

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

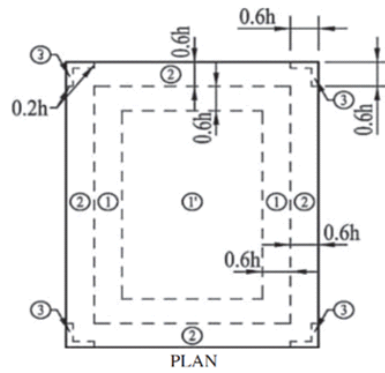
- 0.2-s Spectral Response Acceleration, $SS \leq 3$
- $S_s = 1.25$ and 3 per criteria shown on individual span tables sheets.
- $S_1 = 0.5$
- Seismic site class D

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.

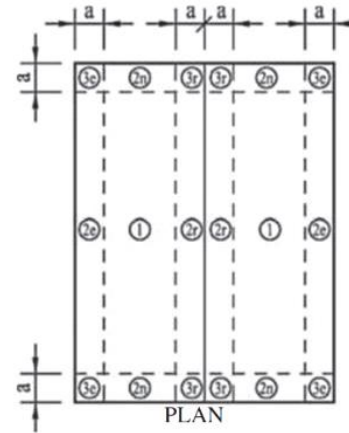
Span Tables

Zone should be considered as per ASCE 7-16, Fig. 30.3-2A to 30.3-2D



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

Rails can be installed in these possible orientations.



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

#N/A

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

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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 HD
Rail Type

NXT COMBO
Clamp

Flashloc DUO 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)	Panel Exposure	Basic Wind Speed (mph)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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Maximum Allowable Rail Spans for Rooftop Solar Panels Parallel to the Roof Surface (inches)

[illegible]

#N/A

* 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.



