



**COMMUNITY DEVELOPMENT DEPT.**

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 1/1/17

**Residential Water Heater Alteration or Replacement Requirement**  
**Per the 2016 California Energy Code (CEC)**

The 2016 CEC now mandates the submittal of a CF-1R-ALT Form for all water heater alterations or replacement permit applications for verification of energy efficiency. The following information is based on the prescriptive approach established in the 2016 CEC. The minimum standards established in the 2016 CEC are as follows.

**Table 5-4: Minimum Federal Energy Factory Requirements for Residential Water Heaters (Effective April 16, 2015)**

PRODUCT CLASS	RATED STORAGE VOLUME	ENERGY FACTOR
Gas-fired Water Heater	≥ 20 gal and ≤ 55 gal	0.675 - (0.0015*V <sub>s</sub> )
	> 55 gal and ≤ 100 gal	0.8012 - (0.00078*V <sub>s</sub> )
Oil-fired Water Heater	≤ 50 gal	0.68 - (0.0019*V <sub>s</sub> )
Electric Water Heater	≥ 20 gal and ≤ 55 gal	0.960 - (0.0003*V <sub>s</sub> )
	> 55 gal and ≤ 120 gal	2.057 - (0.00113*V <sub>s</sub> )
Tabletop Water Heater	≥ 20 gal and ≤ 100 gal	0.93 - (0.00132*V <sub>s</sub> )
Instantaneous Gas-fired Water Heater	< 2 gal	0.82 - (0.0019*V <sub>s</sub> )
Instantaneous Electric Water Heater	< 2 gal	0.93 - (0.00132*V <sub>s</sub> )
Grid-Enabled Water Heaters	>75 gal	1.061 - (0.00168*V <sub>s</sub> )

**V<sub>s</sub>**: Rated Storage Volume – the water storage capacity of a water heater (in gallons).

**Source:** U.S. Department of Energy

[http://www1.eere.energy.gov/buildings/appliance\\_standards/product.aspx/productid/27](http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/27)

Storage water heating equipment that have rated storage volumes of 19 gallons or less or rated storage volumes larger than 101 gallons (in other words, the products not specified in Table 5-4 above), and commercial water heaters are regulated by the *California Appliance Efficiency Regulations*. Energy factor is not applicable for this equipment, but rather minimums are specified for thermal efficiency and standby loss, as shown in Table 5-5 below.

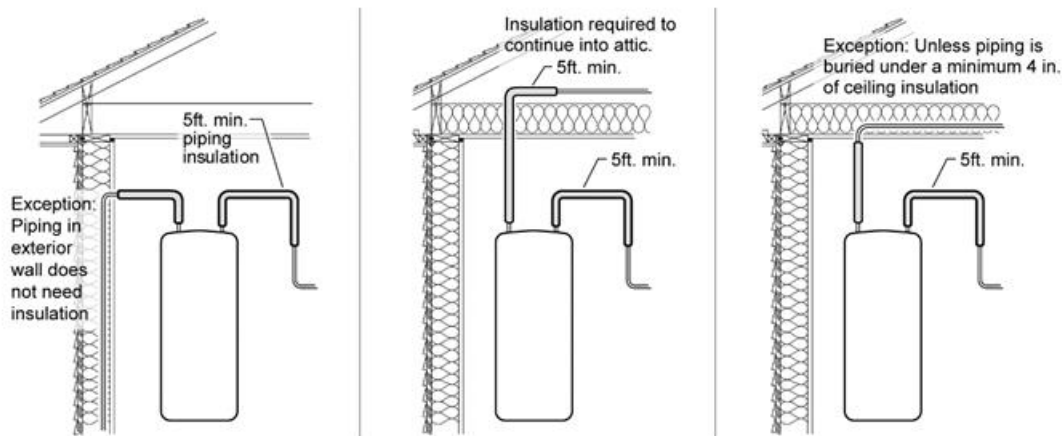
Example: A 40-Gallon Water Heater would require a minimum energy efficiency factor of:

$$0.67 - (.001 \times 40) = 59$$

$$0. \underline{\hspace{1cm}} - (0. \underline{\hspace{1cm}} \times \underline{\hspace{1cm}}) = \underline{\hspace{1cm}}$$

