

DATA FILE



SUBSTITUTION OF GLULAM  
BEAMS FOR STEEL OR  
SOLID-SAWN LUMBER



**WOOD, THE NATURAL CHOICE**

**Wood is good.** It is the earth’s natural, energy efficient and renewable building material.

**Engineered wood is a better use of wood.** It uses less wood to make more wood products.

That’s why using APA trademarked I-joists, glued laminated timbers, laminated veneer lumber, plywood, and oriented strand board is the right thing to do.

**A few facts about wood.**

- **We’re not running out of trees.** One-third of the United States land base – 731 million acres – is covered by forests. About two-thirds of that 731 million acres is suitable for repeated planting and harvesting of timber. But only about half of the land suitable for growing timber is open to logging. Most of that harvestable acreage also is open to other uses, such as camping, hiking, hunting, etc.
- **We’re growing more wood every day.** American landowners plant more than two billion trees every year. In addition, millions of trees seed naturally. The forest products industry, which comprises about 15 percent of forestland ownership, is responsible for 41 percent of replanted forest acreage. That works out to more than one billion trees a year, or about three million trees planted every day. This high rate of replanting accounts for the fact that each year, 27 percent more timber is grown than is harvested.
- **Manufacturing wood products is energy efficient.** Wood products made up 47 percent of all industrial raw materials manufactured in the United States, yet consumed only 4 percent of the energy needed to manufacture all industrial raw materials, according to a 1987 study.
- **Good news for a healthy planet.** For every ton of wood grown, a young forest produces 1.07 tons of oxygen and absorbs 1.47 tons of carbon dioxide.

Material	Percent of Production	Percent of Energy Use
Wood	47	4
Steel	23	48
Aluminum	2	8

Wood. It’s the right product for the environment.



**NOTICE:**  
The recommendations in this data file apply only to glulam that bears the APA EWS trademark. Only glulam bearing the APA EWS trademark is subject to the Association’s quality auditing program.

# SUBSTITUTION OF GLULAM BEAMS FOR STEEL OR SOLID-SAWN LUMBER

## Introduction

Glued laminated timber (glulam) beams of equal or greater strength and stiffness can often be substituted for sawn lumber or steel beams. This *Engineered Wood Systems* publication provides tables for equivalent glulam beams.

*Engineered Wood Systems*, a related corporation of APA – *The Engineered Wood Association*, is dedicated to the promotion of engineered wood systems. Operating in close cooperation with APA, *Engineered*

*Wood Systems* provides services to manufacturers of glued engineered wood products, including glued laminated timber (glulam). *Engineered Wood Systems* member manufacturers certify their products with the trademark *APA EWS*. This mark of quality is supported by comprehensive services for quality validation, product research, testing and marketing. The mark appears only on products manufactured by *Engineered Wood Systems* members and signifies that beams are produced to the requirements of American National Standards Institute (ANSI) Standard A190.1. This is the national consensus standard recognized by all model code agencies for the manufacture and trademarking of glulam.

## How to Use This Publication

Use the Substitution Table Index below to find the correct table for a specific application. The examples on page 4 show how to use the tables to select a glulam beam that can be substituted for a solid-sawn lumber or steel beam.

## For More Information

For additional information on *APA EWS* engineered wood products, contact *Engineered Wood Systems*, P.O. Box 11700, Tacoma, Washington 98411-0700, or one of the APA regional offices listed on the back cover.

### SUBSTITUTION TABLE INDEX

Substituted Beam		Equivalent Glulam Beam					
		Roof - Non-Snow Loads (LDF <sup>(a)</sup> = 1.25)		Roof - Snow Loads (LDF <sup>(a)</sup> = 1.15)		Floor (LDF <sup>(a)</sup> = 1.00)	
		24F Douglas-fir Glulam	24F Southern Pine Glulam	24F Douglas-fir Glulam	24F Southern Pine Glulam	24F Douglas-fir Glulam	24F Southern Pine Glulam
Sawn Lumber	3x _ D. F. <sup>(b)</sup>	Table 1	Table 1	Table 2	Table 2	Table 3	Table 3
	4x _ D. F. <sup>(b)</sup>	Table 4	Table 4	Table 5	Table 5	Table 6	Table 6
	6x _ D. F. <sup>(b)</sup>	Table 7	Table 7	Table 8	Table 8	Table 9	Table 9
	3x _ S. P. <sup>(c)</sup>	Table 10	Table 10	Table 11	Table 11	Table 12	Table 12
	4x _ S. P. <sup>(c)</sup>	Table 13	Table 13	Table 14	Table 14	Table 15	Table 15
Steel	6x _ S. P. <sup>(c)</sup>	Table 16	Table 16	Table 17	Table 17	Table 18	Table 18
	W shape	Table 19	Table 20	Table 21	Table 22	Table 23	Table 24

(a) LDF = Load duration factor.

(b) D.F. = Douglas-fir

(c) S.P. = Southern pine.

## Special Considerations

In addition to the notes given under each table, users should be aware of the following considerations that were used in the development of the tabulated information:

- The tables are intended for preliminary design only. Substitutions should be checked by a registered design professional.
- Design stresses for sawn lumber are based on the Supplement to the 1997 National Design Specification for Wood Construction (NDS) published by the American Forest and Paper Association.
- The equivalent glulam member shown can support the same or greater applied loads than the beam being replaced. The tables assume that the original solid sawn or steel beams were designed correctly and are not intended to evaluate the appropriateness of the design for the original beams.
- Uniform load capacity used in the development of the tables is the minimum capacity due to bending, shear, or deflection considerations, whichever governs, rounded to the nearest 1 lb/ft. Weights of the original beam and the

substitute glulam were deducted from the uniform load capacities before determining the size of the substitute glulam. Tolerances on equivalence, which may be judged satisfactory by practicing design professionals, were not considered when comparing the beam capacities. This will sometimes result in a conservative glulam beam size.

- Since the glulam size shown is based on equivalent or higher capacity than the substituted member, a seemingly inconsistent glulam size may result from the varying controlling capacities as the span changes.

## EXAMPLES

The following examples show how to use the tables to select a glulam beam to be substituted for a solid-sawn lumber or steel beam.

### Example 1

**Question:** A design calls for a 4 x 14 Douglas-fir Select Structural sawn lumber beam spanning 16 feet to support floor loads. What are the equivalent sizes using Douglas-fir glulam?

**Solution:** From Table 6, either 2-1/2 x 13-1/2-in. or 3-1/8 x 13-1/2-in. 24F Douglas-fir glulam can be used with the final selection depending on availability, cost, and other considerations.

### Example 2

**Question:** A design calls for a W8 x 10 steel beam spanning 16 feet to support roof snow loads. What are the equivalent sizes using Southern Pine glulam?

**Solution:** From Table 22, either 3 x 12-3/8-in. or 5 x 11-in. 24F Southern Pine glulam can be used with the final selection depending on availability, cost, and other considerations.

**SAMPLE SUBSTITUTION TABLE**

Span (ft)	Uniform Load Capacity (lb/ft) <sup>(a)</sup>								
	Original Beam: 4 x 10 SS Douglas-fir Lumber				Substitute Beam: 24F Douglas-fir Glulam				
	Bending	Shear	Defl.	Control	Glulam Size	Bending	Shear	Defl.	Control
12	408	384	462	384 (shear)	2-1/2 x 10-1/2	504	813	459	459 (defl.)
14	298	321	288	288 (defl.)	2-1/2 x 12	482	793	430	430 (defl.)
16	226	276	190	190 (defl.)	2-1/2 x 10-1/2	281	583	190	190 (defl.)
18	177	241	131	131 (defl.)	2-1/2 x 10-1/2	220	511	131	131 (defl.)

(a) Beam weight is assumed to be 35 pcf for both sawn lumber and glulam. Beam weight is not included in above number.

TABLE 1

**24F GLULAM EQUIVALENTS FOR 3X DOUGLAS FIR-LARCH LUMBER  
ROOF BEAMS – NON-SNOW LOADS  
Designed According to the 1997 NDS  
(Load Duration Factor = 1.25)**

Span (ft)	Glulam Species	3 x 8 Douglas Fir		3 x 10 Douglas Fir		3 x 12 Douglas Fir		3 x 14 Douglas Fir	
		No. 1	No. 2	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2
<b>24F Glulam Equivalent (in.)</b>									
10	Douglas- fir	2-1/2 x 6	2-1/2 x 6	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 7-1/2	3-1/8 x 6	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 7-1/2
10	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 8-1/4
		3 x 5-1/2	3 x 5-1/2	3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4
12	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 9	2-1/2 x 9
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9
12	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 8-1/4
		3 x 6-7/8	3 x 6-7/8	3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 8-1/4	3 x 8-1/4
14	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 9	2-1/2 x 9
		3-1/8 x 7-1/2	3-1/8 x 6	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9
14	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 9-5/8	3 x 8-1/4
16	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 9
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9	3-1/8 x 9	3-1/8 x 9
16	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 8-1/4	3 x 8-1/4	3 x 9-5/8	3 x 9-5/8
18	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 10-1/2
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9	3-1/8 x 9	3-1/8 x 9
18	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 9-5/8	3 x 8-1/4	3 x 9-5/8	3 x 9-5/8
20	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 10-1/2
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 9
20	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 9-5/8	3 x 9-5/8	3 x 9-5/8	3 x 9-5/8
22	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 10-1/2	2-1/2 x 10-1/2	2-1/2 x 10-1/2
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2
22	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 11	2-1/2 x 11
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 9-5/8
24	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 10-1/2	2-1/2 x 10-1/2	2-1/2 x 10-1/2
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2
24	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 11	2-1/2 x 9-5/8	2-1/2 x 11	2-1/2 x 11
		3 x 6-7/8	3 x 6-7/8	3 x 9-5/8	3 x 8-1/4	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 9-5/8

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/180$  under total load. Deflection under non-snow load must be verified when non-snow/total load > 3/4.
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 2-1/2 x 6 and 3-1/8 x 6 (Douglas-fir), and 2-1/2 x 5-1/2 and 3 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 No. 1 sawn lumber members:  $F_b = C_F \times 1000$  psi,  $F_v = 95$  psi,  $E = 1.7 \times 10^6$  psi, where  $C_F$  = size factor per 1997 NDS.  
 No. 2 sawn lumber members:  $F_b = C_F \times 900$  psi,  $F_v = 95$  psi,  $E = 1.6 \times 10^6$  psi, where  $C_F$  = size factor per 1997 NDS.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 2

**24F GLULAM EQUIVALENTS FOR 3X- DOUGLAS FIR-LARCH LUMBER  
ROOF BEAMS – SNOW LOADS  
Designed According to the 1997 NDS  
(Load Duration Factor = 1.15)**

Span (ft)	Glulam Species	3 x 8 Douglas Fir		3 x 10 Douglas Fir		3 x 12 Douglas Fir		3 x 14 Douglas Fir	
		No. 1	No. 2	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2
<b>24F Glulam Equivalent (in.)</b>									
10	Douglas- fir	2-1/2 x 6 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2
	Southern Pine	2-1/2 x 6-7/8 3 x 5-1/2	2-1/2 x 5-1/2 3 x 5-1/2	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4
12	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 5-1/2	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4
14	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 9-5/8 3 x 8-1/4
16	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 8-1/4
18	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8
20	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8
22	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 11 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8
24	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 11 3 x 9-5/8	2-1/2 x 11 3 x 9-5/8

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection = L/180 under total load. Deflection under snow load must be verified when snow/total load > 3/4.
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 2-1/2 x 6 and 3-1/8 x 6 (Douglas-fir), and 2-1/2 x 5-1/2 and 3 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 No. 1 sawn lumber members:  $F_b = C_F \times 1000$  psi,  $F_v = 95$  psi,  $E = 1.7 \times 10^6$  psi, where  $C_F$  = size factor per 1997 NDS.  
 No. 2 sawn lumber members:  $F_b = C_F \times 900$  psi,  $F_v = 95$  psi,  $E = 1.6 \times 10^6$  psi, where  $C_F$  = size factor per 1997 NDS.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 3

**24F GLULAM EQUIVALENTS FOR 3X- DOUGLAS FIR-LARCH LUMBER  
FLOOR BEAMS**

Designed According to the 1997 NDS  
(Load Duration Factor = 1.00)

Span (ft)	Glulam Species	3 x 8 Douglas Fir		3 x 10 Douglas Fir		3 x 12 Douglas Fir		3 x 14 Douglas Fir	
		No. 1	No. 2	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2
<b>24F Glulam Equivalent (in.)</b>									
10	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 9-5/8 3 x 8-1/4
12	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8
14	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8
16	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 11 3 x 9-5/8	2-1/2 x 11 3 x 9-5/8
18	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 11 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8
20	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 12 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 11 3 x 9-5/8	2-1/2 x 11 3 x 9-5/8	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 11
22	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 12 3-1/8 x 10-1/2	2-1/2 x 12 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8	2-1/2 x 12-3/8 3 x 11	2-1/2 x 11 3 x 11
24	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 12 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 12 3-1/8 x 12	2-1/2 x 12 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8	2-1/2 x 12-3/8 3 x 11	2-1/2 x 11 3 x 11

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/360$  under live load, based on live/total load = 0.8.
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 2-1/2 x 6 and 3-1/8 x 6 (Douglas-fir), and 2-1/2 x 5-1/2 and 3 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 No. 1 sawn lumber members:  $F_b = C_F \times 1000$  psi,  $F_v = 95$  psi,  $E = 1.7 \times 10^6$  psi, where  $C_F$  = size factor per 1997 NDS.  
 No. 2 sawn lumber members:  $F_b = C_F \times 900$  psi,  $F_v = 95$  psi,  $E = 1.6 \times 10^6$  psi, where  $C_F$  = size factor per 1997 NDS.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 4

**24F GLULAM EQUIVALENTS FOR 4X DOUGLAS FIR-LARCH LUMBER**  
**ROOF BEAMS – NON-SNOW LOADS**  
**Designed According to the 1997 NDS**  
**(Load Duration Factor = 1.25)**

Span (ft)	Glulam Species	4 x 6 Douglas Fir		4 x 8 Douglas Fir		4 x 10 Douglas Fir	
		Select Struct.	No. 1	Select Struct.	No. 1	Select Struct.	No. 1
24F Glulam Equivalent (in.)							
10	Douglas-fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 7-1/2
10	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 6-7/8	2-1/2 x 9-5/8	2-1/2 x 8-1/4
		3 x 6-7/8	3 x 5-1/2	3 x 8-1/4	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4
12	Douglas-fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 9	2-1/2 x 7-1/2	2-1/2 x 10-1/2	2-1/2 x 9
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9
12	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 8-1/4
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 6-7/8	3 x 9-5/8	3 x 8-1/4
14	Douglas-fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 9	2-1/2 x 7-1/2	2-1/2 x 10-1/2	2-1/2 x 9
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 10-1/2	3-1/8 x 9
14	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 9-5/8	3 x 8-1/4
16	Douglas-fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 9
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 10-1/2	3-1/8 x 9
16	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 9-5/8
18	Douglas-fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 9	2-1/2 x 9	2-1/2 x 12	2-1/2 x 10-1/2
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 10-1/2	3-1/8 x 9
18	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 9-5/8
20	Douglas-fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 9	2-1/2 x 9	2-1/2 x 12	2-1/2 x 10-1/2
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 10-1/2	3-1/8 x 9
20	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 9-5/8
22	Douglas-fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 10-1/2
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 10-1/2	3-1/8 x 10-1/2
22	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 11	2-1/2 x 11
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 9-5/8
24	Douglas-fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 10-1/2
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 10-1/2	3-1/8 x 10-1/2
24	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 11	2-1/2 x 11
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 9-5/8



