 | 8 - 11 | 13 - 6 | 17 - 5 | 20 - 9 |
| | Southern Pine | #3 | 7 - 1 | 10 - 5 | 13 - 3 | 15 - 8 |
| | Spruce-Pine-Fir | SS | 8 - 8 | 13 - 9 | 18 - 2 | 23 - 1 |
| | Spruce-Pine-Fir | #1 | 8 - 5 | 12 - 10 | 16 - 3 | 19 - 10 |
| | Spruce-Pine-Fir | #2 | 8 - 5 | 12 - 10 | 16 - 3 | 19 - 10 |
| | Spruce-Pine-Fir | #3 | 6 - 8 | 9 - 8 | 12 - 4 | 15 - 0 |
| 19.2 in. | Douglas Fir-Larch | SS | 8 - 11 | 14 - 0 | 18 - 5 | 23 - 7 |
| | Douglas Fir-Larch | #1 | 8 - 7 | 12 - 6 | 15 - 10 | 19 - 5 |
| | Douglas Fir-Larch | #2 | 8 - 2 | 11 - 11 | 15 - 1 | 18 - 5 |
| | Douglas Fir-Larch | #3 | 6 - 2 | 9 - 1 | 11 - 6 | 14 - 1 |
| | Hem-Fir | SS | 8 - 5 | 13 - 3 | 17 - 5 | 22 - 3 |
| | Hem-Fir | #1 | 8 - 3 | 12 - 4 | 15 - 8 | 19 - 2 |
| | Hem-Fir | #2 | 7 - 10 | 11 - 7 | 14 - 8 | 17 - 10 |
| | Hem-Fir | #3 | 6 - 1 | 8 - 10 | 11 - 3 | 13 - 8 |
| | Southern Pine | SS | 8 - 9 | 13 - 9 | 18 - 2 | 23 - 1 |
| | Southern Pine | #1 | 8 - 7 | 13 - 6 | 17 - 9 | 21 - 1 |
| | Southern Pine | #2 | 8 - 5 | 12 - 3 | 15 - 10 | 18 - 11 |
| | Southern Pine | #3 | 6 - 5 | 9 - 6 | 12 - 1 | 14 - 4 |
| | Spruce-Pine-Fir | SS | 8 - 3 | 12 - 11 | 17 - 1 | 21 - 8 |
| | Spruce-Pine-Fir | #1 | 8 - 0 | 11 - 9 | 14 - 10 | 18 - 2 |
| | Spruce-Pine-Fir | #2 | 8 - 0 | 11 - 6 | 14 - 10 | 18 - 2 |
| | Spruce-Pine-Fir | #3 | 6 - 1 | 8 - 10 | 11 - 3 | 13 - 8 |
| 24 in. | Douglas Fir-Larch | SS | 8 - 3 | 13 - 0 | 17 - 2 | 21 - 3 |
| | Douglas Fir-Larch | #1 | 7 - 8 | 11 - 2 | 14 - 2 | 17 - 4 |
| | Douglas Fir-Larch | #2 | 7 - 3 | 10 - 8 | 13 - 6 | 16 - 5 |
| | Douglas Fir-Larch | #3 | 5 - 7 | 8 - 1 | 10 - 3 | 12 - 7 |
| | Hem-Fir | SS | 7 - 10 | 12 - 3 | 16 - 2 | 20 - 6 |
| | Hem-Fir | #1 | 7 - 7 | 11 - 1 | 14 - 0 | 17 - 1 |
| | Hem-Fir | #2 | 7 - 1 | 10 - 4 | 13 - 1 | 16 - 0 |
| | Hem-Fir | #3 | 5 - 5 | 7 - 11 | 10 - 0 | 12 - 3 |
| | Southern Pine | SS | 8 - 1 | 12 - 9 | 16 - 10 | 21 - 6 |
| | Southern Pine | #1 | 8 - 0 | 12 - 6 | 15 - 10 | 18 - 10 |
| | Southern Pine | #2 | 7 - 8 | 11 - 0 | 14 - 2 | 16 - 11 |
| | Southern Pine | #3 | 5 - 9 | 8 - 6 | 10 - 10 | 12 - 10 |
| | Spruce-Pine-Fir | SS | 7 - 8 | 12 - 0 | 15 - 10 | 18 - 5 |
| | Spruce-Pine-Fir | #1 | 7 - 2 | 10 - 6 | 13 - 3 | 16 - 3 |
| | Spruce-Pine-Fir | #2 | 7 - 2 | 10 - 6 | 13 - 3 | 16 - 3 |
| | Spruce-Pine-Fir | #3 | 5 - 5 | 7 - 11 | 10 - 0 | 12 - 3 |

[1] Bracing shall be provided in accordance with 3.3.1.4.

* Spans are limited to 26 feet in length. Check sources for availability of lumber in lengths greater than 20 feet.

## Table 7.12 Rafter Spans for Common Lumber Species

(Ceiling Attached to Rafters, Live Load = 20 psf, L/Δ = 240)

