



REROOF SPAN CHARTS

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One of the most common questions that we hear during inquiries on tile roofing is regarding the structural requirements of the building to be roofed. It is one of the least understood aspects of the installation despite the fact that there are very clear guidelines available to help determine the facts. Since the majority of the roofs that are considered for tile installations are on residential buildings, this booklet will attempt to provide some basic guidelines for the user to determine the suitability of the roof framing to support a tile roof.

Based on the guidelines provided for Conventional Light-Frame Construction contained in the Uniform Building Codes, foundation and wall supports are not specifically affected by roof loads and are typically constructed in the same manner regardless of roof type. Accordingly, this booklet will confine its' discussion to roof systems only and offers the attached information simply for the sake of qualifying information.

The span tables enclosed are taken from the Western Wood Products Association Western Lumber Span Tables for Floor and Ceiling Joists and Roof Rafters (Revised September, 2001) and may be used for evaluation purposes only. The ultimate decision regarding structural issues should be made by a design professional or engineer.

Pertinent Terms

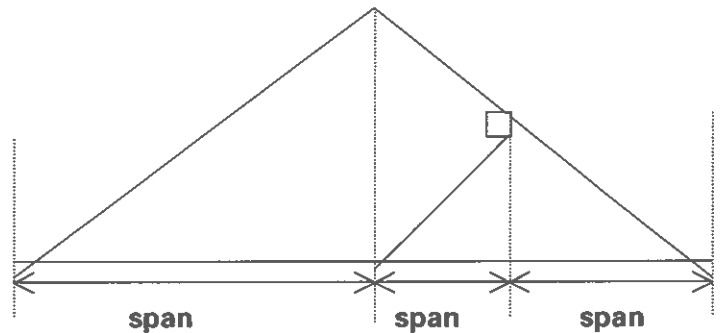
- Dead load is the total weight of all the components of the roof system that are permanently in place. Components include the roof rafters, roof sheathing, roof tiles, etc.
- Live Load - Live load is a weight factor that an engineer is required to consider into design to allow for short-term loads such as foot traffic or water absorption. In essence, it is a safety factor that protects the roof from damage during construction or heavy storms. A typical live load for dry climates is 20 lbs. per square foot (psf) although code allows for a reduction to 16 lbs. for slopes above 4:12. Wind loads and snow loads will sometimes be much greater than the live load, in which case the engineer must use the highest load for determining rafter strength.
- The combined load results when the dead load and live load are added together. This is the load that the engineer must design for.

Using Span Charts

- Span charts deal only with gravity loads and the support capabilities of the rafters; that is, the ability of the rafters to carry the load without developing noticeable deflection (sagging). Code allows a certain amount of deflection with L/180 being the limit for rafters not also carrying a ceiling load. (L/180 means - L = the number of inches of span divided by 180. For example, a

rafter span of 11'3" = 135 inches divided by 180 = approximately .75 inches. This means that any rafter spanning 11'3" is not allowed to sag more than 3/4 - inch. L/240 calculation, which is the limit for rafters carrying a ceiling load, would limit the deflection to 1/2 - inch for the same span.)

- When the measured spans exceed span chart criteria, additional bracing is required. Bracing performed must be in accordance with UBC Conventional Construction Provisions unless otherwise instructed by a licensed engineer. Although there are many methods that may be used to reinforce a roof system, the most common method is to install purlins or double rafters. These procedures should always be done in accordance with code referenced framing procedures or by the instructions of a professional engineer or designer.



Typical dead load for a standard weight tile:

Tile	10.0 psf
Framing	2.0 psf
Sheathing	1.5 psf
Plywood	1.5 psf
Total:	15.0 psf

Live Load will vary depending primarily on climate conditions. The required live load will be determined by the local building official. Live load is independent of the dead load and is the same in any given area, regardless of the weight of the roofing material.

Deflection limits are expressed as a ratio of the span in inches divided by the limiting factor. The model building codes set the maximum allowable deflection criteria for structural members based on their end use.

- Deflection limit for rafters without plaster ceiling attached is L/240 (live load only); L/180 (live load plus dead load)
- Deflection limit for rafters with plaster ceiling attached is L/360 (live load only); L/240 (live load plus dead load)



Criteria for mild climate regions where no snow load is considered:

Deflection limit L/180 (open attic)

ROOF RAFTERS

20# LIVE LOAD¹ 15# DEAD LOAD L/180

Table RR-3

Design Criteria: *Strength* - 20 lbs. per sq. ft. live load, plus 15 lbs. per sq. ft. dead load.
Deflection - Limited in span in inches divided by 180 for live load only.

