

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 7-16 Sec 29.4.4 with Provisions from SEAOC PV2-2017
- 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 7-16, 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

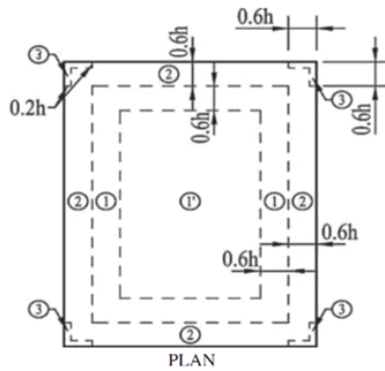
- 0.2-s Spectral Response Acceleration, $S_S \leq 3$
- $S_S = 1.25$ and 3 per criteria shown on individual span tables sheets.
- $S_1 = 0.5$
- Seismic site class D

Array Assumptions

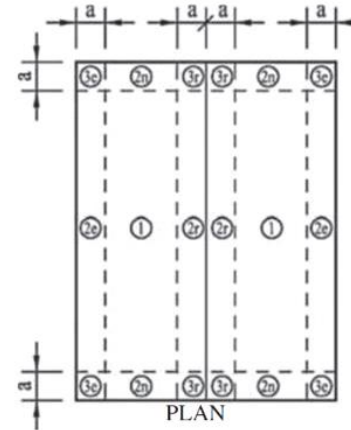
- Module orientation and Rail direction per criteria shown on individual span tables sheets.
- Maximum module dimensions of 40.1" x 67" (~19 sq.ft, 47.65 lbs) and 41" x 80" (~23 sq.ft, 58.6 lbs) per criteria shown on individual span tables sheets.
- Minimum distance between modules and roof edge is at 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.
- 'Exposed' spans as defined in ASCE 7-16 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 7-16, Fig. 30.3-2A to 30.3-2D



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

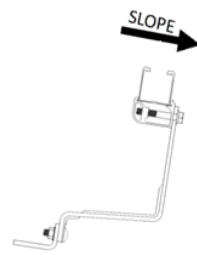


Gable Roofs $7^\circ < \theta \leq 45^\circ$

Grouping of ASCE 7-16 Roof Zones (Gable and Flat)

- **Roof Tilt 0° - 7°**
 - Roof Zone 1 = 1
 - Roof Zone 2 = 2
 - Roof Zone 3 = 3
- **Roof Tilt 7° - 27°**
 - Roof Zone 1 = 1, 2e
 - Roof Zone 2 = 2n, 2r, 3e
 - Roof Zone 3 = 3r
- **Roof Tilt 27° - 45°**
 - Roof Zone 1 = 1, 2e, 2r
 - Roof Zone 2 = 2n, 3r
 - Roof Zone 3 = 3e

Rails can be installed in these possible orientations.

	*CT5
Y+	Alternate orientation not allowed
Y-	

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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ASCE 7-16
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

Solarhooks CT5
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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[illegible]

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

* 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.

* 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]

