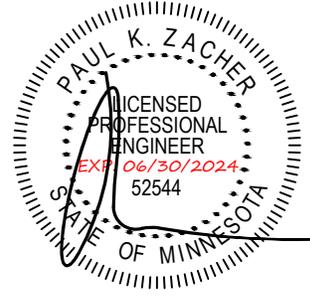




DIGITALLY SIGNED



October 5, 2022

Sunmodo Corp
14800 NE 65th St
Vancouver, WA 98682
TEL: (360) 844-0048

Attn.: Sunmodo Corp - Engineering Department

Re: Report # 2021-02963HG.01 – Sunmodo SMR100

Subject: Engineering Certification for the State of Minnesota

PZSE, Inc. – Structural Engineers has provided engineering and span tables for the Sunmodo SMR100 Rail, as presented in PZSE Report # 2021-02963HG.01, "Sunmodo SMR100 Rail, Engineering Certification for Gable and Hip Roofs". All information, data, and analysis therein are based on, and comply with, the following building codes and typical specifications:

Building Codes:

1. ASCE/SEI 7-16, Minimum Design Loads for Buildings and other Structures, by American Society of Civil Engineers
2. 2020 Minnesota Building Code, by Minnesota Department of Labor and Industry
3. 2020 Minnesota Residential Code, by Minnesota Department of Labor and Industry
4. 2018 International Building Code, by International Code Council, Inc.
5. 2018 International Residential Code, by International Code Council, Inc.
6. AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES
7. Aluminum Design Manual 2015, by The Aluminum Association, Inc.
8. ANSI/AWC NDS-2018, National Design Specification for Wood Construction, by the American Wood Council

Design Criteria:

Risk Category II
 Seismic Design Category = A - E
 Exposure Category = B, C & D
 Basic Wind Speed (ultimate) per ASCE 7-10 & 7-16 = 90 mph to 190 mph
 Ground Snow Load = 0 to 90 (psf)

Span Tables are in compliance with the above codes. Sunmodo SMR100 Rail Span Tables are in compliance with the above codes.

If you have any questions on the above, do not hesitate to call.

Prepared by:
PZSE, Inc. – Structural Engineers
Roseville, CA

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the state of Minnesota.

Signature: _____

Typed or Printed Name: Paul K. Zacher

Date: 10/05/2022 License Number: 52544



September 1, 2021

SunModo Corp
14800 NE 65th St
Vancouver, WA 98682
TEL: (360) 844-0048

Attn.: Sunmodo - Engineering Department

Re: Report #2021-02963HG.01 SunModo SMR100 Rail, Engineering Certification for Gable and Hip roofs.

PZSE, Inc. - Structural Engineers have reviewed SunModo SMR100 Rail. All information, data, and analysis contained within the SunModo SMR100 Rail span tables are based on and comply with the following codes:

1. Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7-10 & ASCE/SEI 7-16
2. 2012 - 2018 International Building Codes, by the International Code Council, Inc.
3. 2012 - 2018 International Residential Code, by the International Code Council, Inc.
4. AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012, by ICC-ES
5. Aluminum Design Manual 2010 & 2015, by The Aluminum Association, Inc.
6. ANSI/AWC NDS-2012 & 2015, National Design Specification for Wood Construction, by the American Wood Council

Following are typical specifications to meet the above code requirements:

Design Criteria: Ground Snow Load = 0 - 90 (psf)
Basic Wind Speed = 90 - 190 (mph)
Roof Mean Height = 0 - 30 (ft)
Enclosed and Partially Enclosed Gable and Hip Roof Pitch = 0° - 90° (degrees)
Exposure Category = B, C & D

Cantilever: Maximum cantilever length is L/3, where "L" is the span noted in the Span Tables, provided there is at least 1 module length between maximum cantilevers.

Clearance: 2" Minimum clear and 10" Maximum clear from the top of the roof to top of PV panel.

Splice:

Rails installed with (2) Roof Attachments (1 rail span)*: SMR100 Rail Splice where required shall be installed within a distance of $L/4$ from either Roof Attachment, where “L” is the rail span.

Rails installed with (3) or more Roof Attachments (2 or more rail spans)*: SMR100 Rail Splice where required shall not be installed within a distance of $L/8$ from any Roof Attachment, where “L” is the rail span.

*SMR100 Rail Splice may be installed on any portion of the span in instances where the rail is continuous over two roof attachments on both sides of the splice.

Tolerance(s):

1.0” tolerance for any specified dimension in this report is allowed for installation.

Installation Orientation:

Landscape (L) - PV Panel long dimension is parallel to the ridge/eave line of roof, and the PV panel is mounted on the long side.
 Portrait (P) - PV Panel short dimension is parallel to the ridge/eave line of roof, and the PV panel is mounted on the short side.
 Rail Spacing Tables assume maximum panel dimensions are: 82” x 42”

Rail Materials:

The SMR100 Rail Aluminum Alloys: 6005-T5, 6005A-T61, 6061-T6

Components and Cladding Roof Zones:

Roof Zones – Enclosed and Partially Enclosed Gable Roofs, $\theta \leq 7^\circ$:

The zones shall be determined using figure 30.3-2A of ASCE 7-16 (or figure 30.4-2A of ASCE 7-10). See Figure 1.

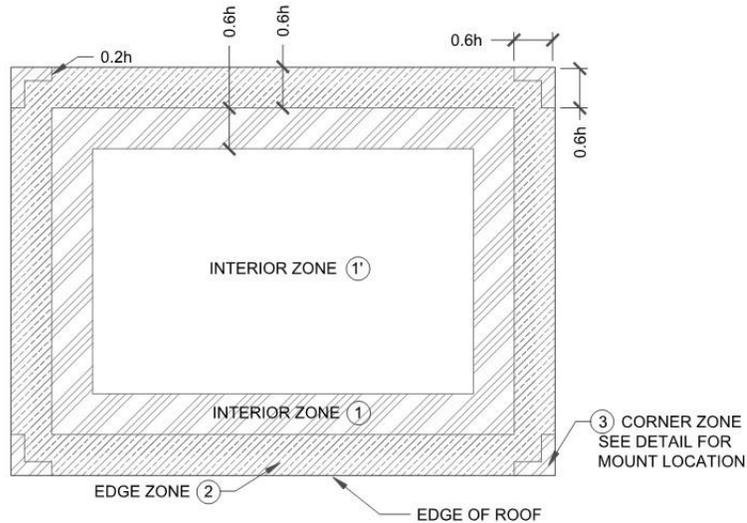


Figure 1: Roof Edge and Corner Zones, Gable Roofs, $\theta \leq 7^\circ$

Roof Zones – Enclosed and Partially Enclosed Gable and Hip Roofs, $7^\circ < \theta \leq 90^\circ$:

The Edge Zone, “a,” shall be determined using figure 30.3-2B to figure 30.3-2D of ASCE 7-16 (or figure 30.4-2A to figure 30.4-2A of ASCE 7-10), for Gable roofs. The Edge Zone, “a,” shall be determined using figure 30.3-2E to figure 30.3-2I of ASCE 7-16 (or figure 30.4-2B – figure 30.4-2C of ASCE 7-10), for Hip roofs. Roofs from $45^\circ < \theta \leq 90^\circ$ shall use the same Edge Zone, “a” determination as roofs from $27^\circ < \theta \leq 45^\circ$.

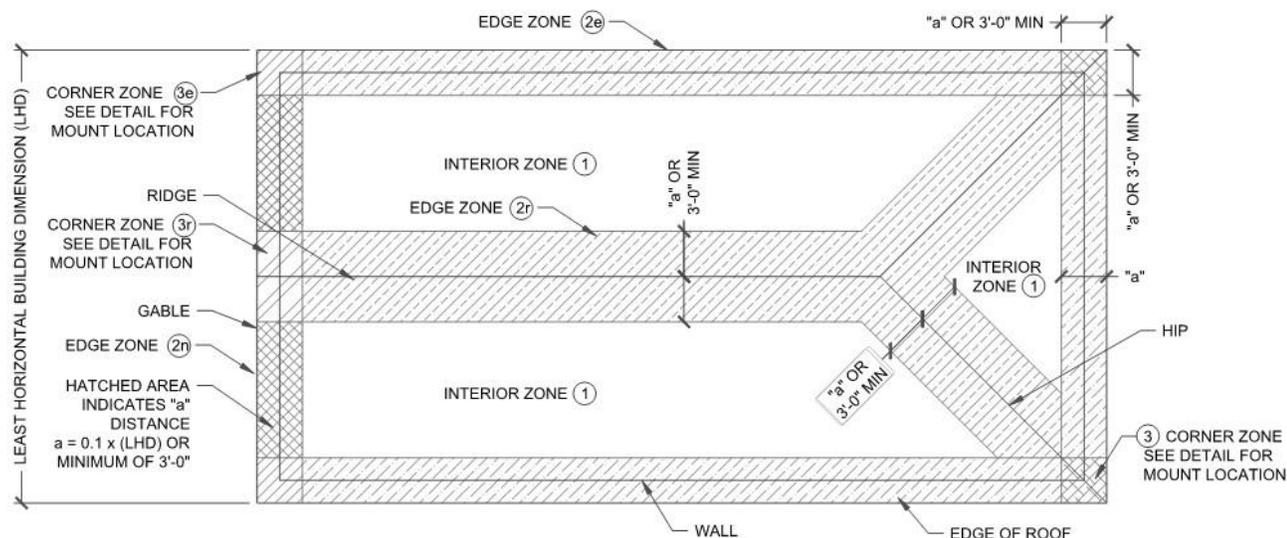


Figure 2: Roof Zones, Gable and Hip Roofs, $7^\circ < \theta \leq 90^\circ$

Panel with Support Mounts in Multiple Roof Zones:

Edge and Corner Zone spacings (Zone 2 & 3, respectively) apply only to mounts located in those Zones, not to all the mounts supporting the module.

