HERS VERIFIED SINGLE DWELLING UNIT HOT WATER SYSTEM DISTRIBUTION

CALIFORNIA ENERGY COMMISSION

CEC-CF2R-PLB-22-H

SAMPLE FORM – NOT VALID FOR SUBMISSION TO BUILDING DEPARTMENTS

CERTIFICATE OF INSTALLATION

Note: This table completed by HERS Registry.

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

A. Design HERS Verified Dwelling Unit Water Heating Systems Information (other than HPWH)

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

01	02	03	04	05	06	07	08	09	10	11	12
Dwelling Unit Name	Water Heating System ID or Name	Water Heating System Type	Water Heater Type	# of Like (or Identical) Water Heaters in System	Fuel Type	Rated Input Type	Rated Input Value	Central DHW System Distribution	Dwelling Unit DHW System Distribution Type	Compact Distrib.	Drain Water Heat Recovery

A2. Design HERS Verified Dwelling Unit HPWH System Information

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

01	02	03	04	05	06	07	08	09
Dwelling Unit Name	Water Heating System ID or Name	Modeled Equipment Make and Model	# of Like (or Identical) Water Heaters in System	Tank Location	Exterior Tank Insulation R-value	Dwelling Unit DHW System Distribution Type	Compact Distribution	Simulated Equipment Make and Model

B. Installed HERS Verified Dwelling Unit Water Heating Systems Information

This table reports features the water heating system other than **HPWH** systems installed in this project

01	02	03	04	05	06	07	08	09	10	11	12
Dwelling Unit Name	Water Heating System ID or Name	Water Heating System Type	Water Heater Type	# of Like (or Identical) Water Heaters in System	Fuel Type	Rated Input Type	Rated Input Value	Central DHW System Distribution	Dwelling Unit DHW System Distribution Type	Compact Distrib.	Drain Water Heat Recovery

B2. Installed HERS Verified Dwelling Unit HPWH System Information

This table reports the water heating system(s) installed in this project

01	02	03	04	05	06	07	08
Dwelling Unit Name	Water Heating System ID or Name	Modeled Equipment Make and Model	# of Like (or Identical) Water Heaters in System	Tank Location	Exterior Tank Insulation R-value	Dwelling Unit DHW System Distribution Type	Compact Distribution

C. Design HERS Verified Dwelling Unit Water Heating Efficiency Information

This table reports the water heater(s) efficiency features specified on the registered CF1R compliance document for this project. (Not needed for central systems)

01	02	03	04	05	06	07
Water Heating System ID or Name	Heating Efficiency Type	Heating Efficiency Value	Standby Loss (%)	Exterior Insulation R-Value	Water Heater Storage Volume (gal)	Tank Location

D. Installed HERS Verified Dwelling Unit Water Heating Efficiency Information

This table reports the water heater(s) efficiency features installed in this project. (Not needed for central systems)

01	02	03	04	05	06	07
Water Heating System ID or Name	Heating Efficiency Type	Heating Efficiency Value	Standby Loss (%)	Exterior Insulation R-Value	Water Heater Storage Volume (gal)	Tank Location

E. Installed Water Heater Manufacturer Information

01	02	03
Water Heating System ID or Name	Manufacturer	Model Number

F. 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-3.5 or combination of R-16 internal and external Insulation. (Section 110.3(c)4).
03	All domestic hot water piping shall be insulated as specified in Section 609.11 of the California Plumbing Code. • Insulation buried below grade must be installed in a waterproof and non-crushable casing or sleeve. • 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. • Piping installed in interior or exterior walls that is surrounded on all sides by at least 1 inch (2.5 cm) of insulation. • Piping installed in crawlspace with a minimum of 1 inches (2.5 cm) of crawlspace insulation above and below. • Piping installed in attics with a minimum of 4 inches (10 cm) of attic insulation on top. • Pipe insulation shall fit tightly and all elbows and tees shall be fully insulated.
04	For Gas or Propane Water Heaters: Ensure either a **or** b are installed (Section 150.0(n)) a) designated space at least 2.5 feet by 2.5 feet and 7 feet tall within 3 feet from the water heater • 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 is accessible with no obstructions; o The conductor shall be labeled with the word "Spare" on both ends; and o A reserved single pole circuit breaker space next to the circuit breaker next to the branch circuit labeled "Future" 240V shall be provided. • A condensate drain no more than 2 inches higher than the base on water heater for natural draining. b) A designated space at least 2.5 feet by 2.5 feet and 7 feet tall more than 3 feet from the water heater • A dedicated 240 volt branch circuit shall be installed within 3 feet from the designated space. The • branch circuit shall be rated at 30 amps minimum. The blank cover shall be identified as "240V ready"; and • The main electrical service panel shall have a reserved space to allow for the installation of a double pole circuit breaker for a future HPWH installation. The reserved space shall be permanently marked as "For Future 240V use"; and • Either a dedicated cold water supply, or the cold water supply shall pass through the designated HPWH location just before reaching the gas or propane water heater; and • The hot water supply pipe coming out of the gas or propane water heater shall be routed first through the designated HPWH location before serving any fixtures; and • The hot and cold water piping at the designated HPWH location shall be exposed and readily accessible for future installation of a HPWH; and • A condensate drain no more than 2 inches higher than the base of the installed water heater, and allows natural draining without pump assistance.

