



MAXIMUM SPANS

Southern Pine Joists & Rafters



VISUALLY GRADED LUMBER

MACHINE STRESS RATED (MSR)

MACHINE EVALUATED LUMBER (MEL)

SouthernPine.com



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SFPA is a nonprofit trade association that has represented manufacturers of Southern Pine lumber since 1915.

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INDEX TO TABLES

TABLE NUMBER	LIVE LOAD (psf)	DEAD LOAD (psf)	DEFLECTION LIMIT	SEE PAGE
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FLOOR JOISTS

1	30	10	360	9
2	40	10	360	9
3	50	10	360	10
4	60	10	360	10
5	40	20	360	11
6	50	20	360	11
7	60	20	360	12
8	75	10	360	12
9	80	10	360	13
10	90	10	360	13
11	100	10	360	14

WET-SERVICE FLOOR JOISTS (MC >19%)

12	40	10	360	14
13	60	10	360	15
14	100	10	360	15

CEILING JOISTS

15	10	5	240	16
16	20	10	240	16

RAFTERS (SNOW LOAD, $C_D = 1.15$)

17	20	10	240	17
18	30	10	240	17
19	40	10	240	18
20	50	10	240	18
21	20	15	240	19
22	30	15	240	19
23	40	15	240	20
24	50	15	240	20
25	20	20	240	21
26	30	20	240	21
27	40	20	240	22
28	50	20	240	22
29	20	10	180	23
30	30	10	180	23
31	40	10	180	24
32	50	10	180	24
33	20	15	180	25
34	30	15	180	25
35	40	15	180	26
36	50	15	180	26
37	20	20	180	27
38	30	20	180	27
39	40	20	180	28
40	50	20	180	28

RAFTERS (CONSTRUCTION LOAD, $C_D = 1.25$)

41	20	10	240	29
42	20	15	240	29
43	20	20	240	30
44	20	10	180	30
45	20	15	180	31
46	20	20	180	31

MC = Moisture Content

C_D = Load Duration Factor

This publication provides simple span tables for selected grades of Southern Pine lumber joists and rafters under a variety of load conditions.

SOUTHERN PINE – AN ABUNDANT AND SUSTAINABLE RESOURCE

Southern Pine forests are some of the most productive and sustainable timberlands in the world, capturing large amounts of carbon from the air and storing it in lumber used every day. Southern Pine is composed of four principal species – longleaf, shortleaf, slash and loblolly – grown in a region that stretches from Virginia through Eastern Texas. With over 200 million acres of timberland, the southern United States offers a healthy and abundant resource. The continued practice of wise forest management, including reforestation, assures a bountiful supply of quality Southern Pine for generations to come. Grown and manufactured in the U.S. South, Southern Pine improves local economies, reduces transportation costs and minimizes impacts on the environment.

STRONG AND DEPENDABLE

Southern Pine has long been a preferred species for building construction because of its treatability, strength, and fastener-holding power. Southern Pine dimension lumber is readily available in wide widths, making it ideal for joists and rafters. Users can choose from a variety of visual grades and an increasing supply of mechanical grades providing a wide range of dependable strength and stiffness properties to meet the needs of any project. From framing a house to building a deck, Southern Pine lumber is one of the best construction products on the market today.

NEW DESIGN VALUES

The lumber industry conducts ongoing testing and invests millions of dollars to provide the most accurate and reliable design values for structural lumber. Maximum spans for the visual grades in these tables – Dense Select Structural, No.1, No.2 and No.3 – were calculated using new design values effective June 1, 2013. The new design values were determined from destructive tests of more than 7,400 full-size samples of commercially-produced Southern Pine that resulted in more than 300,000 data points.

COMPARABLE SPANS

Southern Pine's strength and stiffness is comparable to other softwood species used in residential and commercial construction. Some lumber properties for Southern Pine are higher than for Spruce-Pine-Fir and Hem-fir, while others are the same or lower. The exact comparison depends on the specific application and even varies by grade and size as shown to the right. These graphs compare maximum spans for Southern Pine to maximum spans for Spruce-Pine-Fir and Hem-fir under two common loading conditions, and for two common grades and sizes.

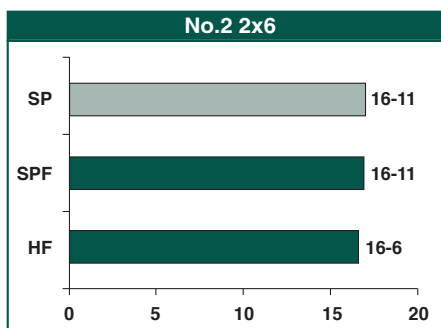
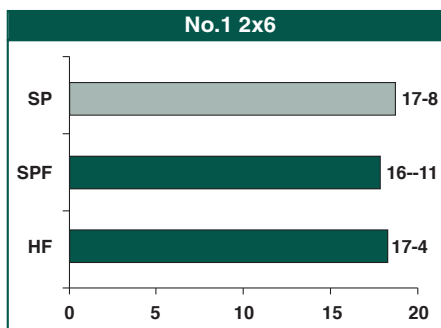
The primary purpose of this publication is to provide a convenient reference for joist and rafter spans for specific grades of Southern Pine lumber. The maximum spans provided herein were determined on the same basis as those in the code-recognized *Span Tables for Joists and Rafters* (2012 edition) and *Wood Structural Design Data* (1986 with 1992 revisions), both published by the American Wood Council (AWC).

The Southern Forest Products Association (SFPA) does not grade or test lumber, and accordingly, does not assign design values to Southern Pine lumber. The design values contained herein are based on the Southern Pine Inspection Bureau's *Standard Grading Rules for Southern Pine Lumber* (2002 edition with supplements) and modified as required by AWC's *National Design Specification® (NDS®) for Wood Construction* (2012 edition). Accordingly, SFPA does not warrant that the design values on which the span tables for Southern Pine lumber contained herein are based are correct, and specifically disclaims any liability for injury or damage resulting from the use of such span tables.

The conditions under which lumber is used in construction may vary widely, as does the quality of workmanship. Neither SFPA, nor its members, have knowledge of the quality of materials, workmanship or construction methods used on any construction project and, accordingly, do not warrant the technical data, design or performance of the lumber in completed structures.

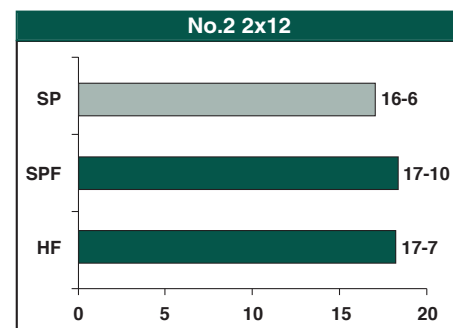
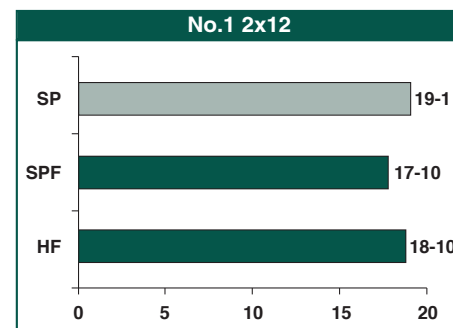
CEILING JOISTS

10psf live load, 5psf dead load, 240 deflection



FLOOR JOISTS

40psf live load, 10psf dead load, 360 deflection



USING THESE TABLES

The purpose of this publication is to provide easy-to-use joist and rafter span tables for specific grades of Southern Pine lumber under common loading conditions. Users of

TABLE CATEGORIES	
APPLICATION	TABLES
FLOOR JOISTS	
Conventional loads	1 - 7
Heavy live loads	8 - 11
Wet-service conditions	12 - 14
CEILING JOISTS	15 - 16
RAFTERS	
Snow loads	17 - 40
Construction loads	41 - 46

these span tables have the final responsibility for determining if the load and design assumptions represent actual conditions for their specific applications.

A total of 46 span tables are provided for three types of framing

members: floor joists, ceiling joists, and rafters. Spans in the tables are listed in feet and inches and are the maximum allowable horizontal span of the member from inside to inside face of supports.

LOADING CONDITIONS

The Index to Tables summarizes the loading conditions included in this publication. The design loads and deflection criteria used to generate the listed spans are also stated in each table heading. Live and dead loads are given in psf (pounds per square foot). Live loads in the tables range from 10 to 100 psf. Dead loads range from 5 to 20 psf and include the weight of the framing members. Deflection is limited to the span in inches divided by 360, 240, or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow loads or 1.25 for construction loads.

The loading conditions included in this document cover typical building applications for wood structural framing members. Rafter spans are tabulated for the most common

ROOF LIVE LOADS		
TABLE NUMBERS	ROOF LIVE LOAD*	
	12 psf	16 psf
17 and 29	1.17	1.07
21 and 33	1.14	1.06
25 and 37	1.12	1.05

*Use straight line interpolation for intermediate roof live loads.

roof loads. Snow loads are based on adjusted roof snow loads from the governing building code. For roof live loads less than 20 psf, tabulated span lengths may be multiplied by the factors shown in the table above.

While directed principally to residential construction, the tables in this publication may also be suitable for other occupancies with similar loading conditions. Note, however, that listed spans do not include checks for concentrated or partition loads that may be required for specific occupancy or use categories. Check governing building code requirements for other applicable occupancies. Also see *Span Tables for Joists and Rafters*, published by the American Wood Council (AWC), for more details on material and occupancy assumptions.

LUMBER GRADES

There are three grading methods for sorting Southern Pine dimension lumber and assigning design values:

- Visually graded lumber
- Machine Stress Rated (MSR) lumber
- Machine Evaluated Lumber (MEL)

Visually graded lumber is the oldest and most common of the three methods. Visual grading is performed by qualified graders in the mill. These graders sort each piece of lumber into various grades based on visual characteristics known to affect lumber strength and stiffness, such as knot size and slope-of-grain. Consistent visual grading is achieved through proper training, education and supervision of the lumber graders. Visually graded lumber will adequately meet the structural requirements for most traditional applications.

Machine grading, which categorizes both MSR and MEL, reduces the variability associated with assigning stress grades to lumber. MSR and MEL can be advantageous, therefore, in more demanding engineered applications, such as trusses or long-span joists and rafters.

Machine Stress Rated (MSR) lumber is evaluated by mechanical stress rating equipment. MSR lumber is distinguished from visually graded lumber in that each piece is nondestructively tested and then sorted into bending strength and stiffness classes. In addition, each piece must meet certain visual requirements before it can be assigned design values. MSR also requires daily quality control tests for bending strength and stiffness.

Machine Evaluated Lumber (MEL) is similar to MSR in that each piece is evaluated by nondestructive grading equipment, checked for visual requirements and then sorted into various strength classifications. MEL requires daily quality control tests for tension strength in addition to the daily bending strength and stiffness tests required for MSR.

Grade marks for MSR and MEL can include "1W" or "2W" if visually graded to the wane restrictions for No.1 or No.2 visual grades, respectively.



SELECTED GRADES

The *Standard Grading Rules for Southern Pine Lumber* provide for numerous visual, MSR and MEL grades. However,

VISUALLY GRADED LUMBER
Dense Select Structural No.1 No.2 No.3
MACHINE STRESS RATED (MSR)
2400f-2.0E 1650f-1.5E 1500f-1.6E
MACHINE EVALUATED LUMBER (MEL)
M-14 M-29 M-12

not all of those possible grade/size combinations are produced or used in the marketplace.

A total of 10 grades for the three grading methods are included in this publication – four visual, three MSR and three MEL grades. Available grades and sizes are subject to change, so check sources of supply at the time of your project.

LUMBER SIZES

Computations for these span tables are based on net lumber dimensions (actual sizes) from the *American Softwood Lumber Standard PS 20* published by the U.S. Department of Commerce.

NOMINAL SIZE	ACTUAL DRY SIZE
(inches)	(inches)
2 x 4	1-1/2 x 3-1/2
2 x 6	1-1/2 x 5-1/2
2 x 8	1-1/2 x 7-1/4
2 x 10	1-1/2 x 9-1/4
2 x 12	1-1/2 x 11-1/4

LUMBER IDENTIFICATION

Maximum spans in these tables apply to properly identified material. Lumber must be identified by the grade mark of an agency certified by the Board of Review of the American Lumber Standard Committee (ALSC) and manufactured in accordance with the *American Softwood Lumber Standard (Voluntary Product Standard PS 20)*. A certified grade mark on Southern Pine dimension lumber indicates the lumber has been properly seasoned by the manufacturer and meets the structural and appearance requirements established for the grade.

TYPICAL LUMBER GRADE MARKS



NOTE: The Southern Pine Inspection Bureau (SPIB) publishes the *Standard Grading Rules for Southern Pine Lumber*. Other agencies are accredited by ALSC to inspect and grade all or selected Southern Pine products according to those rules, including: California Lumber Inspection Service (CLIS); Northeastern Lumber Manufacturers Association (NELMA); Renewable Resource Associates (RRA); Stafford Inspection and Consulting (SIWP); Timber Products Inspection (TP); West Coast Lumber Inspection Bureau (WCLIB); and Western Wood Products Association (WWPA). Numerous other inspection agencies are also approved for the heat treatment portion only of the SPIB rules.

DESIGN ASSUMPTIONS

GENERAL REQUIREMENTS

This publication assumes the quality of wood products and fasteners, and the design of load-supporting members and connections, conforms to the *National Design Specification (NDS) for Wood Construction* published by AWC. All members must be framed, anchored, tied, and braced to achieve the required strength and rigidity. Adequate bracing and bridging to resist wind and other lateral forces must be provided.

SUPPORT REQUIREMENTS

Joists and rafters must also have adequate support. Ridge beams must be installed at roof peaks with rafters bearing directly on the ridge beam or supported by hangers or framing anchors. Ceiling joists are not required when properly designed ridge beams are used.

A ridge board may be substituted for a ridge beam when the roof slope equals or exceeds 3 in 12, except that ridge beams are required for cathedral ceilings. Ridge boards must be at least one-inch nominal in thickness and not less than the depth of the cut end of the rafter. Rafters must be placed directly opposite each other, and ceiling joists must be installed parallel with rafters to provide a continuous tie between exterior walls.

SPANS

The spans provided in these tables were determined on the same basis as those given in the code-recognized *Span Tables for Joists and Rafters* and *Wood Structural Design Data*, both published by AWC. Maximum spans were computed using Allowable Stress Design (ASD) and standard engineering design formulas for simple span beams with uniformly distributed gravity loads. The calculated spans assume fully supported members, properly sheathed and nailed on the top edge of the joist or rafter. They do not, however, include composite action of adhesive and sheathing. Listed spans also do not include checks for concentrated or partition loads that may be required by building codes for specific occupancy or use categories. Uplift loads caused by wind also have not been considered.

Spans in the tables are given in feet and inches and are the maximum allowable horizontal span of the member from inside to inside of bearings. For sloping rafters, the span is also measured along the horizontal projection. The diagram on page 32 provides a convenient tool for calculating the corresponding sloping distance of a rafter.

REFERENCE DESIGN VALUES

The Southern Pine Inspection Bureau publishes Southern Pine reference design values in the *Standard Grading Rules for Southern Pine Lumber*. The table on page 6 lists the reference design values used for this publication. Refer to the *SPIB Grading Rules* or *Southern Pine Use Guide* published by the Southern Forest Products Association to obtain reference design values for other Southern Pine products, grades and sizes.

Reference design values are for normal load duration under the moisture service conditions specified. Because the strength of wood varies with conditions under which it is used, reference design values should only be applied in conjunction with appropriate design and service recommendations from the *NDS*.

