



LOAD-SPAN TABLES FOR APA PLYWOOD

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Load-span tables for specific plywood applications are included in several APA publications. However, there is sometimes a need to know the allowable uniform load on American plywood for conditions not specifically covered in other publications.

The following load-span tables apply to sanded, touch-sanded, and unsanded plywood manufactured in accordance with U.S. Product Standard PS 1-95, with face grain across and with face grain parallel to supports. For each combination of span and thickness or Span Rating, maximum loads are given as controlled by deflections of L/360, L/240 and L/180, and by maximum load controlled by capacity.

For a given Span Rating or thickness, all panel ply-layer constructions produced by APA member manufacturers are considered in deriving the published allowable load values. The allowable value represents the capacity of the most limiting construction considered for each specific criterion (deflection, bending or shear). Take, for example, 3-, 4- and 5-ply constructions of a given thickness. The face and back plies in the 3-ply panel are thicker than those in the 4- or 5-ply panels. This results in a greater stiffness for the 3-ply panel and least stiffness for the 5-ply panel when the stress is applied parallel to the face grain. Yet, on the other hand, the same

3-ply panel applied such that the stress is perpendicular to the face grain, yields smaller stiffness values than for either 4- or 5-ply construction. Therefore, for stress applied parallel to face grain, the 5-ply panel would control load values for L/180, L/240 and L/360 deflections, while the 3-ply panel would control deflection values for stress perpendicular to face grain.

Uniform loads for some applications can be read directly from the tables. In other cases, the values given in the tables should be adjusted for special conditions using the factors listed in the "Table of Adjustment Factors."

Table 1 applies to unsanded plywood and is based on APA Rated Sheathing (marked PS 1) grade. For touch-sanded grades such as APA Rated Sturd-I-Floor (marked PS 1), Underlayment, C-C Plugged and C-D Plugged, see Table 2. Table 3 applies to sanded grades such as A-A, A-C, A-D, B-C and B-D.

The tables also assume dry service conditions (equilibrium moisture content less than 16%), untreated plywood and normal duration of load. Normal duration of load assumes fully stressing a member by the application of the full maximum design load, either continuously or cumulatively, for approximately ten years. For other conditions, the loads given on the tables should be appropriately adjusted.

For face grain across supports, and spans of 800 mm and less, three spans have been assumed, and two spans for

spans greater than 800 mm. For face grain parallel to supports, tables are based on three spans for spans of 400 mm and less, and two spans for more than 400 mm. The tables do not apply directly to plywood having a single span. For one-span conditions, use the span adjustment factors.

Effects of support width have been considered when determining the loads based on shear and deflection. Supports are assumed to be 38 mm wide for spans less than 1200 mm and 89 mm wide for 1200 mm and greater spans. Support width factors are those established by APA Laboratory Report 120.

It is important to note that some plywood applications are not controlled by uniform loads. Take, for example, a residential floor designed for 2 kN/m² live load. The allowable uniform floor load on plywood applied according to APA recommendations is greatly in excess of the typical design loads. This excess does not mean that floor spans for plywood can be increased, but only that there is considerable reserve strength and stiffness for *uniform* loads. Actually, the recommendations for plywood floors are based on performance under concentrated loads, how the floor "feels" to passing foot traffic, and other subjective factors which relate to public acceptance. Always check the maximum roof and floor spans, given in the panel's Span Rating (in inches), indicated on the panel's trademark stamp before making a final plywood selection for these applications.

TABLE OF ADJUSTMENT FACTORS

Basic Stresses for Plywood Grades:	
STRUCTURAL I	1.56 (shear)
Span Adjustments:	
2-span to 1-span	
Deflection	0.42
Bending	1.00
Shear	1.25
3-span to 1-span	
Deflection	0.53
Bending	0.80
Shear	1.20

