

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

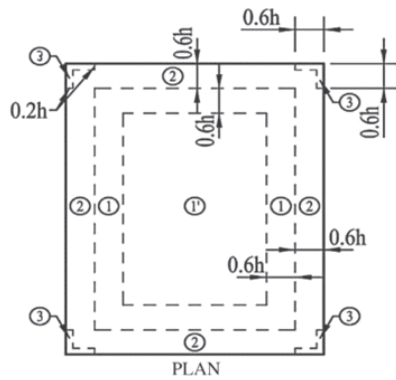
- 0.2-s Spectral Response Acceleration
- $S_s = 1.25$ and 3 with $S_{ds} = 1, 2.4$ respectively per criteria shown on individual span tables sheets.
- $S_1 = 0.5$ & $S_{d1} = 0.6$
- Seismic site class D

Array Assumptions

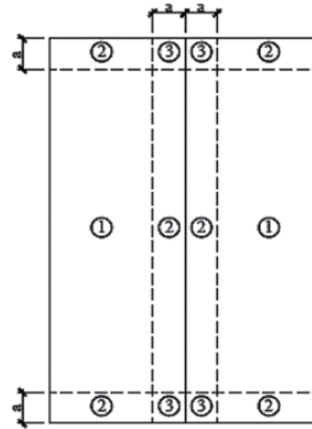
- Module orientation and Rail direction per criteria shown on individual span tables sheets.
- Maximum module dimensions of 40.1” x 67” (~19 sq.ft, 47.65 lbs) and 41” x 80” (~23 sq.ft, 58.6 lbs) per criteria shown on individual span tables sheets.
- Minimum distance between modules and roof edge is at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

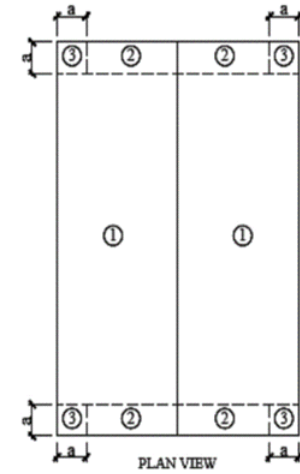
Zone should be considered as per ASCE 7-22, Fig. 30.3-2A to 30.3-2D



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

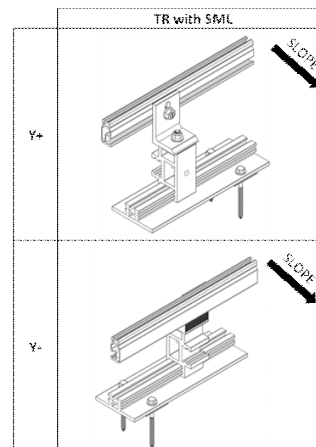


Gable Roofs $7^\circ < \theta \leq 27^\circ$



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

Rails can be installed in these possible orientations.



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

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																																				
30	B	0-7	Interior	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	58	61	61	53	61	59	47	61	54	40	61	50	35	57	44	31																																							
			Exposed	61	61	61	61	61	61	61	61	61	61	61	59	61	61	55	61	52	61	60	49	61	55	40	60	50	34	55	42	30	51	37	39	45	32	35	39	43	31																																								
		Exposed	61	61	61	61	61	61	61	61	59	61	59	61	55	61	52	61	59	48	61	56	42	61	50	35	55	41	30	50	35	40	42	31	35	37	41	31	33	37	27	27																																							
		Exposed	70*	70*	70*	70*	70*	70*	70*	70*	70*	67*	70*	62	70*	66*	58	70*	62	55	70*	53	43	66*	46	37	60	38	32	55	34	42	51	30	37	46	40	33																																											
		Exposed	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	65*	67*	67*	67*	64*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*	67*																																						
		Exposed	61	61	57	61	61	53	61	50	61	50	61	57	44	61	54	39	61	51	36	59	48	33	53	39	42	48	34	36	40	29	31	35	38	27	31	34	24	41	30	24																																							
	Exposed	61	61	53	61	60	50	61	56	42	61	52	38	61	49	35	57	43	32	54	39	44	47	33	37	39	43	32	34	37	28	29	32	24	39	29	24	35	25	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.

