

**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**

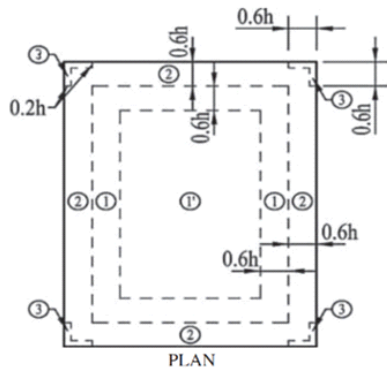
- 0.2-s Spectral Response Acceleration,  $SS \leq 3$
- $S_S = 1.25$  and 3 per criteria shown on individual span tables sheets.
- $S_1 = 0.5$
- Seismic site class D

**Array Assumptions**

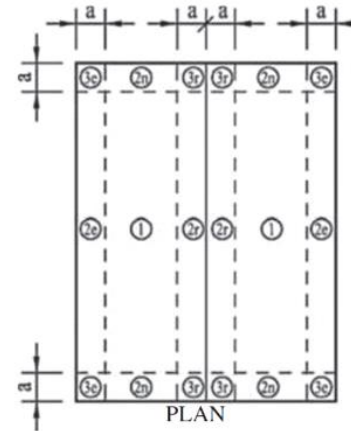
- Module orientation and Rail direction per criteria shown on individual span tables sheets.
- Maximum module dimensions of 40.1" x 67" (~19 sq.ft, 47.65 lbs) and 41" x 80" (~23 sq.ft, 58.6 lbs) per criteria shown on individual span tables sheets.
- Minimum distance between modules and roof edge is at 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  $\theta \leq 7^\circ$

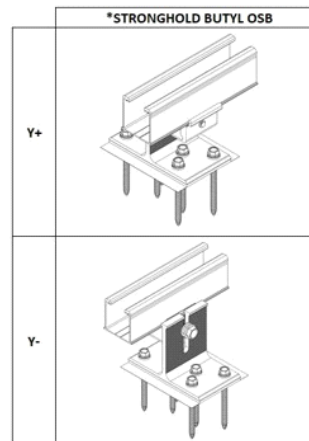


Gable Roofs  $7^\circ < \theta \leq 45^\circ$

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

- **Roof Tilt  $0^\circ$ - $7^\circ$** 
  - Roof Zone 1 = 1
  - Roof Zone 2 = 2
  - Roof Zone 3 = 3
- **Roof Tilt  $7^\circ$ - $27^\circ$** 
  - Roof Zone 1 = 1, 2e
  - Roof Zone 2 = 2n, 2r, 3e
  - Roof Zone 3 = 3r
- **Roof Tilt  $27^\circ$ - $45^\circ$** 
  - Roof Zone 1 = 1, 2e, 2r
  - Roof Zone 2 = 2n, 3r
  - Roof Zone 3 = 3e

Rails can be installed in these possible orientations.





