* 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)																																											
				Roof Wind Zone																																											
				90			95			100			105			110			115			120			130			140			150			160			170			180							
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0	B	0-7	Interior	74	74	74	74	74	74	74	74	74	74	73	74	74	70	74	74	68	74	74	65	74	69	61	74	65	52	70	62	41	66	56	34	63	46	28	30	60	39	27					
			Exposed	74	74	70	74	67	74	73	64	74	70	62	74	67	59	74	65	51	71	63	44	66	57	35	62	45	30	59	37	26	48	32	34	40	28	30	34	25	27						
		7-20	Interior	74	74	74	74	74	74	74	74	74	74	71	74	74	68	74	71	66	74	68	63	71	64	59	67	60	44	64	48	35	60	37	30	54	32	27	46	29	36						
			Exposed	74	74	68	74	70	65	74	67	62	72	64	60	69	62	51	67	60	43	65	51	37	61	38	31	53	32	26	44	27	34	37	24	30	32	32	26	29	28	23					
		20-27	Interior	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	73	69	75	68	65	75	64	61	71	61	50	67	52	39	64	41	32	62	35	27					
			Exposed	75	75	75	75	75	75	71	75	72	68	75	69	65	75	66	63	75	64	60	72	62	55	68	53	39	64	40	31	61	33	26	54	29	22	46	25	28	39	34	24				
	C	0-7	Interior	74	74	72	74	74	69	74	74	66	74	72	63	74	69	61	74	67	58	73	64	50	68	60	38	64	50	32	61	41	28	53	34	36	44	30	32	37	27	28					
			Exposed	74	69	61	74	66	55	72	63	46	69	61	39	66	57	34	64	49	31	62	43	29	54	34	24	43	29	31	35	25	27	30	34	24	27	30	24	36	26	19					
		7-20	Interior	74	74	70	74	72	67	74	69	64	74	66	61	71	64	59	68	61	49	66	59	41	62	43	33	58	34	28	48	29	24	40	26	32	35	34	28	31	30	25					
			Exposed	71	64	58	68	61	47	65	54	38	63	45	64	61	38	30	57	34	28	51	31	25	41	26	32	34	34	28	29	29	24	26	26	21	34	29	19	30	20	17					
		20-27	Interior	75	75	75	75	75	74	75	74	70	75	71	67	75	68	65	75	66	62	74	63	60	70	59	45	66	45	34	62	35	28	59	31	24	50	27	31	43	24	26					
			Exposed	75	68	65	75	65	62	73	62	58	70	60	47	68	52	39	65	44	34	63	38	30	59	31	24	49	27	30	41	35	25	35	31	21	31	27	19	27	24	17					
D	0-7	Interior	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76					
		Exposed	76	76	76	76	76	76	76	76	76	71	76	75	68	76	72	66	74	69	63	72	67	61	67	63	52	63	58	40	59	46	32	45	37	28	36	32	24	32	28	31					
	7-20	Interior	74	74	72	74	74	69	74	74	66	74	72	63	74	69	61	74	67	58	73	64	50	70	62	43	68	60	38	64	49	31	60	39	27	50	33	35	41	28	31	34	25	27	31	34	24
		Exposed	73	64	50	70	62	42	67	59	35	64	50	32	62	44	29	60	38	26	53	34	24	41	29	31	34	25	26	29	32	28	26	28	20	34	25	18	30	22	16	16					
	20-27	Interior	66	59	42	64	48	35	61	39	31	58	34	28	51	31	26	45	28	35	40	26	32	33	33	27	46	28	36	38	25	31	33	33	27	29	29	24	26	26	21	21					
		Exposed	75	75	72	75	72	68	75	69	65	75	66	63	74	64	60	72	61	53	69	59	44	65	44	33	61	34	27	56	30	23	47	26	29	40	35	25	35	31	21	21					
27-45	Interior	74	64	60	71	61	50	68	55	41	66	46	34	63	39	30	61	34	27	59	31	24	48	26	29	39	34	24	33	30	26	29	26	18	26	29	16	34	20	14	14						
	Exposed	76	76	75	76	76	71	76	75	68	76	72	66	74	69	63	71	67	61	66	64	58	53	53	43	43	43	34	35	35	29	31	31	24	28	28	32	25	25	28	28	28					
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		20-27	Interior	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69			
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			Exposed	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	52	52			
		7-20	Interior	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	52	52			
			Exposed	52	52	52	52	52	47	52	52	38	52	45	34	52	38	30	52	34	28	51	31	25	41	26	32	34	34	28	29	29	24	26	26	21	34	29	19	30	20	17					
		20-27	Interior	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69				
			Exposed	69	68	65	69	65	62	69	62	58	69	60	47	68	52	39	65	44	34	63	38	30	59	31	24	49	27	30	41	35	25	35	31	21	31	27	19	27	24	17					
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	74	74	74	74	74	74	74	74	74	74	74	74	74					
	Exposed	74	74	68	74	71	65	73	68	62	70	65	60	67	63	51	64	60	44	62	55	38	53	42	30	39	34	25	33	29	32	29	26	27	25	34	24	34	30	21	21						
D	0-7	Interior	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	52					
		Exposed	52	52	50	52	52	42	52	35	52	50	32	52	44	29	52	38	26	52	35	52	42	32	52	33	27	46	28	36	38	25	31	33	33	27	29	29	24	26	26	21	21				
	7-20	Interior	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	52	52				
		Exposed	52	52	42	52	48	35	52	39	31	52	34	28	51	31	26	45	28	35	40	26	32	33	33	27	46	28	36	38	25	31	33	33	27	29	29	24	26	26	21	21					
	20-27	Interior	70	70	70	70	70	68	70	69	65	70	66	63																																	

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

* 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-foot must be oriented in the Y- direction as indicated in the image.