| | | | Dead Load = 10 psf | | | | | Dead Load = 20 psf | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2x4 | 2x6 | 2x8 | 2x10 | 2x12 | 2x4 | 2x6 | 2x8 | 2x10 | 2x12 |
| | | | Maximum Rafter Spans[2,3] | | | | | | | | | |
| Joist Spacing | Species and Grade | | (ft.-in.) | (ft.-in.) | (ft.-in.) | (ft.-in.) | (ft.-in.) | (ft.-in.) | (ft.-in.) | (ft.-in.) | (ft.-in.) | (ft.-in.) |
| 12 in. | Douglas Fir-Larch | SS | 10 - 5 | 16 - 4 | 21 - 7 | * | * | 10 - 5 | 16 - 4 | 21 - 7 | * | * |
| | Douglas Fir-Larch | #1 | 10 - 0 | 15 - 8 | 20 - 10 | * | * | 10 - 0 | 15 - 8 | 20 - 5 | 25 - 0 | * |
| | Douglas Fir-Larch | #2 | 9 - 10 | 15 - 6 | 20 - 5 | * | * | 9 - 10 | 14 - 7 | 18 - 5 | 23 - 6 | * |
| | Douglas Fir-Larch | #3 | 8 - 6 | 12 - 10 | 16 - 3 | 19 - 10 | 23 - 0 | 7 - 7 | 11 - 1 | 14 - 1 | 17 - 2 | 19 - 11 |
| | Hem-Fir | SS | 9 - 10 | 15 - 6 | 20 - 5 | * | * | 9 - 10 | 15 - 6 | 20 - 5 | * | * |
| | Hem-Fir | #1 | 9 - 8 | 15 - 2 | 19 - 11 | 25 - 3 | * | 9 - 8 | 15 - 2 | 19 - 2 | 23 - 3 | * |
| | Hem-Fir | #2 | 9 - 2 | 14 - 5 | 18 - 8 | 24 - 3 | * | 9 - 2 | 14 - 2 | 17 - 11 | 23 - 11 | 25 - 5 |
| | Hem-Fir | #3 | 8 - 2 | 12 - 6 | 15 - 10 | 18 - 5 | 22 - 6 | 7 - 5 | 10 - 10 | 13 - 8 | 16 - 8 | 18 - 6 |
| | Southern Pine | SS | 10 - 1 | 16 - 1 | 21 - 2 | * | * | 10 - 1 | 16 - 1 | 21 - 2 | * | * |
| | Southern Pine | #1 | 10 - 0 | 15 - 9 | 20 - 10 | * | * | 10 - 0 | 15 - 9 | 20 - 10 | 25 - 10 | * |
| | Southern Pine | #2 | 9 - 10 | 15 - 6 | 20 - 5 | * | * | 9 - 10 | 15 - 1 | 19 - 5 | 23 - 2 | * |
| | Southern Pine | #3 | 8 - 1 | 12 - 6 | 17 - 2 | 21 - 5 | 24 - 1 | 7 - 11 | 11 - 8 | 14 - 10 | 17 - 6 | 20 - 11 |
| | Spruce-Pine-Fir | SS | 9 - 8 | 15 - 2 | 19 - 11 | 25 - 5 | * | 9 - 8 | 15 - 2 | 18 - 11 | 23 - 5 | * |
| | Spruce-Pine-Fir | #1 | 9 - 5 | 14 - 9 | 19 - 6 | 24 - 10 | * | 9 - 5 | 14 - 4 | 18 - 2 | 22 - 3 | 25 - 0 |
| | Spruce-Pine-Fir | #2 | 9 - 5 | 14 - 9 | 19 - 6 | 24 - 10 | * | 9 - 5 | 14 - 4 | 18 - 2 | 22 - 3 | 25 - 0 |
| | Spruce-Pine-Fir | #3 | 8 - 2 | 12 - 6 | 15 - 10 | 18 - 5 | 22 - 6 | 7 - 5 | 10 - 10 | 13 - 8 | 16 - 8 | 18 - 6 |
| 16 in. | Douglas Fir-Larch | SS | 9 - 6 | 14 - 11 | 19 - 7 | 25 - 0 | * | 9 - 6 | 14 - 11 | 19 - 7 | 25 - 0 | * |
| | Douglas Fir-Larch | #1 | 9 - 1 | 14 - 4 | 18 - 11 | 23 - 9 | * | 9 - 1 | 13 - 7 | 16 - 10 | 20 - 7 | 23 - 10 |
| | Douglas Fir-Larch | #2 | 8 - 11 | 14 - 1 | 18 - 5 | 22 - 6 | * | 8 - 7 | 12 - 7 | 16 - 0 | 19 - 6 | 22 - 7 |
| | Douglas Fir-Larch | #3 | 7 - 7 | 11 - 1 | 14 - 1 | 17 - 2 | 19 - 11 | 6 - 7 | 9 - 8 | 12 - 2 | 14 - 11 | 17 - 3 |
