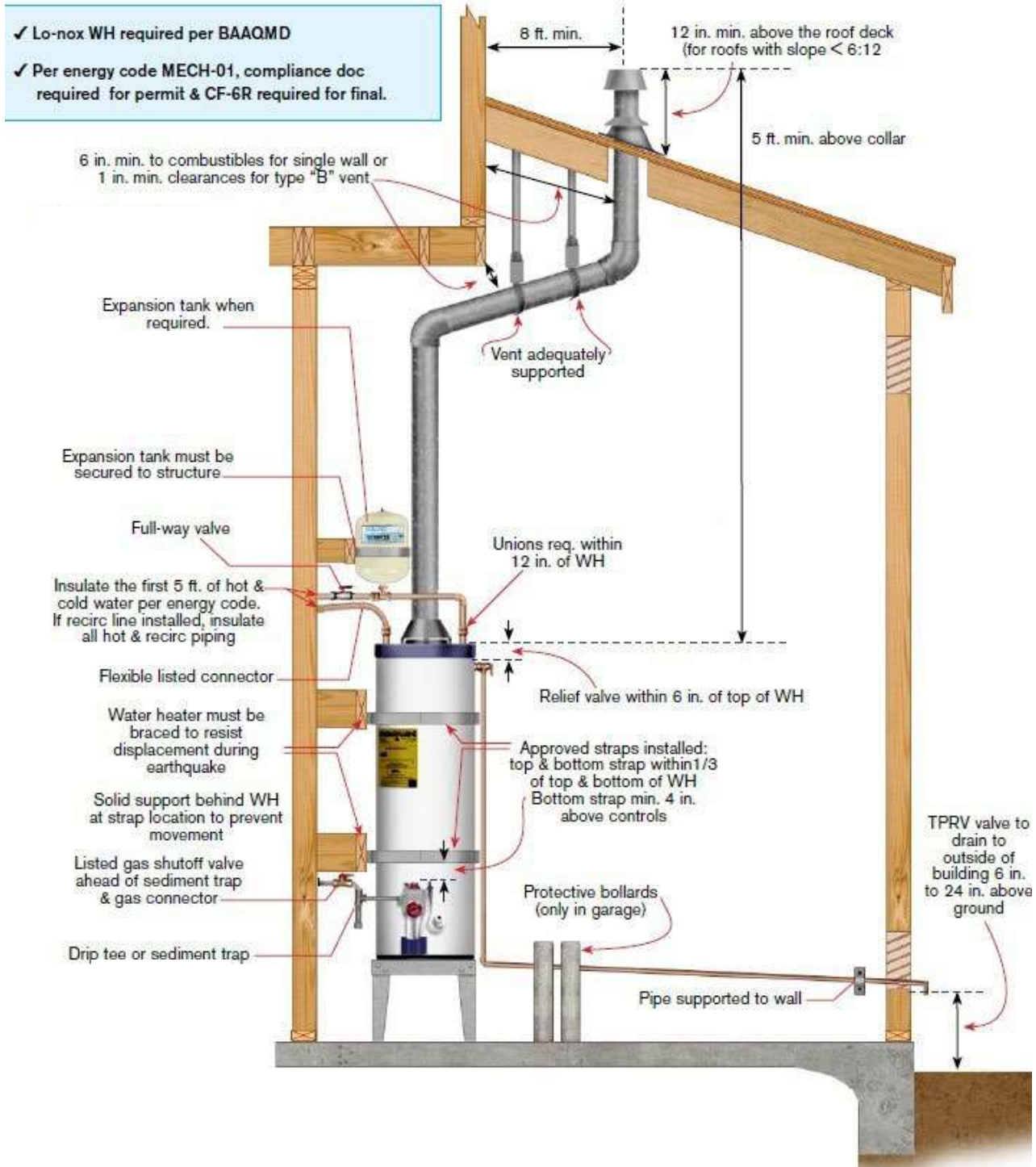




## Natural Gas/LPG Water Heater

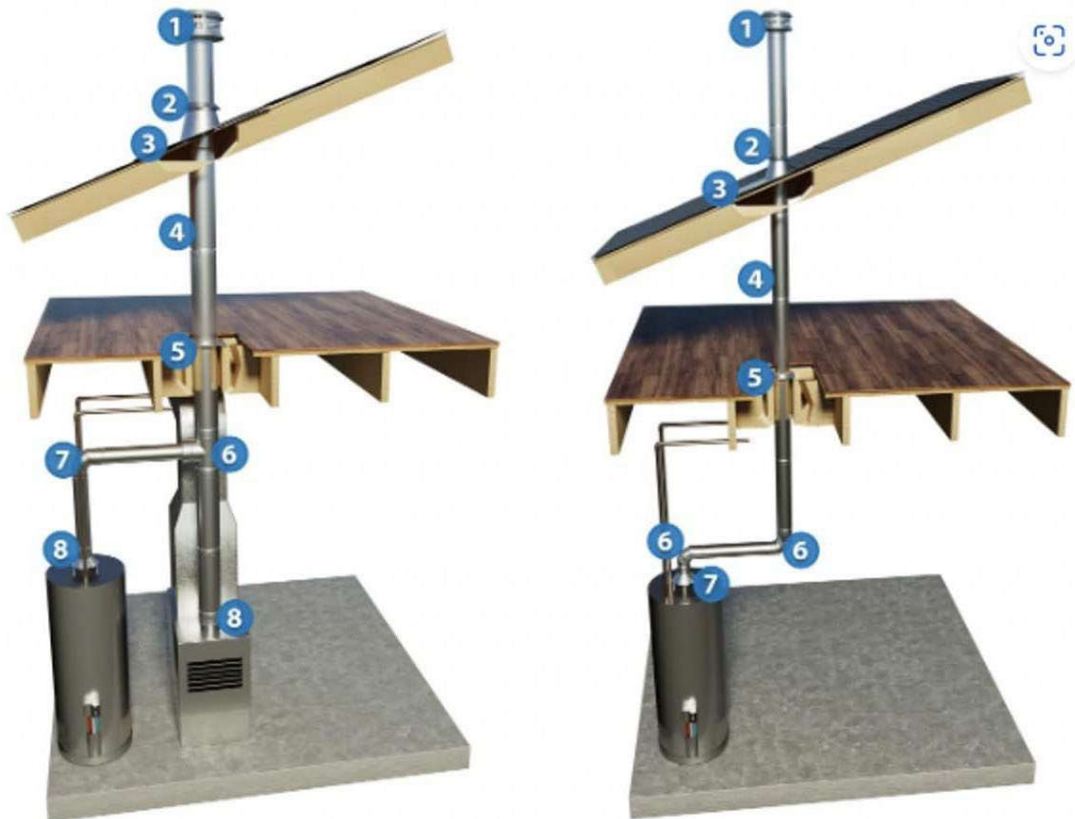
A permit is required to install, remove, replace, raise, lower, or relocate a water heater. Following is a list of the general requirements based on the 2022 California Electrical Code (CEC), California Energy Code (CEC), California Mechanical Code (CMC), and California Plumbing Code (CPC).



## PLAN REVIEW REQUIREMENTS

1. Floor plans are required for following:
  - A. New installation or Re-location.
  - B. Conversions – from gas to electric, electric to gas, from tank to tankless, and tankless to tank.
2. Submit following plans for review:
  - A. Cover Sheet – provide project address, floor plans with labeled areas, # of bedrooms and bathroom, water heater manufacturer information, model #, and BTU.
  - B. Existing and Proposed Plans – clearly show and note existing and proposed water heater type and location(s).
  - C. Plans and Details for # of combustion air openings, dimensions, and locations.
  - D. Plans and Details for gas vent types/materials, length, and termination location.
  - E. Garage Installation – water heater must be protected by two (2) protective bollards that meets or exceeds the general requirements in [IB-30 Residential Bollard Protection](#).
  - F. Gas Plans – any alteration to gas pipe system, provide gas pipe plans per [IB-26 Gas Line and Piping](#).