⚠ 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.

[illegible]

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

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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.

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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

SML
Rail Type

PRO SERIES
Clamp

Tile Replacement
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	97	97	97	97	97	97	97	97	97	95	97	97	91	97	97	87	97	96	83	97	92	80	97	85	73	92	80	65	86	75	60	81	68	56	77	63	53	72	59	50
			Exposed	97	97	86	97	95	82	97	90	78	97	86	74	96	83	69	92	79	65	88	76	62	81	68	57	76	62	52	69	58	60	64	54	56	60	51	53	56	59	50	
		7-20	Interior	98	98	98	98	98	98	98	98	92	98	98	87	98	97	83	98	92	79	98	88	76	96	81	66	88	75	61	82	66	57	76	62	53	70	58	50	64	54	58	
			Exposed	98	97	83	98	91	78	98	86	74	97	82	68	92	78	63	88	75	61	84	69	58	77	62	53	68	57	49	62	53	56	58	50	53	55	57	50	52	54	46	
		20-27	Interior	98	98	98	98	98	98	98	98	98	98	98	98	97	98	98	92	98	97	88	98	92	84	98	85	77	98	78	68	93	71	62	87	64	58	82	60	55	77	57	52
			Exposed	98	98	92	98	96	87	98	90	82	98	86	78	98	81	74	98	78	68	95	74	64	87	64	59	81	60	54	76	55	50	69	52	58	64	60	54	60	56	51	
	27-45	Interior	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	95	99	99	99	99	99	92	83	93	86	77	86	80	70	80	75	64	76	68	60	68	63	56	
		Exposed	99	99	99	99	99	93	99	98	88	99	93	84	97	89	80	92	85	77	88	82	73	81	76	64	75	67	59	66	62	55	61	58	52	58	54	60	54	51	56		
	C	0-7	Interior	97	97	89	97	97	84	97	93	80	97	88	76	97	85	72	94	81	67	90	78	63	83	71	58	78	64	54	72	60	50	65	56	58	61	52	54	58	61	51	
			Exposed	97	84	72	93	80	66	88	77	62	84	72	59	81	67	56	78	64	54	75	61	51	66	56	58	61	52	54	57	59	50	53	55	45	61	52	49	57	49	35	
		7-20	Interior	98	98	85	98	94	81	98	89	76	98	84	71	95	80	65	90	77	62	86	72	60	79	64	55	72	59	51	64	55	58	60	51	54	56	59	51	53	56	47	
			Exposed	95	80	65	89	76	62	84	70	58	80	64	55	76	61	53	71	59	50	66	56	59	60	52	54	56	59	50	52	55	45	60	51	40	56	47	35	53	42	31	
20-27		Interior	98	98	95	98	98	89	98	93	84	98	88	80	98	84	76	98	80	71	97	76	66	90	67	60	83	61	56	78	57	52	72	53	60	65	50	56	62	58	53		
		Exposed	98	84	76	98	79	70	95	75	64	91	88	61	87	64	58	83	61	55	79	58	53	73	54	60	65	50	55	60	57	52	56	53	48	53	50	42	50	46	38		
27-45	Interior	99	99	99	99	99	96	99	99	91	99	96	86	99	91	82	95	87	79	91	84	76	83	78	66	77	71	61	69	64	57	63	60	53	59	56	50	56	53	58			
	Exposed	99	91	82	94	86	78	89	82	74	84	78	68	80	75	64	76	70	61	72	65	58	63	60	53	59	56	49	55	52	57	51	59	53	59	56	50	56	53	45			
D	0-7	Interior	97	94	81	97	90	77	97	85	73	94	81	67	90	78	63	86	75	60	83	70	58	77	63	53	70	59	60	64	54	56	60	51	53	56	59	49	53	55	45		
		Exposed	90	78	63	85	74	60	81	68	57	78	64	54	74	61	51	70	58	60	65	56	57	60	51	53	55	58	49	52	54	43	59	51	37	56	46	38	52	41	29		