TABLE 1

**UNIFORM LOADS (kN/m²) ON UNSANDED (SPAN RATED) PLYWOOD PANELS
MULTI-SPAN, NORMAL DURATION OF LOAD, DRY CONDITIONS**

Span Rating	Load Governed By	Face Grain Across Supports										Face Grain Parallel to Supports			
		Span, Center-to-Center of Supports (mm)										Span, Center-to-Center of Supports (mm)			
		300	400	500	600	700	800	900	1000	1100	1200	300	400	500	600
24/0	L/360	13.3	5.5	2.7	1.5	1.0	0.6	0.5				0.9	0.4	0.2	0.1
	L/240	20.0	8.2	4.1	2.3	1.4	0.9	0.8				1.3	0.5	0.3	0.2
	L/180	26.7	10.9	5.4	3.1	1.9	1.3	1.1				1.8	0.7	0.4	0.2
	Bending	10.5	5.9	3.8	2.6	1.9	1.5	0.9				2.1	1.2	0.6	0.4
	Shear	15.2	11.0	8.7	7.2	6.1	5.3	4.4				12.7	9.1	6.9	5.7
32/16	L/360	22.1	9.7	5.0	2.9	1.8	1.2	1.1	0.8			1.7	0.7	0.4	0.2
	L/240	33.2	14.5	7.5	4.3	2.7	1.8	1.6	1.1			2.5	1.0	0.6	0.4
	L/180	44.2	19.3	10.0	5.7	3.6	2.4	2.1	1.5			3.3	1.3	0.8	0.5
	Bending	16.8	9.4	6.0	4.2	3.1	2.4	1.5	1.2			3.5	2.0	1.0	0.7
	Shear	19.3	13.9	10.9	8.9	7.6	6.6	5.6	5.1			12.1	8.7	6.6	5.4
40/20	L/360	36.0	16.2	8.5	4.9	3.1	2.1	1.8	1.3	1.0	0.9	3.2	1.3	0.8	0.5
	L/240	54.0	24.2	12.7	7.4	4.6	3.1	2.7	2.0	1.5	1.3	4.8	2.0	1.2	0.7
	L/180	72.0	32.3	16.9	9.8	6.2	4.1	3.6	2.6	2.0	1.8	6.4	2.7	1.7	1.0
	Bending	22.3	12.5	8.0	5.6	4.1	3.1	2.0	1.6	1.3	1.1	5.9	3.3	1.7	1.2
	Shear	24.5	17.7	13.9	11.4	9.8	8.5	7.2	6.4	5.8	5.5	15.3	11.0	8.3	6.8
48/24	L/360	55.0	26.0	14.0	8.3	5.3	3.6	3.1	2.3	1.7	1.5	10.2	4.4	2.8	1.6
	L/240	82.5	39.0	21.0	12.5	7.9	5.4	4.7	3.4	2.6	2.3	15.3	6.6	4.2	2.4
	L/180	110.0	52.0	28.0	16.6	10.6	7.1	6.3	4.6	3.5	3.1	20.4	8.8	5.6	3.2
	Bending	33.7	19.0	12.1	8.4	6.2	4.7	3.0	2.4	2.0	1.7	13.4	7.5	3.9	2.7
	Shear	31.7	22.9	17.9	14.7	12.5	10.9	9.2	8.3	7.5	7.2	17.7	12.8	9.6	7.9
28.5 mm (Groups 1 & 2)	L/360	93.2	30.4	29.9	18.9	12.6	8.8	7.7	5.8	4.4	3.9	59.8	29.1	19.1	11.7
	L/240	139.8	75.6	44.8	28.4	18.9	13.2	11.5	8.6	6.6	5.9	89.7	43.7	28.6	17.6
	L/180	186.3	100.8	59.8	37.8	25.2	17.5	15.4	11.5	8.8	7.9	119.6	58.2	38.2	23.3
	Bending	66.3	37.3	23.9	16.6	12.2	9.3	5.9	4.8	4.0	3.3	50.5	28.4	14.5	10.1
	Shear	55.1	39.9	31.2	25.7	21.8	18.9	16.1	14.4	13.1	12.5	41.9	30.3	22.8	18.7

Examples Showing Use Of Plywood Load-Span Tables

Example 1: Find the allowable uniform floor load for APA RATED SHEATHING 32/16. Assume 0.5 kN/m² dead load, and face grain across supports 400 mm on center. Unless stated otherwise, assume floor deflection criteria to be L/360 at live load only and L/240 for total load.

FROM TABLE 1

FOR UNSANDED PANELS WITH FACE GRAIN ACROSS SUPPORTS:

Load Governed By	Load (kN/m ²)
L/360	9.7
L/240	14.5
L/180	19.3
Bending	9.4
Shear	13.9

Allowable total load for floors is the least of loads for L/240, bending and shear. Allowable total load is 9.4 kN/m².

Live load is the lesser of the load for L/360 and total load as determined above, minus dead load.

$$L/360 = 9.7 \text{ kN/m}^2$$

$$\text{Total load} - \text{dead load} = 9.4 - 0.5 = 8.9 \text{ kN/m}^2$$

Allowable live load is 8.9 kN/m².

Note: Do not increase span even though the allowable uniform live load greatly exceeds the 2 kN/m² design live load normally used for floor design. Recommended maximum span reflects performance under concentrated and impact loads in addition to uniform load.

