ROOF LOADS

SIMPLE-SPAN JOIST—ALLOWABLE ROOF LOAD (PLF)

Joist Span (ft)	PWI 20												PWI 30							
	9½″				11⅞″				14″				9½″				11⅞″			
	Live	Total			Live	Total			Live	Total			Live	Total			Live	Total		
	L/240	100%	115%	125%	L/240	100%	115%	125%	L/240	100%	115%	125%	L/240	100%	115%	125%	L/240	100%	115%	125%
6	-	301	346	376	-	301	346	376	-	301	346	376	-	311	357	388	-	311	357	388
7	-	258	297	322	-	258	297	322	-	258	297	322	-	266	306	333	-	266	306	333
8	-	226	259	282	-	226	259	282	-	226	259	282	-	233	268	291	-	233	268	291
9	-	201	231	251	-	201	231	251	-	201	231	251	-	207	238	259	-	207	238	259
10	-	181	208	226	-	181	208	226	-	181	208	226	-	186	214	233	-	186	214	233
11	-	164	189	205	-	164	189	205	-	164	189	205	-	169	195	212	-	169	195	212
12	164	138	159	173	-	150	173	188	-	150	173	188	180	155	179	194	-	155	179	194
13	131	118	135	147	-	139	160	174	-	139	160	174	144	143	165	179	-	143	165	179
14	106	101	117	127	-	129	148	161	-	129	148	161	117	130	149	156	-	133	153	166
15	87	88	102	110	-	115	132	143	-	120	138	150	96	113	128	128	-	124	143	155
16	72	78	89	96	123	101	116	126	-	113	130	141	80	99	106	106	135	117	134	146
17	61	69	79	81	104	89	103	111	-	106	122	133	67	88	89	89	114	110	126	137
18	51	61	68	68	88	80	91	99	-	95	109	118	57	76	76	76	97	102	117	127
19	44	55	58	58	75	71	82	89	-	85	98	106	48	65	65	65	83	91	105	110
20					65	64	74	81	95	77	88	96					71	82	95	95
21					56	58	67	73	82	70	80	87					62	75	83	83
22					49	53	61	66	72	63	73	79					54	68	72	72
23					43	49	56	58	63	58	67	73					48	62	64	64
24									56	53	61	67								
25									50	49	56	61								
26									44	45	52	57								
27									40	42	48	53								
28									36	39	45	47								

Notes:

1. Table values apply to uniformly loaded roof joists.
2. Span is measured to the center of each support.
3. Roofs must be sloped at least ¼″ in 12″ to assure drainage.
4. Table values do not account for stiffness added by glued or nailed sheathing.
5. Provide at least 1¾″ of bearing length at end supports and 3½″ at intermediate supports.
6. Provide lateral restraint at supports (e.g. blocking panels, rim board) and along the compression flange of each joist (e.g. roof sheathing, gypsum board ceiling).
7. Use sizing software or consult a professional engineer to analyze conditions outside the scope of this table (e.g. different bearing lengths, concentrated loads) or for multiple span joists if the length of any span is less than half the length of an adjacent span.

HOW TO USE ROOF LOAD TABLES

1. 1. Choose a joist spacing and convert the live and total design loads specified in pounds per square foot (psf) to joist loads in pounds per lineal foot (plf).
   Joist Spacing [ft] x Design Load [psf] = Joist Load [plf]

JOIST LOAD (PLF)

Joist Spacing		Design Load (psf)								
Inches	Feet	20	30	40	50	60	70	80	90	100
12	1	20	30	40	50	60	70	80	90	100
16	1.33	27	40	53	67	80	93	106	120	133
19.2	1.6	32	48	64	80	96	112	128	144	160
24	2	40	60	80	100	120	140	160	180	200

2. Check the local building code for deflection requirements. Building codes typically require L/180 for total load and L/240 for live load. The values in the Total columns are based on L/180.
3. Choose a span. Use the horizontal span dimension from the building plans for roofs that slope up to 2″ in 12″. For roof slopes greater than 2″ in 12″, multiply the horizontal dimension by the appropriate factor from the table below.

Slope	2½ in 12	3 in 12	3½ in 12	4 in 12	4½ in 12	5 in 12	6 in 12	7 in 12	8 in 12	9 in 12	10 in 12	11 in 12	12 in 12
Factor	1.01	1.02	1.03	1.04	1.05	1.07	1.10	1.14	1.19	1.23	1.28	1.34	1.39

4. Choose a load duration category – 100% for heavy snow, 115% for snow and 125% for non-snow. When in doubt, consult the local building department.
5. Scan across the Span row to find a joist size with sufficient Live and applicable Total load capacities. Both requirements must be satisfied. When no value is shown in a Live column, Total load governs.
6. Sloping joists must be fastened to each support to resist a sliding force equal to:
   $\frac{0.5XWL}{\sqrt{X^2+144}}$ at end supports and $\frac{1.25XWL}{\sqrt{X^2+144}}$ at intermediate supports
   where X = roof slope in 12, L = span [ft] and $W = S\left\{LL+\frac{DL\sqrt{X^2+144}}{12}\right\}$, where S = joist spacing [ft], LL = live load [psf] and DL = dead load [psf]
7. Web stiffeners are required at all supports for 22″ and 24″ joists. See *Web Stiffener Requirements* on page 93 for more details.