



WATER HEATER (RESIDENTIAL)

1. PERMIT INFORMATION

- ☐ The installation or replacement of a water heater requires a plumbing permit [CPC 502.1].
 - If new electrical circuits or outlets are required to supply the water heater with power, an electrical permit will also be required.
- ☐ A Building Permit may be issued only to the Building Owner or their Authorized Agent [CRC 105.1].
 - See also [Authorized Agent Sample Letter](#).
 - Where the Contractor is acting as the Owner's Authorized Agent, they must be a State of California Licensed Contractor with the proper license classification.
- ☐ If the work is performed by the Building Owner personally or by his/her workers and an inspection indicates the work cannot be completed satisfactorily, then a licensed contractor must perform the work.
- ☐ If the Building Owner hires workers, State Law requires the Building Owner to obtain Worker's Compensation Insurance. Proof of this insurance is required prior to inspection.

2. INSTALLATION REQUIREMENTS

- ☐ **Codes.** All work must comply with the California Plumbing Code (CPC), California Electric Code (CEC), California Energy Code (CEnC), the Milpitas Municipal Code (MMC), and other adopted codes as applicable.
 - This document contains informational references to various California codes and the Milpitas Municipal Code, based on the 2022 and 2023 editions of those documents, respectively. For additional, or more specific, information and exceptions, please refer to the codes and standards specific to your project.
- ☐ All pipe, pipe fittings, traps, fixtures, material, and devices used in a plumbing system shall be listed or labeled by an approved listing agency. [CPC 301.2]
- ☐ Listed water heaters shall be installed in accordance with their listings and the manufacturer's instructions [CPC 501.1].
- ☐ **Water Heating Systems.**
 - **Replacement Appliance.** When replacing an existing water heater, the type of the new appliance is limited by the type of the old appliance. If the existing appliance is an electric resistance water heater, it may be replaced with a consumer electric or heat pump water heater. If not, it may be replaced with a natural gas, propane, or heat pump water heater. Alternatively, equivalent systems may be selected using the performance approach in the *California Energy Code*. [CEnC 150.2(b)1.H.iii]
 - **Heat Pumps.** Must be single heat pump water heaters with either (1) storage tank located indoors on a rigid, incompressible surface insulated to R-10 or higher, with a communications interface meeting the CEnC requirements for demand responsive controls or an ANSI/CTA-2045-B communication port, or (2) meet the requirements of NEEA Advanced Water Heater Specification Tier 3 or higher.
 - **Additions.** When a second water heater is installed as part of an addition, it may be a heat pump water heater meeting the requirements for *Heat Pumps* above, a gas or propane instantaneous water heater (200k Btu/h max), an instantaneous electric water heater (500 ft² additions max.), or an equivalent system selected using the performance approach in the *California Energy Code*. [CEnC 150.2(a)1.D]

❑ Location.

- **Bedrooms and Bathrooms.** Water heaters may be installed in bedrooms or bathrooms provided they are either (1) of the direct vent type or (2) are installed in a closet used for no other purpose having a listed, gasketed, self-closing door, with a threshold and bottom door seal, and pull their combustion air from the outdoors [CMC 504.1].
- **Garages.** Appliances in residential garages, and spaces that open to the garage that are not part of the living space, 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 [CPC 507.13].
 - **Physical Damage.** Appliances installed in garages shall be guarded against damage with barriers, through elevation, or by being located outside the normal path of vehicles [CPC 507.13.1].
 - **Access from the Outside.** Appliances in separate, enclosed spaces not accessible from the garage may be installed at floor level, provided the required combustion air is not taken from the garage [CPC 507.13.2].
- **Roof, Attic, and Under-Floor.** Water heaters installed in these locations must comply with the relevant portions of CPC 508.
- **Accessibility for Service.** Water heaters shall be located with respect to building construction and other equipment so as to permit access to the appliance. Clearance must be maintained sufficient to permit cleaning of heating surfaces, replacement of filters and other components, and the adjustment and cleaning of burners and pilots. In attics, the passageway and servicing area adjacent to the appliance shall be floored. [CPC 507.26]

❑ Installation.