| | Hem-Fir | SS | 9 - 11 | 14 - 1 | 18 - 6 | 23 - 8 | * | 9 - 11 | 14 - 1 | 18 - 6 | 23 - 8 | * |
| | Hem-Fir | #1 | 9 - 8 | 13 - 9 | 18 - 2 | 23 - 1 | * | 9 - 8 | 13 - 1 | 16 - 7 | 20 - 6 | 23 - 7 |
| | Hem-Fir | #2 | 9 - 4 | 13 - 3 | 17 - 3 | 21 - 11 | 23 - 7 | 8 - 4 | 12 - 3 | 15 - 6 | 18 - 0 | 22 - 0 |
| | Hem-Fir | #3 | 7 - 5 | 10 - 10 | 13 - 8 | 16 - 8 | 18 - 6 | 6 - 5 | 9 - 5 | 11 - 11 | 14 - 6 | 16 - 10 |
| | Southern Pine | SS | 9 - 4 | 14 - 7 | 19 - 3 | 24 - 7 | * | 9 - 4 | 14 - 7 | 19 - 3 | 24 - 7 | * |
| | Southern Pine | #1 | 9 - 1 | 14 - 4 | 18 - 11 | 24 - 1 | * | 9 - 1 | 14 - 4 | 18 - 10 | 23 - 4 | * |
| | Southern Pine | #2 | 8 - 11 | 14 - 1 | 18 - 6 | 23 - 2 | * | 8 - 11 | 13 - 0 | 16 - 10 | 20 - 1 | 23 - 7 |
| | Southern Pine | #3 | 7 - 11 | 11 - 8 | 14 - 10 | 17 - 6 | 20 - 11 | 6 - 10 | 10 - 1 | 12 - 10 | 15 - 2 | 18 - 1 |
| | Spruce-Pine-Fir | SS | 8 - 9 | 13 - 9 | 18 - 2 | 23 - 1 | * | 8 - 9 | 13 - 9 | 18 - 2 | 23 - 0 | * |
| | Spruce-Pine-Fir | #1 | 8 - 7 | 13 - 5 | 17 - 8 | 22 - 5 | 25 - 0 | 8 - 4 | 12 - 8 | 15 - 8 | 19 - 2 | 22 - 4 |
| | Spruce-Pine-Fir | #2 | 8 - 7 | 13 - 5 | 17 - 8 | 22 - 5 | 25 - 0 | 8 - 4 | 12 - 8 | 15 - 8 | 19 - 2 | 22 - 4 |
| | Spruce-Pine-Fir | #3 | 7 - 5 | 10 - 10 | 13 - 8 | 16 - 9 | 18 - 6 | 6 - 5 | 9 - 5 | 11 - 11 | 14 - 6 | 16 - 10 |
| 19.2 in. | Douglas Fir-Larch | SS | 8 - 11 | 14 - 0 | 18 - 5 | 23 - 7 | * | 8 - 11 | 14 - 0 | 18 - 5 | 23 - 0 | * |
| | Douglas Fir-Larch | #1 | 8 - 7 | 13 - 6 | 17 - 8 | 21 - 8 | 25 - 1 | 8 - 4 | 12 - 2 | 15 - 4 | 18 - 9 | 21 - 9 |
| | Douglas Fir-Larch | #2 | 8 - 5 | 13 - 3 | 16 - 10 | 20 - 7 | 23 - 10 | 7 - 10 | 11 - 6 | 14 - 7 | 17 - 10 | 20 - 8 |
| | Douglas Fir-Larch | #3 | 6 - 11 | 10 - 2 | 12 - 10 | 15 - 8 | 18 - 2 | 6 - 2 | 8 - 8 | 11 - 2 | 13 - 7 | 15 - 9 |
| | Hem-Fir | SS | 8 - 8 | 13 - 3 | 17 - 5 | 22 - 3 | * | 8 - 8 | 13 - 3 | 17 - 5 | 22 - 3 | 25 - 9 |
| | Hem-Fir | #1 | 8 - 3 | 12 - 11 | 17 - 1 | 21 - 5 | 24 - 10 | 8 - 2 | 12 - 0 | 15 - 2 | 18 - 6 | 21 - 6 |
| | Hem-Fir | #2 | 7 - 10 | 12 - 4 | 16 - 3 | 20 - 0 | 23 - 2 | 7 - 8 | 11 - 2 | 14 - 2 | 17 - 8 | 20 - 1 |
| | Hem-Fir | #3 | 6 - 6 | 9 - 11 | 12 - 7 | 15 - 4 | 17 - 8 | 5 - 10 | 8 - 7 | 10 - 10 | 13 - 3 | 15 - 5 |
| | Southern Pine | SS | 8 - 9 | 13 - 8 | 18 - 2 | 23 - 1 | * | 8 - 9 | 13 - 8 | 18 - 2 | 23 - 1 | * |
| | Southern Pine | #1 | 8 - 7 | 13 - 6 | 17 - 8 | 22 - 8 | * | 8 - 7 | 13 - 6 | 17 - 2 | 20 - 5 | 24 - 4 |
