



Residential
Water-heating System Alterations*

Use this checklist when the project:

- Replaces, or adds to, the existing water-heating system – with another system of the same or different type – and nothing more.
- * This checklist is not intended to support projects in which the enforcement agency requires building design plans and specifications to be submitted with the application for a building permit.

ESSENTIALS

1. Does the project trigger California’s Building Energy Efficiency Standards (Title 24, Part 6)? YES NO

- The project triggers Title 24, Part 6 (the Energy Code) if the home’s existing water heating system is replaced or a new water heater is added to the home.

2. Does it meet the Energy Code’s Requirements under the Prescriptive Approach? YES NO

First, the new water-heating system must meet Mandatory Federal and State Appliance Efficiency regulations. (See end of FAQ section for more details.) Then, specific requirements for Prescriptive compliance will depend on the type of existing and proposed water heater – see some of the most common scenarios below:

System Type

If the existing water-heating system is...	And is replaced with...	Can project use Prescriptive Approach?
• Gas (storage tank)	Gas (storage tank)	Yes ^A
	Gas (tankless)	Yes ^B
	Electric Heat Pump (storage tank)	Yes ^C
	Electric Resistance (storage tank)	No ^A
• Electric Resistance (storage tank)	Gas (storage tank or tankless)	Yes ^B
	Electric Heat Pump (storage tank)	Yes ^C
	Electric Resistance (storage tank)	Yes ^D
• Gas or Electric (tankless)	Gas (tankless)	Yes ^{A,B}
	Gas (storage tank)	Yes
	Electric Heat Pump (storage tank)	Yes ^C
• Gas (tankless)	Electric Resistance (tankless)	No ^A
• Electric Resistance (tankless)	Electric Resistance (tankless)	Yes ^D

Mandatory Pipe Insulation per §609.11 of CA Plumbing Code^E

Required Locations – Existing Accessible Pipes Only:

- First 5 feet (1.5 meters) of cold and hot water pipes from the storage tank, or hot water pipes from tankless
- All accessible hot water piping with a nominal diameter less than ¾” that is:
 - Associated with the domestic hot water (DHW^F) recirculation system
 - From the heating source to kitchen fixtures; heating source to storage tank; or between storage tanks (indirect water heating)
 - Buried below grade

Recirculation Pumps:

- Water heater changeouts involving recirculation pumps shall use demand recirculation systems utilizing manual on/off control pumps. (see Title 24, Part 6 Reference Appendix 4.4). All other control types are not supported prescriptively.

3. Are the necessary Prescriptive forms included with the permit application? YES NO

If the project...	Include this form:
Replaces/adds to the existing water-heating system only	CF1R-ALT-05-E: Certificate of Compliance for Alterations (Non-HERS)

A – F See page 3 for notes.

Water-Heater System Changes, HERS Measures & Required Documentation

The permit applicant wants to change to a different fuel source for the new DHW system. Is this allowed prescriptively?

- It is possible to change to a different fuel source and still comply prescriptively, but the type of change allowed will depend on whether or not the building has a natural gas or propane connection in place. (Having a gas line simply “capped off” still qualifies as connected.)

The table below is adapted from the Energy Commission’s “Water Heater Alterations Guide”:

https://www.energy.ca.gov/sites/default/files/2020-07/2019_Res_WaterHeater_Alterations_Guide.pdf

Is Natural Gas Connected to Existing Water Heater Location?	Allowed Prescriptive Installation	Energy Code Section Notes
Yes	Natural gas (tank or tankless)	150.2(b)1Hiiiia
	Propane (tank or tankless)	150.2(b)1Hiiiia
	Electric Heat Pump (tank)	150.2(b)1Hiiiib
	Electric Heat Pump (tank NEEA Tier 3 or higher)	150.2(b)1Hiiic
No	Consumer Electric Resistance (tank or tankless)	150.2(b)1Hiiid
	Any of the water heaters listed above	

Are Certificates of Compliance (CF1R forms) really required for a new water heater?

- Some enforcement agencies may, at their discretion, choose **not** to require compliance documents for Prescriptive Residential Alteration projects that do NOT require Home Energy Rating System (HERS) verification. Even so, exemptions from submitting compliance documentation shall not be deemed to grant authorization for any work to be done in any manner in violation of this code or other provisions of law. See §10-103(a)1C for more information.