ASCE 7-16  
Design Standard

II  
Risk Category

30 ft  
Roof Height

Ss = 1.25  
Seismic

23 sq.ft  
Module Area

PORTRAIT  
Orientation

CROSS-SLOPE  
Rail Direction

NXT  
Rail Type

NXT COMBO  
Clamp

Stronghold BUTYL OSB #45  
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						
0	B	0-7	Interior	29	29	27	29	29	24	29	29	21	29	28	19	29	25	17	29	22	16	29	20	14	24	17	12	20	15	10	17	12	9	15	11	8	13	9	7	12	8	6
			Exposed	29	25	17	29	22	15	27	19	14	24	17	12	22	16	11	20	14	10	18	13	9	15	11	8	13	9	6	11	8	6	10	7	5	8	6	7	5	6	
		7-20	Interior	29	29	23	29	25	21	29	23	19	29	20	17	29	18	15	26	17	14	24	15	12	20	13	10	17	11	9	14	9	8	13	8	7	11	7	6	10	6	5
			Exposed	29	18	15	25	16	13	23	14	12	20	13	11	18	12	10	17	11	9	15	10	8	13	8	7	11	7	6	9	6	5	8	5	7	7	6	6	6	5	
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	27-45	Interior	29	29	29	29	29	29	29	29	26	29	29	22	29	28	20	29	25	18	26	23	16	22	19	13	19	17	11	16	14	9	14	12	8	12	11	7	11	10	6	
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	C	0-7	Interior	29	27	18	29	24	16	29	21	15	26	19	13	24	17	12	22	15	11	20	14	10	16	12	8	14	10	7	12	9	6	10	7	5	9	7	7	8	6	6
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		Exposed	27	15	10	24	14	9	21	12	8	19	11	7	17	10	7	16	9	6	14	8	5	12	7	5	10	6	4	9	5	5	8	7	4	7	6	4	6	5	3	
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	Exposed	22	19	13	19	17	11	17	15	10	15	14	9	14	12	8	13	11	7	12	10	6	10	9	5	8	7	4	7	6	4	6	5	5	8	5	4	5	7	4		
D	0-7	Interior	29	22	15	27	20	14	24	17	12	22	16	11	20	14	10	18	13	9	16	12	8	14	10	7	12	8	6	10	7	5	9	6	7	8	5	6	7	5	5	
		Exposed	20	14	10	17	12	9	16	11	8	14	10	7	13	9	6	11	8	6	10	7	5	9	6	5	7	5	6	7	5	6	6	4	5	5	4	7	5	3		
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		Exposed	16	10	9	15	9	8	13	8	7	12	7	6	11	7	6	10	6	5	9	6	5	7	5	6	6	5	5	5	4	7	5	4	6	4	3	6	3	3		
	20-27	Interior	29	20	13	29	18	12	28	16	11	25	14	10	22	13	9	20	12	8	19	11	7	16	9	6	13	8	5	11	6	4	10	6	4	9	5	5	8	7	4	
		Exposed	22	13	9	20	11	8	18	10	7	16	9	6	14	8	6	13	7	5	12	7	5	10	6	4	8	5	5	7	6	4	6	6	4	6	5	3	5	4	3	
27-45	Interior	28	25	17	25	22	15	22	20	13	20	18	12	18	16	10	16	15	9	15	13	8	13	11	7	11	10	6	9	8	5	8	7	4	7	6	4	6	6	5		
	Exposed	18	16	10	16	14	9	14	13	8	13	12	7	12	10	6	11	9	6	10	9	5	8	7	4	7	6	4	6	5	5	5	5	4	7	6	4	6	5	3		
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		20-27	Interior	26	26	26	26	26	23	26	26	20	26	25	17	26	22	15	26	20	14	26	18	12	26	15	10	23	13	9	20	11	8	17	10	7	15	9	6	13	8	5
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	27-45	Interior	29	29	29	29	29	29	29	29	26	29	29	22	29	28	20	29	25	18	26	23	16	22	19	13	19	17	11	16	14	9	14	12	8	12	11	7	11	10	6	
		Exposed	29	28	20	28	25	17	25	22	15	22	20	13	20	18	12	18	16	10	17	15	9	14	13	8	12	11	6	10	9	5	9	8	5	8	7	4	7	6	4	
	C	0-7	Interior	20	20	18	20	20	16	20	20	15	20	19	13	20	17	12	20	15	11	20	14	10	16	12	8	14	10	7	12	9	6	10	7	5	9	7	7	8	6	6
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		7-20	Interior	20	20	16	20	17	14	20	16	13	20	14	11	20	13	10	18	11	9	16	10	9	14	9	7	12	7	6	10	6	5	9	6	5	8	5	6	7	7	5
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20-27		Interior	26	24	17	26	21	14	26	19	13	26	17	11	26	15	10	25	14	9	22	13	9	19	11	7	16	9	6	14	8	5	12	7	5	10	6	4	9	5	5	
		Exposed	26	15	10	24	14	9	21	12	8	19	11	7	17	10	7	16	9	6	14	8	5	12	7	5	10	6	4	9	5	5	8	7	4	7	6	4	6	5	3	
27-45	Interior	29	29	22	29	27	19	27	24	16	24	21	14	22	19	13	20	18	11	18	16	10	15	13	8	13	11	7	11	10	6	10	9	5	8	8	4	7	7	4		
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D	0-7	Interior	20	20	15	20	20	14	20	17	12	20	16	11	20	14	10	18	13	9	16	12	8	14	10	7	12	8	6	10	7	5	9	6	7	8	5					