Example 2: Find allowable snow loads on APA RATED SHEATHING 48/24 STRUCTURAL I if face grain is across supports spaced 800 mm on center. In question are several panels in the 1-span condition. Deflection criteria are L/240 for live load only and L/180 for total load. Because the panel is STRUCTURAL I, allowable loads for shear may be increased by 56%. Assume 0.5 kN/m² dead load supported by the plywood.

FROM TABLE 1

FOR UNSANDED PANELS WITH FACE GRAIN ACROSS SUPPORTS

Load Governed By	Load (kN/m ²)	Adjustment for Grade	Adjustment for Span	Adjusted Load
L/360	3.6	x	0.53	= 1.9
L/240	5.4	x	0.53	= 2.9
L/180	7.1	x	0.53	= 3.8
Bending	4.7	x	0.80	= 3.8
Shear	10.9	x 1.56	x 1.20	= 20.4

Allowable total load is the least of loads for L/180, bending and shear. Total load is 3.8 kN/m².

Live load is the lesser of total load minus dead load (3.8 – 0.5 = 3.3 kN/m²), and load at L/240 (2.9 kN/m²).

In this case, live load is controlled by deflection at L/240:

Allowable live load = 2.9 kN/m².

Note: In this example the roof live load is a result of a snow load. Local building code jurisdictions may allow further adjustments in allowable loads due to the temporary nature of snow loads in most areas.

TABLE 2

UNIFORM LOADS (kN/m²) ON TOUCH-SANDED (GROUP 1 OR SPAN RATED) PLYWOOD PANELS MULTI-SPAN, NORMAL DURATION OF LOAD, DRY CONDITIONS

Thickness or Span Rating	Load Governed By	Face Grain Across Supports										Face Grain Parallel to Supports			
		Span, Center-to-Center of Supports (mm)										Span, Center-to-Center of Supports (mm)			
		300	400	500	600	700	800	900	1000	1100	1200	300	400	500	600
12.5 mm or 16 oc	L/360	21.6	9.8	5.2	3.0	1.9	1.3	1.1	0.8	0.6	0.5	2.2	0.9	0.6	0.3
	L/240	32.5	14.8	7.8	4.5	2.9	1.9	1.7	1.2	0.9	0.8	3.3	1.4	0.8	0.5
	L/180	43.3	19.7	10.4	6.1	3.8	2.6	2.3	1.6	1.2	1.1	4.4	1.8	1.1	0.6
	Bending	17.1	9.6	6.1	4.3	3.1	2.4	1.5	1.2	1.0	0.9	4.2	2.3	1.2	0.8
	Shear	20.8	15.1	11.8	9.7	8.3	7.2	6.1	5.5	5.0	4.7	13.5	9.8	7.4	6.1
15 mm, 16 mm or 20 oc	L/360	27.0	12.8	6.9	4.1	2.6	1.8	1.5	1.1	0.9	0.8	5.6	2.3	1.5	0.8
	L/240	40.5	19.2	10.3	6.1	3.9	2.6	2.3	1.7	1.3	1.1	8.4	3.5	2.2	1.3
	L/180	54.1	25.5	13.8	8.2	5.2	3.5	3.1	2.3	1.7	1.5	11.2	4.7	2.9	1.7
	Bending	19.8	11.1	7.1	5.0	3.6	2.8	1.8	1.4	1.2	1.0	9.2	5.2	2.6	1.8
	Shear	26.3	19.0	14.9	12.2	10.3	9.0	7.7	6.8	6.3	5.9	15.8	11.4	8.6	7.0
18 mm, 19 mm or 24 oc	L/360	47.4	22.4	12.1	7.2	4.6	3.1	2.7	2.0	1.5	1.3	10.1	4.4	2.8	1.6
	L/240	71.1	33.6	18.1	10.7	6.8	4.6	4.1	3.0	2.2	2.0	15.2	6.5	4.1	2.4
	L/180	94.7	44.8	24.1	14.3	9.1	6.1	5.4	4.0	3.0	2.6	20.2	8.7	5.5	3.2
	Bending	26.4	14.9	9.5	6.6	4.9	3.7	2.4	1.9	1.6	1.3	14.2	8.0	4.1	2.8
	Shear	32.2	23.3	18.3	15.1	12.8	11.1	9.5	8.5	7.7	7.3	17.9	13.0	9.7	8.0
28.5 mm or 48 oc (Group 1)	L/360	93.2	50.4	29.9	18.9	12.6	8.8	7.7	5.8	4.4	3.9	59.8	29.1	19.1	11.7
	L/240	139.7	75.6	44.8	28.4	18.9	13.2	11.5	8.6	6.6	5.9	89.7	43.7	28.6	17.5
	L/180	186.3	100.8	59.8	37.8	25.2	17.5	15.4	11.5	8.8	7.9	119.6	58.2	38.2	23.3
	Bending	66.3	37.3	23.9	16.6	12.2	9.3	5.9	4.8	4.0	3.3	50.5	28.4	14.5	10.1
	Shear	55.1	39.9	31.2	25.7	21.8	18.9	16.1	14.4	13.1	12.5	41.9	30.3	22.8	18.7

