HERS VERIFIED SINGLE DWELLING UNIT HOT WATER SYSTEM DISTRIBUTION

CERTIFICATE OF VERIFICATION	NRCV-PLB-22-H
HERS Verified High Rise Residential/Hotel/Motel Single Dwelling Unit Hot Water System Distribution	(Page 1 of 8)

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

A. General Information

This table reports the dwelling unit name that were specified on the NRCC-PRF-01 compliance document for this project.

01	Dwelling Unit Name	

B. Design HERS Verified Dwelling Unit Water Heating Systems Information

This table reports the water heating system features that were specified on the NRCC-PRF-01 compliance document for this project.

01	02	03	04	05	06	07	08	09	10	11	12	13	14
Water Heating System ID or Name	Water Heating System Type	Water Heater Type	# of Water Heaters in system	Water Heater Storage Volume (gal)	Fuel Type	Rated Input Type	Rated Input Value	Heating Efficiency Type	Heating Efficiency Value	Standby Loss (%)	Exterior Insul. R-Value	Central DHW System Distribution Type	Dwelling Unit DHW System Distribution Type

C. Installed HERS Verified Dwelling Unit Water Heating Systems Information

01	02	03	04	05	06	07	08	09	10	11	12	13	14
Water Heating System ID or Name	Water Heating System Type	Water Heater Type	# of Water Heaters in system	Water Heater Storage Volume (gal)	Fuel Type	Rated Input Type	Rated Input Value	Heating Efficiency Type	Heating Efficiency Value	Standby Loss (%)	Exterior Insul. R-Value	Central DHW System Distribution Type	Dwelling Unit DHW System Distribution Type
15	Compliance Statement:												

D. Installed Water Heater Manufacturer Information

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

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Registration Number: Registration Date/Time: HERS Provider:

CERTIFICATE OF VERIFICATION	NRCV-PLB-22-H
HERS Verified High Rise Residential/Hotel/Motel Single Dwelling Unit Hot Water System Distribution	(Page 2 of 8)

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

E. Mandatory Measures for all Domestic Hot Water Distribution Systems		
01	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: (RA4.4.1) • The first 5 feet (1.5 meters) of hot and cold water pipes from the storage tank. • All piping with a nominal diameter of 3/4 inch (19 millimeter) or larger. • All piping associated with a domestic hot water recirculation system regardless of the pipe diameter, except when cold water return is used in a demand system. • Piping from the heating source to storage tank or between tanks. • Piping buried below grade. • All hot water pipes from the heating source to the kitchen fixtures. The following sections of pipe do not have to be insulated: (RA4.4.1) • Piping installed in interior or exterior walls that is surrounded on all sides by at least 1 inch of insulation. • Piping installed in attics with a minimum of 4 inches (10 cm) of attic insulation on top • Piping that penetrates framing members shall not be required to have pipe insulation for the distance of the framing penetration. Metal 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.	
02	Piping buried below grade must be installed in a water proof and non-crushable casing or sleeve that allows for installation, removal, and replacement of the enclosed pipe and insulation. (Section 150.0(j))	
03	All elbows and tees shall be fully insulated. (RA4.4.1)	
04	Where insulation is required, no piping shall be visible due to insulation voids, and all insulation shall fit tightly to the pipe. (RA4.4.1)	
05	Verification Status:	
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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CERTIFICATE OF VERIFICATION		NRCV-PLB-22-H
HERS Verified High Rise Residential/Hotel/Motel Single Dwelling Unit Hot Water System Distribution		(Page 3 of 8)
Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City	Zip Code

F. HERS-Verified Pipe Insulation Credit Requirements Systems that utilize this distribution type shall comply with these requirements		
01	All hot water piping shall comply with the insulation requirements in Table 120.3-A. (RA 4.4.14)	
02	Verification Status:	
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.		

G. HERS-Verified Parallel Piping Requirements 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. (RA 4.4.15)	
02	For manifolds that include valves, the manifold must be readily accessible in accordance with the plumbing code. (RA 4.4.4)	
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. (RA 4.4.4)	
04	The hot water distribution piping must be separated by at least two inches from any other hot water supply piping, and at least six 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. (RA 4.4.4)	
05	Verification Status:	
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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CERTIFICATE OF VERIFICATION	NRCV-PLB-22-H
HERS Verified High Rise Residential/Hotel/Motel Single Dwelling Unit Hot Water System Distribution	(Page 4 of 8)

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

H. HERS-Verified Compact Hot Water Distribution System Requirements Systems that utilize this distribution type shall comply with these requirements		
01	Total Conditioned floor area (square feet)	
02	Maximum allowed pipe run length from the water heater to the furthest point of use For the floor area served (feet)	
03	The pipe run length from each water heater to the furthest fitting served by that water heater must be no greater than the maximum pipe run length above.	
04	Verification Status:	
05	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.		

