

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: 30 ft
- Roof Pitch: 0°-45°
- Site Elevation: 0 ft

Wind Design Assumptions

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

Snow Design Assumptions

- Ground Snow Load = 0-100 psf
- Exposure Factor coefficients of Partially Exposed condition
- Thermal Factor = 1.0
- Results based on uniform snow load

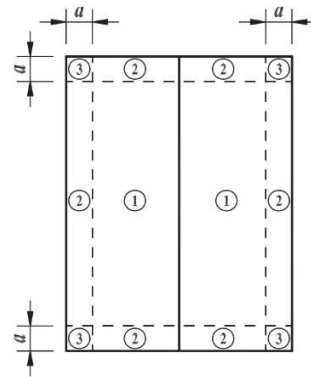
Seismic Design Assumptions

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

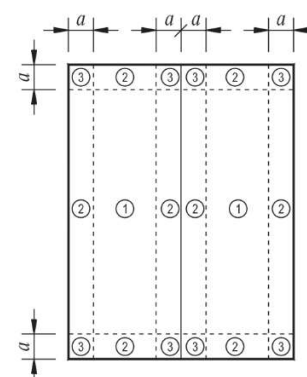
Span Tables

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.
- 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. 30.4-2A to 30.4-2D

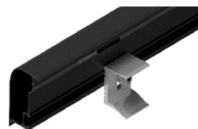


Gable Roofs $\theta \leq 7^\circ$



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

Rail - Isometric View



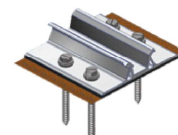
Rail - Side View



Attachment - Butyl Connection



Attachment - Screw Pattern



Trim Rail - DtD OSB



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

Ground Snow Load (psf)	Wind Exposure Category	Roof Tilt Angle (deg)	Basic Wind Speed (mph)																																															
			90			95			100			105			110			115			120			130			140			150			160			170			180											
			Roof Wind Zone																																															
			1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3									
0	B	0-7	28	28	20	28	28	18	28	28	16	28	24	14	28	21	13	28	19	12	28	18	11	28	15	9	24	12	8	20	11	7	18	9	6	16	8	5	14	7	4	4								
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		27-45	29	29	29	29	29	29	29	29	29	29	29	25	16	28	28	28	26	26	26	24	24	24	21	21	21	19	19	19	16	16	16	15	14	14	13	13	13	12	11	11								
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20	B	0-7	20	19	12	20	17	10	20	15	9	20	13	8	20	12	8	20	11	7	19	10	6	16	8	5	14																							



Category
II

30 ft

Roof Height

Ss = 1.25
Seismic

18.66 sq.ft
Module Area

ORIENTATION

CROSS-SLO
Rail Direction

Trim	Rail Type
1	1
2	2
3	3
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96	96
97	97
98	98
99	99
100	100

SFM

Clamp

SFM DtD-OSB

Attachment

SPAN TABLES

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

[illegible]



30 ft
Roof Height

Ss = 1.25
Seismic

18.66 sq.ft
Module Area

LANDSCAPE
Orientation

CROSS-SLOPE
Rail Direction

Trim
Rail Type

SFM
Clamp

SFM DtD-OSB

Attachment

SPAN TABLES

Ground Snow Load (psf) Wind Exposure Category Roof Tilt Angle (deg)			Basic Wind Speed (mph)																																									
			90						95			100			105			110			115			120			130			140			150			160			170			180		
			Roof Wind Zone																																									
			1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3						
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		7-27	12	12	12	12	12																																					



ASCE 7-10
Design Standard

II
Risk Category

30 ft
Roof Height

Ss = 1.25
Seismic

22.78 sq.ft
Module Area

PORTRAIT
Orientation

CROSS-SLOPE
Rail Direction

Trim
Rail Type

SFM
Clamp

SFM Dtd-OSB
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)	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			
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D	0-7	10	10	10	10	10	9	10	10																																



30 ft
Roof Height

S_s = 1.25
Seismic

22.78 sq.ft

Module Area

ORIENTATION

CROSS-SLOPE
Rail Direction

Trim

SFM
Clamp

SFM DtD-OSB

Attachment

[illegible]



