



Residential Water Heater

This information is intended to provide general guidance on the installation of tank type gas water heaters in single family residences. This information is intended to provide general guidance on the installation of gas water heaters in single family residences. It summarizes information contained in the California Plumbing Code (CPC) and the Building Code, but does not replace it. Manufacturer's installation instructions are an integral part of the installation requirements and shall be followed accordingly. If conditions are encountered that are not covered herein, the codes shall be consulted. Copies of the code can be reviewed in many libraries or at your local Building Division.

General Requirements

- Provide the manufacturer's installation, operating, and maintenance instructions. [CPC 507.24]
- Maintain clearances as specified in the manufacturer's installation specification and listing. [CPC 504.3.1]
- Water heaters in garages and in adjacent spaces that open to a garage 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 (FVIR). Water heaters shall be located or protected so that they are not subject to physical damage by a moving vehicle. Note that electric water heaters with a switch and/or heating element located less than 18" above the base must also be elevated.
- Water heaters must be seismically strapped and braced. Provide two 1½" X 18-gauge straps in the upper and lower 1/3 of the water heater. Locate the top strap in the upper 1/3 of the unit, and the bottom strap in the lower 1/3, provide a minimum of 4 inches of clearance from the temperature control valve. [CPC 507.2]
 - Lag screws not less than 1/4" in diameter shall be used to anchor the straps into the wall.
 - Each lag screw must have at least 1-1/2" thread penetration into wall stud.
 - A large flat washer must be installed between each lag screw and strap for reinforcement.
 - Note: Perforated iron strap (plumber's tape) will not be an acceptable material for strapping or bracing water heaters.
- Provide a temperature and pressure relief valve as required by the manufacturer and hard pipe plumb to the outside and directed to the ground and terminated a minimum of 6" to a maximum of 24" above grade/finish surface and pointing downward. Relief valve may not discharge into a secondary water heater drain pan. [CPC 608.5]
 - Drain lines shall be copper, galvanized steel or CPVC rated not less than the operating temperature of the water heater.
- The all water supply pipes must be insulated per 2022 California Energy Code and first 5' of cold-water supply pipe must be insulated per 2022 California Energy Code requirements.
- Where a water heater is in a location where damage can occur from a leak, such as an attic, floor- ceiling assembly, above habitable area; a watertight pan of corrosion-resistant materials shall be installed beneath the water heater with not less than 3/4" drain to an approved location. Such pan shall be not less than 1 1/2" in depth. [CPC 507.5]
- An expansion tank is required when the water system is a "closed loop". A system is considered a closed loop when a water regulator and or back flow prevention device, such as the Reduced Pressure backflow preventer (RP), is installed. Such 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 manufacturer's installation instructions. [CPC 608.3]

Gas & Water Piping

Fuel gas piping must be sized for the demand upon it. If a water heater is replaced with a larger one then the pipe sizing should be reviewed. A listed flexible supply with a maximum length of 3 feet is required. Do not re-use an old flexible supply line.

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- An accessible gas shut off valve is required within 6' of the unit. [CPC 1212.6]
- Gas piping shall not be used as a grounding conductor or electrode [CPC 1211.4]
- Bond the hot water pipe to cold water pipe to gas pipe. [CEC 250.104]
- A union must be installed within 12" of water heater to facilitate removal. [CPC 609.5]
- A full way shutoff valve is required on cold water piping to water heater. [CPC 606.2]
- Gas fittings, valves, or other materials shall not be re-used when replacing water heater. [CPC 1208.6.1]
- Where a sediment trap is not incorporated as part of the appliance, a sediment trap shall be installed downstream of the appliance shut off valves as close to the inlet of the appliance as practical, before the flex connector. [CPC 1212.9]

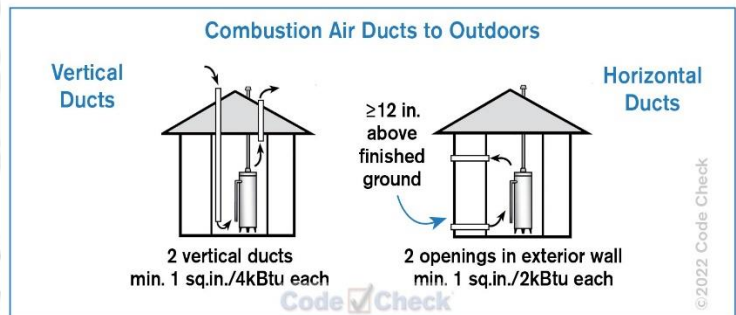
Pipe Insulation Requirements

- All piping greater than ¾ inch diameter.
- The first 5 feet of hot and cold-water pipes from the storage tank.
- All piping associated within a domestic hot water recirculation system regardless of the diameter.
- Piping from the heating source to storage tank or between tanks.
- Piping buried below grade.
- All hot water pipes from the heating source to the kitchen fixtures.
- All domestic hot water pipes that are buried below grade must be installed in a water proof and non-crushable casing or sleeve.