TABLE 3

**UNIFORM LOADS (kN/m²) ON GROUP 1 SANDED PLYWOOD PANELS
MULTI-SPAN, NORMAL DURATION OF LOAD, DRY CONDITIONS**

Thickness	Load Governed By	Face Grain Across Supports										Face Grain Parallel to Supports			
		Span, Center-to-Center of Supports (mm)										Span, Center-to-Center of Supports (mm)			
		300	400	500	600	700	800	900	1000	1100	1200	300	400	500	600
8.5 mm	L/360	7.0	2.8	1.4	0.8	0.5	0.3	0.3				0.4	0.2	0.1	0.1
	L/240	10.5	4.2	2.1	1.2	0.7	0.5	0.4				0.6	0.2	0.1	0.1
	L/180	14.0	5.7	2.8	1.6	1.0	0.6	0.6				0.8	0.3	0.2	0.1
	Bending	6.3	3.5	2.3	1.6	1.2	0.9	0.6				1.1	0.6	0.3	0.2
	Shear	15.0	10.9	8.5	6.9	5.9	5.2	4.4				14.0	10.1	7.6	6.3
9.5 mm	L/360	9.7	4.0	2.0	1.1	0.7	0.5	0.4				0.8	0.3	0.2	0.1
	L/240	14.5	5.9	3.0	1.7	1.0	0.7	0.6				1.2	0.5	0.3	0.2
	L/180	19.3	7.9	3.9	2.2	1.4	0.9	0.8				1.6	0.6	0.4	0.2
	Bending	8.5	4.8	3.1	2.1	1.6	1.2	0.8				1.6	0.9	0.5	0.3
	Shear	16.7	12.1	9.5	7.8	6.6	5.7	4.8				19.0	13.8	10.3	8.5
12 mm	L/360	21.5	9.1	4.6	2.7	1.7	1.1	1.0	0.7	0.5		2.2	0.9	0.6	0.3
	L/240	32.2	13.7	7.0	4.0	2.5	1.6	1.4	1.0	0.8		3.4	1.4	0.8	0.5
	L/180	42.9	18.3	9.3	5.3	3.3	2.2	1.9	1.4	1.0		4.5	1.8	1.1	0.6
	Bending	14.5	8.2	5.2	3.6	2.7	2.0	1.3	1.1	0.9		4.5	2.6	1.3	0.9
	Shear	22.2	16.2	12.7	10.3	8.8	7.7	6.5	5.8	5.3		15.3	11.1	8.4	6.8
12.5 mm	L/360	24.2	10.4	5.3	3.1	1.9	1.3	1.1	0.8	0.6		3.3	1.3	0.8	0.5
	L/240	36.3	15.6	8.0	4.6	2.9	1.9	1.7	1.2	0.9		4.9	2.0	1.2	0.7
	L/180	48.4	20.9	10.7	6.1	3.8	2.5	2.2	1.6	1.2		6.6	2.7	1.7	0.9
	Bending	16.0	9.0	5.8	4.0	3.0	2.3	1.4	1.2	1.0		5.9	3.3	1.7	1.2
	Shear	24.2	17.5	13.8	11.2	9.6	8.3	7.0	6.3	5.7		16.8	12.1	9.1	7.5
15 mm	L/360	32.4	14.5	7.6	4.4	2.8	1.9	1.6	1.2	0.9	0.8	7.2	3.0	1.9	1.1
	L/240	48.6	21.8	11.4	6.6	4.2	2.8	2.5	1.8	1.3	1.2	10.8	4.5	2.8	1.6
	L/180	64.8	29.1	15.2	8.9	5.6	3.7	3.3	2.4	1.8	1.6	14.4	6.0	3.8	2.1
	Bending	21.4	12.0	7.7	5.4	3.9	3.0	1.9	1.5	1.3	1.1	9.3	5.2	2.7	1.9
	Shear	29.6	21.5	16.8	13.8	11.8	10.2	8.7	7.7	7.0	6.7	15.5	11.2	8.5	6.9
16 mm	L/360	35.0	15.9	8.4	4.9	3.1	2.1	1.8	1.3	1.0	0.9	9.0	3.8	2.4	1.4
	L/240	52.5	23.9	12.6	7.4	4.5	3.1	2.7	2.0	1.5	1.3	13.5	5.7	3.6	2.1
	L/180	70.1	31.9	16.8	9.8	6.2	4.1	3.6	2.7	2.0	1.8	18.1	7.6	4.8	2.7
	Bending	23.1	13.0	8.3	5.8	4.2	3.3	2.1	1.7	1.4	1.2	11.1	6.3	3.2	2.2