TABLE 4 (CONTINUED)

**24F GLULAM EQUIVALENTS FOR 4X DOUGLAS FIR-LARCH LUMBER**  
**ROOF BEAMS – NON-SNOW LOADS**  
 Designed According to the 1997 NDS  
 (Load Duration Factor = 1.25)

Span (ft)	Glulam Species	4 x 12 Douglas Fir		4 x 14 Douglas Fir		4 x 16 Douglas Fir	
		Select Struct.	No. 1	Select Struct.	No. 1	Select Struct.	No. 1
24F Glulam Equivalent (in.)							
10	Douglas-fir	2-1/2 x 10-1/2	2-1/2 x 9	2-1/2 x 12	2-1/2 x 10-1/2	2-1/2 x 12	2-1/2 x 12
		3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 11	2-1/2 x 11	2-1/2 x 12-3/8	2-1/2 x 12-3/8
		3 x 9-5/8	3 x 8-1/4	3 x 11	3 x 9-5/8	3 x 11	3 x 11
12	Douglas-fir	2-1/2 x 10-1/2	2-1/2 x 9	2-1/2 x 12	2-1/2 x 10-1/2	2-1/2 x 13-1/2	2-1/2 x 12
		3-1/8 x 10-1/2	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 11	2-1/2 x 9-5/8	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 13-3/4	2-1/2 x 12-3/8
		3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 9-5/8	3 x 12-3/8	3 x 11
14	Douglas-fir	2-1/2 x 12	2-1/2 x 10-1/2	2-1/2 x 13-1/2	2-1/2 x 10-1/2	2-1/2 x 13-1/2	2-1/2 x 12
		3-1/8 x 10-1/2	3-1/8 x 9	3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 11	2-1/2 x 9-5/8	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 13-3/4	2-1/2 x 12-3/8
		3 x 11	3 x 9-5/8	3 x 12-3/8	3 x 9-5/8	3 x 12-3/8	3 x 11
16	Douglas-fir	2-1/2 x 12	2-1/2 x 10-1/2	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 15	2-1/2 x 12
		3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12
	Southern Pine	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 15-1/8	2-1/2 x 12-3/8
		3 x 11	3 x 9-5/8	3 x 12-3/8	3 x 11	3 x 13-3/4	3 x 12-3/8
18	Douglas-fir	2-1/2 x 12	2-1/2 x 10-1/2	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 15	2-1/2 x 13-1/2
		3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12
	Southern Pine	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 13-3/4	2-1/2 x 12-3/8	2-1/2 x 15-1/8	2-1/2 x 12-3/8
		3 x 12-3/8	3 x 11	3 x 12-3/8	3 x 11	3 x 13-3/4	3 x 12-3/8
20	Douglas-fir	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 15	2-1/2 x 13-1/2
		3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12	3-1/8 x 13-1/2	3-1/8 x 12
	Southern Pine	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 13-3/4	2-1/2 x 12-3/8	2-1/2 x 15-1/8	2-1/2 x 13-3/4
		3 x 12-3/8	3 x 11	3 x 13-3/4	3 x 11	3 x 13-3/4	3 x 12-3/8
22	Douglas-fir	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 15	2-1/2 x 12	2-1/2 x 15	2-1/2 x 13-1/2
		3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12	3-1/8 x 15	3-1/8 x 13-1/2
	Southern Pine	2-1/2 x 13-3/4	2-1/2 x 11	2-1/2 x 13-3/4	2-1/2 x 12-3/8	2-1/2 x 15-1/8	2-1/2 x 13-3/4
		3 x 12-3/8	3 x 11	3 x 13-3/4	3 x 12-3/8	3 x 15-1/8	3 x 12-3/8
24	Douglas-fir	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 15	2-1/2 x 13-1/2	2-1/2 x 16-1/2	2-1/2 x 13-1/2
		3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12	3-1/8 x 15	3-1/8 x 13-1/2
	Southern Pine	2-1/2 x 13-3/4	2-1/2 x 12-3/8	2-1/2 x 15-1/8	2-1/2 x 12-3/8	2-1/2 x 16-1/2	2-1/2 x 13-3/4
		3 x 12-3/8	3 x 11	3 x 13-3/4	3 x 12-3/8	3 x 15-1/8	3 x 13-3/4

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/180$  under total load. Deflection under non-snow load must be verified when non-snow/total load > 3/4.
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 2-1/2 x 6 and 3-1/8 x 6 (Douglas-fir), and 2-1/2 x 5-1/2 and 3 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 Select Structural sawn lumber members:  $F_b = C_F \times 1500$  psi,  $F_v = 95$  psi,  $E = 1.9 \times 10^6$  psi, where  $C_F$  = size factor per 1997 NDS.  
 No. 1 sawn lumber members:  $F_b = C_F \times 1000$  psi,  $F_v = 95$  psi,  $E = 1.7 \times 10^6$  psi, where  $C_F$  = size factor per 1997 NDS.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 5

**24F GLULAM EQUIVALENTS FOR 4X- DOUGLAS FIR-LARCH LUMBER  
ROOF BEAMS – SNOW LOADS  
Designed According to the 1997 NDS  
(Load Duration Factor = 1.15)**

Span (ft)	Glulam Species	4 x 6 Douglas Fir		4 x 8 Douglas Fir		4 x 10 Douglas Fir	
		Select Struct.	No. 1	Select Struct.	No. 1	Select Struct.	No. 1
24F Glulam Equivalent (in.)							
10	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 7-1/2
	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 5-1/2	2-1/2 x 8-1/4	2-1/2 x 6-7/8	2-1/2 x 9-5/8	2-1/2 x 8-1/4
		3 x 6-7/8	3 x 5-1/2	3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4
12	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 9	2-1/2 x 7-1/2	2-1/2 x 10-1/2	2-1/2 x 9
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 7-1/2
	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 8-1/4
		3 x 6-7/8	3 x 5-1/2	3 x 8-1/4	3 x 6-7/8	3 x 9-5/8	3 x 8-1/4
14	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 9	2-1/2 x 7-1/2	2-1/2 x 10-1/2	2-1/2 x 9
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 6-7/8	3 x 9-5/8	3 x 8-1/4
16	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 9
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 10-1/2	3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 9-5/8	3 x 8-1/4
18	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 10-1/2
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 10-1/2	3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 9-5/8
20	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 9	2-1/2 x 9	2-1/2 x 12	2-1/2 x 10-1/2
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 10-1/2	3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 9-5/8
22	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 10-1/2
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 10-1/2	3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 9-5/8
24	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 10-1/2
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 10-1/2	3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 11	2-1/2 x 11
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 9-5/8

TABLE 5 (CONTINUED)

**24F GLULAM EQUIVALENTS FOR 4X DOUGLAS FIR-LARCH LUMBER****ROOF BEAMS – SNOW LOADS**

Designed According to the 1997 NDS

(Load Duration Factor = 1.15)

Span (ft)	Glulam Species	4 x 12 Douglas Fir		4 x 14 Douglas Fir		4 x 16 Douglas Fir	
		Select Struct.	No. 1	Select Struct.	No. 1	Select Struct.	No. 1
24F Glulam Equivalent (in.)							
10	Douglas-fir	2-1/2 x 10-1/2	2-1/2 x 9	2-1/2 x 12	2-1/2 x 10-1/2	2-1/2 x 12	2-1/2 x 12
		3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 11	2-1/2 x 11	2-1/2 x 12-3/8	2-1/2 x 12-3/8
		3 x 9-5/8	3 x 8-1/4	3 x 11	3 x 9-5/8	3 x 11	3 x 11
12	Douglas-fir	2-1/2 x 10-1/2	2-1/2 x 9	2-1/2 x 12	2-1/2 x 10-1/2	2-1/2 x 13-1/2	2-1/2 x 12
		3-1/8 x 10-1/2	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 11	2-1/2 x 9-5/8	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 13-3/4	2-1/2 x 12-3/8
		3 x 9-5/8	3 x 8-1/4	3 x 11	3 x 9-5/8	3 x 12-3/8	3 x 11
14	Douglas-fir	2-1/2 x 12	2-1/2 x 10-1/2	2-1/2 x 13-1/2	2-1/2 x 10-1/2	2-1/2 x 13-1/2	2-1/2 x 12
		3-1/8 x 10-1/2	3-1/8 x 9	3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 11	2-1/2 x 9-5/8	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 13-3/4	2-1/2 x 12-3/8
		3 x 11	3 x 9-5/8	3 x 12-3/8	3 x 9-5/8	3 x 12-3/8	3 x 11
16	Douglas-fir	2-1/2 x 12	2-1/2 x 10-1/2	2-1/2 x 13-1/2	2-1/2 x 10-1/2	2-1/2 x 15	2-1/2 x 12
		3-1/8 x 10-1/2	3-1/8 x 9	3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12
	Southern Pine	2-1/2 x 12-3/8	2-1/2 x 9-5/8	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 15-1/8	2-1/2 x 12-3/8
		3 x 11	3 x 9-5/8	3 x 12-3/8	3 x 11	3 x 13-3/4	3 x 11
18	Douglas-fir	2-1/2 x 12	2-1/2 x 10-1/2	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 15	2-1/2 x 12
		3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12
	Southern Pine	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 15-1/8	2-1/2 x 12-3/8
		3 x 11	3 x 9-5/8	3 x 12-3/8	3 x 11	3 x 13-3/4	3 x 12-3/8
20	Douglas-fir	2-1/2 x 12	2-1/2 x 10-1/2	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 15	2-1/2 x 13-1/2
		3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12
	Southern Pine	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 13-3/4	2-1/2 x 12-3/8	2-1/2 x 15-1/8	2-1/2 x 12-3/8
		3 x 12-3/8	3 x 11	3 x 12-3/8	3 x 11	3 x 13-3/4	3 x 12-3/8
22	Douglas-fir	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 15	2-1/2 x 13-1/2
		3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12	3-1/8 x 13-1/2	3-1/8 x 12
	Southern Pine	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 13-3/4	2-1/2 x 12-3/8	2-1/2 x 15-1/8	2-1/2 x 13-3/4
		3 x 12-3/8	3 x 11	3 x 13-3/4	3 x 11	3 x 13-3/4	3 x 12-3/8
24	Douglas-fir	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 15	2-1/2 x 12	2-1/2 x 15	2-1/2 x 13-1/2
		3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12	3-1/8 x 15	3-1/8 x 13-1/2
	Southern Pine	2-1/2 x 13-3/4	2-1/2 x 11	2-1/2 x 13-3/4	2-1/2 x 12-3/8	2-1/2 x 15-1/8	2-1/2 x 13-3/4
		3 x 12-3/8	3 x 11	3 x 13-3/4	3 x 12-3/8	3 x 15-1/8	3 x 12-3/8

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/180$  under total load. Deflection under snow load must be verified when snow/total load  $> 3/4$ .
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 2-1/2 x 6 and 3-1/8 x 6 (Douglas-fir), and 2-1/2 x 5-1/2 and 3 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 Select Structural sawn lumber members:  $F_b = C_F \times 1500$  psi,  $F_v = 95$  psi,  $E = 1.9 \times 10^6$  psi, where  $C_F$  = size factor per 1997 NDS.  
 No. 1 sawn lumber members:  $F_b = C_F \times 1000$  psi,  $F_v = 95$  psi,  $E = 1.7 \times 10^6$  psi, where  $C_F$  = size factor per 1997 NDS.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 6

**24F GLULAM EQUIVALENTS FOR 4X DOUGLAS FIR-LARCH LUMBER  
FLOOR BEAMS**

Designed According to the 1997 NDS  
(Load Duration Factor = 1.00)

Span (ft)	Glulam Species	4 x 6 Douglas Fir		4 x 8 Douglas Fir		4 x 10 Douglas Fir	
		Select Struct.	No. 1	Select Struct.	No. 1	Select Struct.	No. 1
24F Glulam Equivalent (in.)							
10	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 8-1/4
12	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 9 3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8
14	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 12 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 9-5/8 3 x 9-5/8
16	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8
18	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8
20	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8
22	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8
24	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 5-1/2	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8

TABLE 6 (CONTINUED)

**24F GLULAM EQUIVALENTS FOR 4X DOUGLAS FIR-LARCH LUMBER  
FLOOR BEAMS**
**Designed According to the 1997 NDS  
(Load Duration Factor = 1.00)**

Span (ft)	Glulam Species	4 x 12 Douglas Fir		4 x 14 Douglas Fir		4 x 16 Douglas Fir	
		Select Struc.	No. 1	Select Struc.	No. 1	Select Struc.	No. 1
24F Glulam Equivalent (in.)							
10	Douglas- fir	2-1/2 x 10-1/2	2-1/2 x 10-1/2	2-1/2 x 12	2-1/2 x 10-1/2	2-1/2 x 12	2-1/2 x 12
		3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 11	2-1/2 x 11	2-1/2 x 12-3/8	2-1/2 x 12-3/8
		3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 9-5/8	3 x 11	3 x 11
12	Douglas- fir	2-1/2 x 12	2-1/2 x 10-1/2	2-1/2 x 12	2-1/2 x 12	2-1/2 x 13-1/2	2-1/2 x 12
		3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 12
	Southern Pine	2-1/2 x 11	2-1/2 x 11	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 12-3/8	2-1/2 x 12-3/8
		3 x 11	3 x 9-5/8	3 x 11	3 x 11	3 x 12-3/8	3 x 11
14	Douglas- fir	2-1/2 x 12	2-1/2 x 10-1/2	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 13-1/2	2-1/2 x 13-1/2
		3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12
	Southern Pine	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 13-3/4	2-1/2 x 12-3/8	2-1/2 x 13-3/4	2-1/2 x 12-3/8
		3 x 12-3/8	3 x 11	3 x 12-3/8	3 x 11	3 x 13-3/4	3 x 12-3/8
16	Douglas- fir	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 15	2-1/2 x 13-1/2
		3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12	3-1/8 x 13-1/2	3-1/8 x 12
	Southern Pine	2-1/2 x 12-3/8	2-1/2 x 11	2-1/2 x 13-3/4	2-1/2 x 12-3/8	2-1/2 x 15-1/8	2-1/2 x 13-3/4
		3 x 12-3/8	3 x 11	3 x 13-3/4	3 x 11	3 x 13-3/4	3 x 12-3/8
18	Douglas- fir	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 15	2-1/2 x 13-1/2	2-1/2 x 16-1/2	2-1/2 x 13-1/2
		3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12	3-1/8 x 15	3-1/8 x 13-1/2
	Southern Pine	2-1/2 x 13-3/4	2-1/2 x 12-3/8	2-1/2 x 15-1/8	2-1/2 x 12-3/8	2-1/2 x 16-1/2	2-1/2 x 13-3/4
		3 x 12-3/8	3 x 11	3 x 13-3/4	3 x 12-3/8	3 x 15-1/8	3 x 13-3/4
20	Douglas- fir	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 15	2-1/2 x 13-1/2	2-1/2 x 16-1/2	2-1/2 x 15
		3-1/8 x 12	3-1/8 x 12	3-1/8 x 13-1/2	3-1/8 x 12	3-1/8 x 15	3-1/8 x 13-1/2
	Southern Pine	2-1/2 x 13-3/4	2-1/2 x 12-3/8	2-1/2 x 15-1/8	2-1/2 x 13-3/4	2-1/2 x 16-1/2	2-1/2 x 13-3/4
		3 x 12-3/8	3 x 11	3 x 13-3/4	3 x 12-3/8	3 x 15-1/8	3 x 13-3/4
22	Douglas- fir	2-1/2 x 13-1/2	2-1/2 x 12	2-1/2 x 15	2-1/2 x 13-1/2	2-1/2 x 16-1/2	2-1/2 x 15
		3-1/8 x 12	3-1/8 x 12	3-1/8 x 15	3-1/8 x 12	3-1/8 x 16-1/2	3-1/8 x 13-1/2
	Southern Pine	2-1/2 x 13-3/4	2-1/2 x 12-3/8	2-1/2 x 15-1/8	2-1/2 x 13-3/4	2-1/2 x 16-1/2	2-1/2 x 15-1/8
		3 x 12-3/8	3 x 12-3/8	3 x 15-1/8	3 x 12-3/8	3 x 16-1/2	3 x 13-3/4
24	Douglas- fir	2-1/2 x 13-1/2	2-1/2 x 13-1/2	2-1/2 x 16-1/2	2-1/2 x 13-1/2	2-1/2 x 18	2-1/2 x 15
		3-1/8 x 12	3-1/8 x 12	3-1/8 x 15	3-1/8 x 13-1/2	3-1/8 x 16-1/2	3-1/8 x 13-1/2
	Southern Pine	2-1/2 x 13-3/4	2-1/2 x 12-3/8	2-1/2 x 15-1/8	2-1/2 x 13-3/4	2-1/2 x 17-7/8	2-1/2 x 15-1/8
		3 x 12-3/8	3 x 12-3/8	3 x 15-1/8	3 x 13-3/4	3 x 16-1/2	3 x 13-3/4

