



SOLAR RATING  
& CERTIFICATION  
CORPORATION™

# **Navigating the 2025 California Energy Code: Solar Pool Heater Requirements**

October 16, 2024

POST WEBINAR COPY

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## **SPEAKERS**

Presenter: Shawn Martin, ICC-SRCC

Q&A: Danny Tam, California Energy Commission

Q&A: Sean Steffensen, Energy Solutions

01

## **Introduction to the California Energy Code (Title 24, Part 6)**

# INTRODUCTION TO CA STATE BUILDING CODES

*California Building Standards Code,  
Title 24, California Code of Regulations*



T-24 contains numerous codes applying to different situations and project types.

Solar pool heating systems must follow all applicable requirements.

## Life, Health & Safety

- Part 2: California Building Code
- Part 2.5: California Residential Code
- Part 3: California Electrical Code
- Part 4: California Mechanical Code
- Part 5: California Plumbing Code

## Energy Efficiency and Sustainability

- Part 6: California Energy Code
- Part 11: CALGreen

- Some are based on model codes with amendments, others are CA developed.
- Applied and enforced by a range of different agencies in CA depending on building type and category of use (HCD, BSC, OSHPD, DSA, SFM)

# INTRODUCTION TO CA ENERGY CODE

**OFFICIAL NAME** Energy Efficiency Standards for Residential and Non-Residential Buildings (CA Code of Regulations Title 24, Part 6)

**OBJECTIVE** Reduce energy consumption and carbon emissions related to new buildings (commercial and residential). Pursuing goals of net-zero or net positive energy and carbon reduction with each new version.

**BASIS** California-developed code (does not utilize model codes like the IECC or ASHRAE 90.1) updated on a three-year cycle.

## Versions:

First adopted in 1976

2016 version (effective 1/1/2017, expired 12/31/2019)

2019 version (effective 1/1/2020, expired 12/31/2022)

2022 version (current, expires 12/31/2025)

[2025 edition \(approved 9/11/2024, effective 1/1/2026\)](#)



# CA TITLE 24, PART 6 STRUCTURE

## Mandatory for All Buildings (§110.0-110.11)

Non-Residential,  
Hotel/Motel  
(§ 120.0-141.0)

Single-Family  
Residential  
(§ 150.0-150.2)

Multifamily  
Buildings  
(§ 160.0-180.4)

Mandatory  
(§ 120.0-130.5)

Mandatory  
(§ 150.0)

Mandatory  
(§ 160.0)

Performance  
Compliance  
(§ 140.1)

Prescriptive  
Packages  
(§ 140.2-  
140.9)

Additions,  
Alterations,  
Repairs  
(§ 141)

Performance  
Compliance  
(§ 150.1)

Prescriptive  
Packages  
(§ 150.1)

Additions,  
Alterations,  
Repairs  
(§ 150.2)

Performance  
Compliance (§  
170.1)

Prescriptive  
Packages (§  
170.2)

Additions,  
Alterations &  
Repairs (§  
180.1)





# 2025 BUILDING ENERGY STANDARDS TIMELINE



<https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-building-energy-efficiency>



## [2025 CASE Report on Swimming Pool & Spa Heating-FINAL](#)

02

## **New Solar Pool Heating Requirements in 2025 CA Energy Code**

# T-24, PART 6 SECTION 110.4

## Mandatory Requirements for Pools & Spas

Part 6 primarily covers energy efficiency, but it also has some minimum mandatory requirements that must be followed. In many cases, these refer back to other T-24 codes.

### **SECTION 110.4 – MANDATORY REQUIREMENTS FOR POOL AND SPA SYSTEMS AND EQUIPMENT**

- (a) Certification by Manufacturers.
- (b) Installation.
- (c) Heating Source Sizing (NEW)
- (d) Controls for Heat Pump Pool Heaters with Supplementary Heating.

# JOINT APPENDIX JA16

## Criteria for Pool and/or Spa Heating

All pool and water heating systems must also meet all applicable minimum requirements set in Appendix JA16. The Appendix is NEW for 2025 and contain the following sections:

### APPENDIX JA16 – CRITERIA FOR POOL AND/OR SPA HEATING

JA16.1 Systems, Purpose and Scope

JA16.2 Solar Pool Heating Systems

JA16.3 Heat Pump Pool Heater Sizing

JA16.4 On-site Renewable or Recovered Energy



Follow the magnifying glass for relevant JA16 Appendix details

# 110.4(a) Certification by Mfgs

## Changes

- Clarified to show applicability to pool/spa combinations
- Label now required showing energy rating (NEW).
- Electric resistance heating provisions removed and addressed in a following section.