	Shear	31.6	22.8	17.9	14.7	12.4	10.9	9.2	8.3	7.5	7.2	16.9	12.2	9.2	7.6
18 mm	L/360	43.3	20.5	11.0	6.5	4.2	2.8	2.5	1.8	1.4	1.2	15.6	6.7	4.3	2.5
	L/240	65.0	30.7	16.6	9.8	6.3	4.2	3.7	2.7	2.0	1.8	23.3	10.1	6.4	3.7
	L/180	86.7	41.0	22.1	13.1	8.3	5.6	4.9	3.6	2.7	2.4	31.3	13.5	8.5	4.9
	Bending	26.4	14.9	9.5	6.6	4.9	3.7	2.4	1.9	1.6	1.3	15.7	8.8	4.5	3.1
	Shear	36.4	26.3	20.6	16.9	14.4	12.5	10.6	9.5	8.6	8.3	20.7	15.0	11.2	9.2
19 mm	L/360	45.9	22.0	11.9	7.1	4.5	3.1	2.7	2.0	1.5	1.3	19.1	8.4	5.3	3.1
	L/240	68.8	32.9	17.9	10.7	6.8	4.6	4.0	3.0	2.2	2.0	28.7	12.5	7.9	4.6
	L/180	91.8	43.9	23.9	14.2	9.1	6.1	5.4	4.0	3.0	2.6	38.2	16.7	10.6	6.2
	Bending	28.0	15.8	10.1	7.0	5.1	3.9	2.5	2.0	1.7	1.4	19.4	10.9	5.6	3.9
	Shear	37.4	27.9	21.9	17.9	15.3	13.3	12.3	10.0	9.1	8.7	22.1	16.0	12.0	9.9
22 mm	L/360	55.4	27.8	15.6	9.5	6.1	4.2	3.7	2.7	2.1	1.8	33.4	15.1	9.7	5.7
	L/240	83.1	41.7	23.3	14.2	9.2	6.3	5.5	4.1	3.1	2.7	50.1	22.7	14.5	8.6
	L/180	110.9	55.5	31.1	18.9	12.3	8.4	7.3	5.4	4.1	3.6	66.8	30.3	19.4	11.5
	Bending	35.0	19.7	12.6	8.8	6.4	4.9	3.1	2.5	2.1	1.8	31.9	18.0	9.2	6.4
	Shear	44.3	32.0	25.1	20.7	17.5	15.2	13.0	11.6	10.5	10.0	27.5	19.9	15.0	12.3
25.5 mm	L/360	72.3	37.8	21.8	13.5	8.9	6.1	5.4	4.0	3.0	2.7	45.4	21.4	13.9	8.3
	L/240	108.5	56.6	32.7	20.3	13.3	9.2	8.1	6.0	4.5	4.1	68.2	32.1	20.8	12.5
	L/180	144.7	75.5	43.6	27.0	17.8	12.2	10.7	8.0	6.1	5.4	90.9	42.7	27.7	16.6
	Bending	45.1	25.4	16.2	11.3	8.3	6.3	4.0	3.3	2.7	2.3	40.2	22.6	11.6	8.0
	Shear	48.1	34.8	27.3	22.4	19.0	16.5	14.1	12.5	11.4	10.9	38.1	27.5	20.7	17.1
28.5 mm	L/360	80.7	43.7	25.9	16.4	10.9	7.6	6.7	5.0	3.8	3.4	59.6	29.0	19.0	11.6
	L/240	121.0	65.5	38.8	24.6	16.4	11.4	10.0	7.5	5.7	5.1	89.5	43.5	28.6	17.4
	L/180	161.4	87.3	51.8	32.8	21.8	15.2	13.3	10.0	7.6	6.8	119.3	58.1	38.1	23.2
	Bending	55.7	31.3	20.1	13.9	10.2	7.8	5.0	4.0	3.3	2.8	50.5	28.4	14.6	10.1
	Shear	53.5	38.7	30.4	25.5	21.1	18.4	15.6	14.0	12.7	12.1	45.7	33.0	24.9	20.5

We have field representatives in most major U.S. cities and in Canada who can help answer questions involving APA trademarked products. For additional assistance in specifying APA engineered wood products, contact us:

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