

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

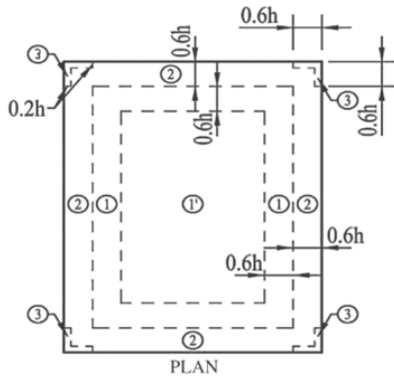
- 0.2-s Spectral Response Acceleration
- $S_S = 1.25$ and 3 with $S_d = 1, 2.4$ respectively per criteria shown on individual span tables sheets.
- $S_1 = 0.5$ & $S_{d1} = 0.6$
- Seismic site class D

Array Assumptions

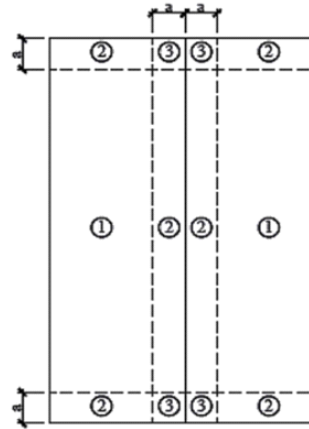
- Module orientation and Rail direction per criteria shown on individual span tables sheets.
- Maximum module dimensions of 40.1" x 67" (~19 sq.ft, 47.65 lbs) and 41" x 80" (~23 sq.ft, 58.6 lbs) per criteria shown on individual span tables sheets.
- Minimum distance between modules and roof edge is at 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

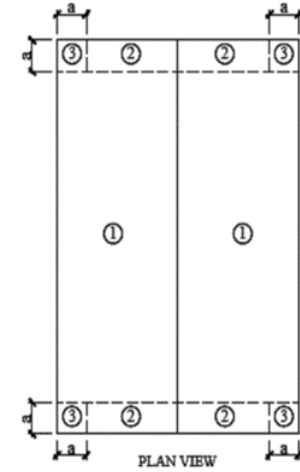
Zone should be considered as per ASCE 7-22, Fig. 30.3-2A to 30.3-2D



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.