| | Southern Pine | #2 | 8 - 5 | 13 - 3 | 17 - 5 | 21 - 2 | 24 - 10 | 8 - 4 | 11 - 11 | 15 - 4 | 18 - 4 | 21 - 6 |
| | Southern Pine | #3 | 7 - 3 | 10 - 8 | 13 - 7 | 16 - 0 | 18 - 1 | 6 - 3 | 9 - 3 | 11 - 9 | 13 - 10 | 16 - 5 |
| | Spruce-Pine-Fir | SS | 8 - 3 | 12 - 11 | 17 - 1 | 21 - 9 | * | 8 - 3 | 12 - 11 | 17 - 1 | 21 - 0 | 24 - 4 |
| | Spruce-Pine-Fir | #1 | 8 - 1 | 12 - 8 | 16 - 7 | 20 - 3 | 23 - 6 | 7 - 9 | 11 - 4 | 14 - 4 | 17 - 7 | 20 - 4 |
| | Spruce-Pine-Fir | #2 | 8 - 1 | 12 - 8 | 16 - 7 | 20 - 3 | 23 - 6 | 7 - 8 | 11 - 4 | 14 - 4 | 17 - 7 | 20 - 4 |
| | Spruce-Pine-Fir | #3 | 6 - 6 | 9 - 11 | 12 - 7 | 15 - 4 | 17 - 8 | 5 - 10 | 8 - 7 | 10 - 10 | 13 - 3 | 15 - 5 |
| 24 in. | Douglas Fir-Larch | SS | 8 - 3 | 13 - 0 | 17 - 2 | 21 - 10 | * | 8 - 3 | 13 - 0 | 16 - 10 | 20 - 7 | 23 - 10 |
| | Douglas Fir-Larch | #1 | 8 - 0 | 12 - 6 | 16 - 10 | 19 - 5 | 22 - 6 | 7 - 5 | 10 - 10 | 13 - 9 | 16 - 8 | 18 - 6 |
| | Douglas Fir-Larch | #2 | 7 - 10 | 11 - 11 | 15 - 1 | 18 - 5 | 21 - 4 | 7 - 0 | 10 - 4 | 13 - 0 | 15 - 11 | 18 - 6 |
| | Douglas Fir-Larch | #3 | 6 - 2 | 8 - 1 | 11 - 6 | 14 - 1 | 16 - 3 | 5 - 4 | 7 - 10 | 10 - 0 | 12 - 2 | 14 - 1 |
| | Hem-Fir | SS | 7 - 10 | 12 - 3 | 16 - 3 | 20 - 8 | 23 - 7 | 7 - 10 | 12 - 3 | 16 - 2 | 19 - 10 | 23 - 0 |
| | Hem-Fir | #1 | 7 - 8 | 12 - 0 | 15 - 8 | 19 - 2 | 22 - 2 | 7 - 4 | 10 - 6 | 13 - 7 | 16 - 7 | 19 - 3 |
| | Hem-Fir | #2 | 7 - 3 | 11 - 5 | 14 - 8 | 17 - 10 | 20 - 9 | 6 - 10 | 10 - 0 | 12 - 9 | 15 - 6 | 17 - 11 |
| | Hem-Fir | #3 | 5 - 9 | 8 - 10 | 11 - 3 | 13 - 9 | 15 - 11 | 5 - 3 | 7 - 8 | 9 - 9 | 11 - 10 | 13 - 9 |
| | Southern Pine | SS | 8 - 1 | 12 - 9 | 16 - 10 | 21 - 6 | * | 8 - 1 | 12 - 9 | 16 - 10 | 21 - 6 | * |
| | Southern Pine | #1 | 8 - 0 | 12 - 6 | 16 - 6 | 21 - 1 | 23 - 2 | 8 - 0 | 12 - 1 | 15 - 4 | 18 - 3 | 21 - 9 |
| | Southern Pine | #2 | 7 - 10 | 12 - 3 | 15 - 10 | 18 - 11 | 22 - 2 | 7 - 5 | 10 - 8 | 13 - 9 | 16 - 5 | 19 - 5 |
| | Southern Pine | #3 | 6 - 5 | 9 - 6 | 12 - 1 | 14 - 4 | 17 - 1 | 5 - 7 | 8 - 3 | 10 - 6 | 12 - 5 | 14 - 9 |
| | Spruce-Pine-Fir | SS | 7 - 8 | 12 - 0 | 15 - 10 | 20 - 2 | 24 - 7 | 7 - 8 | 12 - 0 | 15 - 4 | 18 - 8 | 21 - 8 |
| | Spruce-Pine-Fir | #1 | 7 - 6 | 11 - 9 | 14 - 10 | 18 - 2 | 21 - 0 | 6 - 11 | 10 - 2 | 12 - 10 | 15 - 8 | 18 - 3 |
| | Spruce-Pine-Fir | #2 | 7 - 6 | 11 - 9 | 14 - 10 | 18 - 2 | 21 - 0 | 6 - 11 | 10 - 2 | 12 - 10 | 15 - 8 | 18 - 3 |
| | Spruce-Pine-Fir | #3 | 6 - 1 | 8 - 10 | 11 - 3 | 13 - 8 | 16 - 1 | 5 - 3 | 7 - 8 | 9 - 9 | 11 - 10 | 13 - 9 |