ASCE 7-16
Design Standard

II
Risk Category

30 ft
Roof Height

Ss = 3.00
Seismic

19 sq.ft
Module Area

PORTRAIT
Orientation

CROSS-SLOPE
Rail Direction

NXT HD
Rail Type

NXT COMBO
Clamp

Flashloc DUO OSB
Attachment

SPAN TABLES

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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											
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0	B	0-7	Interior	33	33	33	33	29	33	33	26	33	33	23	33	30	21	33	27	19	33	25	17	29	21	14	24	18	12	21	15	11	18	13	9	16	11	8	13	10	7	12	8	6	10	7	5	9	6	4			
			Exposed	33	30	21	33	26	18	33	24	16	30	21	15	27	19	13	24	17	12	22	16	11	18	13	9	16	11	8	13	10	7	12	8	6	10	7	5	9	6	4	4	3	5	8	5	4					
		7-20	Interior	34	34	28	34	31	25	34	27	16	34	25	20	34	22	18	32	20	16	29	18	15	24	15	13	20	13	11	18	11	9	15	10	8	13	9	7	12	8	6	10	7	5	9	6	4					
			Exposed	34	22	18	31	20	16	27	18	14	25	16	13	22	14	12	20	13	11	18	12	10	15	10	8	13	8	7	11	7	6	10	6	5	9	5	4	8	5	4	8	5	4	8	5	4					
		20-27	Interior	34	34	33	34	34	28	34	33	24	34	30	21	34	27	18	34	24	16	34	22	15	33	19	13	28	16	11	24	14	9	21	12	8	18	10	7	16	9	6	10	7	5	9	6	4					
			Exposed	34	27	18	34	24	16	34	21	14	34	19	13	30	17	12	28	16	11	25	14	10	21	12	8	18	10	7	15	9	6	13	8	5	12	7	4	10	6	4	10	6	4	10	6	4					
		27-45	Interior	35	35	35	35	35	35	35	35	31	35	35	35	34	24	34	31	21	31	28	19	26	23	16	22	20	13	19	17	11	17	15	9	15	13	8	13	12	7	12	8	6	10	7	5	9	6	4			
			Exposed	35	34	24	34	30	21	30	27	18	27	14	22	20	13	20	18	11	17	15	9	14	13	8	12	11	7	11	10	6	10	8	5	8	5	8	5	8	7	4	8	5	8	7	4	8	5	8			
	C	0-7	Interior	33	32	22	33	29	20	33	25	18	32	23	16	29	21	14	26	19	13	24	17	12	20	14	10	17	12	8	14	10	7	13	9	6	11	8	5	10	7	5	9	6	4	10	7	5	9	6	4		
			Exposed	29	20	14	25	18	13	23	16	11	20	15	10	18	13	9	17	12	8	15	11	8	13	9	6	11	8	5	9	7	5	8	6	4	7	5	3	6	4	3	6	4	3	6	4	3	6	4			
		7-20	Interior	34	24	19	33	21	17	30	19	15	27	17	14	24	15	13	22	14	11	20	13	10	7	11	9	14	9	7	13	8	7	11	7	6	9	6	5	8	5	4	7	4	3	5	3	3	5	3	3		
			Exposed	34	15	12	21	14	11	19	12	10	17	11	9	15	10	8	14	9	7	13	8	7	11	7	6	9	6	5	8	5	4	7	4	3	6	4	3	6	4	3	5	3	3	5	3	3					
		20-27	Interior	34	29	20	34	26	17	34	23	15	34	21	14	33	19	13	30	17	11	27	15	10	23	13	9	19	11	7	17	9	6	14	8	6	13	7	5	11	6	4	10	7	5	9	6	4					
			Exposed	33	19	12	29	16	11	26	15	10	23	13	9	21	12	8	19	11	7	17	10	7	14	8	6	12	7	5	11	6	4	9	5	3	8	5	3	7	4	3	7	4	3	7	4	3					
		27-45	Interior	35	35	26	35	32	23	32	29	20	29	26	17	26	23	15	24	21	14	22	19	12	18	16	10	16	14	8	13	12	7	12	10	6	10	9	5	9	8	5	9	8	5	9	8	5					
			Exposed	26	23	15	23	21	13	21	19	12	19	17	10	17	15	9	15	14	8	14	12	8	12	11	6	10	9	5	9	8	5	8	7	4	7	6	3	6	5	3	6	5	3	6	5	3					
	D	0-7	Interior	33	27	18	33	24	16	30	21	15	26	19	13	24	17	12	22	15	11	20	14	10	16	12	8	14	10	7	12	9	6	10	8	5	9	7	5	8	6	4	10	7	5	8	6	4					