*Flashloc DUO for Rafter	
Y+	
Y-	Alternate orientation not allowed



ASCE 7-22
Design Standard

II
Risk Category

30 ft
Roof Height

Ss = 1.25
Seismic

19 sq.ft
Module Area

PORTRAIT
Orientation

CROSS-SLOPE
Rail Direction

NXT
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	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86						
			Exposed	86	86	76	86	82	73	86	79	65	86	76	55	83	73	47	80	68	42	77	60	38	72	47	32	59	27	48	34	24	40	29	21	35	26	18	31	23	25				
		7-20	Interior	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86				
			Exposed	86	83	73	86	79	67	86	76	55	83	73	46	80	66	40	77	56	37	74	47	33	62	38	28	47	33	24	39	28	21	34	25	18	30	22	24	17	19	22			
		20-27	Interior	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87			
			Exposed	87	86	80	87	82	76	87	79	73	87	75	65	87	72	54	85	65	46	82	55	40	74	41	34	72	35	29	59	31	25	48	27	22	40	24	20	36	21	17			
		27-45	Interior	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87		
			Exposed	87	87	85	87	87	81	87	84	77	87	81	74	83	78	72	80	75	62	77	72	53	72	58	41	56	46	35	43	38	30	38	34	27	33	30	24	29	26	21			
		C	0-7	Interior	86	86	78	86	84	74	86	81	71	86	77	60	85	75	52	82	72	45	79	65	40	74	51	34	65	41	29	52	36	25	43	31	22	38	27	19	33	24	17		
				Exposed	85	74	51	81	71	43	77	61	38	74	52	35	72	45	31	63	41	29	55	37	26	43	31	22	37	27	19	32	23	25	28	20	22	25	18	19	22	24	17		
			7-20	Interior	86	85	75	86	81	72	86	79	61	85	74	50	82	71	43	79	61	39	76	52	35	69	40	30	52	35	26	41	30	22	36	26	19	32	23	17	28	20	23		
				Exposed	82	71	42	78	59	38	74	48	34	71	41	31	60	38	28	51	34	25	43	31	23	36	26	20	31	23	25	27	20	22	23	17	19	21	23	17	18	20	15		
	20-27		Interior	87	87	82	87	84	78	87	80	74	87	77	71	87	74	60	87	71	50	84	61	43	78	45	36	74	37	31	65	32	27	52	28	23	43	25	21	38	22	18			
			Exposed	87	74	60	86	69	48	82	56	41	79	47	37	76	41	34	73	37	31	70	34	28	53	29	24	42	25	20	36	21	18	32	19	23	28	25	21	25	22	18			
	27-45		Interior	87	87	87	87	87	83	87	86	79	87	83	76	85	80	73	82	77	68	79	74	58	74	64	44	63	50	37	48	41	32	40	36	28	35	31	25	31	28	22			
			Exposed	85	79	73	81	76	66	78	73	54	74	66	46	72	57	40	61	49	37	52	42	34	44	36	28	34	31	24	30	27	21	26	23	18	23	19	21	25	20	18	22		
	D		0-7	Interior	86	82	72	86	78	63	85	75	53	82	72	45	79	65	40	76	56	37	73	50	33	62	40	28	49	34	24	41	30	21	35	26	18	31	23	24	28	20	22		
				Exposed	79	64	40	75	54	36	72	47	32	64	41	29	55	37	26	48	34	24	42	31	22	36	26	18	31	22	24	27	19	21	23	26	18	20	23	16	18	20	14		