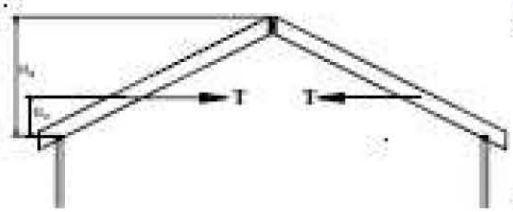
* Spans are limited to 26 feet in length. Check sources for availability of lumber in lengths greater than 20 feet.

See footnotes 1-3.

7 SPAN TABLES

## Footnotes to Table 7.12

1 Tabulated rafter spans assume ceiling joists or rafter ties are located at the bottom of the attic space to resist thrust. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given in the following table:




| Ceiling Height/Roof Ridge Height ($H_c/H_R$) | Rafter Span Adjustment Factors |
|---|---|
| 1/2 | 0.58 |
| 1/3 | 0.67 |
| 1/4 | 0.76 |
| 1/5 | 0.83 |
| 1/6 | 0.90 |
| 1/7.5 and less | 1.00 |

**Note:** Lateral deflection of the rafter below the rafter ties may exceed 3/4 inch when rafter ties are located above one-third of the ridge height, $H_R$, or when $H_c$ is greater than 2 feet and may require additional consideration.

2 Tabulated rafter spans are based on roof dead and live loads. For Exposure B wind loads, the rafter span adjustment factor, which shall not exceed 1.0, shall be multiplied times the rafter spans in Table 7.12. For Exposure C, rafter span adjustments shall be multiplied by 0.8.

RAFTER SPAN ADJUSTMENT FOR EXPOSURE B & C WIND LOADS

| Three Second Gust Wind Speed (mph) | 85 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
|---|---|---|---|---|---|---|---|---|
| Roof Pitch | Rafter Span Adjustment Factor for Dual-Pitched Roofs | | | | | | | |
| 0:12 | 1.18 | 1.10 | 0.97 | 0.87 | 0.79 | 0.73 | 0.67 | 0.62 |
| 1:12 | 1.17 | 1.09 | 0.97 | 0.87 | 0.79 | 0.72 | 0.67 | 0.62 |
| 2:12 | 1.16 | 1.08 | 0.96 | 0.86 | 0.78 | 0.72 | 0.66 | 0.61 |
| 3:12 | 1.34 | 1.25 | 1.10 | 0.98 | 0.89 | 0.81 | 0.75 | 0.70 |
| 4:12 | 1.30 | 1.21 | 1.07 | 0.96 | 0.87 | 0.79 | 0.73 | 0.68 |
| 5:12 | 1.24 | 1.15 | 1.02 | 0.91 | 0.83 | 0.76 | 0.70 | 0.65 |
| 6:12 | 1.17 | 1.09 | 0.96 | 0.86 | 0.78 | 0.72 | 0.66 | 0.62 |
| 7:12 | 1.52 | 1.41 | 1.25 | 1.09 | 0.98 | 0.90 | 0.82 | 0.76 |
| 8:12 | 1.42 | 1.31 | 1.15 | 1.02 | 0.92 | 0.84 | 0.78 | 0.72 |
| 9:12 | 1.32 | 1.22 | 1.07 | 0.96 | 0.87 | 0.79 | 0.73 | 0.68 |
| 10:12 | 1.22 | 1.14 | 1.00 | 0.89 | 0.81 | 0.74 | 0.68 | 0.63 |
| 11:12 | 1.14 | 1.06 | 0.93 | 0.84 | 0.76 | 0.69 | 0.64 | 0.59 |
| 12:12 | 1.06 | 0.98 | 0.87 | 0.78 | 0.71 | 0.65 | 0.60 | 0.56 |