ASCE 7-10
Design Standard

II
Risk Category

30 ft
Roof Height

Ss = 3.00
Seismic

18.66 sq.ft
Module Area

PORTRAIT
Orientation

CROSS-SLOPE
Rail Direction

Trim
Rail Type

SFM
Clamp

SFM DxD-05B
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)	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	28	28	20	28	28	18	28	26	16	28	24	14	28	21	13	28	19	12	28	18	11	28	15	9	24	12	8	20	11	7	18	9	6	16	8	5	14	7	4	
		7-27	28	28	22	28	28	19	28	28	17	28	25	16	28	22	14	28	20	13	28	19	12	28	16	10	27	13	8	23	11	7	20	10	6	17	9	5	15	8	5	
		27-45	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	26	26	24	24	24	21	21	21	19	19	19	16	16	16	16	15	14	14	13	13	13	12	11
	C	0-7	28	23	14	28	20	12	28	18	11	28	16	10	28	15	9	25	13	8	23	12	7	19	10	6	16	9	5	14	7	5	12	6	4	11	6	3	9	5	3	
		7-27	28	24	15	28	21	13	28	19	12	28	17	11	28	15	10	28	14	9	26	13	8	22	11	7	18	9	6	16	8	5	14	7	4	12	6	4	11	5	3	
		27-45	29	29	29	27	27	27	25	25	25	23	23	23	21	21	21	20	20	20	18	18	18	16	16	16	14	13	13	12	11	11	10	10	9	9	9	8	8	8		
10	B	0-7	20	20	20	20	20	18	20	20	16	20	20	14	20	20	13	20	19	12	20	18	11	20	15	9	20	12	8	20	11	7	18	9	6	16	8	5	14	7	4	
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		7-27	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	13	14	14	12	14	14	10	14	13	8	14	11	7	13	10	6	12	9	5	12	8	5	
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	C	0-7	12	12	12	12	12	10	12	12	9	12	12	8	12	12	8	12	11	7	12	10	6	12	8	5	12	7	4	12	6	4	10	5	3	9	5	3	8	4	2	
		7-27	12	12	12	12	12	11	12	12	10	12	12	9	12	12	8	12	12	7	12	11	7	11	9	6	11	8	5	10	7	4	10	6	4	9	5	3	9	4	3	
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		7-27	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
		27-45	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	13	13	13	12	12	12	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	C	0-7	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9		
		7-27	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
		27-45	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	13	13	13	12	12	12	11	11	11	11	11	11	11	11	11	11	11	11	11	11
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	27-45	15	15	15	14	14	14	14	14	14	14	14	13	13	13	12	12	12	12	12	11	11	11	10	10	10	10	10	10	9	9	9	8	8	8	7	7	7	6	6	6	



30 ft
Roof Height

Ss = 3.00
Seismic

18.66 sq.ft

ORIENTATION

CROSS-SLOPE

Trim

SFM

Clamp

SFM DtD-OSB

Attachment

SPAN TABLES

Ground Snow Load (psf)	Wind Exposure Category	Roof Tilt Angle (deg)	Basic Wind Speed (mph)																																						
			90			95			100			105			110			115			120			130			140			150			160			170			180		
			Roof Wind Zone																																						
			1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3			
60	B	0-7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	7	7	5	7	7	4			
		7-27	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	6	8	8	5	8	8	5			
		27-45	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	11	11	11	11	11	11	10	10	10	10	10	9	9	9	9			
	C	0-7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	7	7	6	7	5	7	5	7	6	4	7	6	3	7	5	3			
		7-27	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7	8	8	6	8	8	5	8	7	4	7	6	4	7	5	3			
		27-45	12	12	12	12	12	12	12	12	12	12	12	11	11	11	11	11	11	11	11	10	10	9	9	9	9	9	9	9	8	8	8	8	8	7	7	7			
D	0-7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7	8	8	6	8	8	5	8	7	4	8	5	3	8	5	3	8	4	2		
	7-27	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	7	9	9	6	8	8	5	8	7	4	8	6	4	7	5	3	7	4	3		
	27-45	13	13	13	13	13	13	12	12	12	12	12	11	11	11	11	11	11	10	10	10	10	10	9	9	9	8	8	8	8	8	8	7	7	7	6	6	6			
70	B	0-7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	6	6	4			
		7-27	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	7	5	7	7	5			
		27-45	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	9	9	9	9	9	9	8	8	8	8			
	C	0-7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	6	6	5	6	4	6	6	3	6	5	3			
		7-27	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	7	5	7	4	6	6	4	6	5	3				
		27-45	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	9	9	9	9	9	9	8	8	8	8	8	7	7	7	7	7		