ADJUSTMENT FACTORS

Reference design values must be multiplied by all applicable adjustment factors to determine adjusted design values. Adjusted design values are then used to calculate the maximum allowable span for a specified load condition. The adjustment factors used to develop the span tables in this document are described below. For more complete information on reference design values and adjustment factors, refer to the *NDS* or to the *Southern Pine Use Guide*.

REPETITIVE MEMBER FACTOR, C_r – Reference design values for bending, F_b , for dimension lumber 2" to 4" thick are multiplied by the repetitive member factor, $C_r = 1.15$, when such members are used as joists, truss chords, rafters, studs, planks, decking or similar members that are in contact or spaced not more than 24" on center, are not less than three in number and are joined by floor, roof or other load distributing elements adequate to support the design load.

LOAD DURATION FACTOR, C_D – Wood has the property of carrying substantially greater maximum loads for short durations than for long durations of loading. Reference design values apply to the normal 10-year load duration. With the exception of modulus of elasticity, E and E_{min} , and compression perpendicular-to grain, $F_{c\perp}$, reference design values must be multiplied by the appropriate load duration factor, C_D .

Floor joist and ceiling joist tables are based on the normal load duration which implies a load duration factor, C_D , of 1.0. For rafters, the load duration factor, C_D , is typically either 1.15 for two-month snow loads or 1.25 for seven-day construction loads. Snow loads are presented in rafter tables 17-40, while construction loads are presented in rafter tables 41-46. All rafter tables are labeled to indicate the load duration factor used.

WET SERVICE FACTOR, C_M – When dimension lumber is used under conditions where the moisture content of the wood in service will exceed 19% for an extended period of time, design values must be multiplied by the appropriate wet service factors, C_M .

Almost all of these span tables are intended for use in dry service conditions, such as in most covered structures where the moisture content in use will be a maximum of 19%, regardless of the moisture content at the time of manufacture. Three wet-service floor joist tables (tables 12-14) are included for structures, such as outdoor decks, where the moisture content in use exceeds 19% for an extended period of time.

CALCULATIONS

The spans provided in these tables are limited to the minimum value calculated for the following design parameters using Allowable Stress Design (ASD):

- **BENDING (FLEXURE)**
- **DEFLECTION (BASED ON LIVE LOAD ONLY)**
- **COMPRESSION PERPENDICULAR-TO-GRAIN**
- **SHEAR PARALLEL-TO-GRAIN (HORIZONTAL SHEAR)**

Spans have been limited to 26'-0" based on material availability. Southern Pine is commonly available in lengths up to 20'. Check sources of supply for longer lengths.

BENDING

Bending design values assume a fully supported member, properly sheathed and nailed on the top edge of the joist or rafter. The repetitive member factor, C_r , of 1.15 was included due to the assumption of the installation of at least three joists or rafters spaced not more than 24" on center. The load duration factor, C_D , has also been applied as appropriate.

DEFLECTION

Deflection may be the controlling factor in determining the member size required when appearance or rigidity is

APPLICATION	DEFLECTION LIMIT
Floor Joists	$\ell/360$
Ceiling Joists	$\ell/240$
Rafters: Drywall Ceiling	$\ell/240$
Rafters: No Finished Ceiling	$\ell/180$

important. Control of floor vibration is another important reason to limit deflection. Deflection limits are expressed as a fraction of the span length in inches (ℓ), and consider only live load in accordance with established engineering practice for the design of joists

and rafters. The most commonly used deflection limits are summarized above.

The live load deflection limit for the floor joist span charts used in this document is $\ell/360$.

A stricter deflection limit may be obtained by multiplying the tabulated span by the appropriate factor shown in the table to the right.

DEFLECTION LIMIT	ADJUSTMENT FACTOR
$\ell/480$	0.91
$\ell/600$	0.84

COMPRESSION PERPENDICULAR-TO-GRAIN

The compression perpendicular-to-grain check used to develop these span tables assumes a 2.0" bearing length. An additional check is required for shorter bearing lengths, such as for 1.5" ledgers.

SHEAR PARALLEL-TO-GRAIN (HORIZONTAL SHEAR)

Loads within a distance from the inside face of each support equal to the depth of the member have been ignored for determining the maximum allowable span based on horizontal shear.

SOUTHERN PINE REFERENCE DESIGN VALUES

Based on SPIB Grading Rules
Values in pounds per square inch (psi)

Size	Grade	Bending "F _b "	Shear Parallel to Grain "F _v "	Compression Perpendicular to Grain "F _{c⊥} "	Modulus of Elasticity "E"
Visually Graded Lumber					
2x4	Dense Select Structural	2700	175	660	1,900,000
	No. 1	1500	175	565	1,600,000
	No. 2	1100	175	565	1,400,000
	No. 3	650	175	565	1,300,000
2x6	Dense Select Structural	2400	175	660	1,900,000
	No. 1	1350	175	565	1,600,000
	No. 2	1000	175	565	1,400,000
	No. 3	575	175	565	1,300,000
2x8	Dense Select Structural	2200	175	660	1,900,000
	No. 1	1250	175	565	1,600,000
	No. 2	925	175	565	1,400,000
	No. 3	525	175	565	1,300,000
2x10	Dense Select Structural	1950	175	660	1,900,000
	No. 1	1050	175	565	1,600,000
	No. 2	800	175	565	1,400,000
	No. 3	475	175	565	1,300,000
2x12	Dense Select Structural	1800	175	660	1,900,000
	No. 1	1000	175	565	1,600,000
	No. 2	750	175	565	1,400,000
	No. 3	450	175	565	1,300,000
Machine Stress Rated (MSR) Lumber					
2x4 thru 2x12	2400f – 2.0E	2400	190	805	2,000,000
	1650f – 1.5E	1650	175	565	1,500,000
	1500f – 1.6E	1500	175	565	1,600,000
Machine Evaluated Lumber (MEL)					
2x4 thru 2x12	M – 14	1800	175	565	1,700,000
	M – 29	1550	175	565	1,700,000
	M – 12	1600	175	565	1,600,000

The Southern Pine Inspection Bureau publishes Southern Pine reference design values in the *Standard Grading Rules for Southern Pine Lumber*. This table shows only the reference design values used for this publication. Refer to the *SPIB Grading Rules* or to the *Southern Pine Use Guide* published by the Southern Forest Products Association to obtain reference design values for other Southern Pine products, grades and sizes.

These reference design values are based on normal load duration and dry service conditions. Because the strength of wood varies with conditions under which it is used, reference design values should only be applied in conjunction with appropriate design and service recommendations from the *National Design Specification (NDS)* published by the American Wood Council. Reference design values must be multiplied by all applicable adjustment factors to determine adjusted design values. Refer to the Design Assumptions text beginning on page 4 for adjustment factors used to develop the span tables in this document. For more complete information on reference design values and adjustment factors, refer to the *NDS* or the *Southern Pine Use Guide*.

JOIST & RAFTER EXAMPLES*

EXAMPLE 1 – HOW TO READ THE TABLE VALUES

Given: Use Table 1: Floor Joists – 30 psf Live Load, 10 psf Dead Load, 360 Deflection. Table 1 is for all rooms used for sleeping areas and attic floors where the design loads do not exceed 30 psf (pounds per square foot) live load, 10 psf dead load and the live load deflection limit does not exceed the span (in inches) divided by 360.

Find: The maximum horizontal span in feet and inches for:
a) 2x8 Dense Select Structural spaced 16" on-center
b) 2x10 2400f-2.0E spaced 19.2" on-center
c) 2x12 M-12 MEL spaced 24" on-center

Also, if each joist sits completely on top of 2x4 stud walls at each end, how long does each joist need to be for the maximum span?

Solution: The note in the upper right-hand corner of the table states that maximum spans are given in feet and inches, so the answers can be found listed in the table:
a) 15'-0"
b) 18'-3"
c) 19'-2"

The second part of the note in the upper right-hand corner of the table states the listed maximum spans represent the distance from inside face of bearing to inside face of bearing, also known as the "clear span". If each end of the joists bears completely on top of a 2x4 stud wall, the overall length of these joists will be the maximum span plus seven inches (i.e., the net width of a 2x4 stud wall is 3-1/2", times two walls equals 7").

Therefore the overall joist lengths needed are:

- a) 15'0" plus 7" = 15'-7"
- b) 18'-10"
- c) 19'-9"

EXAMPLE 2 – FLOOR JOISTS FOR RESIDENTIAL CONSTRUCTION

Given: A 14' living room with 2x4 bearing walls.

Find: The size and spacing of Southern Pine No. 2 floor joists needed.

Solution: Use Table 2: Floor Joists – 40 psf Live Load, 10 psf Dead Load, 360 Deflection. Table 2 is for all rooms except those used for sleeping areas and attic floors. The required horizontal span is 14' – (2 times 3-1/2") = 13'-5". Select **No. 2 Southern Pine 2x12s spaced 24" on center** which can span 13'-6", or **No. 2 Southern Pine 2x10s spaced 16" on center** which can span 14'-0".

EXAMPLE 3 – JOISTS FOR AN OUTDOOR DECK

Given: A 12'x14' outdoor deck for a single-family home.

Find: Some grades, sizes and spacings of Southern Pine lumber for single spans in either direction.

Solution: Use Table 12: Wet-Service Floor Joists – 40 psf Live Load, 10 psf Dead Load, 360 Deflection.

If the joists span the full 14' direction:

Grade	Size	Spacing	Span
No. 1	2x10	19.2"	14'-8"
No. 2	2x10	16"	14'-0"
2400f-2.0E	2x10	24"	14'-11"
M-14 or M-29	2x10	24"	14'-1"

If the joists span the full 12' direction:

Grade	Size	Spacing	Span
No. 1	2x8	16"	12'-5"
No. 2	2x10	19.2"	12'-10"
1650f-1.5E	2x8	16"	12'-2"
M-12	2x8	16"	12'-5"

Note: Tables 12, 13 and 14 assume the moisture content in use will exceed 19 percent for an extended period of time. When calculating spans for these tables labeled "Wet-Service", reference design values were reduced by the appropriate wet service factors. Generally, building codes require pressure-treated or naturally durable wood for protection against decay and termites in wet-service applications such as outdoor decks. Building codes also require that fasteners and connectors in contact with pressure-treated wood must be corrosion resistant.

Southern Pine's ease of treatability has made it the preferred species when pressure treatment with preservatives is required. The unique cellular structure of Southern Pine permits deep penetration of preservatives, rendering the wood useless as a food source for fungi, termites and micro-organisms. Because of its superior treatability, Southern Pine is one of the few wood species that does not require incising. Refer to *Pressure-Treated Southern Pine* published by the Southern Forest Products Association for more complete information on types of wood preservatives, retention levels required for various products and applications, and recommendations for fasteners and connectors.

* Users of these span tables have the final responsibility for determining if the load and design assumptions represent actual conditions for their specific applications.

EXAMPLE 4 – FLOOR JOISTS FOR AN OFFICE

Given: An office floor requiring a horizontal span of 18'-0".

Find: A possible Southern Pine 2x10 floor joist.

Solution: Use Table 6: Floor Joists – 50 psf Live Load, 20 psf Dead Load, 360 Deflection. One possible option is 2400f-2.0E MSR Southern Pine 2x10s spaced 12" on center.

Note: The spans in this publication were calculated assuming uniformly distributed gravity loads only. The footnote to all tables states that these spans do not include checks for concentrated loads that may be required by building codes for specific occupancy or use categories. For example, the 2012 International Building Code® (IBC®) requires that office floors be designed to support a uniformly distributed live load of 50 psf, or a 2000 lb concentrated load distributed over a 2.5'x2.5' base area, whichever produces the greater load effects. Also, in office buildings and in other buildings where partition locations are subject to change, a uniformly distributed live load of not less than 15 psf is required for partitions unless the specified live load exceeds 80 psf. Table 6 does not account for either of these load cases so further analysis may be required to determine a final solution.



EXAMPLE 5 – RAFTERS FOR RESIDENTIAL CONSTRUCTION

Given: A residential roof with a 6 in 12 slope. The roof is to be constructed with a medium roof covering (up to two courses of asphalt shingles, or wood shakes/shingles) and without a drywall ceiling attached to the underside of the rafters. The required horizontal span is 12'-0" and the rafters must support a 50 psf snow load.

Find: An acceptable grade, size and on-center spacing for:

- a) Visually graded lumber
- b) Machine Stress Rated (MSR) lumber
- c) The corresponding sloping distance of the rafters based on the required horizontal span.

Solution: Use Table 36: Rafters – 50 psf Live Load, 15 psf Dead Load, 180 Deflection, $C_D = 1.15$ (Snow).

- a) Select No. 1 Southern Pine 2x8s spaced 16" on center which can span 12'-11".
- b) Select 2400f-2.0E MSR Southern Pine 2x6s spaced 16" on center which can span 12'-3".
- c) Use the Conversion Diagram for Rafters on page 32. Find the horizontal span of 12' along the horizontal axis. Follow the vertical line upward to its intersection with the radial line for a 6 in 12 slope. Then follow the arc line upward and to the left to read the sloping distance of approximately 13'-6".

Note: When calculating spans for rafter tables, reference design values were increased by the appropriate load duration factor. The load duration factor, C_D , for snow loads is 1.15.

Generally, a deflection limit of 240 applies to rafters with a drywall ceiling attached to the underside of the rafters (e.g., cathedral ceilings) while a deflection limit of 180 applies to rafters without a drywall ceiling attached to the underside of the rafters. Some building codes also consider the slope of the rafter when determining deflection limits and only allow the use of 180 for rafters with roof slopes greater than 3 in 12 and no ceiling attached.

* Users of these span tables have the final responsibility for determining if the load and design assumptions represent actual conditions for their specific applications.