			Exposed	24	17	12	21	15	11	19	13	9	17	12	8	15	11	8	14	10	7	13	9	6	11	8	5	9	6	4	8	6	4	7	5	3	6	4	3	5	4	4	3	5	4	4	3	5	4				
		7-20	Interior	31	20	16	27	18	14	25	16	13	22	14	12	20	13	10	18	12	9	16	11	9	14	9	7	12	8	6	10	6	5	9	6	5	8	5	4	7	4	3	5	4	4	3	5	4	4	3			
			Exposed	20	13	10	18	11	9	16	10	8	14	9	7	13	8	7	12	7	6	11	7	6	9	6	5	8	5	4	6	4	3	6	4	3	5	3	4	4	3	3	4	3	3	4	3	3					
		20-27	Interior	34	24	16	34	21	14	34	19	13	30	17	12	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	3	7	4	3	7	4	3					
			Exposed	27	15	10	24	14	9	21	12	8	19	11	7	17	10	7	16	9	6	14	8	6	12	7	5	10	6	4	9	5	3	8	4	3	7	4	2	6	3	2	6	3	2	6	3	2					
		27-45	Interior	34	30	21	30	27	18	27	24	16	24	22	14	22	19	12	20	18	11	18	16	10	15	14	8	13	12	7	11	10	6	10	9	5	9	8	5	8	5	8	7	4	8	5	8	7	4				
			Exposed	22	19	12	19	17	11	17	15	10	16	14	8	14	13	8	13	11	7	12	10	6	10	9	5	8	7	4	7	6	4	6	3	5	5	3	5	3	5	4	4	2	4	2	4	2					
10	B	0-7	Interior	24	24	24	24	24	24	24	24	24	24	23	24	24	21	24	24	19	24	24	17	24	21	14	24	18	12	21	15	11	18	13	9	16	11	8	14	10	7	5	9	6	4	10	7	5					
			Exposed	24	24	21	24	24	18	24	24	16	24	21	15	24	19	13	24	17	12	22	16	11	18	13	9	16	11	8	13	10	7	12	8	6	10	7	5	9	6	4	10	7	5	9	6	4					
		7-20	Interior	24	24	24	24	24	24	24	24	22	24	24	20	24	22	18	24	20	16	24	18	15	24	15	13	20	13	11	18	11	9	15	10	8	13	9	7	12	8	6	10	7	5	9	6	4					
			Exposed	24	22	18	24	20	16	24	18	14	24	16	13	22	14	12	20	13	11	18	12	10	15	10	8	13	8	7	11	7	6	10	6	5	9	5	4	8	5	4	8	5	4	8	5	4					
		20-27	Interior	28	28	28	28	28	28	28	28	28	28	28	21	28	27	18	28	24	16	28	22	15																													

10 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.

* Cells with an astrisks indicates that the L-root 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

19 sq.ft
Module Area

PORTRAIT
Orientation

CROSS-SLOPE
Rail Direction

NXT HD
Rail Type

NXT COMBO
Clamp

Flashloc DUO 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)	Panel Exposure	Basic Wind Speed (mph)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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#N/A

- * 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.
- 40 Highlighted cell with strikethrough indicate 3-rail system span and module clamp allowable capacity exceeds with 3-rails. 4-Rail system required. Contact Unirac Engineering Services for support.



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

NXT HD
Rail Type

NXT COMBO
Clamp

Flashloc DUO 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)	Panel Exposure	Basic Wind Speed (mph)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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10 Highlighted cell indicate 3-rail system span. Contact Unirac Engineering Services for support.

