

**Design Criteria for Span Tables:**

Values in the maximum allowable rail span tables provided herein are subject to the following general criteria and additional criteria shown on individual span tables sheets. Values in span tables are based on the same engineering methodology and calculation algorithms used for U-Builder and are provided here for reference.

**Building Assumptions**

- Building Risk Category: II
- Mean Roof Height: 30 ft
- Roof Pitch: 0°-45°
- Site Elevation: 0 ft

**Wind Design Assumptions**

- Wind loads used are based on ASCE 7-22 Sec. 29.4.4
- Exposure Category B, C, or D
- Basic Wind Speed = 90 – 180 mph
- Level terrain. Topographic factor,  $k_{zt} = 1.0$
- $\gamma_E = 1.0$  for 'Interior' spans,  $\gamma_E = 1.5$  for 'Exposed' spans (ASCE 7-22, Fig. 29.4-7)

**Snow Design Assumptions**

- Ground Snow Load = 0-100 psf
- Exposure Factor coefficients of Partially Exposed condition
- Thermal Factor = 1.0
- Results based on uniform snow load

**Seismic Design Assumptions**

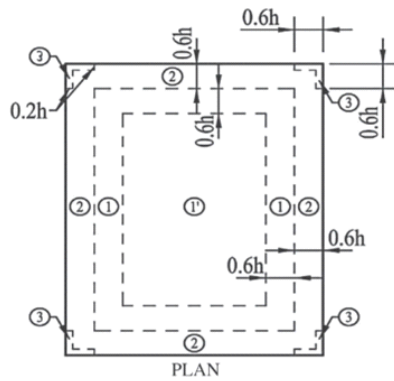
- 0.2-s Spectral Response Acceleration
- $S_s = 1.25$  and 3 with  $S_d = 1, 2.4$  respectively per criteria shown on individual span tables sheets.
- $S_1 = 0.5$  &  $S_d1 = 0.6$
- Seismic site class D

**Array Assumptions**

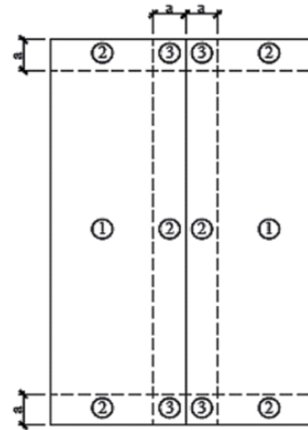
- Module orientation and Rail direction per criteria shown on individual span tables sheets.
- Maximum module dimensions of 40.1" x 67" (~19 sq.ft, 47.65 lbs) and 41" x 80" (~23 sq.ft, 58.6 lbs) per criteria shown on individual span tables sheets.
- Minimum distance between modules and roof edge is at least twice the module height above roof surface.
- Modules are parallel to roof surface and maximum height above roof surface is 5" to 10" depending on attachment type.
- Gaps between module rows and columns is 0.25" in to 1" depending on clamp type.
- The most restrictive of all roof zone spans shall be used when any part of the module is attributed to that span.
- 'Exposed' spans as defined in ASCE 7-22 sec. 29.4.4 shall be used when any part of an exposed module or panel as is attributed to that span.

## Span Tables

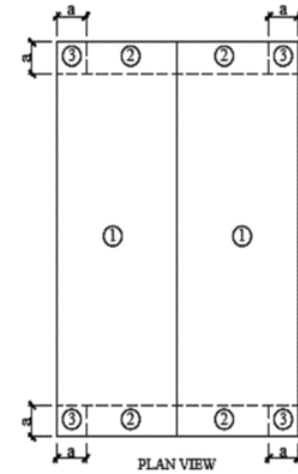
Zone should be considered as per ASCE 7-22, Fig. 30.3-2A to 30.3-2D



Gable Roofs  $\theta \leq 7^\circ$



Gable Roofs  $7^\circ < \theta \leq 27^\circ$



Gable Roofs  $27^\circ < \theta \leq 45^\circ$

Rails can be installed in these possible orientations.

