



DESIGN & ENGINEERING GUIDE

SOLARMOUNT: FLUSH-TO-ROOF DESIGN

A solid grey square graphic located at the end of the title line.

Table of Contents

Getting Started – Introduction	1
Installer Responsibility	2
Design Methodology	3
Project Requirements & Design Aid	4
Prescriptive Design Method	5
ASCE 7-05 Analytical Design Method	8
ASCE 7-10 Analytical Design Method	15
Technical Support	22
Appendix – Table of Contents	23

Getting Started - Introduction

This manual is for professional engineers and permitting authorities. For assistance with your array's engineering and a Bill of Materials, see our U-Builder at <http://design.unirac.com>

SOLARMOUNT Flush-to-Roof is an extruded aluminum rail system that is engineered to hold most framed solar modules to a roof structure and installed parallel to the roof. With SOLARMOUNT, you'll be able to solve virtually any PV module mounting challenge.

Some of the features of this product include:

- Integrated Full System Grounding and Bonding to UL 2703
 - Integrated Bonding Rail Splice
 - Integrated Bonding Module Midclamp Assembly
 - Module Endclamp Assembly
 - Bonding Microinverter Mounting Bolt Assembly
 - Integrated Bonding L-Foot T-Bolt
- Module Landscape (with rails running north/south) or Portrait (with rails running east/west) Orientations
- Works with Most Framed Modules
- Wire Management Clip
- Designed per the ASCE 7-05 and ASCE 7-10 Building Code
- Component Testing
- Rigorous Engineering Analysis
- Superior Aesthetics
 - Optional Front Trim
 - Optional End Caps (SOLARMOUNT Standard and Light Rail Only)

Installer Responsibility & Disclaimer

Please review this guide and the SOLARMOUNT Installation Guide thoroughly before installing your SOLARMOUNT system. These guides provide supporting documentation for building permit applications, planning, and assembling the SOLARMOUNT system.

The installer is solely responsible for:

- Complying with all applicable local or national building codes, including code requirements that can be more stringent than the guidelines set forth in this manual;
- Maintaining and enforcing all aspects of a safe working environment;
- Ensuring that Unirac and other products are appropriate for the particular installation and the installation environment;
- Ensuring that the roof, its rafters, connections, and any other structural support members can support the array under all code level loading conditions (this total building assembly is referred to as the building structure);
- Using only Unirac parts and installer-supplied parts as specified by Unirac (substitution of parts may void the warranty and invalidate the letters of certification in all Unirac publications);
- Ensuring that lag screws have adequate pullout strength and shear capacities as installed;
- Verifying the strength of any alternate mounting if used in lieu of the lag screws;
- Maintaining the waterproof integrity of the roof, including selection and proper installation of appropriate flashing;
- Ensuring safe installation of all electrical aspects of the PV array, including proper grounding/bonding;
- Array shading and output analysis;
- Ensuring correct and appropriate design parameters are used in determining the design loading used for design of the specific installation. Parameters, such as snow loading, wind speed, exposure and topographic factor should be confirmed with the local building official or a licensed professional engineer.

Unirac shall not be liable for any losses, damages, or injuries that directly or indirectly result from any non-conformance with the above.

Design Methodology

SOLARMOUNT was designed using the *Minimum Design Loads for Buildings and Other Structures* by the American Society of Civil Engineers and Structural Engineering Institute, 2005 and 2010 editions. These are referred to as ASCE 7-05 and ASCE 7-10, respectively. Three methods have been provided to aid in design of your project. The use of these methods is discussed in the *Project Requirements & Design Aid* section in the next page.

Quick Note – The online U-Builder is highly recommended for all qualifying projects. It will provide you with a Bill of Materials, Certification Letter, and Calculations for your project. Please review Table 1 in the *Project Requirements and Design Aid* section of this Guide.

Project Requirements & Design Aid

Table 1 - Project Requirements & Design Aid

Project Requirements (Blank Cells for Project Specific Input Provided for your Convenience)		Design Aid					
		U-Builder ^{1a} (Online Design Tool)		Prescriptive Design Method ^{1b}		Do It Yourself ^{1c} (Analytical Method)	
		ASCE 7-05	ASCE 7-10	ASCE 7-05	ASCE 7-10	ASCE 7-05	ASCE 7-10
Project Name:							
Project Address:							
AHJ (Authority Having Jurisdiction):							
Current Adopted Building Code:							
Local Jurisdiction Code Amendments:							
Occupancy/Risk Category*:		II		II		As Permitted by Code	
Basic Wind Speed*:		85-150 mph	110-170 mph	***	***	As Permitted by Code	
Wind Exposure Category*:		B or C		B, C or D		As Permitted by Code	
Ground Snow Load*:		0-60 psf		***		As Permitted by Code	
Seismic Coefficient, S _s *:		≤ 3.1g		≤ 3.1g		As Permitted by Code	
Roof Height (Eave & Ridge)*:		≤ 30 feet		≤ 60 feet		As Permitted by Code	
Roof Slope*:		0-45 Degrees		0-45 Degrees		As Permitted by Code	
Roof Zone(s)*:		1, 2, or 3		1, 2, and 3		As Permitted by Code	
Framed Module Type & Module*:		User Input		Most 60 and 72 Cell		User Input	
Module Weight*:		Module Dependent		See Appendix E		User Input	
Module Dimensions*:		Module Dependent		Module Dependent		User Input	
Total Module Quantity*:		Up to 50 x 50		Unlimited		User Input	
Design Method:		Allowable Stress Design		Allowable Stress Design		Unlimited**	
Project Specific Calculations for Solar System Provided:		Yes		No		No	
Stamped/Certified Engineering Letter for Solar System Provided:		Yes		Yes		No	
Bill of Materials for Unirac Components of Solar System Provided:		Yes		No		No	

* Requirements must fall within defined range to utilize specified design aid.

** The design professional could use the appropriate code to perform the design in LRFD, LSD, or ASD. The ASD procedure for the Analytical Method has been provided.

*** Prescriptive Pressure tables located in Appendix B and Online. Pressure Tables exist for Basic Wind Speeds of 85-170 mph for ASCE 7-05 and 110-190 mph for ASCE 7-10.

1a. U-Builder: This is an easy-to-use online design tool that is recommended for all preliminary and final designs, estimating, and layout validation. It is located on our website at www.unirac.com.

The U-Builder allows for a customized project design that results in a final design, bill of materials, price quote and stamped/certified engineering approval letters.

1b. Prescriptive Design Method: This method is a simplified approach to the design of your SOLARMOUNT project. This method is recommended when computers or internet access is not available. Once project specific requirements are known, the project design load pressures can be looked up in the Pressure Lookup Tables located in Appendix B. If additional tables are needed, they can be found online at www.unirac.com.

1c. Do It Yourself (Analytical Method): This design approach follows the ASD calculations step by step through both the ASCE 7-05 and 7-10 design codes. Equations, figures, tables, and commentary are provided for your convenience to aid in generating the specific design load pressures for your loading conditions, such as wind and snow. This method has been provided for design or layout requirements that fall outside of the other two options or for design professionals that prefer to perform their own calculation package.

Prescriptive Design Method - Quick Design Steps

Step 1: Define Project Requirements

- a. Fill in the *Table 1 - Project Requirements & Design Aid* on previous page.
- b. Once project specific information is determined, confirm that the Prescriptive Design Method may be utilized.
- c. Review the Prescriptive Pressure Tables in the Appendix to see if they meet your needs. If a more precise design is needed (if the tables in the Appendix don't meet your project requirements, but per Table 1, you can still utilize the Prescriptive Design Method) please utilize the online tool for design.

Step 2: Create Initial Array Layout

- a. Identify the structural supporting members of your building. A sketch/drawing of the roof/building with location of supporting members, vents, skylights, cable/wires, areas to avoid, etc., is highly recommended.
- b. Create a "rough draft" layout of solar modules on the actual project roof. (Refer to the SOLARMOUNT Installation Guide.)

Step 3: Determine Array Design Pressure by Roof Zone to Select a Rail Span

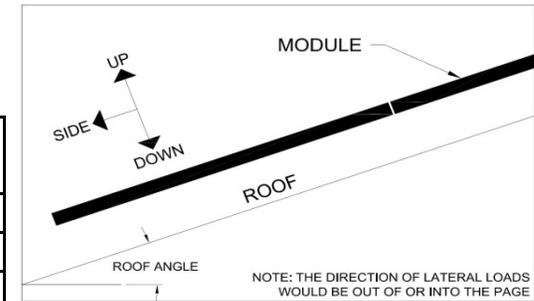
- Using information in Steps 1 & 2, select a Prescriptive Pressure Table contained Appendix B or online.
- Use fill-in boxes below to document your project specific pressures and tables utilized.

Pressure Table Used:

Basic Wind Speed	
Building Height	
Exposure Category	
Seismic Coefficient (Ss)	
Roof Pitch	
Ground Snow Load	

Controlling Pressure:

	Up (psf)	Down (psf)	Side (psf)	Lateral (psf)
Roof zone 1:				
Roof zone 2:				
Roof zone 3:				



Note: For Low Profile Mode, where rails are perpendicular to the roof tilt (E-W Rails), "Side Load" (Down Slope) is load applied in weak axis bending of the SOLARMOUNT rail along the roof tilt and "Lateral" is load applied as an axial load along the SOLARMOUNT rail perpendicular to the roof tilt. For High Profile Mode, where rails are parallel to the roof tilt (N-S Rails), "Side Load" (Downslope) is load applied in as an axial load along the SOLARMOUNT rail perpendicular to the roof tilt and "Lateral Load" is applied in weak axis bending of the SOLARMOUNT rail along the roof tilt.

- Convert pressures (lbs/ft² or psf) from the boxes just filled in to pounds per linear foot (lb/ft or plf) using the following steps:
 - Pressure (from table above) * Area of Module = Total Pounds per Module
 - Total Pounds Per Module / 2 (Number of rails) = Pounds Per Rail
 - Pounds Per Rail / Width of Module Parallel with the Rail = Pounds per Linear Foot (plf)
- Use the *Downward and Upward Span Length Tables* in Appendix C with the plf loads to determine maximum spans.
 - Look up the table "Downward Span Lengths". Using the "Down" plf load and the "Side" plf load combinations, choose the maximum span length in the table.
 - Look up the table "Uplift Span Lengths" and using the "Up" plf and "Side" plf load combinations to choose the maximum span length.
 - Use the smaller length of the "Down" and "Up" maximum span length.
 - Cantilever (overhang) lengths can be up to 33% of the span length. For example, a 9 foot span length can have a 3 foot cantilever. The cantilever is defined as the distance from the center of a L-Foot to the edge of a rail.



Step 4: Determine Load to the Roof

*The U-Builder online can automatically calculate maximum point loads to the roof.

- a. To determine the load on the roof through the attachment:
 - i. Determine the tributary area to each attachment.
 - ii. Review the controlling pressure in Step 3b.
 - iii. Determine pressure zones on the roof per ASCE 7-05, Figure 6-3 or ASCE 7-10, Figure 30.5-1.
 - iv. Multiply the tributary area by the roof pressure to obtain loads to the roof attachment.
 - v. Determine the point load to the roof at each attachment.

Step 5: Check Roof Load

- a. Ensure that the supporting structure is capable of withstanding the additional loads imposed by the proposed solar system.

Step 6: Check the Connections

- a. Similar to Step 3c, determine the tributary area to each connection and the applied load from the Controlling Pressures table in Step 3.
- b. Convert the applied psf loads into pounds through tributary area.
- c. Look up the Technical Data Sheets in Appendix H for maximum permissible load to each connection.
- d. From Step 4, determine if the attachment (lag bolt or other appropriate attachment) is capable of withstanding the point loads applied.
- e. If the maximum permissible load is greater than the applied load, then the connections are adequate.

Step 7: Define Grounding and Bonding Path

- a. Refer to the Installation Guide for how to determine the Grounding and Bonding Path.

Step 8: SOLARMOUNT Front Trim Check

- a. SOLARMOUNT Front Trim should not be installed in areas where the wind load exceeds 100 psf, where the distance from clamp to clamp (span) exceeds 52 inches, or where the cantilever (overhang) is greater than 66% of the span length. To determine your pressure, please use Appendix B. You will need to review the table associated with your project wind speed and no snow, and review the Up and Down Loads (psf) to determine if SOLARMOUNT Front Trim is appropriate for your project.



ASCE 7-05 Analytical Method

Step 1: User Inputs (ASCE 7-05)

Roof Height (ft):	<input type="text"/>	Mean roof height (15 ft, 30 ft, or 60 ft)
Roof Angle (degrees):	<input type="text"/>	Convert roof pitch to angle in degrees [See Appendix D]
Basic Wind Speed (mph):	<input type="text"/>	Per Basic Wind Speed - US Map (ASCE 7-05, Figure 6-1)
Wind Exposure Category:	<input type="text"/>	Determine the Exposure Category (B, C or D) by using the definitions for Surface Roughness Categories (ASCE 7-05, Sections 6.5.6.2 and 6.5.6.3)
Roof Zone:	<input type="text"/>	Determine the Roof Zone (1, 2 or 3) (ASCE 7-05, Figure 6-3)
Ground Snow Load (psf):	<input type="text"/>	P _g = Ground Snow Load in psf. Ground Snow Loads (ASCE 7-05, Figure 7-1)
Seismic Coefficient S _s (g):	<input type="text"/>	ASCE 7-05 (Figures 22-1, 22-3, 22-5, 22-7, 22-9 through 22-11, 22-13, and 22-14)
Roof Live Load ¹ (psf):	<input type="text"/>	0 psf, 20 psf, etc.
Module Manufacturer/Type:	<input type="text"/>	
Solar Module Length (in):	<input type="text"/>	
Solar Module Width (in):	<input type="text"/>	
Solar Module Weight (lb):	<input type="text"/>	
Module Dead Load (psf)	<input type="text"/>	

Commentary:

1) Most Building Officials allow for all or a portion of the roofs original live load design load to be removed/reduced at the time that solar panels are being added to the roof. The rationale behind this is that live load or roof foot traffic is eliminated or reduced to designated paths. In other words, the roof top solar array and live load foot traffic cannot occupy the same space. If all of the roof live load can be utilized by the proposed solar array, 0 psf should be entered.



Step 2: Wind Pressure (ASCE 7-05, Chapter 6)

Wind Pressure Equation - Method 2 - Analytical Procedure (ASCE 7-05, Section 6.5):

	$P_p = q_h (GC_{pp} - GC_{pi})$ (ASCE 7-05, Section 6.5.12.4.1) (GC _{pp} - Positive Downforce Factor)	
	$P_n = q_h (GC_{pn} - GC_{pi})$ (ASCE 7-05, Section 6.5.12.4.1) (GC _{pn} - Negative Uplift Factor)	
	GC _{pi} equals zero (per AC428, November 2012) (internal pressure coefficient)	
	GC _p is defined below (ASCE 7-05 Figure 6-11) and is a function of the roof zone, effective wind area (feet squared), and roof angle (degrees) (external pressure coefficient)	
	GC _{pp} (Positive downforce factor)	
	GC _{pn} (Negative uplift factor)	
	(ASCE 7-05, Figure 6-11B) for roof angles $\leq 7^\circ$	
	(ASCE 7-05, Figure 6-11C) for roof angles $> 7^\circ$ and $\leq 27^\circ$	
	(ASCE 7-05, Figure 6-11D) for roof angles $> 27^\circ$ and $\leq 45^\circ$	
	$q_h = q_z$	
	$q_z = 0.00256 K_z * K_{zt} * K_d * V^2 * I$ (ASCE 7-05, Section 6.5.10)	
	K _z	Velocity Pressure Coefficient (ASCE 7-05, Table 6-3)
	K _{zt}	Topographic Factor (ASCE 7-05, Section 6.5.7.1 & Figure 6-4)
	K _d	Directionality Factor (ASCE 7-05, Table 6-4)
	V	Basic Wind Speed in MPH from User Inputs in Step 1
	I	Importance Factor ² (ASCE 7-05, Table 6-1)

Commentary:

2) Typical values for the Importance Factor are 0.87 based on Occupancy Category I and 1.0 based on Occupancy Category II. Occupancy I is defined by ASCE 7-05 to mean "Buildings and other structures that present a low hazard to human life in the event of failure...". Occupancy II is defined by ASCE 7-05 to mean "All buildings and other structures except those listed in Occupancy Categories I, III, and IV".

Calculate the wind pressure for uplift and downforce, using GC_{pn} & GC_{pp} respectively, in the provided boxes.



Step 3: Dead Load

Module Dead Load (psf):	<input type="text"/>	Module Dead Load (psf) should be determined from User Inputs in Step 1
Racking System Dead Load ³ (psf):	<input type="text"/>	[See Appendix E] (The racking system dead load should be taken as the total weight of the racking system (hardware, rails, nuts, bolts, attachments, etc.) divided by the total module area of the system.) Component weights can be found in the technical datasheets.
Total Dead Load (psf):	<input type="text"/>	Sum of Module Dead Load and Racking System Dead Load

Calculated Dead Load in the provided boxes.

Step 4: Snow Load (ASCE 7-05, Chapter 7)

Sloped Roof Snow Load Pressure Equation:

<input type="text"/>	$P_s = 0.7 * C_s * C_e * C_t * I * P_g$ (ASCE 7-05, Section 7.3)
<input type="text"/>	P_g Ground Snow Load ⁴ (psf) from User inputs in Step 1.
<input type="text"/>	C_s Slope Factor (ASCE 7-05, Figure 7-2)
<input type="text"/>	C_t Thermal Factor ⁵ (ASCE 7-05, Table 7-3)
<input type="text"/>	I Importance Factor ⁶ (snow) (ASCE 7-05, Table 7-4)
<input type="text"/>	C_e Exposure Factor (ASCE 7-05, Table 7-2)

Calculate P_s (Sloped roof snow load) in the provided boxes.

Commentary:

- 3) To be combined with the module dead load and used in wind load combinations.
- 4) The ground snow load is utilized to calculate the roof snow load, which is the load applied to the structure.
- 5) From Section C7.8 of ASCE 7-05, "the collectors should be designed to sustain a load calculated by using the "unobstructed slippery surfaces" curve in Fig. 7-2a". This graph recommends the use of a C_t value of less than or equal to 1.0.
- 6) The Snow Importance Factor for Occupancy Category I = 0.8 and for Occupancy Category II = 1.0.



Step 5: Seismic Load (ASCE 7-05)

Seismic Load Equation (Horizontal):

	$F_{p(\text{horizontal})} = [(0.4 \cdot a_p \cdot S_{DS} \cdot W_p) / (R_p / I_p)] \cdot (1 + 2 \cdot z / h)$ (ASCE 7-05, 13.3.1)
	F_p need not exceed $1.6 \cdot S_{SD} \cdot I_p \cdot W_p$ and F_p shall not be less than $F_p = 0.3 \cdot S_{DS} \cdot I_p \cdot W_p$
	psf (seismic load (horiz.) on the module, divide F_p by the effected area)
	a_p Component Amplification Factor ⁷ (ASCE 7-05, Table 13.6-1)
	R_p Component Response Modification Factor ⁸ (ASCE 7-05, Table 13.6-1)
	S_{DS} Spectral Acceleration (ASCE 7-05, Section 11.4.4) $S_{DS} = 2/3 \cdot S_{MS}$
	$S_{MS} = F_a \cdot S_s$ (ASCE 7-05, Section 11.4.3)
	F_a Site Coefficient (ASCE 7-05, Table 11.4-1)
	S_s from User Inputs in Step 1
	W_p Component operating weight (lbs) (determine by using total dead load (psf) multiplied by the effected area (SF) of the component or attachment)
	I_p Seismic Importance Factor ⁹ (ASCE 7-05, section 13.1.3)
	z Height in structure of point of attachment of component with respect to the base (ASCE 7-05, Section 13.3.1)
	h average roof height of structure with respect to the base (ASCE 7-05, Section 13.3.1)
	z/h need not exceed 1.0

Seismic Load Equation (Vertical):

	$F_{p(\text{vertical})} = \pm 0.2 \cdot S_{DS} \cdot W_p$ (ASCE 7-05, Section 12.4.2.2)
	psf (seismic load (vert.) on the module, divide F_p by the effected area)

Calculate seismic loads for both horizontal and vertical in the provided boxes.

Commentary:

7) The Component Amplification Factor (a_p) for flush-mount systems should be taken as 1.0 (International Code Council (ICC) Acceptanc Criteria (AC) 428, Section 3.1.3.3).

8) The Component Response Modification Factor (R_p) for flush-mount systems should be taken as 1.5 (International Code Council (ICC) Acceptanc Criteria (AC) 428, Section 3.1.3.3).

9) The Seismic Importance Factor for Occupancy Categories I and II = 1.0.

Step 6: Rewrite Your Loads

*Depending on your coordinate system, certain loads will need to be split into their horizontal and vertical components.

Total Dead Load:		psf
Wind Pressure Up:		psf
Wind Pressure Down:		psf
Snow Load:		psf
Seismic Load Horizontal:		lbs
Seismic Load Vertical:		psf

Step 7: Allowable Stress Design (ASD) Load Combinations (ASCE 7-05, Chapter 2, Section 2.4.1)

*The load combinations below have been identified as the likely controlling cases for the roof structure.

1) D	8) $D + 0.75(0.7E) + 0.75Lr$	D = Dead Load
2) D + Lr	9) $D + 0.75(0.7E) + 0.75S$	Lr = Live Load to Roof
3) D + S	10) D + 0.7E	S = Snow Load
4) D + W _{up}	11) $0.6D + W_{up}$	W _{up} = Wind Load Up
5) D + W _{down}	12) $0.6 D + W_{down}$	W _{down} = Wind Load Down
6) $D + 0.75W_{down} + 0.75S$	13) $0.6 D + 0.7E$	E = Earthquake/Seismic Load
7) $D + 0.75W_{down} + 0.75Lr$		

Step 8: Create Initial Array Layout

- a. Identify the structural supporting members of your building. A sketch/drawing of the roof/building with location of supporting members, vents, skylights, cable/wires, areas to avoid, etc., is highly recommended.
- b. Create a "rough draft" layout of solar modules on the actual project roof. (Refer to the SOLARMOUNT Installation Guide.)

Step 9: Determine a Rail Span

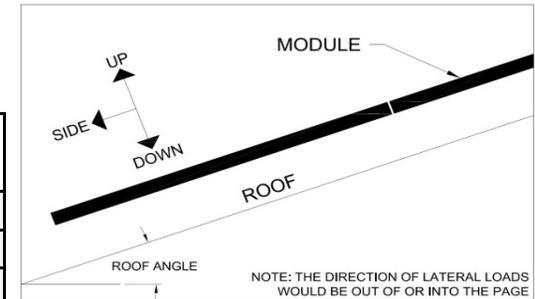
*For structural engineers who would like to determine the rail span without utilizing the Prescriptive Method, section properties can be found in Appendix F - Technical Data Sheets.

- a. Using information in Step 1 & 8, select a Prescriptive Pressure Table contained the Appendix B or
- b. Use fill-in boxes below to document your project specific pressures and tables utilized.

Pressure Table Used:	
Basic Wind Speed	
Building Height	
Exposure Category	
Lateral (Ss)	
Roof Pitch	
Ground Snow Load	

Controlling Pressure:

	Up (psf)	Down (psf)	Side (psf)	Lateral (psf)
Roof zone 1:				
Roof zone 2:				
Roof zone 3:				



Note: For Low Profile Mode, where rails are perpendicular to the roof tilt (E-W Rails), "Side Load" (Down Slope) is load applied in weak axis bending of the SOLARMOUNT rail along the roof tilt and "Lateral" is load applied as an axial load along the SOLARMOUNT rail perpendicular to the roof tilt. For High Profile Mode, where rails are parallel to the roof tilt (N-S Rails), "Side Load" (Downslope) is load applied in as an axial load along the SOLARMOUNT rail perpendicular to the roof tilt and "Lateral Load" is applied in weak axis bending of the SOLARMOUNT rail along the roof tilt.

- c. Convert pressures (lbs/ft² or psf) from the boxes just filled in to pounds per linear foot (lb/ft or plf) using the following steps:
 - i. Pressure (from table above) * Area of Module = Total Pounds per Module
 - ii. Total Pounds Per Module / 2 (Number of rails) = Pounds Per Rail
 - iii. Pounds Per Rail / Width of Module Parallel with the Rail = Pounds per Linear Foot (plf)
- d. Use the *Downward and Upward Span Length Tables* in Appendix C with the plf loads to determine maximum spans.
 - i. Using the plf loads for "Down", look up the table "Downward Span Lengths" in Appendix B and using the "Down" plf load and the "Side" plf load combinations to choose the maximum span length.
 - ii. Using the plf loads for "Up", look up the table "Uplift Span Lengths" in Appendix and using the "Up" plf and "Side" plf load combinations to choose the maximum span length.
 - iii. Use the smaller length of the "Down" and "Up" maximum span length.
 - iv. Cantilever (overhang) lengths can be up to 33% of the span length. For example, a 9 foot span length can have a 3 foot cantilever. The cantilever is defined as the distance from the center of a L-Foot to the edge of a rail.

Step 10: Look-up Layout and Attachment Guidelines for Array

- a. Review your layout in Step 8 above and the Layout and Attachment Guidelines to determine potential attachment points to your structure.

Step 11: Determine Load to the Roof

- a. To determine the load on the roof through the attachment:
 - i. Determine the tributary area to each attachment.
 - ii. Review the controlling pressure in Step 9.
 - iii. Determine pressure zones on the roof per ASCE 7-05, Figure 6-3.
 - iv. Multiply the tributary area by the roof pressure to obtain loads to the roof attachment.
 - v. Determine the point load to the roof at each attachment.

Step 12: Check Roof Load

- a. Ensure that the supporting structure is capable of withstanding the additional loads imposed by the proposed solar system.

Step 13: Check the Connections

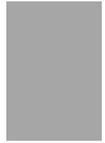
- a. Similar to Step 9c, determine the tributary area to each connection and the applied load from the Controlling Pressures table in Step 9.
- b. Convert the applied psf loads into pounds through tributary area.
- c. Look up the Technical Data Sheets in Appendix H for maximum permissible load to each connection.
- d. From Step 11, determine if the attachment (lag bolt or other appropriate attachment) is capable of withstanding the point loads applied.
- e. If the maximum permissible load is greater than the applied load, then the connections are adequate.

Step 14: Define Grounding and Bonding Path

- a. Refer to the SOLARMOUNT Installation Guide for how to determine the Grounding and Bonding Path.

Step 15: SOLARMOUNT Front Trim Check

- a. SOLARMOUNT Front Trim should not be installed in areas where the wind load exceeds 100 psf, where the distance from clamp to clamp (span) exceeds 52 inches, or where the cantilever (overhang) is greater than 66% of the span length. Please review the Step 6 Up and Down Wind Loads (psf) to determine if Front Trim is appropriate for your project.



ASCE 7-10 Analytical Method

Step 1: User Inputs (ASCE 7-10)

	Notes / Clarifications:
Roof Height (ft):	Mean roof height (15 ft, 30 ft, or 60 ft)
Roof Angle (degrees):	Convert roof pitch to angle in degrees [See Appendix D]
Risk Category:	Table 1.5-1
Basic Wind Speed (mph):	Per Basic Wind Speeds for Risk Category II (ASCE 7-10, Figure 26.5-1A)
Wind Exposure Category:	Determine the Exposure Category (B, C or D) by using the definitions for Surface Roughness Categories (ASCE 7-10, Sections 26.7.2 and 26.7.3)
Roof Zone:	Determine the Roof Zone (1, 2 or 3) (ASCE 7-10, Figure 30.5-1)
Ground Snow Load (psf):	P _g = Ground Snow Load in psf. Ground Snow Loads (ASCE 7-10, Figure 7-1)
Seismic Coefficient S _s (g):	ASCE 7-10 (Figures 22-1, 22-3, 22-5, 22-6 and 22-17)
Roof Live Load ¹ (psf):	0 psf, 20 psf, etc.
Module Manufacturer/Type:	
Solar Module Length (in):	
Solar Module Width (in):	
Solar Module Weight (lb):	
Module Dead Load (psf)	

Commentary:

1) Most Building Officials allow for all or a portion of the roofs original live load design load to be removed/reduced at the time that solar panels are being added to the roof. The rationale behind this is that live load or roof foot traffic is eliminated or reduced to designated paths. In other words, the roof top solar array and live load foot traffic cannot occupy the same space. If all of the roof live load can be utilized by the proposed solar array, 0 psf should be entered.



Step 2: Wind Pressure (ASCE 7-10, Chapter 30)

Wind Pressure Equation - Components & Cladding (ASCE 7-10, Section 30.4.2):

	$P_p = q_h (GC_{pp} - GC_{pi})$ (ASCE 7-10, Section 30.4.2) (GC_{pp} - Positive Downforce Factor)	
	$P_n = q_h (GC_{pn} - GC_{pi})$ (ASCE 7-10, Section 30.4.2) (GC_{pn} - Negative Uplift Factor)	
	GC_{pi} equals zero (per AC428 - Nov, 2012) (internal pressure coefficient)	
	GC_p is defined below (ASCE 7-10 Figure 30.4-2) and is a function of the roof zone, effective wind area (feet squared), and roof angle (degrees) (external pressure coefficient)	
	GC_{pp} (Positive downforce factor)	
	GC_{pn} (Negative uplift factor)	
	(ASCE 7-10, Figure 30.4-2A) for roof angles $\leq 7^\circ$	
	(ASCE 7-10, Figure 30.4-2B) for roof angles $> 7^\circ$ and $\leq 27^\circ$	
	(ASCE 7-10, Figure 30.4-2C) for roof angles $> 27^\circ$ and $\leq 45^\circ$	
	$q_h = q_z$	
	$q_z = 0.00256 * K_z * K_{zt} * K_d * V^2$ (ASCE 7-10, Section 30.3.2)	
	K_z	Velocity Pressure Coefficient (ASCE 7-10, Table 30.3-1)
	K_{zt}	Topographic Factor (ASCE 7-10, Section 26.8 & Figure 268-1)
	K_d	Directionality Factor (ASCE 7-10, Table 26.6-1)
	V	Basic Wind Speed in MPH from User Inputs in Step 1

Calculate the wind pressure for uplift and downforce, using GC_{pn} & GC_{pp} respectively, in the provided boxes.