## EXAMPLE DIAGRAM OF VERTICAL INSTALLATION



1. Termination Cap
2. Storm Collar
3. Roof Flashing
4. Pipe Length
5. Firestop Spacer
6. Reducing Tee
7. 90 Degree Elbow
8. Draft Hood Connector

1. Termination Cap
2. Storm Collar
3. Roof Flashing
4. Pipe Length
5. Firestop Spacer
6. 90 Degree Elbow
7. Draft Hood Connector



## **ENERGY CODE REQUIREMENTS**

**[CEnC 150.0(n)]** System using gas or propane water heaters to serve individual dwelling units shall designate a space at least 2.5 feet by 2.5 feet wide and 7 feet tall suitable for the future installation of a heat pump water heater (HPWH) by meeting either A or B below. All electrical components shall be installed in accordance with the CEC:

- A. If the designated space is within 3 feet from the water heater, then this space shall include the following:
  - i. A dedicated 125-volt, 20 amp electrical receptacle that is connected to the electric panel with a 120/240-volt 3 conductor, 10 AWG copper branch circuit, within 3 feet from the water heater and accessible to the water heater with no obstructions; and
  - ii. Both ends of the unused conductor shall be labeled with the word “spare” and be electrically isolated; and
  - iii. A reserved single pole circuit breaker space in the electrical panel adjacent to the circuit breaker for the branch circuit in A.i above and labeled with the word “Future 240V use”; and
  - iv. A condensate drain that is no more than 2 inches higher than the base of the installed water heater and allows natural draining without pump assistance.
- B. If the designated space is more than 3 feet from the water heater, then this space shall include the following:
  - i. 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
  - ii. 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
  - iii. 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
  - iv. 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
  - v. The hot and cold-water piping at the designated HPWH location shall be exposed and readily accessible for future installation of an HPWH; and
  - vi. A condensate drain that is no more than 2 inches higher than the base of the installed water heater and allows natural draining without pump assistance.

**[CEnC 110.3(c)6]** Instantaneous water heaters with an input rating greater than 6.8 KBTU/hr shall have isolation valves on both the cold-water supply and the hot-water pipe leaving the water heater, and hose bibbs or other fittings on each valve for flushing the water heater when the valves are closed.



## **PLUMBING CODE REQUIREMENTS**

- 1) The minimum capacity for a storage water heater shall be in accordance with the first-hour rating listed in Table 501.1(2) below.

**Table 501.1(2) First Hour Rating<sup>1</sup>**

Number of Bathrooms	1 to 1.5			2 to 2.5				3 to 3.5			
Number of Bedrooms	1	2	3	2	3	4	5	3	4	5	6
First Hour Rating, <sup>2</sup> Gallons	38	49	49	49	62	62	74	62	74	74	74

Notes:

1. The first-hour rating is found on the “Energy Guide” label.
2. Solar water heaters shall be sized to meet the appropriate first-hour rating as shown in the table.

- 2) **Ground Support [CPC 507.4]** – A water heater supported from the earth shall rest on level concrete or other approved base extending not less than 3 inches above the adjoining ground level.
- 3) **Drainage Pan [CPC 507.5]** - where a water heater is located in an attic, in or on attic ceiling assembly, floor-ceiling assembly, or floor-subfloor assembly where damage may result from a leaking water heater, a watertight pan of corrosion-resistant materials shall be installed beneath the water heater with not less than ¾ of an inch diameter drain to an approved location. Such pan shall be not less than 1-1/2 inches in depth.
- 4) **Installation in Residential Garages [CPC 507.13]** – Appliances in residential garages and in adjacent spaces that open to the garage and are not part of the living space of a dwelling unit shall be installed so that all burners and burner-ignition devices are located not less than 18 inches above the floor unless listed as Flammable Vapor Ignition Resistant. [NFPA 54:9.1.10.1]
  - **CPC 507.13.1 Physical Damage.** Appliances installed in garages, warehouses, or other areas subject to mechanical damage shall be guarded against such damage by being installed behind protective barriers or by being elevated or located out of the normal path of vehicles. Review **IB-30 Bollards** for protective bollards.
  - **CPC 507.13.2 Access from the Outside.** Where appliances are installed in a separate, enclosed space having access only from outside of the garage, such appliances shall be permitted to be installed at floor level, providing the required combustion air is taken from the exterior of the garage. [NFPA 54:9.1.10.3].
- 5) **Protection of Outdoor Appliances [CPC 507.25]** - Appliances not listed for outdoor installation but installed outdoors shall be provided with protection to the degree that the environment requires. Appliances listed for outdoor installation shall be permitted to be installed without protection in accordance with the provisions of its listing and the manufacturer’s installation instructions.
- 6) **Expansion Tanks, and Combination Temperature and Pressure-Relief Valves [CPC 608.3]** - A water system provided with a check valve, backflow preventer, or other normally closed device that prevents dissipation of building pressure back into the water main, independent of the type of water heater used, shall be provided with an approved, listed, and adequately sized expansion tank or other approved device having a similar function to control thermal expansion. Pre-pressurized water expansion tanks shall comply with IAPMO Z1088. Such expansion tank or other approved device shall be installed on the building side of the check valve, backflow preventer, or other device and shall be sized and installed in accordance with the manufacturer’s installation instructions.