TABLE 1 FLOOR JOISTS – 30 PSF LIVE LOAD, 10 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	12-6	11-10	11-3	9-2	12-9	11-7	11-10	12-0	12-0	11-10
	16.0	11-4	10-9	10-3	7-11	11-7	10-6	10-9	10-11	10-11	10-9
	19.2	10-8	10-1	9-6	7-3	10-10	9-10	10-1	10-4	10-4	10-1
	24.0	9-11	9-4	8-6	6-5	10-1	9-2	9-4	9-7	9-7	9-4
2 x 8	12.0	16-6	15-7	14-11	11-6	16-9	15-3	15-7	15-10	15-10	15-7
	16.0	15-0	14-2	13-3	10-0	15-3	13-10	14-2	14-5	14-5	14-2
	19.2	14-1	13-4	12-1	9-1	14-4	13-0	13-4	13-7	13-7	13-4
	24.0	13-1	12-4	10-10	8-2	13-4	12-1	12-4	12-7	12-7	12-4
2 x 10	12.0	21-0	19-10	18-1	13-11	21-5	19-5	19-10	20-3	20-3	19-10
	16.0	19-1	18-0	15-8	12-1	19-5	17-8	18-0	18-5	18-5	18-0
	19.2	18-0	16-5	14-4	11-0	18-3	16-7	17-0	17-4	17-4	17-0
	24.0	16-8	14-8	12-10	9-10	17-0	15-5	15-9	16-1	16-1	15-9
2 x 12	12.0	25-7	24-2	21-4	16-6	26-0	23-7	24-2	24-8	24-8	24-2
	16.0	23-3	21-4	18-6	14-4	23-7	21-6	21-11	22-5	22-5	21-11
	19.2	21-10	19-6	16-10	13-1	22-3	20-2	20-8	21-1	21-1	20-8
	24.0	20-3	17-5	15-1	11-8	20-8	18-9	19-2	19-7	19-7	19-2

TABLE 2 FLOOR JOISTS – 40 PSF LIVE LOAD, 10 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	11-4	10-9	10-3	8-2	11-7	10-6	10-9	10-11	10-11	10-9
	16.0	10-4	9-9	9-4	7-1	10-6	9-6	9-9	9-11	9-11	9-9
	19.2	9-8	9-2	8-6	6-5	9-10	9-0	9-2	9-4	9-4	9-2
	24.0	9-0	8-6	7-7	5-9	9-2	8-4	8-6	8-8	8-8	8-6
2 x 8	12.0	15-0	14-2	13-6	10-3	15-3	13-10	14-2	14-5	14-5	14-2
	16.0	13-7	12-10	11-10	8-11	13-10	12-7	12-10	13-1	13-1	12-10
	19.2	12-10	12-1	10-10	8-2	13-0	11-10	12-1	12-4	12-4	12-1
	24.0	11-11	11-3	9-8	7-3	12-1	11-0	11-3	11-5	11-5	11-3
2 x 10	12.0	19-1	18-0	16-2	12-6	19-5	17-8	18-0	18-5	18-5	18-0
	16.0	17-4	16-1	14-0	10-10	17-8	16-0	16-5	16-9	16-9	16-5
	19.2	16-4	14-8	12-10	9-10	16-7	15-1	15-5	15-9	15-9	15-5
	24.0	15-2	13-1	11-5	8-10	15-5	14-0	14-4	14-7	14-7	14-4
2 x 12	12.0	23-3	21-11	19-1	14-9	23-7	21-6	21-11	22-5	22-5	21-11
	16.0	21-1	19-1	16-6	12-10	21-6	19-6	19-11	20-4	20-4	19-11
	19.2	19-10	17-5	15-1	11-8	20-2	18-4	18-9	19-2	19-2	18-9
	24.0	18-5	15-7	13-6	10-5	18-9	17-0	17-5	17-9	17-9	17-5

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 3 FLOOR JOISTS – 50 PSF LIVE LOAD, 10 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	10-6	9-11	9-6	7-5	10-9	9-9	9-11	10-2	10-2	9-11
	16.0	9-7	9-1	8-6	6-5	9-9	8-10	9-1	9-3	9-3	9-1
	19.2	9-0	8-6	7-9	5-11	9-2	8-4	8-6	8-8	8-8	8-6
	24.0	8-4	7-11	6-11	5-3	8-6	7-9	7-11	8-1	8-1	7-11
2 x 8	12.0	13-11	13-1	12-6	9-5	14-2	12-10	13-1	13-5	13-5	13-1
	16.0	12-7	11-11	10-10	8-2	12-10	11-8	11-11	12-2	12-2	11-11
	19.2	11-11	11-3	9-10	7-5	12-1	11-0	11-3	11-5	11-5	11-3
	24.0	11-0	10-3	8-10	6-8	11-3	10-2	10-5	10-8	10-8	10-5
2 x 10	12.0	17-9	16-9	14-9	11-5	18-0	16-5	16-9	17-1	17-1	16-9
	16.0	16-1	14-8	12-10	9-10	16-5	14-11	15-2	15-6	15-6	15-2
	19.2	15-2	13-5	11-8	9-0	15-5	14-0	14-4	14-7	14-7	14-4
	24.0	14-1	12-0	10-5	8-1	14-4	13-0	13-3	13-7	13-7	13-3
2 x 12	12.0	21-7	20-1	17-5	13-6	21-11	19-11	20-4	20-9	20-9	20-4
	16.0	19-7	17-5	15-1	11-8	19-11	18-1	18-6	18-10	18-10	18-6
	19.2	18-5	15-11	13-9	10-8	18-9	17-0	17-5	17-9	17-9	17-5
	24.0	17-1	14-3	12-4	9-6	17-5	15-10	16-2	16-6	16-6	16-2

TABLE 4 FLOOR JOISTS – 60 PSF LIVE LOAD, 10 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	9-11	9-4	8-11	6-11	10-1	9-2	9-4	9-7	9-7	9-4
	16.0	9-0	8-6	7-11	6-0	9-2	8-4	8-6	8-8	8-8	8-6
	19.2	8-6	8-0	7-2	5-5	8-8	7-10	8-0	8-2	8-2	8-0
	24.0	7-10	7-5	6-5	4-11	8-0	7-3	7-5	7-7	7-7	7-5
2 x 8	12.0	13-1	12-4	11-6	8-8	13-4	12-1	12-4	12-7	12-7	12-4
	16.0	11-11	11-3	10-0	7-6	12-1	11-0	11-3	11-5	11-5	11-3
	19.2	11-2	10-7	9-1	6-10	11-4	10-4	10-7	10-9	10-9	10-7
	24.0	10-5	9-6	8-2	6-2	10-7	9-7	9-10	10-0	10-0	9-10
2 x 10	12.0	16-8	15-8	13-8	10-7	17-0	15-5	15-9	16-1	16-1	15-9
	16.0	15-2	13-7	11-10	9-2	15-5	14-0	14-4	14-7	14-7	14-4
	19.2	14-3	12-5	10-10	8-4	14-6	13-2	13-6	13-9	13-9	13-6
	24.0	13-3	11-1	9-8	7-6	13-6	12-3	12-6	12-9	12-9	12-6
2 x 12	12.0	20-3	18-7	16-1	12-6	20-8	18-9	19-2	19-7	19-7	19-2
	16.0	18-5	16-1	14-0	10-10	18-9	17-0	17-5	17-9	17-9	17-5
	19.2	17-4	14-9	12-9	9-10	17-8	16-0	16-5	16-9	16-9	16-5
	24.0	16-1	13-2	11-5	8-10	16-5	14-11	15-2	15-6	15-6	15-2

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 5 FLOOR JOISTS – 40 PSF LIVE LOAD, 20 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	11-4	10-9	9-10	7-5	11-7	10-6	10-9	10-11	10-11	10-9
	16.0	10-4	9-9	8-6	6-5	10-6	9-6	9-9	9-11	9-11	9-9
	19.2	9-8	9-0	7-9	5-11	9-10	9-0	9-2	9-4	9-4	9-2
	24.0	9-0	8-1	6-11	5-3	9-2	8-4	8-6	8-8	8-8	8-6
2 x 8	12.0	15-0	14-2	12-6	9-5	15-3	13-10	14-2	14-5	14-5	14-2
	16.0	13-7	12-7	10-10	8-2	13-10	12-7	12-10	13-1	13-1	12-10
	19.2	12-10	11-5	9-10	7-5	13-0	11-10	12-1	12-4	12-4	12-1
	24.0	11-11	10-3	8-10	6-8	12-1	11-0	11-3	11-5	11-5	11-3
2 x 10	12.0	19-1	16-11	14-9	11-5	19-5	17-8	18-0	18-5	18-5	18-0
	16.0	17-4	14-8	12-10	9-10	17-8	16-0	16-5	16-9	16-9	16-5
	19.2	16-4	13-5	11-8	9-0	16-7	15-1	15-5	15-9	15-9	15-5
	24.0	15-2	12-0	10-5	8-1	15-5	14-0	14-4	14-7	14-7	14-4
2 x 12	12.0	23-3	20-1	17-5	13-6	23-7	21-6	21-11	22-5	22-5	21-11
	16.0	21-1	17-5	15-1	11-8	21-6	19-6	19-11	20-4	20-4	19-11
	19.2	19-10	15-11	13-9	10-8	20-2	18-4	18-9	19-2	19-2	18-9
	24.0	18-5	14-3	12-4	9-6	18-9	17-0	17-5	17-9	17-8	17-5

TABLE 6 FLOOR JOISTS – 50 PSF LIVE LOAD, 20 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	10-6	9-11	9-1	6-11	10-9	9-9	9-11	10-2	10-2	9-11
	16.0	9-7	9-1	7-11	6-0	9-9	8-10	9-1	9-3	9-3	9-1
	19.2	9-0	8-4	7-2	5-5	9-2	8-4	8-6	8-8	8-8	8-6
	24.0	8-4	7-6	6-5	4-11	8-6	7-9	7-11	8-1	8-0	7-11
2 x 8	12.0	13-11	13-1	11-6	8-8	14-2	12-10	13-1	13-5	13-5	13-1
	16.0	12-7	11-7	10-0	7-6	12-10	11-8	11-11	12-2	12-2	11-11
	19.2	11-11	10-7	9-1	6-10	12-1	11-0	11-3	11-5	11-5	11-3
	24.0	11-0	9-6	8-2	6-2	11-3	10-2	10-5	10-8	10-7	10-5
2 x 10	12.0	17-9	15-8	13-8	10-7	18-0	16-5	16-9	17-1	17-1	16-9
	16.0	16-1	13-7	11-10	9-2	16-5	14-11	15-2	15-6	15-6	15-2
	19.2	15-2	12-5	10-10	8-4	15-5	14-0	14-4	14-7	14-7	14-4
	24.0	14-1	11-1	9-8	7-6	14-4	13-0	13-3	13-7	13-6	13-3
2 x 12	12.0	21-7	18-7	16-1	12-6	21-11	19-11	20-4	20-9	20-9	20-4
	16.0	19-7	16-1	14-0	10-10	19-11	18-1	18-6	18-10	18-10	18-6
	19.2	18-5	14-9	12-9	9-10	18-9	17-0	17-5	17-9	17-9	17-5
	24.0	17-1	13-2	11-5	8-10	17-5	15-10	16-1	16-6	16-5	16-2

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 7 FLOOR JOISTS – 60 PSF LIVE LOAD, 20 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	9-11	9-4	8-6	6-5	10-1	9-2	9-4	9-7	9-7	9-4
	16.0	9-0	8-6	7-4	5-7	9-2	8-4	8-6	8-8	8-8	8-6
	19.2	8-6	7-10	6-9	5-1	8-8	7-10	8-0	8-2	8-2	8-0
	24.0	7-10	7-0	6-0	4-7	8-0	7-3	7-4	7-7	7-6	7-5
2 x 8	12.0	13-1	12-4	10-10	8-2	13-4	12-1	12-4	12-7	12-7	12-4
	16.0	11-11	10-10	9-4	7-1	12-1	11-0	11-3	11-5	11-5	11-3
	19.2	11-2	9-11	8-6	6-5	11-4	10-4	10-7	10-9	10-9	10-7
	24.0	10-5	8-10	7-8	5-9	10-7	9-7	9-9	10-0	9-11	9-10
2 x 10	12.0	16-8	14-8	12-10	9-10	17-0	15-5	15-9	16-1	16-1	15-9
	16.0	15-2	12-8	11-1	8-7	15-5	14-0	14-4	14-7	14-7	14-4
	19.2	14-3	11-7	10-1	7-10	14-6	13-2	13-6	13-9	13-9	13-6
	24.0	13-3	10-4	9-1	7-0	13-6	12-3	12-5	12-9	12-7	12-6
2 x 12	12.0	20-3	17-5	15-1	11-8	20-8	18-9	19-2	19-7	19-7	19-2
	16.0	18-5	15-1	13-1	10-1	18-9	17-0	17-5	17-9	17-9	17-5
	19.2	17-4	13-9	11-11	9-3	17-8	16-0	16-5	16-9	16-9	16-5
	24.0	16-1	12-4	10-8	8-3	16-5	14-11	15-1	15-6	15-4	15-2

TABLE 8 FLOOR JOISTS – 75 PSF LIVE LOAD, 10 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	9-2	8-8	8-3	6-3	9-4	8-6	8-8	8-10	8-10	8-8
	16.0	8-4	7-11	7-2	5-5	8-6	7-9	7-11	8-1	8-1	7-11
	19.2	7-10	7-5	6-6	4-11	8-0	7-3	7-5	7-7	7-7	7-5
	24.0	7-4	6-9	5-10	4-5	7-5	6-9	6-11	7-1	7-1	6-11
2 x 8	12.0	12-2	11-6	10-6	7-11	12-4	11-3	11-6	11-8	11-8	11-6
	16.0	11-0	10-5	9-1	6-10	11-3	10-2	10-5	10-8	10-8	10-5
	19.2	10-5	9-7	8-3	6-3	10-7	9-7	9-10	10-0	10-0	9-10
	24.0	9-8	8-7	7-5	5-7	9-10	8-11	9-1	9-3	9-3	9-1
2 x 10	12.0	15-6	14-3	12-5	9-7	15-9	14-4	14-7	14-11	14-11	14-7
	16.0	14-1	12-4	10-9	8-3	14-4	13-0	13-3	13-7	13-7	13-3
	19.2	13-3	11-3	9-10	7-7	13-6	12-3	12-6	12-9	12-9	12-6
	24.0	12-3	10-1	8-9	6-9	12-6	11-4	11-7	11-10	11-10	11-7
2 x 12	12.0	18-10	16-11	14-8	11-4	19-2	17-5	17-9	18-2	18-2	17-9
	16.0	17-1	14-8	12-8	9-10	17-5	15-10	16-2	16-6	16-6	16-2
	19.2	16-1	13-4	11-7	9-0	16-5	14-11	15-2	15-6	15-6	15-2
	24.0	14-11	11-11	10-4	8-0	15-2	13-10	14-1	14-5	14-5	14-1

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 9 FLOOR JOISTS – 80 PSF LIVE LOAD, 10 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No. 1	No. 2	No. 3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	9-0	8-6	8-0	6-1	9-2	8-4	8-6	8-8	8-8	8-6
	16.0	8-2	7-9	6-11	5-3	8-4	7-7	7-9	7-11	7-11	7-9
	19.2	7-8	7-3	6-4	4-10	7-10	7-1	7-3	7-5	7-5	7-3
	24.0	7-2	6-7	5-8	4-4	7-3	6-7	6-9	6-11	6-11	6-9
2 x 8	12.0	11-11	11-3	10-2	7-8	12-1	11-0	11-3	11-5	11-5	11-3
	16.0	10-10	10-2	8-10	6-8	11-0	10-0	10-2	10-5	10-5	10-2
	19.2	10-2	9-4	8-1	6-1	10-4	9-5	9-7	9-9	9-9	9-7
	24.0	9-5	8-4	7-2	5-5	9-7	8-9	8-11	9-1	9-1	8-11
2 x 10	12.0	15-2	13-10	12-1	9-4	15-5	14-0	14-4	14-7	14-7	14-4
	16.0	13-9	12-0	10-5	8-1	14-0	12-9	13-0	13-3	13-3	13-0
	19.2	12-11	10-11	9-7	7-4	13-2	12-0	12-3	12-6	12-6	12-3
	24.0	12-0	9-9	8-6	6-7	12-3	11-1	11-4	11-7	11-7	11-4
2 x 12	12.0	18-5	16-5	14-3	11-0	18-9	17-0	17-5	17-9	17-9	17-5
	16.0	16-9	14-3	12-4	9-6	17-0	15-6	15-10	16-2	16-2	15-10
	19.2	15-9	13-0	11-3	8-8	16-0	14-7	14-11	15-2	15-2	14-11
	24.0	14-8	11-7	10-1	7-9	14-11	13-6	13-10	14-1	14-1	13-10