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/360$  under live load, based on live/total load = 0.8.
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 2-1/2 x 6 and 3-1/8 x 6 (Douglas-fir), and 2-1/2 x 5-1/2 and 3 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 Select Structural sawn lumber members:  $F_b = C_F \times 1500$  psi,  $F_v = 95$  psi,  $E = 1.9 \times 10^6$  psi, where  $C_F$  = size factor per 1997 NDS.  
 No. 1 sawn lumber members:  $F_b = C_F \times 1000$  psi,  $F_v = 95$  psi,  $E = 1.7 \times 10^6$  psi, where  $C_F$  = size factor per 1997 NDS.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 7

**24F GLULAM EQUIVALENTS FOR 6X DOUGLAS FIR-LARCH LUMBER**  
**ROOF BEAMS – NON-SNOW LOADS**  
**Designed According to the 1997 NDS**  
**(Load Duration Factor = 1.25)**

Span (ft)	Glulam Species	6 x 8 Douglas Fir		6 x 10 Douglas Fir		6 x 12 Douglas Fir	
		Select Struct.	No. 1	Select Struct.	No. 1	Select Struct.	No. 1
<b>24F Glulam Equivalent (in.)</b>							
10	Douglas- fir	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 10-1/2
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9
	Southern Pine	3 x 8-1/4	3 x 8-1/4	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 11
		5 x 6-7/8	5 x 6-7/8	5 x 8-1/4	5 x 8-1/4	5 x 8-1/4	5 x 8-1/4
12	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 9	5-1/8 x 9
	Southern Pine	3 x 9-5/8	3 x 8-1/4	3 x 11	3 x 9-5/8	3 x 12-3/8	3 x 12-3/8
		5 x 8-1/4	5 x 6-7/8	5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8
14	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 10-1/2	5-1/8 x 10-1/2
	Southern Pine	3 x 9-5/8	3 x 8-1/4	3 x 11	3 x 11	3 x 12-3/8	3 x 12-3/8
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8
16	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 10-1/2	5-1/8 x 9	5-1/8 x 10-1/2	5-1/8 x 10-1/2
	Southern Pine	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 11	3 x 12-3/8	3 x 12-3/8
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
18	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 12	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 10-1/2	5-1/8 x 9	5-1/8 x 12	5-1/8 x 10-1/2
	Southern Pine	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 11	3 x 13-3/4	3 x 12-3/8
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
20	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 12	3-1/8 x 12	3-1/8 x 13-1/2	3-1/8 x 13-1/2
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 10-1/2	5-1/8 x 10-1/2	5-1/8 x 12	5-1/8 x 10-1/2
	Southern Pine	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 11	3 x 13-3/4	3 x 13-3/4
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 12-3/8	5 x 11
22	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 12	3-1/8 x 12	3-1/8 x 13-1/2	3-1/8 x 13-1/2
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 10-1/2	5-1/8 x 10-1/2	5-1/8 x 12	5-1/8 x 12
	Southern Pine	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 11	3 x 13-3/4	3 x 13-3/4
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 12-3/8	5 x 11
24	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 12	3-1/8 x 12	3-1/8 x 13-1/2	3-1/8 x 13-1/2
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 10-1/2	5-1/8 x 10-1/2	5-1/8 x 12	5-1/8 x 12
	Southern Pine	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 11	3 x 13-3/4	3 x 13-3/4
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 12-3/8	5 x 12-3/8

TABLE 7 (CONTINUED)

**24F GLULAM EQUIVALENTS FOR 6X DOUGLAS FIR-LARCH LUMBER  
ROOF BEAMS – NON-SNOW LOADS  
Designed According to the 1997 NDS  
(Load Duration Factor = 1.25)**

Span (ft)	Glulam Species	6 x 14 Douglas Fir		6 x 16 Douglas Fir	
		Select Struct.	No. 1	Select Struct.	No. 1
24F Glulam Equivalent (in.)					
10	Douglas-fir	3-1/8 x 12 5-1/8 x 9	3-1/8 x 12 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 10-1/2
	Southern Pine	3 x 12-3/8 5 x 9-5/8	3 x 12-3/8 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 13-3/4 5 x 11
12	Douglas-fir	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 10-1/2
	Southern Pine	3 x 12-3/8 5 x 9-5/8	3 x 12-3/8 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 13-3/4 5 x 11
14	Douglas-fir	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 15 5-1/8 x 12	3-1/8 x 15 5-1/8 x 12
	Southern Pine	3 x 13-3/4 5 x 11	3 x 13-3/4 5 x 11	3 x 15-1/8 5 x 12-3/8	3 x 15-1/8 5 x 12-3/8
16	Douglas-fir	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 15 5-1/8 x 12	3-1/8 x 15 5-1/8 x 12
	Southern Pine	3 x 15-1/8 5 x 12-3/8	3 x 13-3/4 5 x 11	3 x 15-1/8 5 x 12-3/8	3 x 15-1/8 5 x 12-3/8
18	Douglas-fir	3-1/8 x 15 5-1/8 x 12	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 16-1/2 5-1/8 x 13-1/2	3-1/8 x 15 5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8 5 x 12-3/8	3 x 13-3/4 5 x 12-3/8	3 x 16-1/2 5 x 13-3/4	3 x 16-1/2 5 x 12-3/8
20	Douglas-fir	3-1/8 x 15 5-1/8 x 13-1/2	3-1/8 x 15 5-1/8 x 12	3-1/8 x 16-1/2 5-1/8 x 13-1/2	3-1/8 x 15 5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8 5 x 12-3/8	3 x 15-1/8 5 x 12-3/8	3 x 16-1/2 5 x 13-3/4	3 x 16-1/2 5 x 13-3/4
22	Douglas-fir	3-1/8 x 15 5-1/8 x 13-1/2	3-1/8 x 15 5-1/8 x 12	3-1/8 x 16-1/2 5-1/8 x 15	3-1/8 x 15 5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8 5 x 13-3/4	3 x 15-1/8 5 x 12-3/8	3 x 16-1/2 5 x 15-1/8	3 x 16-1/2 5 x 13-3/4
24	Douglas-fir	3-1/8 x 16-1/2 5-1/8 x 13-1/2	3-1/8 x 15 5-1/8 x 13-1/2	3-1/8 x 18 5-1/8 x 15	3-1/8 x 16-1/2 5-1/8 x 13-1/2
	Southern Pine	3 x 16-1/2 5 x 13-3/4	3 x 15-1/8 5 x 13-3/4	3 x 17-7/8 5 x 15-1/8	3 x 16-1/2 5 x 13-3/4

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/180$  under total load. Deflection under non-snow load must be verified when non-snow/total load  $> 3/4$ .
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 3-1/8 x 6 and 5-1/8 x 6 (Douglas-fir), and 3 x 5-1/2 and 5 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 Select Structural sawn lumber members:  $F_b = C_F \times 1600$  psi,  $F_v = 85$  psi,  $E = 1.6 \times 10^6$  psi,  
 where  $C_F$  = size factor per 1997 NDS.  
 No. 1 sawn lumber members:  $F_b = C_F \times 1350$  psi,  $F_v = 85$  psi,  $E = 1.6 \times 10^6$  psi,  
 where  $C_F$  = size factor per 1997 NDS.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  
 $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 8

**24F GLULAM EQUIVALENTS FOR 6X DOUGLAS FIR-LARCH LUMBER  
ROOF BEAMS – SNOW LOADS  
Designed According to the 1997 NDS  
(Load Duration Factor = 1.15)**

Span (ft)	Glulam Species	6 x 8 Douglas Fir		6 x 10 Douglas Fir		6 x 12 Douglas Fir	
		Select Struct.	No. 1	Select Struct.	No. 1	Select Struct.	No. 1
24F Glulam Equivalent (in.)							
10	Douglas- fir	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 7-1/2 5-1/8 x 7-1/2	3-1/8 x 10-1/2 5-1/8 x 7-1/2	3-1/8 x 10-1/2 5-1/8 x 7-1/2	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 10-1/2 5-1/8 x 9
	Southern Pine	3 x 8-1/4 5 x 6-7/8	3 x 8-1/4 5 x 6-7/8	3 x 9-5/8 5 x 8-1/4	3 x 9-5/8 5 x 8-1/4	3 x 11 5 x 8-1/4	3 x 11 5 x 8-1/4
12	Douglas- fir	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 12 5-1/8 x 9	3-1/8 x 12 5-1/8 x 9
	Southern Pine	3 x 8-1/4 5 x 6-7/8	3 x 8-1/4 5 x 6-7/8	3 x 11 5 x 8-1/4	3 x 9-5/8 5 x 8-1/4	3 x 12-3/8 5 x 9-5/8	3 x 12-3/8 5 x 9-5/8
14	Douglas- fir	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 12 5-1/8 x 10-1/2
	Southern Pine	3 x 9-5/8 5 x 8-1/4	3 x 8-1/4 5 x 6-7/8	3 x 11 5 x 9-5/8	3 x 9-5/8 5 x 8-1/4	3 x 12-3/8 5 x 9-5/8	3 x 12-3/8 5 x 9-5/8
16	Douglas- fir	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 12 5-1/8 x 10-1/2
	Southern Pine	3 x 9-5/8 5 x 8-1/4	3 x 9-5/8 5 x 8-1/4	3 x 11 5 x 9-5/8	3 x 11 5 x 9-5/8	3 x 12-3/8 5 x 11	3 x 12-3/8 5 x 9-5/8
18	Douglas- fir	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 12 5-1/8 x 10-1/2
	Southern Pine	3 x 9-5/8 5 x 8-1/4	3 x 9-5/8 5 x 8-1/4	3 x 11 5 x 9-5/8	3 x 11 5 x 9-5/8	3 x 12-3/8 5 x 11	3 x 12-3/8 5 x 11
20	Douglas- fir	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 12 5-1/8 x 10-1/2
	Southern Pine	3 x 9-5/8 5 x 8-1/4	3 x 9-5/8 5 x 8-1/4	3 x 11 5 x 9-5/8	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 12-3/8 5 x 11
22	Douglas- fir	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 13-1/2 5-1/8 x 10-1/2
	Southern Pine	3 x 9-5/8 5 x 8-1/4	3 x 9-5/8 5 x 8-1/4	3 x 11 5 x 9-5/8	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 12-3/8	3 x 13-3/4 5 x 11
24	Douglas- fir	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 13-1/2 5-1/8 x 12
	Southern Pine	3 x 9-5/8 5 x 8-1/4	3 x 9-5/8 5 x 8-1/4	3 x 11 5 x 9-5/8	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 12-3/8	3 x 13-3/4 5 x 11



TABLE 8 (CONTINUED)

**24F GLULAM EQUIVALENTS FOR 6X DOUGLAS FIR-LARCH LUMBER  
ROOF BEAMS – SNOW LOADS  
Designed According to the 1997 NDS  
(Load Duration Factor = 1.15)**

Span (ft)	Glulam Species	6 x 14 Douglas Fir		6 x 16 Douglas Fir	
		Select Struct.	No. 1	Select Struct.	No. 1
24F Glulam Equivalent (in.)					
10	Douglas- fir	3-1/8 x 12 5-1/8 x 9	3-1/8 x 12 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 10-1/2
	Southern Pine	3 x 12-3/8 5 x 9-5/8	3 x 12-3/8 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 13-3/4 5 x 11
12	Douglas- fir	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 10-1/2
	Southern Pine	3 x 12-3/8 5 x 9-5/8	3 x 12-3/8 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 13-3/4 5 x 11
14	Douglas- fir	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 15 5-1/8 x 12	3-1/8 x 15 5-1/8 x 12
	Southern Pine	3 x 13-3/4 5 x 11	3 x 13-3/4 5 x 11	3 x 15-1/8 5 x 11	3 x 15-1/8 5 x 11
16	Douglas- fir	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 15 5-1/8 x 12	3-1/8 x 15 5-1/8 x 12
	Southern Pine	3 x 15-1/8 5 x 11	3 x 13-3/4 5 x 11	3 x 15-1/8 5 x 12-3/8	3 x 15-1/8 5 x 12-3/8
18	Douglas- fir	3-1/8 x 15 5-1/8 x 12	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 16-1/2 5-1/8 x 13-1/2	3-1/8 x 15 5-1/8 x 12
	Southern Pine	3 x 15-1/8 5 x 12-3/8	3 x 13-3/4 5 x 11	3 x 16-1/2 5 x 12-3/8	3 x 16-1/2 5 x 12-3/8
20	Douglas- fir	3-1/8 x 15 5-1/8 x 12	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 16-1/2 5-1/8 x 13-1/2	3-1/8 x 15 5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8 5 x 12-3/8	3 x 13-3/4 5 x 12-3/8	3 x 16-1/2 5 x 13-3/4	3 x 16-1/2 5 x 13-3/4
22	Douglas- fir	3-1/8 x 15 5-1/8 x 13-1/2	3-1/8 x 15 5-1/8 x 12	3-1/8 x 16-1/2 5-1/8 x 13-1/2	3-1/8 x 15 5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8 5 x 13-3/4	3 x 15-1/8 5 x 12-3/8	3 x 16-1/2 5 x 13-3/4	3 x 16-1/2 5 x 13-3/4
24	Douglas- fir	3-1/8 x 15 5-1/8 x 13-1/2	3-1/8 x 15 5-1/8 x 12	3-1/8 x 16-1/2 5-1/8 x 15	3-1/8 x 16-1/2 5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8 5 x 13-3/4	3 x 15-1/8 5 x 12-3/8	3 x 16-1/2 5 x 15-1/8	3 x 16-1/2 5 x 13-3/4

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/180$  under total load. Deflection under snow load must be verified when snow/total load  $> 3/4$ .
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 3-1/8 x 6 and 5-1/8 x 6 (Douglas-fir), and 3 x 5-1/2 and 5 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 Select Structural sawn lumber members:  $F_b = C_F \times 1600$  psi,  $F_v = 85$  psi,  $E = 1.6 \times 10^6$  psi,  
 where  $C_F$  = size factor per 1997 NDS.  
 No. 1 sawn lumber members:  $F_b = C_F \times 1350$  psi,  $F_v = 85$  psi,  $E = 1.6 \times 10^6$  psi,  
 where  $C_F$  = size factor per 1997 NDS.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  
 $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 9