- Notes:
- 1) Tables are determined for Rail only and do not include roof capacity check.
 - 2) Risk Category II per ASCE 7-10 & ASCE 7-16.
 - 3) Topographic factor, k_{zt} is 1.0.
 - 4) Average parapet height is 0.0 ft.
 - 5) Wind speeds are LRFD values.
 - 6) Attachment spacing(s) apply to a seismic design category E or less.



Design Responsibility:

These tables are intended to be used under the responsible charge of a registered design professional where required by the authority having jurisdiction. In all cases, these tables should be used under the direction of a design professional with sufficient structural engineering knowledge and experience to be able to:

- Evaluate whether these tables apply to the project, and
- Understand and determine the appropriate values for all input parameters of these tables.

This letter certifies that the SunModo SMR100 Rail, when installed according to the limitations of this letter and the attached span tables, complies with the above codes and loading criteria. This certification excludes evaluation of the building structure to support the loads imposed on the building by the array; including, but not limited to strength and deflection of structural framing members, fastening and/or strength of roofing materials, and/or the effects of snow accumulation on the roof. Structures will require additional knowledge of the building and are outside the scope of the certification of this racking system.

If you have any questions on the above, do not hesitate to call.

Prepared by:
PZSE, Inc. – Structural Engineers
Roseville, CA



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Maximum Rail Spans (Inches)				SMR100 Rail Flush-Mount on 0 to 30 Foot Roof -- ASCE 7-10 -- 72-Cell (P)																																									
Ground Snow Load	Exposure Category	Panel Angle	Wind Speed -> Roof Zone ->	90 mph			95 mph			100 mph			105 mph			110 mph			115 mph			120 mph			130 mph			140 mph			150 mph			160 mph			170 mph			180 mph			190 mph		
				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 psf	B	0 to 7	All Mounts	93	93	93	93	93	91	93	93	88	93	93	85	93	93	82	93	93	79	93	93	76	90	90	69	85	85	64	81	81	60	76	76	56	71	71	52	67	67	49	63	63	46
		7 to 27	All Mounts	93	93	93	93	93	93	93	93	90	93	93	86	93	93	83	93	93	81	93	93	78	90	93	71	88	88	66	84	84	61	80	80	57	75	75	54	71	71	51	67	67	48
		27 to 45	All Mounts	95	95	95	95	95	95	95	95	95	95	95	95	94	94	94	92	92	91	89	89	88	85	85	83	82	82	79	78	78	73	75	75	68	71	71	64	66	66	60	63	63	57
		45 to 90	All Mounts	97	97	97	97	97	97	97	97	94	95	95	91	93	93	88	90	90	85	88	88	83	84	84	78	80	80	72	76	76	67	71	71	63	67	67	59	63	63	55	59	59	52
	C	0 to 7	All Mounts	93	93	84	93	93	81	93	93	77	93	93	73	90	90	69	87	87	66	84	84	63	79	79	58	73	73	54	68	68	50	63	63	47	60	60	44	56	56	41	53	53	39
		7 to 27	All Mounts	93	93	85	93	93	82	93	93	79	93	93	75	93	93	71	90	90	68	87	87	65	82	82	60	77	77	55	72	72	51	67	67	48	63	63	45	59	59	42	56	56	40
		27 to 45	All Mounts	95	95	95	93	93	93	90	90	89	88	88	86	85	85	83	83	83	81	81	81	78	77	77	71	72	72	66	67	67	61	63	63	57	59	59	54	56	56	51	53	53	48
		45 to 90	All Mounts	94	94	90	92	92	87	89	89	84	86	86	81	84	84	78	82	82	74	79	79	71	74	74	65	68	68	60	64	64	56	60	60	53	56	56	49	53	53	47	50	50	44
	D	0 to 7	All Mounts	93	93	79	93	93	74	91	91	70	87	87	66	85	85	63	82	82	60	79	79	58	72	72	53	67	67	49	62	62	46	58	58	43	54	54	40	51	51	38	48	48	36
		7 to 27	All Mounts	93	93	80	93	93	76	93	93	72	91	91	68	88	88	65	85	85	62	82	82	59	76	76	55	71	71	50	66	66	47	61	61	44	57	57	41	54	54	39	51	51	37
		27 to 45	All Mounts	91	91	91	88	88	87	86	86	84	83	83	81	81	81	78	79	79	74	77	77	71	72	72	65	66	66	60	62	62	56	58	58	52	54	54	49	51	51	46	48	48	44
		45 to 90	All Mounts	90	90	85	87	87	82	84	84	79	82	82	75	80	80	71	77	77	68	74	74	65	68	68	60	63	63	55	58	58	52	55	55	48	51	51	45	48	48	43	46	46	40
5 psf	B	0 to 7	All Mounts	90	90	90	90	90	90	90	90	88	90	90	85	90	90	82	90	90	79	90	90	76	90	90	69	85	85	64	81	81	60	76	76	56	71	71	52	67	67	49	63	63	46
		7 to 27	All Mounts	93	93	93	93	93	93	93	93	90	93	93	86	93	93	83	93	93	81	93	93	78	90	93	71	88	88	66	84	84	61	80	80	57	75	75	54	71	71	51	67	67	48
		27 to 45	All Mounts	95	95	95	95	95	95	95	95	95	95	95	95	94	94	94	92	92	91	89	89	88	85	85	83	82	82	79	78	78	73	75	75	68	71	71	64	66	66	60	63	63	57
		45 to 90	All Mounts	97	97	97	97	97	97	97	97	94	95	95	91	93	93	88	90	90	85	88	88	83	84	84	78	80	80	72	76	76	67	71	71	63	67	67	59	63	63	55	59	59	52
	C	0 to 7	All Mounts	90	90	84	90	90	81	90	90	77	90	90	73	90	90	69	87	87	66	84	84	63	79	79	58	73	73	54	68	68	50	63	63	47	60	60	44	56	56	41	53	53	39
		7 to 27	All Mounts	93	93	85	93	93	82	93	93	79	93	93	75	93	93	71	90	90	68	87	87	65	82	82	60	77	77	55	72	72	51	67	67	48	63	63	45	59	59	42	56	56	40
		27 to 45	All Mounts	95	95	95	93	93	93	90	90	89	88	88	86	85	85	83	83	83	81	81	81	78	77	77	71	72	72	66	67	67	61	63	63	57	59	59	54	56	56	51	53	53	48
		45 to 90	All Mounts	94	94	90	92	92	87	89	89	84	86	86	81	84	84	78	82	82	74	79	79	71	74	74	65	68	68	60	64	64	56	60	60	53	56	56	49	53	53	47	50	50	44
	D	0 to 7	All Mounts	90	90	79	90	90	74	90	90	70	87	87	66	85	85	63	82	82	60	79	79	58	72	72	53	67	67	49	62	62	46	58	58	43	54	54	40	51	51	38	48	48	36
		7 to 27	All Mounts	93	93	80	93	93	76	93	93	72	91	91	68	88	88	65	85	85	62	82	82	59	76	76	55	71	71	50	66	66	47	61	61	44	57	57	41	54	54	39	51	51	37
		27 to 45	All Mounts	91	91	91	88	88	87	86	86	84	83	83	81	81	81	78	79	79	74	77	77	71	72	72	65	66	66	60	62	62	56	58	58	52	54	54	49	51	51	46	48	48	44
		45 to 90	All Mounts	90	90	85	87	87	82	84	84	79	82	82	75	80	80	71	77	77	68	74	74	65	68	68	60	63	63	55	58	58	52	55	55	48	51	51	45	48	48	43	46	46	40
10 psf	B	0 to 7	All Mounts	83	83	83	83	83	83	83	83	83	83	83	83	83	83	82	83	83	79	83	83	76	83	83	69	83	83	64	81	81	60	76	76	56	71	71	52	67	67	49	63	63	46
		7 to 27	All Mounts	89	89	89	89	89	89	89	89	89	89	89	86	89	89	83	89	89	81	89	89	78	89	89	71	88	88	66	84	84	61	80	80	57	75	75	54	71	71	51	67	67	48
		27 to 45	All Mounts	95	95	95	95	95	95	95	95	95	95	95	95	94	94	94	92	92	91	89	89	88	85	85	83	82	82	79	78	78	73	75	75	68	71	71	64	66	66	60	63	63	57
		45 to 90	All Mounts	97	97	97	97	97	97	97	97	94	95	95	91	93	93	88	90	90	85	88	88	83	84	84	78	80	80	72	76	76	67	71	71	63	67	67	59	63	63	55	59	59	52
	C	0 to 7	All Mounts	83	83	83	83	83	83	83	83	77	83	83	73	83	83	69	83	83	66	83	83	63	79	79	58	73	73	54	68	68	50	63	63	47	60	60	44	56	56	41	53	53	39
		7 to 27	All Mounts	89	89	85	89	89	82	89	89	79	89	89	75	89	89	71	89	89	68	87	87	65	82	82	60	77	77	55	72	72	51	67	67	48	63	63	45	59	59	42	56	56	40
		27 to 45	All Mounts	95	95	95	93	93	93	90	90	89	88	88	86	85	85	83	83	83	81	81	81	78	77	77	71	72	72	66	67	67	61	63	63	57	59	59	54	56	56	51	53	53	48
		45 to 90	All Mounts	94	94	90	92	92	87	89	89	84	86	86	81	84	84	78	82	82	74	79	79	71	74	74	65	68	68	60	64	64	56	60	60	53	56	56	49	53	53	47	50	50	44
	D	0 to 7	All Mounts	83	83	79	83	83	74	83	83	70	83	83	66	83	83	63	82	82	60	79	79	58	72	72	53	67	67	49	62	62	46	58	58	43	54	54	40	51	51	38	48	48	36
		7 to 27	All Mounts	90	90	80	90	90	76	90	90	72	90	90	68	88	88	65	85	85	62	82	82	59	76	76	55	71	71	50	66	66	47	61	61	44	57	57	41	54	54	39	51	51	37
		27 to 45	All Mounts	91	91	91	88	88	87	86	86	84	83	83	81	81	81	78	79	79	74	77	77	71	72	72	65	66	66	60	62	62	56	58	58	52									