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

G. HERS-Verified Compact Hot Water Distribution Expanded Credit (CHWDS-H-EX) (RA3.6.5)

For dwelling units with multiple systems, enter the master bath distance and kitchen distance to the closest water heater, and enter the average of the furthest fixture to each water heater.

01	02	03	04	05	06	07	08	09
Dwelling 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 (Avg for multiple water heaters)	Weighted Distance	Qualification Distance	Design Compactness Factor	Calculated Compactness Factor

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.

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

H. Compact Hot Water Distribution (CHWDS) (RA4.4.6)

For dwelling units with multiple systems, enter the master bath distance and kitchen distance to the closest water heater, and enter the average of the furthest fixture to each water heater

01	02	03	04	05	06	07	08	09
Dwelling 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 (Avg for multiple water heaters)	Weighted Distance	Qualification Distance	Design Compactness Factor	Calculated Compactness Factor

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

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

DWHR devices shall comply with these requirements.

Design DWHR System Information			
01	02	03	04
System ID/Name	Rated Effectiveness	Installation Configuration	Percent of shower served by the DWHR device

Installed DWHR System Information						
05	06	07	08	09	10	11
System ID/Name	Manufacturer	Model Number	Rated Effectiveness	Installation Configuration	Percent of shower served by the DWHR device	DWHR System Certified by CEC (Yes/No)

12	For water heating system serving a single dwelling, the DWHR system shall, at the minimum, recover heat from the master bathroom shower and must transfer that heat either back to the respective shower(s) or the water heater.
13	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 transfer that heat either back to all the respective showers or the water heater.
14	The DWHR unit(s) shall be installed within 1 degree 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.

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

J. 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).

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

K. 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.
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.

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

L. 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.

M. Point of Use Requirements (POU) (RA4.4.5)

Systems that utilize this distribution type shall comply with these requirements

01	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: 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. 1/2 inch - For only one pipe size – max length allowed is 10 feet For combination pipe sizes the allowed length of 1/2inch piping is 5 feet, and 3/4 inch piping is 2.5 feet. 3/4 inch - For only one pipe size = 5 feet

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

N. Mandatory Requirements for all Recirculation Systems (RA4.4.7)

Systems that utilize a recirculation system 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 the 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 is 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.

O. 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.

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

P. Demand Recirculation Manual Control (R-DRmc) (RA4.4.9)**/Sensor Control (RDRsc)** (RA4.4.10) **Requirements**

Systems that utilize either of these distribution types 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: • 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 • 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 • 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).
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: • Not more than 10°F (5.6°C) above the initial temperature of the water in the pipe; or • Not more than 102°F (38.9°C).
07	Controls shall limit operation to no more than 5 minutes following activation.

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

Q. 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 to verify that the demand pump, manual/sensor controls and thermo-sensor are present and operating properly consistent with the applicable requirements of RA4.4.9 and RA4.4.10

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 Compliance documentation is accurate and complete

Documentation Author Name:	Documentation Author Signature:
Documentation Author Company Name:	Date Signed:
Address:	CEA/HERS Certification Identification (if applicable):
City/State/Zip:	Phone:

RESPONSIBLE PERSON'S DECLARATION STATEMENT

1. I certify the following under penalty of perjury, under the laws of the State of California:
    1. The information provided on this Certificate of Compliance is true and correct.
    2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
    3. That the energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
    4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
    5. I will ensure that a registered copy of this Certificate of Compliance shall be 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 Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Builder/Installer Name:	Responsible Builder/Installer Signature:	
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)	Position With Company (Title):	
Address:	CSLB License:	
City/State/Zip:	Phone:	Date Signed:
Third Party Quality Control Program (TPQCP) Status:	Name of TPQCP (if applicable):	

CF2R-PLB-22-H User Instructions

A. Design HERS Verified 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. His section is for information/verification purposes only and requires no user input.

