

**DOCKETED**

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# HERS VERIFIED SINGLE DWELLING UNIT HOT WATER SYSTEM DISTRIBUTION

CEC-CF3R-PLB-22-H (Revised 01/19)

CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF VERIFICATION		CF3R-PLB-22-H
HERS Verified Single Dwelling Unit Hot Water System Distribution		(Page 1 of 6)
Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City:	Zip Code:

## A. Design HERS Verified Dwelling Unit Water Heater System Information

This table reports the water heating system(s) features specified on the registered CF1R compliance document for this project.

01	02	03	04	05	06	07	08	09
Water Heating System ID or Name	Modeled Equipment Make and Model	Number of Water Heaters	Tank Location	Exterior Tank Insulation R-value	Simulated Equipment Make and Model	Dwelling Unit DHW System Distribution Type	Compact Distrib.	Drain Water Heat Recovery

## B. Installed HERS Verified Dwelling Unit Water Heater System Information

This table reports the water heating system features installed in this project.

01	02	03	04	05	06	07	08
Water Heating System ID or Name	Modeled Equipment Make and Model	Number of Water Heaters	Tank Location	Exterior Tank Insulation R-value	Dwelling Unit DHW System Distribution Type	Compact Distrib.	Drain Water Heat Recovery
09	Compliance Statement						

## C. Mandatory Measures for all Domestic Hot Water Distribution Systems

01	Equipment shall meet the applicable requirements of the Appliance Efficiency Regulations (Section 110.3(b)1).
02	Unfired Storage Tanks are insulated with an external R-12 or combination of R-16 internal and external Insulation. (Section 110.3(c)4).
03	<p>The following pipes are insulated, to the thicknesses required by Table 120.3A, except for those sections of pipe that are subject to one of the exceptions below: All domestic hot water piping shall be insulated as specified in Section 609.11 of the California Plumbing Code. In addition, the following piping conditions shall have a minimum insulation wall thickness of 1 inch or a minimum insulation R-value of 7.7 (RA4.4.1)</p> <ul style="list-style-type: none"> <li>The first 5 feet (1.5 meters) of cold water pipes from the storage tank.</li> <li>All piping with a nominal diameter of 3/4 inch (19 millimeter) and less than 1 inch.</li> <li>All hot water piping from the heating source to the kitchen fixtures.</li> <li>All underground piping.</li> <li>Insulation buried below grade must be installed in a water proof and non-crushable casing or sleeve.</li> <li>Piping from the heating source to storage tank or between tanks</li> <li>Piping that penetrates framing members shall not be required to have pipe insulation for the distance of the framing penetration. Piping that penetrates metal framing shall use grommets, plugs, wrapping or other insulating material to assure that no contact is made with the metal framing. Insulation shall butt securely against all framing members.</li> <li>Piping installed in interior or exterior walls that is surrounded on all sides by at least 1 inch (2.5 cm) of insulation.</li> <li>Piping installed in crawlspace with a minimum of 1 inches (2.5 cm) of crawlspace insulation above and below.</li> <li>Piping installed in attics with a minimum of 4 inches (10 cm) of attic insulation on top</li> <li>Pipe insulation shall fit tightly and all elbows and tees shall be fully insulated.</li> </ul>
04	<p>For Gas or Propane Water Heaters: Ensure the following are installed (Section 150.0(n))</p> <ul style="list-style-type: none"> <li>A dedicated 125V, 20A electrical receptacle connected to the electric panel with a 120/240V 3 conductor, 10 AWG copper branch circuit, within 3 feet from the water heater and accessible with no obstructions; <ul style="list-style-type: none"> <li>The conductor shall be labeled with the work "Spare" on both ends; and</li> </ul> </li> </ul>

Registration Number:

Registration Date/Time:

HERS Provider:

CA Building Energy Efficiency Standards - 2019 Residential Compliance

January 2019

# HERS VERIFIED SINGLE DWELLING UNIT HOT WATER SYSTEM DISTRIBUTION



CERTIFICATE OF VERIFICATION CF3R-PLB-22-H

HERS Verified Single Dwelling Unit Hot Water System Distribution (Page 2 of 6)

Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City:	Zip Code:

- A reserved single pole circuit breaker space next to the circuit breaker next to the branch circuit labeled "Future" 240V shall be provided.
  - A Category III or IV vent, or a Type B vent with straight pipe between outside and water heater
  - A condensate drain no more than 2 inches higher than the base on water heater for natural draining
  - A gas supply line with capacity of at least 200,000 Btu/hr

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

**D. HERS-Verified Compact Hot Water Distribution Expanded Credit (CHWDS-H-EX) (RA3.6.5)**  
 For dwelling units with multiple systems, only allow one value to be entered for both master bath distance and kitchen distance.

