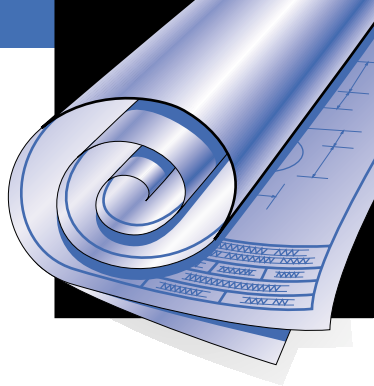

Load-Span Tables for APA Structural-Use Panels

Number Q225E

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Load-span tables for specific structural-use panel applications are included in several APA publications. Recommended loads for sheathing and flooring applications in these publications directly reflect minimum performance criteria given in APA PRP-108, Performance Standards and Policies for Structural-Use Panels and Voluntary Product Standard PS 2-04, Performance Standard for Wood-Based Structural-Use Panels. To qualify for a given Span Rating under the standards, a panel must meet all of the criteria for that rating. As a result, mechanical properties that are characteristic of APA structural-use panels are actually greater than the minimum necessary to pass one criterion.

Because it is sometimes necessary to have engineering design information for structural panel products for conditions not specifically covered in the other APA literature, APA publishes separate design section capacities for the various Span Ratings. These values are listed in APA's *Panel Design Specification,* Form D510. The uniform loads in the following tables were calculated using these section capacities. These loads are recommended when engineering principles are used for design. It is important to remember that structural engineering principles alone do not necessarily take into account other factors, such as moisture and thermal conditions, that may impact design.

This information applies only to products tested and inspected under APA programs. Comparisons cannot be made with products manufactured or inspected under other standards or programs.

The following load-span tables apply to APA trademarked structural-use panels qualified and manufactured in accordance with APA PRP-108, Performance Standards and Policies for Structural-Use Panels, Voluntary Product Standard PS 2-04, Performance Standard for Wood-Based Structural-Use Panels and Voluntary Product Standard PS 1-95, Construction and Industrial Plywood. These panels include unsanded, touch-sanded and sanded plywood and oriented strand board (OSB). Loads are provided for applications where the panel strength axis is applied across supports and applied parallel to supports. For each combination of span and Span Rating, loads are given for deflections of L/360, L/240 and L/180 and maximum loads controlled by bending and shear capacity. The values given in Tables 1 and 2 may be adjusted for panel type using Table 4. Table 3 capacities may be adjusted for panel type using Table 5. For special application conditions for Tables 1, 2 and 3, use the factors listed in Table 6, Application Adjustment Factors. Table 7, Typical APA Panel Constructions, is provided to assist in selecting panel constructions for specific Span Ratings.

Table 1 applies to APA Rated Sheathing. For APA Rated Sturd-I-Floor, see Table 2. For sanded plywood panels, see Table 3.

The values given in Tables 1 and 2 represent the maximum allowable loads without regard to panel type. Using Table 4, these values may, in some cases, be adjusted upward for specific types of structural-use panels. Once the allowable loads have been adjusted for panel type, they should be further adjusted for application conditions using Table 6. The values in Tables 1 and 2 are generated assuming dry conditions, normal duration of load and untreated, Exposure 1, structural panels. For other conditions, the loads should be appropriately adjusted using the factors given. See the examples for proper use of panel construction and application adjustment factors.

(Continued on page 5)

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TABLE 1

UNIFORM LOADS (PSF) ON APA RATED SHEATHING, MULTI-SPAN, NORMAL DURATION OF LOAD, DRY CONDITIONS, PANELS 24 INCHES OR WIDER