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

Stronghold BUTYL OSB #45  
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																																																																																										
0	B	0-7	Interior	56	56	53	56	56	47	56	56	42	56	54	38	56	49	34	56	44	31	56	40	28	47	34	24	40	29	20	34	25	17	30	22	15	26	19	13	23	17	12	13																																																			
			Exposed	56	49	34	56	43	30	54	39	27	48	35	24	44	31	22	40	28	20	36	26	18	30	22	15	26	19	13	22	16	11	19	14	10	17	12	9	15	11	12																																																				
		7-20	Interior	56	56	46	56	50	41	56	45	37	56	40	33	56	36	30	52	33	27	47	30	25	39	25	21	33	22	18	29	19	15	25	16	13	22	14	12	19	13	10																																																				
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	27-45	Interior	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57																																																				
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		20-27	Interior	57	47	33	57	42	29	57	38	25	57	34	23	54	31	21	49	28	19	44	26	17	40	23	16	37	21	14	32	18	12	27	16	11	24	14	9	21	12	8	18	11	7																																																	
			Exposed	53	30	21	47	27	18	42	24	16	38	22	15	34	20	13	31	18	12	28	16	11	24	14	9	20	12	8	18	10	7	15	9	9	14	12	8	12	11	7																																																				
	27-45	Interior	57	57	43	57	53	37	53	47	32	48	42	29	43	38	26	39	35	23	36	32	21	30	27	17	26	23	14	22	20	12	19	17	11	17	15	9	15	13	8																																																					
		Exposed	43	38	25	38	34	22	34	30	20	31	27	17	28	25	15	25	23	14	23	21	13	21	13	20	17	11	17	15	9	14	13	8	13	11	7	11	10	9	15	8																																																				
	D	0-7	Interior	56	44	30	54	39	27	48	35	24	43	31	22	39	28	20	35	26	18	32	23	16	27	20	14	23	17	12	20	14	10	17	13	9	15	11	12	14	10	11																																																				
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		7-20	Interior	51	32	27	45	29	24	40	26	21	36	23	19	33	21	17	30	19	16	27	17	14	23	15	12	19	13	10	17	11	9	15	9	12	13	13	10	11	11	9																																																				
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		20-27	Interior	57	39	27	57	35	24	55	31	21	49	28	19	44	26	17	40	23	16	37	21	14	31	18	12	26	15	10	23	13	9	20	11	8	17	10	7	15	9	9																																																				
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	27-45	Interior	55	49	34	49	44	30	44	39	26	40	35	23	36	32	21	33	29	19	30	27	17	25	22	14	21	19	12	19	17	10	16	14	9	14	13	8	13	11	7																																																					
		Exposed	36	32	21	32	28	18	28	25	16	26	23	14	23	21	13	21	19	12	19	17	11	16	15	9	14	12	8	12	11	7	11	9	9	9	13	8	8	11	7																																																					
10	B	0-7	Interior	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39																																																					
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		7-20	Interior	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40																																																				
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		20-27	Interior	52	52	52	52	52	46	52	52	40	52	49	35	52	44	30	52	40	27	52	37	25	52	31	21	46	26	18	39	23	15	34	20	13	30	17	12	26	15	10																																																				
			Exposed	52	44	30	52	39	26	52	35	24	52	31	21	50	28	19	45	26	18	41	24	16	34	20	13	29	17	12	25	15	10	22	13	9	19	11	8	17	10	7																																																				
	27-45	Interior	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	56	56	56	56	56	56																																																					
		Exposed	56	55	39	55	49	34	49	44	30	44	39	26	40	36	23	36	32	21	33	30	19	28	25	15	24	21	13	21	18	11	18	16	10	16	14	9	14	13	8																																																					
	C	0-7	Interior	39	39	36	39	39	32	39	39	29	39	37	26	39	34	24	39	31	21	39	28	20	33	24	17	28	20	14	24	17	12	21	15	11	18	13	9	16	12	13																																																				
			Exposed	39	34	24	39	30	31	37	27	19	33	24	17	30	22	15	27	20	14	25	18	13	21	15	11	18	13	9	15	11	12	13	10	10	12	13	9	10	12	8																																																				
		7-20	Interior	40	39	32	40	35	28	40	31	25	40	28	23	39	25	21	36	23	19	32	21	17	27	18	15	23	15	12	20	13	11	17	11	9	15	10	13	14	9	11																																																				
			Exposed	39	25	21	35	22	18	31	20	16	28	18	15	25	16	13	23	15	12	21	14	11	18	11	9	15	10	12	13	8	11	11	9	10	10	8	13	9	7																																																					
20-27		Interior	52	47	33	52	42	29	52	38	25	52	34	23	52	31	21	49	28	19	44	25	17	37	21	14	32	18	12	27	16	11	24	14	9	21	12	8	18	11	7																																																					
		Exposed	52	30	21	47	27	18	42	24	16	38	22	15	34	20	13	31	18	12	28	16	11	24	14	9	20	12	8	18	10	7	15	9	9	14	12	8	12	11	7																																																					
27-45	Interior	56	56	43	56	53	37	53	47	32	48	42	29	43	38	26	39	35	23	36	32	21	30	27	17	26	23	14	22	20	12	19	17	11	17	15	9	15	13	8																																																						
	Exposed	43	38	25	38	34	22	34	30	20	31	27	17	28	25	15	2																																																																													

