01	02	03	04	05	06	07
System Name	Number of Stories	Master Bath distance of furthest fixture to Water Heater in feet	Kitchen distance from furthest fixture to Water Heater in feet	Furthest Third furthest fixture to Water Heater in feet	Weighted Distance	Qualification Distance
08	No hot water piping >1 inch diameter is allowed.					
09	Length of 1 inch diameter piping is limited to 8 feet or less.					
10	Two and three story buildings cannot have hot water distribution piping in the attic, unless the water heater is also located in the attic.					
11	Eligible recirculating systems must be HERS-Verified Demand Recirculation: Manual Control conforming to RA4.4.17.					
12	Verification Status:	<input type="checkbox"/> <u>Pass</u> - all applicable requirements are met; or <input type="checkbox"/> <u>Fail</u> - one or more applicable requirements are not met. Enter reason for failure in corrections notes field below; or <input type="checkbox"/> <u>All N/A</u> - This entire table is not applicable				
13	Correction Notes:					

**The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met unless otherwise noted in the Verification Status and the Corrections Notes in this table.**

**E. Compact Hot Water Distribution (CHWDS) (RA4.4.6)**  
 For dwelling units with multiple systems, only allow one value to be entered for both master bath distance and kitchen distance.

01	02	03	04	05	06	07
System Name	Number of Stories	Master Bath distance of furthest fixture to Water Heater in feet	Kitchen distance from furthest fixture to Water Heater in feet	Furthest Third furthest fixture to Water Heater in feet	Weighted Distance	Qualification Distance

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

# HERS VERIFIED SINGLE DWELLING UNIT HOT WATER SYSTEM DISTRIBUTION



CERTIFICATE OF VERIFICATION CF3R-PLB-22-H

HERS Verified Single Dwelling Unit Hot Water System Distribution (Page 3 of 6)

Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City:	Zip Code:

**F. HERS-Verified Drain Water Heat Recovery System (DWHR-H) (RA3.6.9)**

DWHR devices shall comply with these requirements.

01	02	03	04	05	06
Manufacturer	Model #	Rated effectiveness	Installation Configuration	Percent of shower served by the DWHR device	DWHR System Certified by CEC (Yes/No)

08	For water heating system serving a single dwelling, the DWHR system shall, at the minimum, recover heat from the master bathroom shower and must at least transfer that heat either back to the respective shower(s) or the water heater.
09	For central water heating system serving multiple dwellings, the DWHR system shall, at the minimum, recover heat from half the showers located above the first floor and must at least transfer that heat either back to all the respective showers or the water heater.
10	The DWHR unit(s) shall be installed within 1 degrees of the rated slope. Sloped DWHR shall have a minimum lengthwise slope of 1 degree. The lateral level tolerance shall be within plus or minus 1 degree.
11	Verification Status: <ul style="list-style-type: none"> <li><input type="checkbox"/> <u>Pass</u> - all applicable requirements are met; or</li> <li><input type="checkbox"/> <u>Fail</u> - one or more applicable requirements are not met. Enter reason for failure in corrections notes field below; or</li> <li><input type="checkbox"/> <u>All N/A</u> - This entire table is not applicable</li> </ul>

12 Correction Notes:

**The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met unless otherwise noted in the Verification Status and the Corrections Notes in this table.**

**G. HERS-Verified Pipe Insulation Credit Requirements (PIC-H) (RA3.6.3)**

Systems that utilize this distribution type shall comply with these requirements.

01	HERS rater shall perform a visual inspection that all hot water piping complies with the insulation requirements in 150.0(J).
02	Verification Status: <ul style="list-style-type: none"> <li><input type="checkbox"/> <u>Pass</u> - all applicable requirements are met; or</li> <li><input type="checkbox"/> <u>Fail</u> - one or more applicable requirements are not met. Enter reason for failure in corrections notes field below; or</li> <li><input type="checkbox"/> <u>All N/A</u> - This entire table is not applicable</li> </ul>

03 Correction Notes:

**The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met unless otherwise noted in the Verification Status and the Corrections Notes in this table.**

**H. HERS-Verified Parallel Piping Requirements (PP-H) (RA3.6.4)**

Systems that utilize this distribution type shall comply with these requirements.