Combustion Air

Fuel burning appliances, such as water heaters must be provided with a sufficient supply of air to assure proper combustion of fuel and ventilation. In tightly constructed buildings with vapor barriers and weather stripping, the combustion air must be ducted in from the outside or from attic spaces that freely communicate with the outside via permanent screened opening.

- Combustion air openings shall be provided within the upper & lower 12 inches of approved enclosure and shall be supplied by direct vent openings or by approved ducts. Combustion air from the inside of building shall be at least 1 square inch per 1000 Btu/h of total input rating but not less than 100 square inch per opening. If the volume of the garage equals at least 50 cubic feet per 1000 Btu/h input no additional openings are needed. Combustion air from the outdoors shall be at least 1 square inch per 4000 Btu/h of total input rating.
- When located in a confined space (less than 50 cubic feet of area for each 1000 BTU rating of water heater), an upper and lower combustion air opening shall be provided within 12" of the top and bottom of the enclosure.
 - o Two permanent openings, one commencing within 12 inches of the top and one commencing within 12 inches of the bottom of the water heater enclosure shall be provided.
 - o Minimum size of openings shall not be less than 100 square inches per opening except that underfloor openings shall have twice the required combustion air opening.
 - o A typical 50-gallon water heater will require two openings 25 sq. in. each.
 - o Openings shall communicate directly, or by ducts, with the outdoors or spaces that freely communicate with the



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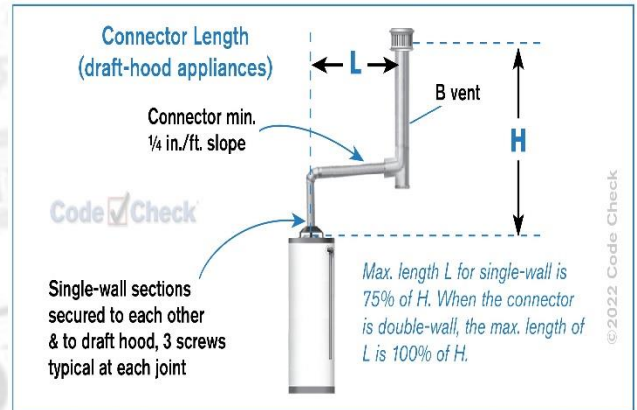
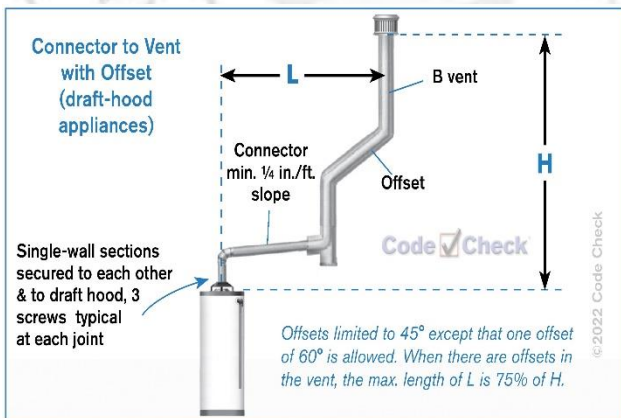
outdoors. [CPC 506]

○ They should be at least 10 ft. away from the return air inlet of a blower type furnace. [CMC 904]