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

Stronghold BUTYL OSB #45  
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	29	29	27	29	29	24	29	29	21	29	28	19	29	25	17	29	22	16	29	20	14	24	17	12	20	15	10	17	12	9	15	11	8	13	9	7	12	8	6
			Exposed	29	25	17	29	22	15	27	19	14	24	17	12	22	16	11	20	14	10	18	13	9	15	11	8	13	9	6	11	8	6	10	7	5	8	6	7	5	6	
		7-20	Interior	29	29	23	29	25	21	29	23	19	29	20	17	29	18	15	26	17	14	24	15	12	20	13	10	17	11	9	14	9	8	13	8	7	11	7	6	10	6	5
			Exposed	29	18	15	25	16	13	23	14	12	20	13	11	18	12	10	17	11	9	15	10	8	13	8	7	11	7	6	9	6	5	8	5	7	7	6	6	5		
		20-27	Interior	29	29	27	29	29	23	29	28	20	29	25	17	29	22	15	29	20	14	29	18	12	27	15	10	23	13	9	20	11	8	17	10	7	15	9	6	13	8	5
			Exposed	29	22	15	29	20	13	29	18	12	28	16	11	25	14	10	23	13	9	21	12	8	17	10	7	15	9	6	13	7	5	11	6	4	10	6	4	9	5	5
	27-45	Interior	29	29	29	29	29	29	29	29	26	29	29	22	29	28	20	29	25	18	26	23	16	22	19	13	19	17	11	16	14	9	14	12	8	12	11	7	11	10	6	
		Exposed	29	28	20	28	25	17	25	22	15	22	20	13	20	18	12	18	16	10	17	15	9	14	13	8	12	11	6	10	9	5	9	8	5	8	7	4	7	6	4	
	C	0-7	Interior	29	27	18	29	24	16	29	21	15	26	19	13	24	17	12	22	15	11	20	14	10	16	12	8	14	10	7	12	9	6	10	7	5	9	7	7	8	6	6
			Exposed	24	17	12	21	15	10	19	13	9	17	12	8	15	11	8	14	10	7	13	9	6	11	8	5	9	6	7	8	5	6	7	5	5	6	6	4	5	6	4
		7-20	Interior	29	20	16	27	17	14	24	16	13	22	14	11	20	13	10	18	11	9	16	10	9	14	9	7	12	7	6	10	6	5	9	6	5	8	5	6	7	7	5
			Exposed	20	13	10	17	11	9	16	10	8	14	9	7	13	8	7	11	7	6	10	7	5	9	6	5	7	5	6	6	5	6	6	4	5	5	4	7	4	3	3
		20-27	Interior	29	24	17	29	21	14	29	19	13	29	17	11	27	15	10	25	14	9	22	13	9	19	11	7	16	9	6	14	8	5	12	7	5	10	6	4	9	5	5
			Exposed	27	15	10	24	14	9	21	12	8	19	11	7	17	10	7	16	9	6	14	8	5	12	7	5	10	6	4	9	5	5	8	7	4	7	6	4	6	5	3
	27-45	Interior	29	29	22	29	27	19	27	24	16	24	21	14	22	19	13	20	18	11	18	16	10	15	13	8	13	11	7	11	10	6	10	9	5	8	8	4	7	7	4	4
		Exposed	22	19	13	19	17	11	17	15	10	15	14	9	14	12	8	13	11	7	12	10	6	10	9	5	8	7	4	7	6	4	6	5	5	8	5	4	5	7	4	
	D	0-7	Interior	29	22	15	27	20	14	24	17	12	22	16	11	20	14	10	18	13	9	16	12	8	14	10	7	12	8	6	10	7	5	9	6	7	8	5	6	7	5	5
			Exposed	20	14	10	17	12	9	16	11	8	14	10	7	13	9	6	11	8	6	10	7	5	9	6	5	7	5	6	7	5	6	6	4	5	5	4	7	5	3	3
		7-20	Interior	26	16	13	23	15	12	20	13	11	18	12	10	16	11	9	15	10	8	14	9	7	11	7	6	10	6	5	8	5	7	7	5	6	6	5	6	6	4	4
			Exposed	16	10	9	15	9	8	13	8	7	12	7	6	11	7	6	10	6	5	9	6	5	7	5	6	6	5	5	4	7	5	4	6	4	3	6	3	3	3	
