



**CERTIFIED SOLAR COLLECTOR**

SUPPLIER:  
**SunEarth, Inc.**  
 8425 Almeria Avenue  
 Fontana, CA 92335 USA  
 www.sunearthinc.com

BRAND: ThermoRay  
 MODEL: TRB-32  
 COLLECTOR TYPE: Glazed Flat Plate  
 CERTIFICATION #: 10001804  
 Original Certification: March 06, 2013  
 Expiration Date: February 01, 2025

The solar collector listed below has been evaluated by the Solar Rating & Certification Corporation™ (SRCC™), an ANSI accredited and EPA recognized Certification Body, in accordance with SRCC OG-100, Operating Guidelines and Minimum Standards for Certifying Solar Collectors, and has been certified by the SRCC. This award of certification is subject to all terms and conditions of the Program Agreement and the documents incorporated therein by reference.

COLLECTOR THERMAL PERFORMANCE RATING							
Kilowatt-hours (thermal) Per Panel Per Day				Thousands of Btu Per Panel Per Day			
Climate -> Category (Ti-Ta)	High Radiation (6.3 kWh/m <sup>2</sup> .day)	Medium Radiation (4.7 kWh/m <sup>2</sup> .day)	Low Radiation (3.1 kWh/m <sup>2</sup> .day)	Climate -> Category (Ti-Ta)	High Radiation (2000 Btu/ft <sup>2</sup> .day)	Medium Radiation (1500 Btu/ft <sup>2</sup> .day)	Low Radiation (1000 Btu/ft <sup>2</sup> .day)
A (-5 °C)	14.1	10.7	7.3	A (-9 °F)	48.3	36.6	24.9
B (5 °C)	12.9	9.5	6.0	B (9 °F)	44.0	32.3	20.6
C (20 °C)	10.9	7.6	4.3	C (36 °F)	37.3	25.9	14.6
D (50 °C)	7.5	4.3	1.4	D (90 °F)	25.4	14.6	4.8
E (80 °C)	4.3	1.6	0.0	E (144 °F)	14.7	5.6	0.0

**A- Pool Heating (Warm Climate) B- Pool Heating (Cool Climate) C- Water Heating (Warm Climate)**  
**D- Space & Water Heating (Cool Climate) E- Commercial Hot Water & Cooling**

COLLECTOR SPECIFICATIONS					
<b>Gross Area:</b>	3.050 m <sup>2</sup>	32.83 ft <sup>2</sup>	<b>Dry Weight:</b>	44 kg	98 lb
<b>Net Aperture Area:</b>	2.733 m <sup>2</sup>	29.42 ft <sup>2</sup>	<b>Fluid Capacity:</b>	2.9 liter	0.8 gal
<b>Absorber Area:</b>	2.810 m <sup>2</sup>	30.25 ft <sup>2</sup>	<b>Test Pressure:</b>	1103 kPa	160 psi

TECHNICAL INFORMATION			Tested in accordance with: ISO 9806		
<b>ISO Efficiency Equation</b> [NOTE: Based on gross area and (P)=Ti-Ta]					
<b>SI UNITS:</b>	$\eta = 0.748 - 3.72370(P/G) - 0.00670(P^2/G)$	<b>Y Intercept:</b>	0.751	<b>Slope:</b>	-4.167 W/m <sup>2</sup> .°C
<b>IP UNITS:</b>	$\eta = 0.748 - 0.65627(P/G) - 0.00066(P^2/G)$	<b>Y Intercept:</b>	0.751	<b>Slope:</b>	-0.734 Btu/hr.ft <sup>2</sup> .°F

Incident Angle Modifier								Test Fluid:	
$\theta$	10	20	30	40	50	60	70	Water	
<b>K<sub>τα</sub></b>	1.00	0.99	0.98	0.96	0.94	0.88	0.77	<b>Test Mass Flow Rate:</b>	0.0199 kg/(s m <sup>2</sup> )    14.75 lb/(hr ft <sup>2</sup> )
								<b>Impact Safety Rating: 11</b>	

REMARKS:

*Jen Higgins*

Technical Director



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ADDITIONAL INFORMATION <a href="#">(click here to return to the rating page)</a>			
Test Lab:	TÜV Rheinland PTL, LLC	Test Report Date:	February 01, 2013
Test Report Number:	RS1-KIO120809	Test Location:	outdoors

SOLAR COLLECTOR CONSTRUCTION DETAILS					
<b>Gross Length:</b>	2.490 m	<b>Gross Width:</b>	1.225 m	<b>Gross Depth:</b>	85.000 mm

COLLECTOR MATERIALS					
<b>Outer Cover:</b>	Glass sheet	<b>Enclosure back:</b>	Aluminum	<b>Back Insulation:</b>	Fiber, Foam
<b>Inner Cover:</b>	None	<b>Enclosure side:</b>	Aluminum	<b>Side Insulation:</b>	None, Foam
<b>Absorber Description:</b>	Tubes connected to Single Sheet		<b>Flow Pattern:</b>	Parallel/Harp	
<b>Riser Tube:</b>	Copper		<b>Fin:</b>	Aluminum	
<b>Absorber Coating:</b>	Selective		<b>Tube to fin connection</b>	Laser Weld	

GLAZING	Outer Cover	Inner Cover
<b>Material:</b>	Glass sheet	None
<b>Surface Characteristics:</b>	Textured	
<b>Thickness:</b>	3.8 mm	N/A
<b>Transmissivity:</b>	Medium (87-89.9%)	
<b>Length:</b>	2.440 m	
<b>Width:</b>	1.134 m	
<b>Tube Glazing to Header Enclosure Seal:</b>	EPDM gasket	

<b>ABSORBER:</b>		<b>Absorber Coating:</b>		Selective	
<b>Header Material:</b>	Copper	<b>Header OD:</b>	28.5 mm	<b>Header Wall:</b>	0.8 mm
<b>Riser Tube Material:</b>	Copper	<b>Riser Tube OD:</b>	9.9 mm	<b>Riser Tube Wall Thickness:</b>	0.4 mm
<b>Fin Material:</b>	Aluminum	<b>Fin Thickness:</b>	0.50 mm		





<b>Flow Pattern:</b>	Parallel/Harp				
<b>Number of Riser Tubes:</b>	10	<b>Tube Spacing:</b>	121.4 mm	<b>Number of times each riser crosses the absorber:</b>	1
<b>Length of Flow Path:</b>	2.38 m	<b>Riser to Fin/Plate Bond:</b>	Laser Weld		

INSULATION:					
Location	Type	Thickness	Location	Type	Thickness
<b>Back – Top Layer:</b>	Fiber	29.0 mm	<b>Sides – Inner Layer:</b>	None	
<b>Back – Bottom Layer:</b>	Foam	25.0 mm	<b>Sides – Outer Layer:</b>	Foam	25.0 mm
<b>Enclosure Fastening Methods:</b>	Screws				

Power Output per Collector(W) [ Ti-Ta, G = 1000 W/m <sup>2</sup> ]					
0	10	30	50	70	
2283	2167	1924	1664	1388	

PRESSURE DROP					
Flow	$\Delta P$		Flow	$\Delta P$	
ml/s	Pa		gpm	in H <sub>2</sub> O	
20	0		0.32	0.0	
50	0		0.79	0.0	
80	0		1.27	0.0	