Maximum Rail Spans (Inches)			SMR100 Rail Flush-Mount on 0 to 30 Foot Roof -- ASCE 7-16 -- 72-Cell (P)																																																
Ground Snow Load	Exposure Category	Panel Angle	Wind Speed ->																																																
			130 mph						140 mph						150 mph						160 mph						170 mph						180 mph						190 mph												
		Roof Zone ->	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	
0 psf	B	0 to 7	Array Interior	93	84	74	74	62	62	93	80	68	68	57	57	93	74	63	63	53	53	92	69	59	59	50	50	88	65	55	55	47	47	84	61	52	52	44	44	81	58	49	49	41	41						
		Array Edge	92	70	59	59	50	50	87	64	55	55	46	46	83	60	51	51	43	43	79	56	48	48	40	40	73	52	45	45	38	38	69	49	42	42	36	36	65	47	40	40	34	34							
		7 to 20	Array Interior	79	79	64	64	64	58	73	73	59	59	54	54	68	68	68	55	55	63	63	63	51	51	57	59	48	48	48	44	56	56	46	46	45	45	53	53	43	43	35	35								
		Array Edge	64	64	64	51	51	51	47	59	59	59	48	48	44	55	55	55	44	44	51	51	51	41	41	48	48	39	39	39	35	45	45	45	37	37	43	43	43	35	35	39	39	35	35	32	32				
		20 to 27	Array Interior	88	88	70	70	70	67	83	83	65	65	65	62	79	79	79	60	60	74	74	74	56	56	69	69	69	53	53	65	65	55	55	50	50	61	61	61	47	47	58	58	51	51	41	41				
		Array Edge	74	74	74	57	57	57	54	69	69	69	52	52	50	64	64	64	49	49	59	59	59	46	46	56	56	46	46	46	44	53	53	43	43	34	34	50	50	50	38	38	47	47	47	47	47	45			
	C	27 to 45	Array Interior	82	82	82	78	78	78	77	77	77	72	72	71	71	71	67	67	67	67	67	63	63	62	62	62	62	59	59	62	62	62	62	59	59	59	59	59	56	56	56	56	56	53	53	53	53	53	43	43
		Array Edge	67	67	67	63	63	63	62	62	62	59	59	58	58	58	55	55	54	54	54	51	51	51	51	51	41	41	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48			
		45 to 90	Array Interior	93	93	89	89	89	89	89	89	84	84	84	84	86	86	86	80	80	82	82	75	75	75	75	79	79	71	71	71	71	76	76	67	67	67	71	71	63	63	63	63	63	63	63	63				
		Array Edge	83	83	76	76	76	76	79	79	70	70	70	70	74	74	65	65	65	69	69	61	61	61	65	65	57	57	57	61	61	54	54	54	54	54	54	54	54	58	58	51	51	51							
		0 to 7	Array Interior	93	72	61	61	61	52	89	67	57	57	57	48	85	62	53	53	53	81	58	49	49	49	42	76	54	46	46	46	46	72	51	44	44	44	68	48	41	41	41									
		Array Edge	81	58	50	50	50	42	76	54	46	46	46	39	70	50	43	43	43	65	47	40	40	40	61	48	40	40	40	57	47	40	40	40	53	47	40	40	40	50	40	40	40	40							
	D	7 to 20	Array Interior	66	66	66	53	53	53	61	61	61	49	49	57	57	57	46	46	53	53	43	43	43	50	50	50	40	40	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47							
		Array Edge	53	53	53	43	43	43	49	49	49	40	40	46	46	46	37	37	43	43	35	35	35	40	40	40	33	33	38	38	38	38	38	38	38	38	38	38													
		20 to 27	Array Interior	77	77	77	59	59	56	71	71	71	54	54	66	66	66	50	50	62	62	62	47	47	58	58	58	44	44	55	55	55	55	55	52	52	52	52	52												
		Array Edge	62	62	62	47	47	47	57	57	57	44	44	53	53	53	41	41	50	50	50	38	38	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47													
		27 to 45	Array Interior	69	69	69	66	66	66	64	64	64	61	61	60	60	60	60	57	56	56	56	53	53	52	52	52	50	50	49	49	49	49	49	47	47	47	47	47												
		Array Edge	56	56	56	53	53	53	52	52	52	49	49	48	48	48	46	46	45	45	45	43	43	42	42	42	40	40	40	40	40	40	40	40	40	40	40	40													