[illegible]

* Cells with an astrisks 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-root must be oriented in the Y- direction as indicated in the image.

10 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]

10 Cells with an asterisks 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

19 sq.ft
Module Area

LANDSCAPE
Orientation

CROSS-SLOPE
Rail Direction

NXT HD
Rail Type

NXT COMBO
Clamp

Flashloc DUO 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)	Panel Exposure	Basic Wind Speed (mph)																																
				Roof Wind Zone																																
				90				95				100				105				110				115				120								
				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	Interior	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	12			
			Exposed	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	12	13	13	11		
		7-20	Interior	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	11		
			Exposed	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	12	13	13	8	
		20-27	Interior	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	11		
			Exposed	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	15	10	16	7		
	C	0-7	Interior	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	18	19	16	12		
			Exposed	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	19	11	18	17	12	
		7-20	Interior	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	8	
			Exposed	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	12	13	13	5
		20-27	Interior	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	11	
			Exposed	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	11	
70	B	0-7	Interior	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	11	
			Exposed	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	11	
		7-20	Interior	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	11	
			Exposed	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	11	
		20-27	Interior	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
			Exposed	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
	C	0-7	Interior	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	
			Exposed	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	
		7-20	Interior	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	
			Exposed	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	
		20-27	Interior	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
			Exposed	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
80	B	0-7	Interior	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	
			Exposed	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
		7-20	Interior	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	
			Exposed	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	
		20-27	Interior	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
			Exposed	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	C	0-7	Interior	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	
			Exposed	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
		7-20	Interior	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
			Exposed	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
		20-27	Interior	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
			Exposed	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
90	B	0-7	Interior	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	
			Exposed	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
		7-20	Interior	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
			Exposed	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
		20-27	Interior	14	14																															

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
				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	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	
			Exposed	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	
		7-20	Interior	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
			Exposed	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	
		20-27	Interior	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
			Exposed	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	
	27-45	Interior	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
		Exposed	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14		
	C	0-7	Interior	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	
			Exposed	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		
		7-20	Interior	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	
			Exposed	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	
		20-27	Interior	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
			Exposed	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	
	27-45	Interior	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
		Exposed	14	14	14	1																																

* Cells with an asterisk indicates that the L-root 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