Step 3: Dead Load

Module Dead Load (psf):	<input type="text"/>	Module Dead Load (psf) should be determined from User Inputs in Step 1
Racking System Dead Load ² (psf):	<input type="text"/>	[See Appendix E] (The racking system dead load should be taken as the total weight of the racking system (hardware, rails, nuts, bolts, attachments, etc.) divided by the total module area of the system.) Component weights can be found in the technical datasheets.
Total Dead Load (psf):	<input type="text"/>	Sum of Module Dead Load and Racking System Dead Load

Calculated Dead Load in the provided boxes.

Commentary:

2) To be combined with the module dead load and used in wind load combinations.

3) The ground snow load is utilized to calculate the roof snow load, which is the load applied to the structure.

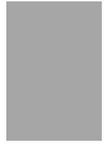
4) The Snow Importance Factor for Occupancy Category I = 0.8 and for Occupancy Category II = 1.0.

Step 4: Snow Load (ASCE 7-10, Chapter 7)

Sloped Roof Snow Load Pressure Equation:

<input type="text"/>	$P_s = 0.7 * C_s * C_e * C_t * I * P_g$ (ASCE 7-10, Sections 7.3 & 7.4 Flat and Sloped Roof Snow Load)
<input type="text"/>	P_g Ground Snow Load ³ (psf) from User inputs in Step 1.
<input type="text"/>	C_s Slope Factor (ASCE 7-10, Figure 7-2)
<input type="text"/>	C_t Thermal Factor (ASCE 7-10, Table 7-3)
<input type="text"/>	I Importance Factor ⁴ (snow) (ASCE 7-10, Table 1.5-2)
<input type="text"/>	C_e Exposure Factor (ASCE 7-10, Table 7-2)

Calculate P_s (Sloped roof snow load) in the provided boxes.



Step 5: Seismic Load (ASCE 7-10)

Seismic Load Equation (Horizontal):

	$F_{p(\text{horizontal})} = [(0.4 \cdot a_p \cdot S_{DS} \cdot W_p) / (R_p / I_p)] \cdot (1 + 2 \cdot z/h)$ (ASCE 7-10, 13.3.1)
	F_p need not exceed $1.6 \cdot S_{SD} \cdot I_p \cdot W_p$ and F_p shall not be less than $F_p = 0.3 \cdot S_{DS} \cdot I_p \cdot W_p$
	psf (seismic load (horiz.) on the module, divide F_p by the effected area)
	a_p Component Amplification Factor ⁵ (ASCE 7-10, Table 13.5-1)
	R_p Component Response Modification Factor ⁶ (ASCE 7-10, Table 13.5-1)
	S_{DS} Spectral Acceleration (ASCE 7-10, Section 11.4.4) $S_{DS} = 2/3 \cdot S_{MS}$
	$S_{MS} = F_a \cdot S_s$ (ASCE 7-10, Section 11.4.3)
	F_a Site Coefficient (ASCE 7-10, Table 11.4-1)
	S_s from User Inputs in Step 1
	W_p Component operating weight (lbs) (determine by using total dead load (psf) multiplied by the effected area (SF) of the component or attachment)
	I_p Seismic Importance Factor ⁷ (ASCE 7-10, section 1.5-2)
	z Height in structure of point of attachment of component with respect to the base (ASCE 7-10, Section 13.3.1)
	h Average roof height of structure with respect to the base (ASCE 7-10, Section 13.3.1)
	z/h need not exceed 1.0

Seismic Load Equation (Vertical):

	$F_{p(\text{vertical})} = \pm 0.2 \cdot S_{DS} \cdot W_p$ (ASCE 7-10, Section 12.4.2.2)
	psf (seismic load (vert.) on the module, divide F_p by the effected area)

Calculate seismic loads for both horizontal and vertical in the provided boxes.

Commentary:

5) The Component Amplification Factor (a_p) for flush-mount systems should be taken as 1.0 (International Code Council (ICC) Acceptanc Criteria (AC) 428, Section 3.1.3.3).

6) The Component Response Modification Factor (R_p) for flush-mount systems should be taken as 1.5 (International Code Council (ICC) Acceptanc Criteria (AC) 428, Section 3.1.3.3).

7) The Seismic Importance Factor for Occupancy Categories I and II = 1.0.

Step 6: Rewrite Your Loads

*Depending on your coordinate system, certain loads will need to be split into their horizontal and vertical components.

Total Dead Load:	<input type="text"/>	psf
Wind Pressure Up:	<input type="text"/>	psf
Wind Pressure Down:	<input type="text"/>	psf
Snow Load:	<input type="text"/>	psf
Seismic Load Horizontal:	<input type="text"/>	lbs
Seismic Load Vertical:	<input type="text"/>	psf

Step 7: Allowable Stress Design (ASD) Load Combinations (ASCE 7-10, Chapter 2, Section 2.4.1)

*The load combinations below have been identified as the likely controlling cases for the roof structure.

1) D	8) $D + 0.75(0.7E) + 0.75Lr$	D = Dead Load
2) D + Lr	9) $D + 0.75(0.7E) + 0.75S$	Lr = Live Load to Roof
3) D + S	10) $D + 0.7E$	S = Snow Load
4) $D + 0.6W_{up}$	11) $0.6D + 0.6W_{up}$	W_{up} = Wind Load Up
5) $D + 0.6W_{down}$	12) $0.6D + 0.6W_{down}$	W_{down} = Wind Load Down
6) $D + 0.75(0.6)W_{down} + 0.75S$	13) $0.6D + 0.7E$	E = Earthquake/Seismic Load
7) $D + 0.75(0.6)W_{down} + 0.75Lr$		

Step 8: Create Initial Array Layout

- a. Identify the structural supporting members of your building. A sketch/drawing of the roof/building with location of supporting members, vents, skylights, cable/wires, areas to avoid, etc., is highly recommended.
- b. Create a "rough draft" layout of solar modules on the actual project roof. (Refer to the SOLARMOUNT Installation Guide.)



Step 9: Determine a Rail Span

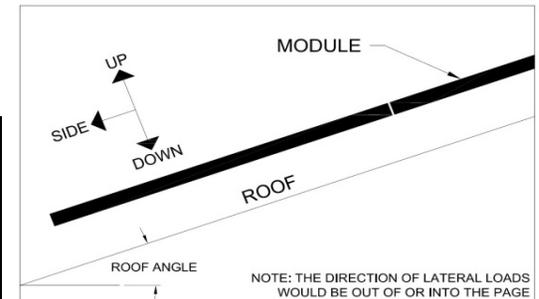
*For structural engineers who would like to determine the rail span without utilizing the Prescriptive Method, section properties can be found in Appendix F - Technical Data Sheets.

- a. Using information in Step 1 & 8, select a Prescriptive Pressure Table contained Appendix B or
- b. Use fill-in boxes below to document your project specific pressures and tables utilized.

Pressure Table Used:	
Basic Wind Speed	
Building Height	
Exposure Category	
Lateral (Ss)	
Roof Pitch	
Ground Snow Load	

Controlling Pressure:

	Up (psf)	Down (psf)	Side (psf)	Lateral (psf)
Roof zone 1:				
Roof zone 2:				
Roof zone 3:				



Note: For Low Profile Mode, where rails are perpendicular to the roof tilt (E-W Rails), "Side Load" (Down Slope) is load applied in weak axis bending of the SOLARMOUNT rail along the roof tilt and "Lateral" is load applied as an axial load along the SOLARMOUNT rail perpendicular to the roof tilt. For High Profile Mode, where rails are parallel to the roof tilt (N-S Rails), "Side Load" (Downslope) is load applied in as an axial load along the SOLARMOUNT rail perpendicular to the roof tilt and "Lateral Load" is applied in weak axis bending of the SOLARMOUNT rail along the roof tilt.

- c. Convert pressures (lbs/ft² or psf) from the boxes just filled in to pounds per linear foot (lb/ft or plf) using the following steps:
 - i. Pressure (from table above) * Area of Module = Total Pounds per Module
 - ii. Total Pounds Per Module / 2 (Number of rails) = Pounds Per Rail
 - iii. Pounds Per Rail / Width of Module Parallel with the Rail = Pounds per Linear Foot (plf)
- d. Use the *Downward and Upward Span Length Tables* in Appendix C with the plf loads to determine maximum spans.
 - i. Using the plf loads for "Down", look up the table "Downward Span Lengths" in the Appendix and using the "Down" plf load and the "Side" plf load combinations to choose the maximum span
 - ii. Using the plf loads for "Up", look up the table "Uplift Span Lengths" in the Appendix and using the "Up" plf and "Side" plf load combinations to choose the maximum span length.
 - iii. Use the smaller length of the "Down" and "Up" maximum span length.
 - iv. Cantilever (overhang) lengths can be up to 33% of the span length. For example, a 9 foot span length can have a 3 foot cantilever. The cantilever is defined as the distance from the center of a L-Foot to the edge of a rail.

Step 10: Look-up Layout and Attachment Guidelines for Array

- a. Review your layout in Step 8 above and the Layout and Attachment Guidelines to determine potential attachment points to your structure.

Step 11: Determine Load to the Roof

- a. To determine the load on the roof through the attachment:
 - i. Determine the tributary area to each attachment.
 - ii. Review the controlling pressure in Step 9.
 - iii. Determine pressure zones on the roof per ASCE 7-10, Figure 30.5-1.
 - iv. Multiply the tributary area by the roof pressure to obtain loads to the roof attachment.
 - v. Determine the point load to the roof at each attachment.

Step 12: Check Roof Load

- a. Ensure that the supporting structure is capable of withstanding the additional loads imposed by the proposed solar system.

Step 13: Check the Connections

- a. Similar to Step 9c, determine the tributary area to each connection and the applied load from the Controlling Pressures table in Step 9.
- b. Convert the applied psf loads into pounds through tributary area.
- c. Look up the Technical Data Sheets in Appendix H for maximum permissible load to each connection.
- d. From Step 11, determine if the attachment (lag bolt or other appropriate attachment) is capable of withstanding the point loads applied.
- e. If the maximum permissible load is greater than the applied load, then the connections are adequate.

Step 14: Define Grounding and Bonding Path

- a. Refer to the SOLARMOUNT Installation Guide for how to determine the Grounding and Bonding Path.

Step 15: SOLARMOUNT Front Trim Check

- a. SOLARMOUNT Front Trim should not be installed in areas where the wind load exceeds 100 psf, where the distance from clamp to clamp (span) exceeds 52 inches, or where the cantilever (overhang) is greater than 66% of the span length. Please review the Step 6 Up and Down Wind Loads (psf) to determine if Front Trim is appropriate for your project.

Technical Support

If you have further questions regarding the SOLARMOUNT product, please contact your distributor. If further clarification is needed, please review the Unirac website online resources at:

<http://unirac.com/solarmount>

The Unirac website contains up-to-date manuals, design guides, webinars, online calculations, information, certification letters, technical data sheets, additional products that Unirac provides, and anything else you might need for your project.

Appendix – Table of Contents

Appendix A – Product Catalog of Parts List
Appendix B – Pressure Lookup Tables
Appendix C – Downward & Upward Span Length Tables
Appendix D – Roof Pitch to Angle
Appendix E – Dead Load Analysis
Appendix F – Enphase Energy Microinverter Testing
Appendix G – System Certification
Appendix H – Technical Data Sheets
Appendix I – SOLARMOUNT HD Rail

Please refer to the **Master Price List** at www.unirac.com for a list of part numbers, part descriptions, and prices.



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-05

ASCE

California (Typical)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

Roof Pitch	85 mph Basic Wind Speed						5 psf Ground Snow Load																		
	Bldg. Height = 15 ft.			Bldg. Height = 30 ft.			Bldg. Height = 60 ft.			Bldg. Height = 60 ft.															
	Up Pressures (psf)	Down (psf)	Zone 3	Up Pressures (psf)	Down (psf)	Zone 3	Up Pressures (psf)	Down (psf)	Zone 3	Up Pressures (psf)	Down (psf)	Zone 3													
1:12	-9.6	-18.4	-29.4	14.7	14.7	14.7	-9.6	-18.4	-29.4	14.7	14.7	14.7	-12.0	-22.7	-36.0	14.7	-12.0	-22.7	-36.0	14.7	-12.0	-22.7	-36.0	14.7	
2:12	-8.6	-17.4	-27.3	14.3	14.3	14.3	-8.6	-17.4	-27.3	14.3	14.3	14.3	-10.7	-21.4	-33.4	14.3	-10.7	-21.4	-33.4	14.3	-10.7	-21.4	-33.4	14.3	
3:12	-8.7	-17.4	-27.3	13.9	13.9	13.9	-8.7	-17.4	-27.3	13.9	13.9	13.9	-10.7	-21.4	-33.4	13.9	-10.7	-21.4	-33.4	13.9	-10.7	-21.4	-33.4	13.9	
4:12	-8.7	-17.4	-27.3	13.5	13.5	13.5	-8.7	-17.4	-27.3	13.5	13.5	13.5	-10.7	-21.4	-33.4	13.5	-10.7	-21.4	-33.4	13.5	-10.7	-21.4	-33.4	13.5	
5:12	-8.7	-17.4	-27.3	13.2	13.2	13.2	-8.7	-17.4	-27.3	13.2	13.2	13.2	-10.8	-21.4	-33.5	13.2	-10.8	-21.4	-33.5	13.2	-10.8	-21.4	-33.5	13.2	
6:12	-8.8	-17.5	-27.4	13.1	13.1	13.1	-8.8	-17.5	-27.4	13.1	13.1	13.1	-10.8	-21.5	-33.5	13.1	-10.8	-21.5	-33.5	13.1	-10.8	-21.5	-33.5	13.1	
7:12	-9.8	-12.0	-12.0	13.0	13.0	13.0	-9.8	-12.0	-12.0	13.0	13.0	13.0	-12.2	-14.8	-14.8	13.0	-12.2	-14.8	-14.8	13.0	-12.2	-14.8	-14.8	13.0	
8:12	-9.9	-12.1	-12.1	12.9	12.9	12.9	-9.9	-12.1	-12.1	12.9	12.9	12.9	-12.2	-14.9	-14.9	12.9	-12.2	-14.9	-14.9	12.9	-12.2	-14.9	-14.9	12.9	
9:12	-9.9	-12.1	-12.1	12.8	12.8	12.8	-9.9	-12.1	-12.1	12.8	12.8	12.8	-12.3	-14.9	-14.9	12.8	-12.3	-14.9	-14.9	12.8	-12.3	-14.9	-14.9	12.8	
10:12	-9.9	-12.1	-12.1	12.7	12.7	12.7	-9.9	-12.1	-12.1	12.7	12.7	12.7	-12.3	-15.0	-15.0	12.7	-12.3	-15.0	-15.0	12.7	-12.3	-15.0	-15.0	12.7	
11:12	-10.0	-12.2	-12.2	12.6	12.6	12.6	-10.0	-12.2	-12.2	12.6	12.6	12.6	-12.3	-15.0	-15.0	12.6	-12.3	-15.0	-15.0	12.6	-12.3	-15.0	-15.0	12.6	
12:12	-10.0	-12.2	-12.2	12.5	12.5	12.5	-10.0	-12.2	-12.2	12.5	12.5	12.5	-12.4	-15.1	-15.1	12.5	-12.4	-15.1	-15.1	12.5	-12.4	-15.1	-15.1	12.5	
1:12	-12.0	-22.7	-36.0	14.7	14.7	14.7	-14.0	-26.4	-41.8	14.7	14.7	14.7	-16.4	-30.6	-48.4	14.7	-16.4	-30.6	-48.4	14.7	-16.4	-30.6	-48.4	14.7	
2:12	-10.7	-21.4	-33.4	14.3	14.3	14.3	-12.5	-24.8	-38.7	14.3	14.3	14.3	-14.6	-28.8	-44.8	14.3	-14.6	-28.8	-44.8	14.3	-14.6	-28.8	-44.8	14.3	
3:12	-10.7	-21.4	-33.4	13.9	13.9	13.9	-12.5	-24.9	-38.7	13.9	13.9	13.9	-14.7	-28.9	-44.9	13.9	-14.7	-28.9	-44.9	13.9	-14.7	-28.9	-44.9	13.9	
4:12	-10.7	-21.4	-33.4	13.5	13.5	13.5	-12.6	-24.9	-38.8	13.5	13.5	13.5	-14.7	-28.9	-44.9	13.5	-14.7	-28.9	-44.9	13.5	-14.7	-28.9	-44.9	13.5	
5:12	-10.8	-21.4	-33.5	13.2	13.2	13.2	-12.6	-24.9	-38.8	13.2	13.2	13.2	-14.7	-28.9	-44.9	13.2	-14.7	-28.9	-44.9	13.2	-14.7	-28.9	-44.9	13.2	
6:12	-10.8	-21.5	-33.5	13.1	13.1	13.1	-12.6	-25.0	-38.8	13.1	13.1	13.1	-14.8	-29.0	-45.0	13.1	-14.8	-29.0	-45.0	13.1	-14.8	-29.0	-45.0	13.1	
7:12	-12.2	-14.8	-14.8	15.0	14.2	17.3	-17.3	-17.3	16.9	16.9	16.6	-20.1	19.0	-16.6	-20.1	19.0	-16.6	-20.1	19.0	-16.6	-20.1	19.0	-16.6	-20.1	19.0
8:12	-12.2	-14.9	-14.9	14.9	14.3	17.3	-17.3	-17.3	16.8	16.8	-16.6	-20.2	18.9	-16.6	-20.2	18.9	-16.6	-20.2	18.9	-16.6	-20.2	18.9	-16.6	-20.2	18.9
9:12	-12.3	-14.9	-14.9	14.8	14.3	17.4	-17.4	-17.4	16.7	16.7	-16.7	-20.2	18.8	-16.7	-20.2	18.8	-16.7	-20.2	18.8	-16.7	-20.2	18.8	-16.7	-20.2	18.8
10:12	-12.3	-15.0	-15.0	14.7	14.4	17.4	-17.4	-17.4	16.6	16.6	-16.7	-20.3	18.7	-16.7	-20.3	18.7	-16.7	-20.3	18.7	-16.7	-20.3	18.7	-16.7	-20.3	18.7
11:12	-12.3	-15.0	-15.0	14.6	14.4	17.5	-17.5	-17.5	16.4	16.4	-16.8	-20.3	18.6	-16.8	-20.3	18.6	-16.8	-20.3	18.6	-16.8	-20.3	18.6	-16.8	-20.3	18.6
12:12	-12.4	-15.1	-15.1	14.5	14.4	17.5	-17.5	-17.5	16.3	16.3	-16.8	-20.3	18.5	-16.8	-20.3	18.5	-16.8	-20.3	18.5	-16.8	-20.3	18.5	-16.8	-20.3	18.5
1:12	-14.8	-27.8	-44.0	14.7	16.9	31.5	-49.7	14.7	14.7	14.7	-19.2	-35.7	56.3	14.7	-19.2	-35.7	56.3	14.7	-19.2	-35.7	56.3	14.7	-19.2	-35.7	
2:12	-13.2	-26.2	-40.7	14.3	15.1	29.6	-46.1	14.3	14.3	14.3	-17.2	-33.7	52.2	14.6	-17.2	-33.7	52.2	14.6	-17.2	-33.7	52.2	14.6	-17.2	-33.7	
3:12	-13.2	-26.2	-40.8	13.9	15.1	29.7	-46.1	13.9	13.9	13.9	-17.2	-33.7	52.2	14.2	-17.2	-33.7	52.2	14.2	-17.2	-33.7	52.2	14.2	-17.2	-33.7	
4:12	-13.3	-26.2	-40.8	13.5	15.1	29.7	-46.1	13.5	13.5	13.5	-17.2	-33.7	52.2	13.7	-17.2	-33.7	52.2	13.7	-17.2	-33.7	52.2	13.7	-17.2	-33.7	
5:12	-13.3	-26.3	-40.8	13.2	15.1	29.7	-46.1	13.2	13.2	13.2	-17.3	-33.7	52.3	13.5	-17.3	-33.7	52.3	13.5	-17.3	-33.7	52.3	13.5	-17.3	-33.7	
6:12	-13.3	-26.3	-40.9	13.1	15.2	29.8	-46.2	13.1	13.1	13.1	-17.3	-33.8	52.3	13.4	-17.3	-33.8	52.3	13.4	-17.3	-33.8	52.3	13.4	-17.3	-33.8	
7:12	-15.0	-18.2	-18.2	17.6	17.0	20.7	-20.7	19.4	19.4	19.4	-23.5	-23.5	21.6	21.6	-23.5	-23.5	21.6	21.6	-23.5	-23.5	21.6	21.6	-23.5	-23.5	
8:12	-15.0	-18.3	-18.3	17.5	17.1	20.7	-20.7	19.3	19.3	19.3	-23.6	-23.6	21.4	21.4	-23.6	-23.6	21.4	21.4	-23.6	-23.6	21.4	21.4	-23.6	-23.6	
9:12	-15.1	-18.3	-18.3	17.4	17.1	20.8	-20.8	19.2	19.2	19.2	-23.6	-23.6	21.3	21.3	-23.6	-23.6	21.3	21.3	-23.6	-23.6	21.3	21.3	-23.6	-23.6	
10:12	-15.1	-18.4	-18.4	17.3	17.2	20.8	-20.8	19.1	19.1	19.1	-23.7	-23.7	21.2	21.2	-23.7	-23.7	21.2	21.2	-23.7	-23.7	21.2	21.2	-23.7	-23.7	
11:12	-15.2	-18.4	-18.4	17.2	17.2	20.9	-20.9	19.0	19.0	19.0	-23.7	-23.7	21.1	21.1	-23.7	-23.7	21.1	21.1	-23.7	-23.7	21.1	21.1	-23.7	-23.7	
12:12	-15.2	-18.5	-18.5	17.0	17.3	20.9	-20.9	18.9	18.9	18.9	-23.7	-23.7	21.0	21.0	-23.7	-23.7	21.0	21.0	-23.7	-23.7	21.0	21.0	-23.7	-23.7	
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1	
1:12	0.7	0.8	0.9	1.1	1.2	1.3	1.8	2.0	2.3	2.9	3.6	4.4	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0	
2:12	1.3	1.3	1.5	1.6	1.7	1.9	2.3	2.4	2.7	3.3	3.9	4.7	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0	
3:12	1.9	1.9	2.0	2.1	2.2	2.3	2.7	2.9	3.1	3.7	4.2	5.0	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0	
4:12	2.4	2.4	2.4	2.5	2.6	2.8	3.2	3.3	3.6	4.1	4.6	5.3	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0	
5:12	2.7	2.7	2.7	2.9	3.0	3.1	3.5	3.6	3.9	4.4	4.9	5.5	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0	
6:12	3.1	3.1	3.1	3.1	3.3	3.4	3.8	3.9	4.2	4.7	5.1	5.7	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0	
7:12	3.3	3.3	3.3	3.4	3.5	3.6	4.0	4.1	4.4	4.9	5.3	5.9	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0	
8:12	3.5	3.5	3.5	3.5	3.7	3.8	4.1	4.3	4.5	5.0	5.5	6.0	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0	
9:12	3.6	3.6	3.6	3.7	3.8	3.9	4.3	4.4	4.6	5.1	5.6	6.1	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0	
10:12	3.7	3.7	3.7	3.8	3.9	4.0	4.4	4.5	4.7	5.2	5.6	6.2	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0	
11:12	3.8	3.8	3.8	3.9	4.0	4.1	4.4	4.5	4.8	5.2	5.7	6.2	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0	
12:12	3.8	3.8	3.8	3.9	4.0	4.1	4.4	4.6	4.8	5.2	5.7	6.2	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0	

* These tables are meant as representative of the areas listed in the title. The local wind speeds and snow loads should be independently verified for the specific install location.

Up and Down (psf)

Side Load (psf)

Lateral



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-05
ASCE

Southwest (Typical)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

Roof Pitch	90 mph Basic Wind Speed						5 psf Ground Snow Load						Bldg. Height = 60 ft. Up Pressures (psf)	Down (psf)		
	Bldg. Height = 15 ft.			Bldg. Height = 30 ft.			Bldg. Height = 15 ft.			Bldg. Height = 30 ft.						
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3				
Exposure Category B																
1:12	-11.0	-20.8	-33.2	14.7	-11.0	-20.8	-33.2	14.7	-13.6	-25.6	-40.6	14.7	-13.6	-25.6	-40.6	14.7
2:12	-9.7	-19.6	-30.7	14.3	-9.7	-19.6	-30.7	14.3	-12.1	-24.1	-37.6	14.3	-12.1	-24.1	-37.6	14.3
3:12	-9.8	-19.6	-30.7	13.9	-9.8	-19.6	-30.7	13.9	-12.1	-24.1	-37.6	13.9	-12.1	-24.1	-37.6	13.9
4:12	-9.8	-19.7	-30.8	13.5	-9.8	-19.7	-30.8	13.5	-12.2	-24.2	-37.6	13.5	-12.2	-24.2	-37.6	13.5
5:12	-9.8	-19.7	-30.8	13.2	-9.8	-19.7	-30.8	13.2	-12.2	-24.2	-37.7	13.2	-12.2	-24.2	-37.7	13.2
6:12	-9.9	-19.7	-30.8	13.1	-9.9	-19.7	-30.8	13.1	-12.3	-24.2	-37.7	13.1	-12.3	-24.2	-37.7	13.1
7:12	-11.1	-13.6	-13.6	14.1	-11.1	-13.6	-13.6	14.1	-13.8	-16.8	-16.8	16.5	-13.8	-16.8	-16.8	16.5
8:12	-11.2	-13.7	-13.7	14.0	-11.2	-13.7	-13.7	14.0	-13.8	-16.8	-16.8	16.4	-13.8	-16.8	-16.8	16.4
9:12	-11.2	-13.7	-13.7	13.9	-11.2	-13.7	-13.7	13.9	-13.9	-16.9	-16.9	16.3	-13.9	-16.9	-16.9	16.3
10:12	-11.3	-13.7	-13.7	13.8	-11.3	-13.7	-13.7	13.8	-13.9	-16.9	-16.9	16.2	-13.9	-16.9	-16.9	16.2
11:12	-11.3	-13.8	-13.8	13.7	-11.3	-13.8	-13.8	13.7	-14.0	-17.0	-17.0	16.1	-14.0	-17.0	-17.0	16.1
12:12	-11.4	-13.8	-13.8	13.6	-11.4	-13.8	-13.8	13.6	-14.0	-17.0	-17.0	16.0	-14.0	-17.0	-17.0	16.0
Exposure Category C																
1:12	-13.6	-25.6	-40.6	14.7	-15.9	-29.7	-47.0	14.7	-18.5	-34.5	-54.4	14.7	-18.5	-34.5	-54.4	14.7
2:12	-12.1	-24.1	-37.6	14.3	-14.2	-28.0	-43.6	14.3	-16.6	-32.5	-50.4	14.3	-16.6	-32.5	-50.4	14.3
3:12	-12.1	-24.1	-37.6	13.9	-14.2	-28.0	-43.6	13.9	-16.6	-32.5	-50.4	13.9	-16.6	-32.5	-50.4	13.9
4:12	-12.2	-24.2	-37.6	13.5	-14.2	-28.1	-43.6	13.5	-16.6	-32.6	-50.5	13.5	-16.6	-32.6	-50.5	13.5
5:12	-12.2	-24.2	-37.7	13.2	-14.3	-28.1	-43.6	13.2	-16.7	-32.6	-50.5	13.2	-16.7	-32.6	-50.5	13.2
6:12	-12.3	-24.2	-37.7	13.1	-14.3	-28.1	-43.7	13.1	-16.7	-32.6	-50.6	13.1	-16.7	-32.6	-50.6	13.1
7:12	-13.8	-16.8	-16.8	16.5	-16.1	-19.5	-19.5	18.6	-18.7	-22.7	-22.7	20.9	-18.7	-22.7	-22.7	20.9
8:12	-13.8	-16.8	-16.8	16.4	-16.1	-19.6	-19.6	18.5	-18.8	-22.8	-22.8	20.8	-18.8	-22.8	-22.8	20.8
9:12	-13.9	-16.9	-16.9	16.3	-16.2	-19.6	-19.6	18.3	-18.8	-22.8	-22.8	20.7	-18.8	-22.8	-22.8	20.7
10:12	-13.9	-16.9	-16.9	16.2	-16.2	-19.7	-19.7	18.2	-18.9	-22.8	-22.8	20.6	-18.9	-22.8	-22.8	20.6
11:12	-14.0	-17.0	-17.0	16.1	-16.3	-19.7	-19.7	18.1	-18.9	-22.9	-22.9	20.5	-18.9	-22.9	-22.9	20.5
12:12	-14.0	-17.0	-17.0	16.0	-16.3	-19.8	-19.8	18.0	-18.9	-22.9	-22.9	20.4	-18.9	-22.9	-22.9	20.4
Exposure Category D																
1:12	-16.8	-31.3	-49.5	14.7	-19.1	-35.4	-55.9	14.7	-21.7	-40.2	-63.3	14.7	-21.7	-40.2	-63.3	14.7
2:12	-15.0	-29.5	-45.8	14.3	-17.0	-33.4	-51.8	14.5	-19.4	-37.9	-58.7	15.5	-19.4	-37.9	-58.7	15.5
3:12	-15.0	-29.5	-45.9	13.9	-17.1	-33.4	-51.8	14.1	-19.4	-37.9	-58.7	15.1	-19.4	-37.9	-58.7	15.1
4:12	-15.0	-29.6	-45.9	13.5	-17.1	-33.5	-51.9	13.7	-19.5	-37.9	-58.7	14.9	-19.5	-37.9	-58.7	14.9
5:12	-15.1	-29.6	-45.9	13.2	-17.1	-33.5	-51.9	13.5	-19.5	-38.0	-58.8	14.8	-19.5	-38.0	-58.8	14.8
6:12	-15.1	-29.6	-46.0	13.1	-17.2	-33.5	-51.9	13.4	-19.6	-38.0	-58.8	14.7	-19.6	-38.0	-58.8	14.7
7:12	-17.0	-20.6	-20.6	19.4	-19.3	-23.3	-23.3	21.4	-21.9	-26.5	-26.5	23.8	-21.9	-26.5	-26.5	23.8
8:12	-17.0	-20.6	-20.6	19.2	-19.3	-23.4	-23.4	21.3	-21.9	-26.6	-26.6	23.7	-21.9	-26.6	-26.6	23.7
9:12	-17.1	-20.7	-20.7	19.1	-19.3	-23.4	-23.4	21.2	-22.0	-26.6	-26.6	23.6	-22.0	-26.6	-26.6	23.6
10:12	-17.1	-20.7	-20.7	19.0	-19.4	-23.5	-23.5	21.1	-22.0	-26.7	-26.7	23.5	-22.0	-26.7	-26.7	23.5
11:12	-17.1	-20.8	-20.8	18.9	-19.4	-23.5	-23.5	21.0	-22.1	-26.7	-26.7	23.4	-22.1	-26.7	-26.7	23.4
12:12	-17.2	-20.8	-20.8	18.8	-19.5	-23.6	-23.6	20.9	-22.1	-26.7	-26.7	23.3	-22.1	-26.7	-26.7	23.3
Down Slope																
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1				
1:12	0.7	0.8	0.9	1.1	1.2	1.3	1.8	2.0	2.3	2.9	3.6	4.4				
2:12	1.3	1.3	1.5	1.6	1.7	1.9	2.3	2.4	2.7	3.3	3.9	4.7				
3:12	1.9	1.9	2.0	2.1	2.2	2.3	2.7	2.9	3.1	3.7	4.2	5.0				
4:12	2.4	2.4	2.4	2.5	2.6	2.8	3.2	3.3	3.6	4.1	4.6	5.3				
5:12	2.7	2.7	2.7	2.9	3.0	3.1	3.5	3.6	3.9	4.4	4.9	5.5				
6:12	3.1	3.1	3.1	3.1	3.3	3.4	3.8	3.9	4.2	4.7	5.1	5.7				
7:12	3.3	3.3	3.3	3.4	3.5	3.6	4.0	4.1	4.4	4.9	5.3	5.9				
8:12	3.5	3.5	3.5	3.5	3.7	3.8	4.1	4.3	4.5	5.0	5.5	6.0				
9:12	3.6	3.6	3.6	3.7	3.8	3.9	4.3	4.4	4.6	5.1	5.6	6.1				
10:12	3.7	3.7	3.7	3.8	3.9	4.0	4.4	4.5	4.7	5.2	5.6	6.2				
11:12	3.8	3.8	3.8	3.9	4.0	4.1	4.4	4.5	4.8	5.2	5.7	6.2				
12:12	3.8	3.8	3.8	3.9	4.0	4.1	4.4	4.6	4.8	5.2	5.7	6.2				
Lateral																
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1				
0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0					

* These tables are meant as representative of the areas listed in the title. The local wind speeds and snow loads should be independently verified for the specific install location.