			7-20	Interior	86	79	65	86	75	53	82	72	44	79	62	39	76	52	35	73	44	32	67	40	29	49	34	25	40	29	21	34	25	18	30	22	24	26	19	22	23	17	19		
				Exposed	76	52	35	72	43	31	62	38	28	51	34	26	43	31	23	39	28	21	36	26	19	30	22	25	26	19	21	22	25	18	20	22	16	17	19	14	23	17	13		
		20-27	Interior	87	82	76	87	78	72	87	75	62	87	72	51	84	61	43	81	51	39	78	44	36	73	36	30	61	31	26	48	27	22	40	24	20	35	21	17	31	18	23			
			Exposed	84	60	43	80	49	38	77	41	34	73	37	31	70	34	28	60	31	25	52	28	23	41	24	20	35	20	26	30	18	22	26	23	19	23	21	17	21	18	15			
		27-45	Interior	87	87	80	87	84	77	86	80	74	82	77	69	79	74	58	76	71	50	73	62	43	59	48	36	45	39	31	38	34	27	33	30	24	29	26	21	26	23	18			
			Exposed	79	74	58	75	69	48	72	58	41	62	49	37	52	42	34	44	39	31	39	35	28	33	30	24	29	26	20	25	22	18	22	19	23	19	17	21	26	23	18			
10		B	0-7	Interior	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77			
				Exposed	77	77	76	77	77	73	77	77	65	77	76	55	77	73	47	77	68	42	77	60	38	72	47	32	59	39	27	48	34	24	40	29	21	35	26	18	31	23	25		
			7-20	Interior	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
				Exposed	78	78	73	78	78	67	78	76	55	78	73	46	78	66	40	77	56	37	74	47	33	62	38	28	47	33	24	39	28	21	34	25	18	30	22	24	27	19	22		
	20-27		Interior	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83		
			Exposed	83	83	80	83	82	76	83	79	73	83	75	65	83	72	54	83	65	46	82	55	40	77	41	34	72	35	29	59	31	25	48	27	22	40	24	20	36	21	17			
	27-45	Interior	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86			
		Exposed	86	86	85	86	86	81	86	84	77	86	81	74	83	78	72	80	75	62	77	72	53	72	58	41	56	46	35	43	38	30	38	34	27	33	30	24	29	26	21				
	C	0-7	Interior	77	77	77	77	74	77	77	71	77	77	60	77	75	52	77	72	45	77	65	40	74	51	34	65	41	29	52	36	25	43	31	22	38	27	19	33	24	17				
			Exposed	77	74	51	77	71	43	77	61	38	74	52	35	72	45	31	63	41	29	55	37	26	43	31	22	37	27	19	32	23	25	28	20	22	25	18	19	22	24	17			
		7-20	Interior	78	78	75	78	78	72	78	78	61	78	74	50	78	71	43	78	61	39	76	52	35	69	40	30	52	35	26	41	30	22	36	26	19	32	23	17	28	20	23			
			Exposed	78	71	42	78	59	38	74	48	34	71	41	31	60	38	28	51	34	25	43	31	23	36	26	20	31	23	25	27	20	22	23	17	19	21	23	17	18	20	15			
20-27		Interior	83	83	82	83	83	78	83	80	74	83	77	71	83	74	60	83	71	50	83	61	43	78	45	36	74	37	31	65	32	27	52	28	23	43	25	21	38	22	18				
		Exposed	83	74	60	83	69	48	82	56	41	79	47	37	76	41	34	73	37	31	70	34	28	53	29	24	42	25	20	36	21	18	32	19	23	28	25	21	25	22	18				
27-45	Interior	86	86	86	86	86	83	86	86	79	86	83																																	