Ground Snow Load (psf)	Wind Exposure Category	Roof Tilt Angle (deg)	Basic Wind Speed (mph)																																																																													
			90						95						100						105						110						115						120						130						140						150						160						170						180					
			Roof Wind Zone																																																																													
			1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3																																	
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		27-45	24	24	24	24	24	24	24	24	24	24	24	21	13	24	24	22	22	20	20	20	20	18	18	18	16	16	16	16	16	14	14	14	12	12	12	11	10	10	9	9	9																																					
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	B	0-7	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	8	9	8	9	6	9	5	9	8	5	9	8	5	9	7	4	9	6	4	9	6	4																																		
		7-27	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10																																			
		27-45	14	14	14	13	13	13	13	13	13	12	12	12	12	12	12	11	11	11	11	11	11	11	11	11	11	11	11	11	11	10	10	10	10	10	10	10	10	10	10	10	10	10	10																																			
50	C	0-7	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	8	9	8	9	6	9	5	9	8	5	9	7	4	9	6	4	9	6	4																																					
		7-27	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10																																			
		27-45	14	14	14	13	13	13	13	13	13	12	12	12	12	12	12	11	11	11	11	11	11	11	11	11	11	11	11	11	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10																																		
	D	0-7	10	10	10	10	10	9	10	10	8	10	10	7	10	10	6	10	9	6	10	8	5	10	7	4	10	6	4	10	5	3	8	4	3	7	4	2	7	3	2	7	3	2																																				
		7-27	10	10	10	10	10	9	10	10	8	10	10	7	10	10	6	10	9	6	10	8	5	10	7	4	10	6	4	10	5	3	8	4	3	7	4	2	7	3	2	7	3	2																																				
		27-45	14	14	14	13	13	13	13	13	12	12	12	12	12	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10																																			



30 ft
Roof Height

S_s = 3.00
Seismic

22.78 sq.ft
Module Area

ORIENTATION

CROSS-SLOPE
Rail Direction

Trim

SFM
Clamp

SFM DtD-OSB

Attachment

[illegible]