Maximum Rail Spans (Inches)			SMR100 Rail Flush-Mount on 0 to 30 Foot Roof -- ASCE 7-16 -- 72-Cell (P)																																																																																					
Ground Snow Load	Exposure Category	Panel Angle	Wind Speed ->		130 mph												140 mph												150 mph												160 mph												170 mph												180 mph												190 mph											
			Roof Zone ->	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r																																					
30 psf	B	0 to 7	Array Interior	73	73	73	73	62	62	73	73	68	68	57	57	73	73	63	63	53	53	73	69	59	59	50	50	73	65	55	55	47	47	73	61	52	52	44	44	73	58	49	49	41	41	73	58	49	49	41	41																																					
			Array Edge	75	70	59	59	50	50	73	64	55	55	46	46	73	60	51	51	43	43	73	56	48	48	40	40	73	52	45	45	38	38	69	49	42	42	36	36	65	47	40	40	34	34	63	47	40	40	34	34																																					
		7 to 20	Array Interior	75	75	64	64	54	54	73	73	59	59	54	54	68	68	55	55	45	45	63	63	51	51	41	41	59	59	48	48	44	44	56	56	45	45	45	45	61	53	43	43	43	43	53	43	43	43	35	35																																					
			Array Edge	64	64	64	64	51	51	59	59	59	59	48	48	55	55	55	55	44	44	51	51	41	41	41	41	48	48	39	39	35	35	45	45	45	45	37	37	43	43	43	43	35	35																																											
		20 to 27	Array Interior	77	77	77	77	70	70	77	77	77	77	65	65	77	77	77	77	60	60	74	74	74	74	60	60	69	69	59	59	50	50	69	69	59	59	50	50	68	61	61	61	47	47	61	61	61	61	47	47																																					
			Array Edge	74	74	74	74	57	57	69	69	69	69	52	52	64	64	64	64	49	49	59	59	59	59	46	46	56	56	46	46	46	46	52	52	43	43	43	43	50	50	50	50	38	38																																											
		27 to 45	Array Interior	80	80	80	80	78	78	77	77	77	77	72	72	71	71	71	71	67	67	67	67	67	67	56	56	62	62	62	62	53	53	59	59	59	59	50	50	56	56	56	56	47	47	53	53	53	53	47	47																																					
			Array Edge	67	67	67	67	63	63	62	62	62	62	59	59	58	58	58	58	55	55	51	51	54	54	45	45	42	42	42	42	44	44	45	45	45	45	48	48	48	48	48	48	44	44																																											
		45 to 90	Array Interior	93	93	89	89	89	89	89	89	84	84	84	84	86	86	80	80	80	80	82	82	75	75	75	75	79	79	71	71	71	71	76	76	67	67	67	67	71	71	63	63	63	63																																											
			Array Edge	83	83	76	76	76	76	79	79	70	70	70	70	74	74	65	65	65	65	69	69	61	61	61	61	65	65	57	57	57	57	61	61	54	54	54	54	58	58	51	51	51	51																																											
		C	0 to 7	Array Interior	73	73	61	61	52	52	73	67	57	57	48	48	73	62	53	53	44	44	73	58	49	49	42	42	73	54	46	46	39	39	72	51	44	44	44	44	68	48	41	41	41	41																																										
				Array Edge	73	58	50	50	42	42	73	54	46	46	39	39	70	50	43	43	36	36	65	47	40	40	34	34	61	44	38	38	32	32	58	41	35	35	30	30																																																
	7 to 20		Array Interior	66	66	66	66	53	53	61	61	61	61	49	49	57	57	57	57	46	46	53	53	43	43	33	33	50	50	40	40	40	40	47	47	47	47	38	38	44	44	44	44	36	36																																											
			Array Edge	53	53	43	43	43	43	49	49	49	49	40	40	46	46	46	46	37	37	43	43	35	35	32	32	40	40	33	33	33	33	38	38	31	31	31	31																																																	
	20 to 27		Array Interior	77	77	77	77	59	59	71	71	71	71	54	54	66	66	66	66	50	50	62	62	62	62	47	47	58	58	44	44	44	44	55	55	44	44	42	42	52	52	40	40	40	40																																											
			Array Edge	62	62	62	62	47	47	57	57	57	57	44	44	53	53	53	53	41	41	50	50	40	40	39	39	47	47	36	36	35	35	44	44	44	44	34	34																																																	
	27 to 45		Array Interior	69	69	69	69	66	66	64	64	64	64	61	61	60	60	60	60	57	57	56	56	56	56	57	57	52	52	52	52	44	44	49	49	49	49	42	42	47	47	47	47	44	44																																											
			Array Edge	56	56	56	56	53	53	52	52	52	52	49	49	48	48	48	48	46	46	45	45	45	45	43	43	42	42	42	42	40	40	40	40	40	40	38	38																																																	
	45 to 90		Array Interior	84	84	79	79	79	79	81	81	73	73	73	73	77	77	68	68	68	68	72	72	63	63	63	63	67	67	59	59	59	59	63	63	56	56	56	56	60	60	53	53	53	53																																											
			Array Edge	72	72	64	64	64	64	67	67	59	59	59	59	62	62	55	55	55	55	58	58	51	51	51	51	55	55	48	48	48	48	51	51	45	45	45	45																																																	
	D		0 to 7	Array Interior	74	74	56	56	47	47	74	61	52	52	44	44	74	57	48	48	41	41	74	53	45	45	38	38	70	50	42	42	42	42	65	47	40	40	34	34	62	44	38	38	32	32																																										
				Array Edge	74	56	45	45	38	38	69	49	42	42	35	35	64	46	39	39	33	33	60	43	37	37	31	31	56	40	34	34	29	29	53	38	32	32	27	27																																																
		7 to 20	Array Interior	60	60	60	60	49	49	56	56	45	45	45	45	52	52	42	42	42	42	49	49	39	39	39	39	46	46	37	37	37	37	43	43	35	35	35	35	41	41	33	33	33	33																																											
			Array Edge	57	57	43	43	43	43	49	49	40	40	40	40	46	46	46	46	37	37	43	43	35	35	32	32	40	40	33	33	33	33	38	38	31	31	31	31																																																	
20 to 27		Array Interior	70	70	70	70	54	54	65	65	65	65	50	50	60	60	60	60	46	46	56	56	46	46	46	46	53	53	43	43	43	43	50	50	40	40	40	40																																																		
		Array Edge	57	57	43	43	43	43	53	53	43	43	40	40	49	49	49	49	37	37	46	46	35	35	35	35	43	43	33	33	32	32	40	40	31	31	31	31																																																		
27 to 45		Array Interior	63	63	63	63	60	60	59	59	59	59	56	56	55	55	55	55	52	52	51	51	51	51	48	48	48	48	48	48	45	45	45	45	45	45	43	43																																																		
		Array Edge	51	51	51	51	49	49	48	48	48	48	45	45	41	41	41	41	37	37	41	41	41	41	39	39	39	39	39	39	37	37	35	35	35	35	33	33																																																		
45 to 90		Array Interior	80	80	72	72	72	72	76	76	67	67	67	67	76	76	62	62	62	62	66	66	58	58	58	58	62	62	54	54	54	54	58	58	51	51	51	51																																																		
		Array Edge	68	68	58	58	58	58	61	61	54	54	54	54	57	57	50	50	50	50	53	53	47	47	47	47	50	50	44	44	44	44	47	47	42	42	42	42																																																		
35 psf		0 to 7	Array Interior	71	71	61	61	52	52	71	67	57	57	48	48	71	62	53	53	44	44	71	58	49	49	42	42	71	54	46	46	39	39	71	51	44	44	44	44	68	48	41	41	41	41																																											
			Array Edge	71	58	50	50	42	42	71	54	46	46	39	39	70	50	43	43	36	36	65	47	40	40	34	34	61	44	38	38	32	32	58	41	35	35	30	30																																																	
	7 to 20	Array Interior	66	66	66	66	53	53	61	61	61	61	49	49	57	57	57	57	46	46	53	53	43	43	33	33	50	50	40	40	40	40	47	47	47	47	38	38	44	44	44	44	36	36																																												
		Array Edge	53	53	43	43	43	43	49	49	40	40	40	40	46	46	46	46	37	37	43	43	35	35	32	32	40	40	33	33	33	33	38	38	31	31	31	31																																																		
	20 to 27	Array Interior	73	73	73	73	70	70	73	73	73	73	65	65	73	73	73	73	60	60	69	69	59	59	54	54	66	66	56	56	50	50	63	63	53	53	53	53																																																		
		Array Edge	73	73	57	57	57	57	69	69	69	69	52	52	64	64	64	64	49	49	59	59	59	59	46	46	56	56	46	46	46	46	53	53	43	43	43	43																																																		
	27 to 45	Array Interior	77	77	77	77	77	77	77	77	77	77	72	72	71	71	71	71	67	67	67	67	67	67	56	56	62	62	62	62	53	53	59	59	59	59	50	50																																																		
		Array Edge	67	67	67	67	63	63	62	62	62	62	59	59	58	58	58	58	55	55	54	54	54	54	45	45	51	51	51	51	48	48	48	48	48	48																																																				