(a) **Certification by manufacturers.** Any pool ~~or spa heating system or equipment~~ heater for a pool, spa, or a pool and spa combination ~~shall~~ may be installed only if the manufacturer has certified that the system or equipment has all of the following:

1. **Efficiency.** ~~For e~~Equipment subject to State or federal appliance efficiency standards, ~~listings in the Commission's directory of certified equipment showing compliance with applicable standards~~ shall comply with the applicable provisions of Section 110.1; and
2. **On-off switch.** A readily accessible on-off switch, mounted on the outside of the heater that allows shutting off the heater without adjusting the thermostat setting; and
3. **Instructions.** A permanent, easily readable and weatherproof plate or card that provides the energy efficiency rating and gives instruction for the energy efficient operation of the pool and/or spa heater, and for the proper care of pool or spa water when a cover is used; and
4. **Electric resistance heating.** ~~No electric resistance heating.~~  
**Exception 1 to Section 110.4(a)4:** Listed package units with fully insulated enclosures, and with tight-fitting covers that are insulated to at least R-6.  
**Exception 2 to Section 110.4(a)4:** Pools or spas deriving at least 60 percent of the annual heating energy from site solar energy or recovered energy.

# 110.4(b) Installation

## Changes

- Equipment standards added for electric, gas, solar pool heaters.
- For solar:
  - ICC 901/SRCC 100 for solar collectors
  - ICC 902/PHTA 902/SRCC 400 for solar pool heating systems.



(b) Installation. Any pool and/or spa system or equipment shall ~~be installed with all of the~~ meet the following requirements:

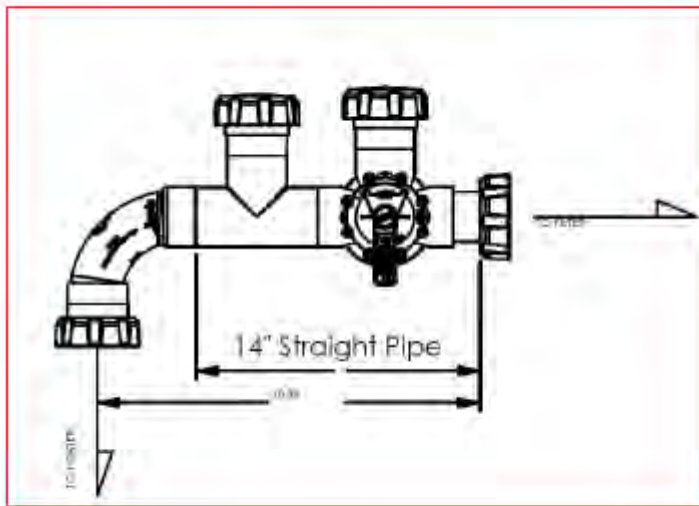
1. Heating Equipment. Equipment installed to heat water for pools and/or spas shall be selected from equipment meeting the standards shown in Table 110.4-A.

*Table 110.4-A HEATING EQUIPMENT STANDARDS*

<u>Heating Energy Source</u>	<u>Standard</u>
<u>Electric Resistance</u>	<u>UL 1261</u>
<u>Gas-fired</u>	<u>ANSI Z21.56/CSA 4.7a</u>
<u>Heat Pump</u>	<u>AHRI 1160 and one of the following: CSA C22.2 No. 236, UL 1995, or UL/CSA 60335-2-40</u>
<u>Solar</u>	<u>ICC/APSP 902/SRCC 400 for solar pool heaters, ICC 901/SRCC 100 for solar collectors</u>

# 110.4(b) Installation - Continued

2. Piping. At least ~~36~~ 18 inches of horizontal or vertical pipe shall be installed between the filter and the heater or dedicated suction and return lines, or built-in or built-up connections shall be installed to allow for the future addition of solar heating equipment;