01	Each central manifold has 5 feet or less of pipe between manifold and water heater.
02	For manifolds that include valves, the manifold must be readily accessible in accordance with the plumbing code. (RA4.4.4)
03	Hot water distribution system piping from the manifold to the fixtures and appliances must take the most direct path. For example, piping from a second story manifold cannot supply the first floor.
04	The hot water distribution piping must be separated by at least 2 inches from any other hot water supply piping, and at least 6 inches from any cold water supply piping. Alternatively, the hot water supply piping must be insulated to the thicknesses shown in TABLE 120.3-A.
05	Verification Status: <ul style="list-style-type: none"> <li><input type="checkbox"/> <u>Pass</u> - all applicable requirements are met; or</li> <li><input type="checkbox"/> <u>Fail</u> - one or more applicable requirements are not met. Enter reason for failure in corrections notes field below; or</li> <li><input type="checkbox"/> <u>All N/A</u> - This entire table is not applicable</li> </ul>

06 Correction Notes:

**The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met unless otherwise noted in the Verification Status and the Corrections Notes in this table.**



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Dwelling Address:	City:	Zip Code:

**I. Parallel Piping Requirements (PP) (RA4.4.4)**

Systems that utilize this distribution type shall comply with these requirements.

01	Each central manifold has 15 feet or less of pipe between manifold and water heater
02	For manifolds that include valves, the manifold must be readily accessible in accordance with the plumbing code.
03	Hot water distribution system piping from the manifold to the fixtures and appliances must take the most direct path. For instance, piping from a second story manifold cannot supply the first floor
04	The hot water distribution piping must be separated by at least 2 inches from any other hot water supply piping, and at least 6 inches from any cold water supply piping. Alternatively, the hot water supply piping must be insulated to the thicknesses shown in TABLE 120.3-A.

**The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.****J. Point of Use Requirements (POU) (RA4.4.5)**

Systems that utilize this distribution type shall comply with these requirements

01	<p>All hot water supply pipe run lengths are equal to or less than the maximum values shown below, based on the pipe diameter. If a combination of piping is used in a single run, then one half the allowed length of each size is the maximum installed length. The maximum allowed length of piping for the longest run terminating in:</p> <p>3/8 inch - For only one pipe size - max length allowed is 15 feet For combination pipe sizes the max allowed length of 3/8-inch piping is 7.5 feet, of 1/2 inch piping is 5 feet, and 3/4 inch piping is 2.5 feet.</p> <p>1/2 inch - For only one pipe size - max length allowed is 10 feet For combination pipe sizes the allowed length of 1/2-inch piping is 5 feet, and 3/4 inch piping is 2.5 feet.</p> <p>3/4 inch - For only one pipe size = 5 feet</p>
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**The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.****K. Mandatory Requirements for all Recirculation Systems (RA4.4.7)**

Systems that utilize this distribution type shall comply with these requirements.

01	A check valve located between the recirculation pump and the water heater to prevent unintentional recirculation.
02	Piping must take most direct path between water heater and fixtures.
03	Insulation is not required on the cold water line when it is used as the return.
04	If more than one loop installed each loop shall have its own pump and controls.

**The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met****L. Recirculation Non-Demand Controls Requirements (R-ND) (RA4.4.8)**

Systems that utilize this distribution type shall comply with these requirements.

01	The active control shall be either: timer, temperature, or time and temperature. Timers shall be set to less than 24 hours. The temperature sensor shall be connected to the piping and to the controls for the pump.
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**The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.**

**HERS VERIFIED SINGLE DWELLING UNIT HOT WATER SYSTEM DISTRIBUTION**

CERTIFICATE OF VERIFICATION		CF3R-PLB-22-H
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Project Name:	Enforcement Agency:	Permit Number:
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**M. Demand Recirculation Manual Control (R-DRmc) (RA4.4.9)/Sensor Control (RDRsc) (RA4.4.10) Requirements**

Systems that utilize this distribution type shall comply with these requirements.