	7-20	Interior	98	91	78	98	85	73	96	81	66	91	77	63	86	72	60	82	67	57	78	63	54	70	58	50	63	54	57	59	50	53	55	57	50	51	54	44	59	51	40		
		Exposed	86	72	59	81	65	56	77	62	53	72	59	51	66	56	59	63	53	56	60	51	54	55	58	50	51	53	44	58	50	38	54	46	38	51	39	29	48	36	26		
	20-27	Interior	98	95	86	98	89	81	98	84	77	98	80	72	97	76	66	93	72	62	89	66	60	82	60	55	77	56	51	70	52	58	64	60	54	60	56	51	56	53	48		
		Exposed	97	76	65	92	70	62	87	64	58	83	61	56	79	58	53	76	56	51	72	53	59	64	49	55	59	56	51	55	52	46	51	48	40	59	43	36	56	31			
27-45	Interior	99	99	93	99	97	88	99	92	83	96	88	79	91	84	76	86	80	71	82	77	66	76	69	60	67	63	56	62	58	52	58	54	60	54	51	56	51	59	53			
	Exposed	90	84	75	85	79	69	81	76	64	77	70	61	72	65	58	66	62	55	63	59	53	58	55	60	54	51	55	50	58	52	57	54	48	54	51	42	51	47	38			
10	B	0-7	Interior	91	91	91	91	91	91	91	91	91	91	91	91	91	91	87	91	91	83	91	80	91	85	73	91	80	65	86	75	60	81	68	56	77	63	53	72	59	50		
			Exposed	91	91	86	91	91	82	91	90	78	91	86	74	91	83	69	91	79	65	88	76	62	81	68	57	76	62	52	69	58	60	64	54	56	60	51	53	56	59	50	
		7-20	Interior	91	91	91	91	91	91	91	91	91	91	91	87	91	91	83	91	80	91	79	91	88	76	91	81	66	88	75	61	82	66	57	76	62	53	70	58	50	64	54	58
			Exposed	91	91	83	91	91	78	91	86	74	91	82	68	91	78	63	88	75	61	84	69	58	77	62	53	68	57	49	62	53	56	58	50	53	55	57	50	52	54	46	
		20-27	Interior	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	85	77	95	78	68	93	71	62	87	64	58	82	60	55	77	57	52		
			Exposed	95	95	92	95	95	87	95	90	82	95	86	78	95	81	74	95	78	68	95	74	64	87	64	59	81	60	54	76	55	50	69	52	58	64	60	54	60	56	51	
	27-45	Interior	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	92	83	93	86	77	86	80	70	80	75	64	76	68	60	68	63	56			
		Exposed	98	98	98	98	98	93	98	88	98	98	93	84	97	89	80	92	85	77	88	82	73	81	76	64	75	67	59	66	62	55	61	58	52	58	54	60	54	51	56		
	C	0-7	Interior	91	91	89	91	91	84	91	91	80	91	88	76	91	85	72	91	81	67	90	78	63	83	71	58	78	64	54	72	60	50	65	56	58	61	52	54	58	61	51	
			Exposed	91	84	72	91	80	66	88	77	62	84	72	59	81	67	56	78	64	54	75	61	51	66	56	58	61	52	54	57	59	50	53	55	45	61	52	49	57	49	35	
		7-20	Interior	91	91	85	91	91	81	91	89	76	91	84	71	91	80	65	90	77	62	86	72	60	79	64	55	72	59	51	64	55	58	60	51	54	56	59	51	53	56	47	
			Exposed	91	80	65	89	76	62	84	70	58	80	64	55	76	61	53	71	59	50	66	56	59	60	52	54	56	59	50	52	55	45	60	51	40	56	47	35	53	42	31	
20-27		Interior	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	85	77	95	78	68	93	71	62	87	64	58	82	60	55	77	57	52			
		Exposed	95	84	76	95	79	70	95	75	64	91	88	61	87	64	58	83	61	55	79	58	53	73	54	60	65	50	55	60	57	52	56	53	48	53	50	42	50	46	38		
27-45	Interior	98	98	98	98	98	96	98	98	91	98	96	86	98	91	82	95	87	79	91	84	76	83	78	66	77	71	61	69	64	57	63	60	53	59	56	50	56	53	58			
	Exposed	98	91	82	94	86</																																					