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)																																									
				Roof Wind Zone																																									
				90			95			100			105			110			115			120			130			140			150			160			170			180					
				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	102	102	102	102	102	102	102	102	101	102	102	96	102	102	92	102	101	88	102	97	84	102	90	78	97	84	73	91	79	61	86	74	53	81	68	47	77	59	42			
			Exposed	102	102	91	102	100	87	102	95	82	102	91	79	101	87	75	97	84	72	93	80	64	86	75	54	80	66	46	75	57	40	71	49	35	60	44	31	53	39	41			
		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	
			Exposed	102	102	88	102	97	83	102	92	79	102	87	75	98	83	72	93	79	62	89	76	56	82	64	48	76	55	41	66	48	35	57	42	31	50	37	41	45	33	37			
		20-27	Interior	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	
			Exposed	103	103	98	103	102	92	103	96	87	103	91	83	103	87	79	103	83	75	100	79	72	92	73	58	86	60	49	80	52	43	76	45	37	71	40	33	60	35	29			
	27-45	Interior	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103		
		Exposed	103	103	103	103	103	99	103	94	103	99	89	103	94	85	99	90	81	94	86	78	86	80	72	80	75	59	74	65	51	63	57	45	56	50	40	49	44	35					
	10	B	0-7	Interior	102	102	94	102	102	89	102	98	85	102	93	81	102	89	77	99	86	74	95	82	71	88	77	57	82	72	49	77	60	42	73	52	37	63	46	33	56	41	29		
				Exposed	102	89	77	98	85	73	93	81	65	89	77	58	85	74	53	82	71	48	79	62	44	73	53	37	62	45	32	54	39	42	47	34	37	41	30	32	37	41	29		
			7-20	Interior	102	102	91	102	100	86	102	94	81	102	90	77	101	85	74	96	81	65	92	78	60	84	72	50	78	58	43	73	50	37	60	44	33	53	39	29	47	35	39		
				Exposed	101	85	74	95	80	64	89	76	57	85	73	52	81	63	47	77	58	43	74	53	39	61	45	33	52	38	28	45	33	37	40	29	33	35	39	29	31	34	26		
20-27			Interior	103	103	101	103	103	95	103	99	90	103	94	85	103	89	81	103	85	77	103	81	74	95	75	61	88	63	52	82	55	45	77	48	40	73	42	35	64	37	31			
			Exposed	103	89	81	103	84	76	101	79	73	96	76	62	92	72	56	88	62	51	84	57	47	78	48	40	73	41	34	61	36	30	53	31	39	47	42	35	42	37	31			
27-45		Interior	103	103	103	103	103	102	103	103	97	103	102	92	103	97	88	102	93	84	97	89	80	89	82	74	81	76	61	75	67	52	64	57	45	56	50	40	49	44	35	44	39	31	
		Exposed	103	97	87	100	91	83	95	87	79	90	83	75	85	79	72	81	76	62	78	73	57	72	60	48	52	41	50	45	36	44	39	31	39	32	29	35	29	39	31				
20		B	0-7	Interior	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95		
				Exposed	95	95	91	95	95	87	95	85	92	95	81	79	95	87	75	95	84	72	93	80	64	86	75	54	80	66	46	75	57	40	71	49	35	60	44	31	53	39	41		
			7-20	Interior	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96
				Exposed	96	96	88	96	96	83	96	92	79	96	87	75	96	83	72	93	79	62	89	76	56	82	64	48	76	55	41	66	48	35	57	42	31	50	37	41	42	35	37		
	20-27		Interior	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
			Exposed	100	100	98	100	100	92	100	96	87	100	91	83	100	87	79	100	83	75	100	79	72	92	73	58	86	60	49	80	52	43	76	45	37	71	40	33	60	35	29			
	27-45	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		
		Exposed	102	102	102	102	102	99	102	102	102	102	102	99	102	94	85	99	90	81	94	86	78	86	80	72	80	75	59	74	65	51	63	57	45	56	50	40	49	44	35				
	10	C	0-7	Interior	95	95	94	95	95	89	95	95	85	95	93	81	95	89	77	95	86	74	95	82	71	88	77	57	82	72	49	77	60	42	73	52	37	63	46	33	56	41	29		
				Exposed	95	89	77	95	85	73	93	81	65	89	77	58	85	74	53	82	71	48	79	62	44	73	53	37	62	45	32	54	39	42	47	34	37	41	30	32	37	41	29		
			7-20	Interior	96	96	91	96	96	86	96	94	81	96	86	79	96	85	74	96	81	65	92	78	60	84	72	50	78	58	43	73	50	37	60	44	33	53	39	29	47	35	39		
				Exposed	96	85	74	95	80	64	89	76	57	85	73	52	81	63	47	77	58	43	74	53	39	61	45	33	52	38	28	45	33	37	40	29	33	35	39	29	31	34	26		
20-27			Interior	100	100	100	100	100	95	100	99	90	100	94	85	100	89	81	100	85	77	100	81	74	95	75	61	88	63	52	82	55	45	77	48	40	73	42	35	64	37	31			
			Exposed	100	89	81	100	84	76	100	79	73	96	76	62	92	72	56	88	62	51	84	57	47	78	48	40	73	41	34	61	36	30	53	31	39	47	42	35	42	37	31			
27-45	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				
	Exposed	102	97	87	100	91	83	95	87	79	90	83	75	85	79	72	81	76	62	78	73	57	72	60	48	52	41	50	45	36	44	39	31	39	32	29	35	29	39	31					
20	D	0-7	Interior	95	95	86	95	94	82	95	90	78	95	86	74	95	82	71	91	79	61	87	76	56	81	70	48	76	58	41	71	50	35	60	44	31	53	38	41	47	34	37			
			Exposed	95	82	71	90	78	60	86	75	54	82	72	49	79	62	44	76	57	40	73	52	37	60	44	31	52	38	40	45	33	35	39	29	31	34	38	27	31	34	24			
		7-20	Interior	96	96	83	96	91	78	96	86	74	96	82	68	91	78	60	87	75	54	83	71	50	77	57	42	71	49	36	58	42	31	50	37	41	44	32	36	39	29	32			
			Exposed	91	78	59	86	74	53	82	64	48	78	58	43	74	53	39	68	48	36	60	44	33	51	37	42	44	32	36	38	42	31	33	37	27	29	32	24	39	29	24			
		20-27	Interior	101	101	91																																							

