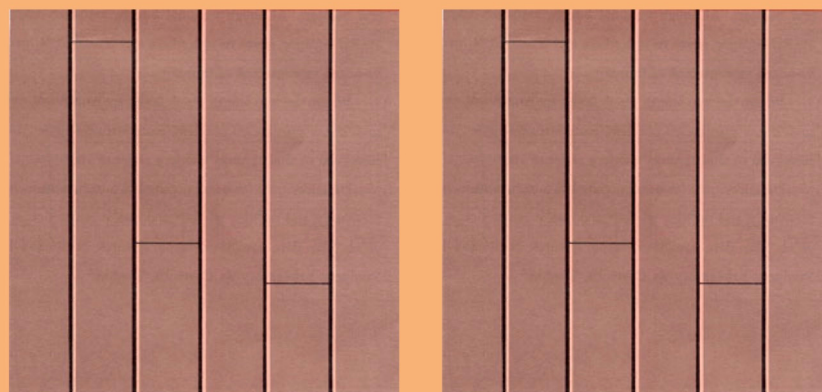
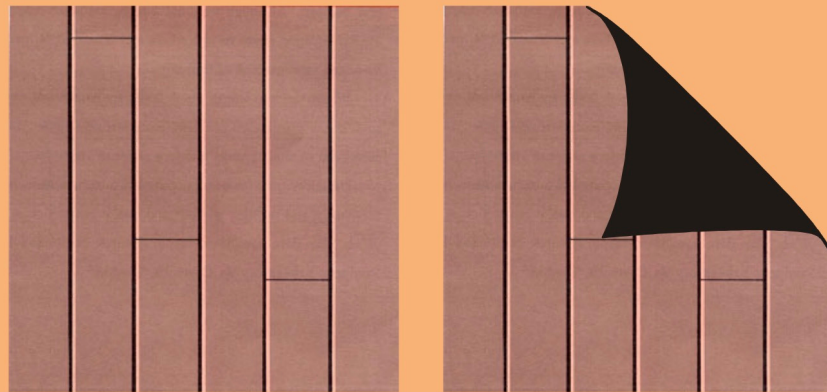


TONGUE AND GROOVE ROOF DECKING



TONGUE AND GROOVE ROOF DECKING

The American Wood Council (AWC) is the wood products division of the American Forest & Paper Association (AF&PA). AF&PA is the national trade association of the forest, paper and wood products industry, representing member companies engaged in growing, harvesting and processing wood and wood fiber, manufacturing pulp, paper and paperboard products from both virgin and recycled fiber, and producing engineered and traditional wood products. For more information see www.afandpa.org.

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GENERAL

Timber tongue and groove decking is a specialty lumber product, constituting an important part of modern timber construction, that can be used for many applications to provide an all wood appearance. Nominal three and four inch decking is especially well adapted for use with glued laminated arches and girders and is easily and quickly erected. To be suitable for its intended purposes, timber tongue and groove decking must be well manufactured to a low moisture content.

Special effort has been made to ensure the accuracy of the information presented. It is intended that this document be used in conjunction with competent engineering design, accurate fabrication, and adequate supervision of construction. However, the American Forest and Paper Association does not assume any responsibility for errors or omissions in WCD No. 2 nor for engineering designs or plans prepared from it. The reader is encouraged to consult the current edition of the code and to consult the authority having jurisdiction.

MATERIALS

Decay Resistance

Structural members that are exposed to weather shall be preservatively treated or be from the heartwood of a naturally durable wood.

Sawn Lumber

The lumber used in heavy timber framing members and roof decking shall be graded in accordance with the grading rules under which the species is customarily graded. Specific grading rules may be obtained from the respective rules writing agencies:

1. "Standard Grading Rules for Northeastern Lumber," Northeastern Lumber Manufacturers Association, 272 Tuttle Rd., PO Box 87A, Cumberland Center, ME 04021 (NELMA)
2. "Standard Specifications for Grades of California Redwood Lumber," Redwood Inspection Service, 405 Enfrente Dr., Suite 200, Novato, CA 94949 (RIS)
3. "Standard Grading Rules For Southern Pine Lumber," Southern Pine Inspection Bureau, 4709 Scenic Highway, Pensacola, FL 32504 (SPIB)
4. "Standard Grading Rules for West Coast Lumber, No. 17," West Coast Lumber Inspection Bureau, P.O. Box 23145, Portland, OR 97223 (WCLIB)
5. "Western Lumber Grading Rules," Western Wood Products Association, 522 SW Fifth, Suite 500, Portland, OR 97204 (WWPA)
6. "NLGA Standard Grading Rules for Canadian Lumber," National Lumber Grades Authority, 960 Quayside Dr., New Westminster, B.C., Canada V3M 6G2

LENGTHS

Decking pieces may be of specified length or may be random length. All layup arrangements except controlled random layup require that the specifier indicate the required lengths.

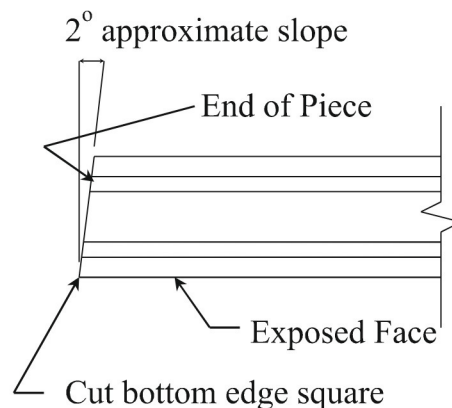
MOISTURE CONTENT

The maximum moisture content shall be 15% for 2-inch nominal decking and 19% for 3- and 4-inch decking. Moisture content shall be determined by such methods as will assure these limitations.

APPLICATION

Tongue-and-groove wood decking shall be installed with tongues up on sloped or pitched roofs, and outward in direction of laying on flat roofs. It is to be laid with pattern faces down and exposed on the underside. Each piece shall be square end trimmed. When random lengths are furnished, each piece must be "*square end trimmed*" across the face so that at least 90% of the pieces will be within 1/64 inches of square for each nominal 2" of width. When the end of a piece is beveled the vertical end cut may vary from square as shown in Figure 1.

Figure 1. Beveled End Cut (optional)



NAILING SCHEDULES

At each support two-inch decking shall be toenailed through the tongue and face nailed with one nail, using 16d common nails.

Three and four-inch decking shall be toenailed at each support with one 40d nail and face nailed with one 60d nail. Courses for three and four inch decking shall be spiked to each other with 8 inch spikes at intervals not to exceed 30 inches through predrilled edge holes and with one spike at a distance not exceeding 10 inches from the end of each piece. See Figure 2 for drilling details.

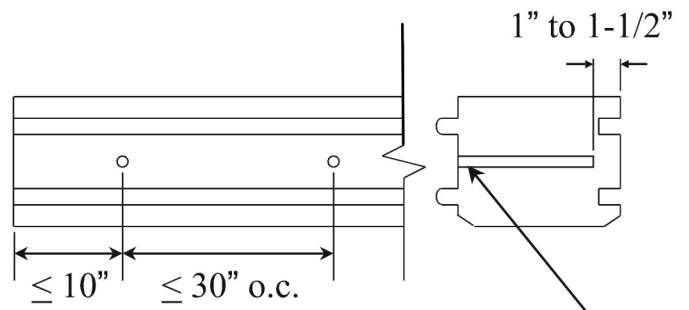
LAYUPS

Heavy timber decking may be installed in any of the following arrangements:

Simple Span

All pieces supported on two supports (Figure 3).

