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| CERTIFICATE OF INSTALLATION | | CF2R-PLB-01-E |
| Multifamily Central Hot Water System Distribution | | (Page 1 of 5) |
| Project Name: | Enforcement Agency: | Permit Number: |
| Dwelling Address: | City: | Zip Code: |

| A. Design Central Water Heating Systems Information | | | | | | | | | | | | | |
|---|---------------------------|-------------------|------------------------------|-----------------------------------|-----------|------------------|-------------------|-------------------------|--------------------------|------------------|-------------------------|--------------------------------------|--|
| This table reports the water heating system features that were specified on the registered CF1R 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 |
| | | | | | | | | | | | | | |

| B. Installed Central 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 |
| | | | | | | | | | | | | | |

| C. Installed Water Heater Manufacturer Information | | |
|--|--------------|--------------|
| 01 | 02 | 03 |
| Water Heating System ID or Name | Manufacturer | Model Number |
| | | |

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| D. Mandatory Requirements for all Central Domestic Hot Water Systems | |
|---|---|
| 01 | On systems that have a total capacity greater than 167,000 Btu/hr, outlets that require higher than service water temperatures as listed in the ASHRAE Handbook have separate remote heaters, heat exchangers, or boosters to supply the outlet with the higher temperature. (Section 110.3 (c)1) |
| 02 | Systems with circulating pumps or with electrical heat trace systems shall be capable of automatically turning off the system. (Section 110.3(c)2). |
| 03 | For public lavatories, the control system shall limit the outlet temperature to 110 degrees Fahrenheit. (Section 110.3(c)3). |
| 04 | Unfired storage tanks are insulated with an external R-12 or combination of R-16 internal and external insulation. Alternatively, the heat loss of the tank surface based on an 80 degrees Fahrenheit water-air temperature difference shall be less than 6.5 Btu per hour per square foot. (Section 110.3(c)4). |
| 05 | All sections of the recirculation loop, and the first five feet of all branches off the loop are insulated, to the thicknesses required by Table 120.3A, except for the following: (RA4.4.1) <ul style="list-style-type: none"> • 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. • Insulation is not required on the cold water line when it is used as the return |
| 06 | Hot water pipes that are buried below grade are installed in a water proof and non-crushable casing or sleeve that allows for installation, removal, and replacement of the enclosed pipe and insulation. (RA4.4.1) |
| 07 | Insulation outside conditioned space is protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind. (RA4.4.1) |
| 08 | Pipe insulation fits tightly to the pipe. (RA4.4.1) |
| 09 | On insulated sections of pipe, no piping is visible due to insulation voids, and all elbows and tees are fully insulated.. (RA4.4.1) |
| 10 | The recirculation pump is mounted on a vertical section of the return line, OR an automatic air release valve is installed on a riser at least 12 inches in length, on the inlet side of the recirculation pump, no more than 4 feet from the pump. (Section 110.3(c)5A). |
| 11 | A check valve is located between the recirculation pump and the water heater. (Section 110.3(c)5B). |
| 12 | A 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. (Section 110.3(c)5C). |
| 13 | Isolation valves are installed on both sides of the pump. One of the isolation valves may be the same isolation valve as in item 12 above. (Section 110.3(c)5D). |
| 14 | The cold water supply piping and the recirculation loop piping is not connected to the hot water storage tank drain port. (Section 110.3(c)5E). |
| 15 | 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. (Section 110.3(c)5F). |
| 16 | The hot water distribution system piping from the water heater(s) to the fixtures and appliances takes the most direct path. (RA 4.4.7.1) |
| 17 | Installation and operation instructions that provide details of the operation of the pump and controls are available at the jobsite for inspection. (RA 4.4.7.1) |
| 18 | More than one circulation loop may be installed. Each loop shall have its own pump and controls. (RA4.4.8, RA 4.4.9, RA 4.4.10) |
| The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met. | |

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E. Multiple Dwelling Units – Recirculation Temperature Modulation Control Requirements

Systems that utilize this distribution type shall comply with these requirements

| | |
|----|---|
| 01 | Controls have been installed that reduce the hot water supply temperature when hot water demand is determined to be low by the control system. The control system may use a fixed control schedule or dynamic control schedules based measurements of hot water demand. (RA4.4.11). |
| 02 | Daily hot water supply temperature reduction (which is defined as the sum of temperature reduction by the control in each hour within a 24-hour period) shall be more than 50 degrees Fahrenheit. (RA4.4.11) |