		20-27	Interior	29	20	13	29	18	12	28	16	11	25	14	10	22	13	9	20	12	8	19	11	7	16	9	6	13	8	5	11	6	4	10	6	4	9	5	5	8	7	4
			Exposed	22	13	9	20	11	8	18	10	7	16	9	6	14	8	6	13	7	5	12	7	5	10	6	4	8	5	5	7	6	4	6	6	4	6	5	3	5	4	3
	27-45	Interior	28	25	17	25	22	15	22	20	13	20	18	12	18	16	10	16	15	9	15	13	8	13	11	7	11	10	6	9	8	5	8	7	4	7	6	4	6	6	5	
		Exposed	18	16	10	16	14	9	14	13	8	13	12	7	12	10	6	11	9	6	10	9	5	8	7	4	7	6	4	6	5	5	5	5	4	7	6	4	6	5	3	
10	B	0-7	Interior	20	20	20	20	20	20	20	20	20	19	20	20	17	20	16	20	16	20	14	20	17	12	20	15	10	17	12	9	15	11	8	13	9	7	12	8	6		
			Exposed	20	20	17	20	20	15	20	19	14	20	17	12	20	16	11	20	14	10	18	13	9	15	11	8	13	9	6	11	8	6	10	7	5	8	6	7	5	6	
		7-20	Interior	20	20	20	20	20	20	20	19	20	20	17	20	18	15	20	17	14	20	15	12	20	13	10	17	11	9	14	9	8	13	8	7	11	7	6	10	6	5	
			Exposed	20	18	15	20	16	13	20	14	12	20	13	11	18	12	10	17	11	9	15	10	8	13	8	7	11	7	6	9	6	5	8	5	7	7	6	6	6	5	
		20-27	Interior	26	26	26	26	26	23	26	26	20	26	25	17	26	22	15	26	20	14	26	18	12	26	15	10	23	13	9	20	11	8	17	10	7	15	9	6	13	8	5
			Exposed	26	22	15	26	20	13	26	18	12	26	16	11	25	14	10	23	13	9	21	12	8	17	10	7	15	8	6	13	7	5	11	6	4	10	6	4	9	5	5
	27-45	Interior	29	29	29	29	29	29	29	29	26	29	29	22	29	28	20	29	25	18	26	23	16	22	19	13	19	17	11	16	14	9	14	12	8	12	11	7	11	10	6	
		Exposed	29	28	20	28	25	17	25	22	15	22	20	13	20	18	12	18	16	10	17	15	9	14	13	8	12	11	6	10	9	5	9	8	5	8	7	4	7	6	4	
	C	0-7	Interior	20	20	18	20	20	16	20	20	15	20	19	13	20	17	12	20	15	11	20	14	10	16	12	8	14	10	7	12	9	6	10	7	5	9	7	7	8	6	6
			Exposed	20	17	12	20	15	10	19	13	9	17	12	8	15	11	8	14	10	7	13	9	6	11	8	5	9	6	7	8	5	6	7	5	5	6	6	4	5	6	4
		7-20	Interior	20	20	16	20	17	14	20	16	13	20	14	11	20	13	10	18	11	9	16	10	9	14	9	7	12	7	6	10	6	5	9	6	5	8	5	6	7	7	5
			Exposed	20	13	10	17	11	9	16	10	8	14	9	7	13	8	7	11	7	6	10	7	5	9	6	5	7	5	6	6	5	6	6	4	5	5	4	7	4	3	3
		20-27	Interior	26	24	17	26	21	14	26	19	13	26	17	11	26	15	10	25	14	9	22	13	9	19	11	7	16	9	6	14	8	5	12	7	5	10	6	4	9	5	5
			Exposed	26	15	10	24	14	9	21	12	8	19	11	7	17	10	7	16	9	6	14	8	5	12	7	5	10	6	4	9	5	5	8	7	4	7	6	4	6	5	3
	27-45	Interior	29	29	22	29	27	19	27	24	16	24	21	14	22	19	13	20	18	11	18	16	10	15	13	8	13	11	7	11	10	6	10	9	5	8	8	4	7	7	4	4
		Exposed	22	19	13	19	17	11	17	15	10	15	14	9	14	12	8	13	11	7	12	10	6	10	9	5	8	7	4	7	6	4	6	5	5	5	4	5	7	4	4	
	D	0-7	Interior	20	20	15	20	20	14	20	17	12	20	16	11	20	14	10	18	13	9	16	12	8	14	10	7	12	8													