ASCE 7-16
Design Standard

II
Risk Category

30 ft
Roof Height

Ss = 1.25
Seismic

23 sq.ft
Module Area

LANDSCAPE
Orientation

CROSS-SLOPE
Rail Direction

NXT
Rail Type

NXT COMBO
Clamp

Solarhooks CT5
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	101	101	101	101	101	101	101	101	96	101	101	96	101	101	91	101	101	87	101	96	83	101	92	79	99	85	74	92	80	69	86	75	65	81	70	62	77	67	59	73	64	53		
			Exposed	101	100	86	101	95	82	101	90	78	100	86	74	96	82	71	92	79	68	88	76	66	81	71	62	76	66	58	71	63	51	67	60	44	64	55	59	62	49	52					
		7-20	Interior	102	102	102	102	102	98	102	102	92	102	97	87	102	92	83	102	87	79	97	83	76	88	77	70	83	71	65	78	66	62	74	63	59	70	61	52	67	56	47					
			Exposed	102	91	83	102	86	78	94	81	74	89	77	71	86	74	67	82	71	65	80	68	63	74	63	59	70	60	52	66	54	45	63	47	59	61	60	52	56	56	46					
		20-27	Interior	102	102	102	102	102	102	102	102	102	102	102	102	99	102	100	94	102	95	89	102	91	85	102	84	78	94	78	72	88	72	67	84	68	63	79	64	60	76	62	54				
			Exposed	102	100	94	102	94	88	102	89	83	102	85	79	98	81	75	93	77	71	90	74	68	84	68	63	79	64	60	74	61	51	71	57	43	67	50	37	64	45	50					
	27-45	Interior	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	98	103	103	94	103	101	90	102	92	83	93	86	77	86	80	72	80	75	68	75	71	64	71	67	61			
		Exposed	103	103	98	103	103	93	103	98	88	103	93	84	98	89	80	93	85	77	88	82	73	81	76	68	75	70	64	70	66	61	65	63	54	63	60	47	60	56	41						
	C	0-7	Interior	101	101	89	101	98	85	101	93	80	101	89	77	99	85	73	95	82	70	91	78	68	84	73	63	78	68	60	74	64	54	69	62	47	66	59	60	63	52	56					
			Exposed	99	85	73	94	81	70	89	77	66	85	74	64	81	71	62	78	68	60	75	65	57	70	62	48	65	58	60	62	50	54	59	44	47	53	58	42	47	52	37					
		7-20	Interior	102	95	86	102	89	81	99	84	77	92	80	73	88	76	70	85	73	67	82	70	64	77	65	61	72	62	55	68	58	48	65	51	42	62	45	56	60	59	50					
			Exposed	88	76	70	84	72	66	80	69	63	77	65	61	74	63	59	72	61	55	69	60	50	65	51	42	62	44	55	58	57	48	51	50	42	62	44	37	59	40	33					
20-27		Interior	102	102	97	102	98	91	102	92	86	102	88	81	102	83	77	97	80	74	93	76	71	86	71	65	81	66	61	76	63	56	72	60	47	69	54	40	66	48	57						
		Exposed	101	83	77	96	79	73	91	75	69	87	71	66	84	68	63	81	65	61	78	63	59	73	60	48	69	53	39	65	46	53	62	60	42	59	53	37	53	48	33						
27-45	Interior	103	103	102	103	103	96	103	102	91	103	97	87	102	92	83	96	88	79	92	84	76	84	78	70	77	73	66	72	68	62	68	64	59	64	62	51	58	58	44							
	Exposed	101	92	83	95	87	78	90	83	74	85	79	71	81	75	68	77	72	65	74	69	63	68	65	59	64	61	50	61	58	42	56	50	44	48	44	48	44	59	41							
D	0-7	Interior	101	95	82	101	90	78	100	86	74	95	82	71	91	79	68	87	76	65	84	73	63	78	68	60	73	64	53	68	61	46	65	56	59	62	49	53	59	44	47						
		Exposed	91	79	68	86	75	65	82	71	62	78	68	60	75	66	57	72	63	52	69	62	48	65	57	60	62	49	52	58	61	45	50	56	40	44	49	36	59	44	34						