PORTRAIT
Orientation

CROSS-SLOPE
Rail Direction

NXT HD
Rail Type

NXT COMBO
Clamp

Flashloc DUO 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)	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																						
0	B	0-7	Interior	28	28	27	28	28	24	28	28	21	28	28	19	28	25	17	28	23	16	28	21	14	24	17
			Exposed	28	25	17	28	22	15	28	20	14	25	18	12	22	16	11	20	14	10	18	13	9	15	11
		7-20	Interior	28	28	24	28	26	21	28	23	19	28	20	17	28	18	15	26	17	14	24	15	12	20	13
			Exposed	28	18	15	26	16	13	23	15	12	20	13	11	18	12	10	17	11	9	15	10	8	13	8
		20-27	Interior	29	29	27	29	29	23	29	28	20	29	25	17	29	22	15	29	20	14	29	19	12	27	16
			Exposed	29	22	15	29	20	13	29	18	12	28	16	11	25	14	10	23	13	9	21	12	8	17	10
	C	27-45	Interior	29	29	29	29	29	29	29	29	26	29	29	23	29	26	18	26	23	16	22	20	13	19	17
			Exposed	29	28	20	28	25	17	25	22	15	22	20	13	20	18	12	18	16	11	17	15	9	14	13
		0-7	Interior	28	27	19	28	24	16	28	21	15	27	19	13	24	17	12	22	16	11	20	14	10	17	12
			Exposed	24	17	12	21	15	10	19	13	9	17	12	8	15	11	8	14	10	7	13	9	6	11	8
		7-20	Interior	28	20	16	28	18	14	25	16	13	22	14	12	20	13	10	18	12	9	16	11	9	14	9
			Exposed	20	13	10	18	11	9	16	10	8	14	9	7	13	8	7	12	7	6	11	7	5	9	6
10	B	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
			Exposed	27	15	10	24	14	9	21	12	8	19	11	7	17	10	7	16	9	6	14	8	5	12	7
		27-45	Interior	29	29	22	29	27	19	27	24	16	24	22	14	22	19	13	20	18	11	18	16	10	15	14
			Exposed	22	19	13	19	17	11	17	15	10	16	14	9	14	13	8	13	11	7	12	10	6	10	9
	C	0-7	Interior	28	22	15	28	20	14	25	18	12	22	16	11	20	14	10	18	13	9	16	12	8	14	10
			Exposed	20	14	10	18	13	9	16	11	8	14	10	7	13	9	6	11	8	6	10	8	5	9	6
		7-20	Interior	26	16	13	23	15	12	20	13	11	18	12	10	17	11	9	15	10	8	14	9	7	11	7
			Exposed	16	11	9	15	9	8	13	8	7	12	7	6	11	7	6	10	6	5	9	6	5	7	5
		20-27	Interior	29	20	13	29	18	12	28	16	11	25	14	10	23	13	9	20	12	8	19	11	7	16	9
			Exposed	23	13	9	20	11	8	18	10	7	16	9	6	14	8	6	13	7	5	12	7	5	10	6
20	B	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
			Exposed	18	16	10	16	14	9	14	13	8	13	12	7	12	10	6	11	9	6	10	9	5	8	7
	C	0-7	Interior	20	20	19	20	20	16	20	20	15	20	19	13	20	17	12	20	16	11	20	14	10	17	12
			Exposed	20	17	12	20	15	10	19	13	9	17	12	8	15	11	8	14	10	7	13	9	6	11	8
		7-20	Interior	20	20	16	20	18	14	20	16	13	20	14	12	20	13	10	18	12	9	16	11	9	14	9
			Exposed	20	13	10	18	11	9	16	10	8	14	9	7	13	8	7	12	7	6	11	7	5	9	6
		20-27	Interior	23	23	17	23	21	14	23	19	13	23	17	11	23	15	10	23	14	9	22	13	9	19	11
			Exposed	23	15	10	23	14	9	21	12	8	19	11	7	17	10	7	16	9	6	14	8	5	12	7
30	B	27-45	Interior	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
			Exposed	26	26	20	26	25	17	25	22	15	22	20	13	20	18	12	18	16	11	17	15	9	14	13
	C	0-7	Interior	20	20	19	20	20	16	20	20	15	20	19	13	20	17	12	20	16	11	20	14	10	17	12
			Exposed	20	17	12	20	15	10	19	13	9	17	12	8	15	11	8	14	10	7	13	9	6	11	8
		7-20	Interior	20	20	16	20	18	14	20	16	13	20	14	12	20	13	10	18	12	9	16	11	9	14	9
			Exposed	20	13	10	18	11	9	16	10	8	14	9	7	13	8	7	12	7	6	11	7	5	9	6
		20-27	Interior	23	23	17	23	21	14	23	19	13	23	17	11	23	15	10	23	14	9	22	13	9	19	11
			Exposed	23	15	10	23	14	9	21	12	8	19	11	7	17	10	7	16	9	6	14	8	5	12	7
40	B	27-45	Interior	26	26	22	26	26	19	26	24	16	24	22	14	22	19	13	20	18	11	18	16	10	15	14
			Exposed	22	19	13	19	17	11	17	15	10	16	14	9	14	13	8	13	11	7	12	10	6	10	9
	C	0-7	Interior	20	20	15	20	20	14	20	18	12	20	16	11	20	14	10	18	13	9	16	12	8	14	10
			Exposed	20	14	10	18	13	9	16	11	8	14	10	7	13	9	6	11	8	6	10	8	5	9	6
		7-20	Interior	20	16	13	20	15	12	20	13	11	18	12	10	17	11	9	15	10	8	14	9	7	11	7
			Exposed	16	11	9	15	9	8	13	8	7	12	7	6	11	7	6	10	6	5	9	6	5	7	5
50	B	27-45	Interior	24	20	13	24	18	12	24	16	11	24	14	10	23	13	9	20	12	8	19	11	7	16	9
			Exposed	23	13	9	20	11	8	18	10	7	16	9	6	14	8	6	13	7	5	12	7	5	10	6
	C	0-7	Interior	26	25	17	25	22	15	22	20	13	20	18	12	18	16	10	16	15	9	15	13	8	13	11
			Exposed	18	16	10	16	14	9	14	13	8	13	12	7	12	10	6	11	9	6	10	9	5	8	7
		7-20	Interior	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
			Exposed	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
60	B	27-45	Interior	14	14	14	14	14	13	14	14	12	14	13	11	14	12	10	14	11	9	14	10	8	13	8
			Exposed	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
	C	0-7	Interior	17	17	15	17	17	13	17	17	12	17	16	11	17	14	10	17	13	9	17	12	8	17	10
			Exposed	20	20	20	20	20	19	20	20	16	20	20	20	20	20	20	20	20	20	20	20	20	20	20
		7-20	Interior	20	20	20	20	20																		

[illegible]

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

Ground Snow Load (psf)		Wind Exposure Category		Roof Tilt Angle (deg)		Panel Exposure		Basic Wind Speed (mph)																																		
								Roof Wind Zone																								170			180							
								90			95			100			105			110			115			120			130			140			150			160			170	
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				
60	B	0-7	Interior	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	6	6	6	6	6		
			Exposed	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	6	6	6	6	6		
		7-20	Interior	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	6	6	6	6	6	6	6
			Exposed	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	6	6	6	6	6	6	
		20-27	Interior	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	8	8	8	8	8	8	8	8	8	8
			Exposed	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	8	8	8	8	8	8	8	8	8	
	C	0-7	Interior	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	6	6	6	6	6	6	
			Exposed	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	6	6	6	6	6		
		7-20	Interior	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	6	6	6	6	6	6	
			Exposed	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	6	6	6	6	6	6	
		20-27	Interior	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	8	8	8	8	8	8	8	8	8	
			Exposed	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	8	8	8	8	8	8	8	8	8	
	D	0-7	Interior	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
			Exposed	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
		7-20	Interior	7	7	7	7	7																																		