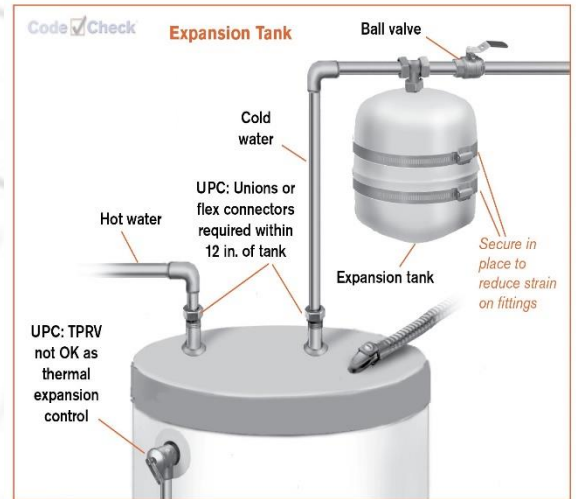
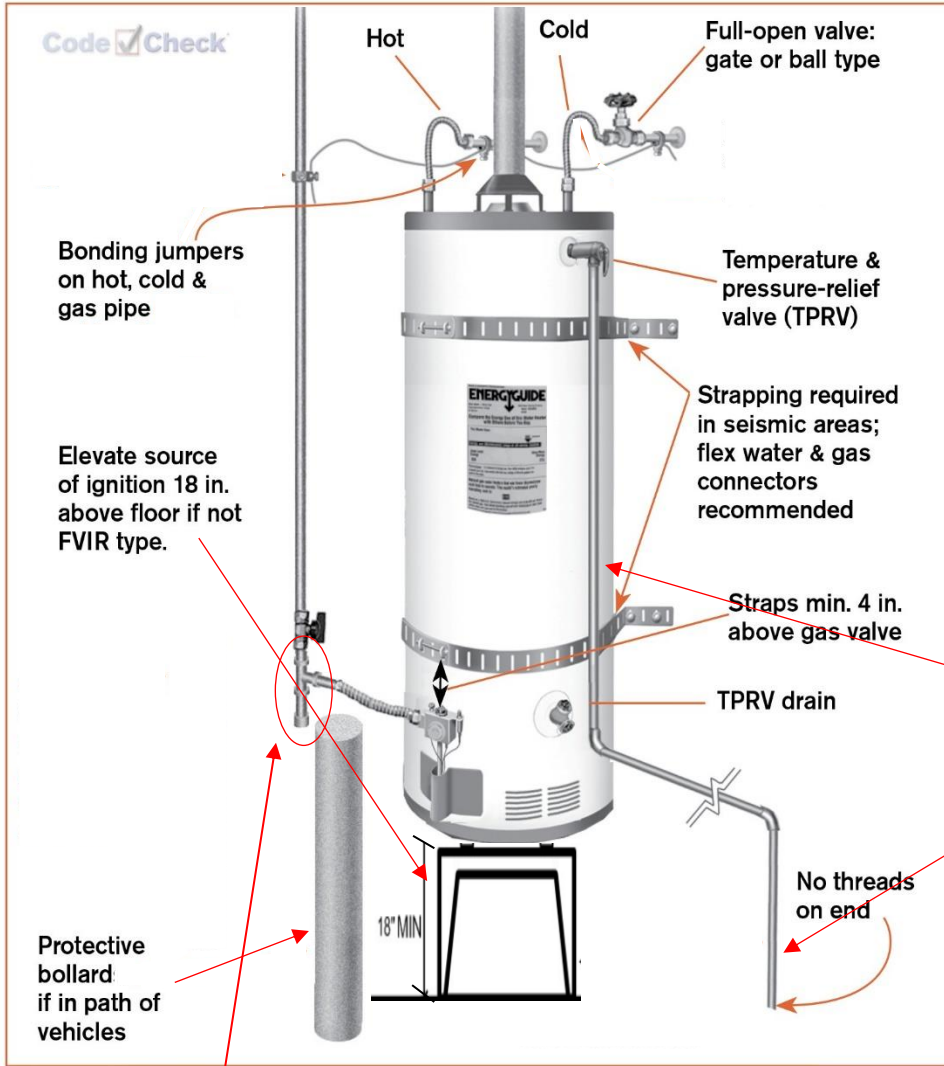
- Water heaters 50 gallons or less, a combustion air duct of 25 square inches (6 inches round) is required. The combustion air duct can take air from the outside of the building or a ventilated attic (min. of 30 inches in height).

Venting

- Vents that pass through unconditioned areas such as attic, underfloor, and unconditioned basements shall be listed Type B or Type L double wall vents. [CMC 802.10.1.1]
- Single wall vents require 6" clearance to combustibles and shall not extend into enclosed framing, attics, or roof areas.
- Single wall vent connectors must start and end in the same space as the water heater.
- No portion of the connector may be concealed within the construction of the building.
- Provide minimum 1-inch clear space from vent to any combustible materials.
- Provide metal shroud or ceiling thimble to maintain clearance to combustibles, insulation, etc. when vent passes through sheathing.
- No single wall vents allowed in attic space.
- Vent connectors serving appliances vented by natural draft shall not be connected into any portion of mechanical draft systems operating under positive pressure. [CMC 802.3.3.3]
- All gravity gas vent connectors shall be as short and straight as possible. Vent connectors shall be pitched from the appliance at least 1/4" per foot
- Gravity vents shall extend in a vertical direction with the offsets not exceeding 45 degrees, a vent system is permitted to have one 60-degree offset. [CPC 509.6.3]
- Water heater shall be located as close as practicable to the venting system. The total horizontal length of the vent system including vent and vent connectors must not exceed 75% of the vertical height of the vent.
- A gravity type venting system must terminate at least 5 ft. above the draft hood.
- A single wall vent connector must be fastened with three sheet metal screws, rivets or other approved fasteners at each joint.
- Roof top vent termination must be 8 feet away from a vertical wall and extend 2 feet above the highest point where it passes through the roof.



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Temperature and pressure relief drain line shall be copper, galvanized steel or CPVC rated not less than the operating temperature of the water heater. The drain line shall discharge between 6"-24" above finished grade

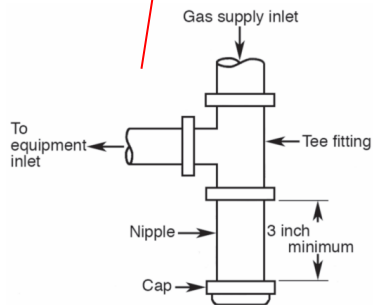


FIGURE 1212.9
METHOD OF INSTALLING A TEE FITTING SEDIMENT TRAP
[NFPA 54: FIGURE 9.6.8]

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