Up and Down (psf)

Side Load (psf)

Lateral



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-05
ASCE

Massachusetts (Typical)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

Roof Pitch	90 mph Basic Wind Speed						40 psf Ground Snow Load					
	Bldg. Height = 15 ft.			Bldg. Height = 30 ft.			Bldg. Height = 60 ft.			Bldg. Height = 60 ft.		
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3
1:12	-11.0	-20.8	-33.2	31.8	-11.0	-20.8	-33.2	31.8	-13.6	-25.6	-40.6	31.8
2:12	-9.7	-19.6	-30.7	30.0	-9.7	-19.6	-30.7	30.0	-12.1	-24.1	-37.6	30.0
3:12	-9.8	-19.6	-30.7	27.9	-9.8	-19.6	-30.7	27.9	-12.1	-24.1	-37.6	27.9
4:12	-9.8	-19.7	-30.8	25.8	-9.8	-19.7	-30.8	25.8	-12.2	-24.2	-37.6	25.8
5:12	-9.8	-19.7	-30.8	23.8	-9.8	-19.7	-30.8	23.8	-12.2	-24.2	-37.7	23.8
6:12	-9.9	-19.7	-30.8	21.9	-9.9	-19.7	-30.8	21.9	-12.3	-24.2	-37.7	21.9
7:12	-11.1	-13.6	-13.6	20.9	-11.1	-13.6	-13.6	20.9	-13.8	-16.8	-16.8	22.7
8:12	-11.2	-13.7	-13.7	19.4	-11.2	-13.7	-13.7	19.4	-13.8	-16.8	-16.8	21.1
9:12	-11.2	-13.7	-13.7	18.0	-11.2	-13.7	-13.7	18.0	-13.9	-16.9	-16.9	19.8
10:12	-11.3	-13.7	-13.7	16.8	-11.3	-13.7	-13.7	16.8	-13.9	-16.9	-16.9	18.6
11:12	-11.3	-13.8	-13.8	15.7	-11.3	-13.8	-13.8	15.7	-14.0	-17.0	-17.0	17.5
12:12	-11.4	-13.8	-13.8	14.8	-11.4	-13.8	-13.8	14.8	-14.0	-17.0	-17.0	16.6
1:12	-13.6	-25.6	-40.6	31.8	-15.9	-29.7	-47.0	31.8	-18.5	-34.5	-54.4	31.8
2:12	-12.1	-24.1	-37.6	30.0	-14.2	-28.0	-43.6	30.0	-16.6	-32.5	-50.4	30.0
3:12	-12.1	-24.1	-37.6	27.9	-14.2	-28.0	-43.6	27.9	-16.6	-32.5	-50.4	27.9
4:12	-12.2	-24.2	-37.6	25.8	-14.2	-28.1	-43.6	25.8	-16.6	-32.6	-50.5	25.8
5:12	-12.2	-24.2	-37.7	23.8	-14.3	-28.1	-43.6	23.8	-16.7	-32.6	-50.5	23.8
6:12	-12.3	-24.2	-37.7	21.9	-14.3	-28.1	-43.7	21.9	-16.7	-32.6	-50.6	21.9
7:12	-13.8	-16.8	-16.8	22.7	-16.1	-19.5	-19.5	24.3	-18.7	-22.7	-22.7	26.0
8:12	-13.8	-16.8	-16.8	21.1	-16.1	-19.6	-19.6	22.7	-18.8	-22.8	-22.8	24.5
9:12	-13.9	-16.9	-16.9	19.8	-16.2	-19.6	-19.6	21.3	-18.8	-22.8	-22.8	23.1
10:12	-13.9	-16.9	-16.9	18.6	-16.2	-19.7	-19.7	20.1	-18.9	-22.8	-22.8	21.9
11:12	-14.0	-17.0	-17.0	17.5	-16.3	-19.7	-19.7	19.1	-18.9	-22.9	-22.9	20.8
12:12	-14.0	-17.0	-17.0	16.6	-16.3	-19.8	-19.8	18.2	-18.9	-22.9	-22.9	20.4
1:12	-16.8	-31.3	-49.5	29.8	-19.1	-35.4	-55.9	29.8	-21.7	-40.2	-63.3	29.8
2:12	-15.0	-29.5	-45.8	28.1	-17.0	-33.4	-51.8	28.2	-19.4	-37.9	-58.7	29.2
3:12	-15.0	-29.5	-45.9	26.2	-17.1	-33.4	-51.8	26.4	-19.4	-37.9	-58.7	27.4
4:12	-15.0	-29.6	-45.9	24.3	-17.1	-33.5	-51.9	24.5	-19.5	-37.9	-58.7	25.5
5:12	-15.1	-29.6	-45.9	22.5	-17.1	-33.5	-51.9	22.6	-19.5	-38.0	-58.8	23.6
6:12	-15.1	-29.6	-46.0	20.7	-17.2	-33.5	-51.9	20.9	-19.6	-38.0	-58.8	21.9
7:12	-17.0	-20.6	-20.6	23.9	-19.3	-23.3	-23.3	25.4	-21.9	-26.5	-26.5	27.2
8:12	-17.0	-20.6	-20.6	22.5	-19.3	-23.4	-23.4	24.0	-21.9	-26.6	-26.6	25.8
9:12	-17.1	-20.7	-20.7	21.2	-19.3	-23.4	-23.4	22.8	-22.0	-26.6	-26.6	24.5
10:12	-17.1	-20.7	-20.7	20.1	-19.4	-23.5	-23.5	21.7	-22.0	-26.7	-26.7	23.5
11:12	-17.1	-20.8	-20.8	19.2	-19.4	-23.5	-23.5	21.0	-22.1	-26.7	-26.7	23.4
12:12	-17.2	-20.8	-20.8	18.8	-19.5	-23.6	-23.6	20.9	-22.1	-26.7	-26.7	23.3
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1
1:12	2.6	2.6	2.6	2.6	2.6	2.7	3.1	3.3	3.5	4.0	4.5	5.1
2:12	4.9	4.9	4.9	4.9	4.9	4.9	4.9	5.0	5.3	5.8	6.3	6.9
3:12	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	7.3	7.8	8.4
4:12	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.4	8.9	9.5
5:12	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.7	10.3
6:12	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	10.3	10.9
7:12	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.7	11.2
8:12	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.8	11.4
9:12	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.8	11.4
10:12	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.8	11.3
11:12	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.6	11.1
12:12	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.3	10.9
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1
0:0	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0

* These tables are meant as representative of the areas listed in the title. The local wind speeds and snow loads should be independently verified for the specific install location.

Up and Down (psf) Side Load (psf) Lateral



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-05 ASCE

Mid US (High Snow)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

90 mph

Basic Wind Speed

60 psf

Ground Snow Load

Roof Pitch	Bldg. Height = 15 ft.						Bldg. Height = 30 ft.						Bldg. Height = 60 ft.							
	Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)				
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3		
1:12	-11.0	-20.8	-33.2	45.2	-11.0	-20.8	-33.2	45.2	-11.0	-20.8	-33.2	45.2	-13.6	-25.6	-40.6	45.2	-13.6	-25.6	-40.6	45.2
2:12	-9.7	-19.6	-30.7	41.5	-9.7	-19.6	-30.7	41.5	-9.7	-19.6	-30.7	41.5	-12.1	-24.1	-37.6	41.5	-12.1	-24.1	-37.6	41.5
3:12	-9.8	-19.6	-30.7	37.4	-9.8	-19.6	-30.7	37.4	-9.8	-19.6	-30.7	37.4	-12.1	-24.1	-37.6	37.4	-12.1	-24.1	-37.6	37.4
4:12	-9.8	-19.7	-30.8	33.3	-9.8	-19.7	-30.8	33.3	-9.8	-19.7	-30.8	33.3	-12.2	-24.2	-37.6	33.3	-12.2	-24.2	-37.6	33.3
5:12	-9.8	-19.7	-30.8	30.3	-9.8	-19.7	-30.8	30.3	-9.8	-19.7	-30.8	30.3	-12.2	-24.2	-37.7	30.3	-12.2	-24.2	-37.7	30.3
6:12	-9.9	-19.7	-30.8	27.5	-9.9	-19.7	-30.8	27.5	-9.9	-19.7	-30.8	27.5	-12.3	-24.2	-37.7	27.5	-12.3	-24.2	-37.7	27.5
7:12	-11.1	-13.6	-13.6	25.7	-11.1	-13.6	-13.6	25.7	-11.1	-13.6	-13.6	25.7	-13.8	-16.8	-16.8	25.7	-13.8	-16.8	-16.8	25.7
8:12	-11.2	-13.7	-13.7	23.4	-11.2	-13.7	-13.7	23.4	-11.2	-13.7	-13.7	23.4	-13.8	-16.8	-16.8	23.4	-13.8	-16.8	-16.8	23.4
9:12	-11.2	-13.7	-13.7	21.4	-11.2	-13.7	-13.7	21.4	-11.2	-13.7	-13.7	21.4	-13.9	-16.9	-16.9	21.4	-13.9	-16.9	-16.9	21.4
10:12	-11.3	-13.7	-13.7	19.7	-11.3	-13.7	-13.7	19.7	-11.3	-13.7	-13.7	19.7	-13.9	-16.9	-16.9	19.7	-13.9	-16.9	-16.9	19.7
11:12	-11.3	-13.8	-13.8	18.1	-11.3	-13.8	-13.8	18.1	-11.3	-13.8	-13.8	18.1	-14.0	-17.0	-17.0	18.1	-14.0	-17.0	-17.0	18.1
12:12	-11.4	-13.8	-13.8	16.9	-11.4	-13.8	-13.8	16.9	-11.4	-13.8	-13.8	16.9	-14.0	-17.0	-17.0	16.9	-14.0	-17.0	-17.0	16.9
1:12	-13.6	-25.6	-40.6	45.2	-15.9	-29.7	-47.0	45.2	-15.9	-29.7	-47.0	45.2	-18.5	-34.5	-54.4	45.2	-18.5	-34.5	-54.4	45.2
2:12	-12.1	-24.1	-37.6	41.5	-14.2	-28.0	-43.6	41.5	-14.2	-28.0	-43.6	41.5	-16.6	-32.5	-50.4	41.5	-16.6	-32.5	-50.4	41.5
3:12	-12.1	-24.1	-37.6	37.4	-14.2	-28.0	-43.6	37.4	-14.2	-28.0	-43.6	37.4	-16.6	-32.5	-50.4	37.4	-16.6	-32.5	-50.4	37.4
4:12	-12.2	-24.2	-37.6	33.3	-14.2	-28.1	-43.6	33.3	-14.2	-28.1	-43.6	33.3	-16.6	-32.6	-50.5	33.3	-16.6	-32.6	-50.5	33.3
5:12	-12.2	-24.2	-37.7	30.3	-14.3	-28.1	-43.6	30.3	-14.3	-28.1	-43.6	30.3	-16.7	-32.6	-50.5	30.3	-16.7	-32.6	-50.5	30.3
6:12	-12.3	-24.2	-37.7	27.5	-14.3	-28.1	-43.7	27.5	-14.3	-28.1	-43.7	27.5	-16.7	-32.6	-50.6	27.5	-16.7	-32.6	-50.6	27.5
7:12	-13.8	-16.8	-16.8	27.5	-16.1	-19.5	-19.5	29.1	-16.1	-19.5	-19.5	29.1	-18.7	-22.7	-22.7	30.8	-18.7	-22.7	-22.7	30.8
8:12	-13.8	-16.8	-16.8	25.2	-16.1	-19.6	-19.6	26.8	-16.1	-19.6	-19.6	26.8	-18.8	-22.8	-22.8	28.5	-18.8	-22.8	-22.8	28.5
9:12	-13.9	-16.9	-16.9	23.2	-16.2	-19.6	-19.6	24.7	-16.2	-19.6	-19.6	24.7	-18.8	-22.8	-22.8	26.5	-18.8	-22.8	-22.8	26.5
10:12	-13.9	-16.9	-16.9	21.4	-16.2	-19.7	-19.7	23.0	-16.2	-19.7	-19.7	23.0	-18.9	-22.8	-22.8	24.8	-18.9	-22.8	-22.8	24.8
11:12	-14.0	-17.0	-17.0	19.9	-16.3	-19.7	-19.7	21.5	-16.3	-19.7	-19.7	21.5	-18.9	-22.9	-22.9	23.3	-18.9	-22.9	-22.9	23.3
12:12	-14.0	-17.0	-17.0	18.6	-16.3	-19.8	-19.8	20.2	-16.3	-19.8	-19.8	20.2	-18.9	-22.9	-22.9	22.0	-18.9	-22.9	-22.9	22.0
1:12	-16.8	-31.3	-49.5	41.0	-19.1	-35.4	-55.9	41.0	-19.1	-35.4	-55.9	41.0	-21.7	-40.2	-63.3	41.0	-21.7	-40.2	-63.3	41.0
2:12	-15.0	-29.5	-45.8	37.7	-17.0	-33.4	-51.8	37.7	-17.0	-33.4	-51.8	37.7	-19.4	-37.9	-58.7	37.8	-19.4	-37.9	-58.7	37.8
3:12	-15.0	-29.5	-45.9	34.0	-17.1	-33.4	-51.8	34.0	-17.1	-33.4	-51.8	34.0	-19.4	-37.9	-58.7	35.0	-19.4	-37.9	-58.7	35.0
4:12	-15.0	-29.6	-45.9	31.1	-17.1	-33.5	-51.9	31.2	-17.1	-33.5	-51.9	31.2	-19.5	-37.9	-58.7	32.2	-19.5	-37.9	-58.7	32.2
5:12	-15.1	-29.6	-45.9	28.3	-17.1	-33.5	-51.9	28.5	-17.1	-33.5	-51.9	28.5	-19.5	-38.0	-58.8	29.5	-19.5	-38.0	-58.8	29.5
6:12	-15.1	-29.6	-46.0	25.8	-17.2	-33.5	-51.9	26.0	-17.2	-33.5	-51.9	26.0	-19.6	-38.0	-58.8	26.9	-19.6	-38.0	-58.8	26.9
7:12	-17.0	-20.6	-20.6	28.2	-19.3	-23.3	-23.3	29.8	-19.3	-23.3	-23.3	29.8	-21.9	-26.5	-26.5	31.5	-21.9	-26.5	-26.5	31.5
8:12	-17.0	-20.6	-20.6	26.1	-19.3	-23.4	-23.4	27.7	-19.3	-23.4	-23.4	27.7	-21.9	-26.6	-26.6	29.5	-21.9	-26.6	-26.6	29.5
9:12	-17.1	-20.7	-20.7	24.3	-19.3	-23.4	-23.4	25.8	-19.3	-23.4	-23.4	25.8	-22.0	-26.6	-26.6	27.6	-22.0	-26.6	-26.6	27.6
10:12	-17.1	-20.7	-20.7	22.7	-19.4	-23.5	-23.5	24.3	-19.4	-23.5	-23.5	24.3	-22.0	-26.7	-26.7	26.0	-22.0	-26.7	-26.7	26.0
11:12	-17.1	-20.8	-20.8	21.3	-19.4	-23.5	-23.5	22.9	-19.4	-23.5	-23.5	22.9	-22.1	-26.7	-26.7	24.7	-22.1	-26.7	-26.7	24.7
12:12	-17.2	-20.8	-20.8	20.2	-19.5	-23.6	-23.6	21.7	-19.5	-23.6	-23.6	21.7	-22.1	-26.7	-26.7	23.5	-22.1	-26.7	-26.7	23.5
Roof Pitch	S _s = 0.0	S _s = 0.1	S _s = 0.2	S _s = 0.3	S _s = 0.4	S _s = 0.5	S _s = 1.0	S _s = 1.25	S _s = 1.5	S _s = 2.0	S _s = 2.5	S _s = 3.1								
1:12	3.8	3.8	4.0	4.5	4.9	5.3	6.6	7.1	8.0	9.7	11.6	14.3								
2:12	7.0	7.0	7.0	7.0	7.3	7.7	9.0	9.5	10.3	11.9	13.5	15.5								
3:12	9.6	9.6	9.6	9.6	9.6	9.6	10.8	11.3	12.1	13.6	15.2	17.0								
4:12	11.6	11.6	11.6	11.6	11.6	11.6	12.2	12.7	13.4	14.9	16.3	18.1								
5:12	13.1	13.1	13.1	13.1	13.1	13.1	13.2	13.6	14.3	15.7	17.0	18.7								
6:12	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.2	14.8	16.1	17.4	18.9								
7:12	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	15.1	16.3	17.4	18.9								
8:12	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	16.2	17.3	18.6								
9:12	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	15.9	16.9	18.1								
10:12	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	15.5	16.4	17.6								
11:12	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.9	15.8	16.9								
12:12	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	14.4	15.2	16.2								
	S _s = 0.0	S _s = 0.1	S _s = 0.2	S _s = 0.3	S _s = 0.4	S _s = 0.5	S _s = 1.0	S _s = 1.25	S _s = 1.5	S _s = 2.0	S _s = 2.5	S _s = 3.1								
	0.0	0.7	1.4	2.1	2.6	3.1	4.9	5.6	6.7	8.9	11.1	13.8								

* These tables are meant as representative of the areas listed in the title. The local wind speeds and snow loads should be independently verified for the specific install location.

Up and Down (psf)

Side Load (psf)

Lateral



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-05 ASCE

100 mph

Basic Wind Speed

25 psf

Ground Snow Load

East Coast (Medium Snow)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

Roof Pitch	Bldg. Height = 15 ft.						Bldg. Height = 30 ft.						Bldg. Height = 60 ft.										
	Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)							
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3					
1:12	-13.9	-26.0	-41.3	25.9	-13.9	-26.0	-41.3	25.9	-17.1	-31.9	-50.4	25.9	-17.1	-31.9	-50.4	25.9	-17.1	-31.9	-50.4	25.9			
2:12	-12.4	-24.5	-38.2	24.5	-12.4	-24.5	-38.2	24.5	-15.3	-30.1	-46.7	24.5	-15.3	-30.1	-46.7	24.5	-15.3	-30.1	-46.7	24.5			
3:12	-12.4	-24.6	-38.3	23.0	-12.4	-24.6	-38.3	23.0	-15.3	-30.1	-46.8	23.0	-15.3	-30.1	-46.8	23.0	-15.3	-30.1	-46.8	23.0			
4:12	-12.4	-24.6	-38.3	21.5	-12.4	-24.6	-38.3	21.5	-15.3	-30.1	-46.8	21.5	-15.3	-30.1	-46.8	21.5	-15.3	-30.1	-46.8	21.5			
5:12	-12.4	-24.6	-38.3	20.0	-12.4	-24.6	-38.3	20.0	-15.4	-30.2	-46.8	20.0	-15.4	-30.2	-46.8	20.0	-15.4	-30.2	-46.8	20.0			
6:12	-12.5	-24.7	-38.4	18.6	-12.5	-24.7	-38.4	18.6	-15.4	-30.2	-46.9	18.6	-15.4	-30.2	-46.9	18.6	-15.4	-30.2	-46.9	18.6			
7:12	-14.0	-17.1	-17.1	20.1	-14.0	-17.1	-17.1	20.1	-17.3	-21.0	-21.0	20.1	-17.3	-21.0	-21.0	20.1	-17.3	-21.0	-21.0	20.1			
8:12	-14.1	-17.1	-17.1	19.0	-14.1	-17.1	-17.1	19.0	-17.4	-21.1	-21.1	19.0	-17.4	-21.1	-21.1	19.0	-17.4	-21.1	-21.1	19.0			
9:12	-14.1	-17.2	-17.2	18.0	-14.1	-17.2	-17.2	18.0	-17.4	-21.1	-21.1	18.0	-17.4	-21.1	-21.1	18.0	-17.4	-21.1	-21.1	18.0			
10:12	-14.2	-17.2	-17.2	17.1	-14.2	-17.2	-17.2	17.1	-17.4	-21.1	-21.1	17.1	-17.4	-21.1	-21.1	17.1	-17.4	-21.1	-21.1	17.1			
11:12	-14.2	-17.3	-17.3	16.3	-14.2	-17.3	-17.3	16.3	-17.3	-21.2	-21.2	16.3	-17.3	-21.2	-21.2	16.3	-17.3	-21.2	-21.2	16.3			
12:12	-14.3	-17.3	-17.3	16.2	-14.3	-17.3	-17.3	16.2	-17.3	-21.2	-21.2	16.2	-17.3	-21.2	-21.2	16.2	-17.3	-21.2	-21.2	16.2			
1:12	-17.1	-31.9	-50.4	25.9	-20.0	-37.0	-58.3	25.9	-23.2	-42.9	-67.5	25.9	-23.2	-42.9	-67.5	25.9	-23.2	-42.9	-67.5	25.9			
2:12	-15.3	-30.1	-46.7	24.5	-17.8	-34.9	-54.1	25.0	-20.8	-40.4	-62.6	26.3	-20.8	-40.4	-62.6	26.3	-20.8	-40.4	-62.6	26.3			
3:12	-15.3	-30.1	-46.8	23.0	-17.9	-34.9	-54.1	23.5	-20.8	-40.5	-62.6	24.8	-20.8	-40.5	-62.6	24.8	-20.8	-40.5	-62.6	24.8			
4:12	-15.3	-30.1	-46.8	21.5	-17.9	-34.9	-54.1	22.0	-20.8	-40.5	-62.6	23.2	-20.8	-40.5	-62.6	23.2	-20.8	-40.5	-62.6	23.2			
5:12	-15.4	-30.2	-46.8	20.0	-17.9	-35.0	-54.2	20.5	-20.9	-40.5	-62.7	21.8	-20.9	-40.5	-62.7	21.8	-20.9	-40.5	-62.7	21.8			
6:12	-15.4	-30.2	-46.9	18.6	-18.0	-35.0	-54.2	19.1	-20.9	-40.6	-62.7	20.4	-20.9	-40.6	-62.7	20.4	-20.9	-40.6	-62.7	20.4			
7:12	-17.3	-21.0	-21.0	22.3	-20.1	-24.4	-24.4	24.3	-23.4	-28.3	-28.3	26.5	-23.4	-28.3	-28.3	26.5	-23.4	-28.3	-28.3	26.5			
8:12	-17.4	-21.1	-21.1	21.2	-20.2	-24.4	-24.4	23.1	-23.4	-28.4	-28.4	25.3	-23.4	-28.4	-28.4	25.3	-23.4	-28.4	-28.4	25.3			
9:12	-17.4	-21.1	-21.1	20.2	-20.2	-24.5	-24.5	22.1	-23.5	-28.4	-28.4	24.9	-23.5	-28.4	-28.4	24.9	-23.5	-28.4	-28.4	24.9			
10:12	-17.4	-21.1	-21.1	19.3	-20.3	-24.5	-24.5	21.9	-23.5	-28.4	-28.4	24.8	-23.5	-28.4	-28.4	24.8	-23.5	-28.4	-28.4	24.8			
11:12	-17.5	-21.2	-21.2	19.2	-20.3	-24.6	-24.6	21.8	-23.6	-28.5	-28.5	24.7	-23.6	-28.5	-28.5	24.7	-23.6	-28.5	-28.5	24.7			
12:12	-17.5	-21.2	-21.2	19.1	-20.4	-24.6	-24.6	21.7	-23.6	-28.5	-28.5	24.6	-23.6	-28.5	-28.5	24.6	-23.6	-28.5	-28.5	24.6			
1:12	-21.0	-39.0	-61.4	25.9	-23.9	-44.1	-69.3	25.9	-27.1	-49.9	-78.4	25.9	-27.1	-49.9	-78.4	25.9	-27.1	-49.9	-78.4	25.9			
2:12	-18.8	-36.7	-56.9	25.4	-21.4	-41.6	-64.3	26.5	-24.3	-47.1	-72.8	27.7	-24.3	-47.1	-72.8	27.7	-24.3	-47.1	-72.8	27.7			
3:12	-18.8	-36.8	-56.9	24.0	-21.4	-41.6	-64.3	25.0	-24.3	-47.1	-72.8	26.2	-24.3	-47.1	-72.8	26.2	-24.3	-47.1	-72.8	26.2			
4:12	-18.9	-36.8	-57.0	22.4	-21.4	-41.6	-64.3	23.5	-24.4	-47.2	-72.8	24.7	-24.4	-47.2	-72.8	24.7	-24.4	-47.2	-72.8	24.7			
5:12	-18.9	-36.8	-57.0	20.9	-21.4	-41.6	-64.4	22.0	-24.4	-47.2	-72.8	23.2	-24.4	-47.2	-72.8	23.2	-24.4	-47.2	-72.8	23.2			
6:12	-18.9	-36.9	-57.0	19.6	-21.5	-41.7	-64.4	20.6	-24.4	-47.2	-72.9	21.8	-24.4	-47.2	-72.9	21.8	-24.4	-47.2	-72.9	21.8			
7:12	-21.2	-25.7	-25.7	25.0	-24.1	-29.1	-29.1	26.9	-27.3	-33.0	-33.0	29.1	-27.3	-33.0	-33.0	29.1	-27.3	-33.0	-33.0	29.1			
8:12	-21.3	-25.8	-25.8	23.8	-24.1	-29.1	-29.1	25.7	-27.4	-33.1	-33.1	28.6	-27.4	-33.1	-33.1	28.6	-27.4	-33.1	-33.1	28.6			
9:12	-21.3	-25.8	-25.8	23.0	-24.1	-29.2	-29.2	25.5	-27.4	-33.1	-33.1	28.5	-27.4	-33.1	-33.1	28.5	-27.4	-33.1	-33.1	28.5			
10:12	-21.4	-25.8	-25.8	22.9	-24.2	-29.2	-29.2	25.4	-27.4	-33.1	-33.1	28.3	-27.4	-33.1	-33.1	28.3	-27.4	-33.1	-33.1	28.3			
11:12	-21.4	-25.9	-25.9	22.7	-24.2	-29.3	-29.3	25.3	-27.5	-33.2	-33.2	28.2	-27.5	-33.2	-33.2	28.2	-27.5	-33.2	-33.2	28.2			
12:12	-21.4	-25.9	-25.9	22.6	-24.3	-29.3	-29.3	25.2	-27.5	-33.2	-33.2	28.1	-27.5	-33.2	-33.2	28.1	-27.5	-33.2	-33.2	28.1			
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 3.1	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 3.1	
1:12	2.0	2.0	2.0	2.0	2.1	2.2	2.6	2.8	3.0	3.5	4.0	4.6	2.0	2.0	2.0	2.0	2.1	2.2	2.6	2.8	3.0	3.5	4.0
2:12	3.6	3.6	3.6	3.6	3.6	3.6	4.0	4.1	4.4	4.9	5.4	6.0	3.6	3.6	3.6	3.6	3.6	3.6	4.0	4.1	4.4	4.9	5.4
3:12	5.0	5.0	5.0	5.0	5.0	5.0	5.1	5.2	5.5	6.0	6.5	7.1	5.0	5.0	5.0	5.0	5.0	5.0	5.1	5.2	5.5	6.0	6.5
4:12	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.4	6.9	7.4	8.0	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.4	6.9
5:12	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.5	8.0	8.6	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.5	8.0
6:12	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	8.0	8.5	9.1	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	8.0	8.5
7:12	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8.3	8.8	9.4	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8.3	8.8
8:12	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.5	9.0	9.5	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.5	9.0
9:12	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.5	9.0	9.6	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.5	9.0
10:12	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.5	9.0	9.5	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.5	9.0
11:12	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.4	8.9	9.4	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.4	8.9
12:12	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8.3	8.7	9.2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8.3	8.7
	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 3.1	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 3.1	
	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3

* These tables are meant as representative of the areas listed in the title. The local wind speeds and snow loads should be independently verified for the specific install location.