TABLE 10 FLOOR JOISTS – 90 PSF LIVE LOAD, 10 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No. 1	No. 2	No. 3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	8-8	8-2	7-7	5-9	8-10	8-0	8-2	8-4	8-4	8-2
	16.0	7-10	7-5	6-7	5-0	8-0	7-3	7-5	7-7	7-7	7-5
	19.2	7-5	7-0	6-0	4-7	7-6	6-10	7-0	7-2	7-2	7-0
	24.0	6-11	6-3	5-5	4-1	7-0	6-4	6-6	6-8	6-8	6-6
2 x 8	12.0	11-5	10-9	9-8	7-3	11-7	10-7	10-9	11-0	11-0	10-9
	16.0	10-5	9-9	8-4	6-4	10-7	9-7	9-10	10-0	10-0	9-10
	19.2	9-9	8-10	7-8	5-9	9-11	9-0	9-3	9-5	9-5	9-3
	24.0	9-1	7-11	6-10	5-2	9-3	8-5	8-7	8-9	8-9	8-7
2 x 10	12.0	14-7	13-1	11-5	8-10	14-10	13-6	13-9	14-0	14-0	13-9
	16.0	13-3	11-4	9-11	7-8	13-6	12-3	12-6	12-9	12-9	12-6
	19.2	12-6	10-4	9-1	7-0	12-8	11-6	11-9	12-0	12-0	11-9
	24.0	11-7	9-3	8-1	6-3	11-9	10-8	10-11	11-2	11-2	10-11
2 x 12	12.0	17-9	15-7	13-6	10-5	18-0	16-5	16-9	17-1	17-1	16-9
	16.0	16-1	13-6	11-8	9-1	16-5	14-11	15-2	15-6	15-6	15-2
	19.2	15-2	12-4	10-8	8-3	15-5	14-0	14-4	14-7	14-7	14-4
	24.0	14-1	11-0	9-6	7-5	14-4	13-0	13-3	13-7	13-7	13-3

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 11 FLOOR JOISTS – 100 PSF LIVE LOAD, 10 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	8-4	7-11	7-3	5-6	8-6	7-9	7-11	8-1	8-1	7-11
	16.0	7-7	7-2	6-3	4-9	7-9	7-0	7-2	7-4	7-4	7-2
	19.2	7-2	6-8	5-9	4-4	7-3	6-7	6-9	6-11	6-11	6-9
	24.0	6-8	6-0	5-2	3-11	6-9	6-2	6-3	6-5	6-5	6-3
2 x 8	12.0	11-0	10-5	9-2	6-11	11-3	10-2	10-5	10-8	10-8	10-5
	16.0	10-0	9-3	8-0	6-0	10-2	9-3	9-6	9-8	9-8	9-6
	19.2	9-5	8-6	7-3	5-6	9-7	8-9	8-11	9-1	9-1	8-11
	24.0	8-9	7-7	6-6	4-11	8-11	8-1	8-3	8-5	8-5	8-3
2 x 10	12.0	14-1	12-6	10-11	8-5	14-4	13-0	13-3	13-7	13-7	13-3
	16.0	12-9	10-10	9-5	7-3	13-0	11-10	12-1	12-4	12-4	12-1
	19.2	12-0	9-11	8-8	6-8	12-3	11-1	11-4	11-7	11-7	11-4
	24.0	11-2	8-10	7-9	5-11	11-4	10-4	10-7	10-9	10-9	10-7
2 x 12	12.0	17-1	14-10	12-10	10-0	17-5	15-10	16-2	16-6	16-6	16-2
	16.0	15-7	12-10	11-2	8-8	15-10	14-4	14-8	15-0	15-0	14-8
	19.2	14-8	11-9	10-2	7-11	14-11	13-6	13-10	14-1	14-1	13-10
	24.0	13-7	10-6	9-1	7-1	13-10	12-7	12-10	13-1	13-1	12-10

TABLE 12 WET-SERVICE FLOOR JOISTS – 40 PSF LIVE LOAD, 10 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	11-0	10-4	9-11	8-2	11-2	10-2	10-4	10-7	10-7	10-4
	16.0	10-0	9-5	9-0	7-1	10-2	9-2	9-5	9-7	9-7	9-5
	19.2	9-4	8-10	8-6	6-5	9-6	8-8	8-10	9-0	9-0	8-10
	24.0	8-8	8-2	7-7	5-9	8-10	8-0	8-3	8-5	8-5	8-3
2 x 8	12.0	14-5	13-8	13-1	10-3	14-8	13-4	13-8	13-11	13-11	13-8
	16.0	13-2	12-5	11-10	8-11	13-4	12-2	12-5	12-8	12-8	12-5
	19.2	12-4	11-7	10-10	8-2	12-7	11-5	11-8	11-11	11-11	11-8
	24.0	11-6	10-4	9-8	7-3	11-8	10-7	10-10	11-1	11-1	10-10
2 x 10	12.0	18-5	17-5	16-2	12-6	18-9	17-0	17-5	17-9	17-9	17-5
	16.0	16-9	15-10	14-0	10-10	17-0	15-6	15-10	16-2	16-2	15-10
	19.2	15-9	14-8	12-10	9-10	16-0	14-7	14-11	15-2	15-2	14-11
	24.0	14-8	13-1	11-5	8-10	14-11	13-6	13-10	14-1	14-1	13-10
2 x 12	12.0	22-5	21-2	19-1	14-9	22-10	20-9	21-2	21-7	21-7	21-2
	16.0	20-4	19-1	16-6	12-10	20-9	18-10	19-3	19-8	19-8	19-3
	19.2	19-2	17-5	15-1	11-8	19-6	17-9	18-1	18-6	18-6	18-1
	24.0	17-10	15-7	13-6	10-5	18-1	16-5	16-10	17-2	17-2	16-10

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 13 WET-SERVICE FLOOR JOISTS – 60 PSF LIVE LOAD, 10 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No. 1	No. 2	No. 3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	9-7	9-1	8-8	6-11	9-9	8-10	9-1	9-3	9-3	9-1
	16.0	8-8	8-3	7-10	6-0	8-10	8-0	8-3	8-5	8-5	8-3
	19.2	8-2	7-8	7-2	5-5	8-4	7-7	7-9	7-11	7-11	7-9
	24.0	7-7	6-11	6-5	4-11	7-9	7-0	7-2	7-4	7-4	7-2
2 x 8	12.0	12-7	11-11	11-5	8-8	12-10	11-8	11-11	12-2	12-2	11-11
	16.0	11-6	10-9	10-0	7-6	11-8	10-7	10-10	11-1	11-1	10-10
	19.2	10-10	9-9	9-1	6-10	11-0	10-0	10-2	10-5	10-5	10-2
	24.0	10-0	8-9	8-2	6-2	10-2	9-3	9-6	9-8	9-8	9-6
2 x 10	12.0	16-1	15-2	13-8	10-7	16-5	14-11	15-2	15-6	15-6	15-2
	16.0	14-8	13-7	11-10	9-2	14-11	13-6	13-10	14-1	14-1	13-10
	19.2	13-9	12-5	10-10	8-4	14-0	12-9	13-0	13-3	13-3	13-0
	24.0	12-9	11-1	9-8	7-6	13-0	11-10	12-1	12-4	12-4	12-1
2 x 12	12.0	19-7	18-6	16-1	12-6	19-11	18-1	18-6	18-10	18-10	18-6
	16.0	17-10	16-1	14-0	10-10	18-1	16-5	16-10	17-2	17-2	16-10
	19.2	16-9	14-9	12-9	9-10	17-0	15-6	15-10	16-2	16-2	15-10
	24.0	15-7	13-2	11-5	8-10	15-10	14-4	14-8	15-0	15-0	14-8

TABLE 14 WET-SERVICE FLOOR JOISTS – 100 PSF LIVE LOAD, 10 PSF DEAD LOAD, 360 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No. 1	No. 2	No. 3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	8-1	7-8	7-3	5-6	8-3	7-6	7-8	7-9	7-9	7-8
	16.0	7-4	6-9	6-3	4-9	7-6	6-9	6-11	7-1	7-1	6-11
	19.2	6-11	6-2	5-9	4-4	7-0	6-5	6-6	6-8	6-7	6-6
	24.0	6-5	5-6	5-2	3-11	6-6	5-11	5-10	6-2	5-11	6-0
2 x 8	12.0	10-8	9-10	9-2	6-11	10-10	9-10	10-1	10-3	10-3	10-1
	16.0	9-8	8-7	8-0	6-0	9-10	8-11	9-2	9-4	9-4	9-2
	19.2	9-1	7-10	7-3	5-6	9-3	8-5	8-7	8-9	8-8	8-7
	24.0	8-5	7-0	6-6	4-11	8-7	7-10	7-8	8-2	7-9	7-11
2 x 10	12.0	13-7	12-6	10-11	8-5	13-10	12-7	12-10	13-1	13-1	12-10
	16.0	12-4	10-10	9-5	7-3	12-7	11-5	11-8	11-11	11-11	11-8
	19.2	11-7	9-11	8-8	6-8	11-10	10-9	10-11	11-2	11-1	11-0
	24.0	10-9	8-10	7-9	5-11	11-0	10-0	9-9	10-4	9-11	10-1
2 x 12	12.0	16-6	14-10	12-10	10-0	16-10	15-3	15-7	15-11	15-11	15-7
	16.0	15-0	12-10	11-2	8-8	15-3	13-10	14-2	14-6	14-6	14-2
	19.2	14-1	11-9	10-2	7-11	14-4	12-11	12-11	12-11	12-11	12-11
	24.0	12-1	10-4	9-1	7-1	13-4	10-4	10-4	10-4	10-4	10-4

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 15 CEILING JOISTS – 10 PSF LIVE LOAD, 5 PSF DEAD LOAD, 240 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	13-2	12-5	11-10	10-1	13-4	12-2	12-5	12-8	12-8	12-5
	16.0	11-11	11-3	10-9	8-9	12-2	11-0	11-3	11-6	11-6	11-3
	19.2	11-3	10-7	10-2	8-0	11-5	10-4	10-7	10-10	10-10	10-7
	24.0	10-5	9-10	9-3	7-2	10-7	9-8	9-10	10-0	10-0	9-10
2 x 6	12.0	20-8	19-6	18-8	14-11	21-0	19-1	19-6	19-11	19-11	19-6
	16.0	18-9	17-8	16-11	12-11	19-1	17-4	17-8	18-1	18-1	17-8
	19.2	17-8	16-8	15-7	11-9	17-11	16-4	16-8	17-0	17-0	16-8
	24.0	16-4	15-6	13-11	10-7	16-8	15-2	15-6	15-9	15-9	15-6
2 x 8	12.0	26-0*	25-8	24-7	18-9	26-0*	25-2	25-8	26-0*	26-0*	25-8
	16.0	24-8	23-4	21-7	16-3	25-2	22-10	23-4	23-10	23-10	23-4
	19.2	23-3	21-11	19-8	14-10	23-8	21-6	21-11	22-5	22-5	21-11
	24.0	21-7	20-5	17-7	13-3	21-11	19-11	20-5	20-10	20-10	20-5
2 x 10	12.0	26-0*	26-0*	26-0*	22-9	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	26-0*	25-7	19-9	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	19.2	26-0*	26-0*	23-5	18-0	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	24.0	26-0*	23-11	20-11	16-1	26-0*	25-5	26-0	26-0*	26-0*	26-0

TABLE 16 CEILING JOISTS – 20 PSF LIVE LOAD, 10 PSF DEAD LOAD, 240 DEFLECTION

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	10-5	9-10	9-3	7-2	10-7	9-8	9-10	10-0	10-0	9-10
	16.0	9-6	8-11	8-0	6-2	9-8	8-9	8-11	9-1	9-1	8-11
	19.2	8-11	8-5	7-4	5-8	9-1	8-3	8-5	8-7	8-7	8-5
	24.0	8-3	7-8	6-7	5-1	8-5	7-8	7-8	8-0	7-9	7-10
2 x 6	12.0	16-4	15-6	13-11	10-7	16-8	15-2	15-6	15-9	15-9	15-6
	16.0	14-11	14-0	12-0	9-2	15-2	13-9	14-1	14-4	14-4	14-1
	19.2	14-0	12-9	11-0	8-4	14-3	12-11	13-3	13-6	13-6	13-3
	24.0	13-0	11-5	9-10	7-5	13-3	12-0	12-0	12-6	12-3	12-3
2 x 8	12.0	21-7	20-5	17-7	13-3	21-11	19-11	20-5	20-10	20-10	20-5
	16.0	19-7	17-9	15-3	11-6	19-11	18-2	18-6	18-11	18-11	18-6
	19.2	18-5	16-2	13-11	10-6	18-9	17-1	17-5	17-9	17-9	17-5
	24.0	17-2	14-6	12-6	9-5	17-5	15-10	15-10	16-6	16-2	16-2
2 x 10	12.0	26-0*	23-11	20-11	16-1	26-0*	25-5	26-0	26-0*	26-0*	26-0
	16.0	25-0	20-9	18-1	13-11	25-5	23-2	23-8	24-1	24-1	23-8
	19.2	23-7	18-11	16-6	12-9	23-11	21-9	22-3	22-8	22-8	22-3
	24.0	21-10	16-11	14-9	11-5	22-3	20-2	20-3	21-1	20-7	20-8

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 17 RAFTERS – 20 PSF LIVE LOAD, 10 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No. 1	No. 2	No. 3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	16-4	15-6	14-9	11-4	16-8	15-2	15-6	15-9	15-9	15-6
	16.0	14-11	14-1	12-11	9-9	15-2	13-9	14-1	14-4	14-4	14-1
	19.2	14-0	13-3	11-9	8-11	14-3	12-11	13-3	13-6	13-6	13-3
	24.0	13-0	12-3	10-7	8-0	13-3	12-0	12-3	12-6	12-6	12-3
2 x 8	12.0	21-7	20-5	18-11	14-3	21-11	19-11	20-5	20-10	20-10	20-5
	16.0	19-7	18-6	16-4	12-4	19-11	18-2	18-6	18-11	18-11	18-6
	19.2	18-5	17-4	14-11	11-3	18-9	17-1	17-5	17-9	17-9	17-5
	24.0	17-2	15-6	13-4	10-1	17-5	15-10	16-2	16-6	16-6	16-2
2 x 10	12.0	26-0*	25-8	22-5	17-3	26-0*	25-5	26-0	26-0*	26-0*	26-0
	16.0	25-0	22-3	19-5	15-0	25-5	23-2	23-8	24-1	24-1	23-8
	19.2	23-7	20-4	17-9	13-8	23-11	21-9	22-3	22-8	22-8	22-3
	24.0	21-10	18-2	15-10	12-3	22-3	20-2	20-8	21-1	21-1	20-8
2 x 12	12.0	26-0*	26-0*	26-0*	20-5	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	26-0*	22-10	17-9	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	19.2	26-0*	24-1	20-11	16-2	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	24.0	26-0*	21-7	18-8	14-6	26-0*	24-7	25-1	25-7	25-7	25-1