**24F GLULAM EQUIVALENTS FOR 6X DOUGLAS FIR-LARCH LUMBER  
FLOOR BEAMS  
DESIGNED ACCORDING TO THE 1997 NDS  
(LOAD DURATION FACTOR = 1.00)**

Span (ft)	Glulam Species	6 x 8 Douglas Fir		6 x 10 Douglas Fir		6 x 12 Douglas Fir	
		Select Struc.	No. 1	Select Struc.	No. 1	Select Struc.	No. 1
<b>24F Glulam Equivalent (in.)</b>							
10	<i>Douglas-fir</i>	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 10-1/2 5-1/8 x 9
	<i>Southern Pine</i>	3 x 9-5/8 5 x 8-1/4	3 x 8-1/4 5 x 6-7/8	3 x 9-5/8 5 x 8-1/4	3 x 9-5/8 5 x 8-1/4	3 x 11 5 x 9-5/8	3 x 11 5 x 9-5/8
12	<i>Douglas-fir</i>	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 12 5-1/8 x 10-1/2
	<i>Southern Pine</i>	3 x 9-5/8 5 x 8-1/4	3 x 9-5/8 5 x 8-1/4	3 x 11 5 x 9-5/8	3 x 11 5 x 9-5/8	3 x 12-3/8 5 x 9-5/8	3 x 12-3/8 5 x 9-5/8
14	<i>Douglas-fir</i>	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 12 5-1/8 x 10-1/2
	<i>Southern Pine</i>	3 x 9-5/8 5 x 8-1/4	3 x 9-5/8 5 x 8-1/4	3 x 11 5 x 9-5/8	3 x 11 5 x 9-5/8	3 x 12-3/8 5 x 11	3 x 12-3/8 5 x 11
16	<i>Douglas-fir</i>	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 13-1/2 5-1/8 x 12
	<i>Southern Pine</i>	3 x 9-5/8 5 x 8-1/4	3 x 9-5/8 5 x 8-1/4	3 x 11 5 x 9-5/8	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 12-3/8	3 x 13-3/4 5 x 11
18	<i>Douglas-fir</i>	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 13-1/2 5-1/8 x 12
	<i>Southern Pine</i>	3 x 9-5/8 5 x 8-1/4	3 x 9-5/8 5 x 8-1/4	3 x 11 5 x 9-5/8	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 12-3/8	3 x 13-3/4 5 x 12-3/8
20	<i>Douglas-fir</i>	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 13-1/2 5-1/8 x 12
	<i>Southern Pine</i>	3 x 9-5/8 5 x 8-1/4	3 x 9-5/8 5 x 8-1/4	3 x 11 5 x 9-5/8	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 12-3/8	3 x 13-3/4 5 x 12-3/8
22	<i>Douglas-fir</i>	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 12 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 13-1/2 5-1/8 x 12
	<i>Southern Pine</i>	3 x 9-5/8 5 x 8-1/4	3 x 9-5/8 5 x 8-1/4	3 x 11 5 x 9-5/8	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 12-3/8	3 x 13-3/4 5 x 12-3/8
24	<i>Douglas-fir</i>	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 9 5-1/8 x 7-1/2	3-1/8 x 10-1/2 5-1/8 x 10-1/2	3-1/8 x 10-1/2 5-1/8 x 10-1/2	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 13-1/2 5-1/8 x 12
	<i>Southern Pine</i>	3 x 8-1/4 5 x 8-1/4	3 x 8-1/4 5 x 8-1/4	3 x 11 5 x 9-5/8	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 12-3/8	3 x 13-3/4 5 x 12-3/8

TABLE 9 (CONTINUED)

**24F GLULAM EQUIVALENTS FOR 6X DOUGLAS FIR-LARCH LUMBER FLOOR BEAMS**
**Designed According to the 1997 NDS  
(Load Duration Factor = 1.00)**

Span (ft)	Glulam Species	6 x 14 Douglas Fir		6 x 16 Douglas Fir	
		Select Struct.	No. 1	Select Struct.	No. 1
24F Glulam Equivalent (in.)					
10	Douglas-fir	3-1/8 x 12	3-1/8 x 12	3-1/8 x 13-1/2	3-1/8 x 13-1/2
		5-1/8 x 10-1/2	5-1/8 x 10-1/2	5-1/8 x 10-1/2	5-1/8 x 10-1/2
	Southern Pine	3 x 12-3/8	3 x 12-3/8	3 x 13-3/4	3 x 13-3/4
		5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
12	Douglas-fir	3-1/8 x 13-1/2	3-1/8 x 13-1/2	3-1/8 x 13-1/2	3-1/8 x 13-1/2
		5-1/8 x 10-1/2	5-1/8 x 10-1/2	5-1/8 x 12	5-1/8 x 12
	Southern Pine	3 x 12-3/8	3 x 12-3/8	3 x 13-3/4	3 x 13-3/4
		5 x 11	5 x 11	5 x 11	5 x 11
14	Douglas-fir	3-1/8 x 13-1/2	3-1/8 x 13-1/2	3-1/8 x 15	3-1/8 x 15
		5-1/8 x 12	5-1/8 x 12	5-1/8 x 12	5-1/8 x 12
	Southern Pine	3 x 13-3/4	3 x 13-3/4	3 x 15-1/8	3 x 15-1/8
		5 x 12-3/8	5 x 12-3/8	5 x 12-3/8	5 x 12-3/8
16	Douglas-fir	3-1/8 x 15	3-1/8 x 15	3-1/8 x 15	3-1/8 x 15
		5-1/8 x 12	5-1/8 x 12	5-1/8 x 13-1/2	5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8	3 x 15-1/8	3 x 15-1/8	3 x 15-1/8
		5 x 12-3/8	5 x 12-3/8	5 x 13-3/4	5 x 13-3/4
18	Douglas-fir	3-1/8 x 16-1/2	3-1/8 x 15	3-1/8 x 16-1/2	3-1/8 x 16-1/2
		5-1/8 x 13-1/2	5-1/8 x 13-1/2	5-1/8 x 15	5-1/8 x 13-1/2
	Southern Pine	3 x 16-1/2	3 x 15-1/8	3 x 16-1/2	3 x 16-1/2
		5 x 13-3/4	5 x 12-3/8	5 x 13-3/4	5 x 13-3/4
20	Douglas-fir	3-1/8 x 16-1/2	3-1/8 x 15	3-1/8 x 18	3-1/8 x 16-1/2
		5-1/8 x 13-1/2	5-1/8 x 13-1/2	5-1/8 x 15	5-1/8 x 15
	Southern Pine	3 x 16-1/2	3 x 15-1/8	3 x 17-7/8	3 x 16-1/2
		5 x 13-3/4	5 x 13-3/4	5 x 15-1/8	5 x 15-1/8
22	Douglas-fir	3-1/8 x 16-1/2	3-1/8 x 16-1/2	3-1/8 x 18	3-1/8 x 18
		5-1/8 x 13-1/2	5-1/8 x 13-1/2	5-1/8 x 15	5-1/8 x 15
	Southern Pine	3 x 16-1/2	3 x 16-1/2	3 x 17-7/8	3 x 17-7/8
		5 x 13-3/4	5 x 13-3/4	5 x 15-1/8	5 x 15-1/8
24	Douglas-fir	3-1/8 x 16-1/2	3-1/8 x 16-1/2	3-1/8 x 18	3-1/8 x 18
		5-1/8 x 13-1/2	5-1/8 x 13-1/2	5-1/8 x 15	5-1/8 x 15
	Southern Pine	3 x 16-1/2	3 x 16-1/2	3 x 17-7/8	3 x 17-7/8
		5 x 13-3/4	5 x 13-3/4	5 x 15-1/8	5 x 15-1/8

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/360$  under live load, based on live/total load = 0.8.
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 3-1/8 x 6 and 5-1/8 x 6 (Douglas-fir), and 3 x 5-1/2 and 5 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 Select Structural sawn lumber members:  $F_b = C_F \times 1600$  psi,  $F_v = 85$  psi,  $E = 1.6 \times 10^6$  psi, where  $C_F$  = size factor per 1997 NDS.  
 No. 1 sawn lumber members:  $F_b = C_F \times 1350$  psi,  $F_v = 85$  psi,  $E = 1.6 \times 10^6$  psi, where  $C_F$  = size factor per 1997 NDS.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 10

**24F GLULAM EQUIVALENTS FOR 3X SOUTHERN PINE LUMBER  
ROOF BEAMS – NON-SNOW LOADS**  
Designed According to the 1997 NDS  
(Load Duration Factor = 1.25)

Span (ft)	Glulam Species	3 x 8 Southern Pine		3 x 10 Southern Pine		3 x 12 Southern Pine	
		No. 1	No. 2	No. 1	No. 2	No. 1	No. 2
<b>24F Glulam Equivalent (in.)</b>							
10	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 7-1/2
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 7-1/2
	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4
		3 x 6-7/8	3 x 5-1/2	3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 6-7/8
12	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9
		3-1/8 x 7-1/2	3-1/8 x 6	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 7-1/2
	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 8-1/4
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4
14	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 8-1/4
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 6-7/8	3 x 9-5/8	3 x 8-1/4
16	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 9
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 9-5/8	3 x 8-1/4
18	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 9
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 9-5/8	3 x 9-5/8
20	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 10-1/2
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 8-1/4	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 9-5/8	3 x 8-1/4	3 x 9-5/8	3 x 9-5/8
22	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 10-1/2	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 10-1/2
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 9-5/8	3 x 8-1/4	3 x 11	3 x 9-5/8
24	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 10-1/2	2-1/2 x 9	2-1/2 x 12	2-1/2 x 10-1/2
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 11	2-1/2 x 11
		3 x 6-7/8	3 x 6-7/8	3 x 9-5/8	3 x 8-1/4	3 x 11	3 x 9-5/8

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/180$  under total load. Deflection under non-snow load must be verified when non-snow/total load  $> 3/4$ .
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 2-1/2 x 6 and 3-1/8 x 6 (Douglas-fir), and 2-1/2 x 5-1/2 and 3 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 No. 1 sawn lumber members:  $F_b = 1500$  (3 x 8), 1300 (3 x 10), 1250 (3 x 12) psi,  $F_v = 90$  psi,  $E = 1.7 \times 10^6$  psi.  
 No. 2 sawn lumber members:  $F_b = 1200$  (3 x 8), 1050 (3 x 10), 975 (3 x 12) psi,  $F_v = 90$  psi,  $E = 1.6 \times 10^6$  psi.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 11

**24F GLULAM EQUIVALENTS FOR 3X SOUTHERN PINE LUMBER  
ROOF BEAMS – SNOW LOADS**  
Designed According to the 1997 NDS  
(Load Duration Factor = 1.15)

Span (ft)	Glulam Species	3 x 8 Southern Pine		3 x 10 Southern Pine		3 x 12 Southern Pine	
		No. 1	No. 2	No. 1	No. 2	No. 1	No. 2
<b>24F Glulam Equivalent (in.)</b>							
10	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 6	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 7-1/2
		3-1/8 x 6	3-1/8 x 6	3-1/8 x 7-1/2	3-1/8 x 6	3-1/8 x 7-1/2	3-1/8 x 7-1/2
	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4
		3 x 6-7/8	3 x 5-1/2	3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 6-7/8
12	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 7-1/2
		3-1/8 x 7-1/2	3-1/8 x 6	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 7-1/2
	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4
		3 x 6-7/8	3 x 6-7/8	3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4
14	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9
		3-1/8 x 7-1/2	3-1/8 x 6	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 7-1/2
	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 8-1/4
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4
16	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 8-1/4
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 9-5/8	3 x 8-1/4
18	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 9
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 6-7/8	2-1/2 x 9-5/8	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 9-5/8	3 x 8-1/4
20	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 9
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 8-1/4	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 9-5/8	3 x 9-5/8
22	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 10-1/2
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 9-5/8	3 x 8-1/4	3 x 9-5/8	3 x 9-5/8
24	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 10-1/2	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 10-1/2
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 9-5/8	3 x 8-1/4	3 x 11	3 x 9-5/8

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/180$  under total load. Deflection under snow load must be verified when snow/total load > 3/4.
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 2-1/2 x 6 and 3-1/8 x 6 (Douglas-fir), and 2-1/2 x 5-1/2 and 3 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 No. 1 sawn lumber members:  $F_b = 1500$  (3 x 8), 1300 (3 x 10), 1250 (3 x 12) psi,  $F_v = 90$  psi,  $E = 1.7 \times 10^6$  psi.  
 No. 2 sawn lumber members:  $F_b = 1200$  (3 x 8), 1050 (3 x 10), 975 (3 x 12) psi,  $F_v = 90$  psi,  $E = 1.6 \times 10^6$  psi.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 12

**24F GLULAM EQUIVALENTS FOR 3X SOUTHERN PINE LUMBER  
FLOOR BEAMS**

Designed According to the 1997 NDS  
(Load Duration Factor = 1.00)

Span (ft)	Glulam Species	3 x 8 Southern Pine		3 x 10 Southern Pine		3 x 12 Southern Pine	
		No. 1	No. 2	No. 1	No. 2	No. 1	No. 2
<b>24F Glulam Equivalent (in.)</b>							
10	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9
		3-1/8 x 7-1/2	3-1/8 x 6	3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 7-1/2
	Southern Pine	2-1/2 x 6-7/8	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 8-1/4
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4
12	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 9
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 6-7/8	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 9-5/8	3 x 8-1/4
14	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 9
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 8-1/4	3 x 8-1/4	3 x 9-5/8	3 x 9-5/8
16	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 9	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 10-1/2
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 9-5/8	3 x 8-1/4	3 x 9-5/8	3 x 9-5/8
18	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 10-1/2	2-1/2 x 9	2-1/2 x 10-1/2	2-1/2 x 10-1/2
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 9
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 11	2-1/2 x 9-5/8
		3 x 6-7/8	3 x 6-7/8	3 x 9-5/8	3 x 8-1/4	3 x 11	3 x 9-5/8
20	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 10-1/2	2-1/2 x 9	2-1/2 x 12	2-1/2 x 10-1/2
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 11	2-1/2 x 11
		3 x 6-7/8	3 x 6-7/8	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 9-5/8
22	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 10-1/2	2-1/2 x 9	2-1/2 x 12	2-1/2 x 10-1/2
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 8-1/4	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 12-3/8	2-1/2 x 11
		3 x 6-7/8	3 x 6-7/8	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 11
24	Douglas- fir	2-1/2 x 7-1/2	2-1/2 x 7-1/2	2-1/2 x 10-1/2	2-1/2 x 9	2-1/2 x 12	2-1/2 x 12
		3-1/8 x 7-1/2	3-1/8 x 7-1/2	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 8-1/4	2-1/2 x 6-7/8	2-1/2 x 9-5/8	2-1/2 x 9-5/8	2-1/2 x 12-3/8	2-1/2 x 11
		3 x 6-7/8	3 x 6-7/8	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 11

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/360$  under live load, based on live/total load = 0.8.
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 2-1/2 x 6 and 3-1/8 x 6 (Douglas-fir), and 2-1/2 x 5-1/2 and 3 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 No. 1 sawn lumber members:  $F_b = 1500$  (3 x 8), 1300 (3 x 10), 1250 (3 x 12) psi,  $F_v = 90$  psi,  $E = 1.7 \times 10^6$  psi.  
 No. 2 sawn lumber members:  $F_b = 1200$  (3 x 8), 1050 (3 x 10), 975 (3 x 12) psi,  $F_v = 90$  psi,  $E = 1.6 \times 10^6$  psi.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 13