Up and Down (psf)

Side Load (psf)

Lateral



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-05
ASCE

New Jersey (Typical)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

Roof Pitch	Bldg. Height = 15 ft.						Bldg. Height = 30 ft.						Bldg. Height = 60 ft.											
	Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)								
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3						
1:12	-18.8	-34.9	-55.0	25.9	-18.8	-34.9	-55.0	25.9	-23.1	-42.7	-67.1	25.9	-23.1	-42.7	-67.1	25.9	-23.1	-42.7	-67.1	25.9				
2:12	-16.8	-32.9	-51.0	24.6	-16.8	-32.9	-51.0	24.6	-20.7	-40.2	-62.2	26.2	-20.7	-40.2	-62.2	26.2	-20.7	-40.2	-62.2	26.2				
3:12	-16.8	-32.9	-51.0	23.1	-16.8	-32.9	-51.0	23.1	-20.7	-40.2	-62.3	24.7	-20.7	-40.2	-62.3	24.7	-20.7	-40.2	-62.3	24.7				
4:12	-16.8	-32.9	-51.1	21.6	-16.8	-32.9	-51.1	21.6	-20.7	-40.3	-62.3	23.2	-20.7	-40.3	-62.3	23.2	-20.7	-40.3	-62.3	23.2				
5:12	-16.9	-33.0	-51.1	20.1	-16.9	-33.0	-51.1	20.1	-20.7	-40.3	-62.3	21.7	-20.7	-40.3	-62.3	21.7	-20.7	-40.3	-62.3	21.7				
6:12	-16.9	-33.0	-51.1	18.7	-16.9	-33.0	-51.1	18.7	-20.8	-40.4	-62.4	20.3	-20.8	-40.4	-62.4	20.3	-20.8	-40.4	-62.4	20.3				
7:12	-19.0	-23.0	-23.0	23.5	-19.0	-23.0	-23.0	23.5	-23.3	-28.2	-28.2	26.4	-23.3	-28.2	-28.2	26.4	-23.3	-28.2	-28.2	26.4				
8:12	-19.0	-23.0	-23.0	22.3	-19.0	-23.0	-23.0	22.3	-23.3	-28.2	-28.2	25.2	-23.3	-28.2	-28.2	25.2	-23.3	-28.2	-28.2	25.2				
9:12	-19.0	-23.1	-23.1	21.3	-19.0	-23.1	-23.1	21.3	-23.4	-28.3	-28.3	24.8	-23.4	-28.3	-28.3	24.8	-23.4	-28.3	-28.3	24.8				
10:12	-19.1	-23.1	-23.1	20.8	-19.1	-23.1	-23.1	20.8	-23.4	-28.3	-28.3	24.7	-23.4	-28.3	-28.3	24.7	-23.4	-28.3	-28.3	24.7				
11:12	-19.1	-23.2	-23.2	20.7	-19.1	-23.2	-23.2	20.7	-23.4	-28.3	-28.3	24.6	-23.4	-28.3	-28.3	24.6	-23.4	-28.3	-28.3	24.6				
12:12	-19.2	-23.2	-23.2	20.6	-19.2	-23.2	-23.2	20.6	-23.5	-28.4	-28.4	24.5	-23.5	-28.4	-28.4	24.5	-23.5	-28.4	-28.4	24.5				
1:12	-23.1	-42.7	-67.1	25.9	-26.8	-49.4	-77.6	25.9	-31.1	-57.2	-89.7	25.9	-31.1	-57.2	-89.7	25.9	-31.1	-57.2	-89.7	25.9				
2:12	-20.7	-40.2	-62.2	26.2	-24.0	-46.6	-72.0	27.6	-27.9	-53.9	-83.2	29.2	-27.9	-53.9	-83.2	29.2	-27.9	-53.9	-83.2	29.2				
3:12	-20.7	-40.2	-62.3	24.7	-24.0	-46.6	-72.0	26.1	-27.9	-53.9	-83.2	27.7	-27.9	-53.9	-83.2	27.7	-27.9	-53.9	-83.2	27.7				
4:12	-20.7	-40.3	-62.3	23.2	-24.1	-46.6	-72.0	24.6	-28.0	-54.0	-83.2	26.2	-28.0	-54.0	-83.2	26.2	-28.0	-54.0	-83.2	26.2				
5:12	-20.7	-40.3	-62.3	21.7	-24.1	-46.7	-72.1	23.1	-28.0	-54.0	-83.3	24.7	-28.0	-54.0	-83.3	24.7	-28.0	-54.0	-83.3	24.7				
6:12	-20.8	-40.4	-62.4	20.3	-24.2	-46.7	-72.1	21.7	-28.0	-54.1	-83.3	23.3	-28.0	-54.1	-83.3	23.3	-28.0	-54.1	-83.3	23.3				
7:12	-23.3	-28.2	-28.2	26.4	-27.0	-32.7	-32.7	28.9	-31.3	-37.8	-37.8	32.3	-31.3	-37.8	-37.8	32.3	-31.3	-37.8	-37.8	32.3				
8:12	-23.3	-28.2	-28.2	25.2	-27.1	-32.7	-32.7	28.3	-31.4	-37.9	-37.9	32.2	-31.4	-37.9	-37.9	32.2	-31.4	-37.9	-37.9	32.2				
9:12	-23.4	-28.3	-28.3	24.8	-27.1	-32.7	-32.7	28.2	-31.4	-37.9	-37.9	32.1	-31.4	-37.9	-37.9	32.1	-31.4	-37.9	-37.9	32.1				
10:12	-23.4	-28.3	-28.3	24.7	-27.1	-32.8	-32.8	28.1	-31.5	-38.0	-38.0	32.0	-31.5	-38.0	-38.0	32.0	-31.5	-38.0	-38.0	32.0				
11:12	-23.4	-28.3	-28.3	24.6	-27.2	-32.8	-32.8	28.0	-31.5	-38.0	-38.0	31.8	-31.5	-38.0	-38.0	31.8	-31.5	-38.0	-38.0	31.8				
12:12	-23.5	-28.4	-28.4	24.5	-27.2	-32.9	-32.9	27.9	-31.5	-38.0	-38.0	31.7	-31.5	-38.0	-38.0	31.7	-31.5	-38.0	-38.0	31.7				
1:12	-28.3	-52.0	-81.6	25.9	-32.0	-58.7	-92.1	25.9	-36.3	-66.5	-104.2	26.9	-36.3	-66.5	-104.2	26.9	-36.3	-66.5	-104.2	26.9				
2:12	-25.3	-49.0	-75.7	28.2	-28.7	-55.4	-85.4	29.6	-32.6	-62.7	-96.7	31.2	-32.6	-62.7	-96.7	31.2	-32.6	-62.7	-96.7	31.2				
3:12	-25.3	-49.1	-75.7	26.7	-28.7	-55.4	-85.5	28.1	-32.6	-62.8	-96.7	29.7	-32.6	-62.8	-96.7	29.7	-32.6	-62.8	-96.7	29.7				
4:12	-25.4	-49.1	-75.8	25.1	-28.7	-55.4	-85.5	26.5	-32.6	-62.8	-96.7	28.2	-32.6	-62.8	-96.7	28.2	-32.6	-62.8	-96.7	28.2				
5:12	-25.4	-49.1	-75.8	23.7	-28.8	-55.5	-85.5	25.1	-32.7	-62.8	-96.7	26.7	-32.7	-62.8	-96.7	26.7	-32.7	-62.8	-96.7	26.7				
6:12	-25.4	-49.2	-75.8	22.3	-28.8	-55.5	-85.5	23.7	-32.7	-62.9	-96.8	25.3	-32.7	-62.9	-96.8	25.3	-32.7	-62.9	-96.8	25.3				
7:12	-28.5	-34.4	-34.4	29.9	-32.2	-38.9	-38.9	33.1	-36.5	-44.1	-44.1	36.9	-36.5	-44.1	-44.1	36.9	-36.5	-44.1	-44.1	36.9				
8:12	-28.5	-34.4	-34.4	29.6	-32.2	-38.9	-38.9	33.0	-36.6	-44.1	-44.1	36.8	-36.6	-44.1	-44.1	36.8	-36.6	-44.1	-44.1	36.8				
9:12	-28.5	-34.5	-34.5	29.5	-32.3	-39.0	-39.0	32.8	-36.6	-44.1	-44.1	36.7	-36.6	-44.1	-44.1	36.7	-36.6	-44.1	-44.1	36.7				
10:12	-28.6	-34.5	-34.5	29.4	-32.3	-39.0	-39.0	32.7	-36.6	-44.2	-44.2	36.6	-36.6	-44.2	-44.2	36.6	-36.6	-44.2	-44.2	36.6				
11:12	-28.6	-34.6	-34.6	29.3	-32.4	-39.0	-39.0	32.6	-36.7	-44.2	-44.2	36.5	-36.7	-44.2	-44.2	36.5	-36.7	-44.2	-44.2	36.5				
12:12	-28.7	-34.6	-34.6	29.1	-32.4	-39.1	-39.1	32.5	-36.7	-44.3	-44.3	36.4	-36.7	-44.3	-44.3	36.4	-36.7	-44.3	-44.3	36.4				
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1
1:12	2.0	2.0	2.0	2.0	2.1	2.2	2.6	2.8	3.0	3.5	4.0	4.6	2.0	2.0	2.0	2.0	2.1	2.2	2.6	2.8	3.0	3.5	4.0	4.6
2:12	3.6	3.6	3.6	3.6	3.6	3.6	4.0	4.1	4.4	4.9	5.4	6.0	3.6	3.6	3.6	3.6	3.6	3.6	4.0	4.1	4.4	4.9	5.4	6.0
3:12	5.0	5.0	5.0	5.0	5.0	5.0	5.1	5.2	5.5	6.0	6.5	7.1	5.0	5.0	5.0	5.0	5.1	5.2	5.5	6.0	6.5	7.1	7.7	8.3
4:12	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.4	6.9	7.4	8.0	6.1	6.1	6.1	6.1	6.1	6.1	6.4	6.4	6.9	7.4	8.0	8.6
5:12	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.5	8.0	8.6	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.5	8.0	8.6	9.2
6:12	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	8.0	8.5	9.1	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	8.0	8.5	9.1	9.7
7:12	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8.3	8.8	9.4	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8.3	8.8	9.4	10.0
8:12	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.5	9.0	9.5	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.5	9.0	9.5	10.1
9:12	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.5	9.0	9.6	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.5	9.0	9.6	10.2
10:12	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.5	9.0	9.5	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.5	9.0	9.5	10.1
11:12	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.4	8.9	9.4	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.4	8.9	9.4	10.0
12:12	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8.3	8.7	9.2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8.3	8.7	9.2	9.8
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1
0.0	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0

* These tables are meant as representative of the areas listed in the title. The local wind speeds and snow loads should be independently verified for the specific install location.

Up and Down (psf)

Side Load (psf)

Lateral



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-05
ASCE

Louisiana (Typical)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

Roof Pitch	Bldg. Height = 15 ft.						Bldg. Height = 30 ft.						Bldg. Height = 60 ft.											
	Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)								
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3						
1:12	-20.6	-38.1	-60.0	13.5	-20.6	-38.1	-60.0	13.5	-20.6	-38.1	-60.0	13.5	-25.3	-46.6	-73.2	13.5	-25.3	-46.6	-73.2	13.5	-25.3	-46.6	-73.2	13.5
2:12	-18.4	-35.9	-55.7	14.4	-18.4	-35.9	-55.7	14.4	-18.4	-35.9	-55.7	14.4	-22.6	-43.9	-67.9	16.8	-22.6	-43.9	-67.9	16.8	-22.6	-43.9	-67.9	16.8
3:12	-18.4	-36.0	-55.7	14.4	-18.4	-36.0	-55.7	14.4	-18.4	-36.0	-55.7	14.4	-22.6	-43.9	-67.9	16.7	-22.6	-43.9	-67.9	16.7	-22.6	-43.9	-67.9	16.7
4:12	-18.4	-36.0	-55.7	14.3	-18.4	-36.0	-55.7	14.3	-18.4	-36.0	-55.7	14.3	-22.7	-44.0	-67.9	16.6	-22.7	-44.0	-67.9	16.6	-22.7	-44.0	-67.9	16.6
5:12	-18.5	-36.0	-55.8	14.2	-18.5	-36.0	-55.8	14.2	-18.5	-36.0	-55.8	14.2	-22.7	-44.0	-68.0	16.5	-22.7	-44.0	-68.0	16.5	-22.7	-44.0	-68.0	16.5
6:12	-18.5	-36.1	-55.8	14.1	-18.5	-36.1	-55.8	14.1	-18.5	-36.1	-55.8	14.1	-22.7	-44.0	-68.0	16.4	-22.7	-44.0	-68.0	16.4	-22.7	-44.0	-68.0	16.4
7:12	-20.7	-25.1	-25.1	22.8	-20.7	-25.1	-25.1	22.8	-20.7	-25.1	-25.1	22.8	-25.4	-30.8	-30.8	27.0	-25.4	-30.8	-30.8	27.0	-25.4	-30.8	-30.8	27.0
8:12	-20.8	-25.2	-25.2	22.7	-20.8	-25.2	-25.2	22.7	-20.8	-25.2	-25.2	22.7	-25.5	-30.8	-30.8	26.9	-25.5	-30.8	-30.8	26.9	-25.5	-30.8	-30.8	26.9
9:12	-20.8	-25.2	-25.2	22.5	-20.8	-25.2	-25.2	22.5	-20.8	-25.2	-25.2	22.5	-25.5	-30.9	-30.9	26.8	-25.5	-30.9	-30.9	26.8	-25.5	-30.9	-30.9	26.8
10:12	-20.9	-25.3	-25.3	22.4	-20.9	-25.3	-25.3	22.4	-20.9	-25.3	-25.3	22.4	-25.6	-30.9	-30.9	26.7	-25.6	-30.9	-30.9	26.7	-25.6	-30.9	-30.9	26.7
11:12	-20.9	-25.3	-25.3	22.3	-20.9	-25.3	-25.3	22.3	-20.9	-25.3	-25.3	22.3	-25.6	-30.9	-30.9	26.5	-25.6	-30.9	-30.9	26.5	-25.6	-30.9	-30.9	26.5
12:12	-21.0	-25.3	-25.3	22.2	-21.0	-25.3	-25.3	22.2	-21.0	-25.3	-25.3	22.2	-25.7	-31.0	-31.0	26.4	-25.7	-31.0	-31.0	26.4	-25.7	-31.0	-31.0	26.4
1:12	-25.3	-46.6	-73.2	13.5	-29.3	-53.9	-84.6	13.5	-29.3	-53.9	-84.6	13.5	-34.0	-62.4	-97.8	14.1	-34.0	-62.4	-97.8	14.1	-34.0	-62.4	-97.8	14.1
2:12	-22.6	-43.9	-67.9	16.8	-26.3	-50.8	-78.5	18.8	-26.3	-50.8	-78.5	18.8	-30.5	-58.8	-90.7	21.2	-30.5	-58.8	-90.7	21.2	-30.5	-58.8	-90.7	21.2
3:12	-22.6	-43.9	-67.9	16.7	-26.3	-50.9	-78.5	18.7	-26.3	-50.9	-78.5	18.7	-30.5	-58.9	-90.7	21.1	-30.5	-58.9	-90.7	21.1	-30.5	-58.9	-90.7	21.1
4:12	-22.7	-44.0	-67.9	16.6	-26.3	-50.9	-78.5	18.7	-26.3	-50.9	-78.5	18.7	-30.6	-58.9	-90.8	21.0	-30.6	-58.9	-90.8	21.0	-30.6	-58.9	-90.8	21.0
5:12	-22.7	-44.0	-68.0	16.5	-26.4	-50.9	-78.6	18.6	-26.4	-50.9	-78.6	18.6	-30.6	-58.9	-90.8	20.9	-30.6	-58.9	-90.8	20.9	-30.6	-58.9	-90.8	20.9
6:12	-22.7	-44.0	-68.0	16.4	-26.4	-51.0	-78.6	18.5	-26.4	-51.0	-78.6	18.5	-30.6	-59.0	-90.8	20.8	-30.6	-59.0	-90.8	20.8	-30.6	-59.0	-90.8	20.8
7:12	-25.4	-30.8	-30.8	27.0	-29.5	-35.7	-35.7	30.7	-29.5	-35.7	-35.7	30.7	-34.2	-41.3	-41.3	34.9	-34.2	-41.3	-41.3	34.9	-34.2	-41.3	-41.3	34.9
8:12	-25.5	-30.8	-30.8	26.9	-29.6	-35.7	-35.7	30.5	-29.6	-35.7	-35.7	30.5	-34.3	-41.3	-41.3	34.8	-34.3	-41.3	-41.3	34.8	-34.3	-41.3	-41.3	34.8
9:12	-25.5	-30.9	-30.9	26.8	-29.6	-35.7	-35.7	30.4	-29.6	-35.7	-35.7	30.4	-34.3	-41.4	-41.4	34.7	-34.3	-41.4	-41.4	34.7	-34.3	-41.4	-41.4	34.7
10:12	-25.6	-30.9	-30.9	26.7	-29.7	-35.8	-35.8	30.3	-29.7	-35.8	-35.8	30.3	-34.4	-41.4	-41.4	34.6	-34.4	-41.4	-41.4	34.6	-34.4	-41.4	-41.4	34.6
11:12	-25.6	-30.9	-30.9	26.5	-29.7	-35.8	-35.8	30.2	-29.7	-35.8	-35.8	30.2	-34.4	-41.5	-41.5	34.4	-34.4	-41.5	-41.5	34.4	-34.4	-41.5	-41.5	34.4
12:12	-25.7	-31.0	-31.0	26.4	-29.7	-35.9	-35.9	30.1	-29.7	-35.9	-35.9	30.1	-34.4	-41.5	-41.5	34.3	-34.4	-41.5	-41.5	34.3	-34.4	-41.5	-41.5	34.3
1:12	-30.9	-56.7	-89.0	13.5	-35.0	-64.1	-100.4	14.4	-35.0	-64.1	-100.4	14.4	-39.7	-72.5	-113.6	15.8	-39.7	-72.5	-113.6	15.8	-39.7	-72.5	-113.6	15.8
2:12	-27.7	-53.5	-82.6	19.6	-31.4	-60.4	-93.1	21.6	-31.4	-60.4	-93.1	21.6	-35.6	-68.4	-105.4	24.0	-35.6	-68.4	-105.4	24.0	-35.6	-68.4	-105.4	24.0
3:12	-27.7	-53.5	-82.6	19.5	-31.4	-60.5	-93.2	21.6	-31.4	-60.5	-93.2	21.6	-35.6	-68.4	-105.4	23.9	-35.6	-68.4	-105.4	23.9	-35.6	-68.4	-105.4	23.9
4:12	-27.7	-53.6	-82.6	19.5	-31.4	-60.5	-93.2	21.5	-31.4	-60.5	-93.2	21.5	-35.6	-68.5	-105.4	23.8	-35.6	-68.5	-105.4	23.8	-35.6	-68.5	-105.4	23.8
5:12	-27.8	-53.6	-82.6	19.4	-31.4	-60.5	-93.2	21.4	-31.4	-60.5	-93.2	21.4	-35.7	-68.5	-105.5	23.8	-35.7	-68.5	-105.5	23.8	-35.7	-68.5	-105.5	23.8
6:12	-27.8	-53.6	-82.7	19.3	-31.5	-60.6	-93.3	21.3	-31.5	-60.6	-93.3	21.3	-35.7	-68.6	-105.5	23.7	-35.7	-68.6	-105.5	23.7	-35.7	-68.6	-105.5	23.7
7:12	-31.1	-37.5	-37.5	32.1	-35.2	-42.4	-42.4	35.7	-35.2	-42.4	-42.4	35.7	-39.9	-48.1	-48.1	40.0	-39.9	-48.1	-48.1	40.0	-39.9	-48.1	-48.1	40.0
8:12	-31.1	-37.6	-37.6	32.0	-35.2	-42.5	-42.5	35.6	-35.2	-42.5	-42.5	35.6	-39.9	-48.1	-48.1	39.9	-39.9	-48.1	-48.1	39.9	-39.9	-48.1	-48.1	39.9
9:12	-31.2	-37.6	-37.6	31.8	-35.2	-42.5	-42.5	35.5	-35.2	-42.5	-42.5	35.5	-39.9	-48.2	-48.2	39.7	-39.9	-48.2	-48.2	39.7	-39.9	-48.2	-48.2	39.7
10:12	-31.2	-37.7	-37.7	31.7	-35.3	-42.6	-42.6	35.4	-35.3	-42.6	-42.6	35.4	-40.0	-48.2	-48.2	39.6	-40.0	-48.2	-48.2	39.6	-40.0	-48.2	-48.2	39.6
11:12	-31.3	-37.7	-37.7	31.6	-35.3	-42.6	-42.6	35.3	-35.3	-42.6	-42.6	35.3	-40.0	-48.2	-48.2	39.5	-40.0	-48.2	-48.2	39.5	-40.0	-48.2	-48.2	39.5
12:12	-31.3	-37.8	-37.8	31.5	-35.4	-42.6	-42.6	35.2	-35.4	-42.6	-42.6	35.2	-40.1	-48.3	-48.3	39.4	-40.1	-48.3	-48.3	39.4	-40.1	-48.3	-48.3	39.4
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1												
1:12	0.3	0.5	0.7	0.9	1.1	1.2	1.8	2.0	2.3	2.9	3.6	4.4												
2:12	0.6	0.8	1.0	1.2	1.4	1.5	2.1	2.3	2.6	3.3	3.9	4.7												
3:12	0.8	1.1	1.3	1.5	1.6	1.8	2.3	2.5	2.9	3.5	4.2	5.0												
4:12	1.1	1.3	1.5	1.7	1.9	2.0	2.6	2.8	3.1	3.8	4.5	5.3												
5:12	1.3	1.6	1.8	2.0	2.1	2.3	2.8	3.0	3.3	4.0	4.7	5.5												
6:12	1.6	1.8	2.0	2.2	2.3	2.5	3.0	3.2	3.5	4.2	4.8	5.6												
7:12	1.8	2.0	2.2	2.4	2.5	2.7	3.2	3.4	3.7	4.3	5.0	5.8												
8:12	1.9	2.1	2.3	2.5	2.7	2.8	3.3	3.5	3.8	4.5	5.1	5.9												
9:12	2.1	2.3	2.5	2.7	2.8	3.0	3.5	3.6	4.0	4.6	5.2	5.9												
10:12	2.2	2.4	2.6	2.8	3.0	3.1	3.6	3.8	4.1	4.7	5.3	6.0												
11:12	2.4	2.6	2.7	2.9	3.1	3.2	3.7	3.8	4.1	4.7	5.3	6.0												
12:12	2.5	2.7	2.8	3.0	3.2	3.3	3.7	3.9	4.2	4.8	5.4	6.1												
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1												
0.0	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0												

* These tables are meant as representative of the areas listed in the title. The local wind speeds and snow loads should be independently verified for the specific install location.

Up and Down (psf)

Side Load (psf)

Lateral



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-05
ASCE

Florida (Typical)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

Roof Pitch	140 mph Basic Wind Speed						0 psf Ground Snow Load						
	Bldg. Height = 15 ft.			Bldg. Height = 30 ft.			Bldg. Height = 60 ft.			Bldg. Height = 60 ft.			
	Up Pressures (psf)	Zone 1	Zone 2	Zone 3	Down (psf)	Zone 1	Zone 2	Zone 3	Down (psf)	Zone 1	Zone 2	Zone 3	Down (psf)
Exposure Category B													
1:12	-28.5	-52.4	-82.2	13.5	-28.5	-52.4	-82.2	13.5	-28.5	-34.9	-63.9	-100.1	14.4
2:12	-25.5	-49.4	-76.3	18.4	-25.5	-49.4	-76.3	18.4	-25.5	-31.3	-60.3	-92.9	21.6
3:12	-25.5	-49.4	-76.3	18.3	-25.5	-49.4	-76.3	18.3	-25.5	-31.3	-60.3	-92.9	21.5
4:12	-25.6	-49.4	-76.3	18.2	-25.6	-49.4	-76.3	18.2	-25.6	-31.3	-60.3	-93.0	21.4
5:12	-25.6	-49.5	-76.4	18.2	-25.6	-49.5	-76.4	18.2	-25.6	-31.4	-60.4	-93.0	21.4
6:12	-25.6	-49.5	-76.4	18.1	-25.6	-49.5	-76.4	18.1	-25.6	-31.4	-60.4	-93.0	21.3
7:12	-28.7	-34.6	-34.6	29.9	-28.7	-34.6	-34.6	29.9	-28.7	-35.1	-42.3	-42.3	35.6
8:12	-28.7	-34.7	-34.7	29.8	-28.7	-34.7	-34.7	29.8	-28.7	-35.1	-42.4	-42.4	35.5
9:12	-28.8	-34.7	-34.7	29.7	-28.8	-34.7	-34.7	29.7	-28.8	-35.2	-42.4	-42.4	35.4
10:12	-28.8	-34.8	-34.8	29.6	-28.8	-34.8	-34.8	29.6	-28.8	-35.2	-42.4	-42.4	35.3
11:12	-28.8	-34.8	-34.8	29.4	-28.8	-34.8	-34.8	29.4	-28.8	-35.2	-42.5	-42.5	35.2
12:12	-28.9	-34.9	-34.9	29.3	-28.9	-34.9	-34.9	29.3	-28.9	-35.3	-42.5	-42.5	35.1
Exposure Category C													
1:12	-34.9	-63.9	-100.1	14.4	-40.4	-73.9	-115.7	16.0	-40.4	-46.8	-85.4	-133.6	17.9
2:12	-31.3	-60.3	-92.9	21.6	-36.3	-69.7	-107.3	24.3	-36.3	-42.0	-80.6	-123.9	27.5
3:12	-31.3	-60.3	-92.9	21.5	-36.3	-69.7	-107.3	24.3	-36.3	-42.0	-80.6	-124.0	27.5
4:12	-31.3	-60.3	-93.0	21.4	-36.3	-69.7	-107.4	24.2	-36.3	-42.1	-80.6	-124.0	27.4
5:12	-31.4	-60.4	-93.0	21.4	-36.3	-69.8	-107.4	24.1	-36.3	-42.1	-80.7	-124.0	27.3
6:12	-31.4	-60.4	-93.0	21.3	-36.4	-69.8	-107.4	24.0	-36.4	-42.1	-80.7	-124.1	27.2
7:12	-35.1	-42.3	-42.3	35.6	-40.6	-49.0	-49.0	40.6	-40.6	-47.0	-56.6	-56.6	46.4
8:12	-35.1	-42.4	-42.4	35.5	-40.7	-49.0	-49.0	40.5	-40.7	-47.0	-56.7	-56.7	46.3
9:12	-35.2	-42.4	-42.4	35.4	-40.7	-49.1	-49.1	40.4	-40.7	-47.1	-56.7	-56.7	46.2
10:12	-35.2	-42.4	-42.4	35.3	-40.7	-49.1	-49.1	40.3	-40.7	-47.1	-56.8	-56.8	46.1
11:12	-35.2	-42.5	-42.5	35.2	-40.8	-49.1	-49.1	40.2	-40.8	-47.2	-56.8	-56.8	46.0
12:12	-35.3	-42.5	-42.5	35.1	-40.8	-49.2	-49.2	40.1	-40.8	-47.2	-56.9	-56.9	45.8
Exposure Category D													
1:12	-42.6	-77.7	-121.6	16.7	-48.1	-87.7	-137.2	18.3	-48.1	-54.5	-99.2	-155.1	20.2
2:12	-38.2	-73.3	-112.9	25.4	-43.2	-82.7	-127.3	28.2	-43.2	-48.9	-93.6	-143.9	31.4
3:12	-38.2	-73.3	-112.9	25.4	-43.2	-82.8	-127.3	28.1	-43.2	-48.9	-93.6	-143.9	31.3
4:12	-38.2	-73.4	-112.9	25.3	-43.2	-82.8	-127.3	28.1	-43.2	-49.0	-93.7	-144.0	31.3
5:12	-38.3	-73.4	-112.9	25.2	-43.3	-82.8	-127.4	28.0	-43.3	-49.0	-93.7	-144.0	31.2
6:12	-38.3	-73.4	-113.0	25.1	-43.3	-82.9	-127.4	27.9	-43.3	-49.1	-93.8	-144.0	31.1
7:12	-42.7	-51.5	-51.5	42.6	-48.3	-58.2	-58.2	47.5	-48.3	-54.7	-65.9	-65.9	53.3
8:12	-42.8	-51.6	-51.6	42.4	-48.3	-58.2	-58.2	47.4	-48.3	-54.7	-65.9	-65.9	53.2
9:12	-42.8	-51.6	-51.6	42.3	-48.4	-58.3	-58.3	47.3	-48.4	-54.8	-65.9	-65.9	53.1
10:12	-42.9	-51.7	-51.7	42.2	-48.4	-58.3	-58.3	47.2	-48.4	-54.8	-66.0	-66.0	53.0
11:12	-42.9	-51.7	-51.7	42.1	-48.5	-58.4	-58.4	47.1	-48.5	-54.9	-66.0	-66.0	52.9
12:12	-43.0	-51.7	-51.7	42.0	-48.5	-58.4	-58.4	47.0	-48.5	-54.9	-66.1	-66.1	52.8
Down Slope													
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1	
1:12	0.3	0.5	0.7	0.9	1.1	1.2	1.8	2.0	2.3	2.9	3.6	4.4	
2:12	0.6	0.8	1.0	1.2	1.4	1.5	2.1	2.3	2.6	3.3	3.9	4.7	
3:12	0.8	1.1	1.3	1.5	1.6	1.8	2.3	2.5	2.9	3.5	4.2	5.0	
4:12	1.1	1.3	1.5	1.7	1.9	2.0	2.6	2.8	3.1	3.8	4.5	5.3	
5:12	1.3	1.6	1.8	2.0	2.1	2.3	2.8	3.0	3.3	4.0	4.7	5.5	
6:12	1.6	1.8	2.0	2.2	2.3	2.5	3.0	3.2	3.5	4.2	4.8	5.6	
7:12	1.8	2.0	2.2	2.4	2.5	2.7	3.2	3.4	3.7	4.3	5.0	5.8	
8:12	1.9	2.1	2.3	2.5	2.7	2.8	3.3	3.5	3.8	4.5	5.1	5.9	
9:12	2.1	2.3	2.5	2.7	2.8	3.0	3.5	3.6	4.0	4.6	5.2	5.9	
10:12	2.2	2.4	2.6	2.8	3.0	3.1	3.6	3.8	4.1	4.7	5.3	6.0	
11:12	2.4	2.6	2.7	2.9	3.1	3.2	3.7	3.8	4.1	4.7	5.3	6.0	
12:12	2.5	2.7	2.8	3.0	3.2	3.3	3.7	3.9	4.2	4.8	5.4	6.1	
Lateral													
	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1	
	0.0	0.2	0.4	0.6	0.8	0.9	1.4	1.6	2.0	2.6	3.3	4.0	

* These tables are meant as representative of the areas listed in the title. The local wind speeds and snow loads should be independently verified for the specific install location.