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

Table with 13 columns for wind speed (90-180 mph) and 13 columns for rail zone (1-3). Rows include ground snow load (60, 70, 80 psf), wind exposure, roof tilt angle, panel exposure, and wind direction (Interior/Exposed). Values represent maximum allowable rail spans in inches.

* Cells with an asterisks indicates that the L-foot must be oriented in the Y- direction as indicated in the image.
10 Highlighted cell indicate 3-rail system span. Contact Unirac Engineering Services for support.
19 Highlighted cell with strikethrough indicate 3-rail system span and module clamp allowable capacity exceeds with 3-rails. 4-Rail system required. Contact Unirac Engineering Services for support.



ASCE 7-22
Design Standard

II
Risk Category

30 ft
Roof Height

Ss = 3.00
Seismic

19 sq.ft
Module Area

LANDSCAPE
Orientation

CROSS-SLOPE
Rail Direction

NXT
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	1	2	3	1	2	3
0	B	0-7	Interior	102	102	102	102	102	102	102	102	102	101	102	102	96	102	102	92	102	101	88	102	97	84	102	90	78	97	84	73	91	79	61	86	74	53	81	68	47	77	59	42		
			Exposed	102	102	91	102	100	87	102	95	82	102	91	79	101	87	75	97	84	72	93	80	64	86	75	54	80	66	46	75	57	40	71	49	35	60	44	31	53	39	41			
		7-20	Interior	102	102	102	102	102	102	102	102	98	102	102	98	102	102	88	102	98	84	102	94	81	102	86	74	94	80	62	87	74	54	81	64	47	76	56	42	72	50	37			
			Exposed	102	102	88	102	97	83	102	92	79	102	87	75	98	83	72	93	79	62	89	76	56	82	64	48	76	55	41	66	48	35	57	42	31	50	37	41	45	33	37			
		20-27	Interior	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	98	103	98	89	103	98	89	103	90	82	103	83	76	98	77	65	92	72	57	87	67	51	50	82	54	45
			Exposed	103	103	98	103	102	92	103	96	87	103	91	83	103	87	79	103	83	75	100	79	72	92	73	58	86	60	49	80	52	43	76	45	37	71	40	33	60	35	29			
	27-45	Interior	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	98	98	91	82	92	85	77	86	80	75	60	76	71	54	
		Exposed	103	103	103	103	103	99	103	94	103	99	89	103	94	85	99	90	81	94	86	78	86	80	72	80	75	59	74	65	51	63	57	45	56	50	40	49	44	35					
	C	0-7	Interior	102	102	94	102	102	89	102	98	85	102	93	81	102	89	77	99	86	74	95	82	71	88	77	57	82	72	49	77	60	42	73	52	37	63	46	33	56	41	29			
			Exposed	102	89	77	98	85	73	93	81	65	89	77	58	85	74	53	82	71	48	79	62	44	73	53	37	62	45	32	54	39	42	47	34	37	41	30	32	37	41	29			
		7-20	Interior	102	102	91	102	100	86	102	94	81	102	90	77	101	85	74	96	81	65	92	78	60	84	72	50	78	58	43	73	50	37	60	44	33	53	39	29	47	35	39			
			Exposed	101	85	74	95	80	64	89	76	57	85	73	52	81	63	47	77	58	43	74	53	39	61	45	33	52	38	28	45	33	37	40	29	33	35	39	29	31	34	26			
20-27		Interior	103	103	101	103	103	95	103	99	90	103	94	85	103	89	81	103	85	77	103	81	74	95	75	61	88	63	52	82	55	45	77	48	40	73	42	35	64	37	31				
		Exposed	103	89	81	103	84	76	101	79	73	96	76	62	92	72	56	88	62	51	84	57	47	78	48	40	73	41	32	61	36	30	53	31	39	47	42	35	42	37	31				
27-45	Interior	103	103	103	103	103	102	103	103	97	103	102	92	103	97	88	102	93	84	97	89	80	89	82	74	81	76	61	75	67	52	64	57	45	56	50	49	44	35	44	39	31			
	Exposed	103	97	87	100	91	83	95	87	79	90	83	75	85	79	72	81	76	62	78	73	57	72	60	48	74	52	41	50	45	36	44	39	31	39	35	42	34	37	37					