TABLE 18 RAFTERS – 30 PSF LIVE LOAD, 10 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No. 1	No. 2	No. 3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	14-4	13-6	12-11	9-9	14-7	13-3	13-6	13-9	13-9	13-6
	16.0	13-0	12-3	11-2	8-6	13-3	12-0	12-3	12-6	12-6	12-3
	19.2	12-3	11-7	10-2	7-9	12-5	11-4	11-7	11-9	11-9	11-7
	24.0	11-4	10-7	9-2	6-11	11-7	10-6	10-9	10-11	10-11	10-9
2 x 8	12.0	18-10	17-10	16-4	12-4	19-2	17-5	17-10	18-2	18-2	17-10
	16.0	17-2	16-2	14-2	10-8	17-5	15-10	16-2	16-6	16-6	16-2
	19.2	16-1	15-1	12-11	9-9	16-5	14-11	15-3	15-6	15-6	15-3
	24.0	15-0	13-5	11-7	8-9	15-3	13-10	14-2	14-5	14-5	14-2
2 x 10	12.0	24-1	22-3	19-5	15-0	24-6	22-3	22-9	23-2	23-2	22-9
	16.0	21-10	19-3	16-10	13-0	22-3	20-2	20-8	21-1	21-1	20-8
	19.2	20-7	17-7	15-4	11-10	20-11	19-0	19-5	19-10	19-10	19-5
	24.0	19-1	15-9	13-9	10-7	19-5	17-8	18-0	18-5	18-5	18-0
2 x 12	12.0	26-0*	26-0*	22-10	17-9	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	22-10	19-10	15-4	26-0*	24-7	25-1	25-7	25-7	25-1
	19.2	25-0	20-11	18-1	14-0	25-5	23-1	23-7	24-1	24-1	23-7
	24.0	23-3	18-8	16-2	12-6	23-7	21-6	21-11	22-5	22-5	21-11

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 19 RAFTERS – 40 PSF LIVE LOAD, 10 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	13-0	12-3	11-7	8-9	13-3	12-0	12-3	12-6	12-6	12-3
	16.0	11-10	11-2	10-0	7-7	12-0	10-11	11-2	11-5	11-5	11-2
	19.2	11-1	10-6	9-2	6-11	11-4	10-3	10-6	10-8	10-8	10-6
	24.0	10-4	9-6	8-2	6-2	10-6	9-6	9-9	9-11	9-11	9-9
2 x 8	12.0	17-2	16-2	14-8	11-0	17-5	15-10	16-2	16-6	16-6	16-2
	16.0	15-7	14-8	12-8	9-7	15-10	14-5	14-8	15-0	15-0	14-8
	19.2	14-8	13-5	11-7	8-9	14-11	13-6	13-10	14-1	14-1	13-10
	24.0	13-7	12-0	10-4	7-10	13-10	12-7	12-10	13-1	13-1	12-10
2 x 10	12.0	21-10	19-11	17-4	13-5	22-3	20-2	20-8	21-1	21-1	20-8
	16.0	19-10	17-3	15-1	11-7	20-2	18-4	18-9	19-2	19-2	18-9
	19.2	18-8	15-9	13-9	10-7	19-0	17-3	17-8	18-0	18-0	17-8
	24.0	17-4	14-1	12-3	9-6	17-8	16-0	16-5	16-9	16-9	16-5
2 x 12	12.0	26-0*	23-7	20-5	15-10	26-0*	24-7	25-1	25-7	25-7	25-1
	16.0	24-2	20-5	17-9	13-9	24-7	22-4	22-10	23-3	23-3	22-10
	19.2	22-9	18-8	16-2	12-6	23-1	21-0	21-6	21-11	21-11	21-6
	24.0	21-1	16-8	14-6	11-2	21-6	19-6	19-11	20-4	20-4	19-11

TABLE 20 RAFTERS – 50 PSF LIVE LOAD, 10 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	12-1	11-5	10-7	8-0	12-3	11-2	11-5	11-8	11-8	11-5
	16.0	11-0	10-4	9-2	6-11	11-2	10-2	10-4	10-7	10-7	10-4
	19.2	10-4	9-8	8-4	6-4	10-6	9-6	9-9	9-11	9-11	9-9
	24.0	9-7	8-8	7-5	5-8	9-9	8-10	9-1	9-3	9-3	9-1
2 x 8	12.0	15-11	15-0	13-4	10-1	16-2	14-8	15-0	15-4	15-4	15-0
	16.0	14-5	13-5	11-7	8-9	14-8	13-4	13-8	13-11	13-11	13-8
	19.2	13-7	12-3	10-7	8-0	13-10	12-7	12-10	13-1	13-1	12-10
	24.0	12-7	11-0	9-5	7-1	12-10	11-8	11-11	12-2	12-2	11-11
2 x 10	12.0	20-3	18-2	15-10	12-3	20-8	18-9	19-2	19-7	19-7	19-2
	16.0	18-5	15-9	13-9	10-7	18-9	17-0	17-5	17-9	17-9	17-5
	19.2	17-4	14-4	12-6	9-8	17-8	16-0	16-5	16-9	16-9	16-5
	24.0	16-1	12-10	11-3	8-8	16-5	14-11	15-2	15-6	15-6	15-2
2 x 12	12.0	24-8	21-7	18-8	14-6	25-1	22-10	23-4	23-9	23-9	23-4
	16.0	22-5	18-8	16-2	12-6	22-10	20-9	21-2	21-7	21-7	21-2
	19.2	21-1	17-1	14-9	11-5	21-6	19-6	19-11	20-4	20-4	19-11
	24.0	19-7	15-3	13-2	10-3	19-11	18-1	18-6	18-10	18-10	18-6

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 21 RAFTERS – 20 PSF LIVE LOAD, 15 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	16-4	15-6	13-10	10-6	16-8	15-2	15-6	15-9	15-9	15-6
	16.0	14-11	13-11	11-11	9-1	15-2	13-9	14-1	14-4	14-4	14-1
	19.2	14-0	12-8	10-11	8-3	14-3	12-11	13-3	13-6	13-6	13-3
	24.0	13-0	11-4	9-9	7-5	13-3	12-0	11-11	12-6	12-2	12-3
2 x 8	12.0	21-7	20-4	17-6	13-2	21-11	19-11	20-5	20-10	20-10	20-5
	16.0	19-7	17-7	15-2	11-5	19-11	18-2	18-6	18-11	18-11	18-6
	19.2	18-5	16-1	13-10	10-5	18-9	17-1	17-5	17-9	17-9	17-5
	24.0	17-2	14-5	12-4	9-4	17-5	15-10	15-9	16-6	16-0	16-2
2 x 10	12.0	26-0*	23-9	20-9	16-0	26-0*	25-5	26-0	26-0*	26-0*	26-0
	16.0	25-0	20-7	18-0	13-10	25-5	23-2	23-8	24-1	24-1	23-8
	19.2	23-7	18-10	16-5	12-8	23-11	21-9	22-3	22-8	22-8	22-3
	24.0	21-10	16-10	14-8	11-4	22-3	20-2	20-1	21-1	20-5	20-8
2 x 12	12.0	26-0*	26-0*	24-5	18-11	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	24-5	21-2	16-5	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	19.2	26-0*	22-4	19-4	15-0	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	24.0	26-0*	20-0	17-3	13-5	26-0*	24-7	24-5	25-7	24-10	25-1

TABLE 22 RAFTERS – 30 PSF LIVE LOAD, 15 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	14-4	13-6	12-2	9-3	14-7	13-3	13-6	13-9	13-9	13-6
	16.0	13-0	12-3	10-7	8-0	13-3	12-0	12-3	12-6	12-6	12-3
	19.2	12-3	11-2	9-7	7-4	12-5	11-4	11-7	11-9	11-9	11-7
	24.0	11-4	10-0	8-7	6-6	11-7	10-6	10-7	10-11	10-9	10-9
2 x 8	12.0	18-10	17-10	15-5	11-8	19-2	17-5	17-10	18-2	18-2	17-10
	16.0	17-2	15-6	13-4	10-1	17-5	15-10	16-2	16-6	16-6	16-2
	19.2	16-1	14-2	12-2	9-2	16-5	14-11	15-3	15-6	15-6	15-3
	24.0	15-0	12-8	10-11	8-3	15-3	13-10	13-11	14-5	14-2	14-2
2 x 10	12.0	24-1	21-0	18-4	14-1	24-6	22-3	22-9	23-2	23-2	22-9
	16.0	21-10	18-2	15-10	12-3	22-3	20-2	20-8	21-1	21-1	20-8
	19.2	20-7	16-7	14-6	11-2	20-11	19-0	19-5	19-10	19-10	19-5
	24.0	19-1	14-10	12-11	10-0	19-5	17-8	17-9	18-5	18-0	18-0
2 x 12	12.0	26-0*	24-11	21-7	16-8	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	21-7	18-8	14-6	26-0*	24-7	25-1	25-7	25-7	25-1
	19.2	25-0	19-8	17-1	13-2	25-5	23-1	23-7	24-1	24-1	23-7
	24.0	23-3	17-7	15-3	11-10	23-7	21-6	21-7	22-5	21-11	21-11

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 23 RAFTERS – 40 PSF LIVE LOAD, 15 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	13-0	12-3	11-0	8-4	13-3	12-0	12-3	12-6	12-6	12-3
	16.0	11-10	11-1	9-6	7-3	12-0	10-11	11-2	11-5	11-5	11-2
	19.2	11-1	10-1	8-8	6-7	11-4	10-3	10-6	10-8	10-8	10-6
	24.0	10-4	9-1	7-9	5-11	10-6	9-6	9-6	9-11	9-8	9-9
2 x 8	12.0	17-2	16-2	14-0	10-6	17-5	15-10	16-2	16-6	16-6	16-2
	16.0	15-7	14-1	12-1	9-1	15-10	14-5	14-8	15-0	15-0	14-8
	19.2	14-8	12-10	11-0	8-4	14-11	13-6	13-10	14-1	14-1	13-10
	24.0	13-7	11-6	9-10	7-5	13-10	12-7	12-7	13-1	12-9	12-10
2 x 10	12.0	21-10	19-0	16-7	12-9	22-3	20-2	20-8	21-1	21-1	20-8
	16.0	19-10	16-5	14-4	11-1	20-2	18-4	18-9	19-2	19-2	18-9
	19.2	18-8	15-0	13-1	10-1	19-0	17-3	17-8	18-0	18-0	17-8
	24.0	17-4	13-5	11-9	9-0	17-8	16-0	16-0	16-9	16-4	16-5
2 x 12	12.0	26-0*	22-6	19-6	15-1	26-0*	24-7	25-1	25-7	25-7	25-1
	16.0	24-2	19-6	16-11	13-1	24-7	22-4	22-10	23-3	23-3	22-10
	19.2	22-9	17-10	15-5	11-11	23-1	21-0	21-6	21-11	21-11	21-6
	24.0	21-1	15-11	13-9	10-8	21-6	19-6	19-6	20-4	19-10	19-11

TABLE 24 RAFTERS – 50 PSF LIVE LOAD, 15 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	12-1	11-5	10-2	7-8	12-3	11-2	11-5	11-8	11-8	11-5
	16.0	11-0	10-2	8-9	6-8	11-2	10-2	10-4	10-7	10-7	10-4
	19.2	10-4	9-4	8-0	6-1	10-6	9-6	9-9	9-11	9-11	9-9
	24.0	9-7	8-4	7-2	5-5	9-9	8-10	8-9	9-3	8-11	9-1
2 x 8	12.0	15-11	14-11	12-10	9-8	16-2	14-8	15-0	15-4	15-4	15-0
	16.0	14-5	12-11	11-1	8-5	14-8	13-4	13-8	13-11	13-11	13-8
	19.2	13-7	11-10	10-2	7-8	13-10	12-7	12-10	13-1	13-1	12-10
	24.0	12-7	10-7	9-1	6-10	12-10	11-8	11-7	12-2	11-9	11-11
2 x 10	12.0	20-3	17-5	15-3	11-9	20-8	18-9	19-2	19-7	19-7	19-2
	16.0	18-5	15-1	13-2	10-2	18-9	17-0	17-5	17-9	17-9	17-5
	19.2	17-4	13-10	12-1	9-3	17-8	16-0	16-5	16-9	16-9	16-5
	24.0	16-1	12-4	10-9	8-4	16-5	14-11	14-9	15-6	15-0	15-2
2 x 12	12.0	24-8	20-9	17-11	13-11	25-1	22-10	23-4	23-9	23-9	23-4
	16.0	22-5	17-11	15-6	12-0	22-10	20-9	21-2	21-7	21-7	21-2
	19.2	21-1	16-5	14-2	11-0	21-6	19-6	19-11	20-4	20-4	19-11
	24.0	19-7	14-8	12-8	9-10	19-11	18-1	17-11	18-10	18-3	18-6

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 25 RAFTERS – 20 PSF LIVE LOAD, 20 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	16-4	15-0	12-11	9-9	16-8	15-2	15-6	15-9	15-9	15-6
	16.0	14-11	13-0	11-2	8-6	15-2	13-9	13-8	14-4	13-11	14-1
	19.2	14-0	11-10	10-2	7-9	14-3	12-11	12-6	13-6	12-8	12-11
	24.0	13-0	10-7	9-2	6-11	13-3	11-9	11-2	12-3	11-4	11-7
2 x 8	12.0	21-7	19-0	16-4	12-4	21-11	19-11	20-5	20-10	20-10	20-5
	16.0	19-7	16-6	14-2	10-8	19-11	18-2	18-1	18-11	18-4	18-6
	19.2	18-5	15-1	12-11	9-9	18-9	17-1	16-6	17-9	16-9	17-0
	24.0	17-2	13-5	11-7	8-9	17-5	15-5	14-9	16-2	15-0	15-3
2 x 10	12.0	26-0*	22-3	19-5	15-0	26-0*	25-5	26-0	26-0*	26-0*	26-0
	16.0	25-0	19-3	16-10	13-0	25-5	23-2	23-0	24-1	23-5	23-8
	19.2	23-7	17-7	15-4	11-10	23-11	21-9	21-0	22-8	21-4	21-9
	24.0	21-5	15-9	13-9	10-7	22-3	19-9	18-10	20-7	19-1	19-5
2 x 12	12.0	26-0*	26-0*	22-10	17-9	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	22-10	19-10	15-4	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	19.2	26-0*	20-11	18-1	14-0	26-0*	26-0*	25-7	26-0*	26-0	26-0*
	24.0	25-1	18-8	16-2	12-6	26-0*	24-0	22-10	25-1	23-3	23-7

TABLE 26 RAFTERS – 30 PSF LIVE LOAD, 20 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	14-4	13-5	11-7	8-9	14-7	13-3	13-6	13-9	13-9	13-6
	16.0	13-0	11-7	10-0	7-7	13-3	12-0	12-3	12-6	12-5	12-3
	19.2	12-3	10-7	9-2	6-11	12-5	11-4	11-2	11-9	11-4	11-7
	24.0	11-4	9-6	8-2	6-2	11-7	10-6	10-0	10-11	10-2	10-4
2 x 8	12.0	18-10	17-0	14-8	11-0	19-2	17-5	17-10	18-2	18-2	17-10
	16.0	17-2	14-9	12-8	9-7	17-5	15-10	16-2	16-6	16-5	16-2
	19.2	16-1	13-5	11-7	8-9	16-5	14-11	14-9	15-6	15-0	15-3
	24.0	15-0	12-0	10-4	7-10	15-3	13-10	13-2	14-5	13-5	13-7
2 x 10	12.0	24-1	19-11	17-4	13-5	24-6	22-3	22-9	23-2	23-2	22-9
	16.0	21-10	17-3	15-1	11-7	22-3	20-2	20-7	21-1	20-11	20-8
	19.2	20-7	15-9	13-9	10-7	20-11	19-0	18-10	19-10	19-1	19-5
	24.0	19-1	14-1	12-3	9-6	19-5	17-8	16-10	18-5	17-1	17-4
2 x 12	12.0	26-0*	23-7	20-5	15-10	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	20-5	17-9	13-9	26-0*	24-7	25-1	25-7	25-6	25-1
	19.2	25-0	18-8	16-2	12-6	25-5	23-1	22-10	24-1	23-3	23-7
	24.0	22-5	16-8	14-6	11-2	23-7	21-5	20-5	22-5	20-10	21-2