ASCE 7-10
Design Standard

II
Risk Category

30 ft
Roof Height

Ss = 3.00
Seismic

22.78 sq.ft
Module Area

LANDSCAPE
Orientation

CROSS-SLOPE
Rail Direction

Trim
Rail Type

SFM
Clamp

SFM DxD-05B
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)	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	47	47	34	47	47	30	47	43	27	47	39	24	47	35	22	47	32	20	47	29	18	46	24	15	39	21	13	34	18	11	29	16	10	26	14	9	23	12	8
		7-27	47	47	36	47	47	32	47	46	29	47	41	26	47	37	23	47	34	21	47	31	19	47	26	16	44	22	14	38	19	12	33	16	10	29	14	9	25	13	8
		27-45	48	48	48	48	48	48	48	48	48	48	48	48	48	47	47	47	43	43	40	40	40	35	35	35	31	31	31	27	27	27	24	24	24	22	21	21	19	18	18
	C	0-7	47	38	23	47	33	21	47	30	19	47	27	17	46	24	15	42	22	14	38	20	13	32	17	11	27	14	9	23	12	8	20	11	7	18	10	6	16	8	5
		7-27	47	40	25	47	35	22	47	31	20	47	28	18	47	26	16	47	23	15	42	21	14	36	18	11	30	15	10	26	13	8	23	11	7	20	10	6	18	9	6
		27-45	48	48	48	45	45	45	41	41	41	38	38	38	35	35	35	32	32	32	30	30	30	26	26	26	23	22	22	20	19	19	18	17	17	16	15	15	14	13	13
10	D	0-7	47	31	19	47	28	17	47	25	15	42	22	14	38	20	13	35	18	11	32	17	10	27	14	9	23	12	7	20	10	6	17	9	6	15	8	5	13	7	4
		7-27	47	33	21	47	29	19	47	26	17	47	24	15	43	21	14	39	19	12	35	18	11	30	15	10	25	13	8	22	11	7	19	10	6	17	8	5	15	7	5
		27-45	43	43	43	39	39	39	36	36	36	33	33	33	30	30	30	28	28	28	26	25	25	22	22	22	19	18	18	17	16	16	15	14	14	13	12	12	12	11	11
	B	0-7	33	33	33	33	33	30	33	33	27	33	33	24	33	33	22	33	32	20	33	29	18	33	24	15	33	21	13	33	18	11	29	16	10	26	14	9	23	12	8
		7-27	33	33	33	33	33	32	33	33	29	33	33	26	33	33	23	33	33	21	33	31	19	33	26	16	33	22	14	32	19	12	30	16	10	28	14	9	25	13	8
		27-45	47	47	47	47	47	47	47	47	47	47	47	47	47	47	46	46	46	43	43	43	40	40	40	35	35	35	31	31	31	27	27	27	24	24	24	22	21	21	19
20	C	0-7	33	33	23	33	33	21	33	30	19	33	27	17	33	24	15	33	22	14	33	20	13	32	17	11	27	14	9	23	12	8	20	11	7	18	10	6	16	8	5
		7-27	33	33	25	33	33	22	33	31	20	33	28	18	33	26	16	33	23	15	33	21	14	31	18	11	29	15	10	26	13	8	23	11	7	20	10	6	18	9	6
		27-45	47	47	47	44	44	44	41	41	41	38	38	38	35	35	35	32	32	32	30	30	30	26	26	26	23	22	22	20	19	19	18	17	17	16	15	15	14	13	13
	D	0-7	33	31	19	33	28	17	33	25	15	33	22	14	33	20	13	33	18	11	32	17	10	27	14	9	23	12	7	20	10	6	17	9	6	15	8	5	13	7	4
		7-27	33	33	21	33	29	19	33	26	17	33	24	15	33	21	14	32	19	12	31	18	11	29	15	10	25	13	8	22	11	7	19	10	6	17	8	5	15	7	5
		27-45	43	43	43	39	39	39	36	36	36	33	33	33	30	30	30	28	28	28	26	25	25	22	22	22	19	18	18	17	16	16	15	14	14	13	12	12	12	11	11
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		27-45	38	38	38	38	38	38	38	38	38	38	38	38	37	37	37	36	36	36	34	34	34	31	31	31	28	28	28	26	26	26	24	24	24	22	21	21	19	18	18
	C	0-7	23	23	23	23	23	21	23	23	19	23	23	17	23	23	15	23	22	14	23	20	13	23	17	11	23	14	9	23	12	8	20	11	7	18	10	6	16	8	5
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40	D	0-7	23	23	19	23	23	17	23	23	15	23	22	14	23	20	13	23	18	11	23	17	10	23	14	9	23	12	7	20	10	6	17	9	6	15	8	5	13	7	4
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		27-45	36	36	36	34	34	34	32	32	32	31	31	31	29	29	29	27	27	26	25	25	22	22	22	19	18	18	17	16	16	15	14	14	13	12	12	12	11	11	
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		7-27	23	23	23	23	23	22	23	23	20	23	23	18	23	23	16	23	23	15	23	21	14	22	18	11	21	15	10	20	13	8	19	11	7	18	10	6	17	9	6
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30 ft
Roof Height

S_s = 3.00
Seismic

22.78 sq.ft
Module Area

LANDSCAPE

Orientation

CROSS-SLOPE
Rail Direction

Trim

SFM
Clamp

SFM Dtd-OSB

[illegible]