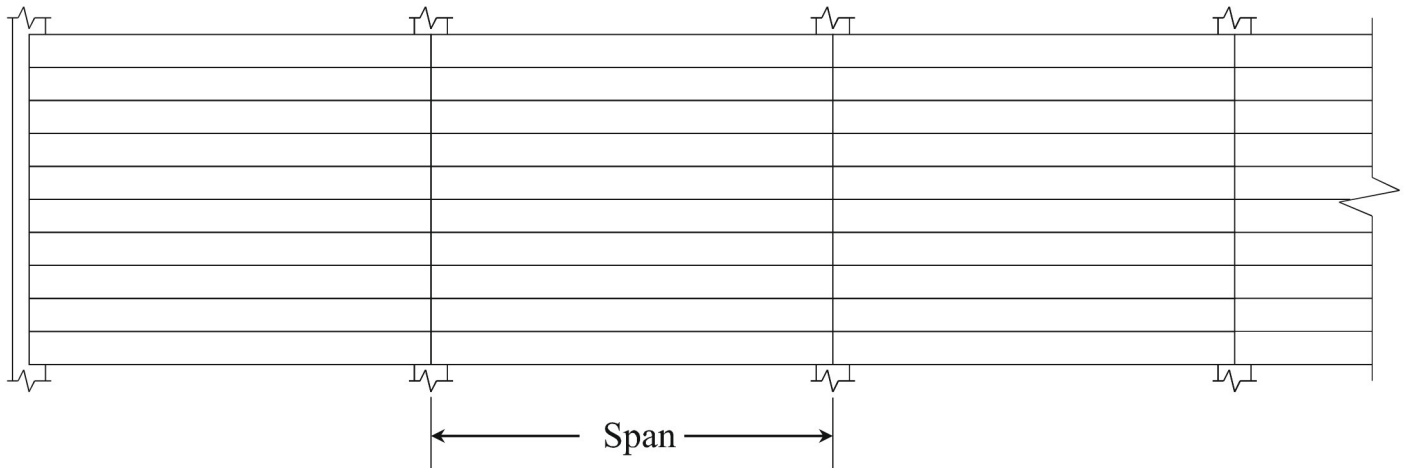
Figure 2. Drilling Detail



Hole diameter approximately same as nail diameter.

Locate end holes not over 10 inches from end of piece.

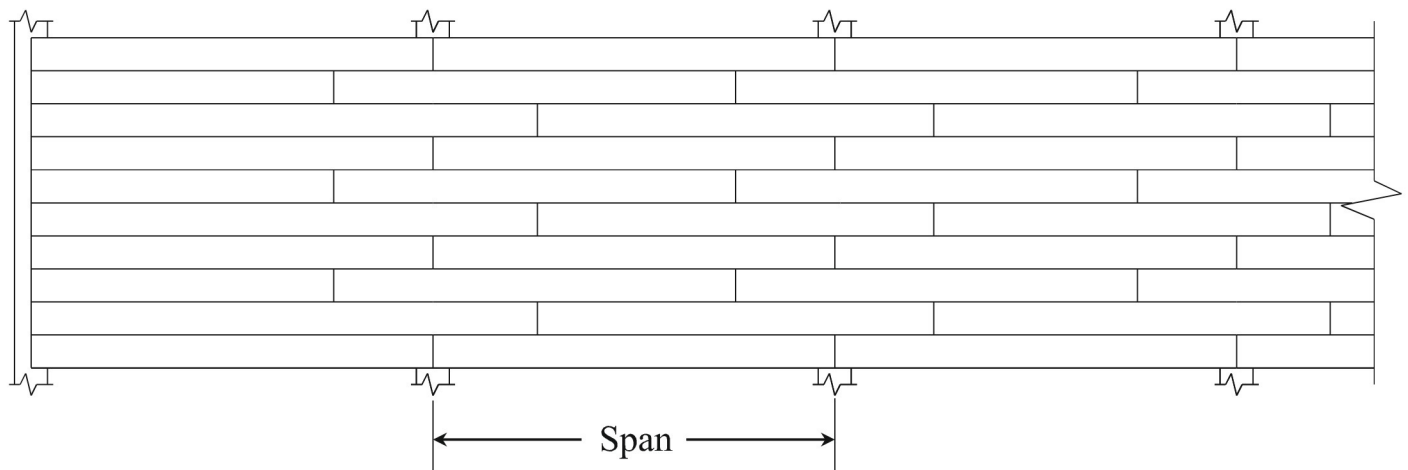
Figure 3. Simple Span



Cantilevered Pieces Intermixed

This arrangement is applicable to 4 or more supports (3 or more spans). Pieces in the starter course and every third course are simple span. Pieces in other courses are cantilevered over the supports with end joints at alternate quarter or third points of the spans, and each piece rests on at least one support. A tie between supports is provided by the simple span courses of the arrangement (Figure 4).

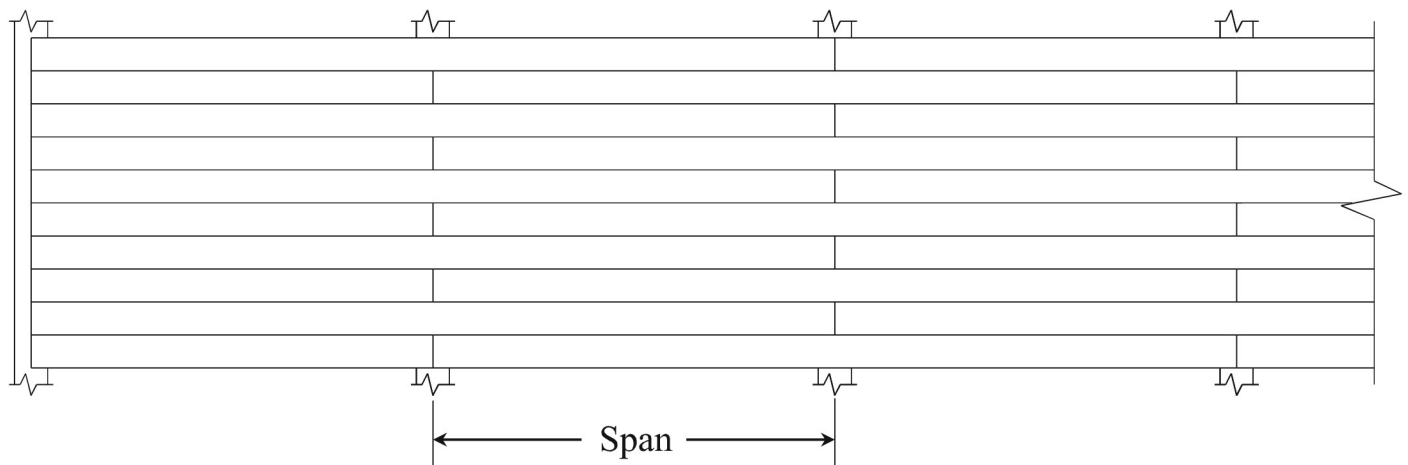
Figure 4. Cantilevered Pieces Intermixed Layout



Combination Simple and Two-Span Continuous

Alternate pieces in end spans are simple span; adjacent pieces are two-span continuous. End joints are staggered in adjacent courses and occur over supports only (Figure 5).