D	0-7	Interior	102	100	86	102	94	82	102	90	78	100	86	74	95	82	71	91	79	61	87	76	56	81	70	48	76	58	41	71	50	35	60	44	31	53	38	41	47	34	37				
		Exposed	95	82	71	90	78	60	86	75	54	82	72	49	79	62	44	76	57	40	73	52	37	60	44	31	52	38	40	45	33	35	39	29	31	34	38	27	31	34	24				
	7-20	Interior	102	96	83	102	91	78	102	86	74	96	82	68	91	78	60	87	75	54	83	71	50	77	57	42	71	49	36	58	42	31	50	37	41	44	32	36	39	29	32				
		Exposed	91	78	59	86	74	53	82	64	48	78	58	43	74	53	39	68	48	36	60	44	33	51	37	42	44	32	36	38	42	31	33	37	27	29	32	24	39	29	24				
	20-27	Interior	103	101	91	103	95	86	103	90	82	103	85	78	103	81	74	98	78	67	94	74	60	87	61	51	81	53	43	76	46	38	71	40	33	60	35	29	53	31	39				
		Exposed	103	81	74	97	77	64	92	73	57	88	63	52	84	57	47	81	52	43	77	47	39	72	40	33	59	35	29	51	30	37	44	40	33	39	35	29	35	31	26				
27-45	Interior	103	103	99	103	103	93	103	98	88	102	93	84	97	89	80	92	85	77	88	82	74	81	76	61	75	67	52	64	57	45	56	50	49	44	35	44	35	44	39	31				
	Exposed	97	88	80	91	84	76	86	80	72	82	76	62	78	73	57	74	65	52	71	59	47	56	50	40	48	43	34	42	38	30	37	33	39	32	29	35	29	39	31					
10	B	0-7	Interior	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95		
			Exposed	95	95	91	95	85	97	95	85	92	95	91	79	95	87	75	95	84	72	93	80	64	86	75	54	80	66	46	75	57	40	71	49	35	60	44	31	53	39	41			
		7-20	Interior	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96
			Exposed	96	96	88	96	96	83	96	92	79	96	87	75	96	83	72	93	79	62	89	76	56	82	64	48	76	55	41	66	48	35	57	42	31	50	37	42	45	33	37			
		20-27	Interior	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
			Exposed	100	100	98	100	100	92	100	96	87	100	91	83	100	87	79	100	83	75	100	79	72	92	73	58	86	60	49	80	52	43	76	45	37	71	40	33	60	35	29			
	27-45	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		
		Exposed	102	102	102	102	102	99	102	102	94	102	99	89	102	94	85	99	90	81	94	86	78	86	80	72	80	75	59	74	65	51	63	57	45	56	50	40	49	44	35				
	C	0-7	Interior	95	95	94	95	95	89	95	95	85	95	93	81	95	89	77	95	86	74	95	82	71	88	77	57	82	72	49	77	60	42	73	52	37	63	46	33	56	41	29			
			Exposed	95	89	77	95	85	73	93	81	65	89	77	58	85	74	53	82	71	48	79	62	44	73	53	37	62	45	32	54	39	42	47	34	37	41	30	32	37	41	29			
		7-20	Interior	96	96	91	96	96	86	96	94	81	96	86	74	96	81	65	92	78	60	84	72	50	78	58	43	73	50	37	60	44	33	53	39	29	47	35	39						
			Exposed	96	85	74	95	80	64	89	76	57	85	73	52	81	63	47	77	58	43	74	53	39	61	45	33	52	38	28	45	33	37	40	29	33	35	39	29	31	34	26			
20-27		Interior	100	100	100	100	100	95	100	99	90	100	94	85	100	89	81	100	85	77	100	81	74	95	75	61	88	63	52	82	55	45	77	48	40	73	42								

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

Table with columns for Wind Exposure Category, Roof Tilt Angle (deg), Panel Exposure, Basic Wind Speed (mph), and Roof Wind Zone. It contains a grid of numerical values representing allowable rail spans in inches.

* Cells with an asterisks indicates that the L-foot must be oriented in the Y- direction as indicated in the image.
10 Highlighted cell indicate 3-rail system span. Contact Unirac Engineering Services for support.
19 Highlighted cell with strikethrough indicate 3-rail system span and module clamp allowable capacity exceeds with 3-rails. 4-Rail system required. Contact Unirac Engineering Services for support.