Maximum Rail Spans (Inches)			SMR100 Rail Flush-Mount on 0 to 30 Foot Roof -- ASCE 7-16 -- 72-Cell (P)																																																			
Ground Snow Load	Exposure Category	Panel Angle	Wind Speed ->		130 mph						140 mph						150 mph						160 mph						170 mph						180 mph						190 mph													
			Roof Zone ->	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r									
45 psf	B	0 to 7	Array Interior	65	65	65	65	65	62	62	65	65	65	65	65	57	57	65	65	63	63	63	53	53	65	65	59	59	50	50	65	65	55	55	55	47	47	65	61	52	52	52	44	44	65	58	49	49	49	41	41			
			Array Edge	65	65	59	59	50	50	68	64	55	55	55	46	46	65	60	51	51	51	43	43	65	56	48	48	48	40	40	65	52	45	45	45	38	38	65	49	42	42	42	36	36	65	47	40	40	40	34	34			
		7 to 20	Array Interior	68	68	64	64	64	58	68	68	59	59	59	54	54	68	68	61	61	61	55	55	63	63	63	63	51	51	47	59	59	48	48	48	44	44	56	56	45	45	45	41	41	53	53	43	43	43	39	39			
			Array Edge	64	64	64	64	51	51	51	47	59	59	59	48	48	48	44	55	55	55	44	44	44	40	57	51	41	41	41	41	38	48	48	48	39	39	35	35	45	45	45	37	37	33	33								
		20 to 27	Array Interior	67	67	67	67	67	67	67	67	67	65	65	65	62	67	67	67	60	60	60	58	67	67	67	66	66	56	56	67	67	67	66	66	56	56	67	67	67	66	66	56	56	67	67	67	67	67	47	47			
			Array Edge	67	67	67	67	57	57	57	54	67	67	67	52	52	52	50	64	64	64	49	49	49	47	59	59	59	46	46	46	44	56	56	56	43	43	43	41	53	53	53	40	40	39	39								
		27 to 45	Array Interior	72	72	72	72	72	72	72	72	72	72	64	64	72	71	71	71	71	67	67	67	67	67	67	67	65	63	62	62	62	62	59	59	59	59	59	59	56	56	56	56	56	56	56	53	53						
			Array Edge	67	67	67	67	63	63	63	62	62	62	62	59	59	59	59	86	86	80	80	80	80	80	82	82	75	75	75	75	75	79	79	71	71	71	71	71	76	76	67	67	67	67	67								
		C	0 to 7	Array Interior	65	65	61	61	61	52	52	65	65	57	57	57	48	48	65	62	53	53	53	44	44	65	58	49	49	49	42	42	65	54	46	46	46	39	39	65	51	44	44	44	37	37	65	48	41	41	41	35	35	
				Array Edge	65	65	50	50	50	42	42	65	64	46	46	46	39	39	65	50	43	43	43	36	36	65	47	40	40	40	34	34	65	44	38	38	38	32	32	65	41	35	35	35	30	30								
			7 to 20	Array Interior	66	66	66	63	63	53	53	49	61	61	61	49	49	49	45	57	57	57	46	46	46	42	53	53	43	43	43	39	50	50	40	40	40	37	37	47	47	47	47	47	42	42	44	44	44	44	44	39	39	
				Array Edge	66	66	66	63	63	53	53	49	61	61	61	49	49	49	45	57	57	57	46	46	46	42	53	53	43	43	43	39	50	50	40	40	40	37	37	47	47	47	47	47	42	42	44	44	44	44	44	39	39	
	20 to 27		Array Interior	67	67	67	67	67	67	67	67	67	67	67	67	67	60	60	60	60	60	60	57	56	56	56	56	53	53	52	52	52	52	50	50	50	49	49	49	49	49	47	47	47	47	47	47	47	44	44				
			Array Edge	67	67	67	67	67	67	67	67	67	67	67	67	67	60	60	60	60	60	60	57	56	56	56	56	53	53	52	52	52	52	50	50	50	49	49	49	49	49	47	47	47	47	47	47	47	44	44				
	27 to 45		Array Interior	69	69	69	69	66	66	66	64	64	64	61	61	61	60	60	60	60	60	60	57	56	56	56	56	53	53	52	52	52	52	50	50	50	49	49	49	49	49	47	47	47	47	47	47	47	44	44				
			Array Edge	69	69	69	69	66	66	66	64	64	64	61	61	61	60	60	60	60	60	60	57	56	56	56	56	53	53	52	52	52	52	50	50	50	49	49	49	49	49	47	47	47	47	47	47	47	44	44				
	D		0 to 7	Array Interior	68	68	66	66	66	56	56	47	68	61	52	52	52	44	44	68	57	48	48	48	41	41	68	53	45	45	45	38	38	68	50	42	42	42	36	36	65	47	40	40	40	34	34	62	44	38	38	38	32	32
				Array Edge	68	68	66	66	66	56	56	47	68	61	52	52	52	44	44	68	57	48	48	48	41	41	68	53	45	45	45	38	38	68	50	42	42	42	36	36	65	47	40	40	40	34	34	62	44	38	38	38	32	32
			7 to 20	Array Interior	60	60	60	60	60	49	49	44	56	56	56	45	45	45	41	52	52	52	42	42	42	38	49	49	49	49	49	49	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	
				Array Edge	49	49	49	49	49	40	40	36	45	45	45	45	37	37	37	33	42	42	42	34	34	34	31	39	39	39	39	39	39	37	37	37	37	37	37	37	35	35	35	35	35	35	35							
		20 to 27	Array Interior	70	70	70	70	70	70	70	60	60	60	60	60	60	60	60	60	60	60	60	60	58	56	56	56	56	56	56	53	53	53	53	53	53	53	50	50	50	50	50	50	50	47	47	47	47	47	47	47			
			Array Edge	70	70	70	70	70	70	70	60	60	60	60	60	60	60	60	60	60	60	60	60	58	56	56	56	56	56	56	53	53	53	53	53	53	53	50	50	50	50	50	50	50	47	47	47	47	47	47	47			
		27 to 45	Array Interior	63	63	63	63	63	63	63	59	59	59	59	59	59	59	55	55	55	55	55	55	52	51	51	51	51	51	51	48	48	48	48	48	48	48	45	45	45	45	45	45	45	45	45	45	45	45	45	45			
			Array Edge	51	51	51	51	51	49	49	49	48	48	48	48	48	48	48	44	44	44	44	44	44	42	41	41	41	41	41	41	38	38	38	38	38	38	38	37	37	37	37	37	37	37									
50 psf		0 to 7	Array Interior	80	80	72	72	72	72	72	76	76	67	67	67	67	67	70	70	62	62	62	62	62	66	66	58	58	58	58	58	62	62	54	54	54	54	54	58	58	51	51	51	51	51	55	55	49	49	49	49	49		
			Array Edge	66	66	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	55	55	55	46	46	62	62	55	55	55	47	47	62	62	55	55	55	47	47								
		7 to 20	Array Interior	65	65	65	64	64	64	58	65	65	65	59	59	59	54	65	65	65	65	65	65	55	63	63	63	63	51	51	47	59	59	48	48	48	44	44	56	56	45	45	45	41	41									
			Array Edge	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	62	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65										
	20 to 27	Array Interior	65	65	65	65	65	65	65	65	65	65	65	65	65	65	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64											
		Array Edge	65	65	65	65	65	65	65	65	65	65	65	65	65	65	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64											
	27 to 45	Array Interior	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	67	67	67	67	67	67	62	62	62	62	62	62	62	59	59	59	59	59	59	59											
		Array Edge	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67											
	60 psf	0 to 7	Array Interior	62	62	61	61	61	61	52	52	62	62	57	57	57	48	48	62	62	53	53	53	44	44	62	58	49	49	49	42	42	62	54	46	46	46	39	39	62	51	44	44	44	37	37								
			Array Edge	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	55	55	55	46	46	62	62	5																				

Maximum Rail Spans (Inches)				SMR100 Rail Flush-Mount on 0 to 30 Foot Roof -- ASCE 7-10 -- 72-Cell (L)																																												
Ground Snow Load	Exposure Category	Panel Angle	Wind Speed -> Roof Zone ->	90 mph			95 mph			100 mph			105 mph			110 mph			115 mph			120 mph			130 mph			140 mph			150 mph			160 mph			170 mph			180 mph			190 mph					
				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 psf	B	0 to 7	All Mounts	116	116	116	116	116	114	116	116	110	116	116	106	116	116	103	116	116	99	116	116	96	113	113	91	107	107	86	101	101	82	97	97	78	93	93	73	89	89	69	85	85	65			
		7 to 27	All Mounts	117	117	117	117	117	116	117	117	112	117	117	108	117	117	104	117	117	101	117	117	98	117	117	93	110	110	88	105	105	84	100	100	80	96	96	75	92	92	71	89	89	67			
		27 to 45	All Mounts	119	119	119	119	119	119	119	119	119	119	119	119	117	117	117	115	115	114	112	112	110	107	107	104	102	102	99	98	98	94	94	94	90	91	91	86	88	88	83	85	85	80			
		45 to 90	All Mounts	121	121	121	121	121	121	121	121	118	119	119	114	116	116	110	113	113	107	110	110	104	105	105	98	100	100	93	96	96	89	92	92	85	88	88	81	85	85	78	82	82	73			
	C	0 to 7	All Mounts	116	116	105	116	116	101	116	116	97	116	116	94	113	113	91	109	109	88	106	106	85	99	99	81	94	94	75	90	90	70	86	86	65	82	82	61	79	79	58	74	74	55			
		7 to 27	All Mounts	117	117	107	117	117	103	117	117	99	117	117	96	117	117	92	113	113	90	109	109	87	103	103	82	98	98	77	93	93	72	89	89	67	85	85	63	82	82	59	78	78	56			
		27 to 45	All Mounts	119	119	119	116	116	116	113	113	112	110	110	108	107	107	104	104	104	101	101	101	98	97	97	92	92	92	88	89	89	84	85	85	80	82	82	75	78	78	71	74	74	67			
		45 to 90	All Mounts	118	118	113	114	114	109	111	111	105	108	108	101	105	105	98	102	102	95	99	99	92	95	95	87	90	90	83	86	86	79	82	82	74	78	78	69	74	74	65	70	70	62			
	D	0 to 7	All Mounts	116	116	99	116	116	95	114	114	91	109	109	88	106	106	85	102	102	83	99	99	80	94	94	74	89	89	69	85	85	64	81	81	60	76	76	56	72	72	53	68	68	50			
		7 to 27	All Mounts	117	117	101	117	117	97	117	117	93	113	113	90	110	110	87	106	106	84	103	103	82	97	97	76	92	92	71	88	88	66	84	84	62	80	80	58	76	76	55	72	72	52			
		27 to 45	All Mounts	114	114	113	111	111	109	107	107	105	104	104	101	102	102	98	99	99	95	96	96	92	92	92	87	88	88	83	84	84	79	80	80	73	76	76	69	71	71	65	68	68	62			
		45 to 90	All Mounts	112	112	106	109	109	102	106	106	99	104	104	95	100	100	92	97	97	90	94	94	87	89	89	82	85	85	78	81	81	72	77	77	68	72	72	64	68	68	60	64	64	57			
5 psf	B	0 to 7	All Mounts	112	112	112	112	112	112	112	112	110	112	112	106	112	112	103	112	112	99	112	112	96	112	112	91	107	107	86	101	101	82	97	97	78	93	93	73	89	89	69	85	85	65			
		7 to 27	All Mounts	117	117	117	117	117	116	117	117	112	117	117	108	117	117	104	117	117	101	117	117	98	117	117	93	110	110	88	105	105	84	100	100	80	96	96	75	92	92	71	89	89	67			
		27 to 45	All Mounts	119	119	119	119	119	119	119	119	119	119	119	119	117	117	117	115	115	114	112	112	110	107	107	104	102	102	99	98	98	94	94	94	90	91	91	86	88	88	83	85	85	80			
		45 to 90	All Mounts	121	121	121	121	121	121	121	121	118	119	119	114	116	116	110	113	113	107	110	110	104	105	105	98	100	100	93	96	96	89	92	92	85	88	88	81	85	85	78	82	82	73			
	C	0 to 7	All Mounts	112	112	105	112	112	101	112	112	97	112	112	94	112	112	91	109	109	88	106	106	85	99	99	81	94	94	75	90	90	70	86	86	65	82	82	61	79	79	58	74	74	55			
		7 to 27	All Mounts	117	117	107	117	117	103	117	117	99	117	117	96	117	117	92	113	113	90	109	109	87	103	103	82	98	98	77	93	93	72	89	89	67	85	85	63	82	82	59	78	78	56			
		27 to 45	All Mounts	119	119	119	116	116	116	113	113	112	110	110	108	107	107	104	104	104	101	101	101	98	97	97	92	92	92	88	89	89	84	85	85	80	82	82	75	78	78	71	74	74	67			
		45 to 90	All Mounts	118	118	113	114	114	109	111	111	105	108	108	101	105	105	98	102	102	95	99	99	92	95	95	87	90	90	83	86	86	79	82	82	74	78	78	69	74	74	65	70	70	62			
	D	0 to 7	All Mounts	112	112	99	112	112	95	112	112	91	109	109	88	106	106	85	102	102	83	99	99	80	94	94	74	89	89	69	85	85	64	81	81	60	76	76	56	72	72	53	68	68	50			
		7 to 27	All Mounts	117	117	101	117	117	97	117	117	93	113	113	90	110	110	87	106	106	84	103	103	82	97	97	76	92	92	71	88	88	66	84	84	62	80	80	58	76	76	55	72	72	52			
		27 to 45	All Mounts	114	114	113	111	111	109	107	107	105	104	104	101	102	102	98	99	99	95	96	96	92	92	92	87	88	88	83	84	84	79	80	80	73	76	76	69	71	71	65	68	68	62			
		45 to 90	All Mounts	112	112	106	109	109	102	106	106	99	104	104	95	100	100	92	97	97	90	94	94	87	89	89	82	85	85	78	81	81	72	77	77	68	72	72	64	68	68	60	64	64	57			
10 psf	B	0 to 7	All Mounts	104	104	104	104	104	104	104	104	104	104	104	103	104	104	99	104	104	96	104	104	91	104	104	86	101	101	82	97	97	78	93	93	73	89	89	69	85	85	65						
		7 to 27	All Mounts	112	112	112	112	112	112	112	112	112	112	112	108	112	112	104	112	112	101	112	112	98	112	112	93	110	110	88	105	105	84	100	100	80	96	96	75	92	92	71	89	89	67			
		27 to 45	All Mounts	119	119	119	119	119	119	119	119	119	119	119	119	117	117	117	115	115	114	112	112	110	107	107	104	102	102	99	98	98	94	94	94	90	91	91	86	88	88	83	85	85	80			
		45 to 90	All Mounts	121	121	121	121	121	121	121	121	118	119	119	114	116	116	110	113	113	107	110	110	104	105	105	98	100	100	93	96	96	89	92	92	85	88	88	81	85	85	78	82	82	73			
	C	0 to 7	All Mounts	104	104	104	104	104	104	104	104	97	104	104	94	104	104	91	104	104	88	104	104	85	99	99	81	94	94	75	90	90	70	86	86	65	82	82	61	79	79	58	74	74	55			
		7 to 27	All Mounts	112	112	107	112	112	103	112	112	99	112	112	96	112	112	92	112	112	90	112	112	90	109	109	87	103	103	82	98	98	77	93	93	72	89	89	67	85	85	63	82	82	59	78	78	56
		27 to 45	All Mounts	119	119	119	116	116	116	113	113	112	110	110	108	107	107	104	104	104	101	101	101	98	97	97	92	92	92	88	89	89	84	85	85	80	82	82	75	78	78	71	74	74	67			
		45 to 90	All Mounts	118	118	113	114	114	109	111	111	105	108	108	101	105	105	98	102	102	95	99	99	92	95	95	87	90	90	83	86	86	79	82	82	74	78	78	69	74	74	65	70	70	62			
	D	0 to 7	All Mounts	104	104	99	104	104	95	104	104	91	104	104	88	104	104	85	102	102	83	99	99	80	94	94	74	89	89	69	85	85	64	81	81	60	76	76	56	72								

