SOLAR RATING & CERTIFICATION CORPORATION

An ICC Evaluation Service Program

OG-300 Solar Water Heating System Certification

No./30004364

Issued: January 28, 2022

This certification is subject to renewal: October 01, 2022

www.solar-rating.org | (800) 423-6587 | (562) 699-0543

CERTIFICATION HOLDER:	**EVALUATION SUBJECT**	
SunEarth, Inc. 8425 Almeria Avenue Fontana, CA 92335 USA www.sunearthinc.com	**BRAND:** **MODEL:** **TYPE:**	Cascade 2 C2-20T-30-TLG Pumped, Indirect

PRODUCT CERTIFICATION SYSTEM:

The ICC-SRCC OG-300 product certification system includes evaluation and development of performance ratings for the solar water heating system in accordance with the SRCC OG-300 Operating Guidelines for Certifying Solar Water Heating Systems, as established in the *ICC-SRCC Rules for Solar Heating & Cooling Product Listing Reports*. The system also involves factory inspections and surveillance of the supplier's quality system.

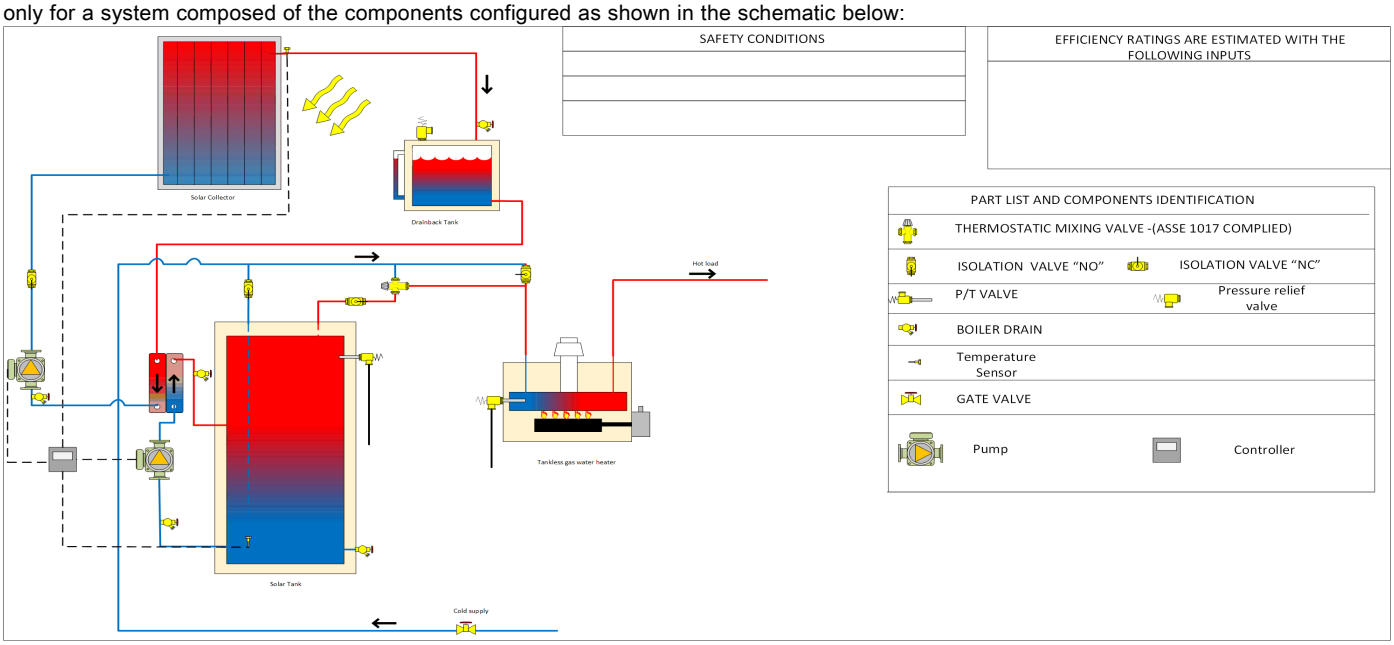
COMPLIANCE WITH THE FOLLOWING STANDARD(S):

ICC 900/SRCC 300-2020, Solar Thermal System Standard

ENERGY STAR® Residential Water Heater Specification v4.0

INSTALLATION:

The solar water heating system must be installed in accordance with the manufacturer's published installation instructions. Installation must conform to the requirements of the applicable code and is subject to approval by the code official having jurisdiction. This certification is valid only for a system composed of the components configured as shown in the schematic below:



PARTS LIST:

Part	Quantity	Evaluated Component
Collector Option 1	1	SunEarth, Inc. Model TRB-20 (OG-100 10002146)
Drainback Tank	1	SolarHot Model DBT 10 SS (38 L volume)
Solar Tank	1	A.O. Smith Model ENS-30 (114 L volume)

IDENTIFICATION:

Certified systems must be identified with the OG-300 certification mark below 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. Systems must be installed and operated in accordance with the manufacturer's instructions and local code.
2. Systems must include all components installed in the configuration shown in the schematic in the OG-300 certification document.
3. Systems must use one of the OG-100 certified solar collector options from the list above. Where more than one collector is installed in a system, all collectors must be the same model.
4. Systems must utilize heat transfer fluids approved by the manufacturer.
5. Certifications are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use.
6. There is no warranty by ICC-SRCC express or implied, as to any finding or other matter in this certification, or as to any product covered by the certification.

RATINGS:

Annual Thermal performance ratings are provided for the system based on computer modeling to standard OG-300 rating conditions and a hot water load of 64.3 gallons per day (243.4 litres per day) at a setpoint of 125F (51.7C) for relative comparison. Performance is rated using the following values:

- Solar Fraction (SF): The portion of the total conventional hot water heating load (including tank standby losses) provided by solar energy over a defined period of time.
- Annual Energy Savings (AES): The projected energy savings over a period of one year for the system compared to a baseline tank-type water heater using the same fuel source.

NOTE: Actual thermal performance and energy savings will vary with local conditions, installation details and hot water usage.
Annual rating results are provided for representative locations in various climate zones, as defined by the ASHRAE 169 standard. Color coding of climate zones is consistent across the maps, with the exception of California. There the climate zones are as defined by the CA Energy Commission for use in CA Title 24.

UNITED STATES OF AMERICA

OG-300 LOCAL ANNUAL SOLAR WATER HEATING SYSTEM PERFORMANCE

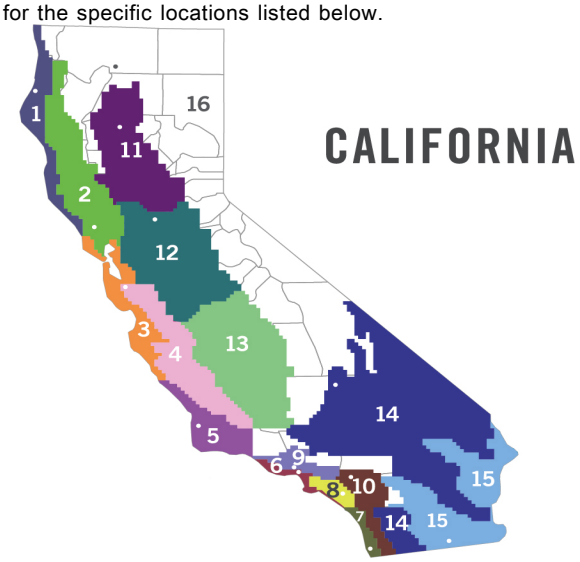
USA			
Location	**Climate Zone (ASHRAE 169)***	**Solar Fraction (SF_A)**	**Annual Energy Savings (kWh)**
AK - Anchorage	7	0.34	2700
AZ - Phoenix	2B	0.69	3780
CO - Denver	5B	0.52	3610
FL - Tampa	2A	0.63	3320
GA - Atlanta	3A	0.54	3330
MA - Boston	5A	0.46	3120
MO - St Louis	4A	0.49	3220
MT - Helena	6B	0.45	3320
TX - Dallas-Fort Worth	3A	0.58	3380
WA - Seattle	4C	0.42	2880
WI - Milwaukee	6A	0.44	3120

*Climate zones are as established in *ANSI/ASHRAE 169, Climatic Data for Building Design Standards*.

STATE OF CALIFORNIA

OG-300 LOCAL ANNUAL SOLAR WATER HEATING SYSTEM PERFORMANCE

System performance at several geographic locations in the state of California corresponding to building climate zones as established by the California Energy Commission (CEC) is provided below. Ratings are determined using weather data, solar irradiance and water supply temperature over a period of one year for the specific locations listed below.