3 Tabulated rafter spans in Table 7.12 shall be permitted to be multiplied by the sloped roof adjustment factors in the following table, for roof pitches greater than 4:12:

| | 20 psf Live, 20 psf Dead | 20 psf Live, 20 psf Dead |
|---|---|---|
| Roof Pitch | Adjustment Factor for Sloped Roofs | |
| 5:12 | 1.02 | 1.01 |
| 6:12 | 1.04 | 1.03 |
| 7:12 | 1.05 | 1.04 |
| 8:12 | 1.07 | 1.05 |
| 9:12 | 1.10 | 1.07 |
| 10:12 | 1.12 | 1.08 |
| 11:12 | 1.14 | 1.10 |
| 12:12 | 1.17 | 1.12 |

# 8.1 Cross-Section Properties[1]

## Table 8.1 Section Properties of Standard Dressed (S4S) Sawn Lumber

| Nominal Size b × d | Standard Dressed Size (S4S) b × d inches × inches | Area of Section A in.² | X-X AXIS | | Y-Y AXIS | | Approximate weight in pounds per linear foot (lb/ft) of piece when density of wood equals: | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Section Modulus $S_x$ in.³ | Moment of Inertia $I_x$ in.⁴ | Section Modulus $S_y$ in.³ | Moment of Inertia $I_y$ in.⁴ | 25 lb/ft³ | 30 lb/ft³ | 35 lb/ft³ | 40 lb/ft³ | 45 lb/ft³ | 50 lb/ft³ |
| 1 × 3 | 3/4 × 2-1/2 | 1.875 | 0.781 | 0.977 | 0.234 | 0.088 | 0.326 | 0.391 | 0.456 | 0.521 | 0.586 | 0.651 |
| 1 × 4 | 3/4 × 3-1/2 | 2.625 | 1.531 | 2.680 | 0.328 | 0.123 | 0.456 | 0.547 | 0.638 | 0.729 | 0.820 | 0.911 |
| 1 × 6 | 3/4 × 5-1/2 | 4.125 | 3.781 | 10.40 | 0.516 | 0.193 | 0.716 | 0.859 | 1.003 | 1.146 | 1.289 | 1.432 |
| 1 × 8 | 3/4 × 7-1/4 | 5.438 | 6.570 | 23.82 | 0.680 | 0.255 | 0.944 | 1.133 | 1.322 | 1.510 | 1.699 | 1.888 |
| 1 × 10 | 3/4 × 9-1/4 | 6.938 | 10.70 | 49.47 | 0.867 | 0.325 | 1.204 | 1.445 | 1.686 | 1.927 | 2.168 | 2.409 |
| 1 × 12 | 3/4 × 11-1/4 | 8.438 | 15.82 | 88.99 | 1.055 | 0.396 | 1.465 | 1.758 | 2.051 | 2.344 | 2.637 | 2.930 |
| 2 × 3 | 1-1/2 × 2-1/2 | 3.750 | 1.563 | 1.953 | 0.938 | 0.703 | 0.651 | 0.781 | 0.911 | 1.042 | 1.172 | 1.302 |
| 2 × 4 | 1-1/2 × 3-1/2 | 5.250 | 3.063 | 5.359 | 1.313 | 0.984 | 0.911 | 1.094 | 1.276 | 1.458 | 1.641 | 1.823 |
| 2 × 5 | 1-1/2 × 4-1/2 | 6.750 | 5.063 | 11.39 | 1.688 | 1.266 | 1.172 | 1.406 | 1.641 | 1.875 | 2.109 | 2.344 |
| 2 × 6 | 1-1/2 × 5-1/2 | 8.250 | 7.563 | 20.80 | 2.063 | 1.547 | 1.432 | 1.719 | 2.005 | 2.292 | 2.578 | 2.865 |
| 2 × 8 | 1-1/2 × 7-1/4 | 10.88 | 13.14 | 47.63 | 2.719 | 2.039 | 1.888 | 2.266 | 2.643 | 3.021 | 3.398 | 3.776 |
| 2 × 10 | 1-1/2 × 9-1/4 | 13.88 | 21.39 | 98.93 | 3.469 | 2.602 | 2.409 | 2.891 | 3.372 | 3.854 | 4.336 | 4.818 |
| 2 × 12 | 1-1/2 × 11-1/4 | 16.88 | 31.64 | 178.0 | 4.219 | 3.164 | 2.930 | 3.516 | 4.102 | 4.688 | 5.273 | 5.859 |
| 2 × 14 | 1-1/2 × 13-1/4 | 19.88 | 43.89 | 290.8 | 4.969 | 3.727 | 3.451 | 4.141 | 4.831 | 5.521 | 6.211 | 6.901 |
| 3 × 4 | 2-1/2 × 3-1/2 | 8.750 | 5.104 | 8.932 | 3.646 | 4.557 | 1.519 | 1.823 | 2.127 | 2.431 | 2.734 | 3.038 |
| 3 × 5 | 2-1/2 × 4-1/2 | 11.25 | 8.438 | 18.98 | 4.688 | 5.859 | 1.953 | 2.344 | 2.734 | 3.125 | 3.516 | 3.906 |
| 3 × 6 | 2-1/2 × 5-1/2 | 13.75 | 12.60 | 34.66 | 5.729 | 7.161 | 2.387 | 2.865 | 3.342 | 3.819 | 4.297 | 4.774 |
| 3 × 8 | 2-1/2 × 7-1/4 | 18.13 | 21.90 | 79.39 | 7.552 | 9.440 | 3.147 | 3.776 | 4.405 | 5.035 | 5.664 | 6.293 |
| 3 × 10 | 2-1/2 × 9-1/4 | 23.13 | 35.65 | 164.9 | 9.635 | 12.04 | 4.015 | 4.818 | 5.621 | 6.424 | 7.227 | 8.030 |
| 3 × 12 | 2-1/2 × 11-1/4 | 28.13 | 52.73 | 296.6 | 11.72 | 14.65 | 4.883 | 5.859 | 6.836 | 7.813 | 8.789 | 9.766 |
| 3 × 14 | 2-1/2 × 13-1/4 | 33.13 | 73.15 | 484.6 | 13.80 | 17.25 | 5.751 | 6.901 | 8.051 | 9.201 | 10.35 | 11.50 |
| 3 × 16 | 2-1/2 × 15-1/4 | 38.13 | 96.90 | 738.9 | 15.89 | 19.86 | 6.619 | 7.943 | 9.266 | 10.59 | 11.91 | 13.24 |
| 4 × 4 | 3-1/2 × 3-1/2 | 12.25 | 7.146 | 12.51 | 7.146 | 12.51 | 2.127 | 2.552 | 2.977 | 3.403 | 3.828 | 4.253 |
| 4 × 5 | 3-1/2 × 4-1/2 | 15.75 | 11.81 | 26.58 | 9.188 | 16.08 | 2.734 | 3.281 | 3.828 | 4.375 | 4.922 | 5.469 |
| 4 × 6 | 3-1/2 × 5-1/2 | 19.25 | 17.65 | 48.53 | 11.23 | 19.65 | 3.342 | 4.010 | 4.679 | 5.347 | 6.016 | 6.684 |