	7-20	Interior	102	86	79	94	82	74	89	77	71	85	74	67	82	70	64	79	67	63	76	65	61	71	61	54	67	56	46	64	49	60	61	43	53	57	47	51	50	42							
		Exposed	82	70	64	78	66	62	75	64	60	72	62	55	69	60	50	67	55	46	65	51	42	61	43	54	56	46	46	49	48	40	61	42	36	57	37	34	50	33	28						
	20-27	Interior	102	95	88	102	89	83	102	84	78	98	80	74	93	77	71	89	73	68	86	70	65	80	65	61	76	62	54	71	59	45	68	51	38	65	45	52	62	60	42						
		Exposed	93	76	71	88	72	67	85	69	64	81	66	61	78	64	59	75	62	53	73	60	47	68	52	38	64	45	50	61	58	40	57	51	35	51	45	34	62	40	28						
27-45	Interior	103	103	93	103	98	88	103	93	84	97	89	80	92	85	76	87	81	73	83	78	70	77	72	65	71	67	61	66	64	56	62	61	48	55	55	41	50	50	58							
	Exposed	92	84	76	86	80	72	82	76	69	78	73	66	74	63	71	67	61	68	64	59	63	61	49	60	56	41	54	48	55	47	61	45	42	56	38	56	50	33								
10	B	0-7	Interior	90	90	90	90	90	90	90	90	90	90	90	90	90	90	87	90	90	83	90	79	90	85	74	90	80	69	86	75	65	81	70	62	77	67	59	73	64	53						
			Exposed	90	90	86	90	90	82	90	78	90	86	74	90	82	71	90	79	68	88	76	66	81	71	62	76	66	58	71	63	51	67	60	44	64	55	59	62	49	52						
		7-20	Interior	91	91	91	91	91	91	91	91	91	91	91	87	91	83	91	87	79	91	83	76	88	77	70	83	71	65	78	66	62	74	63	59	70	61	52	67	56	47						
			Exposed	91	91	83	91	86	78	91	81	74	89	77	71	86	74	67	82	71	65	80	68	63	74	63	59	70	60	52	66	54	45	63	47	59	61	60	52	56	56	46					
		20-27	Interior	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	94	99	95	89	99	91	85	99	84	78	94	78	72	88	72	67	84	68	63	79	64	60	76	62	54
			Exposed	99	99	94	99	94	88	99	89	83	99	85	79	98	81	75	93	77	71	90	74	68	84	68	63	79	64	60	74	61	51	71	57	43	67	50	37	64	45	50					
	27-45	Interior	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	98	101	101	94	101	101	90	101	92	83	93	86	77	86	80	72	80	75	68	75	71	64	71	67	61					
		Exposed	101	101	98	101	101	93	101	98	88	101	93	84	98	89	80	93	85	77	88	82	73	81	76	68	75	70	64	70	66	61	65	63	54	63	60	47	60	56	41						
	C	0-7	Interior	90	90	89	90	90	85	90	90	80	90	89	77	90	85	73	90	82	70	90	78	68	84	73	63	78	68	60	74	64	54	69	62	47	66	59	60	63	52	56					
			Exposed	90	85	73	90	81	70	89	77	66	85	74	64	81	71	62	78	68	60	75	65	57	70	62	48	65	58	60	62	50	54	59	44	47	53	58	42	47	52	37					
		7-20	Interior	91	91	86	91	89	81	91	84	77	91	80	73	88	76	70	85	73	67	82	70	64	77	65	61	72	62	55	68	58	48	65	51	42	62	45	56	60	59	50					
			Exposed	88	76	70	84	72	66	80	69	63	77	65	61	74	63	59	72	61	55	69	60	50	65	51	42	62	44	55	58	57	48	51	50	42	62	44	37	59	40	33					
20-27		Interior	99	99	97	99	98	91	99	92	86	99	88	81	99	83	77	97	80	74	93	76	71	86	71	65	81	66	61	76	63	56	72	60	47	69	54	40	66	48	57						
		Exposed	99	83	77	96	79	73	91	75	69	87	71	66	84	68	63	81	65	61	78	63	59	73	60	48	69	53	39	65	46	53	62	60	42	59	53	37	53	48	33						
27-45	Interior	101	101	101	101	101	96	101	101	91	101																																				

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.