Species or Group	Grade	Span (feet and inches)															
		2 x 6				2 x 8				2 x 10				2 x 12			
		spacing on center															
		12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"
Douglas Fir-Larch	Sel. Struc.	18-0	16-4	15-5	14-3	23-9	21-7	20-1	18-0	30-4	26-11	24-7	22-0	36-1	31-3	28-6	25-6
	No.1 & Btr.	17-8	15-7	14-3	12-9	22-9	19-9	18-0	16-1	27-10	24-1	22-0	19-8	32-3	27-11	25-6	22-10
	No.1	16-5	14-3	13-0	11-7	20-9	18-0	16-5	14-8	25-5	22-0	20-1	17-11	29-5	25-6	23-3	20-10
	No.2	15-7	13-6	12-4	11-0	19-9	17-1	15-7	13-11	24-1	20-10	19-0	17-0	27-11	24-2	22-1	19-9
Douglas Fir-South	Sel. Struc.	16-3	14-9	13-11	12-11	21-5	19-6	18-4	17-0	27-5	24-10	23-4	20-10	33-4	29-7	27-0	24-2
	No.1	15-9	13-8	12-6	11-2	20-0	17-4	15-10	14-2	24-5	21-2	19-4	17-3	28-4	24-6	22-5	20-0
	No.2	15-2	13-1	12-0	10-8	19-2	16-7	15-2	13-7	23-5	20-3	18-6	16-7	27-2	23-6	21-5	19-2
	No.3	11-7	10-1	9-2	8-2	14-8	12-9	11-7	10-5	17-11	15-7	14-2	12-8	20-10	18-0	16-5	14-9
Hem-Fir	Sel. Struc.	17-0	15-6	14-7	13-6	22-5	20-5	19-2	17-5	28-7	26-0	23-9	21-3	34-10	30-2	27-6	24-8
	No.1 & Btr.	16-8	14-11	13-7	12-2	21-10	18-10	17-3	15-5	26-7	23-1	21-1	18-10	30-10	26-9	24-5	21-10
	No.1	16-2	14-0	12-10	11-5	20-6	17-9	16-3	14-6	25-1	21-8	19-10	17-9	29-1	25-2	23-0	20-7
	No.2	15-2	13-1	12-0	10-8	19-2	16-7	15-2	13-7	23-5	20-3	18-6	16-7	27-2	23-6	21-5	19-2
Spruce-Pine-Fir (South)	Sel. Struc.	15-11	14-5	13-7	12-7	20-11	19-0	17-11	16-7	26-9	24-3	22-10	20-6	32-6	29-1	26-6	23-9
	No.1	15-4	13-3	12-2	10-10	19-5	16-10	15-4	13-9	23-9	20-7	18-9	16-9	27-6	23-10	21-9	19-6
	No.2	14-5	12-6	11-5	10-3	18-4	15-10	14-6	12-11	22-4	19-4	17-8	15-10	25-11	22-5	20-6	18-4
	No.3	11-0	9-6	8-8	7-9	13-11	12-1	11-0	9-10	17-0	14-9	13-6	12-0	19-9	17-1	15-7	14-0
Western Woods	Sel. Struc.	15-6	13-6	12-4	11-0	19-9	17-1	15-7	13-11	24-1	20-10	19-0	17-0	27-11	24-2	22-1	19-9
	No.1	13-6	11-8	10-8	9-6	17-1	14-9	13-6	12-1	20-10	18-1	16-6	14-9	24-2	20-11	19-1	17-1
	No.2	13-6	11-8	10-8	9-6	17-1	14-9	13-6	12-1	20-10	18-1	16-6	14-9	24-2	20-11	19-1	17-1
	No.3	10-1	8-8	7-11	7-1	12-9	11-0	10-1	9-0	15-7	13-6	12-3	11-0	18-0	15-7	14-3	12-9

¹ A 1.25 Duration of Load adjustment has been applied.

Deflection limit L/240 (cathedral ceiling)

ROOF RAFTERS

20# LIVE LOAD¹ 15# DEAD LOAD L/240

Table RR-4

Design Criteria: *Strength* - 20 lbs. per sq. ft. live load, plus 15 lbs. per sq. ft. dead load.
Deflection - Limited in span in inches divided by 240 for live load only.

Species or Group	Grade	Span (feet and inches)															
		2 x 6				2 x 8				2 x 10				2 x 12			
		spacing on center															
		12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"
Douglas Fir-Larch	Sel. Struc.	16-4	14-11	14-0	13-0	21-7	19-7	18-5	17-2	27-6	25-0	23-7	21-10	33-6	30-5	28-6	25-6
	No.1 & Btr.	16-1	14-7	13-9	12-9	21-2	19-3	18-0	16-1	27-1	24-1	22-0	19-8	32-3	27-11	25-6	22-10
	No.1	15-9	14-3	13-0	11-7	19-9	18-0	16-5	14-8	25-5	22-0	20-1	17-11	29-5	25-6	23-3	20-10
	No.2	15-6	13-6	12-4	11-0	20-9	17-1	15-7	13-11	24-1	20-10	19-0	17-0	27-11	24-2	22-1	19-9
Douglas Fir-South	Sel. Struc.	14-9	13-5	12-8	11-9	19-6	17-9	16-8	15-6	24-10	22-7	21-3	19-9	30-3	27-6	25-10	24-0
	No.1	14-5	13-1	12-4	11-2	19-0	17-3	15-10	14-2	24-3	21-2	19-4	17-3	28-4	24-6	22-5	20-0
	No.2	14-1	12-9	12-0	10-8	18-6	16-7	15-2	13-7	23-5	20-3	18-6	16-7	27-2	23-6	21-5	19-2
	No.3	11-7	10-1	9-2	8-2	14-8	12-9	11-7	10-5	17-11	15-7	14-2	12-8	20-10	18-0	16-5	14-9
Hem-Fir	Sel. Struc.	15-6	14-1	13-3	12-3	20-5	18-6	17-5	16-2	26-0	23-8	22-3	20-8	31-8	28-9	27-1	24-8
	No.1 & Btr.	15-2	13-9	12-11	12-0	19-11	18-2	17-1	15-5	25-5	23-1	21-7	18-10	30-10	26-9	24-5	21-10
	No.1	15-2	13-9	12-10	11-5	19-11	17-9	16-3	14-6	25-1	21-8	19-10	17-9	29-1	25-2	23-0	20-7
	No.2	14-5	13-1	12-0	10-8	19-0	16-7	15-2	13-7	23-5	20-3	18-6	16-7	27-2	23-6	21-5	19-2
Spruce-Pine-Fir (South)	Sel. Struc.	14-5	13-1	12-4	11-5	19-0	17-3	16-3	15-1	24-3	22-1	20-9	19-3	29-6	26-10	25-3	23-5
	No.1	14-1	12-9	12-0	10-10	18-6	16-10	15-4	13-9	23-8	20-7	18-9	16-9	27-6	23-10	21-9	19-6
	No.2	13-8	12-5	11-5	10-3	18-0	15-10	14-6	12-11	22-4	19-4	17-8	15-10	25-11	22-5	20-6	18-4
	No.3	11-0	9-6	8-8	7-9	13-11	12-1	11-0	9-10	17-0	14-9	13-6	12-0	19-9	17-1	15-7	14-0
Western Woods	Sel. Struc.	14-1	12-9	12-0	11-0	18-6	16-10	15-7	13-11	23-8	20-10	19-0	17-0	27-11	24-2	22-1	19-9
	No.1	13-6	11-8	10-8	9-6	17-1	14-9	13-6	12-1	20-10	18-1	16-6	14-9	24-2	20-11	19-1	17-1
	No.2	13-3	11-8	10-8	9-6	17-1	14-9	13-6	12-1	20-10	18-1	16-6	14-9	24-2	20-11	19-1	17-1
	No.3	10-1	8-8	7-11	7-1	12-9	11-0	10-1	9-0	15-7	13-6	12-3	11-0	18-0	15-7	14-3	12-9