State of California			
Location	**Climate Zone (ASHRAE 169)***	**Solar Fraction (SF_A)**	**Annual Energy Savings (kWh)**
CA - Climate Zone 1	7	0.45	3040
CA - Climate Zone 2	6B	0.55	3540
CA - Climate Zone 3	3C	0.54	3520
CA - Climate Zone 4	4C	0.57	3610
CA - Climate Zone 5	5C	0.57	3690
CA - Climate Zone 6	3B	0.59	3530
CA - Climate Zone 7	3B	0.59	3530
CA - Climate Zone 8	3B	0.61	3660
CA - Climate Zone 9	3B	0.60	3680
CA - Climate Zone 10	3B	0.62	3710
CA - Climate Zone 11	3B	0.58	3520
CA - Climate Zone 12	3B	0.59	3620
CA - Climate Zone 13	3B	0.61	3700
CA - Climate Zone 14	3B	0.65	3780
CA - Climate Zone 15	3B	0.71	3720
CA - Climate Zone 16	7	0.52	3520

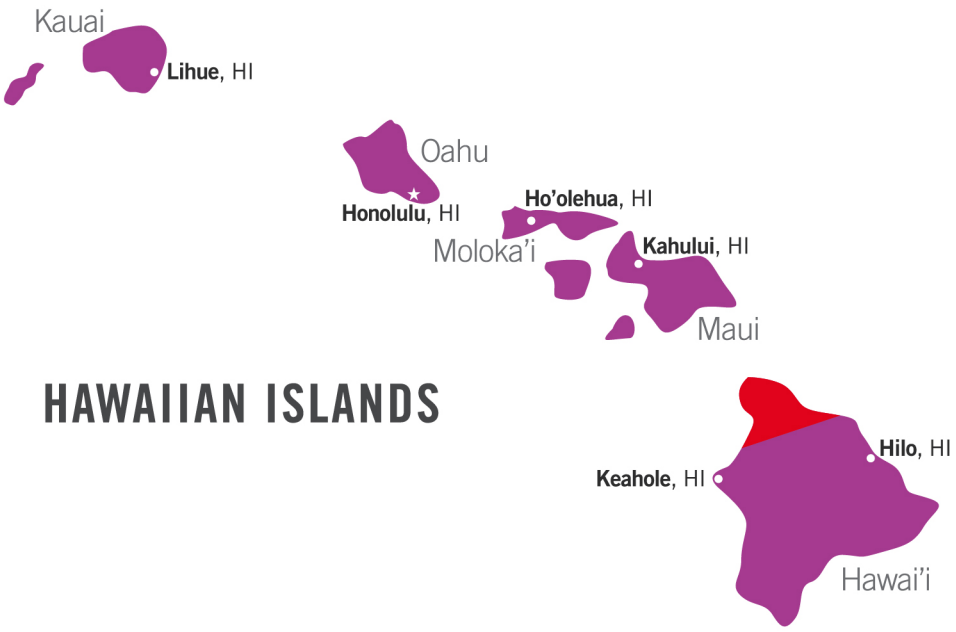
*Climate zones are as established in *ANSI/ASHRAE 169, Climatic Data for Building Design Standards.*

** California Building Climate Zones and representative cities are established by the California Energy Commission for use in the CA Title 24 Energy Efficiency Standards.

HAWAIIAN ISLANDS

OG-300 LOCAL ANNUAL SOLAR WATER HEATING SYSTEM PERFORMANCE

System performance at several geographic locations in the Hawaiian Islands corresponding to climate zones as established in ASHRAE 169 is provided below. Ratings are determined using weather data, solar irradiance and water supply temperature over a period of one year for the specific locations listed below.