**24F GLULAM EQUIVALENTS FOR 4X SOUTHERN PINE LUMBER  
ROOF BEAMS – NON-SNOW LOADS**  
Designed According to the 1997 NDS  
(Load Duration Factor = 1.25)

Span (ft)	Glulam Species	4 x 6 Southern Pine		4 x 8 Southern Pine		4 x 10 Southern Pine		4 x 12 Southern Pine	
		Select Struc.	No. 1	Select Struc.	No. 1	Select Struc.	No. 1	Select Struc.	No. 1
<b>24F Glulam Equivalent (in.)</b>									
10	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8
12	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 11 3 x 9-5/8	2-1/2 x 11 3 x 9-5/8
14	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 12 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8
16	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 12 3-1/8 x 12	2-1/2 x 12 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 12-3/8 3 x 11	2-1/2 x 11 3 x 11
18	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 13-1/2 3-1/8 x 12	2-1/2 x 12 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8	2-1/2 x 13-3/4 3 x 12-3/8	2-1/2 x 12-3/8 3 x 11
20	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 13-1/2 3-1/8 x 12	2-1/2 x 12 3-1/8 x 12
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8	2-1/2 x 13-3/4 3 x 12-3/8	2-1/2 x 12-3/8 3 x 11
22	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 13-1/2 3-1/8 x 12	2-1/2 x 12 3-1/8 x 12
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8	2-1/2 x 13-3/4 3 x 12-3/8	2-1/2 x 12-3/8 3 x 12-3/8
24	Douglas- fir	2-1/2 x 6 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 13-1/2 3-1/8 x 12	2-1/2 x 13-1/2 3-1/8 x 12
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8	2-1/2 x 13-3/4 3 x 12-3/8	2-1/2 x 12-3/8 3 x 12-3/8

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection = L/180 under total load. Deflection under non-snow load must be verified when non-snow/total load > 3/4.
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 2-1/2 x 6 and 3-1/8 x 6 (Douglas-fir), and 2-1/2 x 5-1/2 and 3 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 Select Structural sawn lumber members:  $F_b = 2550$  (4 x 6),  $1.1 \times 2300$  (4 x 8),  $1.1 \times 2050$  (4 x 10),  $1.1 \times 1900$  (4 x 12) psi,  $F_v = 90$  psi,  $E = 1.8 \times 10^6$  psi.  
 No. 1 sawn lumber members:  $F_b = 1650$  (4 x 6),  $1.1 \times 1500$  (4 x 8),  $1.1 \times 1300$  (4 x 10),  $1.1 \times 1250$  (4 x 12) psi,  $F_v = 90$  psi,  $E = 1.7 \times 10^6$  psi.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 14

**24F GLULAM EQUIVALENTS FOR 4X SOUTHERN PINE LUMBER  
ROOF BEAMS – SNOW LOADS**  
Designed According to the 1997 NDS  
(Load Duration Factor = 1.15)

Span (ft)	Glulam Species	4 x 6 Southern Pine		4 x 8 Southern Pine		4 x 10 Southern Pine		4 x 12 Southern Pine	
		Select Struc.	No. 1	Select Struc.	No. 1	Select Struc.	No. 1	Select Struc.	No. 1
<b>24F Glulam Equivalent (in.)</b>									
10	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 5-1/2	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 8-1/4 3 x 6-7/8	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8
12	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 7-1/2 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 11 3 x 9-5/8	2-1/2 x 11 3 x 9-5/8
14	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 12 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8
16	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 12 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 12-3/8 3 x 11	2-1/2 x 11 3 x 11
18	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 13-1/2 3-1/8 x 12	2-1/2 x 12 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 12-3/8 3 x 12-3/8	2-1/2 x 11 3 x 11
20	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 13-1/2 3-1/8 x 12	2-1/2 x 12 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8	2-1/2 x 13-3/4 3 x 12-3/8	2-1/2 x 12-3/8 3 x 11
22	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 13-1/2 3-1/8 x 12	2-1/2 x 12 3-1/8 x 12
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8	2-1/2 x 13-3/4 3 x 12-3/8	2-1/2 x 12-3/8 3 x 11
24	Douglas- fir	2-1/2 x 6 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 13-1/2 3-1/8 x 12	2-1/2 x 12 3-1/8 x 12
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8	2-1/2 x 13-3/4 3 x 12-3/8	2-1/2 x 12-3/8 3 x 12-3/8

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection = L/180 under total load. Deflection under snow load must be verified when snow/total load > 3/4.
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 2-1/2 x 6 and 3-1/8 x 6 (Douglas-fir), and 2-1/2 x 5-1/2 and 3 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 Select Structural sawn lumber members:  $F_b = 2550$  (4 x 6),  $1.1 \times 2300$  (4 x 8),  $1.1 \times 2050$  (4 x 10),  $1.1 \times 1900$  (4 x 12) psi,  $F_v = 90$  psi,  $E = 1.8 \times 10^6$  psi.  
 No. 1 sawn lumber members:  $F_b = 1650$  (4 x 6),  $1.1 \times 1500$  (4 x 8),  $1.1 \times 1300$  (4 x 10),  $1.1 \times 1250$  (4 x 12) psi,  $F_v = 90$  psi,  $E = 1.7 \times 10^6$  psi.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.



TABLE 15

**24F GLULAM EQUIVALENTS FOR 4X SOUTHERN PINE LUMBER  
FLOOR BEAMS**
**Designed According to the 1997 NDS  
(Load Duration Factor = 1.00)**

Span (ft)	Glulam Species	4 x 6 Southern Pine		4 x 8 Southern Pine		4 x 10 Southern Pine		4 x 12 Southern Pine	
		Select Struct.	No. 1	Select Struct.	No. 1	Select Struct.	No. 1	Select Struct.	No. 1
<b>24F Glulam Equivalent (in.)</b>									
10	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 9
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 9-5/8 3 x 8-1/4	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8
12	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 9	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 9-5/8	2-1/2 x 9-5/8 3 x 9-5/8	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 11
14	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 9	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 12 3-1/8 x 12	2-1/2 x 12 3-1/8 x 10-1/2
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8	2-1/2 x 12-3/8 3 x 11	2-1/2 x 12-3/8 3 x 11
16	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 13-1/2 3-1/8 x 12	2-1/2 x 12 3-1/8 x 12
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8	2-1/2 x 13-3/4 3 x 12-3/8	2-1/2 x 12-3/8 3 x 11
18	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 13-1/2 3-1/8 x 12	2-1/2 x 13-1/2 3-1/8 x 12
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8	2-1/2 x 13-3/4 3 x 12-3/8	2-1/2 x 12-3/8 3 x 12-3/8
20	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 13-1/2 3-1/8 x 12	2-1/2 x 13-1/2 3-1/8 x 12
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8	2-1/2 x 13-3/4 3 x 12-3/8	2-1/2 x 12-3/8 3 x 12-3/8
22	Douglas- fir	2-1/2 x 7-1/2 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 13-1/2 3-1/8 x 12	2-1/2 x 13-1/2 3-1/8 x 12
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8	2-1/2 x 13-3/4 3 x 12-3/8	2-1/2 x 12-3/8 3 x 12-3/8
24	Douglas- fir	2-1/2 x 6 3-1/8 x 6	2-1/2 x 6 3-1/8 x 6	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 9 3-1/8 x 7-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 10-1/2 3-1/8 x 10-1/2	2-1/2 x 13-1/2 3-1/8 x 12	2-1/2 x 13-1/2 3-1/8 x 12
	Southern Pine	2-1/2 x 6-7/8 3 x 6-7/8	2-1/2 x 6-7/8 3 x 5-1/2	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 8-1/4 3 x 8-1/4	2-1/2 x 11 3 x 11	2-1/2 x 11 3 x 9-5/8	2-1/2 x 13-3/4 3 x 12-3/8	2-1/2 x 12-3/8 3 x 12-3/8

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/360$  under live load, based on live/total load = 0.8.
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 2-1/2 x 6 and 3-1/8 x 6 (Douglas-fir), and 2-1/2 x 5-1/2 and 3 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 Select Structural sawn lumber members:  $F_b = 2550$  (4 x 6), 1.1 x 2300 (4 x 8), 1.1 x 2050 (4 x 10), 1.1 x 1900 (4 x 12) psi,  $F_v = 90$  psi,  $E = 1.8 \times 10^6$  psi.  
 No. 1 sawn lumber members:  $F_b = 1650$  (4 x 6), 1.1 x 1500 (4 x 8), 1.1 x 1300 (4 x 10), 1.1 x 1250 (4 x 12) psi,  $F_v = 90$  psi,  $E = 1.7 \times 10^6$  psi.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 16

**24F GLULAM EQUIVALENTS FOR 6X SOUTHERN PINE LUMBER  
ROOF BEAMS – NON-SNOW LOADS  
Designed According to the 1997 NDS  
(Load Duration Factor = 1.25)**

Span (ft)	Glulam Species	6 x 8 Southern Pine		6 x 10 Southern Pine		6 x 12 Southern Pine	
		Select Struct.	No. 1	Select Struct.	No. 1	Select Struct.	No. 1
<b>24F Glulam Equivalent (in.)</b>							
10	<i>Douglas-fir</i>	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 7-1/2	5-1/8 x 10-1/2	5-1/8 x 9
	<i>Southern Pine</i>	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 9-5/8	3 x 12-3/8	3 x 12-3/8
		5 x 6-7/8	5 x 6-7/8	5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8
12	<i>Douglas-fir</i>	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 10-1/2	5-1/8 x 9
	<i>Southern Pine</i>	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 9-5/8	3 x 12-3/8	3 x 12-3/8
		5 x 6-7/8	5 x 6-7/8	5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8
14	<i>Douglas-fir</i>	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 10-1/2	5-1/8 x 10-1/2
	<i>Southern Pine</i>	3 x 9-5/8	3 x 8-1/4	3 x 11	3 x 11	3 x 12-3/8	3 x 12-3/8
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 8-1/4	5 x 11	5 x 9-5/8
16	<i>Douglas-fir</i>	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 10-1/2	5-1/8 x 10-1/2
	<i>Southern Pine</i>	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 11	3 x 12-3/8	3 x 12-3/8
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
18	<i>Douglas-fir</i>	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 10-1/2	5-1/8 x 10-1/2
	<i>Southern Pine</i>	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 11	3 x 13-3/4	3 x 12-3/8
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
20	<i>Douglas-fir</i>	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 13-1/2
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 12	5-1/8 x 10-1/2
	<i>Southern Pine</i>	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 11	3 x 13-3/4	3 x 13-3/4
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
22	<i>Douglas-fir</i>	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 13-1/2
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 12	5-1/8 x 12
	<i>Southern Pine</i>	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 11	3 x 13-3/4	3 x 13-3/4
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
24	<i>Douglas-fir</i>	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 13-1/2
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 12	5-1/8 x 12
	<i>Southern Pine</i>	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 11	3 x 13-3/4	3 x 13-3/4
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11

TABLE 16 (CONTINUED)

**24F GLULAM EQUIVALENTS FOR 6X SOUTHERN PINE LUMBER**  
**ROOF BEAMS 150 – NON-SNOW LOADS**  
**Designed According to the 1997 NDS**  
**(Load Duration Factor = 1.25)**

Span (ft)	Glulam Species	6 x 14 Southern Pine		6 x 16 Southern Pine	
		Select Struct.	No. 1	Select Struct.	No. 1
24F Glulam Equivalent (in.)					
10	Douglas- fir	3-1/8 x 13-1/2	3-1/8 x 13-1/2	3-1/8 x 15	3-1/8 x 15
		5-1/8 x 10-1/2	5-1/8 x 10-1/2	5-1/8 x 12	5-1/8 x 12
	Southern Pine	3 x 13-3/4	3 x 13-3/4	3 x 15-1/8	3 x 15-1/8
		5 x 11	5 x 11	5 x 12-3/8	5 x 12-3/8
12	Douglas- fir	3-1/8 x 15	3-1/8 x 13-1/2	3-1/8 x 15	3-1/8 x 15
		5-1/8 x 12	5-1/8 x 10-1/2	5-1/8 x 13-1/2	5-1/8 x 12
	Southern Pine	3 x 15-1/8	3 x 13-3/4	3 x 16-1/2	3 x 16-1/2
		5 x 11	5 x 11	5 x 12-3/8	5 x 12-3/8
14	Douglas- fir	3-1/8 x 15	3-1/8 x 13-1/2	3-1/8 x 16-1/2	3-1/8 x 15
		5-1/8 x 12	5-1/8 x 10-1/2	5-1/8 x 13-1/2	5-1/8 x 12
	Southern Pine	3 x 15-1/8	3 x 13-3/4	3 x 16-1/2	3 x 16-1/2
		5 x 11	5 x 11	5 x 13-3/4	5 x 12-3/8
16	Douglas- fir	3-1/8 x 15	3-1/8 x 13-1/2	3-1/8 x 16-1/2	3-1/8 x 15
		5-1/8 x 12	5-1/8 x 12	5-1/8 x 13-1/2	5-1/8 x 12
	Southern Pine	3 x 15-1/8	3 x 13-3/4	3 x 16-1/2	3 x 16-1/2
		5 x 12-3/8	5 x 11	5 x 13-3/4	5 x 12-3/8
18	Douglas- fir	3-1/8 x 15	3-1/8 x 13-1/2	3-1/8 x 16-1/2	3-1/8 x 15
		5-1/8 x 12	5-1/8 x 12	5-1/8 x 13-1/2	5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8	3 x 13-3/4	3 x 16-1/2	3 x 16-1/2
		5 x 12-3/8	5 x 12-3/8	5 x 13-3/4	5 x 12-3/8
20	Douglas- fir	3-1/8 x 15	3-1/8 x 15	3-1/8 x 16-1/2	3-1/8 x 15
		5-1/8 x 12	5-1/8 x 12	5-1/8 x 13-1/2	5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8	3 x 15-1/8	3 x 16-1/2	3 x 16-1/2
		5 x 12-3/8	5 x 12-3/8	5 x 13-3/4	5 x 13-3/4
22	Douglas- fir	3-1/8 x 15	3-1/8 x 15	3-1/8 x 16-1/2	3-1/8 x 16-1/2
		5-1/8 x 13-1/2	5-1/8 x 12	5-1/8 x 15	5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8	3 x 15-1/8	3 x 16-1/2	3 x 16-1/2
		5 x 13-3/4	5 x 12-3/8	5 x 13-3/4	5 x 13-3/4
24	Douglas- fir	3-1/8 x 15	3-1/8 x 15	3-1/8 x 16-1/2	3-1/8 x 16-1/2
		5-1/8 x 13-1/2	5-1/8 x 13-1/2	5-1/8 x 15	5-1/8 x 13-1/2
	Southern Pine	3 x 16-1/2	3 x 15-1/8	3 x 17-7/8	3 x 16-1/2
		5 x 13-3/4	5 x 13-3/4	5 x 15-1/8	5 x 13-3/4

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/180$  under total load. Deflection under non-snow load must be verified when non-snow/total load  $> 3/4$ .
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 3-1/8 x 6 and 5-1/8 x 6 (*Douglas-fir*), and 3 x 5-1/2 and 5 x 5-1/2 (*Southern Pine*).
- (6) Design properties at normal load duration and dry-use service conditions –  
 Select Structural sawn lumber members:  $F_b = C_F \times 1500$  psi,  $F_v = 110$  psi,  $E = 1.5 \times 10^6$  psi,  
 where  $C_F$  = size factor per 1997 NDS.  
 No. 1 sawn lumber members:  $F_b = C_F \times 1350$  psi,  $F_v = 110$  psi,  $E = 1.5 \times 10^6$  psi,  
 where  $C_F$  = size factor per 1997 NDS.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (*Douglas-fir*) or 270 psi (*Southern Pine*),  
 $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 17