CV Solar

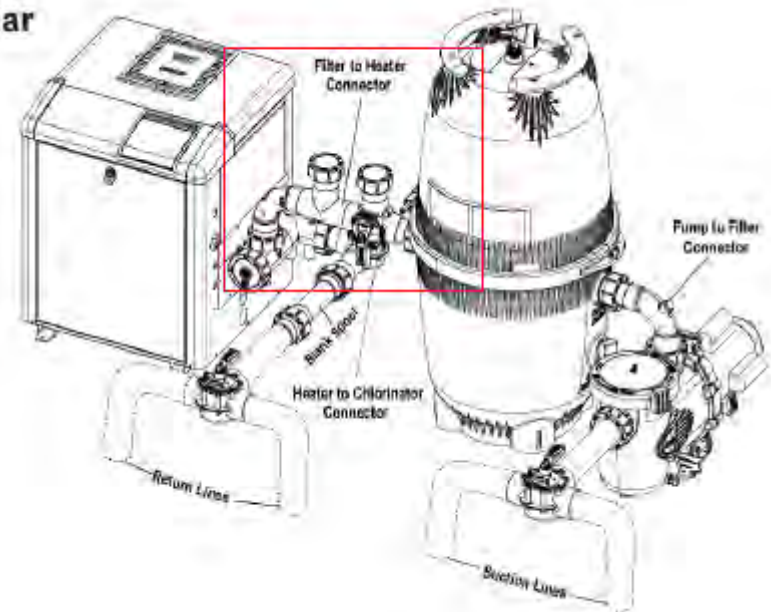


Image courtesy of Zodiac Pool Systems, LLC, a Fluidra Company, used with permission



# 110.4(b) Installation - Continued

## Changes

- Revised requirements for covers on outdoor pools and spas
- Permanent time switches or controls for pool pumps.



- 3. **Covers.** Outdoor pools and/or spa with electric or gas heating equipment shall be installed with a pool cover ~~A cover for outdoor pools and/or outdoor spas that have a heat pump or gas heater;~~ and
- 4. **Directional inlets and time switches for pools.** If the system or equipment is for a pool:
  - i. The pool shall have directional inlets that adequately mix the pool water; and
  - ii. A time switch or similar control mechanism shall be permanently installed as part of a pool water circulation control system that will allow all pumps to be set or programmed to run only during off-peak electric demand period, and for the minimum time necessary to maintain the water in the condition required by applicable public health standards.

# 110.4(c) : Heat Source Sizing (NEW)

(c) Heating Source Sizing. Heating systems or equipment for pool and/or spa shall meet one of the sizing requirements of 1 through 5 below:

1. Solar Pool Heater

2. Heat Pump Pool Heater

3. System with >60% Renewable or Recovered Energy

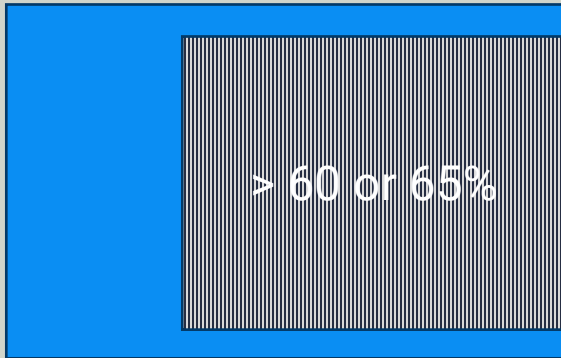
4. Solar and Heat Pump Pool Heater Combination

5. Other System Using No More Energy than 1-4.

## THE EXCEPTIONS:

1. Portable electric spas compliant with 20 CCR § 1605.3(g)(7) of the Appliance Efficiency Regulations.
2. Alterations to existing pools and/or spas with existing heating systems or equipment.
3. A pool and/or spa that is heated solely by a solar pool heating system without any backup heater.
4. Heating systems which are used exclusively for permanent spa applications in existing buildings with gas availability.
5. Heating systems which are used exclusively for permanent spa applications where there is inadequate Solar Access Roof Area (SARA) as specified in Section 150.1(c)14 for a solar pool heating system to be installed.

# SOLAR POOL HEATER



## Option 1

§110.4 (c)(1)

1. A solar pool heating system with a solar collector surface area that is equivalent to the following:

- A. For nonresidential and multifamily buildings, 65 percent or greater of the pool and/or spa surface area.
- B. For single family buildings, 60 percent or greater of the pool and/or spa surface area;.



APPENDIX JA16.2 provides additional details:

- Solar pool heating systems must be certified and rated by an approved listing agency.
- Solar thermal collectors must be listed and labeled to ICC 901/SRCC 100.
- System must be installed in exact configuration and components for which it was rated.
- System must be installed per mfgs instructions.