01	The system operates "on-demand", meaning that the pump begins to operate shortly before or immediately after hot water draw begins, and stops when the return water temperature reaches a certain threshold value. For Demand Recirculation Manual Control, the pump shall be turned on using a manual switch system. For Demand Recirculation Sensor Control, the pump shall be turned on using a sensor system.
02	The controls shall be located in the kitchen, bathroom, and any hot water fixture location that is at least 20 feet from the water heater.
03	Manual controls may be active by wired or wireless mechanisms.
04	Sensor Controls may be activated by wired or wireless mechanisms, including buttons, motion sensors, door switches and flow switches. Each control shall have standby power of 1 Watt or less.
05	Pump and control placement shall meet one of the following criteria: <ul style="list-style-type: none"> <li>When a dedicated return line has been installed the pump, controls and thermo-sensor are installed at the end of the supply portion of the recirculation loop; or</li> <li>The pump and controls are installed on the dedicated return line near the water heater and the thermo-sensor is installed in an accessible location as close to the end of the supply portion of the recirculation loop as possible; or</li> <li>When the cold water line is used as the return, the pump, demand controls and thermo-sensor shall be installed in an accessible location at the end of supply portion of the hot water distribution line (typically under a sink).</li> </ul>
06	After the pump has been activated, the controls shall allow the pump to operate until the water temperature at the thermo-sensor rises to one of the following values: <ul style="list-style-type: none"> <li>Not more than 10°F (5.6°C) above the initial temperature of the water in the pipe</li> <li>Not more than 102°F (38.9°C).</li> </ul>
07	Controls shall limit operation to no more than 5 minutes following activation.
<b>The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.</b>	

**N. HERS-Verified Demand Recirculation Manual Control (RDRmc-H) (RA3.6.6)/Sensor Control (RDRsc-H) (RA3.6.7) Requirements**

Systems that utilize this distribution type shall comply with these requirements

01	HERS rater shall perform a visual inspection that to verify that the demand pump, manual/sensor controls and thermo-sensor are present and operating properly consistence with the applicable requirements of RA4.4.9 and RA4.4.10	
02	Verification Status:	<input type="checkbox"/> <u>Pass</u> - all applicable requirements are met; or <input type="checkbox"/> <u>Fail</u> - one or more applicable requirements are not met. Enter reason for failure in corrections notes field below; or <input type="checkbox"/> <u>All N/A</u> - This entire table is not applicable
03	Correction Notes:	

**The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met unless otherwise noted in the Verification Status and the Corrections Notes in this table.**

**O. Determination of HERS Verification Compliance**

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**HERS VERIFIED SINGLE DWELLING UNIT HOT WATER SYSTEM DISTRIBUTION**

CERTIFICATE OF VERIFICATION		CF3R-PLB-22-H
HERS Verified Single Dwelling Unit Hot Water System Distribution		(Page 6 of 6)
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Dwelling Address:	City:	Zip Code:

**DOCUMENTATION AUTHOR'S DECLARATION STATEMENT**

1. I certify that this Certificate of Verification documentation is accurate and complete.

Documentation Author Name:	Documentation Author Signature:
Company:	Date Signed:
Address:	CEA/HERS Certification Information (if applicable):
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:

- The information provided on this Certificate of Verification is true and correct.
- I am the certified HERS Rater who performed the verification identified and reported on this Certificate of Verification (responsible rater).
- The installed features, materials, components, manufactured devices, or system performance diagnostic results that require HERS verification identified on this Certificate of Verification comply with the applicable requirements in Reference Appendices RA2, RA3, and the requirements specified on the Certificate of Compliance for the building approved by the enforcement agency.
- The information reported on applicable sections of the Certificate(s) of Installation (CF2R) signed and submitted by the person(s) responsible for the construction or installation conforms to the requirements specified on the Certificate(s) of Compliance (CF1R) approved by the enforcement agency.
- I will ensure that a registered copy of this Certificate of Verification shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a registered copy of this Certificate of Verification is required to be included with the documentation the builder provides to the building owner at occupancy.

**BUILDER OR INSTALLER INFORMATION AS SHOWN ON THE CERTIFICATE OF INSTALLATION**

Company Name (Installing Subcontractor, General Contractor, or Builder/Owner):	
Responsible Builder or Installer Name:	CSLB License:

**HERS PROVIDER DATA REGISTRY INFORMATION**

Sample Group Number (if applicable):	Dwelling Test Status in Sample Group (if applicable)
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**HERS RATER INFORMATION**

HERS Rater Company Name:	
Responsible Rater Name:	Responsible Rater Signature:
Responsible Rater Certification Number w/ this HERS Provider	Date Signed:

**CF3R-PLB-22-H User Instructions****A. Design Dwelling Unit Water Heating Systems Information**

This table reports the water heating system features that were specified on the registered CF1R compliance document for this project. For information only and requires no user input.