Maximum Rail Spans (Inches)				SMR100 Rail Flush-Mount on 0 to 30 Foot Roof -- ASCE 7-10 -- 72-Cell (L)																																												
Ground Snow Load	Exposure Category	Panel Angle	Wind Speed -> Roof Zone ->	90 mph			95 mph			100 mph			105 mph			110 mph			115 mph			120 mph			130 mph			140 mph			150 mph			160 mph			170 mph			180 mph			190 mph					
				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			
25 psf	B	0 to 7	All Mounts	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
		7 to 27	All Mounts	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99			
		27 to 45	All Mounts	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	104	102	102	99	98	98	94	94	94	90	91	91	86	88	88	83	85	85	80			
		45 to 90	All Mounts	121	121	121	121	121	121	121	121	118	119	119	114	116	116	110	113	113	107	110	110	104	105	105	98	100	100	93	96	96	89	92	92	85	88	88	81	85	85	78	82	82	73			
	C	0 to 7	All Mounts	92	92	92	92	92	92	92	92	92	92	92	92	92	92	91	92	92	88	92	92	85	92	92	85	92	92	81	92	92	75	90	90	70	86	86	65	82	82	61	79	79	58	74	74	55
		7 to 27	All Mounts	99	99	99	99	99	99	99	99	99	99	99	96	99	99	92	99	99	87	97	97	82	96	96	77	93	93	72	89	89	67	85	85	63	82	82	59	78	78	56						
		27 to 45	All Mounts	105	105	105	105	105	105	105	105	105	105	105	105	105	105	104	104	104	101	99	99	101	98	97	92	92	92	88	89	89	84	85	85	80	82	82	75	78	78	71	74	74	67			
		45 to 90	All Mounts	118	118	113	114	114	109	111	111	105	108	108	101	105	105	98	102	102	95	99	99	92	95	95	87	90	90	83	86	86	79	82	82	74	78	78	69	74	74	65	70	70	62			
	D	0 to 7	All Mounts	92	92	92	92	92	92	92	92	91	92	92	88	92	92	85	92	92	83	92	92	80	92	92	74	89	89	69	85	85	64	81	81	60	76	76	56	72	72	53	68	68	50			
		7 to 27	All Mounts	101	101	101	101	101	97	101	101	93	101	101	90	101	101	87	100	100	84	99	99	82	97	97	76	92	92	71	88	88	66	84	84	62	80	80	58	76	76	55	72	72	52			
		27 to 45	All Mounts	108	108	108	108	108	108	107	107	105	104	104	101	102	102	98	99	99	95	96	96	92	92	92	87	88	88	83	84	84	79	80	80	73	76	76	69	71	71	65	68	68	62			
		45 to 90	All Mounts	112	112	106	109	109	102	106	106	99	102	102	95	100	100	92	97	97	90	94	94	87	89	89	82	85	85	78	81	81	72	77	77	68	72	72	64	68	68	60	64	64	57			
30 psf	B	0 to 7	All Mounts	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91			
		7 to 27	All Mounts	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96			
		27 to 45	All Mounts	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99	98	98	94	94	94	90	91	91	86	88	88	83	85	85	80			
		45 to 90	All Mounts	120	120	120	120	120	120	120	120	118	119	119	114	116	116	110	113	113	107	110	110	104	105	105	98	100	100	93	96	96	89	92	92	85	88	88	81	85	85	78	82	82	73			
	C	0 to 7	All Mounts	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	85	91	91	81	91	91	75	90	90	70	86	86	65	82	82	61	79	79	58	74	74	55			
		7 to 27	All Mounts	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	87	94	94	82	93	93	77	91	91	72	89	89	67	85	85	63	82	82	59	78	78	56			
		27 to 45	All Mounts	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	98	97	97	92	92	92	88	89	89	84	85	85	80	82	82	75	78	78	71	74	74	67
		45 to 90	All Mounts	118	118	113	114	114	109	111	111	105	108	108	101	105	105	98	102	102	95	99	99	92	95	95	87	90	90	83	86	86	79	82	82	74	78	78	69	74	74	65	70	70	62			
	D	0 to 7	All Mounts	92	92	92	92	92	92	92	92	91	92	92	88	92	92	85	92	92	83	92	92	80	92	92	74	89	89	69	85	85	64	81	81	60	76	76	56	72	72	53	68	68	50			
		7 to 27	All Mounts	98	98	98	98	98	97	98	98	93	98	98	90	98	98	87	97	97	84	96	96	82	94	94	76	92	92	71	88	88	66	84	84	62	80	80	58	76	76	55	72	72	52			
		27 to 45	All Mounts	103	103	103	103	103	103	103	103	103	103	103	101	101	101	98	99	99	95	96	96	92	92	92	87	88	88	83	84	84	79	80	80	73	76	76	69	71	71	65	68	68	62			
		45 to 90	All Mounts	112	112	106	109	109	102	106	106	99	102	102	95	100	100	92	97	97	90	94	94	87	89	89	82	85	85	78	81	81	72	77	77	68	72	72	64	68	68	60	64	64	57			
35 psf	B	0 to 7	All Mounts	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89			
		7 to 27	All Mounts	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92			
		27 to 45	All Mounts	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96			
		45 to 90	All Mounts	118	118	118	118	118	118	118	118	118	118	118	114	116	116	110	113	113	107	110	110	104	105	105	98	100	100	93	96	96	89	92	92	85	88	88	81	85	85	78	82	82	73			
	C	0 to 7	All Mounts	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	85	89	89	81	89	89	75	89	89	70	86	86	65	82	82	61	79	79	58	74	74	55			
		7 to 27	All Mounts	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	87	92	92	82	90	90	77	89	89	72	87	87	67	85	85	63	82	82	59	78	78	56			
		27 to 45	All Mounts	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96			
		45 to 90	All Mounts	118	118	113	114	114	109	111	111	105	108	108	101	105	105	98	102	102	95	99	99	92	95	95	87	90	90	83	86	86	79	82	82	74	78	78	69	74	74	65	70	70	62			
	D	0 to 7	All Mounts	91	91	91	91	91	91	91	91	91	91	91	88	91	91	85	91	91	83	91	91	80	91	91	74	89	89	69	85	85	64	81	81	60	76	76	56	72	72	53	68	68	50			
		7 to 27	All Mounts	95	95	95	95	95	95	95	95	93	95	95	90	95	95	87	95	95	84	94	94	82	92	92	76	90	90	71	88	88	66	84	84	62	80	80	58	7								

