



ICC-SRCC™ LISTING

ICC-SRCC™ Solar Heating & Cooling Listing Program

Listing Number: SRCC-19004
Effective Date: January 14th, 2020
This listing is subject to renewal in one year.

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A Program of the ICC Evaluation Service (ICC-ES) – www.icc-es.org

CSI:

DIVISION: 22 00 00 – PLUMBING
Section: 22 33 30.23 – Solar Domestic Water Heater System
Section: 22 10 00 – Plumbing Piping and Pumps
Section: 22 35 00 – Domestic Water Heat Exchangers

DIVISION: 23 00 00 – HEATING
Section: 23 56 13 – Heating Solar Collectors
Section: 23 56 16 – Packaged Solar Heating Equipment

Product Certification Program:

The ICC-SRCC Solar Thermal Standard Listing Program is conducted in accordance with the latest version of the *ICC-SRCC Rules of Procedure for Solar Thermal Listing Reports*. The program includes evaluation of samples and manufacturer's quality assurance systems to assess continued compliance with applicable codes and standard.

Products: PV Water Heater Systems

Listee: Sensible Technologies, Inc.
4723 Tidewater Ave #6
Oakland, CA 94601, USA

Compliance with the following codes, standards and criteria:

- ❖ 2018 Uniform Mechanical Code® (UMC)*
- ❖ 2018 Uniform Solar Energy & Hydronics Code® (USEHC)*
- ❖ 2018 Uniform Plumbing Code® (UPC)*
- ❖ ICC 900/SRCC 300-2015, Solar Thermal Systems Standard
- ❖ TM-2-2017-07 Photovoltaic Water Heating Collector Testing and Certification Protocol
- ❖ SRCC EM-1, Methodology for Determining Compliance with State and Federal Lead in Plumbing Laws for Solar Heating and Cooling Equipment, 10/28/2015.

* Uniform Plumbing Code and Uniform Solar Energy & Hydronic Code are copyrighted publications and trademarks of the International Association of Plumbing and Mechanical Officials (IAPMO)

System Models:

The Solar Electric Thermal Storage System listed below have been evaluated by the Solar Rating & Certification Corporation (ICC-SRCC™), an ISO/IEC 17065 accredited and EPA-recognized Certification Body, in accordance with the *ICC-SRCC Rules of Procedure for Solar Thermal Listing Reports*, and has been listed by the ICC-SRCC to the specific codes, standards and criteria above. This award of listing is subject to all terms and conditions of the *ICC-SRCC Rules of Procedure for Solar Thermal Listing Reports* and the documents incorporated therein by reference.

The SETS system can be configured with the three auxiliary water heater types , corresponding to the model numbers specified below. Installation of the SETS system with any other type of auxiliary water heater are not within the scope of this listing.

Mfg. Brand Name	Mfg. Model Number	Auxiliary Water Heater
SETS Solar Electric Thermal Storage	SETS-55-TG	Tankless Gas
	SETS-55-G	Tank-Type Gas
	SETS-55-E	Tank-Type Electric

The PV Water heating system listed under the ICC-SRCC™ Solar Heating & Cooling Listing Program include the assembly of components that convert solar radiation to thermal energy in a fluid. In this case, the system is comprised of the PV modules, tanks, auxiliary water heaters, inverter, power conditioner and controllers and all associated cabling and connectors. The SETS 55 system was evaluated with the components specified by the manufacturer below. Component substitution is only permitted where all specified criteria are satisfied. Where N/A is specified, no substitution is permitted.

Components List:

Component	Quantity	Evaluated Component	*Specified Criteria for Substitution
Photovoltaic Modules	8	Sunpower SPR X21-350-BLK-E-AC	Listed and labeled to UL 1703 Fire Rating (US) Type 1, per UL 1703 P _{max} of each module equal to or greater than 350 W (@STC).
Inverters	8	Enphase IQ7XS-96-ACM-US	Listed and labeled to UL 1741
Tank	1	SETS-55 with integral controller and heating elements	N/A
Diverter Valve	1	Paxton TVS43R ¾" 3-way valve	As specified by the manufacturer and local code and listed and labeled to NSF 61 and NSF 372.
Valve Controller	1	3HBX Aquastat THM-0100	N/A
Tempering (Thermostatic Mixing) Valve	1	ESBE ¾" 193B1502 tempering valve with thermometer	Listed and labeled to ASSE 1017, NSF 61 and NSF 372; As specified by the manufacturer and local code.
Expansion Tank	1	ESBE DXT-18, 5 gallon expansion tank	As specified by the manufacturer and local code and listed and labeled to NSF 61 and NSF 372.
Recirculation Pump	1	Aquamotion AMH2k-RN	
Temperature and Pressure Relief Valve	1	Watts Model 100XL	As specified by the manufacturer, listed and labeled to ANSI Z21.22, with a 125 °F setpoint.
Piping and Fittings	As specified by the manufacturer and local code and listed and labeled to NSF 61 and NSF 372.		
Ball and Check Valves			
Gauges			

Performance Ratings:

Thermal performance ratings based on the ICC-SRCC OG-300 rating conditions and methodologies are provided for SETs system installed as shown above with four specific auxiliary water heaters. The ratings are provided for the 16 California Building Climate Zones (CCZ) below and were calculated on an annual basis utilizing WYEC weather data. Collectors are assumed to be installed oriented due South, with a slope of 30 degrees (except for Zones 14 and 16, which are 36 degrees). A daily hot water load of 64.3 gallons is imposed, using the ICC-SRCC Dual-Peak Profile. The ratings are based on the output of conditioned, new PV modules and do not account for degradation over time.