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ASCE 7-22
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30 ft
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Ss = 1.25
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23 sq.ft
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SPAN TABLES

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

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				90			95			100			105			110			115			120			130			140			150			160			170			180																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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				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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
60	B	0-7	Interior	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64

[illegible]

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

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	1	2	3	1	2	3	1	2	3																																																																																																									
0	B	0-7	Interior	83	83	83	83	83	83	83	83	83	79	83	83	83	76	83	83	72	83	80	68	83	77	64	82	71	58	77	64	53	72	59	47	66	54	40	61	50	35	57	44	31	31	31	31	31	31	31	31	31	31	31	31	31																																																																																																							
			Exposed	83	83	72	83	79	67	83	76	63	83	72	59	80	68	55	77	64	52	74	60	49	66	55	40	60	50	34	55	42	30	51	37	39	45	32	35	39	43	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31																																																																																																						
		Exposed	83	80	68	83	76	63	83	72	59	80	67	55	77	63	52	73	59	48	69	56	42	61	50	35	55	41	30	50	35	40	42	31	35	37	41	31	31	33	37	41	31	31	37	41	31	31	37	41	31	31	37	41	31	31	37	41	31	31																																																																																																			

[illegible]

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

[illegible]

10 Highlighted cell indicate 3-rail system span. Contact Unirac Engineering Services for support.

[illegible]