Maximum Rail Spans (Inches)			SMR100 Rail Flush-Mount on 0 to 30 Foot Roof -- ASCE 7-16 -- 72-Cell (L)																																																
Ground Snow Load	Exposure Category	Panel Angle	Wind Speed ->																																																
			130 mph						140 mph						150 mph						160 mph						170 mph						180 mph						190 mph												
		Roof Zone ->	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r							
0 psf	B	0 to 7	Array Interior	116	101	90	90	80	80	116	95	86	86	86	74	74	115	91	81	81	81	69	69	109	87	77	77	77	65	65	104	83	72	72	72	61	61	100	80	68	68	68	57	57	96	75	64	64	64	54	54
		Array Edge	110	87	77	77	77	65	65	104	82	72	72	72	60	60	99	78	67	67	67	56	56	94	73	62	62	62	53	53	90	68	59	59	59	49	49	86	64	55	55	55	47	47	83	61	52	52	52	44	44
		7 to 20	Array Interior	95	95	82	82	82	76	76	90	90	90	77	77	77	70	70	85	85	85	85	85	72	72	72	72	65	65	82	82	62	62	62	67	67	78	78	78	63	63	63	57	73	73	73	59	59	59	54	
		Array Edge	82	82	82	67	67	67	61	61	77	77	77	62	62	62	57	57	72	72	72	58	58	58	53	53	67	67	67	54	54	54	49	63	63	63	51	51	51	46	59	59	59	48	48	48	44				
		20 to 27	Array Interior	105	105	105	87	87	87	85	85	99	99	99	83	83	83	81	81	95	95	95	79	79	79	79	76	76	90	90	90	74	74	74	71	71	87	87	87	69	69	69	66	83	83	83	65	65	65	63	
		Array Edge	91	91	91	74	74	74	71	71	86	86	86	68	68	68	66	66	82	82	82	64	64	64	64	61	61	78	78	78	60	60	60	57	57	73	73	73	56	56	56	54									
	27 to 45	Array Interior	98	98	98	94	94	87	87	87	93	93	93	89	89	89	89	89	88	88	88	88	85	85	85	85	85	84	84	84	84	81	81	81	81	81	81	81	81	77	77	77	77								
	Array Edge	85	85	85	82	82	82	74	74	74	80	80	80	80	77	77	77	77	75	75	75	75	71	71	71	71	71	70	70	70	70	67	67	67	67	66	66	66	66	63	63	63	63								
	45 to 90	Array Interior	112	112	106	106	106	106	106	106	107	107	101	101	101	101	101	103	103	96	96	96	96	96	96	96	99	99	92	92	92	92	92	95	95	88	88	88	88	88	92	92	85	85	85	85	85				
	Array Edge	99	99	92	92	92	92	92	92	95	95	87	87	87	87	87	91	91	83	83	83	83	83	83	87	87	80	80	80	80	80	83	83	75	75	75	75	75	80	80	71	71	71	71	71						
	0 to 7	Array Interior	112	89	80	80	80	67	67	106	84	74	74	74	62	62	101	80	69	69	69	58	58	96	76	65	65	65	54	54	92	71	61	61	61	51	51	89	67	57	57	57	48	48							
	Array Edge	97	76	65	65	65	55	55	92	70	60	60	60	51	51	87	65	56	56	56	47	47	83	61	52	52	52	44	44	80	57	49	49	49	42	42	75	54	46	46	46	39	39								
7 to 20	Array Interior	84	84	84	70	70	70	63	63	80	80	80	65	65	65	59	59	74	74	74	60	60	60	60	55	55	69	69	69	56	56	56	51	51	65	65	53	53	53	48	48										
Array Edge	70	70	70	57	57	57	51	51	65	65	65	52	52	52	48	48	60	60	60	49	49	49	49	44	44	56	56	56	46	46	46	41	41	53	53	43	43	43	39	39											
20 to 27	Array Interior	93	93	93	77	77	77	74	74	88	88	88	71	71	71	68	68	84	84	84	66	66	66	66	63	63	80	80	80	62	62	62	59	59	76	76	76	58	58	58	56										
Array Edge	81	81	81	62	62	62	60	60	75	75	75	57	57	57	55	55	70	70	70	54	54	54	54	51	51	65	65	65	50	50	50	48	48	61	61	61	47	47	47	45											
27 to 45	Array Interior	87	87	87	84	84	76	76	76	82	82	82	82	79	79	79	78	78	78	78	74	74	74	74	74	73	73	73	69	69	69	62	62	69	69	69	69	65	65	65											
Array Edge	73	73	73	69	69	69	62	62	68	68	68	68	64	64	64	63	63	63	63	60	60	60	60	60	59	59	59	56	56	56	51	51	56	56	56	53	53	53	53												
45 to 90	Array Interior	101	101	94	94	94	94	94	94	97	97	90	90	90	90	90	93	93	85	85	85	85	85	85	89	89	82	82	82	82	82	85	85	78	78	78	78	78	82	82	73	73	73	73	73						
Array Edge	89	89	82	82	82	82	82	82	85	85	77	77	77	77	77	81	81	72	72	72	72	72	72	76	76	67	67	67	67	67	71	71	63	63	63	63	63	67	67	60	60	60	60	60							
0 to 7	Array Interior	106	84	73	73	73	62	62	100	80	68	68	68	57	57	95	74	63	63	63	53	53	91	69	59	59	59	50	50	87	65	56	56	56	47	47	83	61	52	52	52	44	44								
Array Edge	91	70	59	59	59	50	50	86	64	55	55	55	46	46	82	60	51	51	51	43	43	78	56	48	48	48	41	41	73	53	45	45	45	38	38	69	50	43	43	43	36	36									
7 to 20	Array Interior	79	79	79	64	64	64	58	58	73	73	73	59	59	59	54	54	68	68	68	55	55	55	55	55	64	64	64	52	52	52	47	47	60	60	60	48	48	48	44											
Array Edge	64	64	64	52	52	52	47	47	59	59	59	48	48	48	44	44	55	55	55	45	45	45	45	45	52	52	52	42	42	42	38	38	48	48	48	39	39	39	36												
20 to 27	Array Interior	87	87	87	70	70	70	67	67	83	83	83	65	65	65	62	62	79	79	79	60	60	60	60	58	58	74	74	74	57	57	57	54	54	69	69	69	53	53	53	51										
Array Edge	74	74	74	57	57	57	51	51	69	69	69	53	53	53	51	51	64	64	64	49	49	49	49	47	47	60	60	60	46	46	46	44	44	56	56	56	43	43	43	42											
27 to 45	Array Interior	82	82	82	78	78	78	78	78	77	77	77	77	77	77	77	71	71	71	68	68	68	68	68	67	67	67	63	63	63	63	63	63	63	60	60	60	60	59	59	59	56	56	56	56						
Array Edge	67	67	67	67	67	67	64	64	62	62	62	62	59	59	59	58	58	58	58	55	55	55	55	54	54	54	54	51	51	51	51	51	51	51	48	48	48	48													
45 to 90	Array Interior	96	96	89	89	89	89	89	89	92	92	84	84	84	84	84	88	88	81	81	81	81	81	81	84	84	76	76	76	76	76	80	80	71	71	71	71	71	76	76	67	67	67	67	67						
Array Edge	84	84	76	76	76	76	76	76	80	80	71	71	71	71	71	74	74	66	66	66	66	66	66	70	70	62	62	62	62	62	65	65	58	58	58	58	58	62	62	55	55	55	55	55							
5 psf	B	0 to 7	Array Interior	112	101	90	90	80	80	112	95	86	86	86	74	74	112	91	81	81	81	69	69	109	87	77	77	77	65	65	104	83	72	72	72	61	61	100	80	68	68	68	57	57							
		Array Edge	110	87	77	77	77	65	65	104	82	72	72	72	60	60	99	78	67	67	67	56	56	94	73	62	62	62	53	53	90	68	59	59	59	49	49	86	64	55	55	55	47	47							
		7 to 20	Array Interior	95	95	82	82	82	76	76	90	90	90	77	77	77	70	70	85	85	85	72	72	72	72	65	65	82	82	62	62	62	67	67	78	78	78	63	63	63	57										
		Array Edge	82	82	82	67	67	67	61	61	77	77	77	62	62	62	57	57	72	72	72	58	58	58	53	53	67	67	67	54	54	54	49	63	63	63	51	51	51	46											
		20 to 27	Array Interior	105	105	105	87	87	87	85	85	99	99	99	83	83	83	81	81	95	95	95	79	79	79	79	76	76	90	90	90	74	74	74	71	71	87	87	87	69	69	69	66								
		Array Edge	91	91	91	74	74	74	71	71	86	86	86	68	68	68	66	66	82	82	82	64	64	64	64	61	61	78	78	78	60	60	60	57	57	73	73	73	56	56	56	54									
	27 to 45	Array Interior	98	98	98	94	94	87	87	87	93	93	93	89	89	89	89	88	88	88	88																														