A2. Design HERS Verified Dwelling Unit HPWH System Information

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

B. Installed HERS Verified Dwelling Unit Water Heating Systems Information

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

1. Dwelling Unit Name - Reference information from Table A.
2. Water Heating System ID or Name – Reference information from Table A.
3. Water Heating System Type – Reference information from Table A. The different kinds of water heating system type are DHW, or Combined Hydronic.
4. Water Heater Type – Reference information from Table A. The different kinds of water heaters are Large/Commercial Storage, Small/Consumer Storage, Residential-Duty Commercial Storage, Heat Pump, Boiler, Large/Commercial Instantaneous, Small/Consumer Instantaneous, Residential-Duty Commercial Instantaneous or Indirect.
5. # of Like (or Identical) Water Heaters in system – Reference information from Table A.
6. Fuel Type – Reference information from Table A. The different kinds of fuel types are heat pump, electric resistance, natural gas, and propane.
7. Rated Input Type – Reference information from Table A. For natural gas and propane, the input type is Btu/hr. For heat pump and electric resistance, the input type is kW.
8. Rated Input Value – User input. Numerical value of the rated input. Must be equal to or less than value indicated on the CF1R.
9. Central DHW System Distribution - Reference information from Table A.
10. Dwelling Unit DHW System Distribution Type - Reference information from Table A.
11. Compact Distribution - Reference information from Table A.
12. Drain Water Heat Recovery - Reference information from Table A.

B2. Installed HERS Verified Dwelling Unit HPWH System Information

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

1. Dwelling Unit Name - Reference information from Table A2.
2. Water Heating System ID or Name – Reference information from Table A2.
3. Modeled Equipment Make and Model number – User input must be equal to the value indicated on Table A2 as default and allow user to override.

4. # of Like (or Identical) Water Heaters in system –Reference information from Table A2.
5. Tank Location – User input must equal reference information on Table A2.
6. Exterior Tank Insulation – User Input must be equal to or greater than reference information from Table A2.
7. Dwelling Unit DHW System Distribution Type –Reference information from Table A2.
8. Compact Distribution - Reference information from Table A2.

C. Design HERS Verified Dwelling Unit Water Heating Efficiency Information

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

D. Installed HERS Verified Dwelling Unit Water Heating Efficiency Information

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

1. Water Heating System ID or Name – Reference information from Table A.
2. Heating Efficiency Type – Reference information from Table C. Different efficiency types are Energy Factor, AFUE, UEF and Thermal Efficiency.
3. Heating Efficiency Value – User input must be equal to or higher efficiency than value indicated on the CF1R.
4. Standby Loss – User input. Must be equal to or less than value indicated in Table C. Value may be N/A if CF1R value is N/A.
5. Exterior Insulation R-Value – User input. Must be equal to or higher than value indicated in Table C. Value may be N/A if CF1R value is N/A.
6. Water Heater Storage Volume (gal) – User input. Value may be N/A if water heater type is instantaneous with zero storage.
7. Tank location – User input. Must be equal to system type indicated in Table C.

E. Installed Water Heater Manufacturer Information

This table reports the manufacturer information of the installed water heater(s). Require one line for each installed water heater

1. Water Heating System ID or Name – Reference information from CF1R.
2. Manufacturer – User input. Enter the name of the water heater manufacturer.
3. Model Number – User input. Enter the model number of the water heater.

F. 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.

G. HERS-Verified Compact Hot Water Distribution Expanded Credit and H. 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.

1. Reference information from CF1R
2. Enter the master bath distance of furthest fixture to water heater in feet. For multiple water heaters, enter the distance to the closest water heater.
3. Enter the kitchen distance from furthest fixture to water heater in feet. For multiple water heaters, enter the distance to the closest water heater.
4. Enter furthest third fixtures from fixture to Water Heater in feet. For multiple water heaters, enter the average of the furthest distance of each water heater.
5. Weighted Distance - Calculated value – no user input required.
6. Qualification Distance - Calculated value – no user input required.

I. HERS-Verified Drain Water Heat Recovery System

This table lists the requirements for all drain water heat recovery systems. HERS rater must ensure all the requirements in this table are met.

1. Reference information from CF1R.
2. Reference information from CF1R.03 Reference information from CF1R.
3. Reference information from CF1R.
4. Reference information from CF1R.
5. Drain Water Heat Recovery Manufacturer's Name- Enter the name of the manufacturer.
6. Drain Water Heat Recovery Manufacturer's Model Number – Enter the model number.
7. Rated Effectiveness – Enter the rated effectiveness of the DWHR device.
8. Installation Configuration – Enter type of configuration. Available options are: Equal flow, unequal to shower, and unequal to water heater
9. Percent of showers served by the DWHR device – Enter the percent of showers served by this DWHR device.
10. DWHR System Certified by CEC – Enter "Yes" if certified or else enter "No".

J. 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 F, the installer must ensure the requirements in this table are met.

K. 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 F, the installer must ensure the requirements in this table are met.

L. 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.

M. 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.

N. Mandatory Requirements for all Recirculation Systems

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

O. 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.

P. Demand Recirculation Manual Control/Sensor Control Requirements

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

Q. HERS-Verified Demand Recirculation Manual Control/Sensor Control Requirements

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

Documentation Declaration Statements

1. The person who prepared the CF2R will sign and complete the fields for their name, company (if applicable), address, phone number, certification information (if applicable), date and signature.
2. The person who is assuming responsibility for the project being built to comply with Title 24, Part 6, will complete the fields for their name, company (if applicable), address, phone number, license number (if applicable), date and signature.