7) **Air for Combustion and Ventilation [CPC 506]** – Combustion air shall be supplied according to the total input rating of all appliances in the enclosure (see below for details).

Air Sources	Reference Figure	# of Openings	Opening Locations		Duct Type	Free Area Requirements (SI = square inches)
			Top	Bottom		
Indoor	506.3	2	within 12"	within 12"	--	- 1 in per 1,000 Btu/h but not less than 100 SI. - Min. Dimension of opening = 3"
Outdoor	506.4.1(1) 506.4.1(2)	2	within 12"	within 12"	vertical	- 1 in per 4,000 Btu/h
	506.4.1(3)	2	within 12"	within 12"	Horizontal	- 1 in per 2,000 Btu/h
	506.4.2	1*	within 12"	--	vertical or horizontal	- 1 in per 3,000 Btu/h - Not less than the sum of the areas of all vent connectors in the space

\* - the appliance shall have clearances of at least 1" from the sides and back and 6" from the front of the appliance.

8) **Gas Vent Termination [CPC 509.6.1]**

- Gas vents that are 12 inches or less in size and located not less than 8 feet from a vertical wall or similar obstruction shall terminate above the roof.
- A Type B or a Type L gas vent shall terminate at least 5 feet in vertical height above the highest connected appliance draft hood or flue collar.
- A Type B-W gas vent shall terminate at least 12 feet in vertical height above the bottom of the wall furnace.
- A gas vent extending through an exterior wall shall not terminate adjacent to the wall or below eaves or parapets.
- Decorative shrouds shall not be installed at the termination of gas vents except where such shrouds are listed for use with the specific gas venting system and are installed in accordance with the manufacturer's installation instructions.
- All gas vents shall extend through the roof flashing, roof jack, or roof thimble and terminate with a listed termination cap or listed roof jack assembly.
- A gas vent shall terminate at least 3 feet above a forced air inlet located within 10 feet.

9) **Gas Vent Connectors**

<p><b>Residential-Type Appliances [509.10.1.2]</b> Vent connectors for residential-type appliances shall comply with the following and shall not be covered with insulation. Vent connectors for listed appliances having draft hoods, appliances having draft hoods and equipped with listed conversion burners, and Category I appliances that are not installed in attics, crawl spaces, or other unconditioned areas shall be one of the following:</p> <ul style="list-style-type: none"> <li>(a) Type B or Type L vent materials.</li> <li>(b) Galvanized sheet steel not less than 0.018" thick.</li> <li>(c) Aluminum alloy or equivalent sheet not less than 0.027" thick.</li> <li>(d) Stainless steel sheet not less than 0.012" thick.</li> </ul> <p>(e) Smooth interior wall metal pipe having resistance to heat and corrosion equal to or greater than (a)-(d) listed above.</p>
<p><b>Size of Vent Connector [509.10.2]</b> A vent connector for an appliance with a single draft hood or for a Category I fan-assisted combustion system appliance shall be sized and installed in accordance with Section 510.0 or other approved engineering methods.</p>

**Single Wall Connector [509.10.7.1].** The maximum horizontal length of a single-wall connector shall be 75% of the height of the chimney or vent, except for engineered systems [NFPA 54:12.11.8.1].

