

# International Code Council (ICC) & Solar Rating and Certification Corporation (SRCC) & Association of Pool and Spa Professionals (APSP)



## SOLAR POOL & SPA HEATING SYSTEM STANDARD

### ICC/APSP 902/SRCC 400-201x Public Comment Draft #2

The ICC Pool Solar Heating and Cooling Standard Committee (IS-PHSC) has held 7 public meetings during 2016 and 2017 to develop the second public comments draft of the ICC/APSP 902/SRCC 400-201x Solar Pool & Spa Heating & Cooling System Standard dated July 2017. Public comments are requested on the second public comments draft dated July 2017. Public comments are limited to the portions of the draft shown in legislative (strike through/underline) format. Public comments to other portions of the standard will not be considered. Please show the proposed NEW or REVISED or DELETED TEXT in legislative format: Line through text to be deleted. Underline text to be added. Go to [IS-PHSC Public Comment Draft #2](#) for more information.

Public comment deadline is September 11, 2017

Second Public Comment Draft – July 2017

Copyright © 2017 International Code Council, Inc.

**101.1 Purpose.** This standard sets minimum requirements for the performance, design, and installation of solar energy systems for heating ~~and cooling~~ water used within pools, wading pools and spas. This standard will apply to both residential and commercial systems, both *direct* and *indirect systems*.

**101.2 Scope.** This document applies to solar heating ~~and cooling~~ systems used with residential and commercial swimming and wading pools and spas.

---

**DRAINBACK.** System in which all of the fluid in the *solar loop* is drained from the *collector* into a holding tank or the pool or spa under prescribed circumstances.

**PHOTOVOLTAIC (PV) MODULE.** A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of tracker, designed to generate DC power when exposed to sunlight.

**STAGNATION.** The *solar thermal collector* temperature at which the energy gain is balanced by heat loss during no-flow periods.

**SYSTEM (ALSO REFERRED TO AS SOLAR SWIMMING POOL OR SPA HEATING ~~OR COOLING~~ SYSTEM, OR SOLAR POOL OR SPA HEATER).** An assemblage of components designed to heat ~~or cool~~ water for swimming pools or spas by solar thermal means, excluding pool recirculation components.

---

**302.1.4 Fluid compatibility.** Fluids intended for contact with system materials shall not corrode or otherwise adversely affect *system* materials to the extent that their function will be impaired beyond design specifications during the system *design life*.

**302.1.4.1 Fluid high temperature limit.** The maximum no-flow temperature of the system shall not exceed the high temperature limit of the heat exchange fluid.

**302.1.5 Finish.** Materials that come into contact with the pool user shall be finished, so that they do not constitute a cutting, pinching, puncturing or abrasion hazard under casual contact or intended use.

**302.1.6 Rated temperature/pressure.** Materials that come into contact with the pool water shall be designed to withstand the ambient and anticipated system temperature and pressures.

---

**302.6 Entrapped air.** Means shall be provided for air and gas removal or entrainment down to a drainback reservoir from the piping system.

**Exception:** Where allowed by system design, including but not limited to integral collector storage (ICS), direct thermosiphon, or *drainback* systems. For these systems, air or gas shall not impede the flow of heat transfer fluid.

Second Public Comment Draft – July 2017

Copyright © 2017 International Code Council, Inc.

**302.7 Outlet temperature.** Where water supplied by the system can come into direct human contact in a pool or spa, the temperature of the water at the outlet shall not exceed 110°F (43°C)

**302.7.1 Spa temperature.** Water temperature supplied by the system to a spa shall not exceed 103° F (39° C) unless a lower value is specified by local codes or manufacturer's instructions.

**302.10 Fluid system sizing.** Pumps, piping and other components shall be sized to carry the heat transfer fluid at design flow rates over the *design life* without operational impairment, erosion and corrosion.

**302.10.1 Water-Maximum water velocity.** The continuous water velocity in solar pool heating system piping shall not exceed 8 feet (2.4 m) per second the values provided in Table 302.9.1 or as specified by the manufacturer, whichever is lower, for the purposes of preventing erosion.

**Exception:** Where the system includes a dedicated suction inlet installed within the pool or spa, the water velocity in the suction piping shall be as required by Section 302.7.

**TABLE 302.10.1**

**MAXIMUM WATER VELOCITY FOR COPPER PIPING**

<u>MATERIAL</u>	<u>TEMPERATURE RANGE</u>	<u>MAXIMUM WATER VELOCITY</u>
<u>Copper</u>	<u>40-110°F (4-43°C)</u>	<u>8 feet (2.4 m) per second</u>
<u>Copper</u>	<u>110-140°F (43-60°C)</u>	<u>5 feet (1.5 m) per second</u>
<u>Copper</u>	<u>140-400°F (60-204°C)</u>	<u>2 feet (0.6 m) per second</u>

**302.11.2 Overheating and stagnation.** The *system* shall be able to withstand prolonged periods of *stagnation* without damage or degradation of performance with no maintenance, and without endangering the building or its occupants. The expected *stagnation* temperature effects shall include consideration of worst case roof and ambient temperatures and plastic pipe colors and expansion/contraction stresses. This requirement includes conditions that occur during loss of electric power to the *system* or failure of any of the system components.

**302.11.3 Freeze protection.** Protection from freezing temperatures shall be provided for all system components subject to damage. If the protection depends on owner intervention, the owner's manual shall provide precise instructions for freeze protection. These instructions shall specify an ambient temperature requiring the manual intervention. The supplier shall specify a *freeze tolerance limit* for each system. A freeze

protection mechanism shall be provided on each system. Acceptable mechanisms include but are not limited to [drainback and closed](#)-loop recirculation.