**B. Installed Dwelling Unit Water Heating Systems Information**

This table reports the water heating system information that is being installed. Require one line for each system.

- 01 Water Heating System ID or Name – Reference information from CF1R.
- 02 Manufacturer and Model number – User input. Enter the name and model number of the water heater manufacturer.
- 03 # of Water Heaters in system – User Input must equal Reference information from CF1R.
- 04 Tank Location – User input must equal Reference information on CF1R.
- 05 Exterior Tank Insulation – User Input must be equal to or greater than Reference information from CF1R.
- 06 Dwelling Unit DHW System Distribution Type – User input must equal Reference information from CF1R.
- 07 Compact Distribution - Reference information from CF1R.
- 08 Drain Water Heat Recovery - Reference information from CF1R.

**C. Mandatory Measures for all Domestic Hot Water Distribution Systems**

This table lists the requirements for all DHW systems. HERS rater must ensure all the requirements in this table are met.

**D. HERS-Verified Compact Hot Water Distribution Expanded Credit and E. Compact Hot Water Distribution Basic**

If performance compliance is used, this table lists the values used in the performance calculation and require no user input. If prescriptive compliance is used, fill out this table

- 01 Enter the Master Bath distance of furthest fixture to Water Heater in feet.
- 02 Enter the Kitchen distance from furthest fixture to Water Heater in feet
- 03 Enter Furthest Third fixtures from fixture to Water Heater in feet
- 04 Calculated value – no user input required
- 05 Calculated value – no user input required

**F. HERS-Verified Drain Water Heat Recovery System**

This table lists the requirements for all central recirculation systems. HERS rater must ensure all the requirements in this table are met.

- 01 Drain Water Heat Recovery Manufacturer's name- Enter the name of the Manufacturer.
- 02 Drain Water Heat Recovery Manufacturer's model number – Enter the Model number.
- 03 Rated Effectiveness' – Enter the rated effectiveness of the DWHR device.
- 04 Installation Configuration – Enter type of configuration. Available options are Equal flow, unequal to shower, and unequal to water heater
- 05 Percent of shower served by the DWHR device – Enter the percent of showers served by this DWHR device.
- 06 DWHR System Certified by CEC – Enter "Yes" if certified or else enter "No".

**G. HERS-Verified Pipe Insulation Credit Requirements**

This table only applies to systems indicated as **HERS-Verified Pipe Insulation Credit**. In addition to the mandatory requirements in Table D, the HERS rater must ensure the requirements in this table are met.

**H. HERS-Verified Parallel Piping Requirements**

This table only applies to systems indicated as **HERS-Verified Parallel Piping**. In addition to the mandatory requirements in Table D, the HERS rater must ensure the requirements in this table are met.

**I. Parallel Piping Requirements**

This table only applies to systems indicated as **Parallel Piping**. In addition to the mandatory requirements in Table F, the installer must ensure the requirements in this table are met.

**J. Point of Use Requirements**

This table only applies to systems indicated as **Point of Use** In addition to the mandatory requirements in Table F, the installer must ensure the requirements in this table are met.

**K. Mandatory Requirements for all Recirculation Systems**

The requirements of this table apply to all recirculation systems listed below.



**L. Recirculation Non-Demand Controls Requirements**

This table only applies to systems indicated as **Recirculation Non-demand controls**. In addition to the mandatory requirements in Table F and N, the installer must ensure the requirements in this table are met.

**M. Demand Recirculation Manual Control/Sensor Control Requirements**

This table only applies to systems indicated as **Demand Recirculation Manual Control, Demand Recirculation Sensor Control, HERS-Verified Demand Recirculation Manual Control** or **HERS-Verified Demand Recirculation Sensor Control**. In addition to the mandatory requirements in Table F and N, the installer must ensure the requirements in this table are met.

**N. HERS-Verified Demand Recirculation Manual Control (RDRmc-H) (RA3.6.6)/Sensor Control (RDRsc-H) (RA3.6.7)**

This table only applies to systems indicated as **HERS-Verified Demand Recirculation Manual Control** or **HERS-Verified Demand Recirculation Sensor Control**. In addition to the mandatory requirements in Table F and N, the HERS rater must ensure the requirements in this table are met.