POOL AND SPA HEATING SYSTEMS

CERTIFICATE OF INSTALLATION

Field Name	Entry	Field Name	Entry
Project Name:		Enforcement Agency:	
Dwelling Address:		Permit Number:	
City and Zip Code:		Permit Application Date:	

Note: For projects without a heating systems, Sections B, C, D and E do not apply.

A. Pool and Spa System Type

Field	Field Name	Data Entry
01	Pool and Spa System Type	☐ Pool Only ☐ Spa Only ☐ Pool and Spa

B. Pool and Spa Systems and Equipment Requirements (Section 110.4(a) and 110.5)

Field	Field Name
01	A pool or spa heating system or equipment subject to State or federal appliance efficiency standards shall comply with the applicable provisions of Section 110.1A.
02	A readily accessible on-off switch is mounted on the outside of the heater, which allows the heater to be shut off without the user adjusting the thermostat setting.
03	A weatherproof plate or card providing the energy efficiency rating and instructions for the energy-efficient operation of the pool and/or spa heater is permanently mounted and easily readable.
04	Heating system has no pilot light.

The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.

C. Pool and Spa System Installation Requirements (Section 110.4(b))

Field	Field Name
01	Equipment installed to heat water for pools and/or spas shall be selected from equipment meeting the standards shown in Table 110.4-A.
02	At least 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 future solar heating equipment are provided.
03	Outdoor pools and/or spas with electric or gas heating equipment shall be installed with a pool cover.
04	Pool system has directional inlets to adequately mix the pool water.
05	Pool system has a permanent time switch that allows all pumps to be set or programmed to run during off-peak periods only, and for the minimum time necessary to maintain the water in the condition required by applicable public health standards

The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.

D. Pool and Spa System Heating Source Sizing Requirements (Section 110.4(c))

Field	Field Name	
01	Total Pool or Spa surface area (ft^2)	
02	Method of Compliance	Pick from list: ☐ A. Solar pool heater; with a solar collector surface area that is ≥ 60 % of the pool and/or spa surface area. ☐ B. Heat Pump Pool Heater (HPPH). ☐ C. 60% on-site renewable or recovered energy. ☐ D. Combination solar pool heater and heat pump pool heater with no additional supplementary heater. ☐ E. Alternative pool heating system approved by CEC Executive Director. ☐ F. N/A – Qualified Exceptions (Must select Qualifying Exception below)
03	Qualifying Exceptions to Section 110.4(c)	Pick from list: ☐ A. N/A ☐ B. Portable electric spas compliant with 20 CCR § 1605.3(g)(7) of the Appliance Efficiency Regulations. ☐ C. Alterations to existing pools and/or spas with existing heating systems or equipment. ☐ D. A pool and/or spa that is heated solely by a solar pool heating system without any backup heater. ☐ E. Heating systems which are used exclusively for permanent spa applications in existing buildings with gas availability. ☐ F. 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.

04	Additional Requirement	☐ N/A Check this requirement If D02 = A ☐ This project requires a solar pool heating system with a solar collector surface area that is equivalent to 60 percent or greater of the pool and/or spa surface area. The minimum solar collector surface area required. Check this requirement If D02 = B ☐ This project requires a Heat Pump Pool Heater (HPPH) as the primary heat source. The HPPH shall be sized according to the HPPH manufacturer's specifications. If the HPPH manufacturer's specifications do not include information on HPPH sizing, use the sizing provisions in Reference Joint Appendix JA16.3. The supplementary heater can be of any energy source. Check this requirement If D02 = C ☐ This project requires an on-site renewable or on-site recovery energy source that provides at least 60 percent of the calculated annual energy consumption of the pool and/or spa heater. The mechanical engineer or responsible person shall provide documentation and submit together with this CF2R. Check this requirement If D02 = D ☐ This project requires a combination solar pool heater and heat pump pool heater. The system shall have no additional supplementary heater. Check this requirement If D02 = E ☐ The system shall be verified as an CEC Executive Director approved alternative. Check this exception If D03 = E or F ☐ The responsible person shall provide documentation for the qualifying exception and submit together with this CF2R.
04a	Minimum solar collector surface area (ft^2)	D01 * 0.6 = ☐ (If D04 is D02=A) ☐ N/A

E. Controls for Heat Pump Pool Heaters with Supplementary Heating Requirements (Section 110.4(c))

Field	Field Name
01	Supplementary heater shall not operate when the heating load can be met by the heat pump pool heater alone; and
02	The cut-on temperature for heat pump heating is higher than the cut-on temperature for supplementary heating, and the cut-off temperature for heat pump heating is higher than the cut-off temperature for supplementary heating

The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.