~~J~~I. HERS-Verified Demand Recirculation Manual Control 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. (RA4.4.13)
02	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: (RA4.4.13) • Not more than 10 degrees Fahrenheit (5.6 degrees Celsius) above the initial temperature of the water in the pipe • Not more than 102 degrees Fahrenheit (38.9 degrees Celsius).
03	The controls shall limit pump operation to a maximum of 10 minutes following any activation. This is provided in the event that the normal means of shutting off the pump have failed. (RA4.4.13)

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CERTIFICATE OF VERIFICATION	NRCV-PLB-22-H
HERS Verified High Rise Residential/Hotel/Motel Single Dwelling Unit Hot Water System Distribution	(Page 5 of 8)

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

04	Pump and control placement shall meet one of the following criteria: (RA4.4.13) • 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 thermosensor shall be installed in an accessible location at the end of supply portion of the hot water distribution line (typically under a sink).	
05	Insulation is not required on the cold water line when it is used as the return. (RA4.4.13)	
06	Each control shall have standby power of 1 Watt or less. Controls may be located in individual units or on the loop. Controls may be activated by wired or wireless mechanisms, including buttons, motion sensors, door switches and flow switches. (RA4.4.13)	
07	If more than one loop installed each loop shall have its own pump and controls	
08	Automatic Air release valve is installed on the inlet side of the recirculation pump per Section 110.3(c)5A.	
09	A check valve is located between the recirculation pump and the water heater per Section 110.3(c)5B.	
10	Hose bibb is installed between the pump and the water heating equipment with an isolation valve between the hose bibb and the water heating equipment per Section 110.3(c)5C.	
11	Isolation valves are installed on both sides of the pump. One of the isolation valves may be the same isolation valve as in item 10 above per Section 110.3(c)5D.	
12	The cold water supply piping and the recirculation loop piping is not connected to the hot water storage tank drain port per Section 110.3(c)5E.	
13	A check valve is installed on the cold water supply line between the hot water system and the next closest tee on the cold water supply per Section 110.3(c)5F.	
14	Verification Status:	
15	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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CERTIFICATE OF VERIFICATION	NRCV-PLB-22-H
HERS Verified High Rise Residential/Hotel/Motel Single Dwelling Unit Hot Water System Distribution	(Page 6 of 8)

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

~~K~~J. HERS-Verified Demand Recirculation Sensor Control 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. (RA4.4.13)
02	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: (RA4.4.13) • Not more than 10 degrees Fahrenheit (5.6 degrees Celsius) above the initial temperature of the water in the pipe • Not more than 102 degrees Fahrenheit (38.9 degrees Celsius).
03	The controls shall limit pump operation to a maximum of 10 minutes following any activation. This is provided in the event that the normal means of shutting off the pump have failed. (RA4.4.13)
04	Pump and control placement shall meet one of the following criteria: (RA4.4.13) • 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 thermosensor shall be installed in an accessible location at the end of supply portion of the hot water distribution line (typically under a sink).
05	Insulation is not required on the cold water line when it is used as the return. (RA4.4.13)
06	Each control shall have standby power of 1 Watt or less. Controls may be located in individual units or on the loop. Controls may be activated by wired or wireless mechanisms, including buttons, motion sensors, door switches and flow switches. (RA4.4.13)
07	If more than one loop installed each loop shall have its own pump and controls
08	Automatic Air release valve is installed on the inlet side of the recirculation pump per Section 110.3(c)5A.
09	A check valve is located between the recirculation pump and the water heater per Section 110.3(c)5B.
10	Hose bibb is installed between the pump and the water heating equipment with an isolation valve between the hose bibb and the water heating equipment per Section 110.3(c)5C.
11	Isolation valves are installed on both sides of the pump. One of the isolation valves may be the same isolation valve as in item 8 above per Section 110.3(c)5D.
12	The cold water supply piping and the recirculation loop piping is not connected to the hot water storage tank drain port per Section 110.3(c)5E.