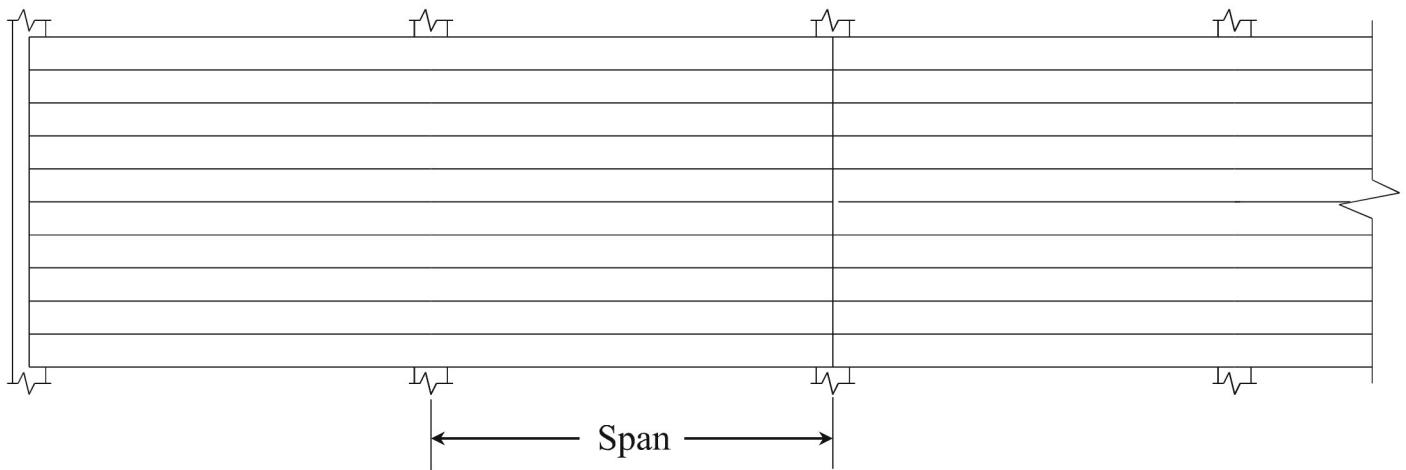
Figure 5. Combination Simple and Two-Span Continuous Layout



Two-Span Continuous

All pieces are supported on three supports. All end joints occur in line on every other support (Figure 6).

Figure 6. Two-span Continuous Layup



Controlled Random Layup

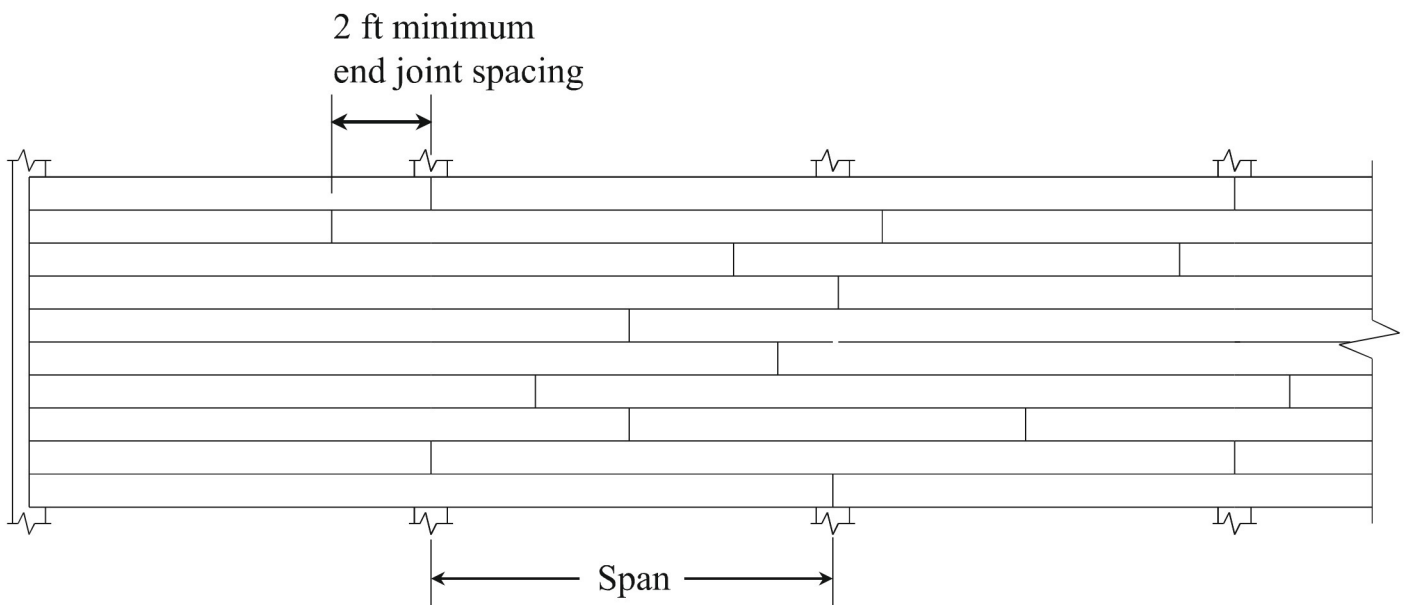
This arrangement is applicable to 4 or more supports (3 or more spans). With less than 4 supports, a special pattern requiring specified lengths must be used. Joints in the same general line (within 6 inches of being in line each way) shall be separated by at least two intervening courses. In the end bays each piece must rest on the end support or continue over the first interior support for at least 2 ft (Figure 7).

Two Inch Decking. There shall be a minimum distance of 2 feet between end joints in adjacent courses. To provide lateral restraint for the supporting member, the

pieces in at least the first and second courses must bear on at least two supports with end joints in these two courses occurring on alternate supports. A maximum of seven intervening courses is allowed before this pattern is repeated. If some other provision, such as plywood overlay, is made to provide continuity, this pattern is not necessary.

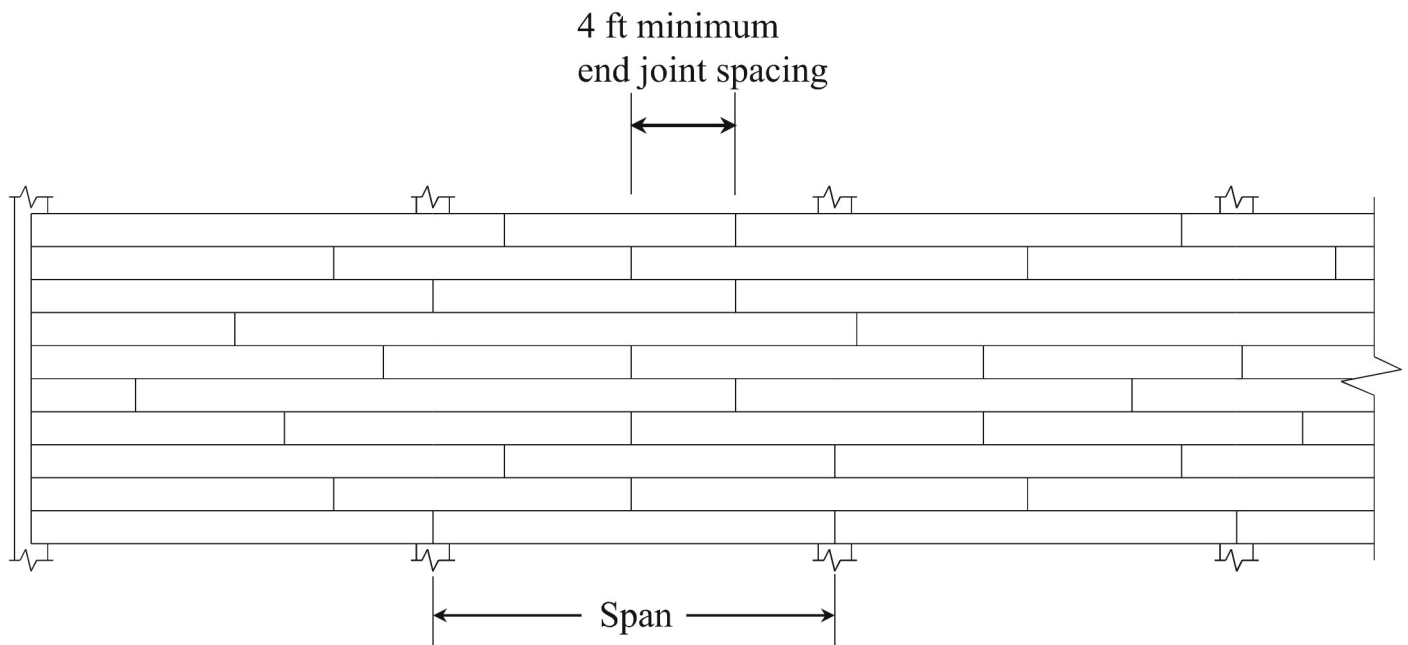
End joints in 2 in. nominal thickness decking not occurring over supports when random length pieces are used shall (a) be matched tongued and grooved or (b) have metal splines inserted at ends so that loads may be distributed from end to end as well as across the planks.

