

**DEVELOPMENT SERVICES – BUILDING INSPECTION****INSPECTION GUIDELINES:  
WATER HEATER****INSPECTION CODE: 503****SCOPE: RESIDENTIAL AND COMMERCIAL****APPLICABLE CODES:** 2016 CBC, CRC, CPC, CMC, CEC, CALGreen, CEnC, and PAMC

*The information provided in this document is general and intended as a guide only. Each project is unique and additional requirements may be enforced as deemed appropriate.*

**IMPOTANT**

- Failure to complete items below prior to inspection may result in a re-inspection fee.

**OTHER TYPES OF WATER HEATERS**

- Direct-vent, high efficiency and tankless water heaters require separate, more restrictive requirements and shall be installed per their manufacturer's specifications. See "[Tankless Water Heater](#)" checklist.

**EXPANSION TANK**

- 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)

**EXISTING MASONRY FLUE**

- A water heater shall not be reconnected to an existing unlined masonry flue. Use of an approved liner such as DuraVent Ventinox® or other listed liner is required. (CMC 802.5.7.3)

**INSPECTION****GENERAL REQUIREMENTS**

- Manufacturer's installation instructions shall be onsite and available to inspector. (CPC 507.24)
- Verify water heater clearances from combustibles as specified in the manufacturer's installation specification and listing. (CPC 504.3.1)
- Water heaters require two seismic straps: one located within the top 1/3 of the water heater and one at the bottom 1/3. The bottom strap shall be located at least 4" from any controls. (CPC 507.2)

- Where a water heater is located in an attic or on an attic-ceiling assembly, floor-ceiling assembly, or floor-subfloor assembly where damage results from a leaking water heater, 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)
- Water heater must be provided with an approved, listed, adequately sized combination temperature and pressure-relief valve. (CPC 608.3)
- Temperature pressure valve shall be drained to the exterior and terminate toward the ground or flood level of the area receiving the discharge and pointing downwards not less than 6" above the ground, nor more than 24". The diameter of the valve opening shall be 3/4" and must be maintained to the termination of the drain. Discharge from a relief valve into a water heater pan shall be prohibited. (CPC 608.5)
- Verify expansion tank installed for "closed loop systems". Expansion tank shall be seismically braced or secured and installed per manufacturer's installation instructions. (CPC 608.3)
- A full way shutoff valve is required on cold water piping to water heater. (CPC 606.2)
- A union must be installed within 12" of water heater to facilitate removal. (CPC 609.5)
- Insulate the first 5' of the hot and cold water pipes at the water heater. (CEnC 150.0(J))
- Bond the hot water pipe to cold water pipe to gas pipe. (CEC 250.104)
- A whole house gas test is required when any modifications are made to gas line piping excluding gas connector. If applicable see [Whole House Gas Test](#) for checklist. (CPC 1213.1.3)
- An accessible gas shut off valve is required within 6' of the unit. (CPC 1212.15)
- Gas piping shall not be used as a grounding conductor or electrode (CPC 1211.3)
- Gas piping shall be seismically braced and secured. (CPC 1210.2.4)

- Gas connector shall be sized for the load of the water heater, the connector shall be of the minimum practical length. The existing old connector shall not be reused when replacing water heater. (CPC 1208.4, CPC 1212.4.3)

1. Determine the maximum Btu/hr rating for appliance. (Manufacturer's name, model number, and rating will contain this information (contact appliance manufacturer if unsure of correct rating).  
 2. Measure the distance between gas source and appliance. Add sufficient length to allow access behind appliance.  
 3. Select the connector on chart below that has a LARGER FLOW CAPACITY than the gas rating of your appliance.

HOUSE PIPING SEALANT HERE ONLY VALVE TYPICAL FITTINGS 90° FEMALE NUT CONNECTOR NUT MALE FITTING SEALANT HERE ONLY APPLIANCE INLET

Model	ID inches	1 foot	1-1/2 foot	2 foot	2-1/2 foot	3 foot	4 foot	5 foot	6 foot
CSSL	1/4	48,000	43,800	40,000	36,400	33,400	28,300	24,900	23,100
CSSD	3/8	102,000	93,100	85,000	77,100	71,100	60,500	53,200	49,100
CSSC	1/2	180,000	164,200	150,000	136,000	125,000	106,000	93,200	86,000
CSSB	3/4	290,900	290,900	290,900	270,500	255,900	215,000	197,400	173,900

This connector meets or exceeds the minimum allowable capacity as determined under test conditions specified in ANSI Z21.24 • CSA 6.10. Straight length capacity rated in Btu/hr using: 0.64 SP. Gr., 1000 Btu per cu ft. (37.2 MJ/m<sup>3</sup>) Gas at 0.50 inch Water Column Pressure Drop. The capacity at 50 Pa (0.2 inch water column) pressure drop can be determined by multiplying the Btu/hr listed in the table above by 0.632.