| 4 × 8 | 3-1/2 × 7-1/4 | 25.38 | 30.66 | 111.1 | 14.80 | 25.90 | 4.405 | 5.286 | 6.168 | 7.049 | 7.930 | 8.811 |
| 4 × 10 | 3-1/2 × 9-1/4 | 32.38 | 49.91 | 230.8 | 18.89 | 33.05 | 5.621 | 6.745 | 7.869 | 8.993 | 10.12 | 11.24 |
| 4 × 12 | 3-1/2 × 11-1/4 | 39.38 | 73.83 | 415.3 | 22.97 | 40.20 | 6.836 | 8.203 | 9.570 | 10.94 | 12.30 | 13.67 |
| 4 × 14 | 3-1/2 × 13-1/4 | 46.38 | 102.4 | 678.5 | 27.05 | 47.34 | 8.051 | 9.661 | 11.27 | 12.88 | 14.49 | 16.10 |
| 4 × 16 | 3-1/2 × 15-1/4 | 53.38 | 135.7 | 1034 | 31.14 | 54.49 | 9.268 | 11.12 | 12.97 | 14.83 | 16.68 | 18.53 |
| 5 × 5 | 4-1/2 × 4-1/2 | 20.25 | 15.19 | 34.17 | 15.19 | 34.17 | 3.516 | 4.219 | 4.922 | 5.625 | 6.328 | 7.031 |
| 6 × 6 | 5-1/2 × 5-1/2 | 30.25 | 27.73 | 76.26 | 27.73 | 76.26 | 5.252 | 6.302 | 7.352 | 8.403 | 9.453 | 10.50 |
| 6 × 8 | 5-1/2 × 7-1/2 | 41.25 | 51.56 | 193.4 | 37.81 | 104.0 | 7.161 | 8.594 | 10.03 | 11.46 | 12.89 | 14.32 |
| 6 × 10 | 5-1/2 × 9-1/2 | 52.25 | 82.73 | 393.0 | 47.90 | 131.7 | 9.071 | 10.89 | 12.70 | 14.51 | 16.33 | 18.14 |
| 6 × 12 | 5-1/2 × 11-1/2 | 63.25 | 121.2 | 697.1 | 57.98 | 159.4 | 10.98 | 13.18 | 15.37 | 17.57 | 19.77 | 21.96 |
| 6 × 14 | 5-1/2 × 13-1/2 | 74.25 | 167.1 | 1128 | 68.06 | 187.2 | 12.89 | 15.47 | 18.05 | 20.62 | 23.20 | 25.78 |
| 6 × 16 | 5-1/2 × 15-1/2 | 85.25 | 220.2 | 1707 | 78.15 | 214.9 | 14.80 | 17.76 | 20.72 | 23.68 | 26.64 | 29.60 |
| 6 × 18 | 5-1/2 × 17-1/2 | 96.25 | 280.7 | 2458 | 88.23 | 242.6 | 16.71 | 20.05 | 23.39 | 26.74 | 30.08 | 33.42 |
| 6 × 20 | 5-1/2 × 19-1/2 | 107.3 | 348.6 | 3398 | 98.31 | 270.4 | 18.62 | 22.34 | 26.07 | 29.79 | 33.52 | 37.24 |
| 6 × 22 | 5-1/2 × 21-1/2 | 118.3 | 423.7 | 4555 | 108.4 | 298.1 | 20.53 | 24.64 | 28.74 | 32.85 | 36.95 | 41.06 |
| 6 × 24 | 5-1/2 × 23-1/2 | 129.3 | 506.2 | 5948 | 118.5 | 325.8 | 22.44 | 26.93 | 31.41 | 35.90 | 40.39 | 44.88 |
| 8 × 8 | 7-1/2 × 7-1/2 | 56.25 | 70.31 | 263.7 | 70.31 | 263.7 | 9.766 | 11.72 | 13.67 | 15.63 | 17.58 | 19.53 |
| 8 × 10 | 7-1/2 × 9-1/2 | 71.25 | 112.8 | 535.9 | 89.06 | 334.0 | 12.37 | 14.84 | 17.32 | 19.79 | 22.27 | 24.74 |
| 8 × 12 | 7-1/2 × 11-1/2 | 86.25 | 165.3 | 950.5 | 107.8 | 404.3 | 14.97 | 17.97 | 20.96 | 23.96 | 26.95 | 29.95 |
| 8 × 14 | 7-1/2 × 13-1/2 | 101.3 | 227.8 | 1538 | 126.6 | 474.6 | 17.58 | 21.09 | 24.61 | 28.13 | 31.64 | 35.16 |
| 8 × 16 | 7-1/2 × 15-1/2 | 116.3 | 300.3 | 2327 | 145.5 | 544.9 | 20.18 | 24.22 | 28.26 | 32.29 | 36.33 | 40.36 |
| 8 × 18 | 7-1/2 × 17-1/2 | 131.3 | 382.8 | 3350 | 164.1 | 615.2 | 22.79 | 27.34 | 31.90 | 36.46 | 41.02 | 45.57 |
| 8 × 20 | 7-1/2 × 19-1/2 | 146.3 | 475.3 | 4634 | 182.8 | 685.5 | 25.39 | 30.47 | 35.55 | 40.63 | 45.70 | 50.78 |
| 8 × 22 | 7-1/2 × 21-1/2 | 161.3 | 577.8 | 6211 | 201.6 | 755.9 | 27.99 | 33.59 | 39.19 | 44.79 | 50.39 | 55.99 |
| 8 × 24 | 7-1/2 × 23-1/2 | 176.3 | 690.3 | 8111 | 220.3 | 826.2 | 30.60 | 36.72 | 42.84 | 48.96 | 55.08 | 61.20 |
| 10 × 10 | 9-1/2 × 9-1/2 | 90.25 | 142.9 | 678.6 | 142.9 | 678.6 | 15.67 | 18.80 | 21.94 | 25.07 | 28.20 | 31.34 |
| 10 × 12 | 9-1/2 × 11-1/2 | 109.3 | 209.4 | 1204 | 173.0 | 821.7 | 18.97 | 22.76 | 26.55 | 30.35 | 34.14 | 37.93 |
| 10 × 14 | 9-1/2 × 13-1/2 | 128.3 | 288.6 | 1946 | 203.1 | 964.5 | 22.27 | 26.72 | 31.17 | 35.63 | 40.08 | 44.53 |
| 10 × 16 | 9-1/2 × 15-1/2 | 147.3 | 380.4 | 2946 | 233.1 | 1107 | 25.56 | 30.68 | 35.79 | 40.90 | 46.02 | 51.13 |
| 10 × 18 | 9-1/2 × 17-1/2 | 166.3 | 484.9 | 4240 | 263.2 | 1250 | 28.86 | 34.64 | 40.41 | 46.18 | 51.95 | 57.73 |
| 10 × 20 | 9-1/2 × 19-1/2 | 185.3 | 602.1 | 5870 | 293.3 | 1393 | 32.16 | 38.59 | 45.03 | 51.46 | 57.89 | 64.32 |
| 10 × 22 | 9-1/2 × 21-1/2 | 204.3 | 731.9 | 7868 | 323.4 | 1536 | 35.46 | 42.55 | 49.64 | 56.74 | 63.83 | 70.92 |
| 10 × 24 | 9-1/2 × 23-1/2 | 223.3 | 874.4 | 10270 | 353.5 | 1679 | 38.76 | 46.51 | 54.26 | 62.01 | 69.77 | 77.52 |