**24F GLULAM EQUIVALENTS FOR 6X SOUTHERN PINE LUMBER****ROOF BEAMS – SNOW LOADS**

Designed According to the 1997 NDS

(Load Duration Factor = 1.15)

Span (ft)	Glulam Species	6 x 8 Southern Pine		6 x 10 Southern Pine		6 x 12 Southern Pine	
		Select Struct.	No. 1	Select Struct.	No. 1	Select Struct.	No. 1
<b>24F Glulam Equivalent (in.)</b>							
10	Douglas- fir	3-1/8 x 9	3-1/8 x 7-1/2	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 7-1/2	5-1/8 x 10-1/2	5-1/8 x 9
	Southern Pine	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 9-5/8	3 x 12-3/8	3 x 12-3/8
		5 x 6-7/8	5 x 6-7/8	5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8
12	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 10-1/2	5-1/8 x 9
	Southern Pine	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 9-5/8	3 x 12-3/8	3 x 12-3/8
		5 x 6-7/8	5 x 6-7/8	5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8
14	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 10-1/2	5-1/8 x 10-1/2
	Southern Pine	3 x 9-5/8	3 x 8-1/4	3 x 11	3 x 9-5/8	3 x 12-3/8	3 x 12-3/8
		5 x 8-1/4	5 x 6-7/8	5 x 9-5/8	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8
16	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 10-1/2	5-1/8 x 10-1/2
	Southern Pine	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 11	3 x 12-3/8	3 x 12-3/8
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 9-5/8
18	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 10-1/2	5-1/8 x 10-1/2
	Southern Pine	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 11	3 x 12-3/8	3 x 12-3/8
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
20	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 12	5-1/8 x 10-1/2
	Southern Pine	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 11	3 x 13-3/4	3 x 12-3/8
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
22	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 13-1/2
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 12	5-1/8 x 10-1/2
	Southern Pine	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 11	3 x 13-3/4	3 x 13-3/4
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
24	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 13-1/2
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 12	5-1/8 x 12
	Southern Pine	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 11	3 x 13-3/4	3 x 13-3/4
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11

TABLE 17 (CONTINUED)

**24F GLULAM EQUIVALENTS FOR 6X SOUTHERN PINE LUMBER****ROOF BEAMS – SNOW LOADS**

Designed According to the 1997 NDS

(Load Duration Factor = 1.15)

Span (ft)	Glulam Species	6 x 14 Southern Pine		6 x 16 Southern Pine	
		Select Struct.	No. 1	Select Struct.	No. 1
24F Glulam Equivalent (in.)					
10	Douglas- fir	3-1/8 x 13	3-1/8 x 13-1/2	3-1/8 x 15	3-1/8 x 15
		5-1/8 x 10-1/2	5-1/8 x 10-1/2	5-1/8 x 12	5-1/8 x 12
	Southern Pine	3 x 13-3/4	3 x 13-3/4	3 x 15-1/8	3 x 15-1/8
		5 x 11	5 x 11	5 x 12-3/8	5 x 12-3/8
12	Douglas- fir	3-1/8 x 15	3-1/8 x 13-1/2	3-1/8 x 15	3-1/8 x 15
		5-1/8 x 12	5-1/8 x 10-1/2	5-1/8 x 13-1/2	5-1/8 x 12
	Southern Pine	3 x 15-1/8	3 x 13-3/4	3 x 16-1/2	3 x 16-1/2
		5 x 11	5 x 11	5 x 12-3/8	5 x 12-3/8
14	Douglas- fir	3-1/8 x 15	3-1/8 x 13-1/2	3-1/8 x 16-1/2	3-1/8 x 15
		5-1/8 x 12	5-1/8 x 10-1/2	5-1/8 x 13-1/2	5-1/8 x 12
	Southern Pine	3 x 15-1/8	3 x 13-3/4	3 x 16-1/2	3 x 16-1/2
		5 x 11	5 x 11	5 x 13-3/4	5 x 12-3/8
16	Douglas- fir	3-1/8 x 15	3-1/8 x 13-1/2	3-1/8 x 16-1/2	3-1/8 x 15
		5-1/8 x 12	5-1/8 x 10-1/2	5-1/8 x 13-1/2	5-1/8 x 12
	Southern Pine	3 x 15-1/8	3 x 13-3/4	3 x 16-1/2	3 x 16-1/2
		5 x 11	5 x 11	5 x 13-3/4	5 x 12-3/8
18	Douglas- fir	3-1/8 x 15	3-1/8 x 13-1/2	3-1/8 x 16-1/2	3-1/8 x 15
		5-1/8 x 12	5-1/8 x 12	5-1/8 x 13-1/2	5-1/8 x 12
	Southern Pine	3 x 15-1/8	3 x 13-3/4	3 x 16-1/2	3 x 16-1/2
		5 x 12-3/8	5 x 11	5 x 13-3/4	5 x 12-3/8
20	Douglas- fir	3-1/8 x 15	3-1/8 x 13-1/2	3-1/8 x 16-1/2	3-1/8 x 15
		5-1/8 x 12	5-1/8 x 12	5-1/8 x 13-1/2	5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8	3 x 13-3/4	3 x 16-1/2	3 x 16-1/2
		5 x 12-3/8	5 x 12-3/8	5 x 13-3/4	5 x 13-3/4
22	Douglas- fir	3-1/8 x 15	3-1/8 x 15	3-1/8 x 16-1/2	3-1/8 x 15
		5-1/8 x 13-1/2	5-1/8 x 12	5-1/8 x 13-1/2	5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8	3 x 15-1/8	3 x 16-1/2	3 x 16-1/2
		5 x 12-3/8	5 x 12-3/8	5 x 13-3/4	5 x 13-3/4
24	Douglas- fir	3-1/8 x 15	3-1/8 x 15	3-1/8 x 16-1/2	3-1/8 x 16-1/2
		5-1/8 x 13-1/2	5-1/8 x 12	5-1/8 x 15	5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8	3 x 15-1/8	3 x 16-1/2	3 x 16-1/2
		5 x 13-3/4	5 x 12-3/8	5 x 13-3/4	5 x 13-3/4

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/180$  under total load. Deflection under snow load must be verified when snow/total load > 3/4.
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 3-1/8 x 6 and 5-1/8 x 6 (Douglas-fir), and 3 x 5-1/2 and 5 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 Select Structural sawn lumber members:  $F_b = C_F \times 1500$  psi,  $F_v = 110$  psi,  $E = 1.5 \times 10^6$  psi,  
 where  $C_F$  = size factor per 1997 NDS.  
 No. 1 sawn lumber members:  $F_b = C_F \times 1350$  psi,  $F_v = 110$  psi,  $E = 1.5 \times 10^6$  psi,  
 where  $C_F$  = size factor per 1997 NDS.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  
 $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 18

**24F GLULAM EQUIVALENTS FOR 6X SOUTHERN PINE LUMBER  
FLOOR BEAMS**

Designed According to the 1997 NDS  
(Load Duration Factor = 1.00)

Span (ft)	Glulam Species	6 x 8 Southern Pine		6 x 10 Southern Pine		6 x 12 Southern Pine	
		Select Struct.	No. 1	Select Struct.	No. 1	Select Struct.	No. 1
<b>24F Glulam Equivalent (in.)</b>							
10	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 10-1/2	5-1/8 x 10-1/2
	Southern Pine	3 x 9-5/8	3 x 8-1/4	3 x 11	3 x 9-5/8	3 x 12-3/8	3 x 12-3/8
		5 x 8-1/4	5 x 6-7/8	5 x 9-5/8	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8
12	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 12	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 10-1/2	5-1/8 x 10-1/2
	Southern Pine	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 11	3 x 12-3/8	3 x 12-3/8
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
14	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 12
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 10-1/2	5-1/8 x 10-1/2
	Southern Pine	3 x 9-5/8	3 x 9-5/8	3 x 11	3 x 11	3 x 13-3/4	3 x 12-3/8
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
16	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 13-1/2
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 12	5-1/8 x 12
	Southern Pine	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 11	3 x 13-3/4	3 x 13-3/4
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
18	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 13-1/2
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 12	5-1/8 x 12
	Southern Pine	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 11	3 x 13-3/4	3 x 13-3/4
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
20	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 13-1/2
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 12	5-1/8 x 12
	Southern Pine	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 11	3 x 13-3/4	3 x 13-3/4
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
22	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 13-1/2
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 12	5-1/8 x 12
	Southern Pine	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 11	3 x 13-3/4	3 x 13-3/4
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11
24	Douglas- fir	3-1/8 x 9	3-1/8 x 9	3-1/8 x 10-1/2	3-1/8 x 10-1/2	3-1/8 x 13-1/2	3-1/8 x 13-1/2
		5-1/8 x 7-1/2	5-1/8 x 7-1/2	5-1/8 x 9	5-1/8 x 9	5-1/8 x 12	5-1/8 x 12
	Southern Pine	3 x 8-1/4	3 x 8-1/4	3 x 11	3 x 11	3 x 13-3/4	3 x 13-3/4
		5 x 8-1/4	5 x 8-1/4	5 x 9-5/8	5 x 9-5/8	5 x 11	5 x 11

TABLE 18 (CONTINUED)

**24F GLULAM EQUIVALENTS FOR 6X SOUTHERN PINE LUMBER  
FLOOR BEAMS**
**Designed According to the 1997 NDS  
(Load Duration Factor = 1.00)**

Span (ft)	Glulam Species	6 x 14 Southern Pine		6 x 16 Southern Pine	
		Select Struct.	No. 1	Select Struct.	No. 1
24F Glulam Equivalent (in.)					
10	Douglas- fir	3-1/8 x 13-1/2	3-1/8 x 13-1/2	3-1/8 x 15	3-1/8 x 15
		5-1/8 x 10-1/2	5-1/8 x 10-1/2	5-1/8 x 12	5-1/8 x 12
	Southern Pine	3 x 13-3/4	3 x 13-3/4	3 x 15-1/8	3 x 15-1/8
		5 x 11	5 x 11	5 x 12-3/8	5 x 12-3/8
12	Douglas- fir	3-1/8 x 15	3-1/8 x 13-1/2	3-1/8 x 15	3-1/8 x 15
		5-1/8 x 12	5-1/8 x 12	5-1/8 x 12	5-1/8 x 12
	Southern Pine	3 x 15-1/8	3 x 13-3/4	3 x 16-1/2	3 x 16-1/2
		5 x 12-3/8	5 x 11	5 x 12-3/8	5 x 12-3/8
14	Douglas- fir	3-1/8 x 15	3-1/8 x 13-1/2	3-1/8 x 16-1/2	3-1/8 x 15
		5-1/8 x 12	5-1/8 x 12	5-1/8 x 13-1/2	5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8	3 x 13-3/4	3 x 16-1/2	3 x 16-1/2
		5 x 12-3/8	5 x 12-3/8	5 x 13-3/4	5 x 12-3/8
16	Douglas- fir	3-1/8 x 15	3-1/8 x 15	3-1/8 x 16-1/2	3-1/8 x 16-1/2
		5-1/8 x 13-1/2	5-1/8 x 12	5-1/8 x 13-1/2	5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8	3 x 15-1/8	3 x 16-1/2	3 x 16-1/2
		5 x 12-3/8	5 x 12-3/8	5 x 13-3/4	5 x 13-3/4
18	Douglas- fir	3-1/8 x 15	3-1/8 x 15	3-1/8 x 16-1/2	3-1/8 x 16-1/2
		5-1/8 x 13-1/2	5-1/8 x 13-1/2	5-1/8 x 15	5-1/8 x 13-1/2
	Southern Pine	3 x 15-1/8	3 x 15-1/8	3 x 16-1/2	3 x 16-1/2
		5 x 13-3/4	5 x 12-3/8	5 x 15-1/8	5 x 13-3/4
20	Douglas- fir	3-1/8 x 15	3-1/8 x 15	3-1/8 x 18	3-1/8 x 16-1/2
		5-1/8 x 13-1/2	5-1/8 x 13-1/2	5-1/8 x 15	5-1/8 x 15
	Southern Pine	3 x 16-1/2	3 x 15-1/8	3 x 17-7/8	3 x 16-1/2
		5 x 13-3/4	5 x 13-3/4	5 x 15-1/8	5 x 15-1/8
22	Douglas- fir	3-1/8 x 15	3-1/8 x 15	3-1/8 x 18	3-1/8 x 18
		5-1/8 x 13-1/2	5-1/8 x 13-1/2	5-1/8 x 15	5-1/8 x 15
	Southern Pine	3 x 16-1/2	3 x 16-1/2	3 x 17-7/8	3 x 17-7/8
		5 x 13-3/4	5 x 13-3/4	5 x 15-1/8	5 x 15-1/8
24	Douglas- fir	3-1/8 x 15	3-1/8 x 15	3-1/8 x 18	3-1/8 x 18
		5-1/8 x 13-1/2	5-1/8 x 13-1/2	5-1/8 x 15	5-1/8 x 15
	Southern Pine	3 x 15-1/8	3 x 15-1/8	3 x 17-7/8	3 x 17-7/8
		5 x 13-3/4	5 x 13-3/4	5 x 15-1/8	5 x 15-1/8

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/360$  under live load, based on live/total load = 0.8.
- (3) Service condition = dry.
- (4) Beam weights for sawn and glulam members are assumed to be the same.
- (5) Minimum glulam sizes considered in the table are: 3-1/8 x 6 and 5-1/8 x 6 (Douglas-fir), and 3 x 5-1/2 and 5 x 5-1/2 (Southern Pine).
- (6) Design properties at normal load duration and dry-use service conditions –  
 Select Structural sawn lumber members:  $F_b = C_F \times 1500$  psi,  $F_v = 110$  psi,  $E = 1.5 \times 10^6$  psi,  
 where  $C_F$  = size factor per 1997 NDS.  
 No. 1 sawn lumber members:  $F_b = C_F \times 1350$  psi,  $F_v = 110$  psi,  $E = 1.5 \times 10^6$  psi,  
 where  $C_F$  = size factor per 1997 NDS.  
 Glulam members:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi (Douglas-fir) or 270 psi (Southern Pine),  
 $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.