F. Pool Pump Sizing and Flow Rate Specification (Section 150.0(p))

Field	Field Name
01	Dedicated-purpose pool pumps and replacement dedicated-purpose pump motors subject to State or federal appliance efficiency standards shall be listed in the CEC's directory of certified equipment. Dedicated-purpose pool pumps shall meet the applicable standards set forth in 20 CCR § 1605.1(g)(7) of the Appliance Efficiency Regulations. Replacement dedicated-purpose pool pump motors shall meet the applicable standards set forth in 20 CCR § 1605.3 of the Appliance Efficiency Regulations.
02	The pool pump flow rate shall not exceed the maximum pump flow rate calculated based on pool sizing in the table below. The return pipe diameter, suction pipe diameter, and filter area shall be at least as large as the required minimums shown in the table. Alternatively, a flow calculation or flow test result shall be provided to demonstrate that the pump flow rate is less than 6 hour filtration turnover, and the return pipe flow rate does not exceed 8 fps and that the suction pipe flow rate does not exceed 6 fps.

03	An alternative compliance calculation or a flow test result is provided for this pool or spa use (must attach flow calculation or flow test result to this form).	☐ Yes ☐ No

04	Dedicated-purpose pool pumps with more than one speed shall have controls which default to the filtration flow rate when no auxiliary pool loads are operating.
05	For dedicated-purpose pool multispeed pumps with more than one speed, the controls shall default to the filtration flow rate setting within 24 hours and shall have an override capability for servicing.

06	Volume of Pool (gallons)	
07	Filter Type	☐ Cartridge ☐ Sand ☐ DE

08a Required Min Return Pipe Diameter (inches)	08b Required Min Suction Pipe Diameter (inches)	08c Required Min Filter Area (ft^2)	08d Required Max Pump Flow (gpm)
☐ N/A	☐ N/A	☐ N/A	☐ N/A

09	Return Pipe Diameter (inches)	
10	Suction Pipe Diameter (inches)	
11	Filter Surface Area (ft^2)	
12	Max Pump Flow Rate (gpm)	
13	Measured Flow Rate Return Line (fps)	☐ N/A
14	Measured Flow Rate Suction Line (fps)	☐ N/A
15	Compliance Statement:	☐ System complies ☐ System does not comply

The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.

Table F Instructions:

3. User select drop down, choices are "Yes" or "No", if D06 > 48000 then force "Yes".
6. User Input
7. User select from list

08a., 08b., 08c, 08d.: If F03 = "No", then enter value from Table C in the user instruction based on input from F06 and F07. Else select "N/A"

13. If F03 = "Yes", then user input. Else select "N/A"
14. If F03 = "Yes", then user input. Else select "N/A"
15. Select "System complies" if F03 = "Yes" and F13 ≤ 8 and F14 ≤ 6. Else display "System complies" if F03 = No and F09 ≥ F08a and F10 ≥ F08b and F11 ≥ F08c and F12 ≤ F08d. Else display "System does not comply"

G. Pool System Piping (Section 150.0(p)2)

Field	Field Name
01	The suction side pipe is straight for at least 4 pipe diameters before entering the pump (See table below for the required straight run lengths for various pipe sizes).
02	All elbows are sweep elbows, or an elbow type that has a pressure drop that is less than the pressure drop of a straight pipe with a length of 30 pipe diameters.

The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.

H. Pool Filters and Valves (Section 150.0(p)3 and 4)

Field	Field Name
01	If a filter is used in a pool intended for public use: The size of the filter is at least the size specified in NSF/ANSI 50.
02	If a backwash valve is used: The diameter of the backwash valve is at least 2 inches, or the diameter of the return pipe, whichever is greater.

The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.

Documentation Author's Declaration Statement 1. I certify that this Certificate of Installation documentation is accurate and complete.	Author Name Author Signature Date Signed Company Name CEA/AEA/ECC Certification ID Address City/State/Zip Phone
RESPONSIBLE PERSON'S DECLARATION STATEMENT I certify the following under penalty of perjury, under the laws of the State of California: 1. The information provided on this Certificate of Installation is true and correct. 2. I am either: a) a responsible person eligible under Division 3 of the Business and Professions Code in the applicable classification to accept responsibility for the system design, construction, or installation of features, materials, components, or manufactured devices for the scope of work identified on this Certificate of Installation, and attest to the declarations in this statement, or b) I am an authorized representative of the responsible person and attest to the declarations in this statement on the responsible person's behalf. 3. The constructed or installed features, materials, components or manufactured devices (the installation) identified on this Certificate of Installation conforms to all applicable codes and regulations and the installation conforms to the requirements given on the Certificate of Compliance, plans, and specifications approved by the enforcement agency. 4. I understand that a completed signed copy of this Certificate of Installation shall be posted or made available with the building permit(s) issued for the building and shall be made available to the enforcement agency for all applicable inspections. I will take the necessary steps to fulfill this requirement. 5. I understand that a completed signed copy of this Certificate of Installation is required to be included with the documentation the builder provides to the building owner at occupancy. I will take the necessary steps to fulfill this requirement.	Responsible Name Responsible Signature Date Signed Company Name Title CSLB License Address City/State/Zip Phone