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Registration Number: Registration Date/Time: HERS Provider:

CERTIFICATE OF VERIFICATION		NRCV-PLB-22-H
HERS Verified High Rise Residential/Hotel/Motel Single Dwelling Unit Hot Water System Distribution		(Page 7 of 8)
Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City	Zip Code

13	A check valve is installed on the cold water supply line between the hot water system and the next closest tee on the cold water supply per Section 110.3(c)5F.	
14	Verification Status:	
15	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.

~~L~~K. Determination of HERS Verification Compliance

All applicable sections of this document shall indicate compliance with the specified verification protocol requirements in order for this Certificate of Verification as a whole to be determined to be in compliance.

01	

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HERS VERIFIED SINGLE DWELLING UNIT HOT WATER SYSTEM DISTRIBUTION

CERTIFICATE OF VERIFICATION	NRCV-PLB-22-H
HERS Verified High Rise Residential/Hotel/Motel Single Dwelling Unit Hot Water System Distribution	(Page 8 of 8)

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

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

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

Name:	Signature:
Company:	Date:
Address:	CEA / HERS Certification Identification (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:

1. The information provided on this Certificate of Verification is true and correct.
2. I am the certified HERS Rater who performed the verification identified and reported on this Certificate of Verification (responsible rater).
3. 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 Nonresidential Appendices NA1 and NA2, and the requirements specified on the Certificate of Compliance for the building approved by the enforcement agency.
4. The information reported on applicable sections of the Certificate(s) of Installation (NRCI), signed and submitted by the person(s) responsible for the construction or installation conforms to the requirements specified on the Certificate(s) of Compliance (NRCC) approved by the enforcement agency.
5. 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 or General Contractor or Builder/Owner):	
Responsible Builder/Installer Name:	CSLB License:

HERS PROVIDER DATA REGISTRY INFORMATION

Sample Group Number (if applicable):	Dwelling Test Status in Sample Group (if applicable)

HERS RATER INFORMATION

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

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Registration Number: Registration Date/Time: HERS Provider:

NRCV-PLB-22-H User Instructions

A. Dwelling Unit Name

01 This identifies the dwelling unit on this form and is reference from the NRCC-PRF-01. One form is required for each dwelling unit in the building.

B. Design Central Water Heating Systems Information

This table reports the water heating system features that were specified on the registered NRCC-PRF-01 compliance document for this project.

01 Water Heating System ID or Name – User input
02 Water Heating System Type – User input. The different kinds of water heating system type are DHW or Combined Hydronic
03 Water Heater Type – User input. The different kinds of water heaters are Large Storage, Small Storage, Heat Pump, Boiler, Large Instantaneous, Small Instantaneous or Indirect
04 # of Water Heaters in system – User input.
05 Water Heater Storage Volume (gal) – User input. Value may be N/A if water heater type is instantaneous with zero storage.
06 Fuel Type – User input. The different kinds of fuel types are natural gas, propane, oil, or electricity.
07 Rated Input Type – User input. For natural gas, propane and oil fuel type the input type is Btu/Hr. For electric the input type is kW
08 Rated Input Value – User input. Numerical value of the rated input. Must be equal to or less than value indicated on the NRCC-PRF-01
09 Heating Efficiency Type – User input. Different efficiency types are Energy Factor, AFUE, and Thermal Efficiency
10 Heating Efficiency Value – User input. Numerical value of the Heating Efficiency. Must be equal to or higher efficiency than value indicated on the NRCC-PRF-01
11 Standby Loss – User input. Value may be N/A if NRCC-PRF-01 value is N/A.
12 Exterior Insul. R-Value – User input. Value may be N/A if NRCC-PRF-01 value is N/A.
13 Central DHW System Distribution Type - User input from list
*N/A
* Recirculation Temperature Modulation Control
* Recirculation Continuous Monitoring Systems
* Demand Recirculation
* Non-demand control Recirculation Systems
* Recirculation Temperature Modulation Control with HERS-Verified Multiple Loops
* Recirculation Continuous Monitoring Systems with HERS-Verified Multiple Loops
* Demand Recirculation with HERS-Verified Multiple Loops
* Non-demand control Recirculation Systems with HERS-Verified Multiple Loops
14 Dwelling Unit DHW System Distribution Type - User input from list. For Single Dwelling systems pick from
* HERS-Verified Pipe Insulation Credit
* HERS-Verified Parallel Piping
* HERS-Verified Compact Hot Water Distribution System
* HERS-Verified Point of Use
* HERS-Verified Demand Recirculation Manual Control
* HERS-Verified Demand Recirculation Sensor Control for Central Systems,
*HERS-Verified Pipe Insulation