[illegible]

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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																																			

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

[illegible]

* 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.

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



ASCE 7-16
Design Standard

II
Risk Category

30 ft
Roof Height

Ss = 3.00
Seismic

23 sq.ft
Module Area

PORTRAIT
Orientation

CROSS-SLOPE
Rail Direction

NXT
Rail Type

NXT COMBO
Clamp

Solarhooks CT5
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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ASCE 7-16
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

Solarhooks CT5
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	101	101	101	101	101	101	101	101	96	101	101	96	101	101	91	101	101	87	101	96	83	101	92	79	99	85	74	92	80	69	86	75	65	81	70	62	77	67	59	73	64	53
			Exposed	101	100	86	101	95	82	101	90	78	100	86	74	96	82	71	92	79	68	88	76	66	81	71	62	76	66	58	71	63	51	67	60	44	64	55	59	62	49	52			
		7-20	Interior	102	102	102	102	102	98	102	102	92	102	97	87	102	92	83	102	87	79	97	83	76	88	77	70	83	71	65	78	66	62	74	63	59	70	61	52	67	56	47			
			Exposed	102	91	83	102	86	78	94	81	74	89	77	71	86	74	67	82	71	65	80	68	63	74	63	59	70	60	52	66	54	45	63	47	59	61	60	52	56	56	46			
		20-27	Interior	102	102	102	102	102	102	102	102	102	102	102	102	99	102	100	94	102	95	89	102	91	85	102	84	78	94	78	72	88	72	67	84	68	63	79	64	60	76	62	54		
			Exposed	102	100	94	102	94	88	102	89	83	102	85	79	98	81	75	93	77	71	90	74	68	84	68	63	79	64	60	74	61	51	71	57	43	67	50	37	64	45	50			
	27-45	Interior	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	98	103	103	94	103	101	90	102	92	83	93	86	77	86	80	72	80	75	68	75	71	64	71	67	61	
		Exposed	103	103	98	103	103	93	103	98	88	103	93	84	98	89	80	93	85	77	88	82	73	81	76	68	75	70	64	70	66	61	65	63	54	63	60	47	60	56	41				
	C	0-7	Interior	101	101	89	101	98	85	101	93	80	101	89	77	99	85	73	95	82	70	91	78	68	84	73	63	78	68	60	74	64	54	69	62	47	66	59	60	63	52	56			
			Exposed	99	85	73	94	81	70	89	77	66	85	74	64	81	71	62	78	68	60	75	65	57	70	62	48	65	58	60	62	50	54	59	44	47	53	58	42	47	52	37			
		7-20	Interior	102	95	86	102	89	81	99	84	77	92	80	73	88	76	70	85	73	67	82	70	64	77	65	61	72	62	55	68	58	48	65	51	42	62	45	56	60	59	50			
			Exposed	88	76	70	84	72	66	80	69	63	77	65	61	74	63	59	72	61	55	69	60	50	65	51	42	62	44	55	58	57	48	51	50	42	62	44	37	59	40	33			
		20-27	Interior	102	102	97	102	98	91	102	92	86	102	88	81	102	83	77	97	80	74	93	76	71	86	71	65	81	66	61	76	63	56	72	60	47	69	54	40	66	48	57			
			Exposed	101	83	77	96	79	73	91	75	69	87	71	66	84	68	63	81	65	61	78	63	59	73	60	48	69	53	39	65	46	53	62	60	42	59	53	37	53	48	33			
	D	0-7	Interior	103	103	103	103	103	96	103	102	91	103	97	87	102	92	83	96	88	79	92	84	76	84	78	70	77	73	66	72	68	62	68	64	59	64	62	51	58	58	44			
			Exposed	101	92	83	95	87	78	90	83	74	85	79	71	81	75	68	77	72	65	74	69	63	68	65	59	64	61	50	61	58	42	56	50	58	50	44	48	44	59	41			