CA Climate Zone†	Annual Solar Fraction (SF)*		
	SETS-55-TG (Gas Tankless)	SETS-55-G (Gas Tank-Type)	SETS-55-E (Electric Tank-Type)
CCZ1	0.80	0.75	0.63
CCZ2	0.84	0.79	0.68
CCZ3	0.86	0.81	0.70
CCZ4	0.88	0.83	0.73
CCZ5	0.87	0.83	0.73
CCZ6	0.89	0.84	0.75
CCZ7	0.89	0.84	0.74
CCZ8	0.89	0.84	0.75
CCZ9	0.87	0.83	0.73
CCZ10	0.89	0.84	0.74
CCZ11	0.85	0.80	0.68
CCZ12	0.86	0.81	0.70
CCZ13	0.87	0.82	0.72
CCZ14	0.90	0.85	0.76
CCZ15	0.89	0.83	0.74
CCZ16	0.84	0.79	0.69

*Modeling conducted utilizing ICC-SRCC OG-300 rating conditions. The specific components listed above, along with the auxiliary water heaters below were utilized to determine these performance ratings. The ratings are not applicable to systems utilizing components differing from those listed or differing in their configuration or quantity specified by the manufacturer. The auxiliary water heaters utilized for these ratings are as follows:

1. Gas Tankless: Generic (92% efficient)
2. Gas Tank-Type: HTP PH76-50 (50 gallon Nominal, 95% efficient)
3. Electric Resistance Tank-Type: Generic (50 gallon Nominal)

† California Building Climate Zones are established by the California Energy Commission and is utilized in CA Title 24 Energy Efficiency Standards. Additional detail is available at www.energy.ca.gov/maps/renewable/building_climate_zones.html

Installation:

The Solar Electric Thermal Storage System must be installed in accordance with the manufacturer's published installation instruction, the applicable code(s) and this listing. Where differences exist, the instructions in this listing must govern.

1. All wiring, connections, components and labeling shall be in accordance with the National Electrical Code (NFPA 70) and as specified by the manufacturer.
2. All individual components of the system which may require periodic examination, adjustment, service and or maintenance must be easily and safely accessible by the owner in accordance with the codes in force at the installation site.
3. Interconnection of the auxiliary water heating system to the solar energy system shall be made in a manner which will not result in excessive temperature or pressure in the auxiliary system or bypassing of safety devices of the auxiliary system.
4. Structural supports shall be selected and installed in such a manner that thermal expansion of the module and appurtenances will not cause damage to the module, structural frame or building.

Conditions of Listing:

1. System components shall be installed in accordance with the manufacturer's published installation instructions and the applicable code(s).
2. System components requiring access for maintenance and inspection shall be installed to provide required access in accordance with manufacturer's instructions and local codes.
3. Systems and components shall be installed in accordance with the requirements of ICC 900/SRCC 300, Chapter 5 of the UPC and Chapter 3 of the IAPMO USEHC and must provide provision for bypass, component isolation, adjustment or override controls as are required to facilitate installation, startup, operation, shutdown and maintenance.
4. Systems shall be sized in accordance with the demand, manufacturer's requirement, and local codes.
5. Systems shall not be installed below flood elevation level.
6. Systems shall only be used with water per manufacturer's requirements.
7. Relief valves shall discharge to a receptor or other approve means as specified by the system manufacturer, fluid supplier and local codes.
8. Each installation must be pressure-tested for leaks in the presence of the code official or code official's designated representative.
9. Devices and components shall not reduce or increase humidity, temperature or thermal radiation beyond acceptable levels or interfere with required headroom or air circulation space.
10. Neither wind loading nor the additional weight of roof-mounted modules and equipment shall exceed the live or dead load ratings of the building, roof, roof anchorage, foundation or soil. Module racking shall comply with UL 2703. The design load shall be as specified by the codes in force at the installation site and shall include and additional load due to snow accumulation for applicable locations.
11. Field-applied pipe and tank insulation shall comply with local code requirements including but not limited to: thermal insulation value, flame spread, smoke development and finishing.
12. System components, including replacement parts shall be compatible with contacting fluids.
13. Solar Thermal Tanks are manufactured by VAUGHN Thermal Corp., Salisbury, MA, USA under a quality control program with surveillance inspection every other year conducted in accordance with the applicable ICC-SRCC program requirements.
14. All components in direct contact with potable water shall comply with NSF 61, NSF 372 and Federal Safe Drinking Water Act requirements for lead content. The lead content of any replacement parts shall not cause the component assembly's lead content to exceed the specifications of the standards that are the subject of this listing.
15. Photovoltaic modules installed in the system shall be listed and labeled to UL 1703 and inverters and power optimizers shall be listed and labeled to UL 1741. The maximum power of the attached PV array shall be equal to or less than 2,800 W (@STC).
16. Power derived from the system shall be used exclusively to power the SETS System.

Marking:

Models listed above were evaluated to the codes and standards listed in accordance with *the ICC-SRCC Rules of Procedure for Solar Thermal Listing Reports* and are eligible to display the following marks as governed by the *ICC-SRCC Rules for Mark & Certificate Use*.



Each listed device or component shall also be permanently marked with manufacturer's name or trademark, model name and/or number, recommended working fluids, maximum working temperature and pressure, and recommended flow rate(s). Manufacturer's contact information shall be included with these documents.

Listings 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 listing or a recommendation for its use. There is no warranty by the Solar Rating and Certification Corporation, express or implied as to any finding or other matter in this listing, or as to any product covered by the listing. This document must be reproduced in its entirety.