10 Highlighted cell indicate 3-rail system span. Contact Unirac Engineering Services for support.



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 HD
Rail Type

NXT COMBO
Clamp

Flashloc DUO 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)	Panel Exposure	Basic Wind Speed (mph)																							
				90						95						100						105					
				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
90	B	0-7	Interior	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
			Exposed	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		7-20	Interior	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
			Exposed	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		20-27	Interior	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
			Exposed	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	C	0-7	Interior	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
			Exposed	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		7-20	Interior	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
			Exposed	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		20-27	Interior	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
			Exposed	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
100	D	0-7	Interior	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
			Exposed	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		7-20	Interior	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
			Exposed	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		20-27	Interior	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
			Exposed	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	B	0-7	Interior	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
			Exposed	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		7-20	Interior	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
			Exposed	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		20-27	Interior	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
			Exposed	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
100	C	0-7	Interior	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
			Exposed	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
		7-20	Interior	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
			Exposed	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		20-27	Interior	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
			Exposed	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
100	D	0-7	Interior	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
			Exposed	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		7-20	Interior	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
			Exposed	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		20-27	Interior	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
			Exposed	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

#N/A

- * Cells with an asterisks indicates that the L-foot must be oriented in the Y- direction as indicated in the image.
10 Highlighted cell indicate 3-rail system span. Contact Unirac Engineering Services for support.
49 Highlighted cell with strikethrough indicate 3-rail system span and module clamp allowable capacity exceeds with 3-rails. 4-Rail system required. Contact Unirac Engineering Services for support.



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 HD
Rail Type

NXT COMBO
Clamp

Flashloc DUO 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)	Panel Exposure	Basic Wind Speed (mph)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
				90						95						100						105						110						115						120						130						140						150						160						170						180																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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				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	1	2	3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
0	B	0-7	Interior	28	28	27	28	28	24	28	28	21	28	28	19	28	25	17	28	23	16	28	21	14	24	17	12	20	15	10	17	13	9	15	11	8	13	10	7	12	8	6																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

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				
30	B	0-7	Interior	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	10	12	12	9	12	11	8	12	10	7	12	8	6				
			Exposed	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12		
		7-20	Interior	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	
			Exposed	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	
		20-27	Interior	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	13	9	14	11	8	14	10	7	13	9	6	13	8	5		
			Exposed	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
	C	0-7	Interior	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	
			Exposed	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	
		7-20	Interior	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
			Exposed	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
		20-27	Interior	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	13	9	14	11	8	14	10	7	13	9	6	13	8	5	
			Exposed	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
D	0-7	Interior	13	13	13	13	13	13	13	13	12	13	13	11	13	13	10	13	13	9	13	12	8	13	10	7	12	8	6														

10 Highlighted cell indicate 3-rail system span. Contact Unirac Engineering Services for support.

[illegible]

10 Highlighted cell indicate 3-rail system span. Contact Unirac Engineering Services for support.



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 HD
Rail Type

NXT COMBO
Clamp

Flashloc DUO 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)	Panel Exposure	Basic Wind Speed (mph)																							
				90						95						100						105					
				110						115						120						130					
				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
90	B	0-7	Interior	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
			Exposed	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		7-20	Interior	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
			Exposed	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		20-27	Interior	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
			Exposed	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	C	0-7	Interior	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
			Exposed	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		7-20	Interior	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
			Exposed	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		20-27	Interior	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
			Exposed	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
100	B	0-7	Interior	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
			Exposed	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		7-20	Interior	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
			Exposed	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		20-27	Interior	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
			Exposed	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	C	0-7	Interior	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
			Exposed	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
		7-20	Interior	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
			Exposed	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		20-27	Interior	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
			Exposed	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
100	D	0-7	Interior	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
			Exposed	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
		7-20	Interior	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
			Exposed	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		20-27	Interior	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
			Exposed	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
100	D	0-7	Interior	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
			Exposed	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		7-20	Interior	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
			Exposed	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		20-27	Interior	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
			Exposed	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

#N/A

- * Cells with an asterisks indicates that the L-foot must be oriented in the Y- direction as indicated in the image.
10 Highlighted cell indicate 3-rail system span. Contact Unirac Engineering Services for support.
49 Highlighted cell with strikethrough indicate 3-rail system span and module clamp allowable capacity exceeds with 3-rails. 4-Rail system required. Contact Unirac Engineering Services for support.