ASCE 7-22
Design Standard

II
Risk Category

30 ft
Roof Height

Ss = 3.00
Seismic

23 sq.ft
Module Area

LANDSCAPE
Orientation

CROSS-SLOPE
Rail Direction

NXT
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															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	1	2	3	1	2	3																									
0	B	0-7	Interior	101	101	101	101	101	101	101	101	100	101	101	95	101	101	91	101	101	87	101	96	83	101	89	77	96	83	72	90	78	60	85	74	52	80	65	46	76	58	41	58	41	43	36	41	28																				
			Exposed	101	101	91	101	99	86	101	94	82	101	90	78	100	86	75	96	83	72	92	80	62	85	74	53	79	64	45	75	55	39	68	48	34	58	43	30	52	38	41	28	24	36	30	25	36	30																			
			Interior	102	102	102	102	102	102	102	102	102	102	102	102	87	102	102	87	102	87	92	102	93	80	101	85	74	93	79	64	61	86	74	53	80	62	46	76	55	41	71	58	43	36	41	28																					
		7-20	Exposed	102	102	87	102	96	82	102	91	78	102	86	74	97	82	71	92	78	60	88	75	55	81	63	47	75	54	40	64	47	35	56	41	30	49	36	40	44	32	36	40	44	32	36	30	25																				
			Interior	102	102	102	102	102	102	102	102	102	102	102	102	87	102	97	102	102	102	92	102	97	88	102	89	81	102	82	75	97	77	64	91	72	56	86	59	49	81	53	44	43	36	30	25																					
			Exposed	102	102	87	102	96	82	102	91	78	102	86	74	97	82	71	92	78	60	88	75	55	81	63	47	75	54	40	64	47	35	56	41	30	49	36	40	44	32	36	40	44	32	36	30	25																				
			Interior	102	102	102	102	102	102	102	102	102	102	102	102	87	102	97	102	102	102	92	102	97	88	102	89	81	102	82	75	97	77	64	91	72	56	86	59	49	81	53	44	43	36	30	25																					
			Exposed	102	102	97	102	101	91	102	95	86	102	90	82	102	86	78	102	82	74	99	78	71	92	72	56	85	58	48	80	51	42	75	44	37	69	39	32	59	35	43	36	30	25																							
			20-27	Interior	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	99	103	103	95	103	97	87	98	90	81	91	84	76	85	79	71	79	75	59	75	68	52	45	38	30	25																			
		Exposed		103	103	103	103	103	98	103	93	103	98	88	103	93	84	97	89	81	93	86	77	85	79	72	79	74	58	73	63	50	62	55	44	54	49	39	48	43	34	30	25																									
		Interior		101	101	93	101	101	88	101	97	84	101	92	80	101	88	77	98	85	73	94	82	68	87	76	56	81	71	48	76	58	41	72	51	36	62	45	32	55	40	43	36	30	25																							
		Exposed		101	88	76	97	84	73	92	80	63	88	77	57	84	74	52	81	69	47	78	61	43	73	52	37	61	44	31	52	38	41	46	34	36	40	45	32	36	40	48	36	30	25																							
	7-20	Interior		102	102	90	102	99	85	102	93	80	102	89	76	100	84	73	95	81	64	91	77	58	83	71	49	77	57	42	72	49	37	59	43	32	52	38	43	46	34	38	30	25																								
		Exposed		100	84	73	94	80	62	89	76	56	84	72	50	80	62	46	76	56	42	73	52	38	60	44	32	51	37	42	44	32	36	39	43	32	34	38	43	30	34	25																										
		Interior	102	102	100	102	102	94	102	98	89	102	93	84	102	88	80	102	84	76	102	80	73	94	74	59	87	62	51	82	53	44	77	47	39	73	41	34	62	37	30	25																										
	27-45	Exposed	102	88	80	102	83	76	100	79	72	95	75	61	91	71	55	87	61	50	83	56	46	77	47	39	72	40	33	60	35	29	52	31	38	46	41	34	41	36	30	25																										
