

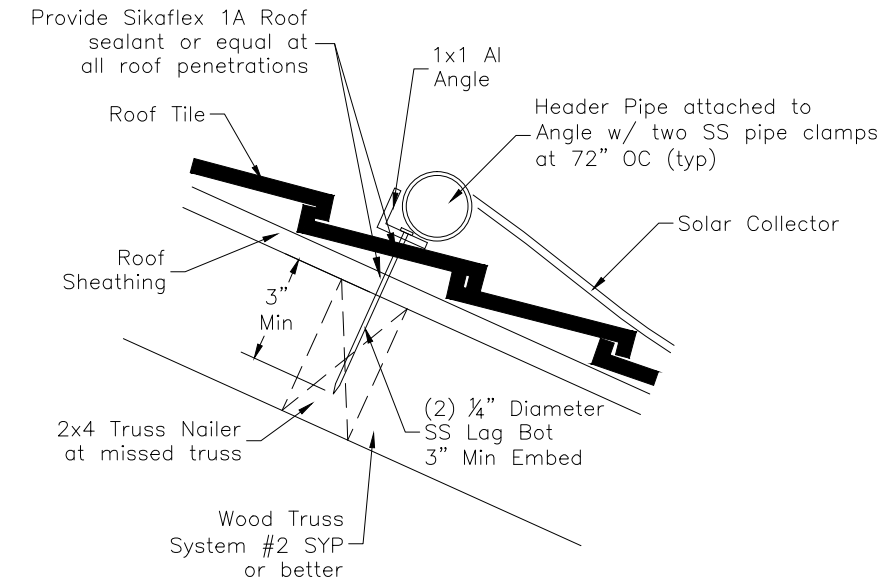
SOLAR COLLECTOR PLAN

NOTES:

- These drawings provide the structural requirement for the installation of Techno-Solis Collectors on low rise residential building with a mean roof height of 30 feet, located in Open Terrain with Scattered Obstructions (Exposure C).
- The design meets the minimum requirements of the Florida Building Code 2010 and ASCE 7.
- The installation shall be in accordance with these drawings and utilize hardware (strap, clamps and screw) provide by the manufacturer and detailed in these drawings and plumbed in accordance with the manufacturer's installation manual.
- The solar collectors shall be secured with a 0.675 in wide x 0.045 in thick polyester reinforced strap across the panels spaced in accordance with the local jurisdiction wind load per Table 1 & 2.
- Each strap shall be secure to the top of roof tiles at 50 1/2 in on center using Techno-Solis Super Clip and (5) #14 stainless steel, hex head, sheet metal screws. Do not penetrate roof deck.
- Attach headers to 1x1 Aluminum angle with (2) Stainless Steel pipe clamps at 72" OC.
- Attach Aluminum angle to roof trusses using 1/4" screw (3" embed) with max spacing per Table 1 & 2.
- All hardware (hose clamps, screws etc.) to be ANSI 304 stainless steel.

NOTES:

- The design described herein is based on ASCE 7 and includes components (bank of 10 solar panels) installed on roof in zone 1 with effective wind area of 100 sf. The calculations are based on stated design wind speed for (0-7) and (7-45). See component and cladding detail.
- The uplift pressure applies to the surface for Exposure C and mean of roof height of 30 feet maximum.
- The installation requirements shown in tables 1 & 2 call for spacing of the connection to roof trusses and hold down straps based on the wind speeds and design load requirement for different configurations.
- Solar collectors shall not extend into the exterior zone (zone-2 and zone-3) more than one foot.
- The width or dimension of the strip in zone 2 and zone 3 is 10% of the least horizontal dimension or 40% of the eave height, but not less than 3 feet.
- The design loads shown in the table apply to component and cladding such as solar collector installed on a building with a mean roof height of 30 feet, located in Exposure C on roof at a tilt angle of 0 to 45 degrees. The design loads for other design wind speeds and for structures at other height or tilts would vary and must be determined on a case by case basis.