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 HD
Rail Type

NXT COMBO
Clamp

Flashloc DUO 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)	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
0	B	0-7	Interior	55	55	54	55	55	47	55	55	42	55	55	38	55	49	34	55	45	31	55	41	28	48	34	24	40	29	20	35	25	17	30	22	15	26	19	13	23	17	12
			Exposed	55	49	34	55	44	30	55	39	27	49	35	24	44	32	22	40	29	20	36	26	18	30	22	15	26	19	13	22	16	11	19	14	10	17	12	9	15	11	8
		7-20	Interior	55	55	47	55	51	41	55	45	37	55	41	33	55	37	30	52	33	27	47	30	25	40	25	21	34	22	18	29	19	15	25	16	13	22	14	12	20	13	10
			Exposed	55	36	30	51	32	27	45	29	24	41	26	21	37	24	19	33	21	18	30	20	16	25	16	14	22	14	12	19	12	10	16	11	9	14	9	8	13	8	7
		20-27	Interior	56	56	54	56	56	46	56	55	40	56	49	35	56	45	31	56	40	27	56	37	25	54	31	21	46	26	18	39	23	15	34	20	13	30	17	12	27	15	10
			Exposed	56	44	30	56	39	26	56	35	24	56	32	21	50	29	19	45	26	18	41	24	16	35	20	14	29	17	12	25	15	10	22	13	9	19	11	8	17	10	7
	C	27-45	Interior	56	56	56	56	56	56	56	56	51	56	56	56	56	56	56	56	51	35	52	46	32	43	39	26	37	33	21	32	28	18	28	25	15	24	22	13	22	19	12
			Exposed	56	55	39	55	49	34	49	44	30	44	40	26	40	36	24	36	33	21	33	30	19	28	25	16	24	21	13	21	18	11	18	16	10	16	14	9	14	13	8
		0-7	Interior	55	53	37	55	47	33	55	42	29	53	38	26	48	34	24	43	31	22	39	28	20	33	24	17	28	20	14	24	17	12	21	15	11	18	13	9	16	12	8
			Exposed	47	34	24	42	30	21	37	27	19	34	24	17	30	22	15	28	20	14	25	18	13	21	15	11	18	13	9	16	11	8	14	10	7	12	9	6	11	8	5
		7-20	Interior	55	39	32	55	35	29	49	31	26	44	28	23	39	25	21	36	23	19	33	21	17	27	18	15	23	15	12	20	13	11	18	11	9	15	10	8	14	9	7
			Exposed	39	25	21	35	22	18	31	20	17	28	18	15	25	16	13	23	15	12	21	14	11	18	11	9	15	10	8	13	8	7	11	7	6	10	6	5	9	6	7
10	B	20-27	Interior	56	48	33	56	42	29	56	38	25	56	34	23	54	31	21	49	28	19	44	25	17	37	21	15	32	18	12	27	16	11	24	14	9	21	12	8	18	11	7
			Exposed	54	31	21	48	27	18	43	24	17	38	22	15	34	20	13	31	18	12	29	17	11	24	14	9	20	12	8	18	10	7	15	9	6	14	8	5	12	7	5
		27-45	Interior	56	56	43	56	53	37	53	47	33	48	43	29	43	39	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	31	20	31	28	17	28	25	15	25	23	14	23	21	13	20	18	11	17	15	9	14	13	8	13	11	7	11	10	6	10	9	5
	C	0-7	Interior	55	44	31	55	39	27	49	35	24	44	31	22	39	28	20	36	26	18	33	23	16	27	20	14	23	17	12	20	14	10	17	13	9	15	11	8	14	10	7
			Exposed	39	28	20	35	25	18	31	22	16	28	20	14	25	18	13	23	17	12	21	15	11	18	13	9	15	11	8	13	9	7	11	8	6	10	7	5	9	6	7
		7-20	Interior	51	33	27	45	29	24	40	26	21	36	23	19	33	21	17	30	19	16	27	18	14	23	15	12	19	13	10	17	11	9	15	9	8	13	8	7	11	7	6
			Exposed	33	21	17	29	19	15	26	17	14	23	15	12	21	14	11	19	12	10	18	11	9	15	10	8	13	8	7	11	7	6	9	6	5	8	5	7	7	5	6
		20-27	Interior	56	40	27	56	35	24	55	32	21	50	28	19	45	26	17	41	23	16	37	21	14	31	18	12	26	15	10	23	13	9	20	12	8	17	10	7	15	9	6
			Exposed	45	26	17	40	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	6	13	7	5	11	7	4	10	6	4
20	B	27-45	Interior	56	50	34	50	44	30	44	39	26	40	36	23	36	32	21	33	29	19	30	27	17	25	23	14	22	19	12	19	17	10	16	14	9	14	13	8	13	11	7
			Exposed	36	32	21	32	29	18	29	26	16	26	23	14	23	21	13	21	19	12	19	17	11	16	15	9	14	13	8	12	11	7	11	9	6	9	8	5	8	7	4
	C	0-7	Interior	39	39	37	39	39	33	39	39	29	39	38	26	39	34	24	39	31	22	39	28	20	33	24	17	28	20	14	24	17	12	21	15	11	18	13	9	16	12	8
			Exposed	39	34	24	39	30	21	37	27	19	34	24	17	30	22	15	28	20	14	25	18	13	21	15	11	18	13	9	16	11	8	14	10	7	12	9	6	11	8	5
		7-20	Interior	39	39	32	39	35	29	39	31	26	39	28	23	39	25	21	36	23	19	33	21	17	27	18	15	23	15	12	20	13	11	18	11	9	15	10	8	14	9	7
			Exposed	39	25	21	35	22	18	31	20	17	28	18	15	25	16	13	23	15	12	21	14	11	18	11	9	15	10	8	13	8	7	11	7	6	10	6	5	9	6	7
		20-27	Interior	46	46	33	46	42	29	46	38	25	46	34	23	46	31	21	46	28	19	44	25	17	37	21	15	32	18	12	27	16	11	24	14	9	21	12	8	18	11	7
			Exposed	46	31	21	46	27	18	43	24	17	38	22	15	34	20	13	31	18	12	29	17	11	24	14	9	20	12	8	18	10	7	15	9	6	14	8	5	12	7	5
30	B	27-45	Interior	50	50	43	50	50	37	50	47	33	48	43	29	43	39	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	31	20	31	28	17	28	25	15	25	23	14	23	21	13	20	18	11	17	15	9	14	13	8	13	11	7	11	10	6	10	9	5
	C	0-7	Interior	39	39	31	39	39	27	39	35	24	39	31	22	39	28	20	36	26	18	33	23	16	27	20	14	23	17	12	20	14	10	17	13	9	15	11	8	14	10	7
			Exposed	39	28	20	35	25	18	31	22	16	28	20	14	25	18	13	23	17	12	21	15	11	18	13	9	15	11	8</												