Figure 7. Controlled Random Layup (Two-Inch Decking)



Three and Four Inch Decking. There shall be a minimum distance of 4 feet between end joints in adjacent courses. For 3 and 4 inch decking in the interior bays, occasional pieces not resting over a support may occur provided the ends of the adjacent pieces in the same course are continued for at least 2 feet over the next support. This condition shall not occur more than once in every 6 courses in each interior bay (Figure 8).

Figure 8. Controlled Random Layup (Three and Four Inch Decking)



Cantilever Spans With Controlled Random Layup

When the overhang does not exceed 1-1/2 ft., 2 ft. and 3 ft. for nominal 2 inch, 3 inch, and 4 inch thick decking, respectively, no special considerations for layup are necessary. The maximum cantilever length for controlled random layup is limited to 0.3 times the length of the first adjacent interior span. For cantilever overhangs exceeding the normal overhang, but not exceeding the maximum, a structural fascia should be fastened to each decking piece to maintain a continuously straight roof line. Also, there shall be no end joints in the cantilevered portion or within 1/2 the span ($L/2$) of the bay adjacent to the cantilevered span.

MINIMUM LENGTHS

If pieces are for controlled random layup, odd or even lengths are permitted, and the minimum lengths based on board feet percentages shall be as follows:

Two Inch Decking

- Not less than 40% to be 14 ft. and longer
- Not more than 10% to be less than 10 ft.
- Not more than 1 % to be 4 to 5 ft.
- Minimum length is limited to 75% of the span length (i.e., for 8 ft. support spacing, 6 ft.)

Three Inch Decking

- Not less than 40% to be 14 ft. and longer with at least 20% equal to or greater in length than the maximum span.
- Not more than 10% to be less than 10 ft.
- Not more than 1% to be 4 to 5 ft.

Four Inch Decking

- Not less than 25% to be 16 ft. and longer with at least 20% equal to or greater in length than the maximum span
- Not less than 50% to be 15 ft. and longer
- Not more than 10% to be 5 to 10 ft.
- Not more than 1% to be 4 to 5 ft.

SPAN TABLES AND LOADS

Allowable Loads

Allowable loads for heavy timber decking may be determined by entering Tables 1 through 5 with the appropriate bending stress and modulus of elasticity values, and using the lower of the tabulated load values from the tables for the nominal thickness and span under consideration. Bending stress and modulus of elasticity values for wood decking species shall be determined in accordance with the current edition of the *National Design Specification® Supplement: Design Values for Wood Construction*.

Allowable loads given in Tables 1 through 5 are for the simple span and controlled random layup arrangements.

The allowable load given in Tables 1 and 2 are based on a maximum moisture content of 15% for 2 inch decking. The allowable loads given in Tables 3 through 5 are based on a maximum moisture content of 19% for 3 and 4 inch decking. If the maximum moisture content is limited to 15% for 3 and 4 inches decking, the allowable bending

stress valued given in Table 3 may be multiplied by 1.08 and the modulus elasticity values in Tables 4 and 5 may be multiplied by 1.05.

Sloped Roofs

Allowable loads given in Tables 1 through 5 are in terms of total uniformly-distributed loads on a horizontal surface. For sloped roofs, dead loads are based on area of the roof while live loads provided in the building code are in terms of horizontal projection. For low slope roofs (slopes of 3 in 12 or less), roof area dead loads and horizontally-projected live loads can be conservatively added together with little error. For higher sloped roofs, some designers may wish to convert the roof area dead load and horizontally-projected live load into two load components, normal and parallel to the roof slope, to be used with the sloped-roof span.

To convert horizontally-projected live loads to a sloped-roof area live load:

$$W_{sr} = (w_{hp}) \cos(\theta)$$

where:

θ = roof slope

W_{sr} = sloped roof load (live)

W_{hp} = horizontally projected load (live)

To convert the total sloped-roof area load (dead + live loads) to normal and parallel load components:

$$W_{\perp} = (w_{sr}) \cos(\theta)$$

$$W_{\parallel} = (w_{sr}) \sin(\theta)$$

where:

W_{\perp} = total load normal to roof slope

W_{\parallel} = total load parallel to roof slope

W_{sr} = total sloped roof load (dead + live)

To convert horizontally-projected spans to sloped-roof spans:

$$S_{SR} = S_{hp} / \cos(\theta)$$

where:

S_{hp} = horizontally projected roof span

S_{SR} = sloped roof span

Note: The sloped roof span should be used when calculating board footage.

Controlled Random Layup Values

The allowable loads for controlled random layup of 2 inch nominal thickness decking as given in Tables 1 and 2, are based on the standard engineering formula for a three-equal-span, continuous, uniformly-loaded member; however, only $2/3$ of the moment of inertia for the cross section was used in calculating the loads. Loads limited by deflection as given in Table 2, are for the maximum deflections in the end spans.

The allowable loads for controlled random layup of 3 and 4 inch nominal thickness decking as given in Tables 3 through 5, are based on the standard engineering formula for a three-equal-span, continuous, uniformly-loaded member; however, only 80% of the moment of inertia for the cross section was used in calculating the loads. Loads limited by deflection, as given in Tables 4 and 5, are for the maximum deflections in the end spans.

The percentage adjustments in moment of inertia take into account the differences between continuous decking without joints and the controlled random layup of decking as specified herein. The factors of $2/3$ for 2 inch and 80% for 3 and 4 inch decking were selected after careful evaluation of tests and previous experience.

When controlled random layup as specified herein is used for unequal spans, non-uniform loading, cantilever action, or conditions other than covered herein by the tabulated values, the same adjustment factors should be applied to the moment of inertia used in standard engineering formulas representing the actual conditions of load and span.