¹ A 1.25 Duration of Load adjustment has been applied.

Deflection limit L/360

ROOF RAFTERS

20# LIVE LOAD¹ 15# DEAD LOAD L/360

Table RR-5

Design Criteria: Strength - 20 lbs. per sq. ft. live load, plus 15 lbs. per sq. ft. dead load.
Deflection - Limited in span in inches divided by 360 for live load only.

Species or Group		Grade		Span (feet and inches)															
				2 x 6				2 x 8				2 x 10				2 x 12			
				spacing on center															
12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"				
Douglas Fir-Larch	Sel. Struc.	14-4	13-0	12-3	11-4	18-10	17-2	16-1	15-0	24-1	21-10	20-7	19-1	29-3	26-7	25-0	23-3		
	No.1 & Btr.	14-1	12-9	12-0	11-2	18-6	16-10	15-10	14-8	23-8	21-6	20-2	18-9	28-9	26-1	24-7	22-10		
	No.1	13-9	12-6	11-9	10-11	18-2	16-6	15-6	14-5	23-2	21-1	19-10	17-11	28-2	25-6	23-3	20-10		
	No.2	13-6	12-3	11-7	10-9	17-10	16-2	15-3	13-11	22-9	20-8	19-0	17-0	27-8	24-2	22-1	19-9		
Douglas Fir-South	Sel. Struc.	12-11	11-9	11-1	10-3	17-0	15-6	14-7	13-6	21-9	19-9	18-7	17-3	26-5	24-0	22-7	21-0		
	No.1	12-7	11-5	10-9	10-0	16-7	15-1	14-2	13-2	21-2	19-3	18-1	16-10	25-9	23-5	22-1	20-0		
	No.2	12-3	11-2	10-6	9-9	16-2	14-8	13-10	12-10	20-8	18-9	17-8	16-5	25-1	22-10	21-5	19-2		
	No.3	11-7	10-1	9-2	8-2	14-8	12-9	11-7	10-5	17-11	15-7	14-2	12-8	20-10	18-0	16-5	14-9		
Hem-Fir	Sel. Struc.	13-6	12-3	11-7	10-9	17-10	16-2	15-3	14-2	22-9	20-8	19-5	18-0	27-8	25-1	23-7	21-11		
	No.1 & Btr.	13-3	12-0	11-4	10-6	17-5	15-10	14-11	13-10	22-3	20-2	19-0	17-8	27-1	24-7	23-1	21-6		
	No.1	13-3	12-0	11-4	10-6	17-5	15-10	14-11	13-10	22-3	20-2	19-0	17-8	27-1	24-7	23-0	20-7		
	No.2	12-7	11-5	10-9	10-0	16-7	15-1	14-2	13-2	21-2	19-3	18-1	16-7	25-9	23-5	21-5	19-2		
Spruce-Pine-Fir (South)	Sel. Struc.	12-7	11-5	10-9	10-0	16-7	15-1	14-2	13-2	21-2	19-3	18-1	16-10	25-9	23-5	22-1	20-6		
	No.1	12-3	11-2	10-6	9-9	16-2	14-8	13-10	12-10	20-8	18-9	17-8	16-5	25-1	22-10	21-6	19-6		
	No.2	11-11	10-10	10-2	9-6	15-9	14-3	13-5	12-6	20-1	18-3	17-2	15-10	24-5	22-2	20-6	18-4		
	No.3	11-0	9-6	8-8	7-9	13-11	12-1	11-0	9-10	17-0	14-9	13-6	12-0	19-9	17-1	15-7	14-0		
Western Woods	Sel. Struc.	12-3	11-2	10-6	9-9	16-2	14-8	13-10	12-10	20-8	18-9	17-8	16-5	25-1	22-10	21-6	19-9		
	No.1	11-11	10-10	10-2	9-6	15-9	14-3	13-5	12-1	20-1	18-1	16-6	14-9	24-2	20-11	19-1	17-1		
	No.2	11-7	10-6	9-10	9-2	15-3	13-10	13-0	12-1	19-5	17-8	16-6	14-9	23-7	20-11	19-1	17-1		
	No.3	10-1	8-8	7-11	7-1	12-9	11-0	10-1	9-0	15-7	13-6	12-3	11-0	18-0	15-7	14-3	12-9		

¹ A 1.25 Duration of Load adjustment has been applied.

