

Design Criteria for Span Tables:

Values in the maximum allowable 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: 30ft
- 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

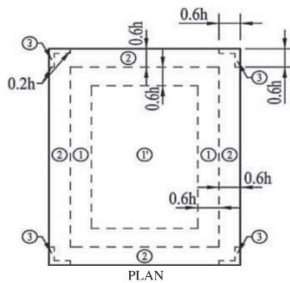
Seismic Design Assumptions

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

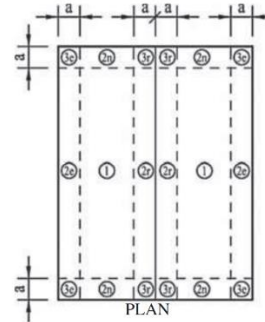
Span Tables

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.
- '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.
- The most restrictive of all roof zone spans shall be used when any part of the module is attributed to that span.
- 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

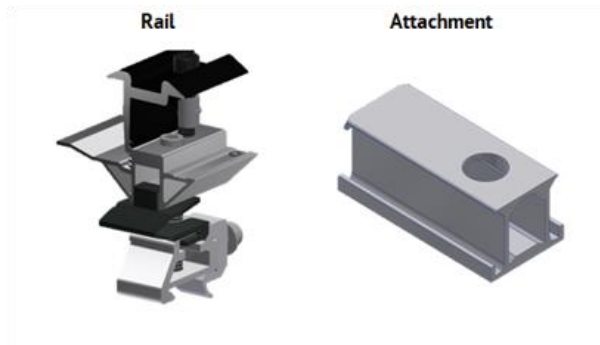
Roof Zone 3 = 3r

Roof Tilt 27° - 45°

Roof Zone 1 = 1, 2e, 2r

Roof Zone 2 = 2n, 3r

Roof Zone 3 = 3e



Micro Rail - SFM Slider

[illegible]

[illegible]

[illegible]



30 ft

$$S_s = 1.25$$

19 sq.ft

PORTRAIT

CROSS-SLOPE

Micro Rail

SFM

SFM Slider

SPAN TABLES

[illegible]



ASCE 7-16
Design Standard

II
Risk Category

30 ft
Roof Height

Ss = 1.25
Seismic

19 sq.ft
Module Area

LANDSCAPE
Orientation

CROSS-SLOPE
Rail Direction

Micro Rail
Rail Type

SFM
Clamp

SFM Slider
Attachment

SPAN TABLES

Maximum Allowable 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	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	13

[illegible]

[illegible]



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		
				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						
90	B	0-7	Interior	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59						
			Exposed	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59						
		Exposed	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61							
		Exposed	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72							
		Exposed	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80						
		Exposed	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59							
		Exposed	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61							
		Exposed	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72							
	Exposed	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80							
	Exposed	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62								
	Exposed	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65								
	Exposed	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75								
	Exposed	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84							
	Exposed	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56									
	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								
	Exposed	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								
	Exposed	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	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56								
	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							
	Exposed	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								
	Exposed	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	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59								
	Exposed	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61								
	Exposed	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72								
Exposed	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80								

[illegible]

[illegible]

[illegible]



Risk Category

Roof Height

Seismic

Module Area

Orientation

Rail Direction

Rail Type

Clamp

Attachment

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

[illegible]

[illegible]

[illegible]

[illegible]



30 ft

23 sq.ft

CROSS-SLOPE

SFM

SPAN TABLES

[illegible]



30 ft

19 sq ft

CROSS-SLOPE

SEM

SEM Slider

SPAN TABLES

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]



II

30 ft

S_s = 3.00
Seismic

23 sq.ft

Module Area

ORIENTATION

CROSS-SLOPE
Rail Direction

Micro Rail
Rail Type

SFM

Clamp

SFM Slider

SPAN TABLES

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

[illegible]

[illegible]

[illegible]

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	136	136	136	136	136	126	136	136	136	136	136	136	136	136	133	136	136	123	136	136	116	136	125	104	136	113	94	127	103	86	116	95	79	107	88	73	99	82	68			
		Exposed	136	136	133	136	136	121	136	136	112	136	127	105	136	118	99	136	112	93	132	106	88	117	95	80	106	87	73	97	80	67	89	74	61	83	69	55	77	64	46				
		7-20	Interior	136	136	136	136	136	126	136	136	136	136	136	136	136	136	136	136	136	122	136	134	115	136	115	102	136	104	92	136	94	84	112	86	77	100	79	71	91	73	65			
		Exposed	136	136	136	136	136	126	136	128	111	136	117	104	136	109	97	136	103	91	136	97	86	113	87	77	99	78	70	88	71	64	79	66	58	72	61	48	67	53	39				
		20-27	Interior	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137	132	122	137	116	109	137	105	98	122	96	89	112	88	82	104	82	76			
	Exposed	137	137	137	137	137	137	137	137	137	137	137	135	124	137	122	115	137	115	108	137	108	101	123	97	90	111	87	81	101	80	74	93	73	68	68	61	80	63	52					
	27-45	Interior	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	126	138	133	113	138	118	103	130	108	94	116	100	87	107	93	81				
	Exposed	138	138	138	138	138	138	138	138	138	138	138	138	128	138	138	119	138	138	131	112	138	121	106	132	108	95	114	99	86	103	90	79	94	83	72	87	77	67	80	71	61			
	C	0-7	Interior	136	136	136	136	136	128	136	136	118	136	134	110	136	124	103	136	117	98	136	110	92	122	100	83	111	91	76	101	83	69	93	77	64	86	71	59	80	67	51			
		Exposed	136	124	103	136	115	96	135	108	90	124	101	84	116	95	79	110	90	75	104	85	71	94	77	64	85	71	59	78	65	48	72	60	40	67	53	34	63	45	30				
7-20		Interior	136	136	136	136	136	129	136	136	117	136	123	109	136	115	102	136	108	96	136	101	90	121	91	81	105	82	73	93	75	67	83	69	61	76	63	54	69	59	44				
Exposed		136	115	102	136	106	94	136	99	88	136	92	82	113	86	77	104	81	72	96	77	68																							

[illegible]

[illegible]



Risk Category

Roof Height

Seismic

Module Area

Orientation

Rail Direction

Rail Type

Clamp

Attachment

SPAN TABLES

[illegible]