Span Rating[b]	Load Governed By	Strength Axis[a]: Perpendicular to Supports, Span Center-to-Center of Supports (inches)										Parallel to Supports, Span Center-to-Center of Supports (inches)		
		12	16	19.2	24	30	32	36	40	48	60	12	16	24
24/0	L/360	261	98	54	26	13	10	9				16	6	
	L/240	392	147	81	39	19	16	14				23	9	
	L/180	522	196	107	52	26	21	18				31	12	
	Bending	208	117	81	52	33	29	19				45	25	
	Shear	248	179	147	116	91	85	72				248	179	
24/16	L/360	339	128	70	34	17	14	12	9			70	26	9
	L/240	509	191	105	51	25	20	18	13			104	39	13
	L/180	679	255	140	68	33	27	24	17			139	52	18
	Bending	321	180	125	80	51	45	29	23			96	54	19
	Shear	286	207	169	133	105	98	83	75			286	207	128
32/16	L/360	500	188	103	50	24	20	18	13			35	13	4
	L/240	750	282	154	75	37	30	26	19			53	20	7
	L/180	1,001	376	206	100	49	40	35	25			70	27	9
	Bending	308	173	120	77	49	43	27	22			77	43	15
	Shear	314	228	186	147	116	108	92	82			314	228	141
40/20	L/360	979	368	201	98	48	39	34	25	16		78	29	10
	L/240	1,468	552	302	146	72	58	51	37	24		117	44	15
	L/180	1,958	736	403	195	96	78	69	49	32		157	59	20
	Bending	521	293	203	130	83	73	46	38	26		125	70	25
	Shear	390	283	232	182	144	134	114	102	88		390	283	175
48/24	L/360	1,740	655	358	174	85	69	61	44	29	14	283	106	36
	L/240	2,610	982	537	260	128	104	91	66	43	21	424	160	54
	L/180	3,480	1,309	716	347	170	139	122	88	57	28	566	213	72
	Bending	775	436	303	194	124	109	69	56	39	25	225	127	45
	Shear	476	345	282	222	175	164	139	125	108	85	476	345	213

(a) The strength axis is the long panel dimension unless otherwise identified.

(b) Nominal thickness may vary within Span Rating. For range of thicknesses, see Table 5 of APA's Panel Design Specification, Form D510.

TABLE 2

UNIFORM LOADS (PSF) ON APA RATED STURD-I-FLOOR, MULTI-SPAN, NORMAL DURATION OF LOAD, DRY CONDITIONS, PANELS 24 INCHES OR WIDER

Span Rating[b]	Load Governed By	Strength Axis[a]: Perpendicular to Supports, Span Center-to-Center of Supports (inches)										Parallel to Supports, Span Center-to-Center of Supports (inches)		
		12	16	19.2	24	30	32	36	40	48	60	12	16	24
16 oc	L/360	653	245	134	65	32	26	23	16	11		48	18	
	L/240	979	368	201	98	48	39	34	25	16		72	27	
	L/180	1,305	491	269	130	64	52	46	33	21		96	36	
	Bending	346	195	135	86	55	49	31	25	17		83	47	
	Shear	390	283	232	182	144	134	114	102	88		390	283	
20 oc	L/360	914	344	188	91	45	36	32	23	15		124	47	16
	L/240	1,370	516	282	137	67	55	48	34	22		186	70	24
	L/180	1,827	687	376	182	89	73	64	46	30		248	93	31
	Bending	442	248	173	110	71	62	39	32	22		142	80	28
	Shear	390	283	232	182	144	134	114	102	88		390	283	175
24 oc	L/360	1,305	491	269	130	64	52	46	33	21	10	248	93	31
	L/240	1,958	736	403	195	96	78	69	49	32	16	372	140	47
	L/180	2,610	982	537	260	128	104	91	66	43	21	496	187	63
	Bending	588	330	229	147	94	83	52	42	29	19	217	122	43
	Shear	476	345	282	222	175	164	139	125	108	85	476	345	213
32 oc	L/360	2,828	1,064	582	282	138	113	99	71	46	23	1,022	385	130
	L/240	4,242	1,596	873	423	207	169	148	107	70	34	1,534	577	195
	L/180	5,656	2,128	1,164	564	276	225	198	142	93	45	2,045	769	260
	Bending	875	492	342	219	140	123	78	63	44	28	571	321	114
	Shear	571	414	339	267	211	197	167	150	129	102	571	414	256
48 oc	L/360	5,003	1,882	1,030	499	244	199	175	126	82	40	2,154	810	273
	L/240	7,505	2,823	1,545	748	367	299	263	189	123	60	3,230	1,215	410
	L/180	10,006	3,764	2,060	998	489	399	350	252	164	80	4,307	1,620	547
	Bending	1,583	891	618	396	253	223	141	114	79	51	1,000	563	200
	Shear	733	531	435	342	270	252	214	192	166	131	733	531	329

(a) The strength axis is the long panel dimension unless otherwise identified.

(b) Nominal thickness may vary within Span Rating. For range of thicknesses, see Table 5 of APA's *Panel Design Specification,* Form D510.