#N/A



ASCE 7-22  
Design Standard

II  
Risk Category

30 ft  
Roof Height

Ss = 1.25  
Seismic

19 sqft  
Module Area

PORTRAIT  
Orientation

CROSS-SLOPE  
Rail Direction

NXT HD  
Rail Type

NXT COMBO  
Clamp

Flashloc DUO Rafter  
Attachment

# SPAN TABLES

## Maximum Allowable Rail Spans for Rooftop Solar Panels Parallel to the Roof Surface (inches)

Ground Snow Load (psf)	Wind Exposure Category	Roof Tilt Angle (deg)	Panel Exposure	Basic Wind Speed (mph)																																									
				90			95			100			105			110			115			120			130			140			150			160			170			180					
				Roof Wind Zone																																									
				1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3						
0	B	0-7	Interior	124	124	124	124	124	124	124	124	124	124	124	124	97	124	124	82	124	124	71	124	90	54	124	70	42	93	57	37	75	46	32	62	40	28	51	35	25					
			Exposed	124	124	96	124	124	79	124	124	66	124	93	56	124	80	48	124	69	42	100	60	38	76	47	32	60	39	28	48	34	24	40	29	21	36	26	18	32	23	16			
		7-20	Interior	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	71	124	124	60	124	77	44	124	57	37	81	44	34	32	62	38	28	49	33	25	41	30	22			
			Exposed	124	124	85	124	124	68	124	124	55	124	81	46	124	67	40	124	56	37	88	48	34	63	38	28	47	33	24	39	28	21	34	25	18	30	22	16	27	19	14			
		20-27	Interior	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	89	126	93	63	126	67	47	126	51	39	99	41	34	79	36	30	64	32	27				
			Exposed	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126		
	27-45	Interior	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128			
		Exposed	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	
	C	0-7	Interior	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124		
			Exposed	124	124	96	124	124	72	124	124	61	124	86	53	35	74	46	32	64	41	29	56	37	26	44	31	22	37	27	19	32	23	16	28	20	14	25	18	13	22	16	11		
		7-20	Interior	124	124	96	124	124	76	124	124	61	124	91	51	124	74	43	124	62	39	124	53	36	70	41	30	52	35	26	41	30	22	36	26	19	32	23	17	28	21	15			
			Exposed	124	124	43	124	124	59	38	91	49	34	73	42	31	61	38	28	51	34	25	43	31	23	36	27	20	31	23	16	27	20	15	24	17	13	21	15	11	18	13	10		
20-27		Interior	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	
		Exposed	126	126	88	126	126	70	49	126	57	41	126	47	37	97	41	34	82	37	31	70	34	28	53	29	24	42	25	20	36	21	18	32	19	15	28	16	14	25	15	12			
27-45	Interior	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128		
	Exposed	128	128	82	128	128	97	66	128	80	55	92	67	46	74	57	40	62	49	37	52	43	34	40	36	29	44	33	24	30	27	21	26	23	19	23	21	16	20	18	14				
D	0-7	Interior	124	124	77	124	119	64	124	90	53	124	76	46	124	66	40	94	57	37	81	50	34	62	40	28	50	34	24	41	30	21	36	26	18	31	23	16	28	20	14				
		Exposed	124	124	65	40	90	55	36	76	47	32	65	41	29	56	37	26	49	34	24	43	31	22	36	26	19	31	22	16	27	19	14	23	17	12	20	15	11	18	13	10			
	7-20	Interior	124	124	66	124	96	53	124	77	44	124	63	39	100	53	36	81	45	32	68	40	30	50	34	25	40	29	21	34	25	19	30	22	16	26	19	14	23	17	13				
		Exposed	99	52	35	77	43	32	63	38	28	52	35	26	43	31	23	39	29	21	36	26	19	30	22	16	26	19	14	22	16	12	20	14	11	17	13	14	15	11	13				
	20-27	Interior	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	
		Exposed	126	126	61	43	126	49	38	101	41	34	83	37	31	70	34	28	60	31	26	52	28	23	41	24	20	35	20	17	30	18	15	26	15	13	23	14	11	21	12	10			
27-45	Interior	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128		
	Exposed	128	128	58	97	70	48	77	59	41	63	50	37	52	43	34	44	39	31	40	35	28	33	30	24	29	26	20	25	22	18	22	19	15	19	17	14	17	15	12					
10	B	0-7	Interior	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101		
			Exposed	101	101	96	101	101	79	101	101	66	101	93	56	101	80	48	101	69	42	100	60	38	76	47	32	60	39	28	48	34	24	40	29	21	36	26	18	32	23	16			
		7-20	Interior	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102
			Exposed	102	102	85	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102
		20-27	Interior	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116
			Exposed	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116
	27-45	Interior	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	
		Exposed	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124
	C	0-7	Interior	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	
			Exposed	101	101	87	101	101	72	101	101	61	101	86	53	35	74	46	32	64	41	29	56	37	26	44	31	22	37	27	19	32	23	16	28	20	14	25	18	13	22	16	11		
		7-20	Interior	102	102	96	102	102	76	102	102	61	102	91	51	102	74	43	102																										

















