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C. Installed Central 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 Table A
02 Water Heating System Type – Reference information from Table A
03 Water Heater Type – Information from Table A 04 # of Water Heaters in system – Reference information from Table A
05 Water Heater Storage Volume (gal) – User input. Value may be N/A if water heater type is instantaneous with zero storage..
06 Fuel Type – Reference information from Table A
07 Rated Input Type – Reference information from Table A
08 Rated Input Value – User input. Numerical value of the rated input. Must be equal to or less than value indicated on the NRCC-PRF-01
09 Heating Efficiency Type – Reference information from Table A
10 Heating Efficiency Value – User input. Numerical value of the Heating Efficiency. Must be equal to or higher efficiency than value indicated on the NRCC-PRF-01
11 Standby Loss – User input. Must be equal to or less than value indicated on the NRCC-PRF-01. Value may be N/A if NRCC-PRF-01 value is N/A.
12 Exterior Insul. R-Value – User input. Must be equal to or higher than value indicated on the NRCC-PRF-01. Value may be N/A if NRCC-PRF-01 value is N/A.
13 Central DHW System Distribution Type - Reference information from Table A
14 Dwelling Unit DHW System Distribution Type - Reference information from Table A

D. 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

01 Water Heating System ID or Name – Reference information from NRCC-PRF-01.
02 Manufacturer – User input. Enter the name of the water heater manufacturer.
03 Model Number – User input. Enter the model number of the water heater.

E. Madatory Measures for All Domestic Hot Water Distribution Systems

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

F. HERS-Verified Pipe Insulation Credit Requirements

This table only applies to systems indicated in B14 and C14 as **HERS-Verified Pipe Insulation Credit.** In additional the mandatory requirements in Table E, the HERS rater must ensure the requirements on this table are met.

G. HERS-Verified Parallel Piping Requirements

This table only applies to systems indicated in B14 and C14 as **HERS-Verified Parallel Piping.** In additional the mandatory requirements in Table E, the HERS rater must ensure the requirements on this table are met.

H. HERS-Verified Compact Hot Water Distribution System Requirements

This table only applies to systems indicated in B14 and C14 as **HERS-Verified Compact Hot Water Distribution System.** In additional the mandatory requirements in Table E, the HERS rater must ensure the distance between the water heater to furthest point of water use does not exceed the maximum indicated in Table H1 below. Calculated the Floor Area Served by dividing the conditioned floor area by the number of installed water heaters (Floor Area Served= CFA/# of WH). In addition all hot water lines shall be insulated.

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TABLE H1 Compact Hot Water Distribution System-(CHWDS)	
Floor Area Served (ft2)	Maximum Measured Water Heater To Use Point Distance (ft)
< 1000	28
1001 – 1600	43
1601 – 2200	53
2201 – 2800	62
>2800	68

~~**I. HERS-Verified Point of Use Requirements**~~

~~This table only applies to systems indicated in B14 and C14 as **HERS-Verified Point of Use.** In additional the mandatory requirements in Table E, the HERS rater must ensure the distance between the water heater to furthest point of water use does not exceed the maximum indicated in Table H1 below. 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. In additional all hot water lines shall be insulated.~~

~~TABLE I1~~ ~~HERS-Verified Point of Use (POU-H)~~	
~~Size Nominal, Inch~~	~~Maximum Measured Water Heater To Use Point Distance Length of Pipe (feet)~~
~~3/8"~~	~~15~~
~~1/2"~~	~~10~~
~~3/4"~~	~~5~~

~~J~~I. HERS-Verified Demand Recirculation Manual Control Requirements

This table only applies to systems indicated in B14 and C14 as **HERS-Verified Demand Recirculation Manual Control.** In additional the mandatory requirements in Table E, the HERS rater must ensure the requirements on this table are met.

~~K~~J. HERS-Verified Demand Recirculation Sensor Control Requirements

This table only applies to systems indicated in B14 and C14 as **HERS-Verified Demand Recirculation Sensor Control.** In additional the mandatory requirements in Table E, the i HERS rater must ensure the requirements on this table are met.

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