TABLE 3

UNIFORM LOADS (PSF) ON GROUP 1 SANDED PLYWOOD PANELS, MULTI-SPAN, NORMAL DURATION OF LOAD, DRY CONDITIONS, A-A, A-C DESIGN CAPACITIES USED

Thickness (inches)	Load Governed By	Face Grain (Strength Axis)[a]												
		Perpendicular to Supports Span Center-to-Center of Supports (inches)										Parallel to Supports Span Center-to-Center of Supports (inches)		
		12	16	19.2	24	30	32	36	40	48	60	12	16	24
1/4	L/360	65	25	13	7							3		
	L/240	98	37	20	10							5		
	L/180	131	49	27	13							6		
	Bending	96	54	37	24							14		
	Shear	200	145	119	93							200		
11/32	L/360	148	56	30	15	7	6	5				8		
	L/240	222	83	46	22	11	9	8				11		
	L/180	296	111	61	29	14	12	10				15		
	Bending	154	87	60	39	25	22	14				26		
	Shear	276	200	164	129	102	95	81				276		
3/8	L/360	213	80	44	21	10	8	7	5			12	5	
	L/240	320	120	66	32	16	13	11	8			18	7	
	L/180	426	160	88	43	21	17	15	11			24	9	
	Bending	204	115	80	51	33	29	18	15			37	21	
	Shear	314	228	186	147	116	108	92	82			314	228	
15/32	L/360	522	196	107	52	26	21	18	13	9		48	18	6
	L/240	783	295	161	78	38	31	27	20	13		72	27	9
	L/180	1,044	393	215	104	51	42	37	26	17		96	36	12
	Bending	354	199	138	89	57	50	31	26	18		108	61	22
	Shear	419	303	249	196	154	144	122	110	95		419	303	188
1/2	L/360	609	229	125	61	30	24	21	15	10	5	67	25	9
	L/240	914	344	188	91	45	36	32	23	15	7	101	38	13
	L/180	1,218	458	251	121	60	49	43	31	20	10	135	51	17
	Bending	392	220	153	98	63	55	35	28	20	13	146	82	29
	Shear	448	324	266	209	165	154	131	117	101	80	448	324	201
19/32	L/360	892	336	184	89	44	36	31	22	15	7	163	61	21
	L/240	1,338	503	275	133	65	53	47	34	22	11	245	92	31
	L/180	1,784	671	367	178	87	71	62	45	29	14	326	123	41
	Bending	521	293	203	130	83	73	46	38	26	17	225	127	45
	Shear	552	400	328	258	204	190	161	145	125	99	552	400	247
5/8	L/360	1,001	376	206	100	49	40	35	25	16	8	211	79	27
	L/240	1,501	565	309	150	73	60	53	38	25	12	317	119	40
	L/180	2,001	753	412	200	98	80	70	50	33	16	422	159	54
	Bending	558	314	218	140	89	79	50	40	28	18	271	152	54
	Shear	590	428	350	276	218	203	173	155	134	105	590	428	265
23/32	L/360	1,392	524	287	139	68	55	49	35	23	11	394	148	50
	L/240	2,088	786	430	208	102	83	73	53	34	17	591	222	75
	L/180	2,784	1,047	573	278	136	111	97	70	46	22	787	296	100
	Bending	646	363	252	161	103	91	57	47	32	21	379	213	76
	Shear	667	483	395	311	246	230	195	175	151	119	667	483	299
3/4	L/360	1,544	581	318	154	75	62	54	39	25	12	500	188	64
	L/240	2,317	871	477	231	113	92	81	58	38	19	750	282	95
	L/180	3,089	1,162	636	308	151	123	108	78	51	25	1,001	376	127
	Bending	679	382	265	170	109	96	60	49	34	22	471	265	94
	Shear	686	497	407	320	253	236	200	180	155	122	686	497	307
7/8	L/360	2,175	818	448	217	106	87	76	55	36	17	805	303	102
	L/240	3,263	1,227	672	325	159	130	114	82	54	26	1,207	454	153
	L/180	4,351	1,637	895	434	213	173	152	109	71	35	1,610	606	204
	Bending	833	469	326	208	133	117	74	60	42	27	650	366	130
	Shear	810	586	480	378	298	279	237	212	183	144	810	586	363
1	L/360	3,306	1,244	681	330	162	132	116	83	54	26	1,436	540	182
	L/240	4,960	1,866	1,021	495	242	198	174	125	81	40	2,154	810	273
	L/180	6,613	2,488	1,361	659	323	263	231	166	109	53	2,871	1,080	365
	Bending	1,083	609	423	271	173	152	96	78	54	35	958	539	192
	Shear	895	648	531	418	330	308	262	234	203	160	895	648	401
1-1/8	L/360	4,285	1,612	882	427	209	171	150	108	70	34	2,132	802	271
	L/240	6,428	2,418	1,323	641	314	256	225	162	105	51	3,198	1,203	406
	L/180	8,571	3,224	1,764	855	419	341	300	216	141	68	4,264	1,604	541
	Bending	1,333	750	521	333	213	188	119	96	67	43	1,250	703	250
	Shear	1,000	724	593	467	368	344	292	262	227	178	1,000	724	448

(a) The strength axis is the long panel dimension unless otherwise identified.