Does a water-heater system replacement require Home Energy Rating System (HERS) verification?

- No, if the project is submitting via the Prescriptive Approach for a low-rise single-family home (using the CF1R-ALT-05-E), it will **not** trigger HERS measures.
- If it is submitting via the Prescriptive Approach for an Addition (CF1R-ADD) or the Performance Approach (CF1R-PRF) and any HERS measures are required for the scope of work, **all** forms must then be registered with a HERS provider.

What forms will the building inspector require?

- In addition to the CF1R-ALT-05-E submitted with the permit application, the inspector will look for the CF2R-ALT-05-E: Certificate of Installation for Prescriptive Alterations (Non-HERS), which is completed by the installing contractor.
- Also, for most projects, the inspector will check any water heater product labeling and the CF2R to confirm they meet the required values specified on the CF1R and verify pipe insulation has been installed as required.

Prescriptive or Performance

What do you mean by “Performance Approach” to compliance?

- The Performance Approach uses approved modeling software to “trade off” energy efficiency measures (so you can do “worse” than Prescriptive requirements for some things and “better” than Prescriptive for others, as long as the Mandatory requirements are met and the energy budget balances). This proof of energy budget balance is documented via the CF1R-PRF-01-E report. This may be considered if the project is unable to meet the Prescriptive requirements for a water heater changeout supported by this checklist.

Installing Additional Water Heaters Within an Existing Home

Can the permit applicant prescriptively install an additional water heater in the existing home?

- Requirements for adding another water heater vary based on what type of water heater is being added. A gas instantaneous meeting Mandatory minimum efficiency and installation requirements can always be added to an existing home. If any other water heating type(s) are desired, then a Performance report (CF1R-PRF-01-E) will need to be provided indicating it “complies.”

Confirming Water Heater Compliance with Federal and State Regulations

What resources can I direct permit applicants to in order to find out whether a particular make and model of water heater is compliant with Mandatory Federal and State Appliance Efficiency regulations?

- All appliances regulated under Title 20 must be certified to the California Energy Commission via its MAEDbS™ database (Modernized Appliance Efficiency Database System). The general public can access this database directly at: <https://cacertappliances.energy.ca.gov/>

Notes

- A** If the existing water heater has a natural gas or propane connection, then to comply prescriptively the replacement water heater must be natural gas or propane, or some equivalent water-heating system as determined by the Energy Commission (Section 150.2(b)1Hiie), such as a single electric heat pump tank water heater meeting efficiency and installation requirements specific to climate zone. See footnote C for more information on electric heat pump water heater requirements.
- B** If the newly installed tankless unit exceeds 6.8 kBtuh (2 kW), isolation valves and other fittings such as hose bibs are required for both the cold and hot water piping leaving the water heater.
- C** In Climate Zones 1-15, the Prescriptive Approach allows for one electric heat pump water heater meeting either of the following conditions:
- The unit is rated “NEEA Tier 3” or higher: The storage tank must not be located outdoors.
 - The unit is NOT rated “NEEA Tier 3” or higher: The storage tank must not be located outdoors and must be placed on a rigid surface insulated to a minimum of R-10. A demand response interface must also be provided per the requirements of Section 110.12(a).
- A “NEEA-rated” heat pump water heater is certified by the Northwest Energy Efficiency Alliance (NEEA) as a qualified product meeting specific Energy Code requirements. NEEA’s Qualified Products List for Heat Pump Water Heaters is available at: <https://neea.org/img/documents/HPWH-qualified-products-list.pdf>
- D** Replacing a consumer electric water heater (tank or tankless) with another of the same type is allowed prescriptively only if natural gas is NOT connected to the existing water heater location.
- E** Accessible existing piping in the locations listed, and any newly installed piping, must be insulated with a minimum wall thickness of not less than the diameter of the pipe for a pipe up to 2 inches (50 mm) in diameter. Insulation wall thickness shall be not less than 2 inches (51 mm) for a pipe of 2 inches (50 mm) or more in diameter.
- Exceptions (per CA 2019 Plumbing Code §609.11.2):
- Piping that penetrates framing members shall not be required to have pipe insulation for the distance of the framing penetration.
 - Hot water piping between the fixture control valve or supply stop and the fixture or appliance shall not be required to be insulated.
- F** “Domestic hot water” (DHW) is potable hot water that is consumed for domestic purposes including food preparation, cleaning and personal hygiene.

