

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 7-10 Sec 30.4.2
- Exposure Category B, C, or D
- Basic Wind Speed = 90 – 180 mph
- Level terrain. Topographic factor, $k_{zt} = 1.0$

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

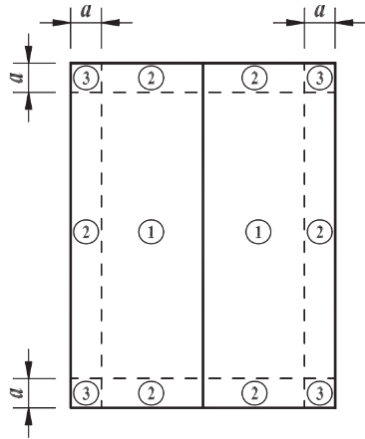
- 0.2-s Spectral Response Acceleration
- $S_s = 1.25$ and 3 per criteria shown on individual span tables sheets.
- $S_1 = 0.5$
- Seismic site class D

Array Assumptions

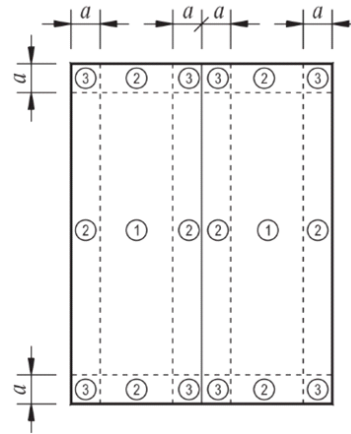
- Module orientation and Rail direction per criteria shown on individual span tables sheets.
- Maximum module dimensions of 40.1" x 67" (~19 sq.ft, 47.65 lbs) and 41" x 80" (~23 sq.ft, 58.6 lbs) per criteria shown on individual span tables sheets.
- Minimum distance between modules and roof edge is at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

Span Tables

Zone should be considered as per ASCE 7-10, Fig. 30.4-2A to 30.4-2D

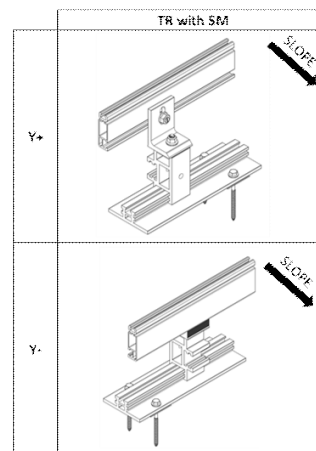


Gable Roofs $\theta \leq 7^\circ$



Gable Roofs $7^\circ < \theta \leq 45^\circ$

Rails can be installed in these possible orientations.





Ground Snow Load (psf)		Wind Exposure Category	Roof Tilt Angle (deg)	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	127	127	127	127	127	124	127	127	117	127	127	95	127	123	81	127	118	70	127	109	61	126	85	48	119	70	40	109	58	35	93	49	30	81	42	27	71	37	36	
		7-27	127	127	119	127	127	110	127	127	96	127	127	85	127	122	76	127	117	68	127	109	62	127	87	51	124	72	43	117	61	37	105	52	32	91	45	29	80	40	25	
		27-45	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	118	118	113	103	103	106	88	88	95	76	76	82	66	66	72	58	58
	C	0-7	127	126	90	127	120	75	127	115	64	127	96	55	126	85	48	122	75	42	118	67	39	102	54	33	86	45	28	74	38	24	64	34	32	56	30	28	49	26	25	
		7-27	127	125	82	127	119	72	127	113	64	127	98	57	127	87	51	126	78	46	122	70	42	115	57	35	97	48	30	82	41	26	71	36	35	62	31	30	55	28	27	
		27-45	128	128	128	128	128	128	124	124	124	121	121	121	118	118	118	115	111	111	99	99	103	83	83	87	70	71	64	60	60	64	52	52	55	45	45	49	40	40		
D	0-7	127	117	68	127	101	58	127	87	50	122	77	43	118	68	39	112	60	35	101	54	32	84	44	27	71	37	35	61	32	31	53	28	27	46	25	24	41	33	21		
	7-27	127	116	67	127	102	59	127	89	52	127	79	47	123	70	42	118	63	38	114	57	35	94	47	30	80	39	25	68	34	33	59	30	29	52	26	26	45	35	29		
	27-45	126	126	126	122	122	122	119	119	115	113	113	112	100	100	107	90	90	103	82	82	85	68	68	72	58	58	61	49	49	53	43	43	46	38	38	40	33	33			
10	B	0-7	113	113	113	113	113	113	113	113	113	113	95	113	113	81	113	113	70	113	109	61	113	85	48	113	70	40	109	58	35	93	49	30	81	42	27	71	37	36		
		7-27	126*	126*	114	126*	126*	110	126*	126*	96	126*	126*	85	126*	114	76	126*	114	68	126*	109	62	126*	87	51	114	72	43	114	61	37	105	52	32	91	45	29	80	40	25	
		27-45	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	118*	118*	113*	103	103	106	88	88	95	76	76	82	6					



• 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.