TABLE 4

ADJUSTMENTS TO ALLOWABLE LOAD CAPACITIES FOR TABLE 1 AND TABLE 2 BASED ON PANEL GRADE AND CONSTRUCTION, C_C

	Strength Axis[a]			
	Perpendicular to Supports		Parallel to Supports	
	Other	Structural I	Other	Structural I
STIFFNESS (L/360, L/240, L/180)				
3-Ply Plywood	1.1	1.1	1.0	1.5
4-Ply Plywood	1.1	1.1	2.2	3.3
5-Ply Plywood[b]	1.1	1.1	3.1	5.2
OSB	1.0	1.0	3.1	5.2
BENDING				
3-Ply Plywood	1.0	1.0	1.0	1.3
4-Ply Plywood	1.1	1.1	1.2	1.7
5-Ply Plywood[b], OSB	1.2	1.2	1.8	2.8
SHEAR				
3-Ply Plywood	1.0	1.4	2.8	5.2
4-Ply Plywood	1.2	1.4	2.9	7.9
5-Ply Plywood[b]	1.1	1.6	1.0	1.4
OSB	1.0	1.0	1.0	1.0

(a) The strength axis is the long panel dimension unless otherwise identified.

(b) Adjustments apply to plywood with 5 or more layers; for 5-ply/3-layer plywood, use adjustments for 4-ply.

TABLE 5

SANDED PLYWOOD PANEL ADJUSTMENTS, C_C, TO ALLOWABLE LOAD CAPACITIES SHOWN IN TABLE 3

	Strength Axis[a]					
	Perpendicular to Supports			Parallel to Supports		
Species Group	A-A, A-C	Marine	Other	A-A, A-C	Marine	Other
STIFFNESS (L/360, L/240, L/180)						
1	1.0	1.0	1.0	1.0	1.38	1.0
2	0.83	NA	0.83	0.83	NA	0.83
3	0.67	NA	0.67	0.67	NA	0.67
4	0.56	NA	0.56	0.56	NA	0.56
Structural 1	1.0	1.0	1.0	1.4	1.0	1.4
BENDING						
1	1.0	0.91	0.82	1.0	1.15	0.82
2	0.7	NA	0.73	0.7	NA	0.73
3	0.7	NA	0.73	0.7	NA	0.73
4	0.67	NA	0.67	0.67	NA	0.67
Structural 1	1.0	1.0	0.91	1.40	1.0	1.15
SHEAR						
1	1.0	1.29	1.0	1.0	1.29	1.0
2	1.0	NA	1.0	1.0	NA	1.0
3	1.0	NA	1.0	1.0	NA	1.0
4	1.0	NA	1.0	1.0	NA	1.0
Structural 1	1.3	1.0	1.3	1.4	1.0	1.4

(a) The strength axis is the long panel dimension unless otherwise identified.

NA: Not applicable, Marine Grade is always Group 1.

TABLE 6

APPLICATION ADJUSTMENT FACTORS

Duration of Load, C_D (Applies to Bending and Shear Only):	
Permanent load (over 10 years)	0.90
2 months, as for snow	1.15
7 days	1.25
Wind or earthquake	1.60
Impact	2.00
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
3-span to 2-span	
Deflection	1.28
Bending	0.80
Shear	0.96
Wet or Damp Locations, C_M (Moisture Content 16% or more):	
Deflection	0.85
Bending	0.75
Shear	0.75

TABLE 7

TYPICAL APA PANEL CONSTRUCTIONS FOR TABLE 1 AND TABLE 2 PANELS[a]

Span Rating	Plywood			OSB
	3-Ply	4-Ply	5-Ply[b]	
APA RATED SHEATHING				
24/0	X			X
24/16				X
32/16	X	X	X	X
40/20	X	X	X	X
48/24		X	X	X
APA RATED STURD-I-FLOOR				
16 oc				
20 oc		X	X	X
24 oc		X	X	X
32 oc			X	X
48 oc			X	X

(a) Constructions may not be available in every area. Check with suppliers concerning availability.

(b) Applies to plywood with 5 or more layers.