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 27 RAFTERS – 40 PSF LIVE LOAD, 20 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	13-0	12-3	10-7	8-0	13-3	12-0	12-3	12-6	12-6	12-3
	16.0	11-10	10-7	9-2	6-11	12-0	10-11	11-2	11-5	11-4	11-2
	19.2	11-1	9-8	8-4	6-4	11-4	10-3	10-2	10-8	10-5	10-6
	24.0	10-4	8-8	7-5	5-8	10-6	9-6	9-2	9-11	9-3	9-5
2 x 8	12.0	17-2	15-6	13-4	10-1	17-5	15-10	16-2	16-6	16-6	16-2
	16.0	15-7	13-5	11-7	8-9	15-10	14-5	14-8	15-0	15-0	14-8
	19.2	14-8	12-3	10-7	8-0	14-11	13-6	13-5	14-1	13-8	13-10
	24.0	13-7	11-0	9-5	7-1	13-10	12-7	12-0	13-1	12-3	12-5
2 x 10	12.0	21-10	18-2	15-10	12-3	22-3	20-2	20-8	21-1	21-1	20-8
	16.0	19-10	15-9	13-9	10-7	20-2	18-4	18-9	19-2	19-1	18-9
	19.2	18-8	14-4	12-6	9-8	19-0	17-3	17-2	18-0	17-5	17-8
	24.0	17-4	12-10	11-3	8-8	17-8	16-0	15-4	16-9	15-7	15-10
2 x 12	12.0	26-0*	21-7	18-8	14-6	26-0*	24-7	25-1	25-7	25-7	25-1
	16.0	24-2	18-8	16-2	12-6	24-7	22-4	22-10	23-3	23-3	22-10
	19.2	22-9	17-1	14-9	11-5	23-1	21-0	20-11	21-11	21-3	21-6
	24.0	20-5	15-3	13-2	10-3	21-6	19-6	18-8	20-4	19-0	19-3

TABLE 28 RAFTERS – 50 PSF LIVE LOAD, 20 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	12-1	11-4	9-9	7-5	12-3	11-2	11-5	11-8	11-8	11-5
	16.0	11-0	9-10	8-5	6-5	11-2	10-2	10-4	10-7	10-6	10-4
	19.2	10-4	9-0	7-9	5-10	10-6	9-6	9-5	9-11	9-7	9-9
	24.0	9-7	8-0	6-11	5-3	9-9	8-10	8-5	9-3	8-7	8-9
2 x 8	12.0	15-11	14-5	12-4	9-4	16-2	14-8	15-0	15-4	15-4	15-0
	16.0	14-5	12-5	10-9	8-1	14-8	13-4	13-8	13-11	13-10	13-8
	19.2	13-7	11-4	9-9	7-4	13-10	12-7	12-5	13-1	12-8	12-10
	24.0	12-7	10-2	8-9	6-7	12-10	11-8	11-2	12-2	11-4	11-6
2 x 10	12.0	20-3	16-10	14-8	11-4	20-8	18-9	19-2	19-7	19-7	19-2
	16.0	18-5	14-7	12-9	9-10	18-9	17-0	17-5	17-9	17-8	17-5
	19.2	17-4	13-4	11-7	8-11	17-8	16-0	15-11	16-9	16-2	16-5
	24.0	16-1	11-11	10-5	8-0	16-5	14-11	14-3	15-6	14-5	14-8
2 x 12	12.0	24-8	20-0	17-3	13-5	25-1	22-10	23-4	23-9	23-9	23-4
	16.0	22-5	17-3	15-0	11-7	22-10	20-9	21-2	21-7	21-6	21-2
	19.2	21-1	15-9	13-8	10-7	21-6	19-6	19-4	20-4	19-8	19-11
	24.0	18-11	14-1	12-3	9-6	19-11	18-1	17-3	18-10	17-7	17-10

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 29 RAFTERS – 20 PSF LIVE LOAD, 10 PSF DEAD LOAD, 180 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	11-6	10-10	9-11	7-8	11-8	10-7	10-10	11-1	11-1	10-10
	16.0	10-5	9-10	8-7	6-7	10-7	9-8	9-10	10-0	10-0	9-10
	19.2	9-10	9-2	7-10	6-1	10-0	9-1	9-2	9-5	9-4	9-3
	24.0	9-1	8-3	7-0	5-5	9-3	8-5	8-3	8-9	8-4	8-6
2 x 6	12.0	18-0	17-0	14-11	11-4	18-4	16-8	17-0	17-4	17-4	17-0
	16.0	16-4	15-0	12-11	9-9	16-8	15-2	15-6	15-9	15-9	15-6
	19.2	15-5	13-8	11-9	8-11	15-8	14-3	14-5	14-10	14-8	14-7
	24.0	14-4	12-3	10-7	8-0	14-7	13-3	12-11	13-9	13-1	13-4
2 x 8	12.0	23-9	22-0	18-11	14-3	24-2	21-11	22-5	22-11	22-11	22-5
	16.0	21-7	19-0	16-4	12-4	21-11	19-11	20-5	20-10	20-10	20-5
	19.2	20-4	17-4	14-11	11-3	20-8	18-9	19-0	19-7	19-4	19-2
	24.0	18-10	15-6	13-4	10-1	19-2	17-5	17-0	18-2	17-4	17-7
2 x 10	12.0	26-0*	25-8	22-5	17-3	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	22-3	19-5	15-0	26-0*	25-5	26-0	26-0*	26-0*	26-0
	19.2	25-11	20-4	17-9	13-8	26-0*	23-11	24-3	25-0	24-8	24-6
	24.0	24-1	18-2	15-10	12-3	24-6	22-3	21-9	23-2	22-1	22-5

TABLE 30 RAFTERS – 30 PSF LIVE LOAD, 10 PSF DEAD LOAD, 180 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	10-0	9-6	8-7	6-7	10-2	9-3	9-6	9-8	9-8	9-6
	16.0	9-1	8-7	7-6	5-9	9-3	8-5	8-7	8-9	8-9	8-7
	19.2	8-7	7-11	6-10	5-3	8-9	7-11	7-11	8-3	8-1	8-1
	24.0	7-11	7-1	6-1	4-8	8-1	7-4	7-1	7-8	7-3	7-4
2 x 6	12.0	15-9	14-10	12-11	9-9	16-0	14-7	14-10	15-2	15-2	14-10
	16.0	14-4	13-0	11-2	8-6	14-7	13-3	13-6	13-9	13-9	13-6
	19.2	13-6	11-10	10-2	7-9	13-8	12-5	12-6	13-0	12-8	12-9
	24.0	12-6	10-7	9-2	6-11	12-9	11-7	11-2	12-0	11-4	11-7
2 x 8	12.0	20-9	19-0	16-4	12-4	21-1	19-2	19-7	20-0	20-0	19-7
	16.0	18-10	16-6	14-2	10-8	19-2	17-5	17-10	18-2	18-2	17-10
	19.2	17-9	15-1	12-11	9-9	18-1	16-5	16-6	17-1	16-9	16-9
	24.0	16-6	13-5	11-7	8-9	16-9	15-3	14-9	15-10	15-0	15-3
2 x 10	12.0	26-0*	22-3	19-5	15-0	26-0*	24-6	25-0	25-6	25-6	25-0
	16.0	24-1	19-3	16-10	13-0	24-6	22-3	22-9	23-2	23-2	22-9
	19.2	22-8	17-7	15-4	11-10	23-0	20-11	21-0	21-10	21-4	21-5
	24.0	21-0	15-9	13-9	10-7	21-5	19-5	18-10	20-3	19-1	19-5

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 31 RAFTERS – 40 PSF LIVE LOAD, 10 PSF DEAD LOAD, 180 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	9-1	8-7	7-8	5-11	9-3	8-5	8-7	8-9	8-9	8-7
	16.0	8-3	7-10	6-8	5-2	8-5	7-8	7-10	8-0	7-11	7-10
	19.2	7-9	7-1	6-1	4-8	7-11	7-2	7-1	7-6	7-3	7-4
	24.0	7-3	6-4	5-5	4-2	7-4	6-8	6-4	7-0	6-6	6-7
2 x 6	12.0	14-4	13-5	11-7	8-9	14-7	13-3	13-6	13-9	13-9	13-6
	16.0	13-0	11-7	10-0	7-7	13-3	12-0	12-3	12-6	12-5	12-3
	19.2	12-3	10-7	9-2	6-11	12-5	11-4	11-2	11-9	11-4	11-7
	24.0	11-4	9-6	8-2	6-2	11-7	10-6	10-0	10-11	10-2	10-4
2 x 8	12.0	18-10	17-0	14-8	11-0	19-2	17-5	17-10	18-2	18-2	17-10
	16.0	17-2	14-9	12-8	9-7	17-5	15-10	16-2	16-6	16-5	16-2
	19.2	16-1	13-5	11-7	8-9	16-5	14-11	14-9	15-6	15-0	15-3
	24.0	15-0	12-0	10-4	7-10	15-3	13-10	13-2	14-5	13-5	13-7
2 x 10	12.0	24-1	19-11	17-4	13-5	24-6	22-3	22-9	23-2	23-2	22-9
	16.0	21-10	17-3	15-1	11-7	22-3	20-2	20-7	21-1	20-11	20-8
	19.2	20-7	15-9	13-9	10-7	20-11	19-0	18-10	19-10	19-1	19-5
	24.0	19-1	14-1	12-3	9-6	19-5	17-8	16-10	18-5	17-1	17-4

TABLE 32 RAFTERS – 50 PSF LIVE LOAD, 10 PSF DEAD LOAD, 180 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	8-5	8-0	7-0	5-5	8-7	7-10	8-0	8-2	8-2	8-0
	16.0	7-8	7-1	6-1	4-8	7-10	7-1	7-1	7-5	7-3	7-3
	19.2	7-3	6-6	5-7	4-3	7-4	6-8	6-6	7-0	6-7	6-9
	24.0	6-8	5-10	5-0	3-10	6-10	6-1	5-10	6-4	5-11	6-0
2 x 6	12.0	13-3	12-3	10-7	8-0	13-6	12-3	12-6	12-10	12-10	12-6
	16.0	12-1	10-7	9-2	6-11	12-3	11-2	11-2	11-8	11-4	11-5
	19.2	11-4	9-8	8-4	6-4	11-7	10-6	10-2	10-11	10-5	10-7
	24.0	10-6	8-8	7-5	5-8	10-9	9-7	9-2	10-0	9-3	9-5
2 x 8	12.0	17-6	15-6	13-4	10-1	17-10	16-2	16-6	16-10	16-10	16-6
	16.0	15-11	13-5	11-7	8-9	16-2	14-8	14-9	15-4	15-0	15-0
	19.2	15-0	12-3	10-7	8-0	15-3	13-10	13-5	14-5	13-8	13-11
	24.0	13-11	11-0	9-5	7-1	14-2	12-7	12-0	13-2	12-3	12-5
2 x 10	12.0	22-4	18-2	15-10	12-3	22-9	20-8	21-1	21-6	21-6	21-1
	16.0	20-3	15-9	13-9	10-7	20-8	18-9	18-10	19-7	19-1	19-2
	19.2	19-1	14-4	12-6	9-8	19-5	17-8	17-2	18-5	17-5	17-9
	24.0	17-6	12-10	11-3	8-8	18-0	16-1	15-4	16-10	15-7	15-10

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 33 RAFTERS – 20 PSF LIVE LOAD, 15 PSF DEAD LOAD, 180 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	11-6	10-9	9-3	7-1	11-8	10-7	10-9	11-1	10-11	10-10
	16.0	10-5	9-4	8-0	6-2	10-7	9-8	9-4	10-0	9-6	9-7
	19.2	9-10	8-6	7-3	5-7	10-0	8-11	8-6	9-4	8-8	8-9
	24.0	9-1	7-7	6-6	5-0	9-3	8-0	7-7	8-4	7-9	7-10
2 x 6	12.0	18-0	16-0	13-10	10-6	18-4	16-8	16-11	17-4	17-2	17-0
	16.0	16-4	13-11	11-11	9-1	16-8	15-2	14-8	15-9	14-11	15-1
	19.2	15-5	12-8	10-11	8-3	15-8	14-0	13-4	14-8	13-7	13-10
	24.0	14-4	11-4	9-9	7-5	14-7	12-6	11-11	13-1	12-2	12-4
2 x 8	12.0	23-9	20-4	17-6	13-2	24-2	21-11	22-3	22-11	22-8	22-5
	16.0	21-7	17-7	15-2	11-5	21-11	19-11	19-4	20-10	19-7	19-11
	19.2	20-4	16-1	13-10	10-5	20-8	18-6	17-7	19-4	17-11	18-2
	24.0	18-10	14-5	12-4	9-4	19-2	16-6	15-9	17-3	16-0	16-3
2 x 10	12.0	26-0*	23-9	20-9	16-0	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	20-7	18-0	13-10	26-0*	25-5	24-7	26-0*	25-0	25-5
	19.2	25-8	18-10	16-5	12-8	26-0*	23-7	22-6	24-7	22-10	23-3
	24.0	22-11	16-10	14-8	11-4	24-6	21-1	20-1	22-0	20-5	20-9

TABLE 34 RAFTERS – 30 PSF LIVE LOAD, 15 PSF DEAD LOAD, 180 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	10-0	9-6	8-1	6-3	10-2	9-3	9-6	9-8	9-8	9-6
	16.0	9-1	8-3	7-0	5-5	9-3	8-5	8-3	8-9	8-4	8-6
	19.2	8-7	7-6	6-5	4-11	8-9	7-10	7-6	8-3	7-7	7-9
	24.0	7-11	6-9	5-9	4-5	8-1	7-0	6-9	7-4	6-10	6-11
2 x 6	12.0	15-9	14-2	12-2	9-3	16-0	14-7	14-10	15-2	15-2	14-10
	16.0	14-4	12-3	10-7	8-0	14-7	13-3	12-11	13-9	13-1	13-4
	19.2	13-6	11-2	9-7	7-4	13-8	12-4	11-9	12-11	12-0	12-2
	24.0	12-6	10-0	8-7	6-6	12-9	11-1	10-7	11-7	10-9	10-11
2 x 8	12.0	20-9	17-11	15-5	11-8	21-1	19-2	19-7	20-0	20-0	19-7
	16.0	18-10	15-6	13-4	10-1	19-2	17-5	17-0	18-2	17-4	17-7
	19.2	17-9	14-2	12-2	9-2	18-1	16-4	15-6	17-0	15-10	16-1
	24.0	16-6	12-8	10-11	8-3	16-9	14-7	13-11	15-3	14-2	14-4
2 x 10	12.0	26-0*	21-0	18-4	14-1	26-0*	24-6	25-0	25-6	25-6	25-0
	16.0	24-1	18-2	15-10	12-3	24-6	22-3	21-9	23-2	22-1	22-5
	19.2	22-7	16-7	14-6	11-2	23-0	20-9	19-10	21-9	20-2	20-6
	24.0	20-3	14-10	12-11	10-0	21-5	18-7	17-9	19-5	18-0	18-4