**Type B Double Wall Connector [509.10.7.2].** The maximum horizontal length of a Type B double-wall connector shall be 100% of the height of the chimney or vent, except for engineered systems. The maximum length of an individual connector for a chimney or vent system serving multiple appliances, from the appliance outlet to the junction with the common vent or another connector, shall be 100% of the height of the chimney or vent. [NFPA 54:12.11.8.2]

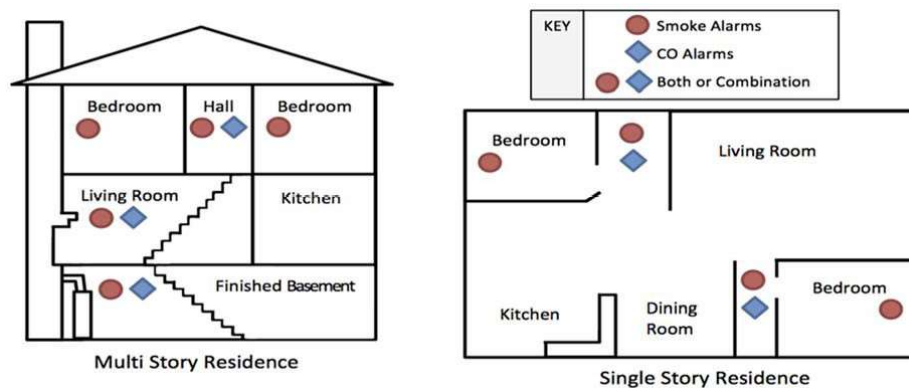
**Vent Connector Maximum Length [510.2.1].** The maximum vent connector horizontal length shall be 18" /" of connector diameter as shown in Table below.

Connector Diameter (inches)	Maximum Connector Horizontal Length (feet)
3	4.5
4	6
5	7.5
6	9
7	10.5
8	12
9	13.5
10	15
12	18

**509.10.5 Joints.** Joints between sections of connector piping and connections to flue collar or draft hood outlets shall be fastened in accordance with one of the following methods:

- (1) Sheet metal screws.
- (2) Vent connectors of listed vent materials assembled and connected to flue collars or draft hood outlets in accordance with the manufacturer’s instructions.
- (3) Other approved means.

**MANDATORY REQUIREMENTS FOR SMOKE DETECTORS (SD) AND CARBON MONOXIDE (CO) ALARMS**



Required Areas for Project Exceeding \$1,000	Smoke Detectors [CRC 314]	CO Alarms* [CRC 315]
In each sleeping room	Yes	
Outside of each sleeping room	Yes	Yes
On every level including basements	Yes	Yes

\*CO alarm not required if there are no fuel burning appliances and no attached garages.



### **High Efficiency Water Heaters**

- All high efficiency water heaters and associated PVC or ABS vents shall be installed in accordance with the manufacturer's installation instructions.

### **Electric Water Heaters**

- All electric water heaters shall be installed in accordance with the manufacturer's installation instructions, California Plumbing Code, California Electric Code, and California Energy Code.

### **INSPECTION**

A minimum of one of the following inspections are required for water heaters as needed based on scope of work:

- **Optional:** A rough framing, plumbing, mechanical, and electrical inspection should be scheduled after the framing is ready to cover, plumbing installed and under pressure or leak test, mechanical installed and vented to exterior of building, electrical wiring and boxes are installed but before any devices are connected. (*if installing new, relocation, or change of energy source*).
- **Optional:** Fire wall/gypsum board (*if framing has been opened or in fire rated assemblies*).
- **Required:** The final inspection should be scheduled after all the work is completed and smoke/carbon monoxide alarms have been installed/verified per IB-18.

The following required at the job site for the inspector:

1. Stamped set of approved plans; and
2. Manufacture specifications and installation instructions.

A re-inspection fee may be assessed if access to the inspection is not provided, the job is not ready for the inspection, or when required corrections have not been made.