# HEAT PUMP POOL HEATER



## Option 2

§110.4 (c)(2)

2. A heat pump pool heater as the primary heating system that meets the sizing requirements of Reference Joint Appendix JA16.3. The supplementary heater can be of any energy source;



APPENDIX JA16.3 provides additional details on HPPH sizing. Ideally sizing to be done per manufacturer's specifications. If unavailable:

- (a) Determine desired pool temperature in °F.
- (b) Determine average temperature for the coldest month of pool use in °F.
- (c) Determine temperature rise in °F by subtracting the average temperature for the coldest month from the desired pool temperature.
- (d) Calculate the pool volume in gallons.
- (e) Calculate the time needed for the HPPH to achieve the 10 °F degree rise in hours. This shall not exceed 17.5 hours.
- (f) Use equation JA16-1 to determine the Btu/h output requirement of the HPPH.

# HEAT PUMP POOL HEATER SIZING EQUATION

Located in [JOINT APPENDIX JA16.3](#)



## Equation JA16-1

$$Q_{out} = \frac{V_p \times 8.33 \times \Delta T}{t}$$

### Where:

*Q<sub>out</sub> is the output heating capacity of the HPPH*

*V<sub>p</sub> is the pool volume in gallons*

*8.33 is the weight of a gallon of water at 62°F in pounds per gallon*

*ΔT is the pool temperature rise in °F, and shall not exceed 10°F*

*t is the time needed for the HPPH to achieve the 10 °F degree rise in hours and shall not exceed 17.5 hours*

# SOLAR AND HEAT PUMP POOL HEATING

## Option 4

§110.4 (c)(4)

A combination of a solar pool heating system and heat pump pool heater without any additional supplementary heater;



# The “Others”

Section 110.4 (c) allows for some more generic options for compliance.



## Option 3

3. A heating system that derives at least 60 percent of the annual heating energy from on-site renewable energy or on-site recovered energy.



## Option 5

5. A pool heating system determined by the Executive Director to use no more energy than the systems specified in Items 1, 2, 3, or 4.



## Exception 3

Exception 3 functions as another compliance option where solar alone is used without any other heater.



APPENDIX JA16.4 provides additional details on Option 3:

The mechanical engineer shall provide documentation that a on-site renewable source and/or on-site recovery source provides at least 60 percent of the calculated annual energy consumption of the pool and/or spa heater. The documentation shall be submitted together with the Certificate of Installation for the pool and/or spa heater.

# FAQs

## When do the requirements apply?

Title 24 requirements come into effect when:

- A new heating system is being installed in a pool and/or spa for the first time
- Applicable to new pool and/or spa, or existing pool and/or spa that previously never had a heater installed.
- Not applicable if the system meets one of the exceptions

## Must existing pool heaters be replaced?

No. There are no Title 24 requirement that forces existing equipment to be replaced. Additionally, the new requirements are not applicable to existing pool heaters.

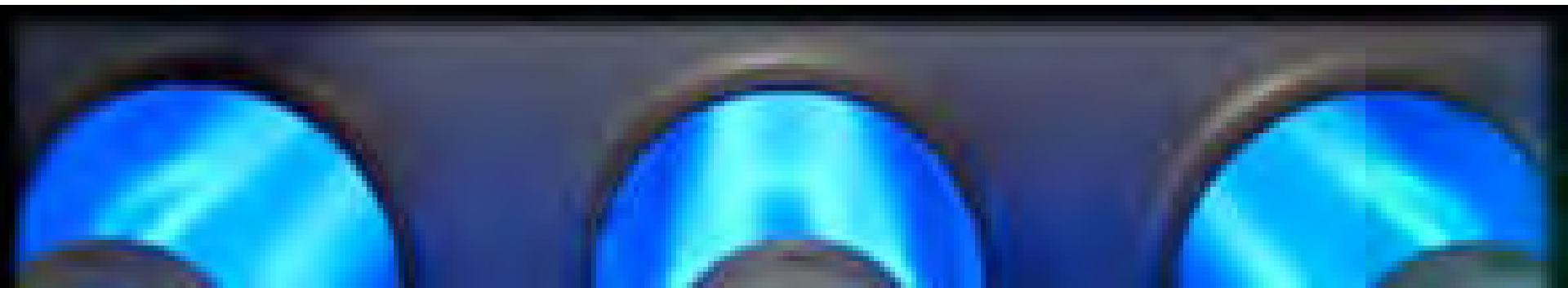


# FAQs *continued*

Are gas pool heaters prohibited?