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

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							
0	B	0-7	Interior	98	98	98	98	98	98	98	98	96	98	98	92	98	98	87	98	97	84	98	93	80	98	86	74	93	80	66	87	76	61	82	69	57	77	64	54	73	60	50	
			Exposed	98	98	87	98	96	83	98	91	79	98	87	75	97	83	70	92	80	65	89	77	62	82	70	57	77	63	53	70	59	49	64	55	57	60	51	53	57	48	50	
		7-20	Interior	98	98	98	98	98	98	98	98	98	98	98	98	98	98	84	98	93	80	98	89	77	97	82	68	89	76	62	83	68	57	77	62	54	71	58	50	64	55	58	
			Exposed	98	98	84	98	92	79	98	87	75	98	83	69	93	79	64	89	75	61	85	70	59	78	63	54	70	58	50	63	54	57	59	50	53	55	58	50	52	55	46	
		20-27	Interior	99	99	99	99	99	99	99	99	99	99	99	99	99	99	93	99	89	99	93	85	99	85	78	99	79	70	94	73	63	88	65	59	83	61	55	78	57	52		
			Exposed	99	99	93	99	97	88	99	91	83	99	86	79	99	82	75	99	79	69	96	75	64	88	65	59	82	60	55	77	56	51	70	52	59	64	49	55	61	57	52	
	27-45	Interior	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	96	99	99	91	99	93	84	86	78	87	81	72	81	76	65	76	70	61	70	64	57		
		Exposed	99	99	99	99	99	94	99	99	89	99	94	85	98	90	81	93	86	78	89	82	74	82	76	65	76	69	60	67	63	56	62	59	52	58	55	49	55	52	57		
	C	0-7	Interior	98	98	90	98	98	85	98	94	81	98	89	77	98	85	73	95	82	68	91	79	64	84	72	59	79	65	55	73	60	51	66	56	58	62	53	55	58	50	52	
			Exposed	98	85	73	94	81	67	89	77	63	85	74	60	82	69	57	78	64	54	75	62	52	67	57	59	61	52	54	57	49	51	53	56	46	50	53	44	58	50	36	
		7-20	Interior	98	98	86	98	95	81	98	90	77	98	85	73	96	81	67	91	77	63	87	74	60	80	64	55	73	60	51	65	55	59	61	52	55	57	49	51	54	56	48	
			Exposed	96	81	66	90	77	62	85	71	59	81	65	56	77	62	53	73	59	51	67	57	49	61	52	55	56	59	51	52	55	46	49	52	44	57	48	36	53	43	32	
20-27		Interior	99	99	96	99	99	90	99	94	85	99	89	81	99	85	77	99	81	73	98	77	67	91	68	61	84	62	56	79	58	52	74	54	49	67	51	57	62	59	53		
		Exposed	99	84	77	99	80	71	96	76	65	92	70	62	87	65	59	84	62	56	80	59	54	74	54	49	66	50	56	61	57	52	57	54	49	53	50	43	50	46	38		
27-45	Interior	99	99	99	99	99	97	99	99	99	92	99	97	87	99	92	83	96	88	80	92	85	76	87	81	72	83	78	67	77	70	61	68	63	56	62	59	52	58	55	49	53	
	Exposed	99	92	83	95	87	79	90	83	75	85	79	69	81	76	64	77	71	61	73	66	59	64	61	54	59	56	50	55	52	57	52	49	54	48	50	56	53	46				
D	0-7	Interior	98	95	82	98	90	78	98	86	74	95	82	68	91	79	64	87	76	61	84	72	59	78	64	54	71	59	50	65	55	57	60	51	53	57	59	50	53	56	46		
		Exposed	91	79	64	86	75	60	82	69	57	79	65	54	75	62	52	71	59	50	66	56	58	61	52	54	56	59	50	52	55	44	49	51	58	56	48	34	53	42	30		
	7-20	Interior	98	92	79	98	86	74	97	82	68	92	78	63	87	74	60	83	68	57	79	64	55	72	59	51	64	54	57	59	51	54	55	58	50	52	55	46	49	51	49	51	40
		Exposed	87	73	60	82	67	57	78	63	54	73	59	51	67	57	49	63	54	57	60	52	55	56	58	50	51	54	45	59	50	39	55	46	34	52	49	30	49	36	27		
	20-27	Interior	99	96	87	99	90	82	99	85	78	99	81	73	98	77	67	94	73	63	90	67	60	83	61	56	77	57	51	71	53	59	64	49	55	60	57	52	57	54	49		
		Exposed	98	77	67	93	71	62	88	65	59	84	62	56	80	59	54	77	56	51	73	54	49	65	49	55	60	56	51	56	52	47	52	49	44	36	56	39	32				
27-45	Interior	99	99	94	99	98	89	99	93	84	97	89	80	92	85	76	87	81	72	83	78	67	77	70	61	68	63	56	62	59	52	58	55	49	55	52	57	52	49	53			
	Exposed	92	84	76	86	80	70	82	76	65	78	71	62	73	66	59	67	63	56	64	60	54	58	55	49	54	51	56	50	59	52	58	55	49	54	52	48	51	49	39			
10	B	0-7	Interior	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	86	74	92	80	66	87	76	61	82	69	57	77	64	54	73	60	50			
			Exposed	92	92	87	92	92	83	92	91	79	92	87	75	92	83	70	92	80	65	89	77	62	82	70	57	77	63	53	70	59	49	64	55	57	60	51	53	57	48	50	
		7-20	Interior	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	86	74	92	80	66	87	76	61	82	69	57	77	64	54	73	60	50			
			Exposed	92	92	84	92	92	79	92	87	75	92	83	69	92	79	64	89	75	61	85	70	59	78	63	54	70	58	50	63	54	57	59	50	53	55	58	50	52	55	46	
		20-27	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	
			Exposed	96	96	93	96	96	88	96	91	83	96	86	79	96	82	75	96	69	69	96	75	64	88	65	59	82	60	55	77	56	51	70	52	59	64	49	55	61	57	52	
	27-45	Interior	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98		
		Exposed	98	98	98	98	98	94	98	98	89	98	94	85	98	90	81	93	86	78	89	82	74	82	76	65	76	69	60	67	63	56	62	59	52	58	55	49	55	52	57		
	C	0-7	Interior	92	92	90	92	92	85	92	92	81	92	89	77	92	85	73	92	82	68	91	79	64	84	72	59	79	65	55	73	60	51	66	56	58	62	53	55	58	50	52	
			Exposed	92	85	73	92	81	67	89	77	63	85	74	60	82	69	57	78	64	54	75	62	52	67	57	59	61	52	54	57	49	51	53	56	46	50	53	44	58	50	36	
		7-20	Interior	92	92	86	92	92	81	92	90	77	92	85	73	92	81	67	91	77	63	87	74	60	80	64	55	73	60	51	65	55	59	61	52	55	57	49	51	54	56	48	
			Exposed	92	81	66	90	77	62	85	71	59	81	65	56	77	62	53	73	59	51	67	57	49	61	52	55	56	59	51	52	55	46	49	52	44	57	48	36	53	43	32	
20-27		Interior	96	96	96	96	96	90	96	94	85	96	89	81	96	85	77	96	81	73	96	77	67	91	68	61	84	62	56	79	58	52	74	54	49	67	51	57	62	59	53		
		Exposed	96	84	77	96	80	71	96	76	65	92	70	62	87	65	59	84	62	56	80	59	54	74	54	49	66	50	56	61	57	52	57	54	49	53	50	43	50	46	38		
27-45	Interior	98	98	98	98	98	97	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98			
	Exposed	98	92	83	95	87	79	90	83	75	85	79	69	81	76	64	77	71	61	73	66	59	64	61	54	59	56	50	55	52	57	52	49	54	48	50	56	53	46				
D	0-7	Interior	92	92																																							