LMCI-PLB-03-E User Instructions

A. Pool and Spa System Type
Pick from Pool only, Spa only, or Pool and Spa

B. Pool and Spa Systems and Equipment Requirements (Section 110.4(a) and 110.5)
Before any pool or spa heating system or equipment may be installed, the manufacturer must certify to the Energy Commission that the system or equipment complies with §110.4 and §110.5. The requirements include minimum heating efficiency according to Appliance Efficiency Regulations, an on-off switch outside the heater, permanent and weatherproof operating instructions, no continuous pilot light.

C. Pool and Spa System Installation Requirements (Section 110.4(b))
A permanent time switch or similar control mechanism must be installed as part of the pool water circulation control system that will allow all pumps to be set or programmed to run only during the off-peak electric demand period and for the minimum time necessary to maintain the water in the condition required by applicable public health standards.

D. Pool and Spa System Heating Source Sizing Requirements (Section 110.4(c))
This table lists the requirements for Pool and Spa System Heating Source Sizing. Pick from Method of Compliance list and Qualifying Exceptions to Section 110.4(c list.

E. Controls for Heat Pump Pool Heaters with Supplementary Heating Requirements (Section 110.4(d))
This table lists the requirements for Controls for Heat Pump Pool Heaters with Supplementary Heating. Installer must ensure all the requirements on this table are met.

F. Pool Pump Sizing and Flow Rate Specification (Section 150.0(p))
The pool filtration flow rate may not be greater than the rate needed to turn over the pool water volume in 6 hours or 36 gpm, whichever is greater. Calculate Max Flow Rate using the following equation:

$$\text{Max Flow Rate (gpm)} = \frac{\text{Pool Volume (gallons)}}{360\text{min.}}$$

Pool piping must be sized according to the maximum flow rate needed for all auxiliary loads. Show work to calculate return and suction line flow rate, minimum filter area, and the maximum pump flow rate correspond to the pool volume in accordance to section 150.0(p), or refer to Table C below for the prescriptive values. The maximum velocity allowed is 8 fps in the return line and 6 fps in the suction line, and the maximum pump flow rate is less than 6 hour filtration turnover.

3. Select whether the alternative calculation is used.
6. Enter the Pool Volume (gal).
7. Enter Filter Type (Cartridge, Sand, DE).

8a Enter the Required Minimum Return Pipe Diameter (inches).
8b Enter the Required Minimum Suction Pipe Diameter (inches).
8c Enter the Required Minimum Filter Area (ft^2).
8d Enter the Required Maximum Pump Flow (gpm).

9. Enter Return Pipe Diameter (inches).
10. Enter Suction Pipe Diameter (inches).

11. Enter Filter Surface Area (ft^2).
12. Enter the Maximum Pump Flow Rate (gpm).
13. Enter the Measured Flow Rate of the Return Line in fps. This is only used if the alternative calculation is used.
14. Enter the Measured Flow Rate of the Return Line in fps. This is only used if the alternative calculation is used.
15. Automatically completed Compliance Statement.

G. Pool System Piping (Section 150.0(p)2)
There must be a length of straight pipe that is greater than or equal to at least 4 inches pipe diameters installed before the pump. Refer to Table D below for the required pipe length. Traditional hard 90° elbows are not allowed. All elbows must be sweep elbows or a type of elbow that has a pressure drop less than the pressure drop of straight pipe with a length of 30 pipe diameters.

H. Pool Filters and Valves (Section 150.0(p)3 and 4)
Backwash valves must be sized to the diameter of the return pipe or 2 inches, whichever is greater. Multiport backwash valves have a high pressure drop and are discouraged.

Table C
Pool sizing (Values are based on a maximum allowable turnover rate of 6- hours)
Note: *For pumps greater than 1 hp. The maximum Pump Flow is the lowest speed default filtration*

Max Pool Volume (gallons)	Min Pipe D or Greater (inches)		Min Filter Area or more (square feet)			Max Pump Flow (gpm)
	Return	Suction	Cartridge	Sand	DE	
13,000	1.5	1.5	100	2.4	20	36
17,000	1.5	2	130	3.1	25	47
21,000	2	2	160	3.9	30	58
28,000	2	2.5	210	5.2	40	78
42,000	2.5	3	320	7.8	60	117
48,000	3	3	360	8.9	70	133

Table D
Pipe Diameter/Pipe Length

Pipe Diameter (inch)	Required Pipe Length leading into pump (inch)
1.5	6
2	8
2.5	10
3	12