No. Gas pool heaters may still be installed under Title 24, so long as one of the five compliance options in Section 110.4 (c) is first met. Also, gas heaters may be used in the cases of two of the exceptions to 110.4 (c):

1. Heating systems used exclusively for permanent spa applications in existing buildings with gas availability, and
2. Heating systems used exclusively for permanent spa applications with inadequate SARA per Section 150.1(c)14 for a SPH.



# FAQs

What type of heater is allowed when an existing pool heater needs to be replaced?

Existing pool heaters are covered by Exception 2 to Section 110.4(c), therefore not subject to the new pool heater requirements. Any type of heaters can be used for replacement, including gas pool heater. Note that other parts of Section 110.4 are still applicable.

What if new pools are constructed that do not have a pool heater?

New pools without a pool heater would not be subject to Section 110.4.

However, if a new pool heating system was later added to the pool, that heating system would be required to comply with Section 110.4.

03

## **Demonstrating Compliance to the 2025 CA Energy Code**

# APPLICABLE ICC-SRCC PROGRAMS



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**OG-100**

**Solar Thermal Collectors**  
ICC 901/SRCC 100



**Solar Pool Heating Systems**  
ICC 902/PHTA 902/SRCC 400  
2025 California Energy Code  
International Pool & Spa Code  
Uniform Swimming Pool, Spa & Hot Tub Code  
NSF 50




**View current certifications at [www.solar-rating.org/directory](http://www.solar-rating.org/directory)**

# ICC-SRCC SOLAR POOL COLLECTOR CERTIFICATION



**OG-100**

## OG-100 SEASONAL POOL HEATING EFFICIENCY

	SPRING	SUMMER	FALL
Efficiency <sup>1</sup>	 58%	 73%	 58%
Wind Derating Factor <sup>2</sup>	0.90	0.97	0.90

1. Peak instantaneous hemispherical efficiency at  $G = 875/1000/750 \text{ W/m}^2$ ,  $dT = 5/0/3.9^\circ\text{C}$ ,  $m = 0.379 \text{ kg/s}$

2. Efficiency derating calculated at wind speed,  $u = 1.34 \text{ m/s}$

Thermal Efficiency Equation <sup>1</sup>										
$\eta_{hem,m} = \eta_{0,hem} (1 - b_u u) - (b_1 + b_2 u) \frac{(T_i - T_a)}{G''}$										
$\eta_{0,hem}$	$b_u$			$b_1$			$b_2$			
0.73	0.0247 s/m			18.065 W/m <sup>2</sup> K			2.889 W/m <sup>3</sup> K			
1: Second order thermal efficiency equation calculated in accordance with ISO 9806-2013 at a fluid flowrate, $m' = 0.100 \text{ kg/s}$ .										
Incident Angle Modifier (IAM)										
$\theta$	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
$K_b(\theta)$	1.00	1.00	1.00	1.00	0.96	0.82	0.66	0.45	0.25	0.00