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

F. Multiple Dwelling Units – Recirculation Continuous Monitoring Systems Requirements

Systems that utilize this distribution type shall comply with these requirements

| | |
|----|---|
| 01 | The water heating system must have a means of communicating with the remote monitoring facility. (RA4.4.12) |
| 02 | The monitoring system must record no less frequently than hourly measurement of key system operation parameters, including hot water supply and return temperatures, and status of gas valve relays. (RA4.4.12) |
| 03 | A current contract must be available that demonstrate the system will be monitored. (RA4.4.12) |

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

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G. Multiple Dwelling Units – Demand Recirculation 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) <ul style="list-style-type: none"> 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) <ul style="list-style-type: none"> 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). |
| 05 | Insulation is not required on the cold water line when it is used as the return. (RA4.4.13) |
| 06 | Manual or sensor controls shall be installed and, if powered, each control has 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) |

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

H. Multiple Dwelling Units – Non-Demand Control Recirculation Systems Requirements

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.

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| DOCUMENTATION AUTHOR'S DECLARATION STATEMENT | | |
| 1. I certify that this Certificate of Installation 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 | | |
| I certify the following under penalty of perjury, under the laws of the State of California: | | |
| <ol style="list-style-type: none"> The information provided on this Certificate of Installation is true and correct. I am 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 (responsible builder/installer), otherwise I am an authorized representative of the responsible builder/installer. 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 plans and specifications approved by the enforcement agency. I reviewed a copy of the Certificate of Compliance approved by the enforcement agency that identifies the specific requirements for the scope of construction or installation identified on this Certificate of Installation, and I have ensured that the requirements that apply to the construction or installation have been met. I will ensure that a registered copy of this Certificate of Installation 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 Installation 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: |

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CF2R-PLB-01-E User Instructions

A. Design Central 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 Central Water Heating Systems Information

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

- 01 Water Heating System ID or Name – Reference information from CF-1R
- 02 Water Heating System Type – Reference information from CF-1R. The different kinds of water heating system type are DHW or Combined Hydronic
- 03 Water Heater Type – Information from CF-1R. 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 – Reference information from CF-1R
- 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 CF-1R. The different kinds of fuel types are natural gas, propane, oil, or electricity.
- 07 Rated Input Type – Reference information from CF-1R. 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 CF-1R
- 09 Heating Efficiency Type – Reference information from CF-1R. 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 CF-1R
- 11 Standby Loss – User input. Must be equal to or less than value indicated on the CF-1R. Value may be N/A if CF-1R value is N/A.
- 12 Exterior Insul. R-Value – User input. Must be equal to or higher than value indicated on the CF-1R. Value may be N/A if CF-1R value is N/A.
- 13 Central DHW System Distribution Type - Reference information from CF-1R
- 14 Dwelling Unit DHW System Distribution Type - Reference information from CF-1R

C. 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 CF-1R.
- 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.

D. MANDATORY REQUIREMENTS FOR ALL CENTRAL DOMESTIC HOT WATER RECIRCULATION SYSTEMS

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

E. Multiple Dwelling Units – Recirculation Temperature Modulation Control Requirements

This table only applies to systems indicated in A13 and B13 as **Recirculation Temperature Modulation Control**. In addition the mandatory requirements in Table D, the installer must ensure the requirements on this table are met.

F. Multiple Dwelling Units – Recirculation Continuous Monitoring Systems Requirements

This table only applies to systems indicated in A13 and B13 as **Recirculation Continuous Monitoring Systems**. In addition to the mandatory requirements in Table D, the installer must ensure the requirements on this table are met.

G. Multiple Dwelling Units – Demand Recirculation Requirements

This table only applies to systems indicated in A13 and B13 as **Demand Recirculation**. In addition to the mandatory requirements in Table D, the installer must ensure the requirements on this table are met.

H. Multiple Dwelling Units – Non-Demand Control Recirculation Systems Requirements

This table only applies to systems indicated in A13 and B13 as **Non-Demand Control Recirculation Systems**. In addition to the mandatory requirements in Table D, the installer must ensure the requirements on this table are met.

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