ASCE 7-22  
Design Standard

II  
Risk Category

30 ft  
Roof Height

Ss = 1.25  
Seismic

23 sq.ft  
Module Area

LANDSCAPE  
Orientation

CROSS-SLOPE  
Rail Direction

NXT HD  
Rail Type

NXT COMBO  
Clamp

Flashloc DUO Rafter  
Attachment

# SPAN TABLES

## Maximum Allowable Rail Spans for Rooftop Solar Panels Parallel to the Roof Surface (inches)

Ground Snow Load (psf)	Wind Exposure Category	Roof Tilt Angle (deg)	Panel Exposure	Basic Wind Speed (mph)																																					
				90		95		100		105		110		115		120		130		140		150		160		170		180													
				Roof Wind Zone																																					
				1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3											
0	B	0-7	Interior	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155													
			Exposed	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155													
		7-20	Interior	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155													
			Exposed	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155													
		20-27	Interior	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156													
			Exposed	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156													
	27-45	Interior	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156														
		Exposed	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156														
	C	0-7	Interior	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155													
			Exposed	155	155	138	155	148	87	155	141	63	155	127	57	150	90	52	143	70	47	137	61	43	82	52	37	61	44	31	53	38	27	46	34	24	41	30	21	36	26
		7-20	Interior	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155												
			Exposed	155	155	140	155	155	62	155	146	56	155	137	51	155	62	46	151	56	42	142	52	38	60	44	32	51	37	28	44	32	24	39	28	21	34	25	19	30	22
20-27		Interior	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156													
		Exposed	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156													
27-45	Interior	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156														
	Exposed	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156														
10	B	0-7	Interior	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144														
			Exposed	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144													
		7-20	Interior	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145													
			Exposed	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145													
		20-27	Interior	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151													
			Exposed	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151													
	27-45	Interior	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155														
		Exposed	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155														
	C	0-7	Interior	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144													
			Exposed	144	144	138	144	144	87	144	141	63	144	127	57	144	90	52	143	70	47	137	61	43	82	52	37	61	44	31	53	38	27	46	34	24	41	30	21	36	26
		7-20	Interior	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145													
			Exposed	145	145	140	145	145	62	145	145	56	145	137	51	145	62	46	145	56	42	142	52	38	60	44	32	51	37	28	44	32	24	39	28	21	34	25	19	30	22
20-27		Interior	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151														
		Exposed	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151														
27-45	Interior	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155															
	Exposed	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155															
20	B	0-7	Interior	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144														
			Exposed	144	143	67	144	136	59	144	95	53	144	71	48	137	61	43	104	56	39	79	51	36	59	43	31	51	37	26	44	32	23	38	28	20	34	25	18	30	22
		7-20	Interior	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145													
			Exposed	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145													
		20-27	Interior	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138													
			Exposed	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138													
	27-45	Interior	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145														
		Exposed	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145														
	C	0-7	Interior	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123														
			Exposed	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123														
		7-20	Interior	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124														
			Exposed	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124														
20-27		Interior	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138														
		Exposed	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138														
27-45	Interior	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145															
	Exposed	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145															
40	B	0-7	Interior	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123														
			Exposed	123	123	123	123																																		