Typical Mounting Bracket Installation

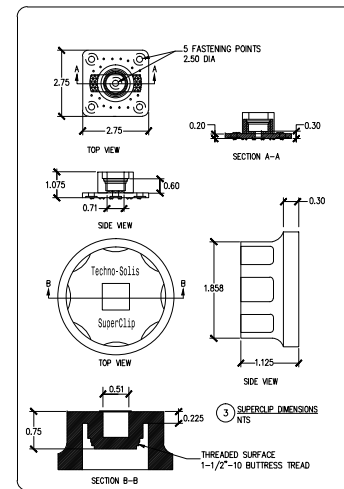
Scale: 1/4"=1'

TABLE 1

ROOF ANGLE= 0 to 7 DEGREES - 10 PANEL BANK - 170 MPH (47.9 psf)									
Panel Length	Strap Spacing	# of Straps	1/4" SS Wood Screw into Roof Rafter						Bracket Spacing
			Total Uplift	Thread Force	Anchor Points	Thread Length	S	D (max)	
			[Lb]	[lb/in]	QTY	[in]	[lb]	[in]	
12'	35"	5	24,240	251.68	34	3.0	25,671	30	
10'	38"	4	20,200	251.68	28	3.0	21,141	43	
8'	45"	3	16,160	251.68	22	3.0	16,610	55	

TABLE 2

ROOF ANGLE= 7 to 45 DEGREES - 10-PANEL BANK - 170 MPH (44.5 psf)									
Panel Length	Strap Spacing	# of Straps	1/4" SS Wood Screw into Roof Rafter						Bracket Spacing
			Total Uplift	Thread Force	Anchor Points	Thread Length	S	D (Max)	
			[Lb]	[lb/in]	QTY	[in]	[lb]	[in]	
12'	35"	5	22,473	251.68	30	3.0	22,650	40	
10'	38"	4	18,728	251.68	26	3.0	19,630	46	
8'	45"	3	14,982	251.68	20	3.0	15,100	60	



Note: Techno-Solis Clip shall be attached directly to roof tiles only. Do not penetrate roof sheathing

Engineering Notes	
Basic Wind Speed	- 170 MPH
Building Category	- I
Wind Importance Factor	- 1
Wind Exposure	- C
Design Wind Pressure	- 47.9 PSF (max)

VALID FOR RESIDENTIAL APPLICATIONS UP TO THREE-STORY ONLY. FOR COMMERCIAL APPLICATIONS, CONTRACTOR SHALL SUBMIT SIGNED AND SEALED INSTALLATION DRAWINGS FOR EACH INDIVIDUAL PROJECT.

BASIS OF CALCULATION:

- Wind Speed: 170 mph
- Uplift Pressure: 47.9 psf (Max)
- Panel Area (12-foot panel): 50.5 sf
- Panel Bank: 10 panel
- Fastener: 0.242" dia wood screws (#14) 251.68 lbf/in thread force (southpine)

6) Fastener Length 4 in (min thread length = 2.625 in ANSI B18.6/1972)

TYPICAL CALCULATION:

10-PANEL BANK (12-FOOT LONG PANEL)

$$F = P \cdot A \cdot N = (47.9 \text{ psf}) \cdot (50.5 \text{ sf}) \cdot (10) = 24,190 \text{ lb} = \text{total uplift per bank}$$

$$S = (L) \cdot (\text{THREAD FORCE}) \cdot (\# \text{ FASTENING CLIPS}) \cdot (\# \text{ SCREWS/CLIP})$$

$$S = (3 \text{ in}) \cdot (251.68 \text{ lb/in}) \cdot (34) = 25,663 \text{ lb}$$

REFER TO TABLE 1 AND 2 FOR MORE INFORMATION

LEGEND:

- P - Uplift pressure (psf)
- A - Maximum Collector's Area (sf)
- N - Maximum Number of Panels per Bank
- F - Total Uplift Force per Bank (lb)
- S - Total Fastener Force (lb)
- L - Fastener Length (in)

Tile Roof Mounting Recommendations

Business Authorization Number - EB 00006579

**Solar Panel Installation Details**  
**Techno-Solis Incorporated**  
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**Unroe Engineering, Inc.**  
 Engineering/Planning/Scientific Evaluations  
 PO Box 690942, Orlando, FL 32869 ◀ PH 407-299-0650 ◀ FX 407-429-7639



Date: 12/27/12  
 Scale: ---  
 File: Techno-solis

Drawing No. **SC**

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