[1] Nominal and minimum dressed sizes are provided in Table 8.1 for boards, dimension lumber, and timbers. The table provides the corresponding section properties about the primary (X-X) and secondary (Y-Y) axes for these products. This table is a reprint of Table 1B of the *NDS Supplement*.

## Table 8.1 Section Properties of Standard Dressed (S4S) Sawn Lumber[1] (Cont.)

| Nominal Size b × d | Standard Dressed Size (S4S) b × d inches × inches | Area of Section A in.² | X-X AXIS | | Y-Y AXIS | | Approximate weight in pounds per linear foot (lb/ft) of piece when density of wood equals | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Section Modulus $S_x$ in.³ | Moment of Inertia $I_x$ in.⁴ | Section Modulus $S_y$ in.³ | Moment of Inertia $I_y$ in.⁴ | 25 lb/ft.³ | 30 lb/ft.³ | 35 lb/ft.³ | 40 lb/ft.³ | 45 lb/ft.³ | 50 lb/ft.³ |
| 12 × 12 | 11-1/2 × 11-1/2 | 132.3 | 253.5 | 1458 | 253.5 | 1458 | 22.96 | 27.55 | 32.14 | 36.74 | 41.33 | 45.92 |
| 12 × 14 | 11-1/2 × 13-1/2 | 155.3 | 348.3 | 2358 | 297.6 | 1711 | 26.95 | 32.34 | 37.73 | 43.13 | 48.52 | 53.91 |
| 12 × 16 | 11-1/2 × 15-1/2 | 178.3 | 460.5 | 3569 | 341.6 | 1964 | 30.95 | 37.14 | 43.32 | 49.51 | 55.70 | 61.89 |
| 12 × 18 | 11-1/2 × 17-1/2 | 201.3 | 587.0 | 5136 | 385.7 | 2218 | 34.94 | 41.93 | 48.91 | 55.90 | 62.89 | 69.88 |
| 12 × 20 | 11-1/2 × 19-1/2 | 224.3 | 728.8 | 7106 | 429.8 | 2471 | 38.93 | 46.72 | 54.51 | 62.29 | 70.08 | 77.86 |
| 12 × 22 | 11-1/2 × 21-1/2 | 247.3 | 886.0 | 9524 | 473.9 | 2725 | 42.93 | 51.51 | 60.10 | 68.68 | 77.27 | 85.85 |
| 12 × 24 | 11-1/2 × 23-1/2 | 270.3 | 1058 | 12440 | 518.0 | 2978 | 46.92 | 56.30 | 65.69 | 75.07 | 84.45 | 93.84 |
| 14 × 14 | 13-1/2 × 13-1/2 | 182.3 | 410.1 | 2768 | 410.1 | 2768 | 31.64 | 37.97 | 44.30 | 50.63 | 56.95 | 63.28 |
| 14 × 16 | 13-1/2 × 15-1/2 | 209.3 | 540.6 | 4189 | 470.6 | 3178 | 36.33 | 43.59 | 50.86 | 58.13 | 65.39 | 72.66 |
| 14 × 18 | 13-1/2 × 17-1/2 | 236.3 | 689.1 | 6029 | 531.6 | 3588 | 41.02 | 49.22 | 57.42 | 65.63 | 73.83 | 82.03 |
| 14 × 20 | 13-1/2 × 19-1/2 | 263.3 | 855.6 | 8342 | 592.5 | 3998 | 45.70 | 54.84 | 63.98 | 73.13 | 82.27 | 91.41 |
| 14 × 22 | 13-1/2 × 21-1/2 | 290.3 | 1040 | 11180 | 653.1 | 4408 | 50.39 | 60.47 | 70.55 | 80.63 | 90.70 | 100.8 |
| 14 × 24 | 13-1/2 × 23-1/2 | 317.3 | 1243 | 14600 | 713.8 | 4818 | 55.08 | 66.09 | 77.11 | 88.13 | 99.14 | 110.2 |
| 16 × 16 | 15-1/2 × 15-1/2 | 240.3 | 620.6 | 4810 | 620.6 | 4810 | 41.71 | 50.05 | 58.39 | 66.74 | 75.08 | 83.42 |
| 16 × 18 | 15-1/2 × 17-1/2 | 271.3 | 791.1 | 6923 | 700.7 | 5431 | 47.09 | 56.51 | 65.93 | 75.35 | 84.77 | 94.18 |
| 16 × 20 | 15-1/2 × 19-1/2 | 302.3 | 982.3 | 9578 | 780.8 | 6051 | 52.47 | 62.97 | 73.46 | 83.96 | 94.45 | 104.9 |
| 16 × 22 | 15-1/2 × 21-1/2 | 333.3 | 1194 | 12840 | 860.9 | 6672 | 57.86 | 69.43 | 81.00 | 92.57 | 104.1 | 115.7 |
| 16 × 24 | 15-1/2 × 23-1/2 | 364.3 | 1427 | 16760 | 941.0 | 7293 | 63.24 | 75.89 | 88.53 | 101.2 | 113.8 | 126.5 |
| 18 × 18 | 17-1/2 × 17-1/2 | 306.3 | 892.2 | 7816 | 892.2 | 7816 | 53.17 | 63.80 | 74.44 | 85.07 | 95.70 | 106.3 |
| 18 × 20 | 17-1/2 × 19-1/2 | 341.3 | 1109 | 10810 | 995.3 | 8709 | 59.24 | 71.09 | 82.94 | 94.79 | 106.6 | 118.5 |
| 18 × 22 | 17-1/2 × 21-1/2 | 376.3 | 1348 | 14490 | 1097 | 9602 | 65.32 | 78.38 | 91.45 | 104.5 | 117.6 | 130.6 |
| 18 × 24 | 17-1/2 × 23-1/2 | 411.3 | 1611 | 18930 | 1199 | 10500 | 71.40 | 85.68 | 99.96 | 114.2 | 128.5 | 142.8 |
| 20 × 20 | 19-1/2 × 19-1/2 | 380.3 | 1236 | 12050 | 1236 | 12050 | 66.02 | 79.22 | 92.42 | 105.6 | 118.8 | 132.0 |
| 20 × 22 | 19-1/2 × 21-1/2 | 419.3 | 1502 | 16150 | 1362 | 13380 | 72.78 | 87.34 | 101.9 | 116.5 | 131.0 | 145.6 |
| 20 × 24 | 19-1/2 × 23-1/2 | 458.3 | 1795 | 21080 | 1489 | 14520 | 79.56 | 95.47 | 111.4 | 127.3 | 143.2 | 159.1 |
| 22 × 22 | 21-1/2 × 21-1/2 | 462.3 | 1656 | 17810 | 1656 | 17810 | 80.25 | 96.30 | 112.4 | 128.4 | 144.5 | 160.5 |
| 22 × 24 | 21-1/2 × 23-1/2 | 505.3 | 1979 | 23250 | 1810 | 19460 | 87.72 | 105.3 | 122.8 | 140.3 | 157.9 | 175.4 |
| 24 × 24 | 23-1/2 × 23-1/2 | 552.3 | 2163 | 25420 | 2163 | 25420 | 95.88 | 115.1 | 134.2 | 153.4 | 172.6 | 191.8 |

[1] Nominal and minimum dressed sizes are provided in Table 1.1 for boards, dimension lumber, and timbers. The table provides the corresponding section properties about the primary (X-X) and secondary (Y-Y) axes for these products. This table is a reprint of Table 1B of the *NDS Supplement*.