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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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				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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
30	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	77</



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

SML
Rail Type

PRO SERIES
Clamp

Tile Replacement
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)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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60	B	0-7	Interior	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64

[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.

40 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.

[illegible]

Highlighted cell indicate 3-rail system span. 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.

[illegible]

* Cells with an asterisk indicates that the L-root 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.

40 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.

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

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.

[illegible]

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

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

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[illegible]

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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	98	98	98	98	98	98	98	98	98	98	98	98	89	98	98	85	98	94	81	98	91	78	97	84	70	90	78	63	85	72	59	79	65	55	75	61	52	69	58	49								
			Exposed	98	98	85	98	98	93	80	88	89	76	98	85	72	94	81	66	90	78	63	98	75	60	80	66	55	74	61	51	67	57	47	62	53	41	58	50	51	55	45	48								
		Exposed	98	95	81	98	89	77	98	84	71	95	80	65	90	76	62	86	71	59	82	66	56	75	60	52	65	56	47	61	52	41	57	48	51	53	43	48	50	38	43										
		Exposed	99	99	90	99	94	85	99	88	80	99	84	76	99	80	70	97	76	65	93	71	62	86	63	57	80	58	53	74	54	49	66	51	43	62	46	38	58	41	50										
		Exposed	99	99	97	99	99	92	99	96	87	99	91	82	95	87	79	90	83	75	86	80	70	79	74	62	72	65	58	64	60	54	60	57	50	56	53	46	53	50	41										
		Exposed	96	83	69	91	79	64	87	75	60	83	70	57	79	65	55	76	62	52	72	59	50	64	55	43	59	51	52	55	45	49	52	40	43	48	51	38	43	47	33										
	Exposed	93	78	63	87	74	60	82	67	57	78	63	54	74	60	51	68	57	49	64	55	45	59	50	38	54	44	49	51	38	43	46	50	38	41	45	38	51	40	36											

10 Highlighted cell indicate 3-rail system span. 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.

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.

[illegible]

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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.

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[illegible]

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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.

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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.

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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.

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* 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.

40 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.

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.

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.

[illegible]

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

[illegible]

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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.

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

[illegible]

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