10 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.



30 ft
Roof Height

18.66 sq.ft

Module Area

CROSS-SLOPE

Rail Direction

UAF

Clamp

Tile Replacement

Attachment

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)	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	127	127	127	127	127	127	124	127	127	117	127	127	95	127	123	81	127	118	70	127	109	61	126	85	48	119	70	40	109	58	35	93	49	30	81	42	27	71	37	24
		7-27	127	127	119	127	127	110	127	127	96	127	128	127	85	127	122	76	127	117	68	127	109	62	127	87	51	124	72	43	117	61	37	105	52	32	91	45	29	80	40	25
		27-45	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	126	126	126	126	123	123	123	118	118	118	113	103	103	106	88	88	95	76	76	82	66	66	72	58
	C	0-7	127	126	90	127	120	75	127	115	64	127	96	55	126	85	48	122	75	42	118	67	39	102	54	33	86	45	28	74	38	24	64	34	21	56	30	28	49	26	25	
		7-27	127	125	82	127	119	72	127	113	64	127	98	57	127	87	51	126	78	46	122	70	42	115	57	35	97	48	30	82	41	26	71	36	23	62	31	20	55	28	27	
		27-45	128	128	128	128	128	128	124	124	124	121	121	121	118	118	118	111	111	111	99	99	103	83	83	87	70	70	74	60	60	64	52	52	55	45	45	49	40	40		
D	0-7	127	117	68	127	101	58	127	87	50	122	77	43	118	68	39	112	60	35	101	54	32	84	44	27	71	37	23	61	32	20	53	28	27	46	25	24	41	22	21		
	7-27	127	116	67	127	102	59	127	89	52	127	79	47	123	70	42	118	63	38	114	57	35	94	47	30	80	39	25	68	34	22	59	30	29	52	26	26	45	23	23		
	27-45	126	126	126	122	122	122	119	119	119	115	113	113	110	107	90	90	103	82	82	85	68	68	72	58	58	61	49	49	53	43	43	46	38	38	40	33	33				
10	B	0-7	113	113	113	113	113	113	113	113	113	113	95	113	113	81	113	113	70	113	109	61	113	85	48	113	70	40	109	58	35	93	49	30	81	42	27	71	37	24		
		7-27	126*	126*	114	126*	126*	110	126*	126*	96	126*	126*	85	126*	114	76	126*	114	68	126*	109	62	126*	87	51	114	72	43	114	61	37	105	52	32	91	45	29	80	40	25	
		27-45	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	123*	118*	118*	118*	113*	103	103	106	88	88	95	76	76	82	66	66	72	58	58	
	C	0-7	113	113	90	113	113	75	113	113	64	113	96	55	113	85	48	113	75	42	113	67	39	102	54	33	86	45	28	74	38	24	64	34	21	56	30	28	49	26	25	
		7-27	126*	125*	82	126*	114	72	126*	113	64	126*	98	57	126*	87	51	126*	78	46	114	70	42	114	57	35	97	48	30	82	41	26	71	36	23	62	31	20	55	28	27	
		27-45	123*	123*	123*	123*	123*	123*	123*	123*	123*	121*	121*	121*	118*	118*	118*	115*	111*	111*	112*	99	99	103	83	83	87	70	70	74	60	60	64	52	52	55	45	45	49	40	40	
D	0-7	113	113	68	113	101	58	113	87	50	113	77	43	113	68	39	112	60	35	101	54	32	84	44	27	71	37	23	61	32	20	53	28	27	46	25	24	41	22	21		
	7-27	114	114	67	114	102	59	114	89	52	114	79	47	114	70	42	114	63	38	114	57	35	94	47	30	80	39	25	68	34	22	59	30	29	52	26	26	45	23	23		
	27-45	126*	126*	126*	122*	122*	122*	119*	119*	119*	116*	113	113	112	100	100	107	90	90	103	82	82	85	68	68	72	58	58	61	49	49	53	43	43	46	38	38	40	33	33		
20	B	0-7	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	70	95	95	61	95	85	48	95	70	40	95	58	35	93	49	30	81	42	27	71	37	24		
		7-27	96*	96*	96*	96*	96*	96*	96*	96*	96*	96*	96*	85	96*	96*	76	96*	96*	68	96*	96*	62	96*	88*	51	96*	72	43	96*	61	37	95*	52	32	91*	45	29	80	40	25	
		27-45	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	88*	88*	90*	76	76	82*	66	66	72	58	58	
	C	0-7	95	95	90	95	95	75	95	95	64	95	95	55	95	85	48	95	75	42	95	67	39	95	54	33	86	45	28	74	38	24	64	34	21	56	30	28	49	26	25	
		7-27	96*	96*	82	96*	96*	72	96*	96*	64	96*	96*	57	96*	87	51	96*	78	46	96*	70	42	96*	57	35	94*	48	30	82	41	26	71	36	23	62	31	20	55	28	27	
		27-45	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*	90*
D	0-7	95	95	68	95	95	58	95	87	50	95	77	43	95	68	39	95	60	35	95	54	32	84	44	27	71	37	23	61	32	20	53	28	27	46	25	24	41	22	21		
	7-27	96*	96*	67	96*	96*	59	96*	90*	52	96*	79	47	96*	63	38	96*	57	35	94*	47	30	80	39	25	68	34	22	59	30	29	52	26	26	45	23	23					
	27-45	96*	96*	96*	96*	96*	96*	96*	96*	96*	96*	96*	96*	96*	96*	96*	96*	96*	96*	90*	96*	96*	82	82	85	68	68	72	58	58	61	49	49	53	43	43	46	38	38	40	33	33
30	B	0-7	93	93	93	93	93	93	93	93	93	93	93	93	93	93	93	93	93	70	93	93	61	93	85	48	93	70	40	93	58	35	93	49	30	81	42	27	71	37	24	
		7-27	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	68*	71*	71*	62	71*	71*	51	71*	71*	43	71*	61	37	71*	52	32	71*	45	29	71*	40	25	
		27-45	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	
	C	0-7	93	93	90	93	93	75	93	93	64	93	93	55	93	85	48	93	75	42	93	67	39	93	54	33	86	45	28	74	38	24	64	34	21	56	30	28	49	26	25	
		7-27	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	71*	
		27-45	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	66*	
D	0-7	95	95	68	95	95	58	95	87	50	95	77	43	95	68	39	95	60	35	95	54	32	84	44	27	71	37	23	61	32	20	53	28	27	46	25	24	41	22	21		
	7-27	78*	78*	67	78*	78*	59	78*	78*	52	78*	78*	47	78*	63	38	78*	57	35	78*	47	30	78*	39	25	68	34	22	59	30	29	52	26	26	45	23	23					
	27-45	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*	72*		
40	B	0-7	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	70	85	85	61	85	85	48	85	70	40	85	58	35	85	49	30	81	42	27	71	37	24	
		7-27	56*	56*	56*	56*	56*	56*	56*	56*	56*	56*	56*	56*	56*	56*	56*	56*	56*	56*	56*	56*	56*	56*	51*	56*	56*	43	56*	56*	37	56*	52*	32	56*	45	29	56*	40	25		
		27-45	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	52*	
	C	0-7	85	85	85	85	85	75	85	85	64	85	85	55	85	85	48	85	75	42	85	67	39	85	54	33	85	45	28	74	38	24	64	34	21	56	30	28	49	26	25	
		7-27	56*	56*	56*	56*	56*	56*	56*	56*	56*																															