Up and Down (psf)

Side Load (psf)

Lateral



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-10
ASCE

110 mph

Basic Wind Speed

5 psf

Ground Snow Load

California (Typical)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

Roof Pitch	Bldg. Height = 15 ft.						Bldg. Height = 30 ft.						Bldg. Height = 60 ft.											
	Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)								
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3						
1:12	-9.8	-18.6	-29.7	14.8	-9.8	-18.6	-29.7	14.8	-12.1	-22.9	-36.3	14.8	-12.1	-22.9	-36.3	14.8	-12.1	-22.9	-36.3	14.8				
2:12	-8.7	-17.5	-27.5	14.4	-8.7	-17.5	-27.5	14.4	-10.8	-21.6	-33.6	14.4	-10.8	-21.6	-33.6	14.4	-10.8	-21.6	-33.6	14.4				
3:12	-8.7	-17.6	-27.5	14.0	-8.7	-17.6	-27.5	14.0	-10.8	-21.6	-33.7	14.0	-10.8	-21.6	-33.7	14.0	-10.8	-21.6	-33.7	14.0				
4:12	-8.7	-17.6	-27.5	13.5	-8.7	-17.6	-27.5	13.5	-10.9	-21.6	-33.7	13.5	-10.9	-21.6	-33.7	13.5	-10.9	-21.6	-33.7	13.5				
5:12	-8.8	-17.6	-27.6	13.2	-8.8	-17.6	-27.6	13.2	-10.9	-21.6	-33.7	13.2	-10.9	-21.6	-33.7	13.2	-10.9	-21.6	-33.7	13.2				
6:12	-8.8	-17.7	-27.6	13.0	-8.8	-17.7	-27.6	13.0	-10.9	-21.7	-33.8	13.0	-10.9	-21.7	-33.8	13.0	-10.9	-21.7	-33.8	13.0				
7:12	-9.9	-12.2	-12.2	13.3	-9.9	-12.2	-12.2	13.3	-12.2	-12.2	-12.2	13.3	-12.2	-12.2	-12.2	13.3	-12.2	-12.2	-12.2	13.3				
8:12	-10.0	-12.2	-12.2	13.2	-10.0	-12.2	-12.2	13.2	-12.2	-12.2	-12.2	13.2	-12.2	-12.2	-12.2	13.2	-12.2	-12.2	-12.2	13.2				
9:12	-10.0	-12.2	-12.2	13.0	-10.0	-12.2	-12.2	13.0	-12.2	-12.2	-12.2	13.0	-12.2	-12.2	-12.2	13.0	-12.2	-12.2	-12.2	13.0				
10:12	-10.1	-12.3	-12.3	12.9	-10.1	-12.3	-12.3	12.9	-12.3	-12.3	-12.3	12.9	-12.3	-12.3	-12.3	12.9	-12.3	-12.3	-12.3	12.9				
11:12	-10.1	-12.3	-12.3	12.8	-10.1	-12.3	-12.3	12.8	-12.3	-12.3	-12.3	12.8	-12.3	-12.3	-12.3	12.8	-12.3	-12.3	-12.3	12.8				
12:12	-10.2	-12.4	-12.4	12.7	-10.2	-12.4	-12.4	12.7	-12.4	-12.4	-12.4	12.7	-12.4	-12.4	-12.4	12.7	-12.4	-12.4	-12.4	12.7				
1:12	-12.1	-22.9	-36.3	14.8	-14.2	-26.6	-42.1	14.8	-16.6	-30.9	-48.7	14.8	-16.6	-30.9	-48.7	14.8	-16.6	-30.9	-48.7	14.8				
2:12	-10.8	-21.6	-33.6	14.4	-12.7	-25.1	-39.0	14.4	-14.8	-29.1	-45.1	14.4	-14.8	-29.1	-45.1	14.4	-14.8	-29.1	-45.1	14.4				
3:12	-10.8	-21.6	-33.7	14.0	-12.7	-25.1	-39.0	14.0	-14.8	-29.1	-45.2	14.0	-14.8	-29.1	-45.2	14.0	-14.8	-29.1	-45.2	14.0				
4:12	-10.9	-21.6	-33.7	13.5	-12.7	-25.1	-39.0	13.5	-14.8	-29.1	-45.2	13.5	-14.8	-29.1	-45.2	13.5	-14.8	-29.1	-45.2	13.5				
5:12	-10.9	-21.6	-33.7	13.2	-12.7	-25.1	-39.1	13.2	-14.9	-29.2	-45.2	13.2	-14.9	-29.2	-45.2	13.2	-14.9	-29.2	-45.2	13.2				
6:12	-10.9	-21.7	-33.8	13.0	-12.8	-25.2	-39.1	13.0	-14.9	-29.2	-45.3	13.0	-14.9	-29.2	-45.3	13.0	-14.9	-29.2	-45.3	13.0				
7:12	-12.3	-15.0	-15.0	15.4	-14.4	-17.5	-17.5	17.3	-16.7	-20.3	-20.3	19.4	-16.7	-20.3	-20.3	19.4	-16.7	-20.3	-20.3	19.4				
8:12	-12.4	-15.0	-15.0	15.3	-14.4	-17.5	-17.5	17.1	-16.8	-20.4	-20.4	19.3	-16.8	-20.4	-20.4	19.3	-16.8	-20.4	-20.4	19.3				
9:12	-12.4	-15.1	-15.1	15.2	-14.5	-17.6	-17.6	17.0	-16.8	-20.4	-20.4	19.1	-16.8	-20.4	-20.4	19.1	-16.8	-20.4	-20.4	19.1				
10:12	-12.4	-15.1	-15.1	15.0	-14.5	-17.6	-17.6	16.9	-16.9	-20.4	-20.4	19.0	-16.9	-20.4	-20.4	19.0	-16.9	-20.4	-20.4	19.0				
11:12	-12.5	-15.2	-15.2	14.9	-14.5	-17.6	-17.6	16.8	-16.9	-20.5	-20.5	18.9	-16.9	-20.5	-20.5	18.9	-16.9	-20.5	-20.5	18.9				
12:12	-12.5	-15.2	-15.2	14.8	-14.6	-17.7	-17.7	16.7	-16.9	-20.5	-20.5	18.8	-16.9	-20.5	-20.5	18.8	-16.9	-20.5	-20.5	18.8				
1:12	-15.0	-28.0	-44.3	14.8	-17.0	-31.7	-50.0	14.8	-19.4	-36.0	-56.7	14.8	-19.4	-36.0	-56.7	14.8	-19.4	-36.0	-56.7	14.8				
2:12	-13.4	-26.4	-41.0	14.4	-15.2	-29.9	-46.4	14.4	-17.4	-33.9	-52.5	15.0	-17.4	-33.9	-52.5	15.0	-17.4	-33.9	-52.5	15.0				
3:12	-13.4	-26.4	-41.1	14.0	-15.2	-29.9	-46.4	14.0	-17.4	-33.9	-52.6	14.5	-17.4	-33.9	-52.6	14.5	-17.4	-33.9	-52.6	14.5				
4:12	-13.4	-26.4	-41.1	13.5	-15.3	-29.9	-46.4	13.5	-17.4	-34.0	-52.6	14.1	-17.4	-34.0	-52.6	14.1	-17.4	-34.0	-52.6	14.1				
5:12	-13.5	-26.5	-41.1	13.2	-15.3	-30.0	-46.5	13.2	-17.4	-34.0	-52.6	13.9	-17.4	-34.0	-52.6	13.9	-17.4	-34.0	-52.6	13.9				
6:12	-13.5	-26.5	-41.2	13.0	-15.3	-30.0	-46.5	13.0	-17.5	-34.0	-52.7	13.8	-17.5	-34.0	-52.7	13.8	-17.5	-34.0	-52.7	13.8				
7:12	-15.2	-18.4	-18.4	18.0	-17.2	-20.9	-20.9	19.8	-19.6	-23.7	-23.7	21.9	-19.6	-23.7	-23.7	21.9	-19.6	-23.7	-23.7	21.9				
8:12	-15.2	-18.5	-18.5	17.8	-17.3	-20.9	-20.9	19.7	-19.6	-23.8	-23.8	21.8	-19.6	-23.8	-23.8	21.8	-19.6	-23.8	-23.8	21.8				
9:12	-15.2	-18.5	-18.5	17.7	-17.3	-21.0	-21.0	19.6	-19.7	-23.8	-23.8	21.7	-19.7	-23.8	-23.8	21.7	-19.7	-23.8	-23.8	21.7				
10:12	-15.3	-18.5	-18.5	17.6	-17.3	-21.0	-21.0	19.4	-19.7	-23.8	-23.8	21.6	-19.7	-23.8	-23.8	21.6	-19.7	-23.8	-23.8	21.6				
11:12	-15.3	-18.6	-18.6	17.5	-17.4	-21.0	-21.0	19.3	-19.7	-23.9	-23.9	21.5	-19.7	-23.9	-23.9	21.5	-19.7	-23.9	-23.9	21.5				
12:12	-15.4	-18.6	-18.6	17.4	-17.4	-21.1	-21.1	19.2	-19.8	-23.9	-23.9	21.3	-19.8	-23.9	-23.9	21.3	-19.8	-23.9	-23.9	21.3				
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1
1:12	0.7	0.8	1.0	1.1	1.3	1.4	1.9	2.1	2.5	3.2	4.0	4.8	0.0	0.2	0.5	0.7	0.9	1.0	1.6	1.8	2.2	2.9	3.6	4.5
2:12	1.4	1.4	1.6	1.7	1.9	2.0	2.4	2.6	2.9	3.6	4.3	5.2												
3:12	1.9	1.9	2.0	2.2	2.4	2.5	2.9	3.1	3.4	3.9	4.6	5.5												
4:12	2.4	2.4	2.5	2.6	2.8	2.9	3.3	3.5	3.8	4.3	4.9	5.8												
5:12	2.8	2.8	2.8	3.0	3.1	3.2	3.7	3.8	4.1	4.6	5.2	6.0												
6:12	3.1	3.1	3.1	3.2	3.4	3.5	3.9	4.1	4.3	4.9	5.4	6.2												
7:12	3.3	3.3	3.3	3.4	3.6	3.7	4.1	4.3	4.5	5.1	5.6	6.3												
8:12	3.4	3.4	3.4	3.6	3.7	3.8	4.3	4.4	4.7	5.2	5.7	6.5												
9:12	3.5	3.5	3.6	3.7	3.8	3.9	4.4	4.5	4.8	5.3	5.8	6.5												
10:12	3.6	3.6	3.6	3.8	3.9	4.0	4.4	4.6	4.8	5.3	5.8	6.6												
11:12	3.7	3.7	3.7	3.8	4.0	4.1	4.5	4.6	4.9	5.3	5.9	6.6												
12:12	3.7	3.7	3.7	3.9	4.0	4.1	4.5	4.6	4.9	5.3	5.9	6.7												

* These tables are meant as representative of the areas listed in the title. The local wind speeds and snow loads should be independently verified for the specific install location.

Up and Down (psf)

Side Load (psf)

Lateral



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-10
ASCE

115 mph

Basic Wind Speed

5 psf

Ground Snow Load

Southwest (Typical)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

Roof Pitch	Bldg. Height = 15 ft.						Bldg. Height = 30 ft.						Bldg. Height = 60 ft.											
	Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)								
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3						
1:12	-10.8	-20.5	-32.6	14.8	-10.8	-20.5	-32.6	14.8	-10.8	-20.5	-32.6	14.8	-13.4	-25.1	-39.8	14.8	-13.4	-25.1	-39.8	14.8				
2:12	-9.6	-19.3	-30.2	14.4	-9.6	-19.3	-30.2	14.4	-9.6	-19.3	-30.2	14.4	-11.9	-23.7	-36.9	14.4	-11.9	-23.7	-36.9	14.4				
3:12	-9.6	-19.3	-30.2	14.0	-9.6	-19.3	-30.2	14.0	-9.6	-19.3	-30.2	14.0	-12.0	-23.7	-36.9	14.0	-12.0	-23.7	-36.9	14.0				
4:12	-9.7	-19.3	-30.2	13.5	-9.7	-19.3	-30.2	13.5	-9.7	-19.3	-30.2	13.5	-12.0	-23.7	-36.9	13.5	-12.0	-23.7	-36.9	13.5				
5:12	-9.7	-19.4	-30.2	13.2	-9.7	-19.4	-30.2	13.2	-9.7	-19.4	-30.2	13.2	-12.0	-23.8	-37.0	13.2	-12.0	-23.8	-37.0	13.2				
6:12	-9.7	-19.4	-30.3	13.0	-9.7	-19.4	-30.3	13.0	-9.7	-19.4	-30.3	13.0	-12.1	-23.8	-37.0	13.0	-12.1	-23.8	-37.0	13.0				
7:12	-11.0	-13.4	-13.4	14.2	-11.0	-13.4	-13.4	14.2	-11.0	-13.4	-13.4	14.2	-13.6	-16.5	-16.5	14.2	-13.6	-16.5	-16.5	14.2				
8:12	-11.0	-13.4	-13.4	14.1	-11.0	-13.4	-13.4	14.1	-11.0	-13.4	-13.4	14.1	-13.6	-16.5	-16.5	14.1	-13.6	-16.5	-16.5	14.1				
9:12	-11.1	-13.5	-13.5	14.0	-11.1	-13.5	-13.5	14.0	-11.1	-13.5	-13.5	14.0	-13.6	-16.6	-16.6	14.0	-13.6	-16.6	-16.6	14.0				
10:12	-11.1	-13.5	-13.5	13.8	-11.1	-13.5	-13.5	13.8	-11.1	-13.5	-13.5	13.8	-13.7	-16.6	-16.6	13.8	-13.7	-16.6	-16.6	13.8				
11:12	-11.1	-13.6	-13.6	13.7	-11.1	-13.6	-13.6	13.7	-11.1	-13.6	-13.6	13.7	-13.7	-16.7	-16.7	13.7	-13.7	-16.7	-16.7	13.7				
12:12	-11.2	-13.6	-13.6	13.6	-11.2	-13.6	-13.6	13.6	-11.2	-13.6	-13.6	13.6	-13.8	-16.7	-16.7	13.6	-13.8	-16.7	-16.7	13.6				
1:12	-13.4	-25.1	-39.8	14.8	-15.6	-29.2	-46.1	14.8	-18.7	-34.8	-54.8	14.8	-18.2	-33.8	-53.4	14.8	-18.2	-33.8	-53.4	14.8				
2:12	-11.9	-23.7	-36.9	14.4	-14.0	-27.5	-42.7	14.4	-16.8	-32.8	-50.8	14.7	-16.3	-31.9	-49.5	14.5	-16.3	-31.9	-49.5	14.5				
3:12	-12.0	-23.7	-36.9	14.0	-14.0	-27.5	-42.7	14.0	-16.8	-32.8	-50.8	14.3	-19.1	-37.2	-57.6	15.3	-19.1	-37.2	-57.6	15.3				
4:12	-12.0	-23.7	-36.9	13.5	-14.0	-27.5	-42.8	13.5	-16.8	-32.8	-50.9	13.8	-19.1	-37.2	-57.6	15.0	-19.1	-37.2	-57.6	15.0				
5:12	-14.8	-29.0	-45.1	13.2	-16.8	-32.9	-50.9	13.6	-16.8	-32.9	-50.9	13.5	-19.2	-37.3	-57.6	14.9	-19.2	-37.3	-57.6	14.9				
6:12	-14.9	-29.1	-45.1	13.0	-16.9	-32.9	-50.9	13.5	-16.9	-32.9	-50.9	13.5	-19.2	-37.3	-57.7	14.8	-19.2	-37.3	-57.7	14.8				
7:12	-16.7	-20.2	-20.2	19.3	-18.9	-22.9	-22.9	21.3	-19.0	-23.0	-23.0	21.2	-21.5	-26.0	-26.0	23.7	-21.5	-26.0	-26.0	23.7				
8:12	-16.7	-20.3	-20.3	19.2	-19.0	-23.0	-23.0	21.2	-19.0	-23.0	-23.0	21.1	-21.6	-26.1	-26.1	23.6	-21.6	-26.1	-26.1	23.6				
9:12	-16.8	-20.3	-20.3	19.1	-19.0	-23.0	-23.0	21.1	-19.0	-23.0	-23.0	21.0	-21.6	-26.1	-26.1	23.4	-21.6	-26.1	-26.1	23.4				
10:12	-16.8	-20.4	-20.4	19.0	-19.0	-23.0	-23.0	21.0	-19.0	-23.0	-23.0	21.0	-21.6	-26.2	-26.2	23.3	-21.6	-26.2	-26.2	23.3				
11:12	-16.8	-20.4	-20.4	18.8	-19.1	-23.1	-23.1	20.9	-19.1	-23.1	-23.1	20.9	-21.7	-26.2	-26.2	23.2	-21.7	-26.2	-26.2	23.2				
12:12	-16.9	-20.4	-20.4	18.7	-19.1	-23.1	-23.1	20.7	-19.1	-23.1	-23.1	20.7	-21.7	-26.2	-26.2	23.1	-21.7	-26.2	-26.2	23.1				
Roof Pitch	S _s = 0.0	S _s = 0.1	S _s = 0.2	S _s = 0.3	S _s = 0.4	S _s = 0.5	S _s = 1.0	S _s = 1.25	S _s = 1.5	S _s = 2.0	S _s = 2.5	S _s = 3.1	S _s = 0.0	S _s = 0.1	S _s = 0.2	S _s = 0.3	S _s = 0.4	S _s = 0.5	S _s = 1.0	S _s = 1.25	S _s = 1.5	S _s = 2.0	S _s = 2.5	S _s = 3.1
1:12	0.7	0.8	1.0	1.1	1.3	1.4	1.9	2.1	2.5	3.2	4.0	4.8	0.0	0.2	0.5	0.7	0.9	1.0	1.6	1.8	2.2	2.9	3.6	4.5
2:12	1.4	1.4	1.6	1.7	1.9	2.0	2.4	2.6	2.9	3.6	4.3	5.2	0.0	0.2	0.5	0.7	0.9	1.0	1.6	1.8	2.2	2.9	3.6	4.5
3:12	1.9	1.9	2.0	2.2	2.4	2.5	2.9	3.1	3.4	3.9	4.6	5.5	0.0	0.2	0.5	0.7	0.9	1.0	1.6	1.8	2.2	2.9	3.6	4.5
4:12	2.4	2.4	2.5	2.6	2.8	2.9	3.3	3.5	3.8	4.3	4.9	5.8	0.0	0.2	0.5	0.7	0.9	1.0	1.6	1.8	2.2	2.9	3.6	4.5
5:12	2.8	2.8	2.8	3.0	3.1	3.2	3.7	3.8	4.1	4.6	5.2	6.0	0.0	0.2	0.5	0.7	0.9	1.0	1.6	1.8	2.2	2.9	3.6	4.5
6:12	3.1	3.1	3.1	3.2	3.4	3.5	3.9	4.1	4.3	4.9	5.4	6.2	0.0	0.2	0.5	0.7	0.9	1.0	1.6	1.8	2.2	2.9	3.6	4.5
7:12	3.3	3.3	3.3	3.4	3.6	3.7	4.1	4.3	4.5	5.1	5.6	6.3	0.0	0.2	0.5	0.7	0.9	1.0	1.6	1.8	2.2	2.9	3.6	4.5
8:12	3.4	3.4	3.4	3.6	3.7	3.8	4.3	4.4	4.7	5.2	5.7	6.5	0.0	0.2	0.5	0.7	0.9	1.0	1.6	1.8	2.2	2.9	3.6	4.5
9:12	3.5	3.5	3.5	3.6	3.7	3.8	3.9	4.4	4.5	4.8	5.3	6.5	0.0	0.2	0.5	0.7	0.9	1.0	1.6	1.8	2.2	2.9	3.6	4.5
10:12	3.6	3.6	3.6	3.8	3.9	4.0	4.4	4.6	4.8	5.3	5.8	6.6	0.0	0.2	0.5	0.7	0.9	1.0	1.6	1.8	2.2	2.9	3.6	4.5
11:12	3.7	3.7	3.7	3.8	4.0	4.1	4.5	4.6	4.9	5.3	5.9	6.6	0.0	0.2	0.5	0.7	0.9	1.0	1.6	1.8	2.2	2.9	3.6	4.5
12:12	3.7	3.7	3.7	3.9	4.0	4.1	4.5	4.6	4.9	5.3	5.9	6.7	0.0	0.2	0.5	0.7	0.9	1.0	1.6	1.8	2.2	2.9	3.6	4.5

* These tables are meant as representative of the areas listed in the title. The local wind speeds and snow loads should be independently verified for the specific install location.

Up and Down (psf)

Side Load (psf)

Lateral



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-10
ASCE

Massachusetts (Typical)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

115 mph

Basic Wind Speed

40 psf

Ground Snow Load

Roof Pitch	Bldg. Height = 15 ft.						Bldg. Height = 30 ft.						Bldg. Height = 60 ft.							
	Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)				
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3		
Exposure Category B																				
1:12	-10.8	-20.5	-32.6	31.9	-10.8	-20.5	-32.6	31.9	-13.4	-25.1	-39.8	31.9	-10.8	-20.5	-32.6	31.9	-13.4	-25.1	-39.8	31.9
2:12	-9.6	-19.3	-30.2	30.0	-9.6	-19.3	-30.2	30.0	-11.9	-23.7	-36.9	30.0	-9.6	-19.3	-30.2	30.0	-11.9	-23.7	-36.9	30.0
3:12	-9.6	-19.3	-30.2	27.9	-9.6	-19.3	-30.2	27.9	-12.0	-23.7	-36.9	27.9	-9.6	-19.3	-30.2	27.9	-12.0	-23.7	-36.9	27.9
4:12	-9.7	-19.3	-30.2	25.8	-9.7	-19.3	-30.2	25.8	-12.0	-23.7	-36.9	25.8	-9.7	-19.3	-30.2	25.8	-12.0	-23.7	-36.9	25.8
5:12	-9.7	-19.4	-30.2	23.8	-9.7	-19.4	-30.2	23.8	-12.0	-23.8	-37.0	23.8	-9.7	-19.4	-30.2	23.8	-12.0	-23.8	-37.0	23.8
6:12	-9.7	-19.4	-30.3	21.9	-9.7	-19.4	-30.3	21.9	-12.1	-23.8	-37.0	21.9	-9.7	-19.4	-30.3	21.9	-12.1	-23.8	-37.0	21.9
7:12	-11.0	-13.4	-13.4	21.1	-11.0	-13.4	-13.4	21.1	-13.6	-16.5	-16.5	21.1	-11.0	-13.4	-13.4	21.1	-13.6	-16.5	-16.5	21.1
8:12	-11.0	-13.4	-13.4	19.5	-11.0	-13.4	-13.4	19.5	-13.6	-16.5	-16.5	19.5	-11.0	-13.4	-13.4	19.5	-13.6	-16.5	-16.5	19.5
9:12	-11.1	-13.5	-13.5	18.1	-11.1	-13.5	-13.5	18.1	-13.6	-16.6	-16.6	18.1	-11.1	-13.5	-13.5	18.1	-13.6	-16.6	-16.6	18.1
10:12	-11.1	-13.5	-13.5	16.9	-11.1	-13.5	-13.5	16.9	-13.7	-16.6	-16.6	16.9	-11.1	-13.5	-13.5	16.9	-13.7	-16.6	-16.6	16.9
11:12	-11.1	-13.6	-13.6	15.8	-11.1	-13.6	-13.6	15.8	-13.7	-16.7	-16.7	15.8	-11.1	-13.6	-13.6	15.8	-13.7	-16.7	-16.7	15.8
12:12	-11.2	-13.6	-13.6	14.9	-11.2	-13.6	-13.6	14.9	-13.8	-16.7	-16.7	14.9	-11.2	-13.6	-13.6	14.9	-13.8	-16.7	-16.7	14.9
Exposure Category C																				
1:12	-13.4	-25.1	-39.8	31.9	-15.6	-29.2	-46.1	31.9	-18.2	-33.8	-53.4	31.9	-13.4	-25.1	-39.8	31.9	-18.2	-33.8	-53.4	31.9
2:12	-11.9	-23.7	-36.9	30.0	-14.0	-27.5	-42.7	30.0	-16.3	-31.9	-49.5	30.1	-11.9	-23.7	-36.9	30.0	-16.3	-31.9	-49.5	30.1
3:12	-12.0	-23.7	-36.9	27.9	-14.0	-27.5	-42.7	27.9	-16.3	-31.9	-49.5	28.1	-12.0	-23.7	-36.9	27.9	-16.3	-31.9	-49.5	28.1
4:12	-12.0	-23.7	-36.9	25.8	-14.0	-27.5	-42.8	25.8	-16.3	-32.0	-49.5	26.0	-12.0	-23.7	-36.9	25.8	-16.3	-32.0	-49.5	26.0
5:12	-12.0	-23.8	-37.0	23.8	-14.0	-27.6	-42.8	23.8	-16.4	-32.0	-49.5	23.9	-12.0	-23.8	-37.0	23.8	-16.4	-32.0	-49.5	23.9
6:12	-12.1	-23.8	-37.0	21.9	-14.1	-27.6	-42.8	21.9	-16.4	-32.0	-49.6	22.0	-12.1	-23.8	-37.0	21.9	-16.4	-32.0	-49.6	22.0
7:12	-13.6	-16.5	-16.5	22.8	-15.8	-19.2	-19.2	24.3	-18.4	-22.3	-22.3	26.1	-13.6	-16.5	-16.5	22.8	-18.4	-22.3	-22.3	26.1
8:12	-13.6	-16.5	-16.5	21.2	-15.9	-19.2	-19.2	22.7	-18.4	-22.3	-22.3	24.5	-13.6	-16.5	-16.5	21.2	-18.4	-22.3	-22.3	24.5
9:12	-13.6	-16.6	-16.6	19.8	-15.9	-19.3	-19.3	21.4	-18.5	-22.4	-22.4	23.1	-13.6	-16.6	-16.6	19.8	-18.5	-22.4	-22.4	23.1
10:12	-13.7	-16.6	-16.6	18.6	-15.9	-19.3	-19.3	20.1	-18.5	-22.4	-22.4	21.9	-13.7	-16.6	-16.6	18.6	-18.5	-22.4	-22.4	21.9
11:12	-13.7	-16.7	-16.7	17.6	-16.0	-19.4	-19.4	19.1	-18.6	-22.5	-22.5	20.8	-13.7	-16.7	-16.7	17.6	-18.6	-22.5	-22.5	20.8
12:12	-13.8	-16.7	-16.7	16.7	-16.0	-19.4	-19.4	18.2	-18.6	-22.5	-22.5	20.3	-13.8	-16.7	-16.7	16.7	-18.6	-22.5	-22.5	20.3
Exposure Category D																				
1:12	-16.5	-30.7	-48.5	29.8	-18.7	-34.8	-54.8	29.8	-21.3	-39.4	-62.1	29.8	-16.5	-30.7	-48.5	29.8	-21.3	-39.4	-62.1	29.8
2:12	-14.7	-29.0	-45.0	28.1	-16.8	-32.8	-50.8	28.4	-19.1	-37.2	-57.5	29.4	-14.7	-29.0	-45.0	28.1	-19.1	-37.2	-57.5	29.4
3:12	-14.8	-29.0	-45.0	26.2	-16.8	-32.8	-50.8	26.6	-19.1	-37.2	-57.6	27.5	-14.8	-29.0	-45.0	26.2	-19.1	-37.2	-57.6	27.5
4:12	-14.8	-29.0	-45.0	24.3	-16.8	-32.8	-50.9	24.7	-19.1	-37.2	-57.6	25.6	-14.8	-29.0	-45.0	24.3	-19.1	-37.2	-57.6	25.6
5:12	-14.8	-29.0	-45.1	22.5	-16.8	-32.9	-50.9	22.8	-19.2	-37.3	-57.6	23.8	-14.8	-29.0	-45.1	22.5	-19.2	-37.3	-57.6	23.8
6:12	-14.9	-29.1	-45.1	20.7	-16.9	-32.9	-50.9	21.1	-19.2	-37.3	-57.7	22.0	-14.9	-29.1	-45.1	20.7	-19.2	-37.3	-57.7	22.0
7:12	-16.7	-20.2	-20.2	24.0	-18.9	-22.9	-22.9	25.5	-21.5	-26.0	-26.0	27.2	-16.7	-20.2	-20.2	24.0	-21.5	-26.0	-26.0	27.2
8:12	-16.7	-20.3	-20.3	22.5	-19.0	-23.0	-23.0	24.0	-21.6	-26.1	-26.1	25.8	-16.7	-20.3	-20.3	22.5	-21.6	-26.1	-26.1	25.8
9:12	-16.8	-20.3	-20.3	21.2	-19.0	-23.0	-23.0	22.8	-21.6	-26.1	-26.1	24.5	-16.8	-20.3	-20.3	21.2	-21.6	-26.1	-26.1	24.5
10:12	-16.8	-20.4	-20.4	20.1	-19.0	-23.0	-23.0	21.7	-21.6	-26.2	-26.2	23.4	-16.8	-20.4	-20.4	20.1	-21.6	-26.2	-26.2	23.4
11:12	-16.8	-20.4	-20.4	19.2	-19.1	-23.1	-23.1	20.9	-21.7	-26.2	-26.2	23.2	-16.8	-20.4	-20.4	19.2	-21.7	-26.2	-26.2	23.2
12:12	-16.9	-20.4	-20.4	18.7	-19.1	-23.1	-23.1	20.7	-21.7	-26.2	-26.2	23.1	-16.9	-20.4	-20.4	18.7	-21.7	-26.2	-26.2	23.1
Down Slope																				
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1								
1:12	2.6	2.6	2.6	2.6	2.7	2.8	3.3	3.4	3.7	4.2	4.8	5.5								
2:12	4.9	4.9	4.9	4.9	4.9	4.9	5.0	5.2	5.5	6.0	6.6	7.2								
3:12	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.9	7.4	8.0	8.6								
4:12	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8.4	9.0	9.6								
5:12	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	9.1	9.7	10.3								
6:12	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.5	10.0	10.7								
7:12	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.7	10.2	10.8								
8:12	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.6	10.2	10.8								
9:12	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.5	10.0	10.6								
10:12	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	9.3	9.8	10.4								
11:12	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	9.0	9.5	10.0								
12:12	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.2	8.7	9.1								
Lateral																				
Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1									
0.0	0.2	0.5	0.7	0.9	1.0	1.6	1.8	2.2	2.9	3.6	4.5									

* These tables are meant as representative of the areas listed in the title. The local wind speeds and snow loads should be independently verified for the specific install location.