State of Hawaii			
Location	**Climate Zone (ASHRAE 169)***	**Solar Fraction (SF_A)**	**Annual Energy Savings (kWh)**
HI - Hilo	1	0.58	3000
HI - Honolulu	1	0.67	3320
HI - Kahului, Maui Island	1	0.67	3340
HI - Keahole, Hawaii Island	1	0.64	3370
HI - Lihue, Kauai Island	1	0.63	3210
HI - Ho'olehua, Molokai Island	1	0.67	3320

*Climate zones are as established in *ANSI/ASHRAE 169, Climatic Data for Building Design Standards.*

CANADA

CANADA SINGLE DAY RATING

The Canada Single Day Rating below provides annual estimated energy savings determined using computer modeling based on the standard day specified in the CAN/CSA F379 SERIES-09 (R2013) standard for a 300 litre/day hot water draw.
Baseline energy savings for single-tank electric and gas tank-type water heaters (with no solar input) are -1.11 and -4.83 GJ/year, respectively. Negative values are indicative of the difference between the energy input to the water heater and the energy delivered to the load, or the sum of the parasitic and standby losses. Therefore, a SWH system with a rating of zero is one where the solar energy input to the system offsets all of the standby and parasitic losses. If the solar contribution in a single-tank system is smaller than the parasitic and stand-by losses, the system will have a negative rating.

ESTIMATED ENERGY SAVINGS (GJ/year for 300 L/day (80 gal/day) hot water load):	None

OG-300 LOCAL ANNUAL SOLAR WATER HEATING SYSTEM PERFORMANCE

System performance at several geographic locations in Canada corresponding to climate zones as established in ASHRAE 169 is provided below. Ratings are determined using weather data, solar irradiance and water supply temperature over a period of one year for the specific locations listed below. The local annual ratings are provided for a 243 L/day (64.3 gal/day) hot water load.

Canada			
Location	**Climate Zone (ASHRAE 169)***	**Solar Fraction (SF_A)**	**Annual Energy Savings (kWh)**
Edmonton, Alberta	5	0.43	3340
Halifax Nova Scotia, Canada	7A	0.40	2910
Thunder Bay, Ontario, Canada		0.44	3160
Quebec City, Quebec	5	0.42	3170
Winnipeg, Manitoba	7A	0.42	3320
Calgary, Alberta	7A	0.44	3420
Vancouver, British Columbia	7	0.43	2940

*Climate zones are as established in *ANSI/ASHRAE 169, Climatic Data for Building Design Standards.*

CENTRAL AMERICA AND CARIBBEAN REGION

OG-300 LOCAL ANNUAL SOLAR WATER HEATING SYSTEM PERFORMANCE

System performance at several geographic locations in Central America and the Caribbean region corresponding to climate zones as established in ASHRAE 169 is provided below. Ratings are determined using weather data, solar irradiance and water supply temperature over a period of one year for the specific locations listed below.

Carribean and Central America			
Location	**Climate Zone (ASHRAE 169)***	**Solar Fraction (SF_A)**	**Annual Energy Savings (kWh)**
Barbados - Christ Church	1	0.73	3520
Costa Rica - San Jose	1	0.62	4220
Jamaica - Kingston	1	0.75	3640
Mexico - Monterrey	2	0.52	2990
MEX - Mexico City	2	0.53	3590
BLZ - Belize	1	0.64	3100
PR - San Juan	1	0.68	3310

*Climate zones are as established in *ANSI/ASHRAE 169, Climatic Data for Building Design Standards*.

SOLAR UNIFORM ENERGY FACTOR (SUEF)

OG-300 No. 30004364

MANUFACTURER: SunEarth, Inc.

BRAND: Cascade 2

MODEL: C2-20T-30-TLG

The Solar Uniform Energy Factor (SUEF) metric is used in incentive programs like the ENERGY STAR® Residential Water Heater Program, replacing the outdated Solar Energy Factor (SEF) metric. SUEF is specified in the *ICC 900/SRCC 300 – 2020 Standard, Appendix A* which is referenced in Version 4 of the *ENERGY STAR Residential Water Heater Specification*. The SUEF value for this system is provided below using the DOE hot water draw pattern specified and was determined by SRCC using TRNSYS energy modeling software.

SOLAR UNIFORM ENERGY FACTOR (SUEF) ‡	DRAW PATTERN*
99	10 GPD – Very Small

‡ Solar Uniform Energy Factor (SUEF) specified in *ICC 900/SRCC 300, Appendix A*.
* Draw patterns specified in 10 CFR 430, Subpart B, Appendix E, *Uniform Test Method for Measuring the Energy Consumption of Water Heaters*

The specification defines the conditions, assumptions, and methodologies to be used to determine a Uniform Energy Factor for domestic water heaters directly utilizing solar energy. The Uniform Energy Factor (UEF) metric was created by the U.S. Department of Energy created to quantify the energy efficiency of water heaters and is also available for other types of water heaters, allowing for performance comparisons.