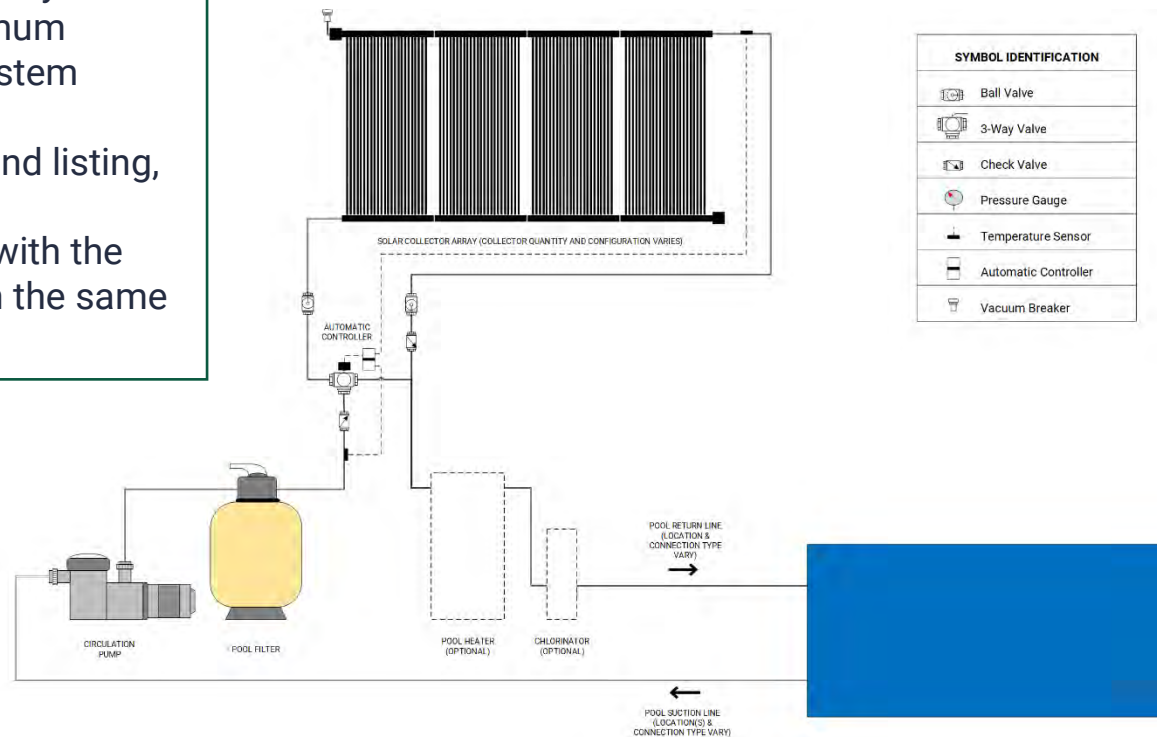
## OG-100 Certification Program

- Assesses compliance with ICC 901/SRCC 100 standard.
- Testing per ISO 9806 standard for safety, durability, performance.
- Allows for different collector sizes with the same construction.
- Solar thermal efficiency ratings customized for dedicated pool heating collectors under standardized conditions.
- More detailed thermal efficiency ratings to aid system designers.

# ICC-SRCC SOLAR POOL HEATING SYSTEM LISTINGS

## ICC 902/PHTA 902/SRCC 400 Listings

- Schematic shows system configuration
- Parts list specifies key components, allowable substitutions and optional items.
- Allows for different collector array sizes
- Checks compliance with minimum standard requirements - No system performance ratings.
- Based on component testing and listing, no system testing.
- Can also indicate compliance with the 2025 California Energy Code in the same listing.



# OTHER OPTIONS FOR COMPLIANCE ASSESSMENT

## **ICC-SRCC Site-Specific Certification**

- Applicable to any certification or listing program
- Intended use when systems are custom and will not be replicated, but proof of compliance or ratings are needed for codes or incentive programs.
- Certification or listing document has specific project address and is only applicable for that site.

## **ICC-SRCC Rating Service**

- Service provides third-party performance ratings separate from a full certification or listing.
- Possible method for confirming at least 60% of annual energy consumption comes from renewable or onsite recovered sources.

04

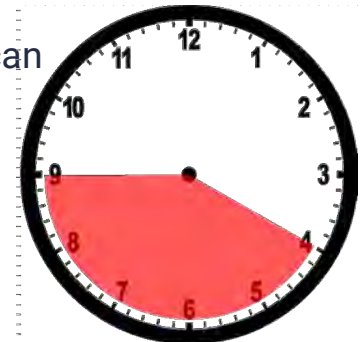
## **Other Regulatory Developments Impacting Solar Pool Heating**



# Flexible Demand Appliance Standards for Pool Controls



- CEC has also developed new regulations known as FDAS for pool controls under Title 20 effective [September 29, 2025](#).
- Establishes requirements for controls used for many pool and spa pumps to shift the loads to the period of lowest GHG emissions on the grid.
  - Adds demand response and communication capabilities (with customer consent).
  - Default settings may not operate the pool filter pump, pressure cleaner booster pump or electric pool heater 4 PM - 9 PM and limit some automatic operations 3 PM - 9 AM.
  - Exceptions for controls exclusively for pumps rated >2.5 hhp or controls integral to a single pool filter pump or pump motor that can control only that pump or motor.
- Resources
  - <https://www.energy.ca.gov/proceeding/pool-controls>
  - [Energy Code Ace FDAS Fact Sheet](#)