Table 1. Two Inch Nominal Thickness - Allowable Roof Load Limited by Bending

| Bending Stress, psi | Allowable Uniformly Distributed Total Roof Load ^{1,2,3,4,5} , psf | | | | | | | | | | | | | |
|---------------------|--|-----|----|----|----|----|----|-----------------------------------|-----|----|----|----|----|----|
| | Simple Span, ft. | | | | | | | Controlled Random Layup Span, ft. | | | | | | |
| | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 875 | 73 | 54 | 41 | 32 | 26 | 22 | 18 | 61 | 45 | 34 | 27 | 22 | 18 | 15 |
| 950 | 79 | 58 | 45 | 35 | 29 | 24 | 20 | 66 | 48 | 37 | 29 | 24 | 20 | 16 |
| 1000 | 83 | 61 | 47 | 37 | 30 | 25 | 21 | 69 | 51 | 39 | 31 | 25 | 21 | 17 |
| 1050 | 88 | 64 | 49 | 39 | 32 | 26 | 22 | 73 | 54 | 41 | 32 | 26 | 22 | 18 |
| 1100 | 92 | 67 | 52 | 41 | 33 | 27 | 23 | 76 | 56 | 43 | 34 | 28 | 23 | 19 |
| 1150 | 96 | 70 | 54 | 43 | 35 | 29 | 24 | 80 | 59 | 45 | 35 | 29 | 24 | 20 |
| 1200 | 100 | 73 | 56 | 44 | 36 | 30 | 25 | 83 | 61 | 47 | 37 | 30 | 25 | 21 |
| 1250 | 104 | 77 | 59 | 46 | 38 | 31 | 26 | 87 | 64 | 49 | 39 | 31 | 26 | 22 |
| 1300 | 108 | 80 | 61 | 48 | 39 | 32 | 27 | 90 | 66 | 51 | 40 | 33 | 27 | 23 |
| 1350 | 113 | 83 | 63 | 50 | 41 | 33 | 28 | 94 | 69 | 53 | 42 | 34 | 28 | 23 |
| 1400 | 117 | 86 | 66 | 52 | 42 | 35 | 29 | 97 | 71 | 55 | 43 | 35 | 29 | 24 |
| 1450 | 121 | 89 | 68 | 54 | 44 | 36 | 30 | 101 | 74 | 57 | 45 | 36 | 30 | 25 |
| 1500 | 125 | 92 | 70 | 56 | 45 | 37 | 31 | 104 | 77 | 59 | 46 | 38 | 31 | 26 |
| 1550 | 129 | 95 | 73 | 57 | 47 | 38 | 32 | 108 | 79 | 61 | 48 | 39 | 32 | 27 |
| 1600 | 133 | 98 | 75 | 59 | 48 | 40 | 33 | 111 | 82 | 63 | 49 | 40 | 33 | 28 |
| 1650 | 138 | 101 | 77 | 61 | 50 | 41 | 34 | 115 | 84 | 64 | 51 | 41 | 34 | 29 |
| 1700 | 142 | 104 | 80 | 63 | 51 | 42 | 35 | 118 | 87 | 66 | 52 | 43 | 35 | 30 |
| 1750 | 146 | 107 | 82 | 65 | 53 | 43 | 36 | 122 | 89 | 68 | 54 | 44 | 36 | 30 |
| 1900 | 158 | 116 | 89 | 70 | 57 | 47 | 40 | 132 | 97 | 74 | 59 | 48 | 39 | 33 |
| 2000 | 167 | 122 | 94 | 74 | 60 | 50 | 42 | 139 | 102 | 78 | 62 | 50 | 41 | 35 |

¹ Tabulated values are based on 1-1/2 in. net thickness. For 1-7/16 in. decking multiply the tabulated allowable loads by 0.918

² To determine allowable uniformly distributed loads for other span conditions, use simple span load values for combination simple and two-span continuous, and two span continuous layouts; and use controlled random layup load values for cantilevered pieces intermixed layout.

³ Duration of Load, $C_D = 1.0$ used in this table. For other load durations, adjust by the appropriate factor.

⁴ No increase for size effect has been applied, ($C_F = 1.00$).

⁵ Dry conditions of use.

Table 2. Two Inch Nominal Thickness - Allowable Roof Load Limited by Deflection

| Modulus of Elasticity, psi | Deflection Limit ² | Allowable Uniformly Distributed Total Roof Load ^{1,3,4,5,6} , psf | | | | | | | | | | | | | |
|----------------------------|-------------------------------|--|----|----|----|----|----|-----------------------------------|-----|----|----|----|----|----|----|
| | | Simple Span, ft. | | | | | | Controlled Random Layup Span, ft. | | | | | | | |
| | | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 700000 | L/180 | 32 | 20 | 14 | 10 | 7 | 5 | 4 | 41 | 26 | 17 | 12 | 9 | 7 | 5 |
| | L/240 | 24 | 15 | 10 | 7 | 5 | 4 | 3 | 31 | 19 | 13 | 9 | 7 | 5 | 4 |
| 800000 | L/180 | 37 | 23 | 16 | 11 | 8 | 6 | 5 | 47 | 29 | 20 | 14 | 10 | 8 | 6 |
| | L/240 | 28 | 17 | 12 | 8 | 6 | 5 | 3 | 35 | 22 | 15 | 10 | 8 | 6 | 4 |
| 900000 | L/180 | 42 | 26 | 18 | 12 | 9 | 7 | 5 | 53 | 33 | 22 | 16 | 11 | 9 | 7 |
| | L/240 | 31 | 20 | 13 | 9 | 7 | 5 | 4 | 39 | 25 | 17 | 12 | 9 | 6 | 5 |
| 1000000 | L/180 | 46 | 29 | 20 | 14 | 10 | 8 | 6 | 58 | 37 | 25 | 17 | 13 | 9 | 7 |
| | L/240 | 35 | 22 | 15 | 10 | 8 | 6 | 4 | 44 | 28 | 18 | 13 | 9 | 7 | 5 |
| 1100000 | L/180 | 51 | 32 | 21 | 15 | 11 | 8 | 6 | 64 | 40 | 27 | 19 | 14 | 10 | 8 |
| | L/240 | 38 | 24 | 16 | 11 | 8 | 6 | 5 | 48 | 30 | 20 | 14 | 10 | 8 | 6 |
| 1200000 | L/180 | 56 | 35 | 23 | 16 | 12 | 9 | 7 | 70 | 44 | 30 | 21 | 15 | 11 | 9 |
| | L/240 | 42 | 26 | 18 | 12 | 9 | 7 | 5 | 53 | 33 | 22 | 16 | 11 | 9 | 7 |
| 1300000 | L/180 | 60 | 38 | 25 | 18 | 13 | 10 | 8 | 76 | 48 | 32 | 22 | 16 | 12 | 9 |
| | L/240 | 45 | 28 | 19 | 13 | 10 | 7 | 6 | 57 | 36 | 24 | 17 | 12 | 9 | 7 |
| 1400000 | L/180 | 65 | 41 | 27 | 19 | 14 | 11 | 8 | 82 | 51 | 34 | 24 | 18 | 13 | 10 |
| | L/240 | 49 | 31 | 21 | 14 | 11 | 8 | 6 | 61 | 39 | 26 | 18 | 13 | 10 | 8 |
| 1500000 | L/180 | 69 | 44 | 29 | 21 | 15 | 11 | 9 | 88 | 55 | 37 | 26 | 19 | 14 | 11 |
| | L/240 | 52 | 33 | 22 | 15 | 11 | 8 | 7 | 66 | 41 | 28 | 19 | 14 | 11 | 8 |
| 1600000 | L/180 | 74 | 47 | 31 | 22 | 16 | 12 | 9 | 93 | 59 | 39 | 28 | 20 | 15 | 12 |
| | L/240 | 56 | 35 | 23 | 16 | 12 | 9 | 7 | 70 | 44 | 30 | 21 | 15 | 11 | 9 |
| 1700000 | L/180 | 79 | 50 | 33 | 23 | 17 | 13 | 10 | 99 | 62 | 42 | 29 | 21 | 16 | 12 |
| | L/240 | 59 | 37 | 25 | 17 | 13 | 10 | 7 | 74 | 47 | 31 | 22 | 16 | 12 | 9 |
| 1800000 | L/180 | 83 | 52 | 35 | 25 | 18 | 14 | 10 | 105 | 66 | 44 | 31 | 23 | 17 | 13 |
| | L/240 | 63 | 39 | 26 | 19 | 14 | 10 | 8 | 79 | 50 | 33 | 23 | 17 | 13 | 10 |

¹ Tabulated values are based on 1-1/2 in. net thickness. For 1-7/16 in. decking multiply the tabulated allowable loads by 0.880.