Criteria for moderate climate regions where some snow accumulates on the roof.

Deflection limit L/180 (open attic)

ROOF RAFTERS

30# SNOW LOAD 15# DEAD LOAD L/180

Table RR-22

Design Criteria: Strength - 30 lbs. per sq. ft. snow load, plus 15 lbs. per sq. ft. dead load.
Deflection - Limited in span in inches divided by 180 for live load only.

Species or Group		Grade		Span (feet and inches)															
				2 x 6				2 x 8				2 x 10				2 x 12			
				spacing on center															
12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"				
Douglas Fir-Larch	Sel. Struc.	15-9	14-4	13-5	12-0	20-9	18-8	17-0	15-3	26-4	22-9	20-9	18-7	30-6	26-5	24-1	21-7		
	No.1 & Btr.	15-2	13-2	12-0	10-9	19-3	16-8	15-3	13-7	23-6	20-4	18-7	16-8	27-3	23-7	21-7	19-3		
	No.1	13-11	12-0	11-0	9-10	17-7	15-3	13-11	12-5	21-6	18-7	17-0	15-2	24-11	21-7	19-8	17-7		
	No.2	13-2	11-5	10-5	9-4	16-8	14-5	13-2	11-9	20-4	17-8	16-1	14-5	23-7	20-5	18-8	16-8		
Douglas Fir-South	Sel. Struc.	14-3	12-11	12-2	11-3	18-9	17-0	16-0	14-5	23-11	21-7	19-9	17-8	28-11	25-1	22-10	20-5		
	No.1	13-4	11-7	10-7	9-5	16-11	14-8	13-4	11-11	20-8	17-11	16-4	14-7	23-11	20-9	18-11	16-11		
	No.2	12-10	11-1	10-1	9-1	16-2	14-0	12-10	11-6	19-10	17-2	15-8	14-0	22-11	19-11	18-2	16-3		
	No.3	9-10	8-6	7-9	6-11	12-5	10-9	9-10	8-9	15-2	13-2	12-0	10-9	17-7	15-3	13-11	12-5		
Hem-Fir	Sel. Struc.	14-10	13-6	12-9	11-7	19-7	17-10	16-5	14-8	25-0	22-0	20-1	18-0	29-6	25-6	23-3	20-10		
	No.1 & Btr.	14-7	12-7	11-6	10-4	18-5	16-0	14-7	13-0	22-6	19-6	17-10	15-11	26-1	22-7	20-8	18-6		
	No.1	13-8	11-10	10-10	9-8	17-4	15-0	13-9	12-3	21-2	18-4	16-9	15-0	25-1	21-3	19-5	17-5		
	No.2	12-10	11-1	10-1	9-1	16-2	14-0	12-10	11-6	19-10	17-2	15-8	14-0	22-11	19-11	18-2	16-3		
Spruce-Pine-Fir (South)	Sel. Struc.	13-10	12-7	11-10	11-0	18-3	16-7	15-8	14-2	23-4	21-2	19-4	17-4	28-5	24-7	22-5	20-1		
	No.1	13-0	11-3	10-3	9-2	16-5	14-3	13-0	11-8	20-1	17-5	15-11	14-2	23-3	20-2	18-5	16-6		
	No.2	12-3	10-7	9-8	8-8	15-6	13-5	12-3	10-11	18-11	16-4	14-11	13-4	21-11	19-0	17-4	15-6		
	No.3	9-4	8-1	7-4	6-7	11-9	10-3	9-4	8-4	14-5	12-6	11-5	10-2	16-8	14-6	13-2	11-10		
Western Woods	Sel. Struc.	13-2	11-5	10-5	9-4	16-8	14-5	13-2	11-9	20-4	17-8	16-1	14-5	23-7	20-5	18-8	16-8		
	No.1	11-5	9-10	9-0	8-1	14-5	12-6	11-5	10-3	17-8	15-3	13-11	12-6	20-5	17-9	16-2	14-6		
	No.2	11-5	9-10	9-0	8-1	14-5	12-6	11-5	10-3	17-8	15-3	13-11	12-6	20-5	17-9	16-2	14-6		
	No.3	8-6	7-4	6-9	6-0	10-9	9-4	8-6	7-7	13-2	11-5	10-5	9-4	15-3	13-2	12-1	10-9		



Deflection limit L/240 (cathedral ceiling)

ROOF RAFTERS

30# SNOW LOAD 15# DEAD LOAD L/240

Table RR-29

Design Criteria: Strength - 30 lbs. per sq. ft. snow load, plus 15 lbs. per sq. ft. dead load.
Deflection - Limited in span in inches divided by 240 for live load only.