TABLE 19 (CONTINUED)

**24F DOUGLAS-FIR GLULAM EQUIVALENTS FOR STEEL  
ROOF BEAMS – NON-SNOW LOADS**  
(Load Duration Factor for Glulam = 1.25)

Span (ft)	W12x22	W14x22	W12x26	W14x26	W16x26	W12x30
	24F Douglas-fir Glulam Equivalent (in.)					
10	3-1/8 x 21 5-1/8 x 16-1/2	3-1/8 x 24 5-1/8 x 16-1/2	3-1/8 x 25-1/2 5-1/8 x 19-1/2	3-1/8 x 27 5-1/8 x 19-1/2	3-1/8 x 27 5-1/8 x 21	3-1/8 x 27 5-1/8 x 21
12	3-1/8 x 21 5-1/8 x 16-1/2	3-1/8 x 22-1/2 5-1/8 x 16-1/2	3-1/8 x 24 5-1/8 x 18	3-1/8 x 25-1/2 5-1/8 x 19-1/2	3-1/8 x 27 5-1/8 x 19-1/2	3-1/8 x 27 5-1/8 x 19-1/2
14	3-1/8 x 21 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 16-1/2	3-1/8 x 22-1/2 5-1/8 x 18	3-1/8 x 24 5-1/8 x 19-1/2	3-1/8 x 25-1/2 5-1/8 x 19-1/2	3-1/8 x 25-1/2 5-1/8 x 19-1/2
16	3-1/8 x 21 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 16-1/2	3-1/8 x 22-1/2 5-1/8 x 18	3-1/8 x 24 5-1/8 x 19-1/2	3-1/8 x 25-1/2 5-1/8 x 19-1/2	3-1/8 x 25-1/2 5-1/8 x 19-1/2
18	3-1/8 x 21 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 18	3-1/8 x 22-1/2 5-1/8 x 18	3-1/8 x 24 5-1/8 x 19-1/2	3-1/8 x 25-1/2 5-1/8 x 19-1/2	3-1/8 x 25-1/2 5-1/8 x 19-1/2
20	3-1/8 x 21 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 18	3-1/8 x 24 5-1/8 x 18	3-1/8 x 24 5-1/8 x 19-1/2	3-1/8 x 25-1/2 5-1/8 x 19-1/2	3-1/8 x 25-1/2 5-1/8 x 19-1/2
22	3-1/8 x 21 5-1/8 x 16-1/2	3-1/8 x 22-1/2 5-1/8 x 18	3-1/8 x 24 5-1/8 x 18	3-1/8 x 24 5-1/8 x 19-1/2	3-1/8 x 25-1/2 5-1/8 x 19-1/2	3-1/8 x 25-1/2 5-1/8 x 19-1/2
24	3-1/8 x 21 5-1/8 x 16-1/2	3-1/8 x 22-1/2 5-1/8 x 18	3-1/8 x 24 5-1/8 x 19-1/2	3-1/8 x 24 5-1/8 x 19-1/2	3-1/8 x 25-1/2 5-1/8 x 19-1/2	3-1/8 x 25-1/2 5-1/8 x 19-1/2
26	3-1/8 x 21 5-1/8 x 18	3-1/8 x 22-1/2 5-1/8 x 18	3-1/8 x 24 5-1/8 x 19-1/2	3-1/8 x 24 5-1/8 x 19-1/2	3-1/8 x 25-1/2 5-1/8 x 21	3-1/8 x 25-1/2 5-1/8 x 21
28	3-1/8 x 21 5-1/8 x 18	3-1/8 x 22-1/2 5-1/8 x 18	3-1/8 x 24 5-1/8 x 19-1/2	3-1/8 x 24 5-1/8 x 19-1/2	3-1/8 x 25-1/2 5-1/8 x 21	3-1/8 x 25-1/2 5-1/8 x 21
30	3-1/8 x 21 5-1/8 x 18	3-1/8 x 22-1/2 5-1/8 x 19-1/2	3-1/8 x 24 5-1/8 x 19-1/2	3-1/8 x 24 5-1/8 x 19-1/2	3-1/8 x 25-1/2 5-1/8 x 21	3-1/8 x 25-1/2 5-1/8 x 21
32	3-1/8 x 21 5-1/8 x 18	3-1/8 x 22-1/2 5-1/8 x 19-1/2	3-1/8 x 24 5-1/8 x 19-1/2	3-1/8 x 24 5-1/8 x 21	3-1/8 x 25-1/2 5-1/8 x 21	3-1/8 x 25-1/2 5-1/8 x 21
34	3-1/8 x 22-1/2 5-1/8 x 19-1/2	3-1/8 x 22-1/2 5-1/8 x 19-1/2	3-1/8 x 24 5-1/8 x 21	3-1/8 x 24 5-1/8 x 21	3-1/8 x 25-1/2 5-1/8 x 21	3-1/8 x 25-1/2 5-1/8 x 21
36	3-1/8 x 22-1/2 5-1/8 x 19-1/2	3-1/8 x 24 5-1/8 x 19-1/2	3-1/8 x 24 5-1/8 x 21	3-1/8 x 25-1/2 5-1/8 x 21	3-1/8 x 25-1/2 5-1/8 x 22-1/2	3-1/8 x 25-1/2 5-1/8 x 21
38	3-1/8 x 22-1/2 5-1/8 x 19-1/2	3-1/8 x 24 5-1/8 x 21	3-1/8 x 24 5-1/8 x 21	3-1/8 x 25-1/2 5-1/8 x 21	3-1/8 x 25-1/2 5-1/8 x 22-1/2	3-1/8 x 25-1/2 5-1/8 x 21
40	3-1/8 x 22-1/2 5-1/8 x 19-1/2	3-1/8 x 24 5-1/8 x 21	3-1/8 x 24 5-1/8 x 21	3-1/8 x 25-1/2 5-1/8 x 21	3-1/8 x 27 5-1/8 x 22-1/2	3-1/8 x 25-1/2 5-1/8 x 21

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/180$  under total load. Deflection under non-snow load must be verified when non-snow/total load > 3/4.
- (3) Service condition for glulam members = dry.
- (4) Beam weights for steel and glulam members (assumed 35 pcf) are included.
- (5) Minimum glulam sizes considered in the table are: 3-1/8 x 6 and 5-1/8 x 6.
- (6) Design properties for steel members:  $F_b = 0.66 \times 36$  ksi,  $F_v = 0.4 \times 36$  ksi,  $E = 29 \times 10^6$  psi.
- (7) Design properties for glulam members at normal load duration and dry-use service conditions:  
 $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi,  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 20

**24F SOUTHERN PINE GLULAM EQUIVALENTS FOR STEEL  
ROOF BEAMS – NON-SNOW LOADS  
(Load Duration Factor for Glulam = 1.25)**

Span (ft)	W6x9	W8x10	W12x14	W12x16	W12x19	W10x22
	24F Southern Pine Glulam Equivalent (in.)					
10	3 x 9-5/8 5 x 8-1/4	3 x 12-3/8 5 x 9-5/8	3 x 16-1/2 5 x 12-3/8	3 x 16-1/2 5 x 13-3/4	3 x 19-1/4 5 x 15-1/8	3 x 19-1/4 5 x 15-1/8
12	3 x 9-5/8 5 x 8-1/4	3 x 12-3/8 5 x 9-5/8	3 x 16-1/2 5 x 12-3/8	3 x 16-1/2 5 x 13-3/4	3 x 19-1/4 5 x 15-1/8	3 x 19-1/4 5 x 15-1/8
14	3 x 11 5 x 8-1/4	3 x 12-3/8 5 x 9-5/8	3 x 16-1/2 5 x 12-3/8	3 x 16-1/2 5 x 13-3/4	3 x 19-1/4 5 x 15-1/8	3 x 19-1/4 5 x 15-1/8
16	3 x 11 5 x 9-5/8	3 x 12-3/8 5 x 11	3 x 16-1/2 5 x 12-3/8	3 x 16-1/2 5 x 13-3/4	3 x 19-1/4 5 x 15-1/8	3 x 19-1/4 5 x 15-1/8
18	3 x 11 5 x 9-5/8	3 x 12-3/8 5 x 11	3 x 16-1/2 5 x 13-3/4	3 x 16-1/2 5 x 13-3/4	3 x 19-1/4 5 x 15-1/8	3 x 19-1/4 5 x 15-1/8
20	3 x 11 5 x 9-5/8	3 x 12-3/8 5 x 11	3 x 16-1/2 5 x 13-3/4	3 x 16-1/2 5 x 13-3/4	3 x 19-1/4 5 x 15-1/8	3 x 19-1/4 5 x 15-1/8
22	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 16-1/2 5 x 13-3/4	3 x 16-1/2 5 x 15-1/8	3 x 19-1/4 5 x 15-1/8	3 x 19-1/4 5 x 16-1/2
24	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 16-1/2 5 x 13-3/4	3 x 17-7/8 5 x 15-1/8	3 x 19-1/4 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2
26	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 15-1/8	3 x 17-7/8 5 x 15-1/8	3 x 19-1/4 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2
28	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 15-1/8	3 x 17-7/8 5 x 15-1/8	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8
30	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 15-1/8	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
32	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 15-1/8	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
34	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
36	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
38	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
40	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8

TABLE 20 (CONTINUED)

**24F SOUTHERN PINE GLULAM EQUIVALENTS FOR STEEL  
ROOF BEAMS – NON-SNOW LOADS  
(Load Duration Factor for Glulam = 1.25)**

Span (ft)	W12x22	W14x22	W12x26	W14x26	W16x26	W12x30
	24F Southern Pine Glulam Equivalent (in.)					
10	3 x 20-5/8 5 x 16-1/2	3 x 22 5 x 17-7/8	3 x 24-3/4 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 19-1/4	3 x 26-1/8 5 x 19-1/4
12	3 x 20-5/8 5 x 16-1/2	3 x 22 5 x 17-7/8	3 x 23-3/8 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4
14	3 x 20-5/8 5 x 16-1/2	3 x 22 5 x 17-7/8	3 x 23-3/8 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4
16	3 x 20-5/8 5 x 16-1/2	3 x 22 5 x 17-7/8	3 x 23-3/8 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4
18	3 x 20-5/8 5 x 16-1/2	3 x 22 5 x 17-7/8	3 x 23-3/8 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 20-5/8
20	3 x 20-5/8 5 x 16-1/2	3 x 22 5 x 17-7/8	3 x 23-3/8 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 20-5/8	3 x 24-3/4 5 x 20-5/8
22	3 x 20-5/8 5 x 16-1/2	3 x 22 5 x 17-7/8	3 x 23-3/8 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
24	3 x 20-5/8 5 x 16-1/2	3 x 22 5 x 17-7/8	3 x 23-3/8 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
26	3 x 20-5/8 5 x 17-7/8	3 x 22 5 x 17-7/8	3 x 23-3/8 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
28	3 x 20-5/8 5 x 17-7/8	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
30	3 x 22 5 x 17-7/8	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 19-1/4	3 x 24-3/4 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
32	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 19-1/4	3 x 23-3/8 5 x 20-5/8	3 x 24-3/4 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
34	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 19-1/4	3 x 24-3/4 5 x 20-5/8	3 x 24-3/4 5 x 20-5/8	3 x 26-1/8 5 x 22	3 x 24-3/4 5 x 22
36	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 20-5/8	3 x 24-3/4 5 x 20-5/8	3 x 24-3/4 5 x 22	3 x 26-1/8 5 x 22	3 x 24-3/4 5 x 22
38	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 20-5/8	3 x 23-3/8 5 x 20-5/8	3 x 26-1/8 5 x 22	3 x 26-1/8 5 x 22	3 x 24-3/4 5 x 22
40	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 20-5/8	3 x 23-3/8 5 x 20-5/8	3 x 26-1/8 5 x 22	3 x 27-1/2 5 x 23-3/8	3 x 24-3/4 5 x 22

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/180$  under total load. Deflection under non-snow load must be verified when non-snow/total load > 3/4.
- (3) Service condition for glulam members = dry.
- (4) Beam weights for steel and glulam members (assumed 36 pcf) are included.
- (5) Minimum glulam sizes considered in the table are: 3 x 5-1/2 and 5 x 5-1/2.
- (6) Design properties for steel members:  $F_b = 0.66 \times 36$  ksi,  $F_v = 0.4 \times 36$  ksi,  $E = 29 \times 10^6$  psi.
- (7) Design properties for glulam members at normal load duration and dry-use service conditions:  
 $F_b = C_v \times 2400$  psi,  $F_v = 270$  psi,  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.



TABLE 21 (CONTINUED)

**24F DOUGLAS-FIR GLULAM EQUIVALENTS FOR STEEL  
ROOF BEAMS – SNOW LOADS**  
(Load Duration Factor for Glulam = 1.15)

Span (ft)	W12x22	W14x22	W12x26	W14x26	W16x26	W12x30
	24F Douglas-fir Glulam Equivalent (in.)					
10	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 27	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 28-1/2
	5-1/8 x 16-1/2	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2
12	3-1/8 x 21	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 28-1/2
	5-1/8 x 16-1/2	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21
14	3-1/8 x 21	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 27
	5-1/8 x 16-1/2	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21
16	3-1/8 x 21	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 25-1/2	3-1/8 x 25-1/2
	5-1/8 x 16-1/2	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21
18	3-1/8 x 21	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 25-1/2	3-1/8 x 25-1/2
	5-1/8 x 16-1/2	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21
20	3-1/8 x 21	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 25-1/2	3-1/8 x 25-1/2
	5-1/8 x 16-1/2	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21
22	3-1/8 x 21	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 27
	5-1/8 x 16-1/2	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21
24	3-1/8 x 21	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 27
	5-1/8 x 16-1/2	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21
26	3-1/8 x 21	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 27
	5-1/8 x 18	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21
28	3-1/8 x 21	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 27
	5-1/8 x 18	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21
30	3-1/8 x 21	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 27
	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21
32	3-1/8 x 21	3-1/8 x 22-1/2	3-1/8 x 25-1/2	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 27
	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21
34	3-1/8 x 22-1/2	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 27
	5-1/8 x 19-1/2	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21
36	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 25-1/2
	5-1/8 x 19-1/2	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 21
38	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 25-1/2
	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 21
40	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 25-1/2
	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 21

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/180$  under total load. Deflection under snow load must be verified when snow/total load > 3/4.
- (3) Service condition for glulam members = dry.
- (4) Beam weights for steel and glulam members (assumed 35 pcf) are included.
- (5) Minimum glulam sizes considered in the table are: 3-1/8 x 6 and 5-1/8 x 6.
- (6) Design properties for steel members:  $F_b = 0.66 \times 36$  ksi,  $F_v = 0.4 \times 36$  ksi,  $E = 29 \times 10^6$  psi.
- (7) Design properties for glulam members at normal load duration and dry-use service conditions:  
 $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi,  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 22

**24F SOUTHERN PINE GLULAM EQUIVALENTS FOR STEEL  
ROOF BEAMS – SNOW LOADS**

(Load Duration Factor for Glulam = 1.15)

Span (ft)	W6x9	W8x10	W12x14	W12x16	W12x19	W10x22
	24F Southern Pine Glulam Equivalent (in.)					
10	3 x 11 5 x 8-1/4	3 x 12-3/8 5 x 9-5/8	3 x 16-1/2 5 x 13-3/4	3 x 17-7/8 5 x 13-3/4	3 x 19-1/4 5 x 15-1/8	3 x 20-5/8 5 x 16-1/2
12	3 x 11 5 x 8-1/4	3 x 12-3/8 5 x 9-5/8	3 x 16-1/2 5 x 13-3/4	3 x 17-7/8 5 x 13-3/4	3 x 19-1/4 5 x 15-1/8	3 x 20-5/8 5 x 16-1/2
14	3 x 11 5 x 8-1/4	3 x 12-3/8 5 x 9-5/8	3 x 16-1/2 5 x 13-3/4	3 x 17-7/8 5 x 13-3/4	3 x 19-1/4 5 x 15-1/8	3 x 20-5/8 5 x 16-1/2
16	3 x 11 5 x 9-5/8	3 x 12-3/8 5 x 11	3 x 16-1/2 5 x 13-3/4	3 x 17-7/8 5 x 13-3/4	3 x 19-1/4 5 x 15-1/8	3 x 20-5/8 5 x 16-1/2
18	3 x 11 5 x 9-5/8	3 x 12-3/8 5 x 11	3 x 16-1/2 5 x 13-3/4	3 x 17-7/8 5 x 13-3/4	3 x 19-1/4 5 x 15-1/8	3 x 20-5/8 5 x 16-1/2
20	3 x 11 5 x 9-5/8	3 x 12-3/8 5 x 11	3 x 16-1/2 5 x 13-3/4	3 x 17-7/8 5 x 13-3/4	3 x 19-1/4 5 x 15-1/8	3 x 20-5/8 5 x 16-1/2
22	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 16-1/2 5 x 13-3/4	3 x 17-7/8 5 x 15-1/8	3 x 19-1/4 5 x 15-1/8	3 x 20-5/8 5 x 16-1/2
24	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 16-1/2 5 x 13-3/4	3 x 17-7/8 5 x 15-1/8	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 16-1/2
26	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 15-1/8	3 x 17-7/8 5 x 15-1/8	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 16-1/2
28	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 15-1/8	3 x 17-7/8 5 x 15-1/8	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8
30	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 15-1/8	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
32	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 15-1/8	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
34	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
36	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
38	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
40	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8