* Cells with an astrisks 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.

~~10~~ 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.



• 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.

16 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.



30 ft

Roof Height

Ss = 1.25
Seismic

22.78 sq.ft
Module Area

ORIENTATION

CROSS-SLO
Rail Direction

SM
Rail Type

UAF

Clamp

Tile Replacement

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

[illegible]

* Cells with an astrisks 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.

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.



Category
II

30 ft
Roof Height

$$S_s = 1.25$$

Seismic

22.78 sq.ft

Module Area

LANDSCAPE

Orientation

CROSS-SLOPE
Rail Direction

SM
Rail Type

UAF

Clamp

Tile Replacement

Attachment

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

[illegible]

* Cells with an asterisk 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.

10 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.



• Cells with an asterisk 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.

~~10~~ 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.



30 ft
Roof Height

Ss = 3.00

22.78 sq.ft

Module Area

ORIENTATION

CROSS-SLOPE
Rail Direction

SM
Rail Type

UAF

Clamp

Tile Replacement

SPAN TABLES

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

[illegible]

* Cells with an asterisk 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.

10 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.



30 ft
Roof Height

S_s = 3.00
Seismic

22.78 sq.ft

LANDSCAPE

CROSS-SLOPE

SM
Rail Type

UAF

Tile Replacement

SPAN TABLES

[illegible]

* Cells with an asterisk indicates that the L-foot must be oriented in the Y- direction as indicated in the image.