² For a deflection limit of L/360, use 1/2 the tabulated value for a deflection limit of L/180.

³ To determine allowable uniformly distributed loads for other span conditions, multiply controlled random layup load values by the following factors:

| | |
|--|------|
| Cantilever pieces intermixed; | 1.05 |
| Combination simple span and two-span continuous; | 1.31 |
| Two-span continuous; | 1.85 |

⁴ Duration of Load, $C_D = 1.0$ used in this table. For other load durations, adjust by the appropriate factor.

⁵ No increase for size effect has been applied, ($C_F = 1.00$).

⁶ Dry conditions of use.

Table 3. Three and Four Inch Nominal Thickness - Allowable Roof Load Limited by Bending - Simple Span and Controlled Random Layups (3 or More Spans)

| Bending Stress, psi | Allowable Uniformly Distributed Total Roof Load ^{1,3,5,6,7} , psf | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------|--|-----|-----|-----|-----|----|----|----|----|----|---|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|
| | 3 inch nominal thickness ² , Span, ft. | | | | | | | | | | 4 inch nominal thickness ⁴ , Span, ft. | | | | | | | | | | | | | | | |
| | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 875 | 114 | 90 | 73 | 60 | 51 | 43 | 37 | 32 | 28 | 25 | 23 | 20 | 18 | 223 | 176 | 143 | 118 | 99 | 85 | 73 | 64 | 56 | 49 | 44 | 40 | 36 |
| 950 | 124 | 98 | 79 | 65 | 55 | 47 | 40 | 35 | 31 | 27 | 24 | 22 | 20 | 242 | 192 | 155 | 128 | 108 | 92 | 79 | 69 | 61 | 54 | 48 | 43 | 39 |
| 1000 | 130 | 103 | 83 | 69 | 58 | 49 | 43 | 37 | 33 | 29 | 26 | 23 | 21 | 255 | 202 | 163 | 135 | 113 | 97 | 83 | 73 | 64 | 57 | 50 | 45 | 41 |
| 1050 | 137 | 108 | 88 | 72 | 61 | 52 | 45 | 39 | 34 | 30 | 27 | 24 | 22 | 268 | 212 | 172 | 142 | 119 | 101 | 88 | 76 | 67 | 59 | 53 | 48 | 43 |
| 1100 | 143 | 113 | 92 | 76 | 64 | 54 | 47 | 41 | 36 | 32 | 28 | 25 | 23 | 281 | 222 | 180 | 148 | 125 | 106 | 92 | 80 | 70 | 62 | 55 | 50 | 45 |
| 1150 | 150 | 118 | 96 | 79 | 67 | 57 | 49 | 43 | 37 | 33 | 30 | 27 | 24 | 293 | 232 | 188 | 155 | 130 | 111 | 96 | 83 | 73 | 65 | 58 | 52 | 47 |
| 1200 | 156 | 123 | 100 | 83 | 69 | 59 | 51 | 44 | 39 | 35 | 31 | 28 | 25 | 306 | 242 | 196 | 162 | 136 | 116 | 100 | 87 | 77 | 68 | 60 | 54 | 49 |
| 1250 | 163 | 129 | 104 | 86 | 72 | 62 | 53 | 46 | 41 | 36 | 32 | 29 | 26 | 319 | 252 | 204 | 169 | 142 | 121 | 104 | 91 | 80 | 71 | 63 | 57 | 51 |
| 1300 | 169 | 134 | 108 | 90 | 75 | 64 | 55 | 48 | 42 | 37 | 33 | 30 | 27 | 332 | 262 | 212 | 175 | 147 | 126 | 108 | 94 | 83 | 73 | 66 | 59 | 53 |
| 1350 | 176 | 139 | 113 | 93 | 78 | 67 | 57 | 50 | 44 | 39 | 35 | 31 | 28 | 345 | 272 | 221 | 182 | 153 | 130 | 113 | 98 | 86 | 76 | 68 | 61 | 55 |
| 1400 | 182 | 144 | 117 | 96 | 81 | 69 | 60 | 52 | 46 | 40 | 36 | 32 | 29 | 357 | 282 | 229 | 189 | 159 | 135 | 117 | 102 | 89 | 79 | 71 | 63 | 57 |
| 1450 | 189 | 149 | 121 | 100 | 84 | 71 | 62 | 54 | 47 | 42 | 37 | 33 | 30 | 370 | 292 | 237 | 196 | 164 | 140 | 121 | 105 | 93 | 82 | 73 | 66 | 59 |
| 1500 | 195 | 154 | 125 | 103 | 87 | 74 | 64 | 56 | 49 | 43 | 39 | 35 | 31 | 383 | 302 | 245 | 202 | 170 | 145 | 125 | 109 | 96 | 85 | 76 | 68 | 61 |
| 1550 | 202 | 159 | 129 | 107 | 90 | 76 | 66 | 57 | 50 | 45 | 40 | 36 | 32 | 396 | 313 | 253 | 209 | 176 | 150 | 129 | 113 | 99 | 88 | 78 | 70 | 63 |
| 1600 | 208 | 165 | 133 | 110 | 93 | 79 | 68 | 59 | 52 | 46 | 41 | 37 | 33 | 408 | 323 | 261 | 216 | 181 | 155 | 133 | 116 | 102 | 90 | 81 | 72 | 65 |
| 1650 | 215 | 170 | 138 | 114 | 95 | 81 | 70 | 61 | 54 | 48 | 42 | 38 | 34 | 421 | 333 | 270 | 223 | 187 | 159 | 138 | 120 | 105 | 93 | 83 | 75 | 67 |
| 1700 | 221 | 175 | 142 | 117 | 98 | 84 | 72 | 63 | 55 | 49 | 44 | 39 | 35 | 434 | 343 | 278 | 229 | 193 | 164 | 142 | 123 | 108 | 96 | 86 | 77 | 69 |
| 1750 | 228 | 180 | 146 | 121 | 101 | 86 | 74 | 65 | 57 | 50 | 45 | 40 | 36 | 447 | 353 | 286 | 236 | 198 | 169 | 146 | 127 | 112 | 99 | 88 | 79 | 71 |
| 1900 | 247 | 195 | 158 | 131 | 110 | 94 | 81 | 70 | 62 | 55 | 49 | 44 | 40 | 485 | 383 | 310 | 256 | 216 | 184 | 158 | 138 | 121 | 107 | 96 | 86 | 78 |
| 2000 | 260 | 206 | 167 | 138 | 116 | 99 | 85 | 74 | 65 | 58 | 51 | 46 | 42 | 510 | 403 | 327 | 270 | 227 | 193 | 167 | 145 | 128 | 113 | 101 | 90 | 82 |

¹ These load values may also be used for cantilevered pieces intermixed, combination simple span and two-span continuous, and two-span continuous layups.

² Tabulated values are based on 2-1/2 in. net thickness. For 2-5/8 in. decking multiply the tabulated allowable loads by 1.10.

³ When using controlled random layups spans greater than 14 feet for 3-inch decking and greater than 16 feet for 4-inch decking requires special ordering of additional lengths to assure that at least 20% of the decking is equal to the span length or longer.

⁴ 3-1/2 in. net thickness

⁵ Duration of Load, $C_D = 1.0$ used in this table. For other load durations, adjust by the appropriate factor.

⁶ No increase for size effect has been applied, ($C_F = 1.00$).

⁷ Dry conditions of use.