Up and Down (psf)

Side Load (psf)

Lateral



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-10
ASCE

Mid US (High Snow)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

Roof Pitch	Bldg. Height = 15 ft.						Bldg. Height = 30 ft.						Bldg. Height = 60 ft.							
	Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)				
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3		
Exposure Category B																				
1:12	-10.8	-20.5	-32.6	45.5	-10.8	-20.5	-32.6	45.5	-13.4	-25.1	-39.8	45.5	-10.8	-20.5	-32.6	45.5	-13.4	-25.1	-39.8	45.5
2:12	-9.6	-19.3	-30.2	41.9	-9.6	-19.3	-30.2	41.9	-11.9	-23.7	-36.9	41.9	-9.6	-19.3	-30.2	41.9	-11.9	-23.7	-36.9	41.9
3:12	-9.6	-19.3	-30.2	37.8	-9.6	-19.3	-30.2	37.8	-12.0	-23.7	-36.9	37.8	-9.6	-19.3	-30.2	37.8	-12.0	-23.7	-36.9	37.8
4:12	-9.7	-19.3	-30.2	33.6	-9.7	-19.3	-30.2	33.6	-12.0	-23.7	-36.9	33.6	-9.7	-19.3	-30.2	33.6	-12.0	-23.7	-36.9	33.6
5:12	-9.7	-19.4	-30.2	30.3	-9.7	-19.4	-30.2	30.3	-12.0	-23.8	-37.0	30.3	-9.7	-19.4	-30.2	30.3	-12.0	-23.8	-37.0	30.3
6:12	-9.7	-19.4	-30.3	27.5	-9.7	-19.4	-30.3	27.5	-12.1	-23.8	-37.0	27.5	-9.7	-19.4	-30.3	27.5	-12.1	-23.8	-37.0	27.5
7:12	-11.0	-13.4	-13.4	25.9	-11.0	-13.4	-13.4	25.9	-13.6	-16.5	-16.5	27.6	-11.0	-13.4	-13.4	25.9	-13.6	-16.5	-16.5	27.6
8:12	-11.0	-13.4	-13.4	23.5	-11.0	-13.4	-13.4	23.5	-13.6	-16.5	-16.5	25.3	-11.0	-13.4	-13.4	23.5	-13.6	-16.5	-16.5	25.3
9:12	-11.1	-13.5	-13.5	21.5	-11.1	-13.5	-13.5	21.5	-13.6	-16.6	-16.6	23.3	-11.1	-13.5	-13.5	21.5	-13.6	-16.6	-16.6	23.3
10:12	-11.1	-13.5	-13.5	19.7	-11.1	-13.5	-13.5	19.7	-13.7	-16.6	-16.6	21.5	-11.1	-13.5	-13.5	19.7	-13.7	-16.6	-16.6	21.5
11:12	-11.1	-13.6	-13.6	18.2	-11.1	-13.6	-13.6	18.2	-13.7	-16.7	-16.7	20.0	-11.1	-13.6	-13.6	18.2	-13.7	-16.7	-16.7	20.0
12:12	-11.2	-13.6	-13.6	16.9	-11.2	-13.6	-13.6	16.9	-13.8	-16.7	-16.7	18.7	-11.2	-13.6	-13.6	16.9	-13.8	-16.7	-16.7	18.7
Exposure Category C																				
1:12	-13.4	-25.1	-39.8	45.5	-15.6	-29.2	-46.1	45.5	-18.2	-33.8	-53.4	45.5	-13.4	-25.1	-39.8	45.5	-18.2	-33.8	-53.4	45.5
2:12	-11.9	-23.7	-36.9	41.9	-14.0	-27.5	-42.7	41.9	-16.3	-31.9	-49.5	41.9	-11.9	-23.7	-36.9	41.9	-16.3	-31.9	-49.5	41.9
3:12	-12.0	-23.7	-36.9	37.8	-14.0	-27.5	-42.7	37.8	-16.3	-31.9	-49.5	37.8	-12.0	-23.7	-36.9	37.8	-16.3	-31.9	-49.5	37.8
4:12	-12.0	-23.7	-36.9	33.6	-14.0	-27.5	-42.8	33.6	-16.3	-32.0	-49.5	33.6	-12.0	-23.7	-36.9	33.6	-16.3	-32.0	-49.5	33.6
5:12	-12.0	-23.8	-37.0	30.3	-14.0	-27.6	-42.8	30.3	-16.4	-32.0	-49.5	30.4	-12.0	-23.8	-37.0	30.3	-16.4	-32.0	-49.5	30.4
6:12	-12.1	-23.8	-37.0	27.5	-14.1	-27.6	-42.8	27.5	-16.4	-32.0	-49.6	27.6	-12.1	-23.8	-37.0	27.5	-16.4	-32.0	-49.6	27.6
7:12	-13.6	-16.5	-16.5	27.6	-15.8	-19.2	-19.2	29.1	-18.4	-22.3	-22.3	30.9	-13.6	-16.5	-16.5	27.6	-18.4	-22.3	-22.3	30.9
8:12	-13.6	-16.5	-16.5	25.3	-15.9	-19.2	-19.2	26.8	-18.4	-22.3	-22.3	28.6	-13.6	-16.5	-16.5	25.3	-18.4	-22.3	-22.3	28.6
9:12	-13.6	-16.6	-16.6	23.3	-15.9	-19.3	-19.3	24.8	-18.5	-22.4	-22.4	26.5	-13.6	-16.6	-16.6	23.3	-18.5	-22.4	-22.4	26.5
10:12	-13.7	-16.6	-16.6	21.5	-15.9	-19.3	-19.3	23.0	-18.5	-22.4	-22.4	24.8	-13.7	-16.6	-16.6	21.5	-18.5	-22.4	-22.4	24.8
11:12	-13.7	-16.7	-16.7	20.0	-16.0	-19.4	-19.4	21.5	-18.6	-22.5	-22.5	23.2	-13.7	-16.7	-16.7	20.0	-18.6	-22.5	-22.5	23.2
12:12	-13.8	-16.7	-16.7	18.7	-16.0	-19.4	-19.4	20.2	-18.6	-22.5	-22.5	21.9	-13.8	-16.7	-16.7	18.7	-18.6	-22.5	-22.5	21.9
Exposure Category D																				
1:12	-16.5	-30.7	-48.5	41.4	-18.7	-34.8	-54.8	41.4	-21.3	-39.4	-62.1	41.4	-16.5	-30.7	-48.5	41.4	-21.3	-39.4	-62.1	41.4
2:12	-14.7	-29.0	-45.0	38.0	-16.8	-32.8	-50.8	38.0	-19.1	-37.2	-57.5	38.0	-14.7	-29.0	-45.0	38.0	-19.1	-37.2	-57.5	38.0
3:12	-14.8	-29.0	-45.0	34.4	-16.8	-32.8	-50.8	34.4	-19.1	-37.2	-57.6	35.2	-14.8	-29.0	-45.0	34.4	-19.1	-37.2	-57.6	35.2
4:12	-14.8	-29.0	-45.0	31.1	-16.8	-32.8	-50.9	31.4	-19.1	-37.2	-57.6	32.4	-14.8	-29.0	-45.0	31.1	-19.1	-37.2	-57.6	32.4
5:12	-14.8	-29.0	-45.1	28.4	-16.8	-32.9	-50.9	28.7	-19.2	-37.3	-57.6	29.6	-14.8	-29.0	-45.1	28.4	-19.2	-37.3	-57.6	29.6
6:12	-14.9	-29.1	-45.1	25.8	-16.9	-32.9	-50.9	26.1	-19.2	-37.3	-57.7	27.1	-14.9	-29.1	-45.1	25.8	-19.2	-37.3	-57.7	27.1
7:12	-16.7	-20.2	-20.2	28.3	-18.9	-22.9	-22.9	29.8	-21.5	-26.0	-26.0	31.5	-16.7	-20.2	-20.2	28.3	-21.5	-26.0	-26.0	31.5
8:12	-16.7	-20.3	-20.3	26.2	-19.0	-23.0	-23.0	27.7	-21.6	-26.1	-26.1	29.4	-16.7	-20.3	-20.3	26.2	-21.6	-26.1	-26.1	29.4
9:12	-16.8	-20.3	-20.3	24.3	-19.0	-23.0	-23.0	25.8	-21.6	-26.1	-26.1	27.6	-16.8	-20.3	-20.3	24.3	-21.6	-26.1	-26.1	27.6
10:12	-16.8	-20.4	-20.4	22.7	-19.0	-23.0	-23.0	24.2	-21.6	-26.2	-26.2	26.0	-16.8	-20.4	-20.4	22.7	-21.6	-26.2	-26.2	26.0
11:12	-16.8	-20.4	-20.4	21.4	-19.1	-23.1	-23.1	22.9	-21.7	-26.2	-26.2	24.6	-16.8	-20.4	-20.4	21.4	-21.7	-26.2	-26.2	24.6
12:12	-16.9	-20.4	-20.4	20.2	-19.1	-23.1	-23.1	21.7	-21.7	-26.2	-26.2	23.4	-16.9	-20.4	-20.4	20.2	-21.7	-26.2	-26.2	23.4
Down Slope																				
Roof Pitch	S _s = 0.0	S _s = 0.1	S _s = 0.2	S _s = 0.3	S _s = 0.4	S _s = 0.5	S _s = 1.0	S _s = 1.25	S _s = 1.5	S _s = 2.0	S _s = 2.5	S _s = 3.1								
1:12	3.8	3.8	4.0	4.6	5.0	5.4	6.8	7.3	8.2	9.9	11.9	14.7								
2:12	7.0	7.0	7.0	7.4	7.4	7.7	9.1	9.6	10.4	12.1	13.8	15.8								
3:12	9.4	9.4	9.4	9.4	9.4	9.6	10.8	11.3	12.1	13.7	15.3	17.2								
4:12	11.2	11.2	11.2	11.2	11.2	11.2	12.0	12.5	13.3	14.8	16.3	18.1								
5:12	12.3	12.3	12.3	12.3	12.3	12.3	12.8	13.2	13.9	15.3	16.7	18.5								
6:12	12.9	12.9	12.9	12.9	12.9	12.9	13.1	13.5	14.1	15.5	16.8	18.4								
7:12	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.4	14.1	15.3	16.5	18.0								
8:12	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.2	13.7	14.9	16.1	17.5								
9:12	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.7	13.3	14.3	15.4	16.7								
10:12	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.2	12.7	13.7	14.7	15.9								
11:12	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.6	12.1	13.0	13.9	15.1								
12:12	10.8	10.8	10.8	10.8	10.8	10.8	10.8	11.0	11.4	12.3	13.2	14.2								
Side Load (psf)																				
Lateral																				
S _s = 0.0 S _s = 0.1 S _s = 0.2 S _s = 0.3 S _s = 0.4 S _s = 0.5 S _s = 1.0 S _s = 1.25 S _s = 1.5 S _s = 2.0 S _s = 2.5 S _s = 3.1																				
0.0 0.7 1.5 2.1 2.7 3.2 5.0 5.7 6.9 9.1 11.4 14.2																				

* These tables are meant as representative of the areas listed in the title. The local wind speeds and snow loads should be independently verified for the specific installation.

Up and Down (psf)

Side Load (psf)

Lateral



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-10
ASCE

East Coast (Medium Snow)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

Roof Pitch	Bldg. Height = 15 ft.						Bldg. Height = 30 ft.						Bldg. Height = 60 ft.					
	Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)		
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3
Exposure Category B																		
Exposure Category C																		
Exposure Category D																		
Down Slope																		
Lateral																		

* These tables are meant as representative of the areas listed in the title. The local wind speeds and snow loads should be independently verified for the specific install location.



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-10
ASCE

East Coast (Low Snow)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

Roof Pitch	Bldg. Height = 15 ft.						Bldg. Height = 30 ft.						Bldg. Height = 60 ft.					
	Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)		
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3
Exposure Category B																		
Exposure Category C																		
Exposure Category D																		
Down Slope																		
Up and Down (psf)																		
Side Load (psf)																		
Lateral																		

* These tables are meant as representative of the areas listed in the title. The local wind speed and snow loads should be independently verified for the specific install location.



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-10
ASCE

New Jersey (Typical)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

Roof Pitch	130 mph Basic Wind Speed						25 psf Ground Snow Load								
	Bldg. Height = 15 ft.			Bldg. Height = 30 ft.			Bldg. Height = 60 ft.			Bldg. Height = 60 ft.					
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3			
1:12	-14.2	-26.5	-42.0	25.9	-14.2	-26.5	-42.0	25.9	-17.5	-32.5	-51.2	25.9	-17.5	-32.5	-51.2
2:12	-12.6	-25.0	-38.9	24.6	-12.6	-25.0	-38.9	24.6	-15.6	-30.6	-47.5	24.6	-15.6	-30.6	-47.5
3:12	-12.7	-25.0	-38.9	23.1	-12.7	-25.0	-38.9	23.1	-15.6	-30.6	-47.5	23.1	-15.6	-30.6	-47.5
4:12	-12.7	-25.0	-38.9	21.6	-12.7	-25.0	-38.9	21.6	-15.7	-30.7	-47.5	21.6	-15.7	-30.7	-47.5
5:12	-12.7	-25.1	-39.0	20.1	-12.7	-25.1	-39.0	20.1	-15.7	-30.7	-47.6	20.1	-15.7	-30.7	-47.6
6:12	-12.8	-25.1	-39.0	18.7	-12.8	-25.1	-39.0	18.7	-15.7	-30.7	-47.6	18.7	-15.7	-30.7	-47.6
7:12	-14.3	-17.4	-17.4	20.6	-14.3	-17.4	-17.4	20.6	-17.6	-21.4	-21.4	20.6	-17.6	-21.4	-21.4
8:12	-14.4	-17.5	-17.5	19.4	-14.4	-17.5	-17.5	19.4	-17.7	-21.4	-21.4	19.4	-17.7	-21.4	-21.4
9:12	-14.4	-17.5	-17.5	18.4	-14.4	-17.5	-17.5	18.4	-17.7	-21.5	-21.5	18.4	-17.7	-21.5	-21.5
10:12	-14.5	-17.5	-17.5	17.5	-14.5	-17.5	-17.5	17.5	-17.8	-21.5	-21.5	17.5	-17.8	-21.5	-21.5
11:12	-14.5	-17.6	-17.6	16.7	-14.5	-17.6	-17.6	16.7	-17.8	-21.6	-21.6	16.7	-17.8	-21.6	-21.6
12:12	-14.5	-17.6	-17.6	16.6	-14.5	-17.6	-17.6	16.6	-17.8	-21.6	-21.6	16.6	-17.8	-21.6	-21.6
1:12	-17.5	-32.5	-51.2	25.9	-20.3	-37.6	-59.3	25.9	-23.7	-43.6	-68.5	25.9	-23.7	-43.6	-68.5
2:12	-15.6	-30.6	-47.5	24.6	-18.2	-35.5	-55.0	25.5	-21.2	-41.1	-63.6	26.7	-21.2	-41.1	-63.6
3:12	-15.6	-30.6	-47.5	23.1	-18.2	-35.5	-55.0	24.0	-21.2	-41.1	-63.6	25.2	-21.2	-41.1	-63.6
4:12	-15.7	-30.7	-47.5	21.6	-18.2	-35.5	-55.0	22.5	-21.2	-41.2	-63.6	23.7	-21.2	-41.2	-63.6
5:12	-15.7	-30.7	-47.6	20.1	-18.3	-35.6	-55.0	21.0	-21.3	-41.2	-63.6	22.2	-21.3	-41.2	-63.6
6:12	-15.7	-30.7	-47.6	18.7	-18.3	-35.6	-55.1	19.6	-21.3	-41.2	-63.7	20.8	-21.3	-41.2	-63.7
7:12	-17.6	-21.4	-21.4	22.8	-20.5	-24.8	-24.8	24.8	-23.8	-28.8	-28.8	27.0	-23.8	-28.8	-28.8
8:12	-17.7	-21.4	-21.4	21.7	-20.6	-24.9	-24.9	23.6	-23.9	-28.9	-28.9	25.8	-23.9	-28.9	-28.9
9:12	-17.7	-21.5	-21.5	20.6	-20.6	-24.9	-24.9	22.6	-23.9	-28.9	-28.9	25.5	-23.9	-28.9	-28.9
10:12	-17.8	-21.5	-21.5	19.8	-20.6	-25.0	-25.0	22.4	-23.9	-28.9	-28.9	25.4	-23.9	-28.9	-28.9
11:12	-17.8	-21.6	-21.6	19.7	-20.7	-25.0	-25.0	22.3	-24.0	-29.0	-29.0	25.3	-24.0	-29.0	-29.0
12:12	-17.8	-21.6	-21.6	19.6	-20.7	-25.0	-25.0	22.2	-24.0	-29.0	-29.0	25.2	-24.0	-29.0	-29.0
1:12	-21.4	-39.6	-62.4	25.9	-24.3	-44.8	-70.4	25.9	-27.6	-50.7	-79.7	25.9	-27.6	-50.7	-79.7
2:12	-19.2	-37.4	-57.8	25.9	-21.8	-42.2	-65.3	27.0	-24.7	-47.9	-73.9	28.2	-24.7	-47.9	-73.9
3:12	-19.2	-37.4	-57.8	24.4	-21.8	-42.3	-65.3	25.5	-24.8	-47.9	-73.9	26.7	-24.8	-47.9	-73.9
4:12	-19.2	-37.4	-57.9	22.9	-21.8	-42.3	-65.3	24.0	-24.8	-47.9	-73.9	25.2	-24.8	-47.9	-73.9
5:12	-19.3	-37.4	-57.9	21.4	-21.9	-42.3	-65.4	22.5	-24.8	-48.0	-74.0	23.7	-24.8	-48.0	-74.0
6:12	-19.3	-37.5	-57.9	20.0	-21.9	-42.4	-65.4	21.1	-24.9	-48.0	-74.0	22.3	-24.9	-48.0	-74.0
7:12	-21.6	-26.2	-26.2	25.5	-24.5	-29.6	-29.6	27.4	-27.8	-33.6	-33.6	29.7	-27.8	-33.6	-33.6
8:12	-21.7	-26.2	-26.2	24.3	-24.5	-29.6	-29.6	26.3	-27.8	-33.6	-33.6	29.2	-27.8	-33.6	-33.6
9:12	-21.7	-26.2	-26.2	23.5	-24.6	-29.7	-29.7	26.1	-27.9	-33.7	-33.7	29.1	-27.9	-33.7	-33.7
10:12	-21.7	-26.3	-26.3	23.4	-24.6	-29.7	-29.7	26.0	-27.9	-33.7	-33.7	29.0	-27.9	-33.7	-33.7
11:12	-21.8	-26.3	-26.3	23.3	-24.6	-29.8	-29.8	25.9	-28.0	-33.7	-33.7	28.9	-28.0	-33.7	-33.7
12:12	-21.8	-26.4	-26.4	23.2	-24.7	-29.8	-29.8	25.8	-28.0	-33.8	-33.8	28.7	-28.0	-33.8	-33.8
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1	Ss = 3.1	Ss = 3.1	Ss = 3.1
1:12	2.0	2.0	2.0	2.1	2.2	2.3	2.8	2.9	3.2	3.8	4.3	5.0	5.0	5.0	5.0
2:12	3.7	3.7	3.7	3.7	3.7	3.7	4.1	4.3	4.6	5.1	5.7	6.3	6.3	6.3	6.3
3:12	5.0	5.0	5.0	5.0	5.0	5.0	5.2	5.4	5.6	6.2	6.7	7.4	7.4	7.4	7.4
4:12	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.2	6.4	7.0	7.6	8.2	8.2	8.2	8.2
5:12	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	7.0	7.6	8.1	8.8	8.8	8.8	8.8
6:12	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.4	7.9	8.4	9.1	9.1	9.1	9.1
7:12	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.5	8.1	8.6	9.2	9.2	9.2	9.2
8:12	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.6	8.1	8.6	9.2	9.2	9.2	9.2
9:12	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.5	8.0	8.5	9.2	9.2	9.2	9.2
10:12	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.1	7.4	7.9	8.4	9.0	9.0	9.0	9.0
11:12	6.8	6.8	6.8	6.8	6.8	6.8	6.8	7.0	7.2	7.7	8.2	8.8	8.8	8.8	8.8
12:12	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.7	6.8	7.0	7.5	8.0	8.0	8.0	8.0
	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1	Ss = 3.1	Ss = 3.1	Ss = 3.1
	0.0	0.2	0.5	0.7	0.9	1.0	1.6	1.8	2.2	2.9	3.6	4.5	4.5	4.5	4.5

* These tables are meant as representative of the areas listed in the title. The local wind speeds and snow loads should be independently verified for the specific install location.

Up and Down (psf) Side Load (psf) Lateral



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-10
ASCE

Florida (Typical)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

Roof Pitch	Bldg. Height = 15 ft.						Bldg. Height = 30 ft.						Bldg. Height = 60 ft.						
	Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			Up Pressures (psf)			Down (psf)			
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	
Exposure Category B																			
1:12	-22.1	-40.8	-64.2	13.4	-22.1	-40.8	-64.2	13.4	-22.1	-40.8	-64.2	13.4	-27.1	-49.9	-78.3	13.4	-27.1	-49.9	-78.3
2:12	-19.8	-38.5	-59.6	15.5	-19.8	-38.5	-59.6	15.5	-19.8	-38.5	-59.6	15.5	-24.3	-47.0	-72.6	18.0	-24.3	-47.0	-72.6
3:12	-19.8	-38.5	-59.6	15.4	-19.8	-38.5	-59.6	15.4	-19.8	-38.5	-59.6	15.4	-24.3	-47.1	-72.6	17.9	-24.3	-47.1	-72.6
4:12	-19.8	-38.6	-59.6	15.3	-19.8	-38.6	-59.6	15.3	-19.8	-38.6	-59.6	15.3	-24.4	-47.1	-72.6	17.9	-24.4	-47.1	-72.6
5:12	-19.9	-38.6	-59.6	15.2	-19.9	-38.6	-59.6	15.2	-19.9	-38.6	-59.6	15.2	-24.4	-47.1	-72.7	17.8	-24.4	-47.1	-72.7
6:12	-19.9	-38.6	-59.7	15.1	-19.9	-38.6	-59.7	15.1	-19.9	-38.6	-59.7	15.1	-24.4	-47.1	-72.7	17.6	-24.4	-47.1	-72.7
7:12	-22.3	-27.0	-27.0	24.4	-22.3	-27.0	-27.0	24.4	-22.3	-27.0	-27.0	24.4	-27.3	-33.0	-33.0	28.9	-27.3	-33.0	-33.0
8:12	-22.3	-27.0	-27.0	24.3	-22.3	-27.0	-27.0	24.3	-22.3	-27.0	-27.0	24.3	-27.3	-33.0	-33.0	28.8	-27.3	-33.0	-33.0
9:12	-22.4	-27.0	-27.0	24.1	-22.4	-27.0	-27.0	24.1	-22.4	-27.0	-27.0	24.1	-27.4	-33.1	-33.1	28.6	-27.4	-33.1	-33.1
10:12	-22.4	-27.1	-27.1	24.0	-22.4	-27.1	-27.1	24.0	-22.4	-27.1	-27.1	24.0	-27.4	-33.1	-33.1	28.5	-27.4	-33.1	-33.1
11:12	-22.4	-27.1	-27.1	23.9	-22.4	-27.1	-27.1	23.9	-22.4	-27.1	-27.1	23.9	-27.5	-33.1	-33.1	28.4	-27.5	-33.1	-33.1
12:12	-22.5	-27.2	-27.2	23.8	-22.5	-27.2	-27.2	23.8	-22.5	-27.2	-27.2	23.8	-27.5	-33.2	-33.2	28.3	-27.5	-33.2	-33.2
Exposure Category C																			
1:12	-27.1	-49.9	-78.3	13.4	-31.5	-57.7	-90.4	13.7	-31.5	-57.7	-90.4	13.7	-36.5	-66.7	-104.5	15.2	-36.5	-66.7	-104.5
2:12	-24.3	-47.0	-72.6	18.0	-28.2	-54.4	-83.9	20.2	-28.2	-54.4	-83.9	20.2	-32.7	-62.9	-96.9	22.7	-32.7	-62.9	-96.9
3:12	-24.3	-47.1	-72.6	17.9	-28.2	-54.4	-83.9	20.1	-28.2	-54.4	-83.9	20.1	-32.7	-63.0	-97.0	22.6	-32.7	-63.0	-97.0
4:12	-24.4	-47.1	-72.6	17.9	-28.3	-54.5	-83.9	20.0	-28.3	-54.5	-83.9	20.0	-32.8	-63.0	-97.0	22.5	-32.8	-63.0	-97.0
5:12	-24.4	-47.1	-72.7	17.8	-28.3	-54.5	-84.0	19.9	-28.3	-54.5	-84.0	19.9	-32.8	-63.0	-97.0	22.4	-32.8	-63.0	-97.0
6:12	-24.4	-47.1	-72.7	17.6	-28.3	-54.5	-84.0	19.8	-28.3	-54.5	-84.0	19.8	-32.8	-63.1	-97.0	22.3	-32.8	-63.1	-97.0
7:12	-27.3	-33.0	-33.0	28.9	-31.6	-38.2	-38.2	32.8	-31.6	-38.2	-38.2	32.8	-36.7	-44.2	-44.2	37.3	-36.7	-44.2	-44.2
8:12	-27.3	-33.0	-33.0	28.8	-31.7	-38.2	-38.2	32.7	-31.7	-38.2	-38.2	32.7	-36.7	-44.3	-44.3	37.2	-36.7	-44.3	-44.3
9:12	-27.4	-33.1	-33.1	28.6	-31.7	-38.3	-38.3	32.6	-31.7	-38.3	-38.3	32.6	-36.7	-44.3	-44.3	37.1	-36.7	-44.3	-44.3
10:12	-27.4	-33.1	-33.1	28.5	-31.8	-38.3	-38.3	32.4	-31.8	-38.3	-38.3	32.4	-36.8	-44.3	-44.3	36.9	-36.8	-44.3	-44.3
11:12	-27.5	-33.1	-33.1	28.4	-31.8	-38.4	-38.4	32.3	-31.8	-38.4	-38.4	32.3	-36.8	-44.4	-44.4	36.8	-36.8	-44.4	-44.4
12:12	-27.5	-33.2	-33.2	28.3	-31.8	-38.4	-38.4	32.2	-31.8	-38.4	-38.4	32.2	-36.9	-44.4	-44.4	36.7	-36.9	-44.4	-44.4
Exposure Category D																			
1:12	-33.1	-60.7	-95.1	14.2	-37.5	-68.5	-107.3	15.5	-37.5	-68.5	-107.3	15.5	-42.5	-77.5	-121.3	17.0	-42.5	-77.5	-121.3
2:12	-29.7	-57.3	-88.2	21.0	-33.6	-64.6	-99.5	23.2	-33.6	-64.6	-99.5	23.2	-38.1	-73.2	-112.6	25.7	-38.1	-73.2	-112.6
3:12	-29.7	-57.3	-88.3	20.9	-33.6	-64.7	-99.6	23.1	-33.6	-64.7	-99.6	23.1	-38.2	-73.2	-112.6	25.6	-38.2	-73.2	-112.6
4:12	-29.8	-57.3	-88.3	20.9	-33.7	-64.7	-99.6	23.0	-33.7	-64.7	-99.6	23.0	-38.2	-73.2	-112.6	25.5	-38.2	-73.2	-112.6
5:12	-29.8	-57.3	-88.3	20.8	-33.7	-64.7	-99.6	22.9	-33.7	-64.7	-99.6	22.9	-38.2	-73.2	-112.7	25.4	-38.2	-73.2	-112.7
6:12	-29.8	-57.4	-88.4	20.7	-33.7	-64.8	-99.7	22.8	-33.7	-64.8	-99.7	22.8	-38.3	-73.3	-112.7	25.3	-38.3	-73.3	-112.7
7:12	-33.3	-40.2	-40.2	34.3	-37.7	-45.4	-45.4	38.2	-37.7	-45.4	-45.4	38.2	-42.7	-51.4	-51.4	42.7	-42.7	-51.4	-51.4
8:12	-33.4	-40.2	-40.2	34.2	-37.7	-45.5	-45.5	38.1	-37.7	-45.5	-45.5	38.1	-42.7	-51.5	-51.5	42.6	-42.7	-51.5	-51.5
9:12	-33.4	-40.3	-40.3	34.1	-37.7	-45.5	-45.5	38.0	-37.7	-45.5	-45.5	38.0	-42.8	-51.5	-51.5	42.5	-42.8	-51.5	-51.5
10:12	-33.4	-40.3	-40.3	33.9	-37.8	-45.5	-45.5	37.8	-37.8	-45.5	-45.5	37.8	-42.8	-51.6	-51.6	42.4	-42.8	-51.6	-51.6
11:12	-33.5	-40.4	-40.4	33.8	-37.8	-45.6	-45.6	37.7	-37.8	-45.6	-45.6	37.7	-42.8	-51.6	-51.6	42.2	-42.8	-51.6	-51.6
12:12	-33.5	-40.4	-40.4	33.7	-37.9	-45.6	-45.6	37.6	-37.9	-45.6	-45.6	37.6	-42.9	-51.6	-51.6	42.1	-42.9	-51.6	-51.6
Down Slope																			
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1							
1:12	0.3	0.6	0.8	1.0	1.2	1.3	1.9	2.1	2.5	3.2	4.0	4.8							
2:12	0.6	0.9	1.1	1.3	1.5	1.7	2.3	2.5	2.8	3.6	4.3	5.2							
3:12	0.9	1.2	1.4	1.6	1.8	2.0	2.6	2.8	3.2	3.9	4.6	5.5							
4:12	1.2	1.5	1.7	1.9	2.1	2.3	2.8	3.1	3.4	4.2	4.9	5.8							
5:12	1.5	1.7	1.9	2.2	2.3	2.5	3.1	3.3	3.7	4.4	5.1	6.0							
6:12	1.7	2.0	2.2	2.4	2.6	2.7	3.3	3.5	3.9	4.6	5.3	6.2							
7:12	1.9	2.2	2.4	2.6	2.8	2.9	3.5	3.7	4.1	4.8	5.5	6.3							
8:12	2.1	2.4	2.6	2.8	3.0	3.1	3.7	3.9	4.2	4.9	5.6	6.5							
9:12	2.3	2.5	2.7	2.9	3.1	3.3	3.8	4.0	4.4	5.0	5.7	6.5							
10:12	2.5	2.7	2.9	3.1	3.3	3.4	3.9	4.1	4.5	5.1	5.8	6.6							
11:12	2.6	2.8	3.0	3.2	3.4	3.5	4.0	4.2	4.6	5.2	5.9	6.6							
12:12	2.7	2.9	3.1	3.3	3.5	3.6	4.1	4.3	4.6	5.3	5.9	6.7							
Up and Down (psf)																			
Side Load (psf)																			
Lateral																			

* These tables are meant as representative of the areas listed in the title. The local wind speed and snow loads should be independently verified for the specific install location.