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 35 RAFTERS – 40 PSF LIVE LOAD, 15 PSF DEAD LOAD, 180 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	9-1	8-7	7-4	5-8	9-3	8-5	8-7	8-9	8-9	8-7
	16.0	8-3	7-5	6-4	4-11	8-5	7-8	7-5	8-0	7-7	7-8
	19.2	7-9	6-9	5-10	4-6	7-11	7-1	6-9	7-5	6-11	7-0
	24.0	7-3	6-1	5-2	4-0	7-4	6-4	6-1	6-8	6-2	6-3
2 x 6	12.0	14-4	12-10	11-0	8-4	14-7	13-3	13-6	13-9	13-8	13-6
	16.0	13-0	11-1	9-6	7-3	13-3	12-0	11-8	12-6	11-10	12-1
	19.2	12-3	10-1	8-8	6-7	12-5	11-2	10-8	11-8	10-10	11-0
	24.0	11-4	9-1	7-9	5-11	11-7	10-0	9-6	10-5	9-8	9-10
2 x 8	12.0	18-10	16-3	14-0	10-6	19-2	17-5	17-9	18-2	18-1	17-10
	16.0	17-2	14-1	12-1	9-1	17-5	15-10	15-5	16-6	15-8	15-11
	19.2	16-1	12-10	11-0	8-4	16-5	14-9	14-1	15-5	14-3	14-6
	24.0	15-0	11-6	9-10	7-5	15-3	13-2	12-7	13-9	12-9	13-0
2 x 10	12.0	24-1	19-0	16-7	12-9	24-6	22-3	22-8	23-2	23-1	22-9
	16.0	21-10	16-5	14-4	11-1	22-3	20-2	19-8	21-1	20-0	20-3
	19.2	20-5	15-0	13-1	10-1	20-11	18-10	17-11	19-8	18-3	18-6
	24.0	18-3	13-5	11-9	9-0	19-5	16-10	16-0	17-7	16-4	16-7

TABLE 36 RAFTERS – 50 PSF LIVE LOAD, 15 PSF DEAD LOAD, 180 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	8-5	7-11	6-9	5-2	8-7	7-10	7-11	8-2	8-0	8-0
	16.0	7-8	6-10	5-10	4-6	7-10	7-1	6-10	7-5	6-11	7-1
	19.2	7-3	6-3	5-4	4-1	7-4	6-7	6-3	6-10	6-4	6-5
	24.0	6-8	5-7	4-9	3-8	6-10	5-10	5-7	6-1	5-8	5-9
2 x 6	12.0	13-3	11-9	10-2	7-8	13-6	12-3	12-5	12-10	12-7	12-6
	16.0	12-1	10-2	8-9	6-8	12-3	11-2	10-9	11-8	10-11	11-1
	19.2	11-4	9-4	8-0	6-1	11-7	10-3	9-10	10-9	10-0	10-2
	24.0	10-6	8-4	7-2	5-5	10-9	9-2	8-9	9-7	8-11	9-1
2 x 8	12.0	17-6	14-11	12-10	9-8	17-10	16-2	16-4	16-10	16-7	16-6
	16.0	15-11	12-11	11-1	8-5	16-2	14-8	14-2	15-4	14-5	14-7
	19.2	15-0	11-10	10-2	7-8	15-3	13-7	12-11	14-2	13-2	13-4
	24.0	13-11	10-7	9-1	6-10	14-2	12-2	11-7	12-8	11-9	11-11
2 x 10	12.0	22-4	17-5	15-3	11-9	22-9	20-8	20-10	21-6	21-2	21-1
	16.0	20-3	15-1	13-2	10-2	20-8	18-9	18-1	19-7	18-4	18-8
	19.2	18-10	13-10	12-1	9-3	19-5	17-4	16-6	18-1	16-9	17-0
	24.0	16-10	12-4	10-9	8-4	18-0	15-6	14-9	16-2	15-0	15-3

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 37 RAFTERS – 20 PSF LIVE LOAD, 20 PSF DEAD LOAD, 180 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No. 1	No. 2	No. 3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	11-6	10-1	8-7	6-7	11-8	10-7	10-1	11-0	10-3	10-5
	16.0	10-5	8-9	7-6	5-9	10-7	9-2	8-9	9-7	8-10	9-0
	19.2	9-10	7-11	6-10	5-3	10-0	8-4	7-11	8-9	8-1	8-3
	24.0	9-1	7-1	6-1	4-8	9-0	7-6	7-1	7-10	7-3	7-4
2 x 6	12.0	18-0	15-0	12-11	9-9	18-4	16-7	15-10	17-4	16-1	16-4
	16.0	16-4	13-0	11-2	8-6	16-8	14-4	13-8	15-0	13-11	14-2
	19.2	15-5	11-10	10-2	7-9	15-8	13-1	12-6	13-8	12-8	12-11
	24.0	14-2	10-7	9-2	6-11	14-2	11-9	11-2	12-3	11-4	11-7
2 x 8	12.0	23-9	19-0	16-4	12-4	24-2	21-10	20-10	22-10	21-2	21-6
	16.0	21-7	16-6	14-2	10-8	21-11	18-11	18-1	19-9	18-4	18-8
	19.2	19-11	15-1	12-11	9-9	20-8	17-3	16-6	18-1	16-9	17-0
	24.0	17-10	13-5	11-7	8-9	18-8	15-5	14-9	16-2	15-0	15-3
2 x 10	12.0	26-0*	22-3	19-5	15-0	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	19-3	16-10	13-0	26-0*	24-2	23-0	25-3	23-5	23-9
	19.2	24-0	17-7	15-4	11-10	26-0*	22-1	21-0	23-0	21-4	21-9
	24.0	21-5	15-9	13-9	10-7	23-9	19-9	18-10	20-7	19-1	19-5

TABLE 38 RAFTERS – 30 PSF LIVE LOAD, 20 PSF DEAD LOAD, 180 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No. 1	No. 2	No. 3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	10-0	9-0	7-8	5-11	10-2	9-3	9-0	9-8	9-2	9-4
	16.0	9-1	7-10	6-8	5-2	9-3	8-2	7-10	8-6	7-11	8-1
	19.2	8-7	7-1	6-1	4-8	8-9	7-6	7-1	7-10	7-3	7-4
	24.0	7-11	6-4	5-5	4-2	8-1	6-8	6-4	7-0	6-6	6-7
2 x 6	12.0	15-9	13-5	11-7	8-9	16-0	14-7	14-2	15-2	14-5	14-7
	16.0	14-4	11-7	10-0	7-7	14-7	12-10	12-3	13-5	12-5	12-8
	19.2	13-6	10-7	9-2	6-11	13-8	11-9	11-2	12-3	11-4	11-7
	24.0	12-6	9-6	8-2	6-2	12-8	10-6	10-0	10-11	10-2	10-4
2 x 8	12.0	20-9	17-0	14-8	11-0	21-1	19-2	18-8	20-0	18-11	19-3
	16.0	18-10	14-9	12-8	9-7	19-2	16-11	16-2	17-8	16-5	16-8
	19.2	17-9	13-5	11-7	8-9	18-1	15-5	14-9	16-2	15-0	15-3
	24.0	16-0	12-0	10-4	7-10	16-8	13-10	13-2	14-5	13-5	13-7
2 x 10	12.0	26-0*	19-11	17-4	13-5	26-0*	24-6	23-9	25-6	24-2	24-7
	16.0	23-6	17-3	15-1	11-7	24-6	21-7	20-7	22-7	20-11	21-3
	19.2	21-5	15-9	13-9	10-7	23-0	19-9	18-10	20-7	19-1	19-5
	24.0	19-2	14-1	12-3	9-6	21-3	17-8	16-10	18-5	17-1	17-4

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 39 RAFTERS – 40 PSF LIVE LOAD, 20 PSF DEAD LOAD, 180 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	9-1	8-3	7-0	5-5	9-3	8-5	8-3	8-9	8-4	8-6
	16.0	8-3	7-1	6-1	4-8	8-5	7-6	7-1	7-10	7-3	7-4
	19.2	7-9	6-6	5-7	4-3	7-11	6-10	6-6	7-1	6-7	6-9
	24.0	7-3	5-10	5-0	3-10	7-4	6-1	5-10	6-4	5-11	6-0
2 x 6	12.0	14-4	12-3	10-7	8-0	14-7	13-3	12-11	13-9	13-1	13-4
	16.0	13-0	10-7	9-2	6-11	13-3	11-9	11-2	12-3	11-4	11-7
	19.2	12-3	9-8	8-4	6-4	12-5	10-8	10-2	11-2	10-5	10-7
	24.0	11-4	8-8	7-5	5-8	11-7	9-7	9-2	10-0	9-3	9-5
2 x 8	12.0	18-10	15-6	13-4	10-1	19-2	17-5	17-0	18-2	17-4	17-7
	16.0	17-2	13-5	11-7	8-9	17-5	15-5	14-9	16-2	15-0	15-3
	19.2	16-1	12-3	10-7	8-0	16-5	14-1	13-5	14-9	13-8	13-11
	24.0	14-7	11-0	9-5	7-1	15-3	12-7	12-0	13-2	12-3	12-5
2 x 10	12.0	24-1	18-2	15-10	12-3	24-6	22-3	21-9	23-2	22-1	22-5
	16.0	21-5	15-9	13-9	10-7	22-3	19-9	18-10	20-7	19-1	19-5
	19.2	19-7	14-4	12-6	9-8	20-11	18-0	17-2	18-10	17-5	17-9
	24.0	17-6	12-10	11-3	8-8	19-5	16-1	15-4	16-10	15-7	15-10

TABLE 40 RAFTERS – 50 PSF LIVE LOAD, 20 PSF DEAD LOAD, 180 DEFLECTION, $C_D = 1.15$ (SNOW)

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	8-5	7-7	6-6	5-0	8-7	7-10	7-7	8-2	7-9	7-10
	16.0	7-8	6-7	5-8	4-4	7-10	6-11	6-7	7-3	6-8	6-10
	19.2	7-3	6-0	5-2	4-0	7-4	6-4	6-0	6-7	6-1	6-3
	24.0	6-8	5-5	4-7	3-6	6-10	5-8	5-5	5-11	5-6	5-7
2 x 6	12.0	13-3	11-4	9-9	7-5	13-6	12-3	11-11	12-10	12-2	12-4
	16.0	12-1	9-10	8-5	6-5	12-3	10-10	10-4	11-4	10-6	10-8
	19.2	11-4	9-0	7-9	5-10	11-7	9-11	9-5	10-4	9-7	9-9
	24.0	10-6	8-0	6-11	5-3	10-8	8-10	8-5	9-3	8-7	8-9
2 x 8	12.0	17-6	14-5	12-4	9-4	17-10	16-2	15-9	16-10	16-0	16-3
	16.0	15-11	12-5	10-9	8-1	16-2	14-4	13-8	14-11	13-10	14-1
	19.2	15-0	11-4	9-9	7-4	15-3	13-1	12-5	13-8	12-8	12-10
	24.0	13-6	10-2	8-9	6-7	14-1	11-8	11-2	12-2	11-4	11-6
2 x 10	12.0	22-4	16-10	14-8	11-4	22-9	20-8	20-1	21-6	20-5	20-9
	16.0	19-10	14-7	12-9	9-10	20-8	18-3	17-5	19-1	17-8	18-0
	19.2	18-1	13-4	11-7	8-11	19-5	16-8	15-11	17-5	16-2	16-5
	24.0	16-2	11-11	10-5	8-0	18-0	14-11	14-3	15-7	14-5	14-8

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 41 RAFTERS – 20 PSF LIVE LOAD, 10 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.25$

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No. 1	No. 2	No. 3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	16-4	15-6	14-9	11-9	16-8	15-2	15-6	15-9	15-9	15-6
	16.0	14-11	14-1	13-5	10-2	15-2	13-9	14-1	14-4	14-4	14-1
	19.2	14-0	13-3	12-3	9-4	14-3	12-11	13-3	13-6	13-6	13-3
	24.0	13-0	12-3	11-0	8-4	13-3	12-0	12-3	12-6	12-6	12-3
2 x 8	12.0	21-7	20-5	19-6	14-10	21-11	19-11	20-5	20-10	20-10	20-5
	16.0	19-7	18-6	17-1	12-10	19-11	18-2	18-6	18-11	18-11	18-6
	19.2	18-5	17-5	15-7	11-9	18-9	17-1	17-5	17-9	17-9	17-5
	24.0	17-2	16-2	13-11	10-6	17-5	15-10	16-2	16-6	16-6	16-2
2 x 10	12.0	26-0*	26-0	23-5	18-0	26-0*	25-5	26-0	26-0*	26-0*	26-0
	16.0	25-0	23-2	20-3	15-7	25-5	23-2	23-8	24-1	24-1	23-8
	19.2	23-7	21-2	18-6	14-3	23-11	21-9	22-3	22-8	22-8	22-3
	24.0	21-10	18-11	16-6	12-9	22-3	20-2	20-8	21-1	21-1	20-8
2 x 12	12.0	26-0*	26-0*	26-0*	21-4	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	26-0*	23-10	18-6	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	19.2	26-0*	25-2	21-9	16-10	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	24.0	26-0*	22-6	19-6	15-1	26-0*	24-7	25-1	25-7	25-7	25-1

TABLE 42 RAFTERS – 20 PSF LIVE LOAD, 15 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.25$

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No. 1	No. 2	No. 3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	16-4	15-6	14-5	10-11	16-8	15-2	15-6	15-9	15-9	15-6
	16.0	14-11	14-1	12-6	9-5	15-2	13-9	14-1	14-4	14-4	14-1
	19.2	14-0	13-3	11-5	8-8	14-3	12-11	13-3	13-6	13-6	13-3
	24.0	13-0	11-10	10-2	7-9	13-3	12-0	12-3	12-6	12-6	12-3
2 x 8	12.0	21-7	20-5	18-3	13-9	21-11	19-11	20-5	20-10	20-10	20-5
	16.0	19-7	18-4	15-10	11-11	19-11	18-2	18-6	18-11	18-11	18-6
	19.2	18-5	16-9	14-5	10-10	18-9	17-1	17-5	17-9	17-9	17-5
	24.0	17-2	15-0	12-11	9-9	17-5	15-10	16-2	16-6	16-6	16-2
2 x 10	12.0	26-0*	24-10	21-8	16-8	26-0*	25-5	26-0	26-0*	26-0*	26-0
	16.0	25-0	21-6	18-9	14-5	25-5	23-2	23-8	24-1	24-1	23-8
	19.2	23-7	19-7	17-1	13-2	23-11	21-9	22-3	22-8	22-8	22-3
	24.0	21-10	17-6	15-4	11-10	22-3	20-2	20-8	21-1	21-1	20-8
2 x 12	12.0	26-0*	26-0*	25-6	19-9	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	25-6	22-1	17-1	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	19.2	26-0*	23-3	20-2	15-7	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	24.0	26-0*	20-10	18-0	14-0	26-0*	24-7	25-1	25-7	25-7	25-1

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 43 RAFTERS – 20 PSF LIVE LOAD, 20 PSF DEAD LOAD, 240 DEFLECTION, $C_D = 1.25$

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 6	12.0	16-4	15-6	13-6	10-2	16-8	15-2	15-6	15-9	15-9	15-6
	16.0	14-11	13-7	11-8	8-10	15-2	13-9	14-1	14-4	14-4	14-1
	19.2	14-0	12-4	10-8	8-1	14-3	12-11	13-0	13-6	13-3	13-3
	24.0	13-0	11-1	9-6	7-3	13-3	12-0	11-8	12-6	11-10	12-0
2 x 8	12.0	21-7	19-10	17-1	12-10	21-11	19-11	20-5	20-10	20-10	20-5
	16.0	19-7	17-2	14-9	11-2	19-11	18-2	18-6	18-11	18-11	18-6
	19.2	18-5	15-8	13-6	10-2	18-9	17-1	17-2	17-9	17-6	17-5
	24.0	17-2	14-0	12-1	9-1	17-5	15-10	15-4	16-6	15-7	15-10
2 x 10	12.0	26-0*	23-2	20-3	15-7	26-0*	25-5	26-0	26-0*	26-0*	26-0
	16.0	25-0	20-1	17-6	13-6	25-5	23-2	23-8	24-1	24-1	23-8
	19.2	23-7	18-4	16-0	12-4	23-11	21-9	21-11	22-8	22-3	22-3
	24.0	21-10	16-5	14-4	11-0	22-3	20-2	19-7	21-1	19-11	20-3
2 x 12	12.0	26-0*	26-0*	23-10	18-6	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	23-10	20-8	16-0	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	19.2	26-0*	21-9	18-10	14-7	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	24.0	26-0*	19-6	16-10	13-1	26-0*	24-7	23-10	25-7	24-3	24-8

