May 2, 2014

Orion Solar Racking
2917 Vail Ave.
Commerce, California 90040
TEL: (310) 258-9900
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Attn.: Engineering Department,

Re: Engineering Certification for the Orion Solar Venus Racking Mounting System

PZSE, Inc.-Structural Engineers has reviewed Orion Solar's Venus rail span chart, rail allowable uplift wind force table and performed rail components capacity check including the L foot bracket, end clamp, mid-clamp and stand off base. All information, data and analysis are based on, and comply with the following:

1. Minimum Design Loads for Buildings and other Structures, ASCE/SEI 7-05
2. 2009 International Building Code, by International Code Council, Inc.
3. 2005 Aluminum Design Manual, by The Aluminum Association

This letter certifies that the structural calculations contained within Orion Solar's Venus rail span chart, rail allowable uplift wind force table and rail components capacity check are in compliance with the above Codes.

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

Sincerely,

Paul Zacher, SE - President

		Orion Standard Rail Span (ft)								
EXP	WIND SPEED (mph)	ZONE 1 kzt (Topographic Factor)			ZONE 2 kzt (Topographic Factor)			ZONE 3 kzt (Topographic Factor)		
		1.0	1.2	1.4	1.0	1.2	1.4	1.0	1.2	1.4
B	85	8.5	8.5	8.5	8.0	7.5	7.0	6.5	6.0	5.5
	90	8.5	8.5	8.0	7.5	7.0	6.5	6.5	5.5	5.5
	100	8.5	8.0	7.5	7.0	6.5	6.0	5.5	5.5	4.5
	110	8.0	7.5	7.0	6.5	6.0	5.5	5.5	4.5	4.5
	120	7.5	7.0	6.5	6.0	5.5	5.0	4.5	4.5	4.0
	130	7.0	6.5	6.5	5.5	5.0	4.5	4.5	4.0	3.5
	140	6.5	6.5	5.5	5.0	4.5	4.0	4.0	3.5	3.5
	150	6.5	5.5	5.5	4.5	4.0	4.0	3.5	3.5	3.0
C	85	8.5	8.0	7.5	7.0	6.5	6.0	5.5	5.5	4.5
	90	8.0	7.5	7.5	6.5	6.0	5.5	5.5	5.0	4.5
	100	7.5	7.0	6.5	6.0	5.5	5.0	4.5	4.5	4.0
	110	7.0	6.5	6.5	5.5	5.0	4.5	4.5	4.0	3.5
	120	6.5	6.0	5.5	5.0	4.5	4.0	4.0	3.5	3.5
	130	6.5	5.5	5.5	5.0	4.0	4.0	3.5	3.5	3.0
	140	5.5	5.5	5.0	4.5	4.0	4.0	3.5	3.5	3.0
	150	5.5	5.0	4.5	4.0	3.5	3.0	3.0	3.0	2.5
D	85	8.0	7.5	7.0	6.5	6.0	5.5	5.5	4.5	4.5
	90	8.0	7.0	6.5	6.0	5.5	5.5	5.0	4.5	4.0
	100	7.0	6.5	6.5	5.5	5.0	4.5	4.5	4.0	3.5
	110	6.5	6.0	5.5	5.0	4.5	4.0	4.0	3.5	3.5
	120	6.5	5.5	5.5	4.5	4.0	3.5	3.5	3.5	3.0
	130	5.5	5.5	5.0	4.0	3.5	3.5	3.5	3.0	3.0
	140	5.5	5.0	4.5	4.0	3.5	3.0	3.0	3.0	2.5
	150	5.0	4.5	4.0	3.5	3.0	3.0	3.0	2.5	2.5

a. The table above ONLY includes Orion rail capacity check. For roof attachment refer to the allowable uplift force table. Roof deck capacity check is provided by others.
b. The rail components including the L foot bracket, end clamp, mid-clamp and stand off base are adequate to support the loading conditions listed above.
c. Wind exposure category II per ASCE7-05
d. Maximum mean roof height is 30 ft. For mean roof height greater than 30 ft and less than 45 ft, reduce the span length by 0.5 ft.
e. Average parapet height is 0 ft
f. Roof pitch is between 7 degree and 27 degree
g. Ground snow load is 0 psf
h. Maximum solar panel weight is 60 lbs
i. Height of solar panel is between 2" and 10" to roof