SM SOLAR MOUNT

APPENDIX B

Pressure Lookup Tables

7-10
ASCE

Louisiana (Typical)*

APPENDIX - Pressure Tables for Flush Mounted Roof Systems

Roof Pitch	170 mph Basic Wind Speed						0 psf Ground Snow Load								
	Bldg. Height = 15 ft.			Bldg. Height = 30 ft.			Bldg. Height = 60 ft.			Lateral					
	Up Pressures (psf)	Down (psf)	Down (psf)	Up Pressures (psf)	Down (psf)	Down (psf)	Up Pressures (psf)	Down (psf)	Down (psf)	Up Pressures (psf)	Down (psf)	Down (psf)	Down (psf)		
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3
1:12	-25.1	-46.3	-72.7	13.4	-25.1	-46.3	-72.7	13.4	-30.8	-56.4	-88.5	13.5	-30.8	-56.4	-88.5
2:12	-22.5	-43.6	-67.4	17.0	-22.5	-43.6	-67.4	17.0	-27.6	-53.3	-82.1	19.8	-27.6	-53.3	-82.1
3:12	-22.5	-43.7	-67.4	16.9	-22.5	-43.7	-67.4	16.9	-27.6	-53.3	-82.1	19.8	-27.6	-53.3	-82.1
4:12	-22.6	-43.7	-67.5	16.9	-22.6	-43.7	-67.5	16.9	-27.6	-53.3	-82.2	19.7	-27.6	-53.3	-82.2
5:12	-22.6	-43.7	-67.5	16.8	-22.6	-43.7	-67.5	16.8	-27.7	-53.3	-82.2	19.6	-27.7	-53.3	-82.2
6:12	-22.6	-43.8	-67.5	16.6	-22.6	-43.8	-67.5	16.6	-27.7	-53.4	-82.2	19.5	-27.7	-53.4	-82.2
7:12	-25.3	-30.6	-30.6	27.1	-25.3	-30.6	-30.6	27.1	-31.0	-37.4	-37.4	32.2	-31.0	-37.4	-37.4
8:12	-25.3	-30.6	-30.6	27.0	-25.3	-30.6	-30.6	27.0	-31.0	-37.4	-37.4	32.1	-31.0	-37.4	-37.4
9:12	-25.4	-30.7	-30.7	26.8	-25.4	-30.7	-30.7	26.8	-31.0	-37.5	-37.5	31.9	-31.0	-37.5	-37.5
10:12	-25.4	-30.7	-30.7	26.7	-25.4	-30.7	-30.7	26.7	-31.1	-37.5	-37.5	31.8	-31.1	-37.5	-37.5
11:12	-25.5	-30.7	-30.7	26.6	-25.5	-30.7	-30.7	26.6	-31.1	-37.5	-37.5	31.7	-31.1	-37.5	-37.5
12:12	-25.5	-30.8	-30.8	26.5	-25.5	-30.8	-30.8	26.5	-31.2	-37.6	-37.6	31.6	-31.2	-37.6	-37.6
1:12	-30.8	-56.4	-88.5	13.5	-35.7	-65.3	-102.3	14.9	-41.4	-75.5	-118.1	16.6	-41.4	-75.5	-118.1
2:12	-27.6	-53.3	-82.1	19.8	-32.0	-61.6	-94.9	22.3	-37.1	-71.2	-109.6	25.1	-37.1	-71.2	-109.6
3:12	-27.6	-53.3	-82.1	19.8	-32.0	-61.6	-94.9	22.2	-37.1	-71.2	-109.6	25.1	-37.1	-71.2	-109.6
4:12	-27.6	-53.3	-82.2	19.7	-32.1	-61.6	-94.9	22.1	-37.2	-71.3	-109.6	25.0	-37.2	-71.3	-109.6
5:12	-27.7	-53.3	-82.2	19.6	-32.1	-61.7	-95.0	22.0	-37.2	-71.3	-109.7	24.9	-37.2	-71.3	-109.7
6:12	-27.7	-53.4	-82.2	19.5	-32.1	-61.7	-95.0	21.9	-37.2	-71.3	-109.7	24.8	-37.2	-71.3	-109.7
7:12	-31.0	-37.4	-37.4	32.2	-35.9	-43.3	-43.3	36.6	-41.5	-50.1	-50.1	41.7	-41.5	-50.1	-50.1
8:12	-31.0	-37.4	-37.4	32.1	-35.9	-43.3	-43.3	36.5	-41.6	-50.1	-50.1	41.6	-41.6	-50.1	-50.1
9:12	-31.0	-37.5	-37.5	31.9	-35.9	-43.3	-43.3	36.4	-41.6	-50.1	-50.1	41.5	-41.6	-50.1	-50.1
10:12	-31.1	-37.5	-37.5	31.8	-36.0	-43.4	-43.4	36.2	-41.7	-50.2	-50.2	41.3	-41.7	-50.2	-50.2
11:12	-31.1	-37.5	-37.5	31.7	-36.0	-43.4	-43.4	36.1	-41.7	-50.2	-50.2	41.2	-41.7	-50.2	-50.2
12:12	-31.2	-37.6	-37.6	31.6	-36.1	-43.5	-43.5	36.0	-41.7	-50.3	-50.3	41.1	-41.7	-50.3	-50.3
1:12	-37.6	-68.7	-107.5	15.5	-42.5	-77.5	-121.3	17.0	-48.1	-87.7	-137.1	18.7	-48.1	-87.7	-137.1
2:12	-33.7	-64.8	-99.8	23.2	-38.1	-73.1	-112.5	25.7	-43.2	-82.8	-127.2	28.5	-43.2	-82.8	-127.2
3:12	-33.7	-64.8	-99.8	23.2	-38.1	-73.2	-112.6	25.6	-43.2	-82.8	-127.3	28.4	-43.2	-82.8	-127.3
4:12	-33.8	-64.9	-99.8	23.1	-38.2	-73.2	-112.6	25.5	-43.3	-82.8	-127.3	28.4	-43.3	-82.8	-127.3
5:12	-33.8	-64.9	-99.9	23.0	-38.2	-73.2	-112.6	25.4	-43.3	-82.8	-127.3	28.3	-43.3	-82.8	-127.3
6:12	-33.8	-64.9	-99.9	22.9	-38.2	-73.3	-112.7	25.3	-43.3	-82.9	-127.4	28.2	-43.3	-82.9	-127.4
7:12	-37.8	-45.5	-45.5	38.3	-42.7	-51.4	-51.4	42.7	-48.3	-58.2	-58.2	47.8	-48.3	-58.2	-58.2
8:12	-37.8	-45.6	-45.6	38.2	-42.7	-51.5	-51.5	42.6	-48.4	-58.2	-58.2	47.7	-48.4	-58.2	-58.2
9:12	-37.8	-45.6	-45.6	38.1	-42.7	-51.5	-51.5	42.5	-48.4	-58.3	-58.3	47.6	-48.4	-58.3	-58.3
10:12	-37.9	-45.6	-45.6	37.9	-42.8	-51.5	-51.5	42.3	-48.4	-58.3	-58.3	47.4	-48.4	-58.3	-58.3
11:12	-37.9	-45.7	-45.7	37.8	-42.8	-51.6	-51.6	42.2	-48.5	-58.4	-58.4	47.3	-48.5	-58.4	-58.4
12:12	-38.0	-45.7	-45.7	37.7	-42.9	-51.6	-51.6	42.1	-48.5	-58.4	-58.4	47.2	-48.5	-58.4	-58.4
Roof Pitch	Ss = 0.0	Ss = 0.1	Ss = 0.2	Ss = 0.3	Ss = 0.4	Ss = 0.5	Ss = 1.0	Ss = 1.25	Ss = 1.5	Ss = 2.0	Ss = 2.5	Ss = 3.1	Ss = 0.0	Ss = 0.1	Ss = 0.2
1:12	0.3	0.6	0.8	1.0	1.2	1.3	1.9	2.1	2.5	3.2	4.0	4.8	0.0	0.2	0.5
2:12	0.6	0.9	1.1	1.3	1.5	1.7	2.3	2.5	2.8	3.6	4.3	5.2	0.0	0.2	0.5
3:12	0.9	1.2	1.4	1.6	1.8	2.0	2.6	2.8	3.2	3.9	4.6	5.5	0.0	0.2	0.5
4:12	1.2	1.5	1.7	1.9	2.1	2.3	2.8	3.1	3.4	4.2	4.9	5.8	0.0	0.2	0.5
5:12	1.5	1.7	1.9	2.2	2.3	2.5	3.1	3.3	3.7	4.4	5.1	6.0	0.0	0.2	0.5
6:12	1.7	2.0	2.2	2.4	2.6	2.7	3.3	3.5	3.9	4.6	5.3	6.2	0.0	0.2	0.5
7:12	1.9	2.2	2.4	2.6	2.8	2.9	3.5	3.7	4.1	4.8	5.5	6.3	0.0	0.2	0.5
8:12	2.1	2.4	2.6	2.8	3.0	3.1	3.7	3.9	4.2	4.9	5.6	6.5	0.0	0.2	0.5
9:12	2.3	2.5	2.7	2.9	3.1	3.3	3.8	4.0	4.4	5.0	5.7	6.5	0.0	0.2	0.5
10:12	2.5	2.7	2.9	3.1	3.3	3.4	3.9	4.1	4.5	5.1	5.8	6.6	0.0	0.2	0.5
11:12	2.6	2.8	3.0	3.2	3.4	3.5	4.0	4.2	4.6	5.2	5.9	6.6	0.0	0.2	0.5
12:12	2.7	2.9	3.1	3.3	3.5	3.6	4.1	4.3	4.6	5.3	5.9	6.7	0.0	0.2	0.5

* These tables are meant as representative of the areas listed in the title. The local wind speeds and snow loads should be independently verified for the specific install location.

Up and Down (psf)

Side Load (psf)

Lateral

SOLARMOUNT Standard Rail		Downforce Span Length										
		20 plf	30 plf	40 plf	50 plf	60 plf	70 plf	80 plf	100 plf	120 plf	150 plf	180 plf
Horizontal Load	0 plf	12.5 ft	11.0 ft	10.0 ft	9.0 ft	8.5 ft	7.5 ft	7.0 ft	6.5 ft	6.0 ft	5.0 ft	4.5 ft
	5 plf	12.5 ft	11.0 ft	10.0 ft	9.0 ft	8.0 ft	7.5 ft	7.0 ft	6.5 ft	6.0 ft	5.0 ft	4.5 ft
	10 plf	11.0 ft	10.0 ft	9.0 ft	8.5 ft	8.0 ft	7.5 ft	7.0 ft	6.5 ft	5.5 ft	5.0 ft	4.5 ft
	15 plf	7.5 ft	7.5 ft	7.5 ft	7.5 ft	7.5 ft	7.0 ft	6.5 ft	6.0 ft	5.5 ft	5.0 ft	4.5 ft
	20 plf	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.0 ft	4.5 ft
	25 plf	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft
	30 plf	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft
	35 plf	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft
	40 plf	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft
	50 plf	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft
	60 plf	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft
70 plf	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	

SOLARMOUNT Standard Rail		Uplift Span Length										
		20 plf	30 plf	40 plf	50 plf	60 plf	70 plf	80 plf	100 plf	120 plf	150 plf	180 plf
Horizontal Load	0 plf	12.5 ft	11.0 ft	10.0 ft	9.0 ft	8.5 ft	7.5 ft	7.0 ft	6.5 ft	6.0 ft	5.0 ft	4.0 ft
	5 plf	12.5 ft	11.0 ft	10.0 ft	9.0 ft	8.0 ft	7.5 ft	7.0 ft	6.5 ft	6.0 ft	5.0 ft	4.0 ft
	10 plf	11.0 ft	10.0 ft	9.0 ft	8.5 ft	8.0 ft	7.5 ft	7.0 ft	6.5 ft	5.5 ft	5.0 ft	4.0 ft
	15 plf	7.5 ft	7.5 ft	7.5 ft	7.5 ft	7.5 ft	7.0 ft	6.5 ft	6.0 ft	5.5 ft	5.0 ft	4.0 ft
	20 plf	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.0 ft	4.0 ft
	25 plf	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.0 ft
	30 plf	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft
	35 plf	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft
	40 plf	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft
	50 plf	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft
	60 plf	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft
70 plf	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	

Note: No Interpolation Permitted.

Example:

- 60 plf Downward Load (strong axis)
- 50 plf Upward Load (strong axis)
- 10 plf Horizontal Load (weak axis)

8.0 ft Max Span for Downforce

8.5 ft Max Span for Uplift

8.0 ft Max Span = min (downforce, uplift) with SOLARMOUNT Standard Rail

SOLARMOUNT Light (LT) Rail		Downforce Span Length										
Rail		20 plf	30 plf	40 plf	50 plf	60 plf	70 plf	80 plf	100 plf	120 plf	150 plf	180 plf
Horizontal Load	0 plf	8.0 ft	7.0 ft	6.5 ft	6.0 ft	5.5 ft	5.0 ft	4.5 ft	4.0 ft	3.5 ft	3.5 ft	3.0 ft
	5 plf	8.0 ft	7.0 ft	6.5 ft	6.0 ft	5.5 ft	5.0 ft	4.5 ft	4.0 ft	3.5 ft	3.5 ft	3.0 ft
	10 plf	7.5 ft	7.0 ft	6.0 ft	5.5 ft	5.0 ft	5.0 ft	4.5 ft	4.0 ft	3.5 ft	3.5 ft	3.0 ft
	15 plf	7.0 ft	6.5 ft	6.0 ft	5.5 ft	5.0 ft	4.5 ft	4.5 ft	4.0 ft	3.5 ft	3.0 ft	3.0 ft
	20 plf	6.0 ft	5.5 ft	5.5 ft	5.0 ft	5.0 ft	4.5 ft	4.5 ft	4.0 ft	3.5 ft	3.0 ft	3.0 ft
	25 plf	5.5 ft	5.5 ft	5.0 ft	5.0 ft	4.5 ft	4.5 ft	4.0 ft	4.0 ft	3.5 ft	3.0 ft	3.0 ft
	30 plf	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.0 ft	4.0 ft	3.5 ft	3.5 ft	3.0 ft	3.0 ft
	35 plf	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.0 ft	3.0 ft
	40 plf	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft
	50 plf	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft
	60 plf	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft
70 plf	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	

SOLARMOUNT Light (LT) Rail		Uplift Span Length										
Rail		20 plf	30 plf	40 plf	50 plf	60 plf	70 plf	80 plf	100 plf	120 plf	150 plf	180 plf
Horizontal Load	0 plf	8.0 ft	7.0 ft	6.5 ft	6.0 ft	5.5 ft	5.0 ft	4.5 ft	4.0 ft	3.5 ft	3.0 ft	2.5 ft
	5 plf	8.0 ft	7.0 ft	6.5 ft	6.0 ft	5.5 ft	5.0 ft	4.5 ft	4.0 ft	3.5 ft	3.0 ft	2.5 ft
	10 plf	7.5 ft	7.0 ft	6.0 ft	5.5 ft	5.0 ft	5.0 ft	4.5 ft	4.0 ft	3.5 ft	3.0 ft	2.5 ft
	15 plf	7.0 ft	6.5 ft	6.0 ft	5.5 ft	5.0 ft	4.5 ft	4.5 ft	4.0 ft	3.5 ft	3.0 ft	2.5 ft
	20 plf	6.0 ft	5.5 ft	5.5 ft	5.0 ft	5.0 ft	4.5 ft	4.5 ft	4.0 ft	3.5 ft	3.0 ft	2.5 ft
	25 plf	5.5 ft	5.5 ft	5.0 ft	5.0 ft	4.5 ft	4.5 ft	4.0 ft	4.0 ft	3.5 ft	3.0 ft	2.5 ft
	30 plf	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.0 ft	4.0 ft	3.5 ft	3.5 ft	3.0 ft	2.5 ft
	35 plf	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.0 ft	2.5 ft
	40 plf	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	2.5 ft
	50 plf	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft
	60 plf	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft
70 plf	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	

Note: No Interpolation Permitted.

Example: 60 plf Downward Load (strong axis) 5.0 ft Max Span for Downforce
 50 plf Upward Load (strong axis) 5.5 ft Max Span for Uplift
 10 plf Horizontal Load (weak axis) 5.0 ft Max Span = min (downforce, uplift)
 with SOLARMOUNT Light (LT) Rail

SOLARMOUNT Heavy Duty (HD) Rail		Downforce Span Length										
		20 plf	30 plf	40 plf	50 plf	60 plf	70 plf	80 plf	100 plf	120 plf	150 plf	180 plf
Horizontal Load	0 plf	18.5 ft	16.0 ft	14.5 ft	13.5 ft	12.5 ft	12.0 ft	11.5 ft	10.5 ft	9.0 ft	7.0 ft	6.0 ft
	5 plf	18.5 ft	16.0 ft	14.5 ft	13.5 ft	12.5 ft	12.0 ft	11.5 ft	10.0 ft	9.0 ft	7.0 ft	6.0 ft
	10 plf	11.5 ft	11.5 ft	11.5 ft	11.5 ft	11.5 ft	11.5 ft	11.0 ft	10.0 ft	9.0 ft	7.0 ft	6.0 ft
	15 plf	7.5 ft	7.5 ft	7.5 ft	7.5 ft	7.5 ft	7.5 ft	7.5 ft	7.5 ft	7.5 ft	7.0 ft	6.0 ft
	20 plf	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft
	25 plf	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft
	30 plf	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft
	35 plf	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft
	40 plf	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft
	50 plf	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft
	60 plf	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft
70 plf	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	

SOLARMOUNT Heavy Duty (HD) Rail		Uplift Span Length										
		20 plf	30 plf	40 plf	50 plf	60 plf	70 plf	80 plf	100 plf	120 plf	150 plf	180 plf
Horizontal Load	0 plf	18.5 ft	16.0 ft	14.5 ft	13.5 ft	12.5 ft	10.5 ft	9.0 ft	7.5 ft	6.0 ft	5.0 ft	4.0 ft
	5 plf	18.5 ft	16.0 ft	14.5 ft	13.5 ft	12.5 ft	10.5 ft	9.0 ft	7.5 ft	6.0 ft	5.0 ft	4.0 ft
	10 plf	11.5 ft	11.5 ft	14.0 ft	13.0 ft	12.0 ft	10.5 ft	9.0 ft	7.5 ft	6.0 ft	5.0 ft	4.0 ft
	15 plf	7.5 ft	7.5 ft	7.5 ft	7.5 ft	7.5 ft	7.5 ft	9.0 ft	7.5 ft	6.0 ft	5.0 ft	4.0 ft
	20 plf	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	5.5 ft	6.0 ft	5.0 ft	4.0 ft
	25 plf	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.5 ft	4.0 ft
	30 plf	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft	3.5 ft
	35 plf	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft	3.0 ft
	40 plf	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft	2.5 ft
	50 plf	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft	2.0 ft
	60 plf	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft
70 plf	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	1.5 ft	

Note: No Interpolation Permitted.

Example: 60 plf Downward Load (strong axis)
 50 plf Upward Load (strong axis)
 10 plf Horizontal Load (weak axis)

11.5 ft Max Span for Downforce
 13.0 ft Max Span for Uplift
11.5 ft Max Span = min (downforce, uplift)
 with SOLARMOUNT Heavy Duty (HD) Rail



SOLARMOUNT FRONT TRIM

SOLARMOUNT Front Trim should not be installed in areas where the wind load exceeds 100 psf, where the distance from clamp to clamp (span) exceeds 52 inches, or where the cantilever (overhang) is greater than 66% of the span length.

Roof Pitch to Angle Conversion:

$$12:12 = 45^\circ$$

$$11:12 = 42.50^\circ$$

$$10:12 = 39.81^\circ$$

$$9:12 = 36.87^\circ$$

$$8:12 = 33.69^\circ$$

$$7:12 = 30.26^\circ$$

$$6:12 = 26.57^\circ$$

$$5:12 = 22.62^\circ$$

Still Walkable

$$4:12 = 18.43^\circ$$

Standard Roof Pitch

$$3:12 = 14.04^\circ$$

Typical in Southern Climates

$$2:12 = 9.46^\circ$$

Low Roof Pitch

The Pressure Lookup Tables and U-Builder include service dead loads ranging from 2.1 to 3.8 psf and include the weight of SOLARMOUNT Standard Rail, SOLARMOUNT connections, and the weight of the module.

To calculate the dead load of your system, please refer to Appendix H - Technical Data Sheet and the project specific Module Specification Sheet. If your loads fall outside the range listed above, please use the Analytical Method in the SOLARMOUNT Design and Engineering Guide for analysis.



Fault Test Parameters [e]nphase ENERGY

Installation Parameters for Equipment Grounding Fault Test

Enphase Energy is looking to perform fault testing to verify that our microinverter enclosure and cabling system can be utilized to clear a 20A fault condition occurring on the metallic racking or module frames within a system in which all of the metallic equipment is bonded using devices listed for bonding the components. These bonding devices can be either WEEB grounding clips or UL-2703 listed bonding components, but the primary test scenario is designed to utilize WEEB grounding clips.

Installation Parameters

Ideally, we would like to show that a single microinverter can clear a fault condition occurring on the second rail of the racking system.

WEEB grounding clips would be used for bonding the modules, microinverters, and racking system. WEEB DMC clips with Unirac SolarMount Rails would be an acceptable pairing.

The wire length between the microinverter and the overcurrent protective device should be maintained to at least 2% voltage drop, but 3% voltage drop (based upon 16A) would be ideal.

If the primary test scenario is adequate to properly open the breaker, then no additional testing would be required.

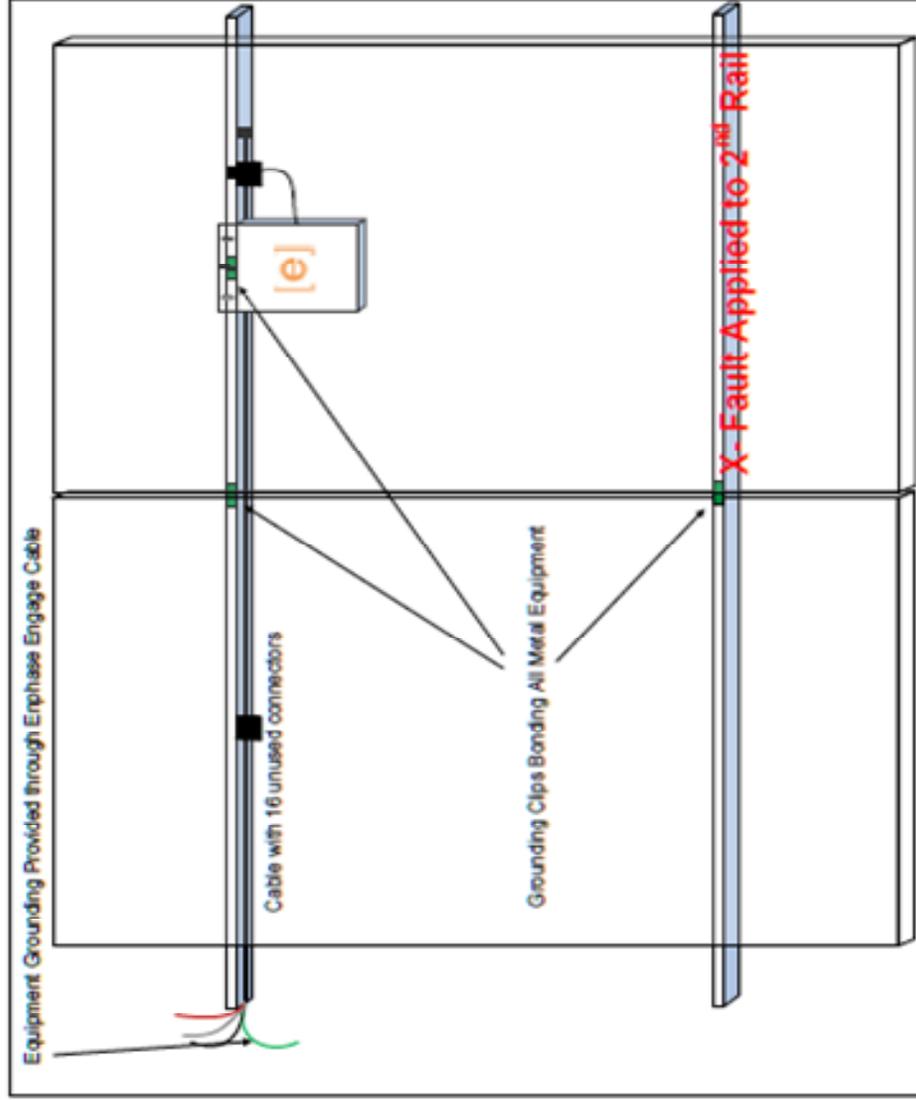
Primary Test Scenario - One Inverter to clear fault, 3% voltage drop

Installation Requirements for the primary test scenario

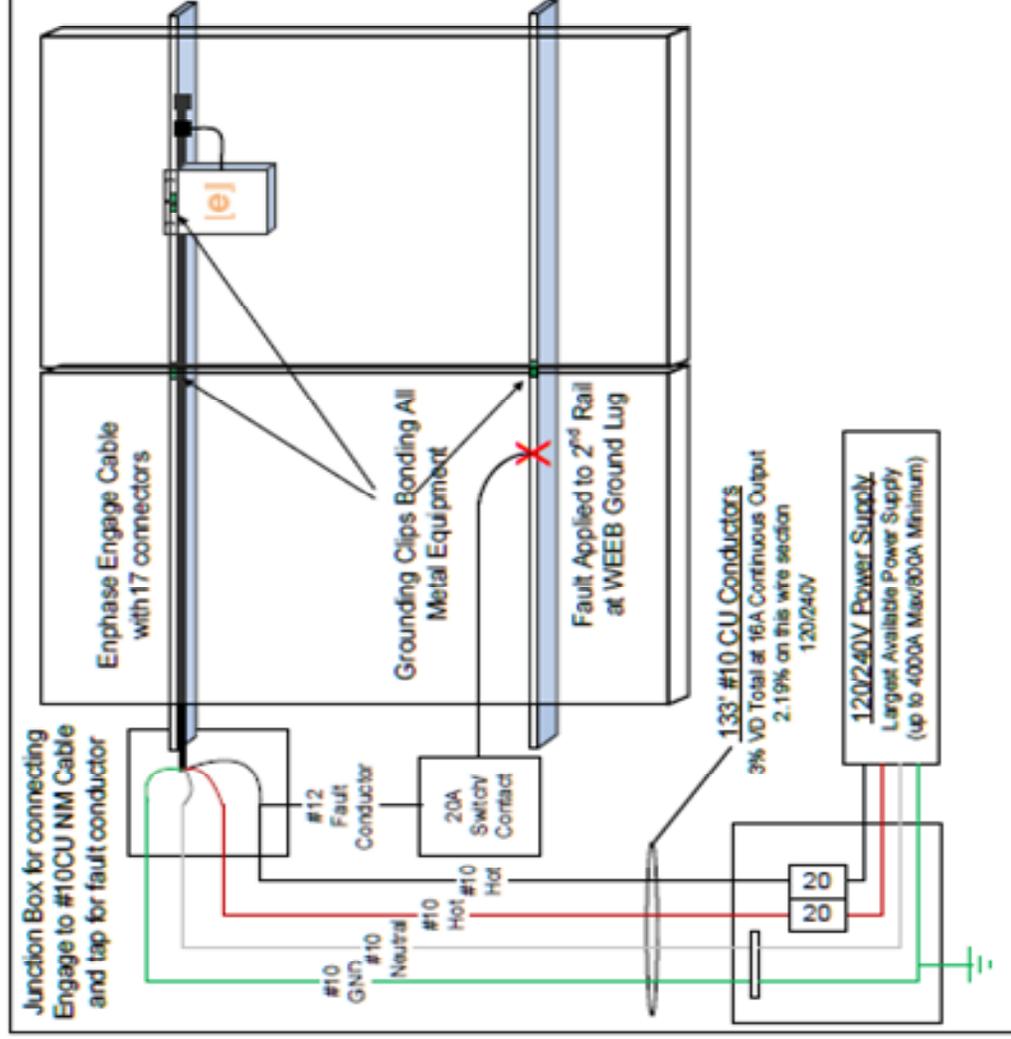
- 2 modules - (could be used Sharp 235s from Enphase inventory)
- 2 rail - 2 x 8' sections of Unirac U-SMR Rail
- 1 - Flat-lid microinverter (M215 and/or M250 acceptable)
- 3 - WEEB-DMC grounding clips between metal components and installed as per Bummy installation requirements
- 1 - WEEB Grounding Lug for bonding of fault to 2nd rail
- Enphase Engage Cable with 17 portrait connectors in portrait (.81% voltage drop when fully populated. The microinverter is to be installed at the 17th connector in the cable.
- 133' of #10 CU conductors
 - Designed for 3% Voltage Drop total including Engage Cable
 - .81% on Engage Cable with 17 portrait connectors (from Enphase Vrise Technical Brief)
 - 2.19% voltage drop on #10 conductors
 - 133' of #10 CU conductors
 - Could be type NM cable.
 - Vdrop % = $16A \times 2 \text{ way wire length in kft} \times \text{Resistance } \Omega/kft / 240V$
 - 2.19% = $16A \times 2 \times \text{Distance} \times 1.24\Omega/kft / 240V$
 - One Way Distance of #10CU = 133 ft
- Fault applied to 2nd rail
- Bonding of modules to rail with 1 WEEB clip per mid clamp
- Bonding of microinverter to rail with 1 WEEB clip



Conceptual Drawing



Electrical Schematic



Other Potential Test Scenarios

Additional test scenarios may be required or preferred. Alternate test parameters may include the following:

- We may want to test both M215 and M250 microinverters
- Decreasing Voltage Drop from 3% to 2% with use of 72' one way wire length of #10CU conductors
- Apply fault to module frame
- Apply fault to 1st rail
- Install 2 or more microinverters on the cable / rail section
- Use UL-2703 racking system in place of WEEB bonding clips (potentially Unirac rail-less system)
- Test with approved Siemens AFCI Breaker



Equipment Grounding in an Enphase System

Overview

An Enphase Energy Microinverter system offers the safest photovoltaic system available. The Enphase Microinverter system provides a system that is safer for service personnel, safer for fire fighter personnel, and less prone to the fire hazards that come with higher voltage DC photovoltaic systems. Many of these safety advantages are widely known:

- DC voltages are maintained at low, safe levels
- Conduits and conductors are de-energized when the main breaker is shut-off.
- Enphase Microinverter systems are free of DC arc-fault hazards and requirements

However, one advantage that is rarely discussed is the high levels of ground bonding that exists in an Enphase Microinverter system.