- **Instruction Manual.** Installer shall leave the manufacturer's installation, operating, and maintenance instructions in a location on the premises where they are readily available for reference and guidance to the inspector, service personnel, and the owner or operator. [CPC 507.24]
- **Clearances.** Listed water heaters shall have clearances in accordance with their listing and the manufacturer's installation instructions, and as necessary to prevent interference with combustion air, draft hood clearance and relief, and accessibility for servicing. Unlisted water heaters require 12 inches of clearance on all sides and rear, and combustible floors underneath must be protected in an approved manner. [CPC 504.3]
- **Seismic Restraints.** Water heaters shall be anchored or strapped to resist horizontal displacement due to earthquake motion. Straps shall be at points within the upper one-third and lower one-third of the vertical dimensions. The lower strap must be held a minimum of 4 inches above the controls. [CPC 507.2]
- **Support.** Water heaters shall be furnished either with load distributing bases or with a sufficient number of supports to prevent damage to either the building structure or the appliance, and in a manner so as not to exert undue stress on the connections [CPC 507.3 – 507.3.1].
 - **Ground Support.** A water heater supported from the ground shall rest on level concrete or other approved base extending not less than 3 inches above the adjoining ground level [CPC 507.4].
- **Drainage Pan.** Where a water heater is located such that damage would result from a leaking water heater, a 1 ½" deep watertight drainage pan shall be required beneath the water heater. The pan must have not less than a ¾" diameter drain to an approved location. [CPC 507.5]
- **Air for Combustion and Ventilation.** Shall be calculated by one of the methods in CPC 506.
- **Vent.** Venting of water heater appliance shall be per manufacturer's installation instructions or, when required, per CPC 509.
 - **Plastic Piping.** Plastic piping may only be used to vent an appliance where that appliance is listed for use with plastic vent piping. The manufacturer's installation instructions must identify the specific plastic piping material, which shall be labelled in accordance with the product standards specified by the appliance manufacturer or shall be listed and labelled in accordance with UL 1738. [CPC 509.4.1]

❑ Pressure and Temperature Control.

- **Pressure Relief Valve.** Water heaters shall be provided with overpressure protection using an approved, listed device installed in accordance with the terms of its listing and the manufacturer's instructions [CPC 504.4].

- **Temperature-Limiting Devices.** Water heaters shall be provided with overtemperature protection by means of an approved, listed device installed in accordance with the terms of its listing and the manufacturer's installation instructions [CPC 504.5].
- **Discharge Piping.** The discharge piping serving a pressure or temperature relief valve, or combination of both, shall have no valves, obstructions, or means of isolation [CPC 608.5].
 - **Installation.** The piping shall discharge independently by gravity through an air gap into the drainage system or outside of the building with the end of the pipe not exceeding 2 feet and not less than 5 inches above the ground and pointing downwards.
 - **Readily Observable.** The discharge termination point shall be readily observable.
 - **No Pans.** Discharge from a relief valve into a water heater pan is prohibited.

□ Gas.

- **Sizing.** It is the responsibility of the installer to verify that the new or existing gas supply is correctly sized before installation. Refer to the separate handout [Natural Gas Piping](#) for additional information.
- **Pressure Regulator.** Where the gas supply pressure is higher than that at which the appliance is designed to operate or varies beyond the design pressure limits of the appliance, a gas appliance pressure regulator shall be installed [CPC 507.20]. Venting of pressure regulators shall comply with CPC 507.21.
- **Gas Shut-Off Device.** An approved Seismic Gas Shut-off Device (motion sensitive) *or* an approved Excess Flow Gas Shut-off Device (non-motion sensitive) shall be installed downstream of the gas utility meter (after PG&E service tee), but upstream of any appliances, when altering or adding to the existing gas system per MMC Chapter 170. These devices shall be sized and installed per the manufacturer's installation instructions.
- **Electrical Bonding and Grounding.**
 - **Non-CSST.** Each aboveground portions of a gas piping system, other than CSST, that are likely to become energized shall be electrically continuous and bonded to an effective ground-fault current path [CPC 1211.1].
 - **CSST.** Gas piping systems of CSST or containing segments of CSST, shall be electrically continuous and bonded to the electrical service grounding electrode system or, where provided, lighting protection grounded electrode system. The bonding jumper shall not be smaller than 6 AWG and shall connect to a metallic pipe, CSST fitting, or CSST fitting. [CPC 1211.2]
- **Connection.** Gas connection from building piping to appliance shall comply with a method as outlined per CPC 1212. Listed flexible gas connectors in compliance with CSA Z21.24, shall be used in accordance with the manufacturer's installation instructions and shall be in the same room as the appliance.
- **Sediment Trap.** Where a sediment trap is not incorporated as a part of the water heater, a sediment trap shall be installed downstream of the appliance shutoff valve as close to the inlet of the appliance as practical at the time of appliance installation. The sediment trap shall be either a tee fitting with a capped nipple in the bottom outlet, or another device recognized as an effective sediment trap. [CPC 1212.9]

□ Supply Water.