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

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		
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	Interior	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	12			
			Exposed	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	10	13	11	8				
		7-20	Interior	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	12	9	13	11	8		
			Exposed	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	12	13	12	10	13	11	9	13	8	13	8	7		
		20-27	Interior	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	15	16	16	13	16	12	16	15	10			
			Exposed	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	15	10	16	13	9	16	11	8	16	10	7	
	C	0-7	Interior	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	19	19	18	18	18	15	18	18	13	17	17	12	
			Exposed	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	19	19	18	18	18	13	17	17	12			
		7-20	Interior	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	19	18	11	18	16	10	16	14	9	14	13	8	
			Exposed	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	19	18	11	18	16	10	16	14	9	14	13	8
		20-27	Interior	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	12	13	13	11	13	10	6	5	9	6	7
			Exposed	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	15	14	9	15	12	8	14	11	7			
70	B	0-7	Interior	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	13	10	14	13	9	14	11	7	6		
			Exposed	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	13	9	7	11	8	6	10	7	5	9	6	7
		7-20	Interior	14	14	14	14	14</																															

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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 HD
Rail Type

NXT COMBO
Clamp

Flashloc DUO 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)	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
0	B	0-7	Interior	55	55	54	55	55	47	55	55	42	55	55	38	55	49	34	55	45	31	55	41	28	48	34	24	40	29	20	35	25	17	30	22	15	26	19	13	23	17	12
			Exposed	55	49	34	55	44	30	55	39	27	49	35	24	44	32	22	40	29	20	36	26	18	30	22	15	26	19	13	22	16	11	19	14	10	17	12	9	15	11	8
		7-20	Interior	55	55	47	55	51	41	55	45	37	55	41	33	55	37	30	52	33	27	47	30	25	40	25	21	34	22	18	29	19	15	25	16	13	22	14	12	20	13	10
			Exposed	55	36	30	51	32	27	45	29	24	41	26	21	37	24	19	33	21	18	30	20	16	25	16	14	22	14	12	19	12	10	16	11	9	14	9	8	13	8	7
		20-27	Interior	56	56	54	56	56	46	56	55	40	56	49	35	56	45	31	56	40	27	56	37	25	54	31	21	46	26	18	39	23	15	34	20	13	30	17	12	27	15	10
			Exposed	56	44	30	56	39	26	56	35	24	56	32	21	50	29	19	45	26	18	41	24	16	35	20	14	29	17	12	25	15	10	22	13	9	19	11	8	17	10	7
	C	27-45	Interior	56	56	56	56	56	56	56	56	51	56	56	56	56	56	56	56	51	35	52	46	32	43	39	26	37	33	21	32	28	18	28	25	15	24	22	13	22	19	12
			Exposed	56	55	39	55	49	34	49	44	30	44	40	26	40	36	24	36	33	21	33	30	19	28	25	16	24	21	13	21	18	11	18	16	10	16	14	9	14	13	8
		0-7	Interior	55	53	37	55	47	33	55	42	29	53	38	26	48	34	24	43	31	22	39	28	20	33	24	17	28	20	14	24	17	12	21	15	11	18	13	9	16	12	8
			Exposed	47	34	24	42	30	21	37	27	19	34	24	17	30	22	15	28	20	14	25	18	13	21	15	11	18	13	9	16	11	8	14	10	7	12	9	6	11	8	5
		7-20	Interior	55	39	32	55	35	29	49	31	26	44	28	23	39	25	21	36	23	19	33	21	17	27	18	15	23	15	12	20	13	11	18	11	9	15	10	8	14	9	7
			Exposed	39	25	21	35	22	18	31	20	17	28	18	15	25	16	13	23	15	12	21	14	11	18	11	9	15	10	8	13	8	7	11	7	6	10	6	5	9	6	7
10	B	20-27	Interior	56	48	33	56	42	29	56	38	25	56	34	23	54	31	21	49	28	19	44	25	17	37	21	15	32	18	12	27	16	11	24	14	9	21	12	8	18	11	7
			Exposed	54	31	21	48	27	18	43	24	17	38	22	15	34	20	13	31	18	12	29	17	11	24	14	9	20	12	8	18	10	7	15	9	6	14	8	5	12	7	5
		27-45	Interior	56	56	43	56	53	37	53	47	33	48	43	29	43	39	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	31	20	31	28	17	28	25	15	25	23	14	23	21	13	20	18	11	17	15	9	14	13	8	13	11	7	11	10	6	10	9	5
	C	0-7	Interior	55	44	31	55	39	27	49	35	24	44	31	22	39	28	20	36	26	18	33	23	16	27	20	14	23	17	12	20	14	10	17	13	9	15	11	8	14	10	7
			Exposed	39	28	20	35	25	18	31	22	16	28	20	14	25	18	13	23	17	12	21	15	11	18	13	9	15	11	8	13	9	7	11	8	6	10	7	5	9	6	7
		7-20	Interior	51	33	27	45	29	24	40	26	21	36	23	19	33	21	17	30	19	16	27	18	14	23	15	12	19	13	10	17	11	9	15	9	8	13	8	7	11	7	6
			Exposed	33	21	17	29	19	15	26	17	14	23	15	12	21	14	11	19	12	10	18	11	9	15	10	8	13	8	7	11	7	6	9	6	5	8	5	7	7	5	6
		20-27	Interior	56	40	27	56	35	24	55	32	21	50	28	19	45	26	17	41	23	16	37	21	14	31	18	12	26	15	10	23	13	9	20	12	8	17	10	7	15	9	6
			Exposed	45	26	17	40	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	6	13	7	5	11	7	4	10	6	4
20	B	27-45	Interior	56	50	34	50	44	30	44	39	26	40	36	23	36	32	21	33	29	19	30	27	17	25	23	14	22	19	12	19	17	10	16	14	9	14	13	8	13	11	7
			Exposed	36	32	21	32	29	18	29	26	16	26	23	14	23	21	13	21	19	12	19	17	11	16	15	9	14	13	8	12	11	7	11	9	6	9	8	5	8	7	4
	C	0-7	Interior	39	39	37	39	39	33	39	39	29	39	38	39	39	34	39	39	31	39	39	28	39	34	24	39	29	20	35	25	17	30	22	15	26	19	13	23	17	12	
			Exposed	39	34	34	39	30	21	37	27	19	34	24	17	30	22	15	28	20	14	25	18	13	21	15	11	18	13	9	16	11	8	14	10	7	12	9	6	11	8	5
		7-20	Interior	39	39	32	39	35	29	39	31	26	39	28	23	39	25	21	36	23	19	33	21	17	27	18	15	23	15	12	20	13	11	18	11	9	15	10	8	14	9	7
			Exposed	39	25	21	35	22	18	31	20	17	28	18	15	25	16	13	23	15	12	21	14	11	18	11	9	15	10	8	13	8	7	11	7	6	10	6	5	9	6	7
		20-27	Interior	46	46	33	46	42	29	46	38	25	46	34	23	46	31	21	46	28	19	44	25	17	37	21	15	32	18	12	27	16	11	24	14	9	21	12	8	18	11	7
			Exposed	46	31	21	46	27	18	43	24	17	38	22	15	34	20	13	31	18	12	29	17	11	24	14	9	20	12	8	18	10	7	15	9	6	14	8	5	12	7	5
30	B	27-45	Interior	50	50	43	50	50	37	50	47	33	48	43	29	43	39	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	31	20	31	28	17	28	25	15	25	23	14	23	21	13	20	18	11	17	15	9	14	13	8	13	11	7	11	10	6	10	9	5
	C	0-7	Interior	39	39	31	39	39	27	39	35	24	39	31	22	39	28	20	36	26	18	33	23	16	27	20	14	23	17	12	20	14	10	17	13	9	15	11	8	14	10	7
			Exposed	39	28	20	35	25	18	31	22	16	28	20	14	25	18	13	23	17	12	21	15	11	18	13	9															

10 Highlighted cell indicate 3-rail system span. Contact Unirac Engineering Services for support.

[illegible]

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

[illegible]

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