For More Information

The Energy Code (Title 24, Part 6 Energy Standards)

- Energy Code Section **150.2(b)1H** – Energy Efficiency Standards for Prescriptive Alterations to Existing Low-Rise Residential Buildings – **Water-Heating System**
energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/section1502energyefficiencystandardsforadditionsandalterationsto.htm
- Energy Code **Section 150.0(j)** – Low-Rise Mandatory Features and Devices – **Insulation for Piping and Tanks**
energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/section1500mandatoryfeaturesanddevices.htm
- Energy Code **Section 110.3** – **Mandatory Requirements** for Service Water-Heating Systems and Equipment
energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/section1103mandatoryrequirementsforservicewaterheatingsystemsand.htm
- Energy Code **Table 120.3-A** – Mandatory Requirements for **Pipe Insulation Thickness**
energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/section1203requirementsforpipeinsulation.htm#table1203apipeinsulationthickness.htm
- Energy Code Section **110.0(b)** – **Certification Requirements** for Manufactured Systems, Equipment, Appliances and Building Components
energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/section1100systemsandequipmentgeneral.htm
- Energy Code Section **110.1** – **Mandatory Requirements** for Appliances
energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/section1101mandatoryrequirementsforappliances.htm
- Title 20 Appliance Efficiency Regulations Section **1601(f)** – Scope – **Water Heaters**
energycodeace.com/site/custom/public/reference-ace-t20/Documents/section1601scope.htm#fwaterheatersincludingbutnotlimitedtohotwatersupplyboilers.htm

To Interpret the Energy Code

- Energy Code Ace **Fact Sheet: Residential Domestic Hot Water**
energycodeace.com/download/35088/file_path/fieldList/FactSheet.Res-DHW.2019
- Energy Code Ace **Application Guide: Residential HVAC and Plumbing** (see Chapter 5)
energycodeace.com/download/36880/file_path/fieldList/AppGuide.Res.%20HVAC_Plumbing.2019
- California Energy Commission **Water Heater Alterations Guide**
energy.ca.gov/sites/default/files/2020-07/2019_Res_WaterHeater_Alterations_Guide.pdf
- Title 24, Part 6 **Reference Appendix RA4 (RA4): Water Heating Measures** (see RA4.4)
energycodeace.com/site/custom/public/reference-ace-2019/Documents/ra44waterheatingmeasures.htm
- Energy Code **Residential Compliance Manual** (see Chapter 5, sections 5.3 and 5.4.1; and Table 9-7)
energycodeace.com/site/custom/public/reference-ace-2019/Documents/5waterheatingrequirements.htm
- California Energy Commission's **Appliance Efficiency Database** (MAEDbS™)
cacertappliances.energy.ca.gov/Login.aspx
- NEEA's Qualified Heat Pump Water Heater **Product List**
nea.org/img/documents/HPWH-qualified-products-list.pdf

Forms for Water-Heating System Alterations (Prescriptive Approach)

- **CF1R-ALT-05-E: Certificate of Compliance** for Prescriptive Residential Alterations (Non-HERS)
energycodeace.com/download/39471/file_path/fieldList/2019-CF1R-ALT-05-E-PrescriptiveAlterations-SimpleNonHERS-PaperVersion.pdf
- **CF2R-ALT-05-E: Certificate of Installation** for Prescriptive Residential Alterations (Non-HERS)
energycodeace.com/download/39478/file_path/fieldList/2019-CF2R-ALT-05-E-PrescriptiveAlterations-SimpleNonHERS-PaperVersion.pdf



This program is funded by California utility customers and administered by Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E®), Southern California Edison Company (SCE), and Southern California Gas Company (SoCalGas®) under the auspices of the California Public Utilities Commission.

© 2021 PG&E, SDG&E, SoCalGas and SCE. All rights reserved, except that this document may be used, copied, and distributed without modification. Neither PG&E, SoCalGas, SDG&E, nor SCE — nor any of their employees makes any warranty, express or implied; or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any data, information, method, product, policy or process disclosed in this document; or represents that its use will not infringe any privately-owned rights including, but not limited to patents, trademarks or copyrights. Images used in this document are intended for illustrative purposes only. Any reference or appearance herein to any specific commercial products, processes or services by trade name, trademark, manufacturer or otherwise does not constitute or imply its endorsement, recommendation or favoring.