1. Water Heaters (generating a glow, spark, or flame capable of igniting flammable vapors) shall be installed 18" above garage floor.
2. Water Heater in garage shall be protected with bollard as a method of protection from vehicle impact.
3. Seismic Anchorage of Water Heater shall include anchors or straps at points within the upper and lower one-third of its vertical dimension, the lower anchor/strap located to maintain a minimum distance of 4 inches above the controls.
4. All Water Heaters shall have a pressure relief valve with drain to outside of building.
5. Minimum 24-inch wide door to Water Heater compartment is required.

**Figure 5-4: Pipe Insulation Requirements First Five Feet From Water Heater**



**Figure 5-7: Pipe Insulation Thickness Requirement  
(Excerpt From Table 120.3-A of the Energy Standards)**

Fluid Temperature Range (°F)	Conductivity Range (in Btu-inch per hour per square foot per °F)	Insulation Mean Rating Temperature (°F)	Nominal Pipe Diameter (in inches)				
			< 1	1 to <1.5	1.5 to <4	4 to <8	8 and larger
			Insulation Thickness Required (in inches)				
Above 350	0.32-0.34	250	4.5	5	5	5	5
251-350	0.29-0.32	200	3	4	4.5	4.5	4.5
201-250	0.27-0.30	150	2.5	2.5	2.5	3	3
141-200	0.25-0.29	125	1.5	1.5	2	2	2
105-140	0.22-0.28	100	1	1.5	1.5	1.5	1.5

Where insulation is required as described above, 1 inch of insulation is typically required. This requirement applies to domestic water pipe (above 105°F) when the pipe diameter is 1 inch or smaller, the water temperature is between 105°F and 140°F, and the insulation conductivity between 0.22 and 0.28 BTU-in/hr-ft<sup>2</sup>-°F (typical of cellular foam pipe insulation material). One and one-half inch insulation is required on pipes greater than 1 inch. For other situations refer to Table 120.3-A.

**For questions on the California Energy Code,  
please contact the California Energy Commission Hotline at (800) 772-3300  
or visit online at [www.energy.ca.gov/title24](http://www.energy.ca.gov/title24)**



California Energy Commission  
2016 Building Energy Efficiency Standards  
Minimum Water Heater Energy Factor

**Gas-fired**

Volume (gallons)	Federal Minimum Energy Factor
30	0.63
35	0.62
40	0.62
45	0.61
50	0.60
55	0.59
60	0.75

**Instantaneous Gas-fired**

Volume (gallons)	Federal Minimum Energy Factor
< 2	0.82

**Electric**

Volume (gallons)	Federal Minimum Energy Factor
30	0.95
35	0.95
40	0.95
45	0.95
50	0.95
55	0.94
60	1.99

**Instantaneous Electric**

Volume (gallons)	Federal Minimum Energy Factor
< 2	0.93

**Tabletop**

Volume (gallons)	Federal Minimum Energy Factor
30	0.89
35	0.88
40	0.88
45	0.87
50	0.86
55	0.86
60	0.85

**Oil-fired**

Volume (gallons)	Federal Minimum Energy Factor
30	0.62
35	0.61
40	0.60
45	0.59
50	0.59
55	0.58
60	0.57





**CERTIFICATE OF COMPLIANCE**

CF1R-ALT-05-E

**Prescriptive Residential Alterations That Do Not Require HERS Field Verification**

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Project Name: \_\_\_\_\_ Date Prepared: \_\_\_\_\_

**DOCUMENTATION AUTHOR'S DECLARATION STATEMENT**

1. I certify that this Certificate of Compliance documentation is accurate and complete.	
Documentation Author Name:	Documentation Author Signature:
Company:	Signature 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:

- The information provided on this Certificate of Compliance is true and correct.
- 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).
- 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.
- 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.
- 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 Designer Name:	Responsible Designer Signature:
Company:	Date Signed:
Address:	License:
City/State/Zip:	Phone:

**For assistance or questions regarding the Energy Standards, contact the Energy Hotline at: 1-800-772-3300.**