TABLE 44 RAFTERS – 20 PSF LIVE LOAD, 10 PSF DEAD LOAD, 180 DEFLECTION, $C_D = 1.25$

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No.1	No.2	No.3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	11-6	10-10	10-4	8-0	11-8	10-7	10-10	11-1	11-1	10-10
	16.0	10-5	9-10	9-0	6-11	10-7	9-8	9-10	10-0	10-0	9-10
	19.2	9-10	9-3	8-2	6-4	10-0	9-1	9-3	9-5	9-5	9-3
	24.0	9-1	8-7	7-4	5-8	9-3	8-5	8-7	8-9	8-8	8-7
2 x 6	12.0	18-0	17-0	15-7	11-9	18-4	16-8	17-0	17-4	17-4	17-0
	16.0	16-4	15-6	13-6	10-2	16-8	15-2	15-6	15-9	15-9	15-6
	19.2	15-5	14-3	12-3	9-4	15-8	14-3	14-7	14-10	14-10	14-7
	24.0	14-4	12-9	11-0	8-4	14-7	13-3	13-6	13-9	13-8	13-6
2 x 8	12.0	23-9	22-5	19-8	14-10	24-2	21-11	22-5	22-11	22-11	22-5
	16.0	21-7	19-10	17-1	12-10	21-11	19-11	20-5	20-10	20-10	20-5
	19.2	20-4	18-1	15-7	11-9	20-8	18-9	19-2	19-7	19-7	19-2
	24.0	18-10	16-2	13-11	10-6	19-2	17-5	17-9	18-2	18-0	17-10
2 x 10	12.0	26-0*	26-0*	23-5	18-0	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	23-2	20-3	15-7	26-0*	25-5	26-0	26-0*	26-0*	26-0
	19.2	25-11	21-2	18-6	14-3	26-0*	23-11	24-6	25-0	25-0	24-6
	24.0	24-1	18-11	16-6	12-9	24-6	22-3	22-8	23-2	23-0	22-9

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

TABLE 45 RAFTERS – 20 PSF LIVE LOAD, 15 PSF DEAD LOAD, 180 DEFLECTION, $C_D = 1.25$

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No. 1	No. 2	No. 3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	11-6	10-10	9-7	7-5	11-8	10-7	10-10	11-1	11-1	10-10
	16.0	10-5	9-9	8-4	6-5	10-7	9-8	9-9	10-0	9-10	9-10
	19.2	9-10	8-10	7-7	5-10	10-0	9-1	8-10	9-5	9-0	9-2
	24.0	9-1	7-11	6-9	5-3	9-3	8-4	7-11	8-8	8-1	8-2
2 x 6	12.0	18-0	16-9	14-5	10-11	18-4	16-8	17-0	17-4	17-4	17-0
	16.0	16-4	14-6	12-6	9-5	16-8	15-2	15-3	15-9	15-6	15-6
	19.2	15-5	13-3	11-5	8-8	15-8	14-3	13-11	14-10	14-2	14-5
	24.0	14-4	11-10	10-2	7-9	14-7	13-1	12-6	13-8	12-8	12-10
2 x 8	12.0	23-9	21-2	18-3	13-9	24-2	21-11	22-5	22-11	22-11	22-5
	16.0	21-7	18-4	15-10	11-11	21-11	19-11	20-1	20-10	20-5	20-5
	19.2	20-4	16-9	14-5	10-10	20-8	18-9	18-4	19-7	18-8	19-0
	24.0	18-10	15-0	12-11	9-9	19-2	17-3	16-5	18-0	16-8	17-0
2 x 10	12.0	26-0*	24-10	21-8	16-8	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	21-6	18-9	14-5	26-0*	25-5	25-8	26-0*	26-0*	26-0
	19.2	25-11	19-7	17-1	13-2	26-0*	23-11	23-5	25-0	23-10	24-2
	24.0	23-11	17-6	15-4	11-10	24-6	22-0	21-0	23-0	21-4	21-8

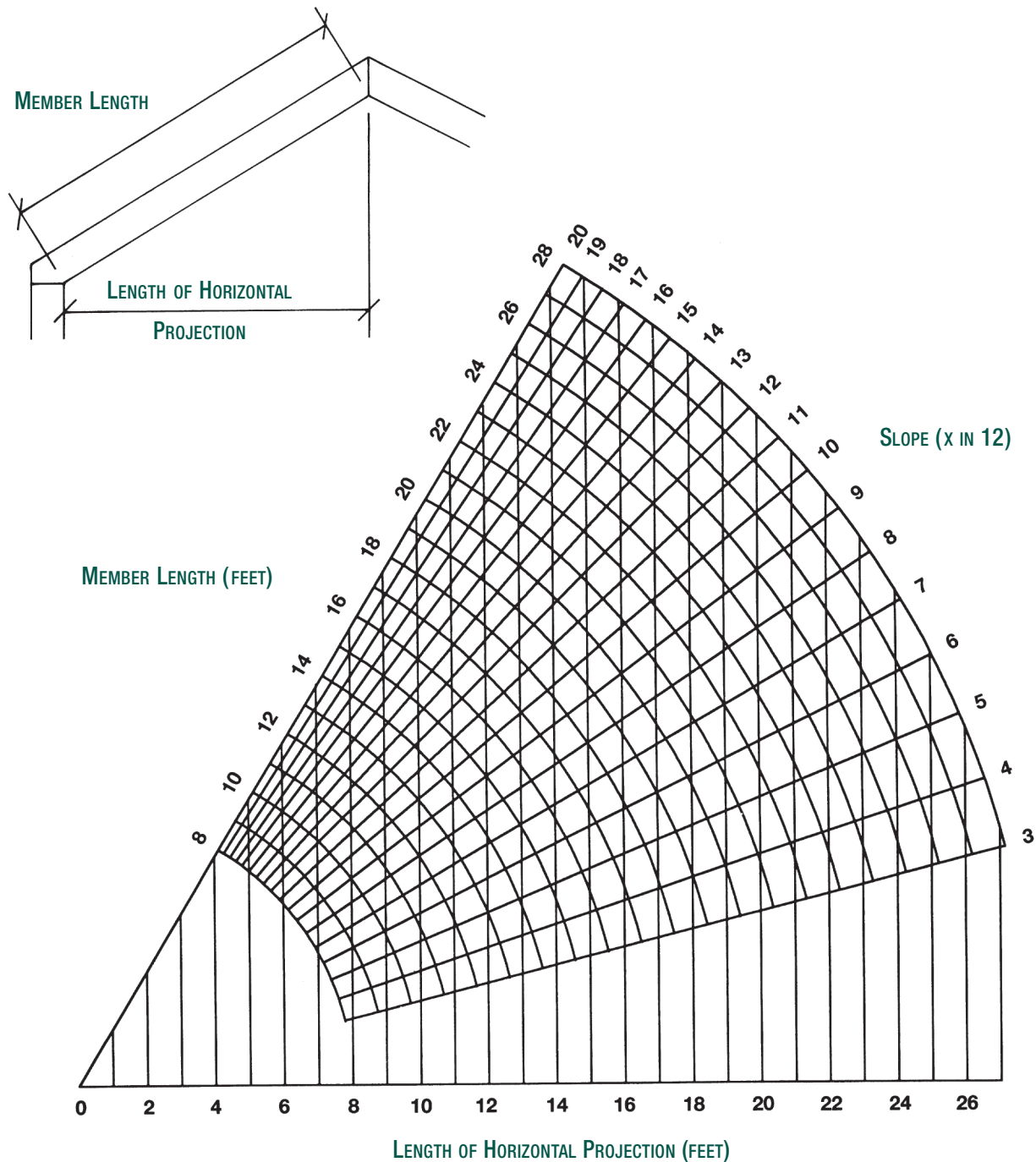
TABLE 46 RAFTERS – 20 PSF LIVE LOAD, 20 PSF DEAD LOAD, 180 DEFLECTION, $C_D = 1.25$

Size inches	Spacing inches on center	Grade									
		Visually Graded				Machine Stress Rated (MSR)			Machine Evaluated Lumber (MEL)		
		DSS	No. 1	No. 2	No. 3	2400f - 2.0E	1650f - 1.5E	1500f - 1.6E	M-14 (1800-1.7)	M-29 (1550-1.7)	M-12 (1600-1.6)
2 x 4	12.0	11-6	10-6	9-0	6-11	11-8	10-7	10-6	11-1	10-8	10-10
	16.0	10-5	9-1	7-9	6-0	10-7	9-6	9-1	9-11	9-3	9-5
	19.2	9-10	8-4	7-1	5-6	10-0	8-8	8-4	9-1	8-5	8-7
	24.0	9-1	7-5	6-4	4-11	9-3	7-9	7-5	8-2	7-6	7-8
2 x 6	12.0	18-0	15-8	13-6	10-2	18-4	16-8	16-6	17-4	16-9	17-0
	16.0	16-4	13-7	11-8	8-10	16-8	15-0	14-3	15-8	14-6	14-9
	19.2	15-5	12-4	10-8	8-1	15-8	13-8	13-0	14-3	13-3	13-6
	24.0	14-4	11-1	9-6	7-3	14-7	12-3	11-8	12-9	11-10	12-0
2 x 8	12.0	23-9	19-10	17-1	12-10	24-2	21-11	21-9	22-11	22-1	22-5
	16.0	21-7	17-2	14-9	11-2	21-11	19-9	18-10	20-7	19-2	19-5
	19.2	20-4	15-8	13-6	10-2	20-8	18-0	17-2	18-10	17-6	17-9
	24.0	18-7	14-0	12-1	9-1	19-2	16-1	15-4	16-10	15-7	15-10
2 x 10	12.0	26-0*	23-2	20-3	15-7	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*
	16.0	26-0*	20-1	17-6	13-6	26-0*	25-2	24-0	26-0*	24-5	24-10
	19.2	25-0	18-4	16-0	12-4	26-0*	23-0	21-11	24-0	22-3	22-8
	24.0	22-4	16-5	14-4	11-0	24-6	20-7	19-7	21-6	19-11	20-3

The spans in these tables were determined on the same basis as the code-recognized *Span Tables for Joists & Rafters* and *Wood Structural Design Data*, both published by the American Wood Council; concentrated loads and uplift loads caused by wind were not considered. See *Using These Tables and Design Assumptions* for additional information. Applied loads are given in pounds per square foot (psf). Deflection is limited to the span in inches divided by 360, 240 or 180 and is based on live load only. The load duration factor, C_D , is 1.0 unless shown as 1.15 for snow or 1.25 for construction loads. Listed spans are for dry-service conditions unless the table is labeled as Wet-Service. Check sources of supply for available grades and sizes, and for lumber longer than 20 feet; an asterisk (*) indicates the listed span has been limited to 26'-0" based on availability. Neither SFPA, nor its members, warrant that the design values on which the span tables are based are correct, and disclaim responsibility for injury or damage resulting from the use of such span tables.

CONVERSION DIAGRAM FOR RAFTERS

Courtesy of the American Wood Council



Spans given in the tables are the maximum allowable horizontal span of the member from inside to inside of bearings. For sloping rafters, spans are measured along the horizontal projection. This diagram provides a convenient tool for calculating the corresponding sloping distance of a rafter. Select the horizontal span along the horizontal axis and follow the vertical line upward to its intersection with the radial line of the specified slope. Then follow the arc line

upward and to the left to read the sloping distance. Interpolation between the lines is acceptable.

This diagram can also be used to find the horizontal distance corresponding to a given sloping distance, or to find the slope when the horizontal and sloping distances are known.

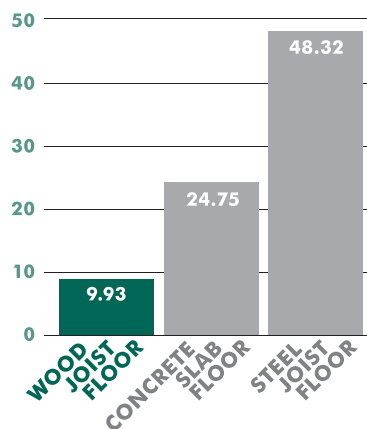
Example: Given a horizontal distance of 20 feet and a roof slope of 8 in 12, the sloping distance is 24 feet.

BUILDING WITH WOOD

Throughout history, wood has found favor as a building material due to its strength, economy, workability, beauty and durability. Wood-frame buildings are economical to build, heat and cool, and provide maximum comfort to occupants. Wood construction is readily adaptable to traditional, contemporary and the most cutting-edge building styles. Its architectural possibilities are limitless and its durability spans the centuries.

Wood building materials are good for the environment, too. Wood is a renewable, sustainable resource that is manufactured in energy efficient processes that optimize use of renewable energy sources. In fact, in a comparison of fossil fuel consumption associated with the materials for three floor systems – wood, concrete and steel – the wood joist floor required the least amount of fossil fuel energy.

CONSUMPTION OF FOSSIL FUELS (MJ/FT²) ASSOCIATED WITH THREE FLOOR DESIGNS



Note:

One megajoule (MJ) is equivalent to 0.27778 kilowatt hours or 947.8 BTUs.

Source: Consortium for Research on Renewable Industrial Materials (CORRIM)

WHY? wood!

Wood products are the most environmentally responsible building material available, making them the GREEN choice.

Life cycle of wood building products



How Does Wood Reduce Carbon?

Wood products require less energy to manufacture – meaning fewer greenhouse gases, like CO₂. And trees use CO₂ to grow, changing greenhouse gases into the building blocks we know as wood. That's why wood products are increasingly being recognized as tools to combat climate change.

As trees grow, they remove and store carbon from the atmosphere.



ADDITIONAL RESOURCES

The Southern Forest Products Association offers a wide variety of helpful publications for design-build professionals. The titles listed below are available online in PDF. Visit SouthernPine.com to download and to see a listing of all publications.

Southern Pine Use Guide (#200)

grade descriptions, design values, applications, specification guidelines

Pocket Span Card (#204)

most popular tables for joist and rafter spans

Aquatic & Wetland Structures (#322)

product selection, design details for marine, walkways and light vehicular bridge construction

Raised Wood Floor Foundations (#411)

foundation types, construction details, floor framing spans, cost-saving strategies

Pressure-Treated Southern Pine (#300)

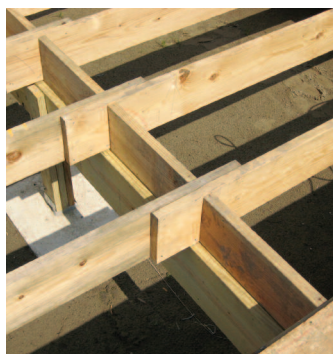
preservative types, standards, specifications, applications

Southern Pine Headers & Beams (#207)

size selection and allowable load tables for Southern Pine lumber and glued laminated timber

Southern Pine Flooring (#705)

product description, installation, finishing, maintenance



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