(Continued from page 1)

For strength axis across supports, and spans of 32 inches and less, three spans are assumed. Two spans are assumed for spans greater than 32 inches. For strength axis parallel to supports, tables are based on three spans for spans of 16 inches or less and two spans for 24 inches. The tables do not apply directly to panels having a single span.

For one-span conditions, use the adjustment factors from Table 6.

Effects of support width have been considered when determining the loads based on shear and deflection. Supports are assumed to be 2x nominal members for spans less than 48 inches, and 4x members for 48-inch and greater spans. Support-width factors are those established in APA Laboratory Report 120.

It is important to note that some structural panel applications are not controlled by uniform loads. Residential floors are a good example. They are commonly designed for 40 psf live load. The allowable uniform floor load on panels applied at maximum span according to APA recommendations is greatly in excess of the typical design loads. This excess does not mean that floor spans for structural panels can be increased, but only that there is considerable reserve strength and stiffness for uniform loads. The recommendations for panel floors are based on performance under concentrated loads, how the floor "feels" to passing foot traffic, and other subjective factors that relate to public acceptance. Always check the maximum floor and roof spans for structural panels before making a final panel selection for these applications.

EXAMPLES SHOWING USE OF LOAD-SPAN TABLES

EXAMPLE 1:

Find the allowable uniform floor load for APA RATED SHEATHING 32/16, plywood, when applied at its rated span. From Table 7 it can be seen that 32/16 sheathing is available in 3-, 4- or 5-ply. Since actual construction may not be known during design, assume the most conservative plywood values as given in Table 1. Table 4 indicates the most conservative values are those where the multiplier in Table 4 is 1.0. Assume 10 psf dead load, and panel strength axis across supports 16 inches o.c. Unless stated otherwise, assume floor deflection criteria to be L/360 under live load and L/240 under total load.

Note: In these examples, panel type is selected for illustrative purposes. Often, specification is by grade and Span Rating without regard to panel type, and calculations should assume the lowest adjustments (Table 4) applicable to typical constructions (Table 7) for the specified Span Rating.

FROM TABLE 1

FOR APA RATED SHEATHING PANELS WITH STRENGTH AXIS PERPENDICULAR TO SUPPORTS:

Load Governed by	Load (psf)		Adjustment for Panel Grade and Construction, C_c		Adjusted Load (psf)
L/360	188	x	1.1	=	207
L/240	282	x	1.1	=	310
L/180	376	x	1.1	=	414
Bending	173	x	1.0	=	173
Shear	228	x	1.0	=	228

Allowable total load for floors is the least of loads for L/240, bending and shear. Allowable total load is 173 psf.

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

L/360 = 207 psf

Total load – dead load = 173 – 10 = 163 psf

Allowable live load = 163 psf, or 165 psf (rounded to nearest 5 psf).

Note: Do not increase span beyond the floor Span Rating even though the allowable uniform live load greatly exceeds the 40 psf design live load normally used for floors. Recommended maximum span reflects performance under concentrated and impact loads in addition to uniform load.

EXAMPLE 2:

Find the allowable snow load for APA RATED STURD-I-FLOOR 24 oc, OSB, when the panel is used as roof sheathing with the strength axis across supports spaced 32 inches o.c. In question are several panels in the 1-span condition. Deflection criteria are L/240 under live load only and L/180 under total load. Assuming a 2-month duration of load for snow, allowable loads for bending and shear may be increased 15%. Assume that 10 psf dead load is supported by the Sturd-I-Floor. Find maximum roof span from the tables in APA's *Engineered Wood Construction Guide,* Form E30.

FROM TABLE 2

FOR APA RATED STURD-I-FLOOR PANELS WITH STRENGTH AXIS PERPENDICULAR TO SUPPORTS:

Load Governed by	Load (psf)		Adjustment for Panel Grade and Construction, C_c		Adjustment for Duration of Load, C_D		Adjustment for Span		Adjusted Load (psf)
L/360	52	x	1.0			x	0.53	=	28
L/240	78	x	1.0			x	0.53	=	41
L/180	104	x	1.0			x	0.53	=	55
Bending	83	x	1.2	x	1.15	x	0.80	=	92
Shear	164	x	1.0	x	1.15	x	1.20	=	226

Allowable total load is the lesser of the load for L/180, bending and shear. Allowable total load is 55 psf.

Live load is the lesser of the load for L/240, and total load as determined above minus dead load.

L/240 = 41 psf

Total load – dead load = 55 – 10 = 45 psf

In this case, live load is governed by deflection of L/240: Allowable live load = 41 psf, or 40 psf (rounded to nearest 5 psf).

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

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