Figure CPA 068 – Example Flex Connector Sizing Label

- 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 1212.8)

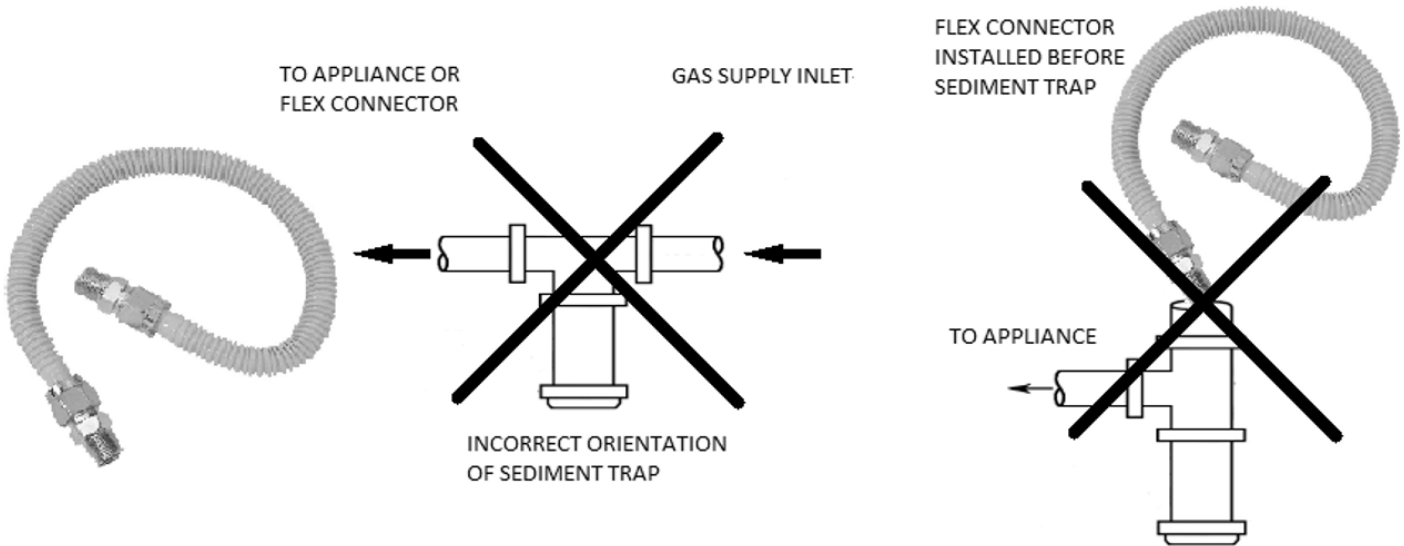


Figure CPA 065 – Improper Installations of Sediment Trap

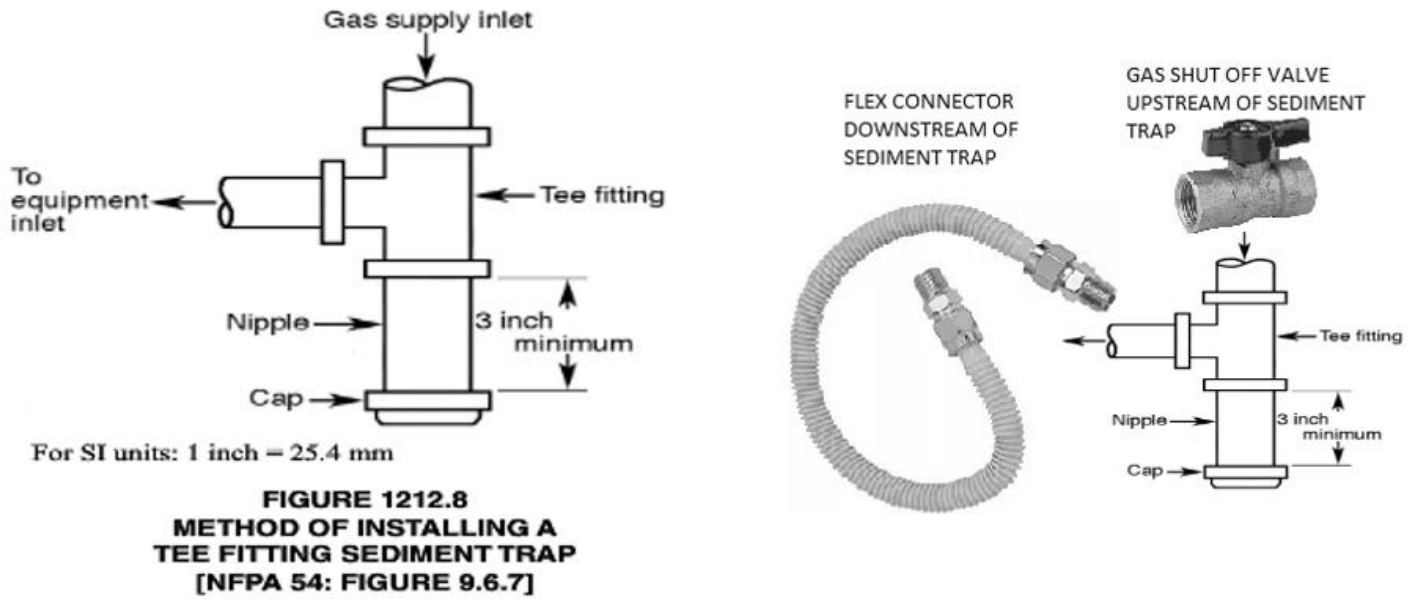


Figure CPA 066 – Correct Installation of Sediment Trap

### COMBUSTION AIR

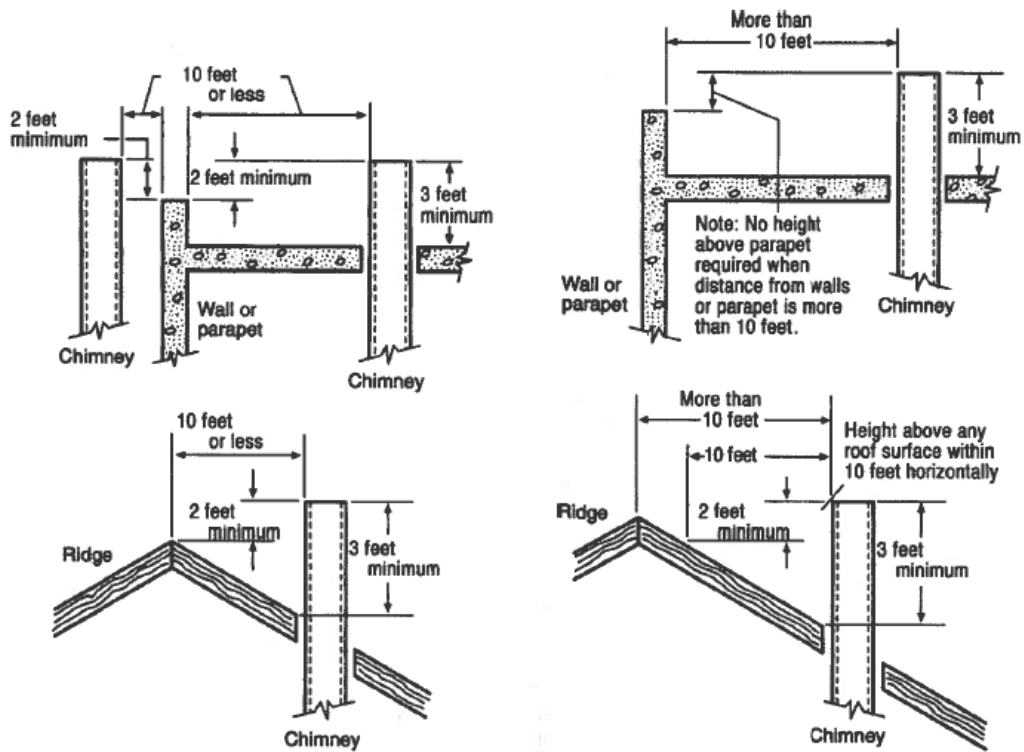
- Verify combustion air is supplied per CPC section 506. When located in a confined space (less than 50 cubic feet of area for each 1000 BTU rating of water heater), an upper and lower combustion air opening shall be provided within 12" of the top and bottom of the enclosure. Minimum size of openings shall not be less than 100 square inches per opening except that underfloor openings shall have twice the required combustion air opening. Openings shall communicate directly, or by ducts, with the outdoors or spaces that freely communicate with the outdoors. (CPC 506)
- See "[Combustion Air for Gas Appliances](#)" checklist.

