



OG-100 Solar Thermal Collector Certification

No./10001888

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CERTIFICATION HOLDER: UMA Solar 950 Sunshine Lane Altamonte Springs, FL 32714 USA www.umasolar.com	EVALUATION SUBJECT BRAND: Sunstar MODEL: STR TYPE: Unglazed Flat Plate
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PRODUCT CERTIFICATION SYSTEM:

The ICC-SRCC OG-100 certification program includes evaluation and performance ratings for solar thermal collectors as established in the [ICC-SRCC Rules for Solar Heating & Cooling Product Listing Reports](#). The program also includes periodic factory inspections and surveillance of the manufacturer's quality management system.

COMPLIANCE WITH THE FOLLOWING STANDARD(S):

[SRCC Standard 100-2013-01](#)

OG-100 THERMAL PERFORMANCE RATINGS:

ICC-SRCC OG-100 thermal performance ratings provided for the collector are calculated for a 24-hour period using OG-100 standard conditions using collector parameters measured through laboratory testing. Actual performance will vary with local conditions, installation details and hot water usage.

OG-100 STANDARD DAILY PRODUCTION (Collector Tested per ISO 9806:1994)							
Kilowatt-hours (thermal) Per m ² Per Day				Thousands of Btu Per ft ² Per Day			
Climate ->	High Radiation	Medium Radiation	Low Radiation	Climate ->	High Radiation	Medium Radiation	Low Radiation
Category (Ti-Ta)	(6.3 kWh/m ² .day)	(4.7 kWh/m ² .day)	(3.1 kWh/m ² .day)	Category (Ti-Ta)	(2 kBtu/ft ² .day)	(1.5 kBtu/ft ² .day)	(1 kBtu/ft ² .day)
A (-5 °C)	6.5	5.1	3.7	A (-9 °F)	2.1	1.6	1.2
B (5 °C)	3.3	2.0	0.8	B (9 °F)	1.0	0.6	0.2
C (20 °C)	0.2	0.0	0.0	C (36 °F)	0.1	0.0	0.0
D (50 °C)	0.0	0.0	0.0	D (90 °F)	0.0	0.0	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



THERMAL EFFICIENCY:

The efficiency of solar thermal collectors is determined using test methods set in ICC 901/SRCC 100, based on ISO 9806 procedures. Results are processed to provide unique coefficients ($\eta_{0,hem}$, a_1 , $a_2...$) for collection efficiency equations, provided in several forms below. For the simplified equations, instantaneous power is given by $Q = \eta_{hem} A_G G$. Incident Angle Modifiers (IAMs) are provided to indicate the change in output as the angle of solar irradiance changes in the transverse and longitudinal planes of the collector. The inputs to the equations are defined as:

T_i : Temperature of the fluid entering the collector

T_a : Temperature of the ambient air around the collector

G : Hemispherical solar irradiance. Sub-types include beam (b) and diffuse (d) irradiance.

A_G : Gross collector area

SIMPLIFIED THERMAL PERFORMANCE COEFFICIENTS (ISO 9806-2013, T_i , A_G)											
Second Order Thermal Efficiency Equation* $\eta_{hem} = \eta_{(0,hem)} - (a_1 (T_i - T_a)/G) - a_2 G((T_i - T_a)/G)^2$						Linearized Thermal Efficiency Equation* $\eta_{hem} = \eta_{(0,hem)} - a_1 (T_i - T_a)/G$					
UNITS:	η_{hem}	a_1	a_2	η_{hem} ("Intercept")				a_1 ("Slope")			
SI	0.000	0.000 (W/m ² .°C)	0.000 (W/m ² .°C)	0.909				(W/m ² .°C)			
IP	0.000	0.000 (Btu/hr.ft ² .°F)	0.000 (Btu/hr.ft ² .°F)	0.909				(Btu/hr.ft ² .°F)			
* Thermal efficiency equations per ISO 9806-2013 using inlet (T_i) fluid temperature, provided in second and first order (linearized) forms. The second order efficiency equation is a more accurate representation of the collector performance. The linearized efficiency equation is provided for use with incentive programs, regulations and software that require the simplified "slope" and "intercept" coefficients to describe collector performance.											
DIRECT INCIDENT ANGLE MODIFIERS (IAM)											
Angle (θ)	θ	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
Longitudinal IAM:	K_{la}	-	1.00	1.02	1.04	1.07	1.08	1.03	0.57	-	-
Transverse IAM:	K_{ra}	-	-	-	-	-	-	-	-	-	-

TEST SAMPLE SPECIFICATIONS:

The specifications of the collector sample submitted for testing are provided below.

TEST & SAMPLE SPECIFICATIONS					
Gross Area:	2.244 m ²	24.15 ft ²	Maximum Design Operating Temperature:		
Gross Length:	3.850 m	151.57 in	Maximum Design Operating Pressure:		
Gross Width:	0.680 m	26.77 in	Gross Depth:	50.0 mm	2.0 in
Test Fluid:	Water		Dry Weight:	5.0 kg	11.0 lb
Ave. Flowrate - Thermal Performance Testing:	0.099 Kg/sm ²	0.014 lb/stf ²	Fluid Capacity:	7.2 liter	1.9 gal
Test Standard(s):	Standard 100, ISO 9806:1994				
Notes:	All sizes of this collector are certified.				

IDENTIFICATION:

Certified systems must be identified in accordance with the [Rules for Certification Mark and Certificate Use](#).



CONDITIONS:

The certified solar water heating system must comply with the following conditions:

1. Collector must be installed and operated in accordance with the manufacturer's published instructions and local codes and regulations.
2. OG-100 Standard Performance Ratings have been calculated for the tested components using standardized conditions established by the OG-100 program and associated test standards. Actual performance will vary based on the specific usage, installation and local environmental conditions.
3. The collector in this ICC-SRCC OG-100 certification must be labeled in accordance with the [ICC-SRCC Rules for Mark and Certificate Use](#).
4. OG-100 certifications do not include mounting hardware and fixtures.
5. Solar thermal collectors and mounting hardware and appurtenances must comply with all applicable local requirements for fire resistance. Solar thermal collectors must be mounted in accordance with the requirements of the collector and mounting hardware manufacturers to comply with local codes for structural loading for wind, seismic, snow and other loads.
6. Solar thermal collectors must be used with the heat transfer fluids listed in this document.
7. Solar thermal collector manufactured under a quality control program subject to periodic evaluation in accordance with the requirements of ICC-SRCC.
8. This document must be reproduced in its entirety.
9. Certification status should be confirmed on the ICC-SRCC Directory at www.solar-rating.org

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