		Interior	103	103	103	103	103	101	103	103	96	103	100	91	103	96	87	101	92	83	96	88	79	88	81	73	81	76	61	75	71	53	65	58	46	57	52	41	51	46	36	30	25																									
		Exposed	103	96	86	99	91	82	94	86	78	89	82	74	84	79	70	80	75	60	77	72	55	71	59	47	56	51	40	49	44	35	43	38	31	38	34	41	34	30	36	30	25																									
		0-7	Interior	101	99	85	101	94	81	101	89	77	99	85	74	94	82	68	90	78	60	87	75	55	80	66	47	75	56	40	69	49	35	58	43	30	51	38	40	46	33	36	30	25																								
			Exposed	94	81	67	89	78	59	85	74	53	81	70	48	78	61	43	75	56	39	72	51	36	59	43	31	51	37	40	44	32	34	38	42	36	34	37	26	45	33	24																										
			Interior	102	95	82	102	90	77	101	85	74	95	81	64	90	77	58	86	74	53	82	67	49	76	55	41	65	48	35	56	41	31	49	36	40	43	32	36	38	43	32	36	30	25																							
	7-20	Exposed	90	77	58	85	73	52	81	63	47	77	57	42	73	51	38	64	47	35	59	43	32	50	36	41	43	31	35	37	41	30	32	36	27	43	32	23	38	28	24																											
		Interior	102	100	90	102	94	85	102	89	81	102	84	77	102	80	73	97	77	64	93	73	59	86	60	50	80	51	43	75	45	37	69	39	32	58	34	43	52	31	38	30	25																									
		Exposed	102	80	73	96	76	62	91	72	56	87	61	51	83	56	46	80	51	42	77	46	38	71	39	33	57	34	42	50	29	37	43	39	32	38	34	28	34	30	25																											
		20-27	Interior	103	103	97	103	102	92	103	97	87	101	92	83	96	88	79	91	84	76	87	81	73	80	75	60	74	64	51	62	56	44	54	49	39	48	43	34	43	38	30	25																									
			Exposed	95	88	79	90	83	75	85	79	72	81	76	61	77	72	55	74	64	50	65	58	46	55	49	39	47	42	34	41	37	44	36	32	39	32	43	34	42	38	30	25																									
			27-45	Interior	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	89	97	79	95	83	72	90	78	60	85	74	52	80	65	46	76	58	41	58	41	43	36	30	25																			
	Exposed	95		95	91	95	95	86	95	84	82	95	80	95	90	78	95	86	75	95	83	72	92	80	62	85	74	53	79	64	45	75	55	39	68	48	34	58	43	30	52	38	41																									
	7-20	Interior		95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	89	97	79	95	83	72	90	78	60	85	74	52	80	65	46	76	58	41	71	49	36	41																						
		Exposed		95	95	87	95	95	82	95	91	78	95	86	74	95	82	71	92	78	60	88	75	55	81	63	47	75	54	40	64	47	35	56	41	30	49	36	40	44	32	36	30	25																								
		Interior		99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99																						
	20-27	Exposed		99	99	97	99	99	91	99	95	86	99	90	82	99	86	78	99	82	74	99	78	71	92	72	56	85	58	48	80	51	42	75	44	37	69	39	32	59	35	43																										
		27-45	Interior	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	99	102	97	87	98	90	81	91	84	76	85	79	71	79	75	59	75	68	52	45	38	30	25																						
			Exposed	102	102	102	102	102	98	102	93	102	98	88	102	93	84	97	89	81	93	86	77	85	79	72	79	74	58	73	63	50	62	55	44	54	49	39	48	43	34	30	25																									
			27-45	Interior	95	95	93	95	95	88	95	84	95	95	84	95	95	82	95	80	95	88	77	95	85	73	94	82	68	77	95	83	72	90	78	60	85	74	52	80	65	46	76	58	41	58	41	43	36	30	25																	
		Exposed		95	88	76	95	84	73	92	80	63	88	77																																																						