**Exception:** Systems installed in a location that has no record of an ambient temperature below 41°F (5 °C) for [one hour](#) in the last 100 years, shall not be required to provide freeze protection mechanisms. The *freeze tolerance limit* shall be specified regardless of whether a freeze protection mechanism is supplied.

**302.11.3.1 Manual intervention freeze protection.** Where manual intervention is used for freeze protection, the *system* shall have the proper fittings, pipe slope and *collector* design to allow for manual gravity draining and air filling of the affected components and piping. Sagging of any portion of the collector [and/or horizontal piping](#) shall not interfere with *collector* draining. *System* components shall be sloped in accordance with the requirements in Table 302.10.3.1 [unless a greater slope is specified by the manufacturer](#).

---

**402.1.1 Collector isolation.** Means shall be provided to isolate the *collector* for servicing, [manual drain down drainback](#) freeze protection or emergencies. Valves used to comply with the requirements of this section shall comply with Section 404.

---

**402.2.4 Expansion and contraction of supports.** Structural supports shall be selected and installed in such a manner that thermal expansion of the *collector* and piping will not cause damage to the *collector* structural frame, [piping](#) or the building.

---

**414.1 General.** Where photovoltaic modules are utilized as part of a *system* they shall be *listed* to UL 1703, IEC 61215 or IEC 61646, as applicable. Photovoltaic modules shall be installed in accordance with all applicable codes [and standards](#).

---

**501.2 Sizing Procedure.** The sizing methodology shall be consistent with the performance of the *collector*, and with common industry practice. [Where pool or spa covers are installed, their impact on heat loss shall be incorporated into the sizing of the system.](#)

---

**601.1 General.** A manual or manuals shall be provided with each solar pool heating [and cooling](#) system. The manuals shall contain the name and address of the system supplier, the system model name or number and shall describe the operation of the system and its components and the procedures for installation, operation and maintenance in accordance with this chapter.

**601.1.1 Fluids.** The manuals shall identify *heat transfer fluid(s)* used in the solar pool heating ~~and cooling~~ system. Proper procedures for handling, storage, safe disposal, and first aid shall be provided for each non-water fluid. A technical data sheet shall be provided for each non-water fluid or additives for water used in the system. Procedures shall be described for maintaining the heat transfer fluid's chemical composition at levels to prevent ~~transition~~ beyond design specifications, deposits on the heat transfer surfaces, corrosion of the heat transfer surfaces and loss of freeze resistance. Recommended inspection and test intervals for the heat transfer fluid shall be provided.

---

**601.1.3 Warranty coverage.** The manuals shall provide a full description of the scope of the warranty coverage on the *system*. ~~All warranties shall be clearly stated.~~ The manual shall describe what actions the purchaser shall undertake to obtain and transfer warranty coverage, as applicable. Warranties shall conform to federal and, when applicable, state requirements. Requirements for validation of warranties and procedures for warranty claims shall be specified.

---

**602.2 Installation instructions.** The manual shall include ~~and~~ explanation of the physical and functional requirements of the system and its components and the general procedures for their proper installation. The *installation manual* shall:

1. Provide instructions for the connection and interface of *collectors* to supports, mounting structures and roofing surfaces.
  2. Guidance for the orientation and tilt of the *collectors* to maximize performance.
  3. Address local solar resource access and the effects on system performance.
  4. List balance of system components required to install the system, along with minimum specifications for each.
  5. Identify piping configurations or other freeze ~~and overheating~~ protection strategies designed to prevent damage to the system, where applicable.
  6. Describe control system installation, testing and programming, as applicable.
- 

**603.1 General.** The manufacturer's *operation manual(s)* shall be provided with each system. *Operation manuals* shall clearly describe the operation of the *system*, explaining the function of each subsystem and component. The *operation manual(s)* shall:

1. Require a schematic provided by the installer, showing the *system* components as installed at the time of commissioning, and a list of model numbers of major components.
2. Provide the system operating setpoints and settings for normal operation, including fill weights, pressure ratings and temperature ratings for servicing and routine maintenance of the system.
3. Describe procedures for system start-up, shut-down, routine maintenance and special conditional operations such as ~~draindown~~ ~~drainback~~.
4. Include instructions for isolating different sections of the system in emergency situations and include instructions for leaving the system unused for extended periods of time.
5. Indicate the *freeze tolerance limit* and freezing control measures in accordance with 603.3

6. Identify non-water *heat transfer fluids* used in the solar thermal system by name and toxicity classification.
- 6.7. Provide instructions on control system operation, including indicators, adjustments, alarms, and trouble-shooting procedures in accordance with 603.5.
- 

**603.2 Maintenance.** The *operation manual* shall include a comprehensive plan for maintaining the specified performance of the solar pool heating ~~or cooling~~ system over the *design life* of the system. The plan shall include a schedule and description of procedures for ordinary and preventive maintenance including cleaning of *collector* exterior surfaces. The manual shall describe minor repairs and anticipated frequency.

---

**603.4 Freeze protection instructions.** The *operation manual* shall include measures to be taken to prevent freeze damage to *solar thermal collectors* and/or components. If the system relies on ~~draindown~~ drainback or other owner-initiated measure(s) to prevent freezing during periods of sub-freezing weather, specific directions for such measures must be set forth, along with instructions for system refilling and restart.