Species or Group		Grade		Span (feet and inches)															
				2 x 6				2 x 8				2 x 10				2 x 12			
				spacing on center															
		12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"		
Douglas Fir-Larch	Sel. Struc.	14-4	13-0	12-3	11-4	18-10	17-2	16-1	15-0	24-1	21-10	20-7	18-7	29-3	26-5	24-1	21-7		
	No.1 & Btr.	14-1	12-9	12-0	10-9	18-6	16-8	15-3	13-7	23-6	20-4	18-7	16-8	27-3	23-7	21-7	19-3		
	No.1	13-9	12-0	11-0	9-10	17-7	15-3	13-11	12-5	21-6	18-7	17-0	15-2	24-11	21-7	19-8	17-7		
	No.2	13-2	11-5	10-5	9-4	16-8	14-5	13-2	11-9	20-4	17-8	16-1	14-5	23-7	20-5	18-8	16-8		
Douglas Fir-South	Sel. Struc.	12-11	11-9	11-1	10-3	17-0	15-6	14-7	13-6	21-9	19-9	18-7	17-3	26-5	24-0	22-7	20-5		
	No.1	12-7	11-5	10-7	9-5	16-7	14-8	13-4	11-11	20-8	17-11	16-4	14-7	23-11	20-9	18-11	16-11		
	No.2	12-3	11-1	10-1	9-1	16-2	14-0	12-10	11-6	19-10	17-2	15-8	14-0	22-11	19-11	18-2	16-3		
	No.3	9-10	8-6	7-9	6-11	12-5	10-9	9-10	8-9	15-2	13-2	12-0	10-9	17-7	15-3	13-11	12-5		
Hem-Fir	Sel. Struc.	13-6	12-3	11-7	10-9	17-10	16-2	15-3	14-2	22-9	20-8	19-5	18-0	27-8	25-1	23-3	20-10		
	No.1 & Btr.	13-3	12-0	11-4	10-4	17-5	15-10	14-7	13-0	22-3	19-6	17-10	15-11	26-1	22-7	20-8	18-6		
	No.1	13-3	11-10	10-10	9-8	17-4	15-0	13-9	12-3	21-2	18-4	16-9	15-0	24-7	21-3	19-5	17-5		
	No.2	12-7	11-1	10-1	9-1	16-2	14-0	12-10	11-6	19-10	17-2	15-8	14-0	22-11	19-11	18-2	16-3		
Spruce-Pine-Fir (South)	Sel. Struc.	12-7	11-5	10-9	10-0	16-7	15-1	14-2	13-2	21-2	19-3	18-1	16-10	25-9	23-5	22-1	20-1		
	No.1	12-3	11-2	10-3	9-2	16-2	14-3	13-0	11-8	20-1	17-5	15-11	14-2	23-3	20-2	18-5	16-6		
	No.2	11-11	10-7	9-8	8-8	15-6	13-5	12-3	10-11	18-11	16-4	14-11	13-4	21-11	19-0	17-4	15-6		
	No.3	9-4	8-1	7-4	6-7	11-9	10-3	9-4	8-4	14-5	12-6	11-5	10-2	16-8	14-6	13-2	11-10		
Western Woods	Sel. Struc.	12-3	11-2	10-5	9-4	16-2	14-5	13-2	11-9	20-4	17-8	16-1	14-5	23-7	20-5	18-8	16-8		
	No.1	11-5	9-10	9-0	8-1	14-5	12-6	11-5	10-3	17-8	15-3	13-11	12-6	20-5	17-9	16-2	14-6		
	No.2	11-5	9-10	9-0	8-1	14-5	12-6	11-5	10-3	17-8	15-3	13-11	12-6	20-5	17-9	16-2	14-6		
	No.3	8-6	7-4	6-9	6-0	10-9	9-4	8-6	7-7	13-2	11-5	10-5	9-4	15-3	13-2	12-1	10-9		

Deflection limit L/360

ROOF RAFTERS

30# SNOW LOAD 15# DEAD LOAD L/360

Table RR-43

Design Criteria: Strength - 30 lbs. per sq. ft. snow load, plus 15 lbs. per sq. ft. dead load.
Deflection - Limited in span in inches divided by 360 for live load only.

Species or Group		Grade		Span (feet and inches)															
				2 x 6				2 x 8				2 x 10				2 x 12			
				spacing on center															
		12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"		
Douglas Fir-Larch	Sel. Struc.	12-6	11-4	10-8	9-11	16-6	15-0	14-1	13-1	21-0	19-1	18-0	16-8	25-7	23-3	21-10	20-3		
	No.1 & Btr.	12-3	11-2	10-6	9-9	16-2	14-8	13-10	12-10	20-8	18-9	17-8	16-5	25-1	22-10	21-6	19-3		
	No.1	12-0	10-11	10-4	9-7	15-10	14-5	13-7	12-5	20-3	18-5	17-0	15-2	24-8	21-7	19-8	17-7		
	No.2	11-10	10-9	10-1	9-4	15-7	14-2	13-2	11-9	19-10	17-8	16-1	14-5	23-7	20-5	18-8	16-8		
Douglas Fir-South	Sel. Struc.	11-3	10-3	9-8	8-11	14-11	13-6	12-9	11-10	19-0	17-3	16-3	15-1	23-1	21-0	19-9	18-4		
	No.1	11-0	10-0	9-5	8-9	14-6	13-2	12-5	11-6	18-6	16-10	15-10	14-7	22-6	20-6	18-11	16-11		
	No.2	10-9	9-9	9-2	8-6	14-2	12-10	12-1	11-3	18-0	16-5	15-5	14-0	21-11	19-11	18-2	16-3		
	No.3	9-10	8-6	7-9	6-11	12-5	10-9	9-10	8-9	15-2	13-2	12-0	10-9	17-7	15-3	13-11	12-5		
Hem-Fir	Sel. Struc.	11-10	10-9	10-1	9-4	15-7	14-2	13-4	12-4	19-10	18-0	17-0	15-9	24-2	21-11	20-8	19-2		
	No.1 & Btr.	11-7	10-6	9-10	9-2	15-3	13-10	13-0	12-1	19-5	17-8	16-7	15-5	23-7	21-6	20-2	18-6		
	No.1	11-7	10-6	9-10	9-2	15-3	13-10	13-0	12-1	19-5	17-8	16-7	15-0	23-7	21-3	19-5	17-5		
	No.2	11-0	10-0	9-5	8-9	14-6	13-2	12-5	11-6	18-6	16-10	15-8	14-0	22-6	19-11	18-2	16-3		
Spruce-Pine-Fir (South)	Sel. Struc.	11-0	10-0	9-5	8-9	14-6	13-2	12-5	11-6	18-6	16-10	15-10	14-8	22-6	20-6	19-3	17-11		
	No.1	10-9	9-9	9-2	8-6	14-2	12-10	12-1	11-3	18-0	16-5	15-5	14-2	21-11	19-11	18-5	16-6		
	No.2	10-5	9-6	8-11	8-3	13-9	12-6	11-9	10-11	17-6	15-11	14-11	13-4	21-4	19-0	17-4	15-6		
	No.3	9-4	8-1	7-4	6-7	11-9	10-3	9-4	8-4	14-5	12-6	11-5	10-2	16-8	14-6	13-2	11-10		
Western Woods	Sel. Struc.	10-9	9-9	9-2	8-6	14-2	12-10	12-1	11-3	18-0	16-5	15-5	14-4	21-11	19-11	18-8	16-8		
	No.1	10-5	9-6	8-11	8-1	13-9	12-6	11-5	10-3	17-6	15-3	13-11	12-6	20-5	17-9	16-2	14-6		
	No.2	10-1	9-2	8-8	8-0	13-4	12-1	11-4	10-3	17-0	15-3	13-11	12-6	20-5	17-9	16-2	14-6		
	No.3	8-6	7-4	6-9	6-0	10-9	9-4	8-6	7-7	13-2	11-5	10-5	9-4	15-3	13-2	12-1	10-9		

