

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

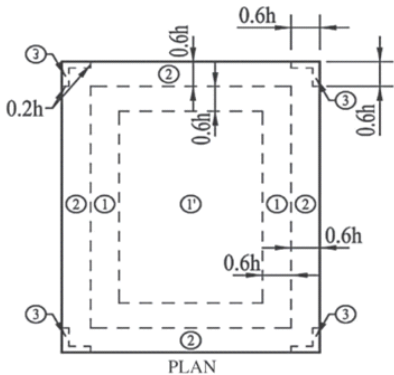
- 0.2-s Spectral Response Acceleration
- $S_S = 1.25$ and 3 with $S_{ds} = 1, 2.4$ respectively per criteria shown on individual span tables sheets.
- $S_1 = 0.5$ & $S_{d1} = 0.6$
- Seismic site class D

Array Assumptions

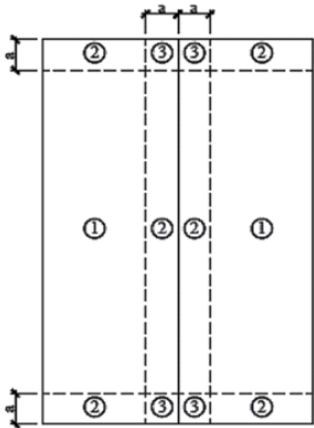
- Module orientation and Rail direction per criteria shown on individual span tables sheets.
- Maximum module dimensions of 40.1” x 67” (~19 sq.ft, 47.65 lbs) and 41” x 80” (~23 sq.ft, 58.6 lbs) per criteria shown on individual span tables sheets.
- Minimum distance between modules and roof edge is at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

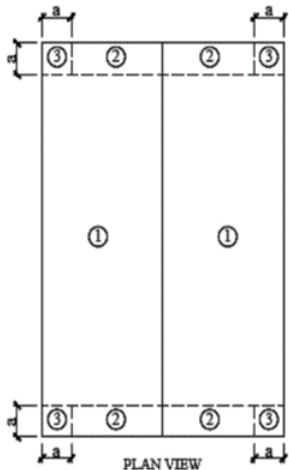
Zone should be considered as per ASCE 7-22, Fig. 30.3-2A to 30.3-2D



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

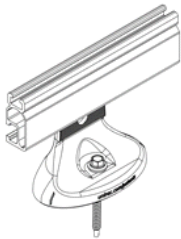


Gable Roofs $7^\circ < \theta \leq 27^\circ$



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

Rails can be installed in these possible orientations.

*Flashloc Comp	
Y+	
Y-	Alternate orientation not allowed

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	
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	55	61	61	43	61	57	37	61	47	32	61	40	29	52	36	25			
			Exposed	61	61	61	61	61	61	61	61	61	61	61	56	61	61	49	61	61	42	61	61	39	61	48	33	61	40	28	49	34	24	41	30	32	36	26	28	32	23	25	
		7-20	Interior	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	46	58	38	61	46	33	61	39	29	50	34	25	41	30	22			
			Exposed	61	61	61	61	61	61	61	61	61	61	56	61	61	47	61	61	41	61	57	37	61	49	34	61	39	29	48	33	25	40	29	21	35	25	28	30	22	25	27	30
		20-27	Interior	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	64	68	67	48	68	52	40	68	42	35	68	37	30	65	33	27		
			Exposed	68	68	68	68	68	68	68	68	68	68	66	68	68	66	68	68	56	68	66	47	68	56	41	68	42	35	68	36	30	60	31	26	49	27	23	41	24	30	37	21
	27-45	Interior	74* 74* 74* 74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	64	74*	64	74*	69	51	69	59	42	60	48	37	48	41	32	
		Exposed	74* 74* 74* 74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	74*	69	74*	74*	63	74*	70	54	70	59	42	58	47	36	45	39	31	38	34	27	34	30	24	30	27	32	
40	B	0-7	Interior	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	
			Exposed	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
50	B	0-7	Interior	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	
			Exposed	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50

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

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[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.