Each and every microinverter in an Enphase system is bonded to ground through the Enphase Engage cabling system. The Enphase Engage cable provides for a robust grounding path to each microinverter, and when properly bonded to racking and to modules frames provides for robust equipment grounding to this equipment, also. When the microinverters, racking, and modules are properly bonded together, then the equipment grounding may also be provided through the microinverter. This can provide a significant cost savings to the labor and balance of system costs in an Enphase Microinverter system.

Enphase Grounding and the 2011 National Electrical Code

Equipment Grounding and System Grounding Requirements

The Enphase M250-IG and M215-60-2LL-S22-IG meet the requirements of the National Electrical Code Article 690.35 Ungrounded Photovoltaic Power Systems. NEC 690.35 allows for photovoltaic power systems to be installed with ungrounded photovoltaic source and output circuits. Systems that meet the requirements of NEC 690.35 are exempt from the requirements of NEC 690.41 System Grounding.

The NEC calls out two distinct types of grounding; equipment grounding and system grounding. Equipment grounding provides for the grounding of metal equipment and enclosures and is generally provided for with equipment grounding conductors (EGCs). System grounding provides the primary grounding path between a grounding electrode (I.E. ground rod or ufer) and a grounded system. System grounding requires the installation of a grounding electrode conductor (GEC). In an Enphase system, the DC conductors are not bonded to ground and the microinverters do not require a GEC, but do require that EGCs are provided for equipment grounding.

The term ungrounded is somewhat misleading, because ungrounded photovoltaic systems are still required to have equipment grounding provided to the metal frames, equipment, and enclosures in the system, but are not required to meet the requirements for system grounding. This means that a grounding electrode conductor (GEC) is not required to be installed to the enclosure of each Enphase Microinverter.

Systems that do bond the DC conductors of the photovoltaic source and output circuits must meet the installation requirements for the grounding electrode conductors (GEC) as called out in NEC 250.64, which requires that the GEC be continuous and protected against damage. The grounding electrode conductor (GEC) must also be a minimum #8CU conductor, as required by NEC 250.166.

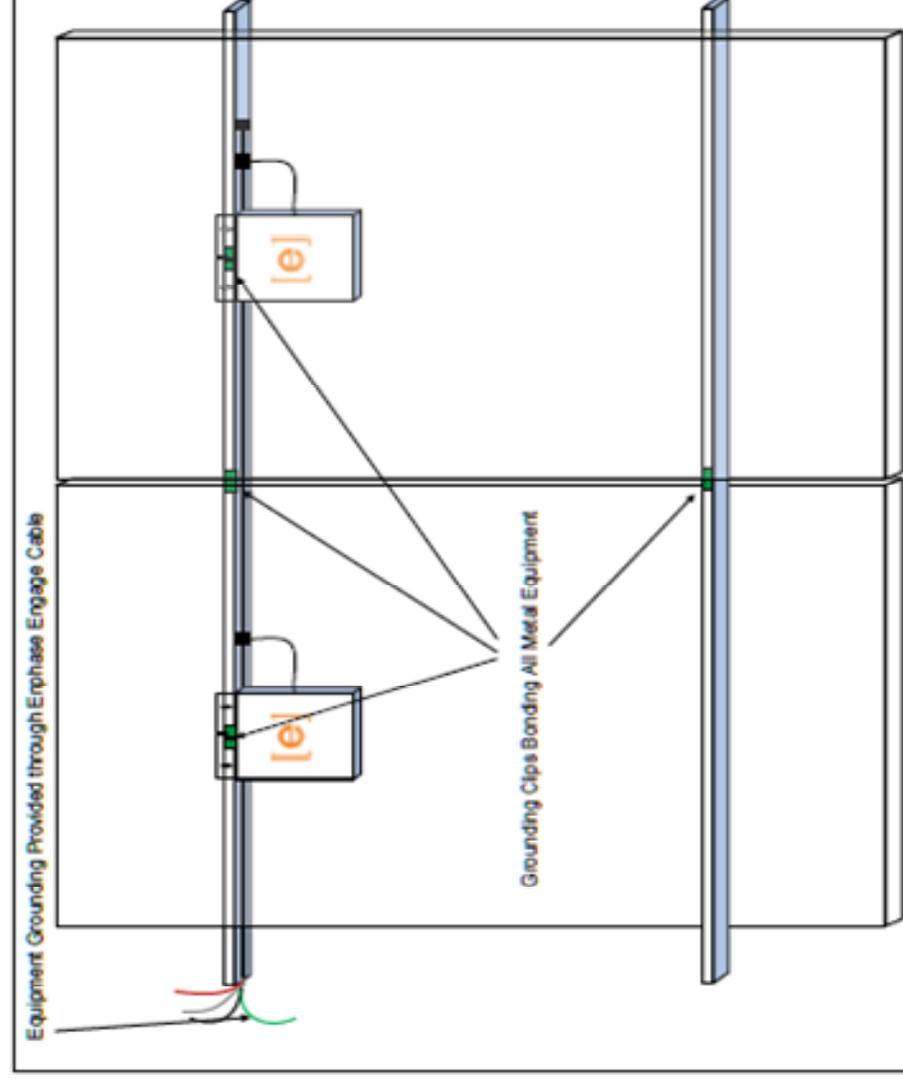
Equipment Grounding Requirements for an Enphase System

In an Enphase system with Integrated Ground Microinverters, the requirements for providing a GEC to the microinverters is removed, and only equipment grounding is required. In these systems, it is reasonable and safe to provide the equipment grounding through the Enphase Engage cabling.

NEC Article 690.43 Equipment Grounding specifies that all exposed non-current-carrying metal parts of PV module frames, electrical equipment, and conductor enclosures shall be provided with equipment grounding.

690.43(C) Structure as Equipment Grounding Conductor allows for equipment to be used as the equipment grounding conductor in a photovoltaic system. Specifically, *"Devices listed and identified for grounding the metallic frames of PV modules or other equipment shall be permitted to bond the exposed metal surfaces or other equipment to mounting surfaces."*

In an Enphase microinverter system, if the microinverters and modules are bonded to the racking assemblies with the use of listed and approved grounding clips or grounding components, then the equipment grounding conductor provided to the microinverters through the Enphase Engage cable may also be used to ground the other photovoltaic system components.



**Always check with your Authority Having Jurisdiction about your proposed grounding methodology prior to the installation of the system.

Meeting the Requirements of NEC 690.35 Ungrounded Photovoltaic Power Systems

Enphase microinverters meet the requirements of NEC Article 690.35 for Ungrounded Photovoltaic Power systems. The article states:

690.35 Ungrounded Photovoltaic Power Systems. Photovoltaic Power Systems shall be permitted to operate with ungrounded photovoltaic source and output circuits where the system complies with 690.35(A) through (G).

- (A) **Disconnects.** In an Enphase microinverter system the AC and DC connectors are the disconnecting means.
- (B) **Overcurrent Protection.** In an Enphase system, the AC circuit breaker or fused disconnecting feeding the branch circuit provides overcurrent protection for the inverter output circuit. As per 690.9(A) Exception (b), overcurrent protection is not required on the DC conductors.
- (C) **Ground Fault Protection.** In an Enphase microinverter system, ground fault protection is provided in the microinverter. In the Enphase microinverters with integrated grounding, the ground fault protection is provided by a ground fault sensing circuit.
- (D) **The DC conductors must be PV Wire.** The DC conductors in an Enphase Microinverter are PV Wire.
- (E) Allowed for use in ungrounded battery systems
- (F) **Labelling.** The Enphase Microinverters are labeled as specified.
- (G) **Listing.** The Enphase Microinverters are listed for use in an ungrounded photovoltaic system.

The SOLARMOUNT system has been certified and listed to the UL 2703 standard (Rack Mounting Systems and Clamping Devices for Flat-Plate Photovoltaic Modules and Panels). This standard included electrical grounding, electrical bonding, mechanical load and fire resistance testing.

In conducting these tests, specific modules are selected for their physical properties so that the certifications can be mostly broadly applied. The following lists the specific modules that were tested and the applicability of those certifications to other modules that might come onto the market.

In addition to UL 2703 certification, Unirac performs internal testing beyond the requirements of certification tests in order to establish system functional limits, allowable loads, and factors of safety. These tests include functional system tests, and destructive load testing.

Mechanical Load Test Modules	System Level Fire Classification																																
<p>The modules selected for UL 2703 mechanical load testing were selected to represent the broadest range possible for modules on the market. The tests performed cover the following basic module parameters:</p> <ul style="list-style-type: none"> • 60, 72, and 96 cell framed modules • Frame thicknesses greater than or equal to 1.0 mm • Basic single and double wall frame profiles (some complex frame profiles could require further analysis to determine applicability) • Clear and dark anodized aluminum frames • Certification loads: 50 psf up, 112 psf down 	<p>The system fire class rating requires installation in the manner specified in the SOLARMOUNT Installation Guide. SOLARMOUNT has been classified to the system level fire portion of UL 1703. This UL 1703 classification has been incorporated into our UL 2703 product certification. Class A system level fire performance is inherent in the SOLARMOUNT design, and no additional mitigation measures are required. The fire classification rating is only valid on roof pitches greater than 2:12 (slopes \geq 2 inches per foot, or 9.5 degrees). There is no required minimum or maximum height limitation above the roof deck to maintain the system fire rating for SOLARMOUNT. Module Types & System Level Fire Ratings are listed below:</p>																																
<table border="1"> <thead> <tr> <th colspan="2">Tested Modules</th> </tr> <tr> <th>Module Manufacturer</th> <th>Model/Series</th> </tr> </thead> <tbody> <tr> <td>CentroSolar</td> <td>E-Series 60 Cell, T-Series 60 Cell</td> </tr> <tr> <td>Hyundai</td> <td>HiS-MxxxMI, HiS-SxxxMI</td> </tr> <tr> <td>SunPower</td> <td>SPR-E20-327</td> </tr> <tr> <td>Trina</td> <td>TSM-PA05.08</td> </tr> </tbody> </table>	Tested Modules		Module Manufacturer	Model/Series	CentroSolar	E-Series 60 Cell, T-Series 60 Cell	Hyundai	HiS-MxxxMI, HiS-SxxxMI	SunPower	SPR-E20-327	Trina	TSM-PA05.08	<table border="1"> <thead> <tr> <th>Rail Type</th> <th>Module Type</th> <th>System Level Fire Rating</th> <th>Rail Direction</th> <th>Module Orientation</th> <th>Mitigation Required</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Standard Rail</td> <td rowspan="2">Type 1, Type 2, Type 3, & Type 10</td> <td rowspan="2">Class A, B, & C</td> <td>East-West</td> <td rowspan="2">Landscape OR Portrait</td> <td rowspan="2">None Required</td> </tr> <tr> <td>North-South</td> </tr> <tr> <td rowspan="2">Light Rail</td> <td rowspan="2">Type 1 & Type 2</td> <td rowspan="2">Class A, B, & C</td> <td>East-West</td> <td rowspan="2">Landscape OR Portrait</td> <td rowspan="2">None Required</td> </tr> <tr> <td>North-South</td> </tr> </tbody> </table>	Rail Type	Module Type	System Level Fire Rating	Rail Direction	Module Orientation	Mitigation Required	Standard Rail	Type 1, Type 2, Type 3, & Type 10	Class A, B, & C	East-West	Landscape OR Portrait	None Required	North-South	Light Rail	Type 1 & Type 2	Class A, B, & C	East-West	Landscape OR Portrait	None Required	North-South
Tested Modules																																	
Module Manufacturer	Model/Series																																
CentroSolar	E-Series 60 Cell, T-Series 60 Cell																																
Hyundai	HiS-MxxxMI, HiS-SxxxMI																																
SunPower	SPR-E20-327																																
Trina	TSM-PA05.08																																
Rail Type	Module Type	System Level Fire Rating	Rail Direction	Module Orientation	Mitigation Required																												
Standard Rail	Type 1, Type 2, Type 3, & Type 10	Class A, B, & C	East-West	Landscape OR Portrait	None Required																												
			North-South																														
Light Rail	Type 1 & Type 2	Class A, B, & C	East-West	Landscape OR Portrait	None Required																												
			North-South																														

Electrical Bonding and Grounding Test Modules

The list below is not exhaustive of compliant modules but shows those that have been evaluated and found to be electrically compatible with the SOLARMOUNT system.

Manufacturer	Module or Series
AU Optronics (BenQ Solar)	PM Series
Canadian Solar	CS5A-M, CS6P-M, CS6P-P, CS6X-P, ELPS CS6A-MM, ELPS CS6P-MM, CS6U-P, CS6U-M, CS6K-MS, CS6K-M, CS6K-P
CentroSolar America	C-Series, E Series
ET Solar	ET AC Module, ET Module
Flextronics	FXS
Hanwha SolarOne	HSL 60
Hyundai Heavy Industries	MG Series, RG Series, RW Series
Jinko	Jinko 60 JKMxxx-P-60, Jinko Eagle 60 JKMxxxPP-60, Jinko Eagle MX60 JKMSxxxPP-60, Jinko MX60 JKMSxxxP-60, Jinko Black 60 JKMxxxPP-60B-J4, Jinko 72 JKMxxxPP-72, Jinko Eagle 72 JKMxxxPP-72, Jinko Eagle MX72 JKMxxxPP-72, Eagle PERC 60, Eagle PERC 72
Kyocera	KD-F Series, KU-60
LG Electronics	MONO NEON, MONO X, NeON 2 LGxxxN1C-G4, NeON 2 LGxxxN2W-G4, NeON LGxxxN2W-B3, NeON LGxxxS1C-G4, Mono XLGxxxS2W-G4
Panasonic	VBHNxxxSA06, VBHNxxxSA06B, VBHNxxxSA11, VBHNxxxSA11B, VBHNxxxSA15, VBHNxxxSA15B, VBHNxxxSA16, VBHNxxxSA16B, VBHNxxxKA
Phono Solar Technology	Standard Modules

Manufacturer	Module or Series
Q-Cells	Q.PEAK-G3.1 XXX, Q.PEAK BLK-G3.1 XXX, Q.PLUS BFR G3.1 XXX, Q.PLUS-G3 XXX, P.PRO G3 XXX, Q.PRO BFR-G3 XXX, Q.PEAK-G3 XXX, Q.PEAK BLK-G3 XXX, Q.PLUS BFR G4.1 XXX, Q.PRO BFR G4 XXX, Q.PRO BFR G4.1 XXX, Q.PRO BFR G4.3 XXX, Q.PEAK-G4.1 XXX, Q.PEAK-G4.1/MAX XXX, Q.PEAK BLK G4.1 XXX, Q.PRO G4 XXX, Q.PLUS G4 XXX, Q.PEAK-G4.1/TAA XXX, Q.PEAK BLK G4.1/TAA XXX, Q.PLUS BFR G4.1/TAA XXX, Q.PLUS BFR G4.1/MAX XXX, B.LINE PLUS BFR G4.1 XXX, B.LINE PRO BFR G4.1 XXX, Q.PRO EC-G4.4 XXX, Q.PRO L-G2 XXX, Q.PEAK L G4.2 XXX, Q.PLUS L G4.2 XXX, Q.PLUS L G4.1 XXX, Q.PLUS L G4 XXX, Q.PRO L G4 XXX, Q.PRO L G4.1 XXX, Q.PRO L G4.2 XXX, B.LINE PLUS L G4.2 XXX, B.LINE PRO L G4.1 XXX, B.LINE PRO L G4.2 XXX, Q.PLUS L-G4.2/TAA
Renesola	60-Cell Modules
Sharp	ND-240QCJ, ND-250QCS, ND-Q235F4
Silfab	SLA-M, SLA-P, SLG-P, SLG-M
SolarWorld	Sunmodule Plus, Sunmodule Pro, Sunmodule Protect
Sun Edison/MEMC	F-Series, R-Series
Suniva	MV Series, Optimus™ Series
SunPower	AC, E-Series, Sig Black, X-Series, P-Series
Suntech	STP"XXX"
Trina	PA05, PD05, DD05
TSMC Solar	TS-150C2 CIGS
Yingli	Panda 60, YGE 60, YGE-Z 60

Electrical Bonding and Grounding Test Modules

The modules selected for UL 2703 bonding and grounding testing represent the broadest possible range of modules on the market. The tests were performed for each specific bonding location using representative module frame profile sections. The tests performed cover the following basic module parameters:

- 60, 72, and 96 cell framed modules
- Frame thicknesses greater than or equal to 1.0 mm
- Basic single and double wall frame profiles (some complex frame profiles could require further analysis to determine applicability)
- Clear and dark anodized aluminum frames
- The frame profile must not have any feature that might interfere with the bonding devices that are integrated into the racking system

UL 2703 Certification Marking Label

Unirac SOLARMOUNT is listed to UL 2703. Marking Labels are shipped with the Midclamps. After the racking system is fully assembled, a single Marking Label should be applied to the SOLARMOUNT rail at the edge of the array. Note: The sticker label should be placed such that it is visible, but not outward facing.



Midclamp and Endclamp Loads per Module



Module Condition Definitions:

END-END: The END-END module shown above, correlating with the loads below, indicates a module that is secured by 4 Endclamps on 2 rails.

END-MID/MID-END: The END-MID and MID-END modules shown above, correlating with the loads below, indicate modules that are secured by 2 Endclamps and 2 Midclamps on 2 rails.

MID-MID: The MID-MID module shown above, correlating with the loads below, indicate a module that is properly secured by 4 Midclamps on 2 rails.

Midclamp and Endclamp Loads per Module							
Rail	Loading Condition (with Respect to the Rail)	Allowable Load (lbs)			Design Load (lbs)		
		End-End	End-Mid & Mid-End	Mid-Mid	End-End	End-Mid & Mid-End	Mid-Mid
SM/SM HD	Z+, Tension	1836	1751	1666	2780	2726	2672
	Y±, Transverse*	178*	315*	428	269*	476*	647
	X±, Sliding	244	244	850	368	368	1286
	Y±, Transverse w/33mm Module	67	248	428	102	373	647
SM LT	Z+, Tension	1260	1234	1208	1908	1867	1826
	Y±, Transverse*	139*	225*	419	211*	340*	634
	X±, Sliding	266	266	840	402	402	1270
	Y±, Transverse w/33mm Module	67	225	419	102	340	634

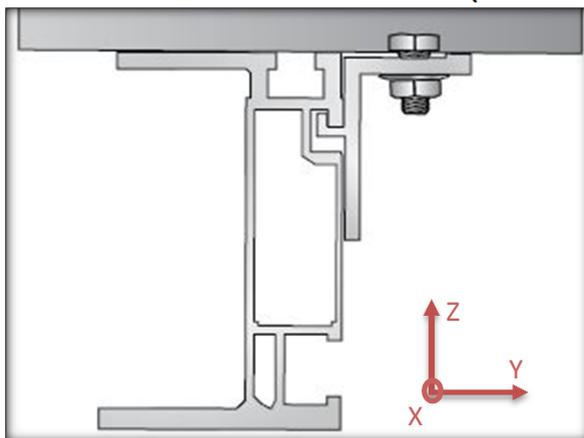
*For transverse loads associated with using "C" Endclamps and 33 mm Modules, please see "Y±, Transverse w/33mm Module"

Midclamp: Part No. - 302027C, 302027D, 302028C, 302028D, 302029C, 302029D. Material - Stainless Steel 300 Series. Ultimate Tensile Strength - 85 ksi. Finish - Clear or Black Oxide. Weight - 0.05 lbs (23 g).

Endclamp: Part No. - 302021C, 302021D, 302022C, 302022D, 302023C, 302023D, 302024C, 302024D, 302025C, 302025D, 302026C, 302026D. Material - 6000 Series Aluminum Alloys. Ultimate Tensile Strength - 38 ksi. Yield Strength - 35 ksi. Finish - Clear or Dark Anodized. Weight ~ 0.06 lbs (26 g)

***NOTE: See NOTES on Page H2.

SOLARMOUNT BOTTOM MOUNTING CLIP (SM HD ONLY)



Bottom Mounting Clip (SM HD Only)		
Direction	Allowable Load (lbs)	Design Load (lbs)
	SM HD	SM HD
X ±, Sliding	27	41
Y ±, Transverse	329	497
Z +, Tension	686	746

Part No. 302000C

Bottom Mounting Clip Material: 6000 Series Aluminum Alloys

Ultimate Tensile Strength: 38 ksi, Yield Strength: 35 ksi

Finish: Clear Anodized

NOTES:

Allowable and design loads are valid when components are assembled according to authorized UNIRAC documents.

For the beam to L-Foot connection: Assemble with one Unirac $\frac{3}{8}$ "-20 T-Bolt and one $\frac{3}{8}$ "-20 ASTM F594 serrated flange nut.

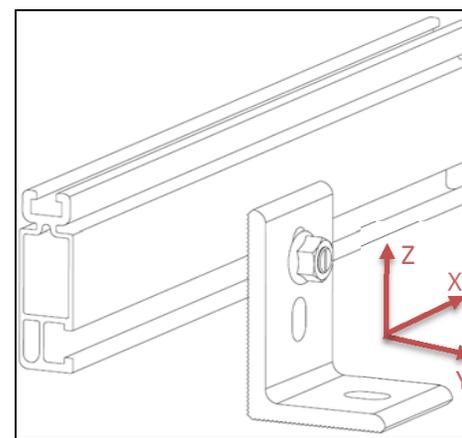
Use anti-seize and torque the Midclamp, Endclamp, and Bottom Mounting Clip to 10 ft-lbs. Use anti-seize and torque the L-Foot to 30 ft-lbs.

Values for the L-Foot and Bottom Mounting Clip represent the capacity of a single part when used with a SOLARMOUNT series rail to retain a module in the direction indicated.

Assemble Midclamp and Endclamp with one Unirac $\frac{1}{4}$ "-20 T-Bolt and one $\frac{1}{4}$ "-20 ASTM F594 serrated flange nut.

SM = SOLARMOUNT Standard Rail, SM HD = SOLARMOUNT Heavy Duty Rail, SM LT = SOLARMOUNT Light Rail

SOLARMOUNT L-FOOT



L-Foot with $\frac{3}{8}$ " T-Bolt				
Direction	Allowable Load (lbs)		Design Load (lbs)	
	SM/SM HD	SM LT	SM/SM HD	SM LT
X ±, Sliding	565	594	854	898
Y ±, Transverse	146	172	220	261
Z +, Tension	938	603	1419	911
Z -, Compression	1357	1297	2052	1962

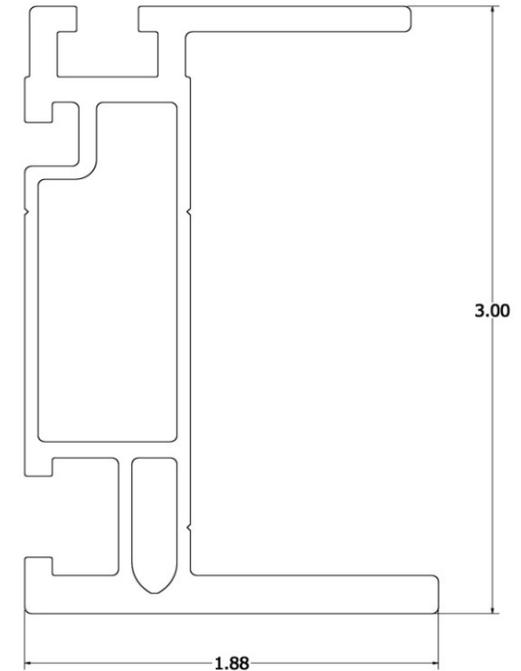
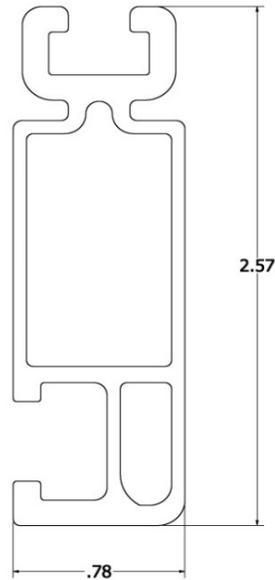
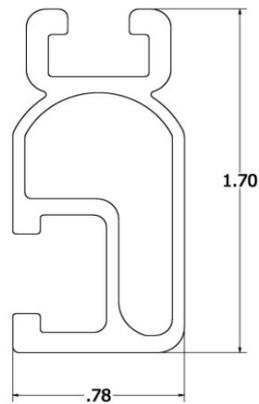
Part No. 304001C, 304001D

L-Foot material: 6000 Series Aluminum Alloys

Ultimate Tensile: 38 ksi, Yield: 35 ksi

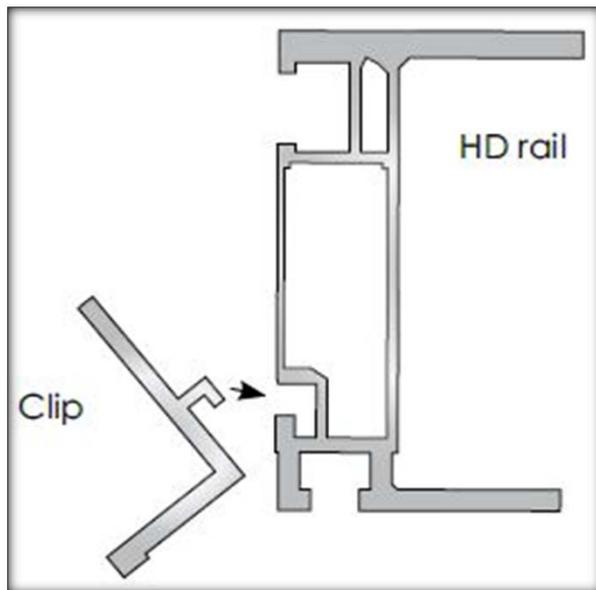
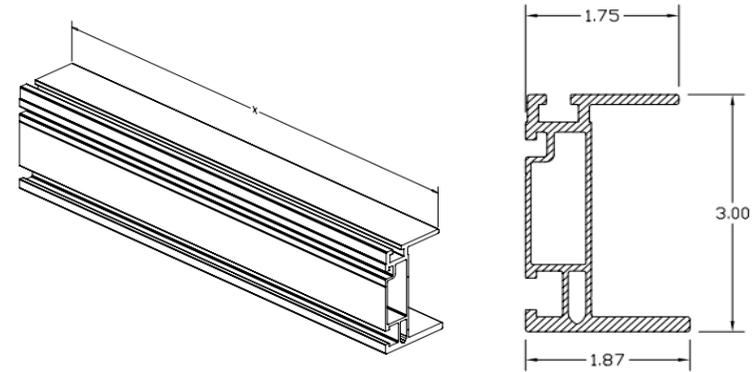
Finish: Clear or Dark Anodized

L-Foot Weight: 0.215 lbs (98g)



Properties	SOLARMOUNT Light	SOLARMOUNT Rail Profile 2	SOLARMOUNT HD	Units
BEAM HEIGHT	1.70	2.57	3.00	in
APPROX WEIGHT	0.491	0.728	1.271	plf
CROSS SECTION AREA	0.409	0.625	1.059	in ²
SECTION MODULUS (X-AXIS)	0.15	0.363	0.898	in ³
SECTION MODULUS (Y-AXIS)	0.067	0.113	0.221	in ³
MOMENT OF INERTIA (X-AXIS)	0.13	0.467	1.45	in ⁴
MOMENT OF INERTIA (Y-AXIS)	0.026	0.045	0.267	in ⁴
RADIUS OF GYRATION (X-AXIS)	0.564	0.865	1.17	in
RADIUS OF GYRATION (Y-AXIS)	0.254	0.269	0.502	in

The SOLARMOUNT Installation Guide and system certifications are equally applicable to SOLARMOUNT HD and Light rail. Unless otherwise noted, installation procedures for both are equivalent and sufficient to maintain system certifications. For maximum spans and cantilevers specific to SOLARMOUNT HD and Light rail, please refer to Appendix C and the SOLARMOUNT Installation Guide.



Bottom Mounting with SOLARMOUNT HD Rail:

Bottom mounting is no longer possible with standard SOLARMOUNT or Light rail, however, SOLARMOUNT HD still accommodates this mounting method. Should you elect to use bottom mounting clips to secure modules, please refer to the procedure below. NOTE: Bottom mounting of modules does not provide module bonding through clips and is not covered under the current UL 2703 certification.

	Wrench size	* Recommended torque (ft-lbs)
¼" hardware	7/16"	10
¾" hardware	9/16"	30

Note: Torque specifications do not apply to lag bolt connections.

*With anti-seize



Stainless steel hardware can seize up, a process called galling. To significantly reduce its likelihood, (1) apply lubricant to bolts, preferably an anti-seize lubricant, available at auto parts stores, (2) shade hardware prior to installation, and (3) avoid spinning on nuts at high speed. See Installation Supplement 910, Galling and Its Prevention, at www.unirac.com.