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

Stronghold BUTYL OSB #45  
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		
				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	56	56	53	56	56	47	56	56	42	56	54	38	56	49	34	56	44	31	56	40	28	47	34	24	40	29	20	34	25	17	30	22	15	26	19	13	23	17	12
			Exposed	56	49	34	56	43	30	54	39	27	48	35	24	44	31	22	40	28	20	36	26	18	30	22	15	26	19	13	22	16	11	19	14	10	17	12	9	15	11	12
		7-20	Interior	56	56	46	56	50	41	56	45	37	56	40	33	56	36	30	52	33	27	47	30	25	39	25	21	33	22	18	29	19	15	25	16	13	22	14	12	19	13	10
			Exposed	56	36	30	50	32	26	45	29	24	40	26	21	36	23	19	33	21	18	30	19	16	25	16	14	22	14	12	19	12	10	16	11	9	14	9	12	13	13	10
		20-27	Interior	57	57	54	57	57	46	57	55	40	57	49	35	57	44	30	57	40	27	57	37	25	54	31	21	46	26	18	39	23	15	34	20	13	30	17	12	26	15	10
			Exposed	57	44	30	57	39	26	57	35	24	55	31	21	50	28	19	45	26	18	41	24	16	34	20	13	29	17	12	25	15	10	22	13	9	19	11	8	17	10	7
	27-45	Interior	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57
		Exposed	57	55	39	55	49	34	49	44	30	44	39	26	40	36	23	36	32	21	33	30	19	28	25	15	24	21	13	21	18	11	18	16	10	16	14	9	14	13	8	
	C	0-7	Interior	56	53	36	56	47	32	56	42	29	52	37	26	47	34	24	43	31	21	39	28	20	33	24	17	28	20	14	24	17	12	21	15	11	18	13	9	16	12	13
			Exposed	47	34	24	42	30	21	37	27	19	33	24	17	30	22	15	27	20	14	25	18	13	21	15	11	18	13	9	15	11	12	13	10	10	12	13	9	10	12	8
		7-20	Interior	56	39	32	54	35	28	48	31	25	43	28	23	39	25	21	36	23	19	32	21	17	27	18	15	23	15	12	20	13	11	17	11	9	15	10	13	14	9	11
			Exposed	39	25	21	35	22	18	31	20	16	28	18	15	25	16	13	23	15	12	21	14	11	18	11	9	15	10	12	13	8	11	11	11	9	10	10	8	13	9	7
20-27		Interior	57	47	33	57	42	29	57	38	25	57	34	23	54	31	21	49	28	19	44	25	17	37	21	14	32	18	12	27	16	11	24	14	9	21	12	8	18	11	7	
		Exposed	53	30	21	47	27	18	42	24	16	38	22	15	34	20	13	31	18	12	28	16	11	24	14	9	20	12	8	18	10	7	15	9	9	14	12	8	12	11	7	
27-45	Interior	57	57	43	57	53	37	53	47	32	48	42	29	43	38	26	39	35	23	36	32	21	30	27	17	26	23	14	22	20	12	19	17	11	17	15	9	15	13	8		
	Exposed	43	38	25	38	34	22	34	30	20	31	27	17	28	25	15	25	23	14	23	21	13	20	17	11	17	15	9	14	13	8	13	11	7	11	10	9	10	9	8		
D	0-7	Interior	56	44	30	54	39	27	48	35	24	43	31	22	39	28	20	35	26	18	32	23	16	27	20	14	23	17	12	20	14	10	17	13	9	15	11	12	14	10	11	
		Exposed	39	28	20	35	25	17	31	22	16	28	20	14	25	18	13	23	17	12	21	15	11	18	13	9	15	11	12	13	9	10	11	13	9	10	11	8	9	10	7	
	7-20	Interior	51	32	27	45	29	24	40	26	21	36	23	19	33	21	17	30	19	16	27	17	14	23	15	12	19	13	10	17	11	9	15	9	12	13	13	10	11	11	9	