Table 4. Three and Four Inch Nominal Thickness - Allowable Roof Load Limited by Deflection - Simple Span Layup

| Modulus of Elasticity, psi | Deflection Limit ¹ | Allowable Uniformly Distributed Total Roof Load ^{4,5,6} , psf | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|-------------------------------|--|-----|----|----|----|----|----|----|----|-----|---|-----|-----|-----|-----|----|----|----|----|----|----|----|
| | | 3 inch nominal thickness ² , Span, ft. | | | | | | | | | | 4 inch nominal thickness ³ , Span, ft. | | | | | | | | | | | |
| | | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 700000 | L/180 | 63 | 44 | 32 | 24 | 19 | 15 | 12 | 10 | 8 | 174 | 122 | 89 | 67 | 51 | 40 | 32 | 26 | 22 | 18 | 15 | 13 | 11 |
| | L/240 | 47 | 33 | 24 | 18 | 14 | 11 | 9 | 7 | 6 | 130 | 91 | 67 | 50 | 39 | 30 | 24 | 20 | 16 | 14 | 11 | 10 | 8 |
| 800000 | L/180 | 72 | 51 | 37 | 28 | 21 | 17 | 13 | 11 | 9 | 198 | 139 | 102 | 76 | 59 | 46 | 37 | 30 | 25 | 21 | 17 | 15 | 13 |
| | L/240 | 54 | 38 | 28 | 21 | 16 | 13 | 10 | 8 | 7 | 149 | 105 | 76 | 57 | 44 | 35 | 28 | 23 | 19 | 16 | 13 | 11 | 10 |
| 900000 | L/180 | 81 | 57 | 42 | 31 | 24 | 19 | 15 | 12 | 10 | 223 | 157 | 114 | 86 | 66 | 52 | 42 | 34 | 28 | 23 | 20 | 17 | 14 |
| | L/240 | 61 | 43 | 31 | 23 | 18 | 14 | 11 | 9 | 8 | 167 | 118 | 86 | 64 | 50 | 39 | 31 | 25 | 21 | 17 | 15 | 13 | 11 |
| 1000000 | L/180 | 90 | 64 | 46 | 35 | 27 | 21 | 17 | 14 | 11 | 248 | 174 | 127 | 95 | 74 | 58 | 46 | 38 | 31 | 26 | 22 | 19 | 16 |
| | L/240 | 68 | 48 | 35 | 26 | 20 | 16 | 13 | 10 | 8 | 186 | 131 | 95 | 72 | 55 | 43 | 35 | 28 | 23 | 19 | 16 | 14 | 12 |
| 1100000 | L/180 | 99 | 70 | 51 | 38 | 29 | 23 | 19 | 15 | 12 | 273 | 192 | 140 | 105 | 81 | 64 | 51 | 41 | 34 | 28 | 24 | 20 | 17 |
| | L/240 | 75 | 52 | 38 | 29 | 22 | 17 | 14 | 11 | 9 | 205 | 144 | 105 | 79 | 61 | 48 | 38 | 31 | 26 | 21 | 18 | 15 | 13 |
| 1200000 | L/180 | 109 | 76 | 56 | 42 | 32 | 25 | 20 | 16 | 14 | 298 | 209 | 152 | 115 | 88 | 69 | 56 | 45 | 37 | 31 | 26 | 22 | 19 |
| | L/240 | 81 | 57 | 42 | 31 | 24 | 19 | 15 | 12 | 10 | 223 | 157 | 114 | 86 | 66 | 52 | 42 | 34 | 28 | 23 | 20 | 17 | 14 |
| 1300000 | L/180 | 118 | 83 | 60 | 45 | 35 | 27 | 22 | 18 | 15 | 323 | 227 | 165 | 124 | 96 | 75 | 60 | 49 | 40 | 34 | 28 | 24 | 21 |
| | L/240 | 88 | 62 | 45 | 34 | 26 | 21 | 16 | 13 | 11 | 242 | 170 | 124 | 93 | 72 | 56 | 45 | 37 | 30 | 25 | 21 | 18 | 15 |
| 1400000 | L/180 | 127 | 89 | 65 | 49 | 38 | 30 | 24 | 19 | 16 | 347 | 244 | 178 | 134 | 103 | 81 | 65 | 53 | 43 | 36 | 30 | 26 | 22 |
| | L/240 | 95 | 67 | 49 | 37 | 28 | 22 | 18 | 14 | 12 | 261 | 183 | 133 | 100 | 77 | 61 | 49 | 40 | 33 | 27 | 23 | 19 | 17 |
| 1500000 | L/180 | 136 | 95 | 69 | 52 | 40 | 32 | 25 | 21 | 17 | 372 | 261 | 191 | 143 | 110 | 87 | 69 | 56 | 47 | 39 | 33 | 28 | 24 |
| | L/240 | 102 | 71 | 52 | 39 | 30 | 24 | 19 | 15 | 13 | 279 | 196 | 143 | 107 | 83 | 65 | 52 | 42 | 35 | 29 | 25 | 21 | 18 |
| 1600000 | L/180 | 145 | 102 | 74 | 56 | 43 | 34 | 27 | 22 | 18 | 397 | 279 | 203 | 153 | 118 | 93 | 74 | 60 | 50 | 41 | 35 | 30 | 25 |
| | L/240 | 109 | 76 | 56 | 42 | 32 | 25 | 20 | 16 | 14 | 298 | 209 | 152 | 115 | 88 | 69 | 56 | 45 | 37 | 31 | 26 | 22 | 19 |
| 1700000 | L/180 | 154 | 108 | 79 | 59 | 46 | 36 | 29 | 23 | 19 | 422 | 296 | 216 | 162 | 125 | 98 | 79 | 64 | 53 | 44 | 37 | 31 | 27 |
| | L/240 | 115 | 81 | 59 | 44 | 34 | 27 | 22 | 17 | 14 | 316 | 222 | 162 | 122 | 94 | 74 | 59 | 48 | 40 | 33 | 28 | 24 | 20 |
| 1800000 | L/180 | 163 | 114 | 83 | 63 | 48 | 38 | 30 | 25 | 20 | 447 | 314 | 229 | 172 | 132 | 104 | 83 | 68 | 56 | 47 | 39 | 33 | 29 |
| | L/240 | 122 | 86 | 63 | 47 | 36 | 28 | 23 | 19 | 15 | 335 | 235 | 172 | 129 | 99 | 78 | 63 | 51 | 42 | 35 | 29 | 25 | 21 |

¹ For a deflection limit L/360, use 1/2 the tabulated value for a deflection limit of L/180.

² Tabulated values are based on 2-1/2 in. net thickness. For 2-5/8 in. decking multiply the tabulated allowable loads by 1.147.

³ 3-1/2 in. thickness

⁴ Duration of Load, $C_D = 1.0$ used in this table. For other load durations, adjust by the appropriate factor.

⁵ No increase for size effect has been applied, ($C_F = 1.00$).

⁶ Dry conditions of use.