Criteria for climates with moderate to heavy snow accumulation:

Deflection limit L/180 (open attic)

ROOF RAFTERS

40# SNOW LOAD 15# DEAD LOAD L/180

Table RR-23

Design Criteria: Strength - 40 lbs. per sq. ft. snow load, plus 15 lbs. per sq. ft. dead load.

Deflection - Limited in span in inches divided by 180 for live load only.

Species or Group	Grade	Span (feet and inches)															
		2 x 6				2 x 8				2 x 10				2 x 12			
		spacing on center															
		12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"
Douglas Fir-Larch	Sel. Struc.	14-4	13-0	12-2	10-10	18-10	16-10	15-5	13-9	23-9	20-7	18-10	16-10	27-7	23-11	21-10	19-6
	No.1 & Btr.	13-9	11-11	10-10	9-9	17-5	15-1	13-9	12-4	21-3	18-5	16-10	15-1	24-8	21-4	19-6	17-5
	No.1	12-7	10-10	9-11	8-11	15-11	13-9	12-7	11-3	19-5	16-10	15-4	13-9	22-6	19-6	17-10	15-11
	No.2	11-11	10-4	9-5	8-5	15-1	13-1	11-11	10-8	18-5	15-11	14-7	13-0	21-4	18-6	16-11	15-1
Douglas Fir-South	Sel. Struc.	12-11	11-9	11-1	10-3	17-0	15-6	14-7	13-1	21-9	19-7	17-10	15-11	26-2	22-8	20-8	18-6
	No.1	12-1	10-5	9-7	8-6	15-3	13-3	12-1	10-10	18-8	16-2	14-9	13-2	21-8	18-9	17-1	15-4
	No.2	11-7	10-0	9-2	8-2	14-8	12-8	11-7	10-4	17-11	15-6	14-2	12-8	20-9	18-0	16-5	14-8
	No.3	8-11	7-8	7-0	6-3	11-3	9-9	8-11	7-11	13-9	11-11	10-10	9-9	15-11	13-9	12-7	11-3
Hem-Fir	Sel. Struc.	13-6	12-3	11-7	10-6	17-10	16-2	14-10	13-4	22-9	19-11	18-2	16-3	26-8	23-1	21-1	18-10
	No.1 & Btr.	13-2	11-5	10-5	9-4	16-8	14-5	13-2	11-9	20-4	17-8	16-1	14-5	23-7	20-5	18-8	16-8
	No.1	12-5	10-9	9-10	8-9	15-8	13-7	12-5	11-1	19-2	16-7	15-2	13-7	22-3	19-3	17-7	15-9
	No.2	11-7	10-0	9-2	8-2	14-8	12-8	11-7	10-4	17-11	15-6	14-2	12-8	20-9	18-0	16-5	14-8
Spruce-Pine-Fir (South)	Sel. Struc.	12-7	11-5	10-9	10-0	16-7	15-1	14-2	12-10	21-2	19-2	17-6	15-8	25-8	22-3	20-4	18-2
	No.1	11-9	10-2	9-3	8-4	14-10	12-11	11-9	10-6	18-2	15-9	14-4	12-10	21-1	18-3	16-8	14-11
	No.2	11-1	9-7	8-9	7-10	14-0	12-1	11-1	9-11	17-1	14-10	13-6	12-1	19-10	17-2	15-8	14-0
	No.3	8-5	7-4	6-8	5-11	10-8	9-3	8-5	7-6	13-0	11-3	10-4	9-3	15-1	13-1	11-11	10-8
Western Woods	Sel. Struc.	11-11	10-4	9-5	8-5	15-1	13-1	11-11	10-8	18-5	15-11	14-7	13-0	21-4	18-6	16-11	15-1
	No.1	10-4	8-11	8-2	7-4	13-1	11-4	10-4	9-3	15-11	13-10	12-7	11-3	18-6	16-0	14-8	13-1
	No.2	10-4	8-11	8-2	7-4	13-1	11-4	10-4	9-3	15-11	13-10	12-7	11-3	18-6	16-0	14-8	13-1
	No.3	7-8	6-8	6-1	5-5	9-9	8-5	7-8	6-11	11-11	10-4	9-5	8-5	13-9	11-11	10-11	9-9