		Exposed	32	21	17	29	19	15	26	17	14	23	15	12	21	14	11	19	12	10	17	11	9	15	10	12	13	12	10	11	11	9	9	9	8	13	8	7	11	7	6	
	20-27	Interior	57	39	27	57	35	24	55	31	21	49	28	19	44	26	17	40	23	16	37	21	14	31	18	12	26	15	10	23	13	9	20	11	8	17	10	7	15	9	9	
		Exposed	44	25	17	39	23	15	35	20	14	32	18	12	29	17	11	26	15	10	24	14	9	20	12	8	17	10	7	15	9	9	13	11	8	11	10	7	10	9	6	
27-45	Interior	55	49	34	49	44	30	44	39	26	40	35	23	36	32	21	33	29	19	30	27	17	25	22	14	21	19	12	19	17	10	16	14	9	14	13	8	13	11	7		
	Exposed	36	32	21	32	28	18	28	25	16	26	23	14	23	21	13	21	19	12	19	17	11	16	15	9	14	12	8	12	11	7	11	9	9	9	13	8	8	11	7		
10	B	0-7	Interior	39	39	39	39	39	39	39	39	39	39	38	39	39	34	39	39	31	39	39	28	39	34	24	39	29	20	34	25	17	30	22	15	26	19	13	23	17	12	
			Exposed	39	39	34	39	39	30	39	29	37	39	35	24	39	31	22	39	28	20	36	26	18	30	22	15	26	19	13	22	16	11	19	14	10	17	12	9	15	11	12
		7-20	Interior	40	40	40	40	40	40	40	40	37	40	40	33	40	36	30	40	33	27	40	30	25	39	25	21	33	22	18	29	19	15	25	16	13	22	14	12	19	13	10
			Exposed	40	36	30	40	32	26	40	29	24	40	26	21	36	23	19	33	21	18	30	19	16	25	16	14	22	14	12	19	12	10	16	11	9	14	9	12	13	13	10
		20-27	Interior	52	52	52	52	52	46	52	52	40	52	49	35	52	44	30	52	40	27	52	37	25	52	31	21	46	26	18	39	23	15	34	20	13	30	17	12	26	15	10
			Exposed	52	44	30	52	39	26	52	35	24	52	31	21	50	28	19	45	26	18	41	24	16	34	20	13	29	17	12	25	15	10	22	13	9	19	11	8	17	10	7
	27-45	Interior	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	56	56	56	56	56	56	56
		Exposed	56	55	39	55	49	34	49	44	30	44	39	26	40	36	23	36	32	21	33	30	19	28	25	15	24	21	13	21	18	11	18	16	10	16	14	9	14	13	8	
	C	0-7	Interior	39	39	36	39	39	32	39	39	29	39	37	26	39	34	24	39	31	21	39	28	20	33	24	17	28	20	14	24	17	12	21	15	11	18	13	9	16	12	13
			Exposed	39	34	24	39	30	31	37	27	19	33	24	17	30	22	15	27	20	14	25	18	13	21	15	11	18	13	9	15	11	12	13	10	10	12	13	9	10	12	8
		7-20	Interior	40	39	32	40	35	28	40	31	25	40	28	23	39	25	21	36	23	19	32	21	17	27	18	15	23	15	12	20	13	11	17	11	9	15	10	13	14	9	11
			Exposed	39	25	21	35	22	18	31	20	16	28	18	15	25	16	13	23	15	12	21	14	11	18	11	9	15	10	12	13	8	11	11	9	10	10	8	13	9	7	
20-27		Interior	52	47	33	52	42	29	52	38	25	52	34	23	52	31	21	49	28	19	44	25	17	37	21	14	32	18	12	27	16	11	24	14	9	21	12	8	18	11	7	
		Exposed	52	30	21	47	27	18	42	24	16	38	22	15	34	20	13	31	18	12	28	16	11	24	14	9	20	12	8	18	10	7	15	9	9	14	12	8	12	11	7	
27-45	Interior	56	56	43	56	53	37	53	47	32	48	42	29	43	38	26	39	35	23	36	32	21	30																			