Table 5. Three and Four Inch Nominal Thickness - Allowable Roof Load Limited by Deflection - Controlled Random Layup (3 or More Spans)

| Modulus of Elasticity, psi | Deflection Limit ² | Allowable Uniformly Distributed Total Roof Load ^{1,4,6,7,8} , psf | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|-------------------------------|--|-----|-----|----|----|----|----|----|----|----|---|----|----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|
| | | 3 inch nominal thickness ³ , Span, ft. | | | | | | | | | | 4 inch nominal thickness ⁵ , Span, ft. | | | | | | | | | | | | | | | |
| | | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 700000 | L/180 | 96 | 67 | 49 | 37 | 28 | 22 | 18 | 15 | 12 | 10 | 8 | 7 | 6 | 263 | 185 | 135 | 101 | 78 | 61 | 49 | 40 | 33 | 27 | 23 | 20 | 17 |
| | L/240 | 72 | 50 | 37 | 28 | 21 | 17 | 13 | 11 | 9 | 7 | 6 | 5 | 5 | 197 | 138 | 101 | 76 | 58 | 46 | 37 | 30 | 25 | 21 | 17 | 15 | 13 |
| 800000 | L/180 | 109 | 77 | 56 | 42 | 32 | 26 | 20 | 17 | 14 | 11 | 10 | 8 | 7 | 300 | 211 | 154 | 116 | 89 | 70 | 56 | 46 | 38 | 31 | 26 | 22 | 19 |
| | L/240 | 82 | 58 | 42 | 32 | 24 | 19 | 15 | 12 | 10 | 9 | 7 | 6 | 5 | 225 | 158 | 115 | 87 | 67 | 52 | 42 | 34 | 28 | 23 | 20 | 17 | 14 |
| 900000 | L/180 | 123 | 86 | 63 | 47 | 36 | 29 | 23 | 19 | 15 | 13 | 11 | 9 | 8 | 338 | 237 | 173 | 130 | 100 | 79 | 63 | 51 | 42 | 35 | 30 | 25 | 22 |
| | L/240 | 92 | 65 | 47 | 36 | 27 | 22 | 17 | 14 | 12 | 10 | 8 | 7 | 6 | 253 | 178 | 130 | 97 | 75 | 59 | 47 | 38 | 32 | 26 | 22 | 19 | 16 |
| 1000000 | L/180 | 137 | 96 | 70 | 53 | 41 | 32 | 26 | 21 | 17 | 14 | 12 | 10 | 9 | 375 | 264 | 192 | 144 | 111 | 87 | 70 | 57 | 47 | 39 | 33 | 28 | 24 |
| | L/240 | 103 | 72 | 53 | 39 | 30 | 24 | 19 | 16 | 13 | 11 | 9 | 8 | 7 | 282 | 198 | 144 | 108 | 83 | 66 | 53 | 43 | 35 | 29 | 25 | 21 | 18 |
| 1100000 | L/180 | 150 | 106 | 77 | 58 | 45 | 35 | 28 | 23 | 19 | 16 | 13 | 11 | 10 | 413 | 290 | 211 | 159 | 122 | 96 | 77 | 63 | 52 | 43 | 36 | 31 | 26 |
| | L/240 | 113 | 79 | 58 | 43 | 33 | 26 | 21 | 17 | 14 | 12 | 10 | 8 | 7 | 310 | 218 | 159 | 119 | 92 | 72 | 58 | 47 | 39 | 32 | 27 | 23 | 20 |
| 1200000 | L/180 | 164 | 115 | 84 | 63 | 49 | 38 | 31 | 25 | 21 | 17 | 14 | 12 | 11 | 450 | 316 | 231 | 173 | 133 | 105 | 84 | 68 | 56 | 47 | 40 | 34 | 29 |
| | L/240 | 123 | 86 | 63 | 47 | 36 | 29 | 23 | 19 | 15 | 13 | 11 | 9 | 8 | 338 | 237 | 173 | 130 | 100 | 79 | 63 | 51 | 42 | 35 | 30 | 25 | 22 |
| 1300000 | L/180 | 178 | 125 | 91 | 68 | 53 | 41 | 33 | 27 | 22 | 19 | 16 | 13 | 11 | 488 | 343 | 250 | 188 | 145 | 114 | 91 | 74 | 61 | 51 | 43 | 36 | 31 |
| | L/240 | 133 | 94 | 68 | 51 | 40 | 31 | 25 | 20 | 17 | 14 | 12 | 10 | 9 | 366 | 257 | 187 | 141 | 108 | 85 | 68 | 56 | 46 | 38 | 32 | 27 | 23 |
| 1400000 | L/180 | 192 | 135 | 98 | 74 | 57 | 45 | 36 | 29 | 24 | 20 | 17 | 14 | 12 | 526 | 369 | 269 | 202 | 156 | 122 | 98 | 80 | 66 | 55 | 46 | 39 | 34 |
| | L/240 | 144 | 101 | 74 | 55 | 43 | 33 | 27 | 22 | 18 | 15 | 13 | 11 | 9 | 394 | 277 | 202 | 152 | 117 | 92 | 74 | 60 | 49 | 41 | 35 | 29 | 25 |
| 1500000 | L/180 | 205 | 144 | 105 | 79 | 61 | 48 | 38 | 31 | 26 | 21 | 18 | 15 | 13 | 563 | 395 | 288 | 217 | 167 | 131 | 105 | 85 | 70 | 59 | 49 | 42 | 36 |
| | L/240 | 154 | 108 | 79 | 59 | 46 | 36 | 29 | 23 | 19 | 16 | 14 | 11 | 10 | 422 | 297 | 216 | 162 | 125 | 98 | 79 | 64 | 53 | 44 | 37 | 32 | 27 |
| 1600000 | L/180 | 219 | 154 | 112 | 84 | 65 | 51 | 41 | 33 | 27 | 23 | 19 | 16 | 14 | 601 | 422 | 308 | 231 | 178 | 140 | 112 | 91 | 75 | 63 | 53 | 45 | 38 |
| | L/240 | 164 | 115 | 84 | 63 | 49 | 38 | 31 | 25 | 21 | 17 | 14 | 12 | 11 | 450 | 316 | 231 | 173 | 133 | 105 | 84 | 68 | 56 | 47 | 40 | 34 | 29 |
| 1700000 | L/180 | 233 | 163 | 119 | 89 | 69 | 54 | 43 | 35 | 29 | 24 | 20 | 17 | 15 | 638 | 448 | 327 | 245 | 189 | 149 | 119 | 97 | 80 | 67 | 56 | 48 | 41 |
| | L/240 | 174 | 123 | 89 | 67 | 52 | 41 | 33 | 26 | 22 | 18 | 15 | 13 | 11 | 479 | 336 | 245 | 184 | 142 | 112 | 89 | 73 | 60 | 50 | 42 | 36 | 31 |
| 1800000 | L/180 | 246 | 173 | 126 | 95 | 73 | 57 | 46 | 37 | 31 | 26 | 22 | 18 | 16 | 676 | 475 | 346 | 260 | 200 | 157 | 126 | 103 | 84 | 70 | 59 | 50 | 43 |
| | L/240 | 185 | 130 | 95 | 71 | 55 | 43 | 34 | 28 | 23 | 19 | 16 | 14 | 12 | 507 | 356 | 259 | 195 | 150 | 118 | 95 | 77 | 63 | 53 | 44 | 38 | 32 |

¹ To determine allowable uniformly distributed loads for other span conditions, multiply controlled random layup load values by the following factors:

| | |
|--|------|
| Cantilever pieces intermixed; | 0.9 |
| Combination simple span and two-span continuous; | 1.13 |
| Two-span continuous; | 1.59 |

² For a deflection limit of L/360, use 1/2 the tabulated value for a deflection limit of L/180.

³ Tabulated values are based on 2-1/2 in. net thickness. For 2-5/8 in. decking multiply the tabulated allowable loads by 1.147.

⁴ When using controlled random layups spans greater than 14 feet for 3-inch decking and greater than 16 feet for 4-inch decking requires special ordering of additional lengths to assure that at least 20% of the decking is equal to the span length or longer.

⁵ 3-1/2 in. thickness

⁶ Duration of Load, $C_D = 1.0$ used in this table. For other load durations, adjust by the appropriate factor.

⁷ No increase for size effect has been applied, ($C_F = 1.00$).

⁸ Dry conditions of use.

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