		7-20	Interior	101	95	82	101	90	78	100	86	74	95	82	71	91	79	68	87	76	65	84	73	63	78	68	60	73	64	53	68	61	46	65	56	59	62	49	53	59	44	47			
			Exposed	91	79	68	86	75	65	82	71	62	78	68	60	75	66	57	72	63	52	69	62	48	65	57	60	62	49	52	58	61	45	50	56	40	44	49	36	59	44	34			
20-27		Interior	102	86	79	94	82	74	89	77	71	85	74	67	82	70	64	79	67	63	76	65	61	71	61	54	67	56	46	64	49	60	61	43	53	57	47	51	50	42					
		Exposed	82	70	64	78	66	62	75	64	60	72	62	55	69	60	50	67	55	46	65	51	42	61	43	54	56	46	49	48	40	61	42	36	57	37	31	50	33	28					
10	C	0-7	Interior	102	95	88	102	89	83	102	84	78	98	80	74	93	77	71	89	73	68	86	70	65	80	65	61	76	62	54	71	59	45	68	51	38	65	45	52	62	60	42			
			Exposed	93	76	71	88	72	67	85	69	64	81	66	61	78	64	59	75	62	53	73	60	47	68	52	38	64	45	50	61	58	40	57	51	35	51	45	31	62	40	28			
		7-20	Interior	103	103	93	103	98	88	103	93	84	97	89	80	92	85	76	87	81	73	83	78	70	77	72	65	71	67	61	66	64	56	62	61	48	55	55	41	50	50	58			
			Exposed	92	84	76	86	80	72	82	76	69	78	73	66	74	63	71	67	61	68	64	59	63	61	49	60	56	41	54	48	55	47	61	45	42	56	38	56	50	33				
		20-27	Interior	101	101	101	101	101	96	101	101	91	101	97	87	101	92	83	96	88	79	92	84	76	84	78	70	77	73	66	72	68	62	68	64	59	64	62	51	58	58	44			
			Exposed	101	92	83	95	87	78	90	83	74	85	79	71	81	75	68	77	72	65	74	69	63	68	65	59	64	61	50	61	58	42	56	50	58	50	44	48	44	59	41			
20	B	0-7	Interior	90	90	82	90	90	86	74	90	82	71	90	79	68	87	76	65	84	73	63	78	68	60	73	64	53	68	61	46	65	56	59	62	49	53	59	44	47					
			Exposed	90	79	68	86	75	65	82	71	62	78	68	60	75	66	57	72	63	52	69	62	48	65	57	60	62	49	52	58	61	45	50	56	40	44	49	36	59	44	34			
		7-20	Interior	91	86	79	91	82	74	89	77	71	85	74	67	82	70	64	79	67	63	76	65	61	71	61	54	67	56	46	64	49	60	61	43	53	57	47	51	50	42				
			Exposed	82	70	64	78	66	62	75	64	60	72	62	55	69	60	50	67	55	46	65	51	42	61	43	54	56	46	49	48	40	61	42	36	57	37	31	50	33	28				
		20-27	Interior	100	95	88	100	89	83	100	84	78	98	80	74	93	77	71	89	73	68	86	70	65	80	65	61	76	62	54	71	59	45	68	51	38	65	45	52	62	60	42			
			Exposed	93	76	71	88	72	67	85	69	64	81	66	61	78	64	59	75	62	53	73	60	47	68	52	38	64	45	50	61	58	40	57	51	35	51	45	31	62	40	28			
20	C	0-7	Interior	102	102	93	102	98	88	102	93	84	97	89	80	92	85	76	87	81	73	83	78	70	77	72	65	71	67	61	66	64	56	62	61	48	55	55	41	50	50	58			
			Exposed	92	84	76	86	80	72	82	76	69	78	73	66	74	63	71	67	61	68	64	59	63	61	49	60	56	41	54	48	55	47	61	45	42	56	38	56	50	33				
		7-20	Interior	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	69	71	71	65	71	70	62	71	67	59	71	64	53	
			Exposed	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	66	58	71	63	51	67	60	44	64	55	59	62	49	52
		20-27	Interior	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	65	71	66	62	71	63	59	70	61	52	67	56	47
			Exposed	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	66	62	71	63	59	70	61	52	67	56	47		
20	D	0-7	Interior	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	9																										

* 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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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.