



# OG-100 Solar Thermal Collector Certification

# No./10002063

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<b>CERTIFICATION HOLDER:</b> <b>Techno-Solis, Inc.</b> 301 20th Street South St. Petersburg, FL 33712 USA <a href="http://www.techno-solisusa.com">www.techno-solisusa.com</a>	<b>EVALUATION SUBJECT</b> <b>BRAND:</b> Swimmaster <b>MODEL:</b> C15TS08, C15TS10, C15TS12, C20TS08, C20TS10, C20TS12 <b>TYPE:</b> 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): [ICC 901/SRCC 100-2015](#)

COLLECTOR THERMAL PERFORMANCE RATING
SRCC OG-100 performance ratings based on average climate data and application categories are optional and have been omitted from this certification. The collector's efficiency equation from testing to ISO 9806, given below, can be used for project-specific performance evaluations. For more information on collector performance, contact the manufacturer. The collector(s) addressed by this certification have been found to comply with the requirements of the SRCC OG-100 program and SRCC Standard 100 (version listed above).



**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, $T_i$ , $A_G$ )											
<b>Second Order Thermal Efficiency Equation*</b> $\eta_{hem} = \eta_{(0,hem)} - (a_1 (T_i - T_a)/G) - a_2 G((T_i - T_a)/G)^2$						<b>Linearized Thermal Efficiency Equation*</b> $\eta_{hem} = \eta_{(0,hem)} - a_1 (T_i - T_a)/G$					
<b>UNITS:</b>	$\eta_{hem}$	$a_1$	$a_2$	$\eta_{hem}$ ("Intercept")				$a_1$ ("Slope")			
<b>SI</b>	1.000	0.105 (W/m <sup>2</sup> .°C)	0.781 (W/m <sup>2</sup> .°C)	0.734				(W/m <sup>2</sup> .°C)			
<b>IP</b>	1.000	0.019 (Btu/hr.ft <sup>2</sup> .°F)	0.138 (Btu/hr.ft <sup>2</sup> .°F)	0.734				(Btu/hr.ft <sup>2</sup> .°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)											
<b>Angle (<math>\theta</math>)</b>	$\theta$	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
<b>Longitudinal IAM:</b>	$K_{la}$	-	1.00	1.00	1.00	0.96	0.82	0.32	0.00	-	-
<b>Transverse IAM:</b>	$K_{ra}$	-	-	-	-	-	-	-	-	-	-

**TEST SAMPLE SPECIFICATIONS:**

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

TEST & SAMPLE SPECIFICATIONS					
<b>Gross Area:</b>	3.672 m <sup>2</sup>	39.53 ft <sup>2</sup>	<b>Maximum Design Operating Temperature:</b>		
<b>Gross Length:</b>	3.048 m	120.00 in	<b>Maximum Design Operating Pressure:</b>		
<b>Gross Width:</b>	1.205 m	47.43 in	<b>Gross Depth:</b>	6.4 mm	0.3 in
<b>Test Fluid:</b>	Water		<b>Dry Weight:</b>	11.1 kg	24.5 lb
<b>Ave. Flowrate - Thermal Performance Testing:</b>	0.030 Kg/sm <sup>2</sup>	0.004 lb/stft <sup>2</sup>	<b>Fluid Capacity:</b>	17.4 liter	4.6 gal
<b>Test Standard(s):</b>	ICC 901/SRCC 100:2015, ISO 9806:2013				
<b>Notes:</b>	All sizes of this collector model are certified.				

**IDENTIFICATION:**

Certified systems must be identified with the OG-100 certification mark below in accordance with the [Rules for Certification Mark and Certificate Use](#) and labeled in with the information below per ICC 901/SRCC 100:



1. Manufacturer's name and model number.
2. OG-100 collector certification number.
3. Maximum operating pressure.
4. Dry weight.
5. Fluid volume.
6. Compatible heat transfer fluids.
7. Standard stagnation temperature.
8. Year of manufacture and/or serial number.

**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 and Standard Collector Power Output 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 listed in this ICC-SRCC OG-100 certification must be labeled in accordance with the [Rules for Certification 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](http://www.solar-rating.org)

*Shawn Martin*

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Vice President of Technical Services, ICC-SRCC