# U.S. DOE Standards and Rulemaking



- DOE Consumer Pool Heaters
  - [Announced in Federal Register Vol 88, No. 103, 5/30/2023](#)
  - Compliance May 30, 2028
  - Does not address solar pool heaters, but sets new standards for gas and electric pool heater efficiency.
- DOE Dedicated Purpose Pool Pump Motor Rule
  - [Announced in Federal Register Vol 88, No. 187, 9/28/2023](#)
  - Compliance September 29, 2025, for less than 0.5 and 1.15 – 5 THP categories
  - Compliance September 28, 2027, for 0.5 to less than 1.15 THP category
  - References UL 1004 standard for pumps

**TABLE I.1—ENERGY CONSERVATION STANDARDS FOR DPPP MOTORS (TSL 7)**

Motor total horsepower (THP)	Performance standard: full-load efficiency (%)	Design requirement: speed capability	Design requirement: freeze protection
THP <0.5 .....	69%	None .....	None .....
0.5 ≤ THP < 1.15 .....	.....	Variable speed control * ...	Only for DPPP motors with freeze protection controls **.
1.15 ≤ THP ≤ 5 .....	.....	Variable speed control * ...	Only for DPPP motors with freeze protection controls **.

# California Air Resources Board (CARB) Standards

CARB has a project underway to develop standards for zero-emission space and water heaters under their Building Decarbonization Program.

Objective is to transition to zero-emission products available for sale in the market to transition installations over time as existing, emitting heaters are replaced.

- CARB has not yet finalized the standards and is reaching out to various stakeholders to research the feasibility and structure.
- CARB staff has posed several questions on solar water heating technologies. SRCC solicited and compiled the responses for submission.
- Upcoming technical feedback meeting being convened by CARB on pool heaters specifically.
- Project Website: [Zero-Emission Space and Water Heater Standards](#)

# CARB Solar Pool Heater Information Request

- *What is the typical use of solar pool heaters - a standalone or supplemental system (connected with other gas/electric pool heaters)?*
- *Are solar pool heaters more common in residential or commercial pools (or both)?*
- *What are the market niches and barriers for solar pool heaters?*
- *Do solar pool heaters typically have a back-up pool heater system? How common are models with back-up heating integrated into the water storage tank?*
- *Do you have any data you'd be able to share on the typical installation costs for solar pool heaters?*
- *What kinds of building retrofits may be needed to install a solar pool heater? Would you be able to share any cost data on building retrofit costs associated with installing pool heaters?*
- *Would you be able to share any data on maintenance costs for solar pool heaters?*

CARB posed the questions above regarding solar pool heating technology. SRCC collected responses from solar pool heater mfgs who chose to participate. These were summarized and sent to CARB in August, 2024.



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# SUMMARY

- **2025 California Energy Code (Title 24, Part 6) has been approved by the CEC and will go into effect on 1/1/2026.** It contains significant changes to requirements for pool and/or spa heating equipment.
  - Requires solar and/or heat pump pool heaters of a minimum size for heated pools and some spas. Exceptions for electric portable spas and some permanent spas.
  - Gas and electric resistance pool heaters are still permitted, but only after requirements for solar and/or heat pumps are met (unless subject to exemptions).
  - All pool heating equipment must be listed and labeled to specific standards (e.g. ICC 901/SRCC 100 and ICC 902/PHTA 902/SRCC 400 for solar pool heaters)
- **New CEC FDAS load-shifting regulations** for pool pump controls may curtail or cut off operation after 3 PM local time.
- **CARB is actively working to develop future standards** that could limit pool heating to zero-emission technologies. These are not finalized.

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## Questions & Answers

Please submit your questions through the chat.

# RESOURCES

- [2025 CA Building Energy Efficiency Standards Webpage](#)
  - [15 Day Standards Document](#) (Adopted)
  - [15 Day Reference Appendices](#)
  - [2025 CASE Report on Swimming Pool & Spa Heating](#)
- [Energy Code Ace](#)
  - [Energy Code Ace FDAS Fact Sheet](#)
- [FDAS Pool Control Standards](#)
- [ICC-SRCC Solar Pool & Spa Heater Programs Webpage](#)
  - [OG-100 Directory](#)
  - [SRCC Listing Directory](#)
- [CARB Zero-Emission Space and Water Heater Standards](#)
- U.S. Department of Energy
  - [Consumer Pool Heater Regulations](#)
  - [Dedicated-Purpose Pool Pump Motors](#)

# Thank you for attending!



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