Maximum Rail Spans (Inches)			SMR100 Rail Flush-Mount on 0 to 30 Foot Roof -- ASCE 7-16 -- 72-Cell (L)																																																				
Ground Snow Load	Exposure Category	Panel Angle	Wind Speed ->		130 mph						140 mph						150 mph						160 mph						170 mph						180 mph						190 mph														
			Roof Zone ->	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r	1'	2e	2r	2n	3e	3r										
30 psf	B	0 to 7	Array Interior	91	91	90	90	80	80	91	91	86	86	86	74	74	91	91	81	81	81	69	69	91	87	77	77	77	65	65	91	83	72	72	72	61	61	91	80	68	68	68	57	57	91	75	64	64	64	54	54				
			Array Edge	91	87	77	77	77	65	65	91	82	72	72	72	60	60	91	78	67	67	67	56	56	91	73	62	62	62	53	53	90	68	59	59	59	49	49	86	64	55	55	55	47	47	83	61	52	52	52	44	44			
		7 to 20	Array Interior	94	94	94	82	82	82	76	76	90	90	90	77	77	70	85	85	85	72	72	72	65	65	82	73	62	62	62	53	53	78	78	78	63	63	63	57	73	73	73	59	59	59	54	69	69	69	56	56	56	51		
			Array Edge	82	82	82	67	67	67	61	61	77	77	77	62	62	62	57	57	72	72	72	58	58	58	53	67	67	67	54	54	54	49	63	63	63	51	51	51	46	59	59	59	48	48	48	44								
		20 to 27	Array Interior	96	96	96	87	87	87	85	85	96	96	96	83	83	83	81	81	95	95	95	79	79	79	73	73	90	90	90	74	74	74	71	87	87	87	69	69	69	66	83	83	83	65	65	65	63	80	80	80	62	62	62	62
			Array Edge	91	91	91	74	74	74	71	71	86	86	86	68	68	68	66	66	82	82	82	64	64	64	61	61	78	78	78	60	60	60	57	73	73	73	56	56	56	54	69	69	69	53	53	53	51							
		27 to 45	Array Interior	98	98	98	94	94	87	87	87	93	93	93	89	89	89	89	89	88	88	88	84	84	84	85	85	84	84	84	84	81	81	81	81	81	81	81	77	77	77	77	77	77	73	73	73	69							
			Array Edge	85	85	85	82	82	82	74	74	80	80	80	80	77	77	77	77	75	75	75	75	71	71	71	71	70	70	70	70	67	67	67	66	66	66	66	63	63	63	62	62	62	62	59	59	59							
		45 to 90	Array Interior	112	112	106	106	106	106	106	106	107	107	101	101	101	101	101	103	103	96	96	96	96	96	96	99	99	92	92	92	92	92	95	95	88	88	88	88	88	92	92	85	85	85	85	85	89	89	81	81	81	81	81	
			Array Edge	99	99	92	92	92	92	92	92	95	95	87	87	87	87	87	91	91	83	83	83	83	83	87	87	80	80	80	80	80	83	83	75	75	75	75	75	80	80	71	71	71	71	71									
		C	0 to 7	Array Interior	91	89	80	80	80	67	67	91	84	74	74	74	62	62	91	80	69	69	69	58	58	91	76	65	65	65	54	54	91	71	61	61	61	51	51	89	67	57	57	57	48	48	85	63	54	54	54	46	46		
				Array Edge	91	76	65	65	65	55	55	91	70	60	60	60	51	51	87	65	56	56	56	47	47	83	61	52	52	52	44	44	80	57	49	49	49	42	42	75	64	46	46	46	39	39									
	7 to 20		Array Interior	84	84	84	70	70	70	63	63	80	80	80	65	65	65	65	74	74	74	60	60	60	55	55	69	69	69	56	56	56	51	65	65	53	53	53	48	48	61	61	61	50	50	50	45								
			Array Edge	70	70	70	57	57	57	51	51	65	65	65	52	52	52	48	48	60	60	60	49	49	49	44	44	56	56	56	46	46	46	41	53	53	43	43	43	39	39	50	50	40	40	40	37	37							
	20 to 27		Array Interior	93	93	93	77	77	77	74	74	88	88	88	71	71	71	68	68	84	84	84	66	66	66	63	63	80	80	80	62	62	62	59	76	76	76	58	58	58	56	71	71	71	55	55	55	53							
			Array Edge	81	81	81	62	62	62	60	60	75	75	75	57	57	57	55	55	70	70	70	54	54	54	51	51	65	65	65	50	50	50	48	61	61	61	47	47	47	45	58	58	44	44	44	44	44							
	27 to 45		Array Interior	87	87	87	84	84	76	76	76	82	82	82	82	79	79	79	78	78	78	78	74	74	74	74	73	73	73	69	62	62	62	69	69	69	69	65	65	65	61	61	61	61	55	55	55								
			Array Edge	73	73	73	69	62	62	60	60	68	68	68	68	64	64	64	63	63	63	63	60	60	60	60	59	59	59	56	56	56	56	56	56	56	53	53	53	53	54	54	54	50	50	50	47								
	45 to 90		Array Interior	101	101	94	94	94	94	94	94	97	97	90	90	90	90	90	93	93	85	85	85	85	85	85	89	89	82	82	82	82	82	85	85	78	78	78	78	78	82	82	73	73	73	73	73								
			Array Edge	89	89	82	82	82	82	82	82	85	85	82	82	82	82	82	81	81	81	81	81	81	81	81	84	84	84	84	84	84	84	84	84	76	76	76	76	76	80	80	71	71	71	71	71								
	D		0 to 7	Array Interior	89	89	89	89	80	80	80	89	89	86	86	86	74	74	89	89	81	81	81	69	69	89	87	77	77	77	65	65	89	83	72	72	72	61	61	89	80	68	68	68	57	57									
				Array Edge	89	87	77	77	77	65	65	89	82	72	72	72	60	60	89	78	67	67	67	56	56	89	73	62	62	62	53	53	89	68	59	59	59	49	49	86	64	55	55	55	47	47									
		7 to 20	Array Interior	91	91	91	82	82	82	76	76	90	90	90	77	77	70	85	85	85	72	72	72	65	65	82	82	82	67	67	67	78	78	78	63	63	63	57	73	73	73	59	59	59	54										
			Array Edge	82	82	82	67	67	67	61	61	77	77	77	62	62	62	57	57	72	72	72	58	58	58	53	67	67	67	54	54	54	49	63	63	63	51	51	51	46															
20 to 27		Array Interior	91	91	91	74	74	74	71	71	86	86	86	68	68	68	66	66	82	82	82	64	64	64	61	61	78	78	78	60	60	60	57	73	73	73	56	56	56	54															
		Array Edge	91	91	91	74	74	74	71	71	86	86	86	68	68	68	66	66	82	82	82	64	64	64	61	61	78	78	78	60	60	60	57	73	73	73	56	56	56	54															
27 to 45		Array Interior	96	96	96	94	94	87	87	87	93	93	93	89	89	89	89	88	88	88	85	85	85	85	84	84	84	84	81	81	81	81	81	81	81	77	77	77	77	77	77	73	73	73	69										
		Array Edge	85	85	85	82	82	82	74	74	80	80	80	80	77	77	77	77	75	75	75	75	71	71	71	71	70	70	70	70	67	67	67	66	66	66	66	63	63	63															
45 to 90		Array Interior	112	112	106	106	106	106	106	106	107	107	101	101	101	101	101	103	103	96	96	96	96	96	99	99	92	92	92	92	92	95	95	88	88	88	88	88	92	92	85	85	85	85	85										
		Array Edge	99	99	92	92	92	92	92	92	95	95	87	87	87	87	87	91	91	83	83	83	83	83	87	87	80	80	80	80	80	83	83	75	75	75	75	75	80	80	71	71	71	71	71										
35 psf		0 to 7	Array Interior	89	89	80	80	80	67	67	89	84	74	74	74	62	62	89	80	69	69	69	58	58	89	76	65	65	65	54	54	89	71	61	61	61	51	51	88	67	57	57	57	48	48										
			Array Edge	89	76	65	65	65	55	55	89	70	60	60	60	51	51	87	65	56	56	56	47	47	83	61	52	52	52	44	44	80	57	49	49	49	42	42																	
	7 to 20	Array Interior	84	84	84	70	70	70	63	63	80	80	80	65	65	65	65	74	74	74	60	60	60	55	55	69	69	69	56	56	56	51	65	65	53	53	53	48	48																
		Array Edge	70	70	70	57	57	57	51	51	65	65	65	52	52	52	48	48	60	60	60	49	49	49	44	44	56	56	56	46	46	46	41	53	53	43	43	43	39	39															
	20 to 27	Array Interior	92	92	92	77	77	77	74	74	88	88	88	71	71	71	68	68	84	84	84	66	66	66	63	63	80	80	80	62	62	62	59	76	76	76	58	58	58	56															
		Array Edge	81	81	81	62	62	62	60	60	75	75	75																																										