TABLE 22 (CONTINUED)

**24F SOUTHERN PINE GLULAM EQUIVALENTS FOR STEEL  
ROOF BEAMS – SNOW LOADS  
(Load Duration Factor for Glulam = 1.15)**

Span (ft)	W12x22	W14x22	W12x26	W14x26	W16x26	W12x30
	24F Southern Pine Glulam Equivalent (in.)					
10	3 x 22 5 x 16-1/2	3 x 23-3/8 5 x 17-7/8	3 x 26-1/8 5 x 19-1/4	3 x 26-1/8 5 x 19-1/4	3 x 27-1/2 5 x 20-5/8	3 x 27-1/2 5 x 20-5/8
12	3 x 22 5 x 16-1/2	3 x 23-3/8 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
14	3 x 22 5 x 16-1/2	3 x 23-3/8 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
16	3 x 22 5 x 16-1/2	3 x 23-3/8 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
18	3 x 22 5 x 16-1/2	3 x 23-3/8 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
20	3 x 22 5 x 16-1/2	3 x 23-3/8 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
22	3 x 22 5 x 16-1/2	3 x 23-3/8 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 24-3/4 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
24	3 x 22 5 x 16-1/2	3 x 23-3/8 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
26	3 x 22 5 x 17-7/8	3 x 23-3/8 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
28	3 x 22 5 x 17-7/8	3 x 23-3/8 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
30	3 x 22 5 x 17-7/8	3 x 23-3/8 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
32	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 19-1/4	3 x 24-3/4 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8
34	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 19-1/4	3 x 24-3/4 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8	3 x 26-1/8 5 x 22	3 x 26-1/8 5 x 22
36	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 20-5/8	3 x 24-3/4 5 x 20-5/8	3 x 26-1/8 5 x 22	3 x 26-1/8 5 x 22	3 x 26-1/8 5 x 22
38	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 20-5/8	3 x 23-3/8 5 x 20-5/8	3 x 26-1/8 5 x 22	3 x 26-1/8 5 x 22	3 x 24-3/4 5 x 22
40	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 20-5/8	3 x 23-3/8 5 x 20-5/8	3 x 26-1/8 5 x 22	3 x 27-1/2 5 x 23-3/8	3 x 24-3/4 5 x 22

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/180$  under total load. Deflection under snow load must be verified when snow/total load > 3/4.
- (3) Service condition for glulam members = dry.
- (4) Beam weights for steel and glulam members (assumed 36 pcf) are included.
- (5) Minimum glulam sizes considered in the table are: 3 x 5-1/2 and 5 x 5-1/2.
- (6) Design properties for steel members:  $F_b = 0.66 \times 36$  ksi,  $F_v = 0.4 \times 36$  ksi,  $E = 29 \times 10^6$  psi.
- (7) Design properties for glulam members at normal load duration and dry-use service conditions:  
 $F_b = C_v \times 2400$  psi,  $F_v = 270$  psi,  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 23

**24F DOUGLAS-FIR GLULAM EQUIVALENTS FOR STEEL FLOOR BEAMS****(Load Duration Factor for Glulam = 1.00)**

Span (ft)	W6x9	W8x10	W12x14	W12x16	W12x19	W10x22
	24F Douglas-fir Glulam Equivalent (in.)					
10	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 18 5-1/8 x 13-1/2	3-1/8 x 19-1/2 5-1/8 x 15	3-1/8 x 22-1/2 5-1/8 x 16-1/2	3-1/8 x 24 5-1/8 x 16-1/2
12	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 10-1/2	3-1/8 x 18 5-1/8 x 13-1/2	3-1/8 x 19-1/2 5-1/8 x 15	3-1/8 x 21 5-1/8 x 16-1/2	3-1/8 x 22-1/2 5-1/8 x 16-1/2
14	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 18 5-1/8 x 13-1/2	3-1/8 x 19-1/2 5-1/8 x 15	3-1/8 x 21 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 16-1/2
16	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 18 5-1/8 x 15	3-1/8 x 19-1/2 5-1/8 x 15	3-1/8 x 21 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 16-1/2
18	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 18 5-1/8 x 15	3-1/8 x 18 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 16-1/2
20	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 18 5-1/8 x 15	3-1/8 x 19-1/2 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 18	3-1/8 x 19-1/2 5-1/8 x 16-1/2
22	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 18 5-1/8 x 15	3-1/8 x 19-1/2 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 18	3-1/8 x 19-1/2 5-1/8 x 16-1/2
24	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 18 5-1/8 x 16-1/2	3-1/8 x 19-1/2 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 18	3-1/8 x 19-1/2 5-1/8 x 16-1/2
26	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 18 5-1/8 x 16-1/2	3-1/8 x 19-1/2 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 18	3-1/8 x 19-1/2 5-1/8 x 16-1/2
28	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 18 5-1/8 x 16-1/2	3-1/8 x 19-1/2 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 18	3-1/8 x 19-1/2 5-1/8 x 16-1/2
30	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 18 5-1/8 x 16-1/2	3-1/8 x 19-1/2 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 18	3-1/8 x 19-1/2 5-1/8 x 16-1/2
32	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 18 5-1/8 x 16-1/2	3-1/8 x 19-1/2 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 18	3-1/8 x 19-1/2 5-1/8 x 16-1/2
34	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 18 5-1/8 x 16-1/2	3-1/8 x 19-1/2 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 18	3-1/8 x 19-1/2 5-1/8 x 16-1/2
36	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 18 5-1/8 x 16-1/2	3-1/8 x 19-1/2 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 18	3-1/8 x 19-1/2 5-1/8 x 16-1/2
38	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 18 5-1/8 x 16-1/2	3-1/8 x 19-1/2 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 18	3-1/8 x 19-1/2 5-1/8 x 16-1/2
40	3-1/8 x 10-1/2 5-1/8 x 9	3-1/8 x 13-1/2 5-1/8 x 12	3-1/8 x 18 5-1/8 x 16-1/2	3-1/8 x 19-1/2 5-1/8 x 16-1/2	3-1/8 x 21 5-1/8 x 18	3-1/8 x 19-1/2 5-1/8 x 16-1/2



TABLE 23 (CONTINUED)

**24F DOUGLAS-FIR GLULAM EQUIVALENTS FOR STEEL FLOOR BEAMS****(Load Duration Factor for Glulam = 1.00)**

Span (ft)	W12x22		W14x22		W12x26		W14x26		W16x26		W12x30	
	24F Douglas-fir Glulam Equivalent (in.)											
10	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 30	3-1/8 x 31-1/2	3-1/8 x 31-1/2	3-1/8 x 28-1/2	3-1/8 x 30	3-1/8 x 31-1/2	3-1/8 x 31-1/2	3-1/8 x 28-1/2	3-1/8 x 30
	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 24	5-1/8 x 24	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 24	5-1/8 x 24	5-1/8 x 21	5-1/8 x 22-1/2
12	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 30	3-1/8 x 30	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 30	3-1/8 x 30	3-1/8 x 28-1/2	3-1/8 x 30
	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 22-1/2
14	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 30	3-1/8 x 30	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 30	3-1/8 x 30	3-1/8 x 27	3-1/8 x 30
	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 22-1/2
16	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 25-1/2	3-1/8 x 27
	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 22-1/2
18	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 25-1/2	3-1/8 x 27
	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 22-1/2
20	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 25-1/2	3-1/8 x 27
	5-1/8 x 18	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 22-1/2
22	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 25-1/2	3-1/8 x 27
	5-1/8 x 19-1/2	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 22-1/2
24	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 24	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 27
	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21
26	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2
	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21
28	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 28-1/2	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2
	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21
30	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2
	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21
32	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2
	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21
34	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2
	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21
36	3-1/8 x 22-1/2	3-1/8 x 24	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2
	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 22-1/2	5-1/8 x 22-1/2	5-1/8 x 21	5-1/8 x 21
38	3-1/8 x 21	3-1/8 x 24	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2
	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21	5-1/8 x 24	5-1/8 x 24	5-1/8 x 21	5-1/8 x 21	5-1/8 x 24	5-1/8 x 24	5-1/8 x 21	5-1/8 x 21
40	3-1/8 x 21	3-1/8 x 24	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2	3-1/8 x 27	3-1/8 x 28-1/2	3-1/8 x 24	3-1/8 x 25-1/2
	5-1/8 x 19-1/2	5-1/8 x 21	5-1/8 x 21	5-1/8 x 21	5-1/8 x 24	5-1/8 x 24	5-1/8 x 21	5-1/8 x 21	5-1/8 x 24	5-1/8 x 24	5-1/8 x 21	5-1/8 x 21

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/360$  under live load, based on live/total load = 0.8.
- (3) Service condition for glulam members = dry.
- (4) Beam weights for steel and glulam members (assumed 35 pcf) are included.
- (5) Minimum glulam sizes considered in the table are: 3-1/8 x 6 and 5-1/8 x 6.
- (6) Design properties for steel members:  $F_b = 0.66 \times 36$  ksi,  $F_v = 0.4 \times 36$  ksi,  $E = 29 \times 10^6$  psi.
- (7) Design properties for glulam members at normal load duration and dry-use service conditions:  $F_b = C_v \times 2400$  psi,  $F_v = 240$  psi,  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

TABLE 24

**24F SOUTHERN PINE GLULAM EQUIVALENTS FOR STEEL  
FLOOR BEAMS**
**(Load Duration Factor for Glulam = 1.00)**

Span (ft)	W6x9	W8x10	W12x14	W12x16	W12x19	W10x22
	24F Southern Pine Glulam Equivalent (in.)					
10	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 13-3/4	3 x 19-1/4 5 x 15-1/8	3 x 20-5/8 5 x 16-1/2	3 x 22 5 x 17-7/8
12	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 13-3/4	3 x 19-1/4 5 x 15-1/8	3 x 20-5/8 5 x 16-1/2	3 x 22 5 x 17-7/8
14	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 13-3/4	3 x 19-1/4 5 x 15-1/8	3 x 20-5/8 5 x 16-1/2	3 x 22 5 x 17-7/8
16	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 15-1/8	3 x 19-1/4 5 x 15-1/8	3 x 20-5/8 5 x 16-1/2	3 x 22 5 x 17-7/8
18	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 15-1/8	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 16-1/2	3 x 22 5 x 17-7/8
20	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 15-1/8	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
22	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
24	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
26	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
28	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
30	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
32	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
34	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
36	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 11	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 20-5/8 5 x 17-7/8
38	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 12-3/8	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 19-1/4 5 x 17-7/8
40	3 x 11 5 x 9-5/8	3 x 13-3/4 5 x 12-3/8	3 x 17-7/8 5 x 16-1/2	3 x 19-1/4 5 x 16-1/2	3 x 20-5/8 5 x 17-7/8	3 x 19-1/4 5 x 17-7/8

TABLE 24 (CONTINUED)

**24F SOUTHERN PINE GLULAM EQUIVALENTS FOR STEEL FLOOR BEAMS****(Load Duration Factor for Glulam = 1.00)**

Span (ft)	W12x22	W14x22	W12x26	W14x26	W16x26	W12x30
	24F Southern Pine Glulam Equivalent (in.)					
10	3 x 23-3/8 5 x 17-7/8	3 x 26-1/8 5 x 19-1/4	3 x 27-1/2 5 x 20-5/8	3 x 28-7/8 5 x 20-5/8	3 x 30-1/4 5 x 22	3 x 30-1/4 5 x 22
12	3 x 23-3/8 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 27-1/2 5 x 20-5/8	3 x 28-7/8 5 x 22	3 x 28-7/8 5 x 22
14	3 x 23-3/8 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 27-1/2 5 x 20-5/8	3 x 28-7/8 5 x 22	3 x 28-7/8 5 x 22
16	3 x 23-3/8 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 27-1/2 5 x 20-5/8	3 x 28-7/8 5 x 22	3 x 28-7/8 5 x 22
18	3 x 23-3/8 5 x 17-7/8	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 27-1/2 5 x 22	3 x 28-7/8 5 x 22	3 x 28-7/8 5 x 22
20	3 x 23-3/8 5 x 19-1/4	3 x 24-3/4 5 x 19-1/4	3 x 26-1/8 5 x 20-5/8	3 x 27-1/2 5 x 22	3 x 28-7/8 5 x 22	3 x 28-7/8 5 x 22
22	3 x 22 5 x 19-1/4	3 x 24-3/4 5 x 20-5/8	3 x 26-1/8 5 x 20-5/8	3 x 27-1/2 5 x 22	3 x 28-7/8 5 x 22	3 x 27-1/2 5 x 22
24	3 x 22 5 x 19-1/4	3 x 24-3/4 5 x 20-5/8	3 x 24-3/4 5 x 20-5/8	3 x 27-1/2 5 x 22	3 x 28-7/8 5 x 22	3 x 26-1/8 5 x 22
26	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 20-5/8	3 x 24-3/4 5 x 20-5/8	3 x 26-1/8 5 x 22	3 x 28-7/8 5 x 23-3/8	3 x 26-1/8 5 x 22
28	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 20-5/8	3 x 24-3/4 5 x 20-5/8	3 x 26-1/8 5 x 22	3 x 27-1/2 5 x 23-3/8	3 x 24-3/4 5 x 22
30	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 20-5/8	3 x 24-3/4 5 x 20-5/8	3 x 26-1/8 5 x 22	3 x 27-1/2 5 x 23-3/8	3 x 24-3/4 5 x 22
32	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 20-5/8	3 x 24-3/4 5 x 20-5/8	3 x 26-1/8 5 x 22	3 x 27-1/2 5 x 23-3/8	3 x 24-3/4 5 x 22
34	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 20-5/8	3 x 23-3/8 5 x 20-5/8	3 x 26-1/8 5 x 22	3 x 27-1/2 5 x 23-3/8	3 x 24-3/4 5 x 22
36	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 20-5/8	3 x 23-3/8 5 x 20-5/8	3 x 26-1/8 5 x 22	3 x 27-1/2 5 x 23-3/8	3 x 24-3/4 5 x 22
38	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 20-5/8	3 x 23-3/8 5 x 20-5/8	3 x 26-1/8 5 x 22	3 x 27-1/2 5 x 23-3/8	3 x 24-3/4 5 x 22
40	3 x 22 5 x 19-1/4	3 x 23-3/8 5 x 20-5/8	3 x 23-3/8 5 x 20-5/8	3 x 26-1/8 5 x 22	3 x 27-1/2 5 x 23-3/8	3 x 24-3/4 5 x 22

## Notes:

- (1) Span = uniformly loaded simply supported beam.
- (2) Maximum deflection =  $L/360$  under live load, based on live/total load = 0.8.
- (3) Service condition for glulam members = dry.
- (4) Beam weights for steel and glulam members (assumed 36 pcf) are included.
- (5) Minimum glulam sizes considered in the table are: 3 x 5-1/2 and 5 x 5-1/2.
- (6) Design properties for steel members:  $F_b = 0.66 \times 36$  ksi,  $F_v = 0.4 \times 36$  ksi,  $E = 29 \times 10^6$  psi.
- (7) Design properties for glulam members at normal load duration and dry-use service conditions:  
 $F_b = C_v \times 2400$  psi,  $F_v = 270$  psi,  $E = 1.8 \times 10^6$  psi, where  $C_v$  = volume factor per 1997 NDS.

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