- **Water Pressure Regulator.** Where the water pressure is in excess of 80 psi, provide an approved-type water pressure regulator preceded by an adequate strainer after the building system shut off valve to reduce the static pressure to 80 psi. The regulator and strainer shall be accessible, protected from freezing, and shall have the strainer readily accessible for cleaning without removing the regulator or strainer body or disconnecting the supply piping. [CPC 608.2]
- **Expansion Tank.** When a water pressure regulator is required or the water system is provided with a non-bypass type of water meter, check valve, backflow preventer, or other normally closed device that prevents water system pressure dissipation back into the water main, an approved, adequately sized expansion tank shall be installed near the water heater per manufacturer's installation instructions to control thermal expansion. [CPC 608.2, 608.3]
- **Vacuum Relief.** Where the water heater storage tank is located at an elevation above the fixture outlets in the hot-water system, a vacuum relief valve that complies with CSA Z21.22 shall be installed on the storage tank [CPC 608.7].

☐ **Insulation.**

- **Hot Water Piping.** Shall be insulated [CPC 609.12.1]
- **Thickness.** Insulation wall thickness shall be at least the diameter of the pipe but need not exceed 2 inches [CPC 609.12.2].

☐ **Electrical.**

- **Circuits.** Circuits for storage-type water heaters that have a capacity of 120 gal or less shall be sized not smaller than 125% of the rating of the water heater [CEC 424.13].
- **Disconnect.** Electric water heaters shall be provided with a means to simultaneously disconnect the appliance from all ungrounded conductors. For appliances rated 20-amps or less and 150v or less, a factory installed attachment plug is permitted to serve as the disconnecting means. [CEC 427.55].
- **Service Outlet.** A 125v, 15- or 20-amp receptacle outlet must be installed at an accessible location in the same room within 25 feet of the water heater [CEC 210.63].

☐ **Tankless.**

- **Retrofit.** When replacing an existing gas storage tank type water heater with a gas-fueled tankless water heater, the existing piping, combustion air, and ventilation shall be checked to determine whether it is adequate for the new appliance.

3. ADDITIONAL REQUIREMENTS

- ☐ **Smoke/Carbon Monoxide Alarms and Spark Arrestor Inspection.** In all one- and two-family residences, installation and inspection of required smoke alarms, carbon monoxide alarms, and spark arresters must be completed prior to the final inspection. Refer to the [Smoke Alarm, Carbon Monoxide Alarm, and Spark Arrestor Certificate](#) handout for detailed information.
- ☐ **Water Conserving Fixture Inspection.** All one- and two- family residences must have replaced all non-compliant plumbing fixtures with water-conserving plumbing fixtures and verification of this is required as a condition of final approval of any permit [CA Civ Code § 1101]. Refer to the [Water Conserving Certificate of Compliance](#) handout for details and exceptions.

4. INSPECTIONS

- ☐ Typically, only a single inspection is required for water heaters, but additional inspections may be required if work is required above ceilings, in-walls, or in other concealed spaces.
 - **Rough Plumbing.** If work is required on chimneys, vents, or similar components and the work will be covered or concealed, then a rough inspection must be performed after work on these components has been completed and before anything has been covered or concealed [CPC 503.1].
 - **Final.** A final inspection is conducted after all work has been completed [CPC 503.2].
 - **Instruction Manual.** The instruction manual for the appliance is to be left on-site, readily accessible for use during the inspection [CPC 507.24].
 - Inspection of smoke alarms, carbon monoxide detectors, and water conserving fixtures may be performed during the final inspection, or certificates stating compliance may be provided to the inspector (see *Additional Requirements* above).

5. QUESTIONS

- ☐ If you have any questions regarding your project, contact the Office of Building Safety at (408) 586-3240.