Deflection limit L/240 (cathedral ceiling)

ROOF RAFTERS

40# SNOW LOAD 15# DEAD LOAD L/240

Table RR-20

Design Criteria: Strength - 40 lbs. per sq. ft. snow load, plus 15 lbs. per sq. ft. dead load.

Deflection - Limited in span in inches divided by 240 for live load only.

Species or Group	Grade	Span (feet and inches)															
		2 x 6				2 x 8				2 x 10				2 x 12			
		spacing on center															
		12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"
Douglas Fir-Larch	Sel. Struc.	13-0	11-10	11-1	10-4	17-2	15-7	14-8	13-7	21-10	19-10	18-8	16-10	26-7	23-11	21-10	19-6
	No.1 & Btr.	12-9	11-7	10-10	9-9	16-10	15-1	13-9	12-4	21-3	18-5	16-10	15-1	24-8	21-4	19-6	17-5
	No.1	12-6	10-10	9-11	8-11	15-11	13-9	12-7	11-3	19-5	16-10	15-4	13-9	22-6	19-6	17-10	15-11
	No.2	11-11	10-4	9-5	8-5	15-1	13-1	11-11	10-8	18-5	15-11	14-7	13-0	21-4	18-6	16-11	15-1
Douglas Fir-South	Sel. Struc.	11-9	10-8	10-0	9-4	15-6	14-1	13-3	12-3	19-9	17-11	16-11	15-8	24-0	21-10	20-6	18-6
	No.1	11-5	10-5	9-7	8-6	15-1	13-3	12-1	10-10	18-8	16-2	14-9	13-2	21-8	18-9	17-1	15-4
	No.2	11-2	10-0	9-2	8-2	14-8	12-8	11-7	10-4	17-11	15-6	14-2	12-8	20-9	18-0	16-5	14-8
	No.3	8-11	7-8	7-0	6-3	11-3	9-9	8-11	7-11	13-9	11-11	10-10	9-9	15-11	13-9	12-7	11-3
Hem-Fir	Sel. Struc.	12-3	11-2	10-6	9-9	16-2	14-8	13-10	12-10	20-8	18-9	17-8	16-3	25-1	22-10	21-1	18-10
	No.1 & Btr.	12-0	10-11	10-3	9-4	15-10	14-5	13-2	11-9	20-2	17-8	16-1	14-5	23-7	20-5	18-8	16-8
	No.1	12-0	10-9	9-10	8-9	15-8	13-7	12-5	11-1	19-2	16-7	15-2	13-7	22-3	19-3	17-7	15-9
	No.2	11-5	10-0	9-2	8-2	14-8	12-8	11-7	10-4	17-11	15-6	14-2	12-8	20-9	18-0	16-5	14-8
Spruce-Pine-Fir (South)	Sel. Struc.	11-5	10-5	9-9	9-1	15-1	13-9	12-11	12-0	19-3	17-6	16-6	15-3	23-5	21-3	20-0	18-2
	No.1	11-2	10-2	9-3	8-4	14-8	12-11	11-9	10-6	18-2	15-9	14-4	12-10	21-1	18-3	16-8	14-11
	No.2	10-10	9-7	8-9	7-10	14-0	12-1	11-1	9-11	17-1	14-10	13-6	12-1	19-10	17-2	15-8	14-0
	No.3	8-5	7-4	6-8	5-11	10-8	9-3	8-5	7-6	13-0	11-3	10-4	9-3	15-1	13-1	11-11	10-8
Western Woods	Sel. Struc.	11-2	10-2	9-5	8-5	14-8	13-1	11-11	10-8	18-5	15-11	14-7	13-0	21-4	18-6	16-11	15-1
	No.1	10-4	8-11	8-2	7-4	13-1	11-4	10-4	9-3	15-11	13-10	12-7	11-3	18-6	16-0	14-8	13-1
	No.2	10-4	8-11	8-2	7-4	13-1	11-4	10-4	9-3	15-11	13-10	12-7	11-3	18-6	16-0	14-8	13-1
	No.3	7-8	6-8	6-1	5-5	9-9	8-5	7-8	6-11	11-11	10-4	9-5	8-5	13-9	11-11	10-11	9-9



Deflection limit L/360

ROOF RAFTERS

40# SNOW LOAD 15# DEAD LOAD L/360

Table RR-44

Design Criteria: Strength - 40 lbs. per sq. ft. snow load, plus 15 lbs. per sq. ft. dead load.
Deflection - Limited in span in inches divided by 360 for live load only.