		Orion Heavy Duty Rail Span (ft)								
EXP	WIND SPEED (mph)	ZONE 1 kzt (Topographic Factor)			ZONE 2 kzt (Topographic Factor)			ZONE 3 kzt (Topographic Factor)		
		1.0	1.2	1.4	1.0	1.2	1.4	1.0	1.2	1.4
B	85	10.0	10.0	10.0	10.0	9.0	8.5	8.0	7.5	6.5
	90	10.0	10.0	10.0	9.0	8.5	8.0	7.5	6.5	6.5
	100	10.0	10.0	9.0	8.5	8.0	7.0	6.5	6.0	5.5
	110	10.0	9.0	8.5	8.0	7.0	6.5	6.0	5.5	5.0
	120	9.0	8.5	8.0	7.0	6.5	6.0	5.5	5.0	4.5
	130	8.5	8.0	7.5	6.5	6.0	5.5	5.0	4.5	4.0
	140	8.0	7.5	6.5	6.0	5.5	5.0	4.5	4.0	4.0
	150	7.5	6.5	6.5	5.5	5.0	4.5	4.0	4.0	3.5
C	85	10.0	10.0	9.0	8.5	8.0	7.0	6.5	6.0	5.5
	90	10.0	10.0	9.0	8.0	7.5	6.5	6.5	5.5	5.5
	100	9.0	8.5	8.0	7.0	6.5	6.0	5.5	5.0	4.5
	110	8.5	8.0	7.5	6.5	6.0	5.5	5.0	4.5	4.0
	120	8.0	7.0	6.5	6.0	5.5	5.0	4.5	4.0	4.0
	130	7.5	6.5	6.0	5.5	5.0	4.5	4.0	4.0	3.5
	140	6.5	6	5.5	5.0	4.5	4.0	4.0	3.5	3.5
	150	6.5	5.5	5.5	4.5	4.0	4.0	3.5	3.5	3.0
D	85	10.0	9.0	8.5	8.0	7.0	6.5	6.0	5.5	5.0
	90	10.0	9.0	8.5	7.5	6.5	6.0	5.5	5.0	4.5
	100	8.5	8.0	7.5	6.5	6.0	5.5	5.0	4.5	4.0
	110	8.0	7.5	6.5	6.0	5.5	5.0	4.5	4.0	4.0
	120	7.5	6.5	6.0	5.5	5.0	4.5	4.0	4.0	3.5
	130	6.5	6.0	5.5	5.0	4.0	4.0	4.0	3.5	3.5
	140	6.0	5.5	5.0	4.5	4.0	3.5	3.5	3.5	3.0
	150	5.5	5.5	5.0	4.0	3.5	3.5	3.5	3.0	3.0

a. The table above ONLY includes Orion rail capacity check. For roof attachment refer to the allowable uplift force table. Roof deck capacity check is provided by others.
b. The rail components including the L foot bracket, end clamp, mid-clamp and stand off base are adequate to support the loading conditions stated above.
c. Wind exposure category II per ASCE7-05
d. Maximum mean roof height is 30 ft. For mean roof height greater than 30 ft and less than 45 ft, reduce the span length by 0.5 ft.
e. Average parapet height is 0 ft
f. Roof pitch is between 7 degree and 27 degree
g. Ground snow load is 0 psf
h. Maximum Solar panel weight is 60 lbs
i. Height of solar panel is between 2" and 10" to roof

Table 1:

	Rail Allowable Uplift Wind Force (plf)																		
Rail Span (ft)	40	50	60	70	80	90	100	120	130	140	150	170	190	200	240	250	320	440	600
2.5																			Std Rail
3																		Std Rail	HD Rail
3.5																	Std Rail	HD Rail	
4															Std Rail		HD Rail		
4.5													Std Rail			HD Rail			
5											Std Rail			HD Rail					
5.5									Std Rail			HD Rail							
6							Std Rail			HD Rail									
6.5						Std Rail		HD Rail											
7				Std Rail			HD Rail												
7.5			Std Rail			HD Rail													
8		Std Rail			HD Rail														
8.5	Std Rail			HD Rail															
9			HD Rail																
9.5		HD Rail																	
10		HD Rail																	
10.5																			
11																			

Table 2:

	Allowable Uplift Force (lb)	
Rail Span (ft)	Standard Rail	HD Rail
2.5	1634	---
3	1434	1961
3.5	1211	1672
4	1032	1383
4.5	913	1210
5	795	1069
5.5	753	995
6	624	887
6.5	604	818
7	497	727
7.5	450	697
8	392	655
8.5	380	603
9	---	539
9.5	---	465
10	---	450

a. Wind exposure category II per ASCE7-05
b. Maximum mean roof height is 30 ft. For mean roof height greater than 30 ft and less than 45 ft, reduce the span length by 0.5 ft.
c. Average parapet height is 0 ft
d. Roof pitch is between 7 degree and 27 degree
e. Ground snow load is 0 psf
f. Maximum solar panel weight is 60 lbs
g. Height of solar panel is between 2" and 10" to roof