Species or Group	Grade	Span (feet and inches)															
		2 x 6				2 x 8				2 x 10				2 x 12			
		spacing on center															
		12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"
Douglas Fir-Larch	Sel. Struc.	11-4	10-4	9-8	9-0	15-0	13-7	12-10	11-11	19-1	17-4	16-4	15-2	23-3	21-1	19-10	18-5
	No.1 & Btr.	11-2	10-2	9-6	8-10	14-8	13-4	12-7	11-8	18-9	17-0	16-0	14-11	22-10	20-9	19-6	17-5
	No.2	10-11	9-11	9-4	8-8	14-5	13-1	12-4	11-3	18-5	16-9	15-4	13-9	22-5	19-6	17-10	15-11
	No.3	10-9	9-9	9-2	8-5	14-2	12-10	11-11	10-8	18-0	15-11	14-7	13-0	21-4	18-6	16-11	15-1
Douglas Fir-South	Sel. Struc.	10-3	9-4	8-9	8-2	13-6	12-3	11-7	10-9	17-3	15-8	14-9	13-8	21-0	19-1	17-11	16-8
	No.1	10-0	9-1	8-7	7-11	13-2	12-0	11-3	10-6	16-10	15-3	14-5	13-2	20-6	18-7	17-1	15-4
	No.2	9-9	8-10	8-4	7-9	12-10	11-8	11-0	10-2	16-5	14-11	14-0	12-8	19-11	18-0	16-5	14-8
	No.3	8-11	7-8	7-0	6-3	11-3	9-9	8-11	7-11	13-9	11-11	10-10	9-9	15-11	13-9	12-7	11-3
Hem-Fir	Sel. Struc.	10-9	9-9	9-2	8-6	14-2	12-10	12-1	11-3	18-0	16-5	15-5	14-4	21-11	19-11	18-9	17-5
	No.1 & Btr.	10-6	9-6	9-0	8-4	13-10	12-7	11-10	11-0	17-8	16-0	15-1	14-0	21-6	19-6	18-4	16-8
	No.1	10-6	9-6	9-0	8-4	13-10	12-7	11-10	11-0	17-8	16-0	15-1	13-7	21-6	19-3	17-7	15-9
	No.2	10-0	9-1	8-7	7-11	13-2	12-0	11-3	10-4	16-10	15-3	14-2	12-8	20-6	18-0	16-5	14-8
Spruce-Pine-Fir (South)	Sel. Struc.	10-0	9-1	8-7	7-11	13-2	12-0	11-3	10-6	16-10	15-3	14-5	13-4	20-6	18-7	17-6	16-3
	No.1	9-9	8-10	8-4	7-9	12-10	11-8	11-0	10-2	16-5	14-11	14-0	12-10	19-11	18-1	16-8	14-11
	No.2	9-6	8-7	8-1	7-6	12-6	11-4	10-8	9-11	15-11	14-6	13-6	12-1	19-4	17-2	15-8	14-0
	No.3	8-5	7-4	6-8	5-11	10-8	9-3	8-5	7-6	13-0	11-3	10-4	9-3	15-1	13-1	11-11	10-8
Western Woods	Sel. Struc.	9-9	8-10	8-4	7-9	12-10	11-8	11-0	10-2	16-5	14-11	14-0	13-0	19-11	18-1	16-11	15-1
	No.1	9-6	8-7	8-1	7-4	12-6	11-4	10-4	9-3	15-11	13-10	12-7	11-3	18-6	16-0	14-8	13-1
	No.2	9-2	8-4	7-10	7-3	12-1	11-0	10-4	9-3	15-5	13-10	12-7	11-3	18-6	16-0	14-8	13-1
	No.3	7-8	6-8	6-1	5-5	9-9	8-5	7-8	6-11	11-11	10-4	9-5	8-5	13-9	11-11	10-11	9-9

In areas where snow loads exceed those shown, please consult with a professional engineer to determine the suitability of the roof structure.

LIGHTWEIGHT PRODUCTS

Design Criteria: Live load: Roof Pitches - Less than 4:12 = 20 psf
4:12 and greater = 16 psf

Dead load:	Roof tile	6.0 psf	Boral Roofing Lightweight Products:		
	Framing	2.0 psf		Cedarlite® 600	5.6 psf
	Sheathing	1.5 psf		Duralite® 600	5.9 psf
	Plywood	1.5 psf			
	TOTAL	11.0 psf			

Deflection: L/240 **Module of Elasticity:** 1,600,000 psi

Bending:

Lumber size	Fb fiber bending stress	Cf size factor	Cd load duration factor	Cr repetitive member factor	Fb (psi)
2x4	875	1.5	1.25	1.15	1940
2x6	875	1.3	1.25	1.15	1681
2x8	875	1.2	1.25	1.15	1552
2x10	875	1.1	1.25	1.15	1423

MAXIMUM RAFTER SPANS* - Chart is for #2 D.F.
with Live Load = 16 psf

Lumber size	Rafter Spacing	Maximum Span
2x4	12" o.c.	9'- 9"
	16" o.c.	8'- 10"
	24" o.c.	7'- 9"
2x6	12" o.c.	15'- 4"
	16" o.c.	13'- 11"
2x8	24" o.c.	12'- 2"
	12" o.c.	20'- 2"
	16" o.c.	18'- 4"
2x10	24" o.c.	15'- 6"
	12" o.c.	25'- 9"
	16" o.c.	22'- 9"
	24" o.c.	18'- 9"

Note: All spans are measured along the horizontal projection of the rafter.

IMPORTANT NOTICE

These span tables are provided as a general guide for reroofing work using concrete roofing tiles, and are believed to be accurate for the conditions noted. However, Boral Roofing makes no warranties or representations of any type regarding the accuracy of the information contained herein or the suitability of its materials for any particular application. Since design values for wood vary with species, grade of material, and other factors, judgment and prudence must be exercised by the roofing contractor. Structures should be checked by a qualified architect or engineer, and all structural reinforcement should be done by state-licensed contractors responsible for their work.