### VENTING

- Where inspection reveals that an existing chimney is not safe for the intended application, it shall be repaired, rebuilt, lined, relined, or replaced with a vent or chimney in accordance with NFPA 211, and shall be approved for the appliances to be attached. (CMC 802.5.7.3)
- Water heater shall not be reconnected to an existing unlined masonry flue. Use of an approved liner such as DuraVent Ventinox® or other listed liner is required. (CMC 802.5.7.3)
- Gravity venting sizing and length per CPC section 509 and CPC section 510.
- Vents that pass through unconditioned areas such as attic, underfloor, and unconditioned basements shall be listed Type B or Type L double wall vents. Single wall vents are not allowed. (CMC 802.10.1.1).
- 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 and shall be located in the same room or space as

the water heater and shall not be concealed in construction (CPC 509.10.6, CMC 802.10.6,)

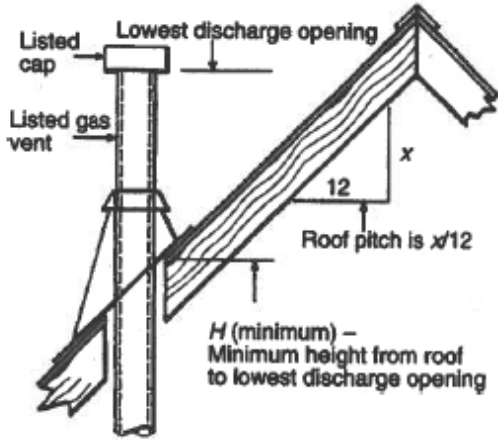
- Gravity vents shall extend in a vertical direction with the offsets not exceeding 45 degrees, except that a vent system having one 60 degree offset shall be permitted. (CPC 509.6.3)
- Water heater shall be located as close as practicable to the venting system. A horizontal connector shall not be longer than seventy-five (75) percent of the portion of the venting system above the inlet connection for single wall and 100 percent for type B double wall unless as part of an approved engineered venting system. (CPC 509.10.7)
- The vent and water heater must maintain clearance from combustible materials such as wall framing or roofing. Generally the minimum distance is 6" for single wall and 1" for double wall vents, check the manufacturer's listing on the materials. (CPC 509.7.3.4)
- The vent shall terminate in a listed and approved vent cap and a minimum of 5' above the water heater draft hood. Vents may require additional supports depending on the material and design. (CPC 509.6.2, CPC 509.6.5)



(a) Termination 10 feet or Less from Ridge, Wall, or Parapet

(b) Termination More Than 10 feet from Ridge, Wall, or Parapet

**CPC Figure 509.5.4 – Typical Termination Locations for Chimney and Single-Wall Metal Pipes**



**FIGURE 509.6.2**  
**GAS VENT TERMINATION LOCATIONS FOR LISTED CAPS 12 INCHES OR LESS IN SIZE NOT LESS THAN 8 FEET FROM A VERTICAL WALL [NFPA 54: FIGURE 12.7.2]**

**TABLE 509.6.2**  
**ROOF PITCH HEIGHT**  
**[NFPA 54: TABLE 12.7.2]**

ROOF PITCH	H (minimum) (feet)
Flat to 1/12	1.0
Over 1/12 to 2/12	1.25
Over 2/12 to 3/12	1.5
Over 3/12 to 4/12	2.0
Over 4/12 to 5/12	2.5
Over 5/12 to 6/12	3.25
Over 6/12 to 7/12	4.0
Over 7/12 to 8/12	5.0
Over 8/12 to 9/12	6.0
Over 9/12 to 10/12	7.0
Over 10/12 to 11/12	7.5
Over 11/12 to 12/12	8.0

For SI Units: 1 inch = 25.4 mm, 1 foot = 304.8 mm

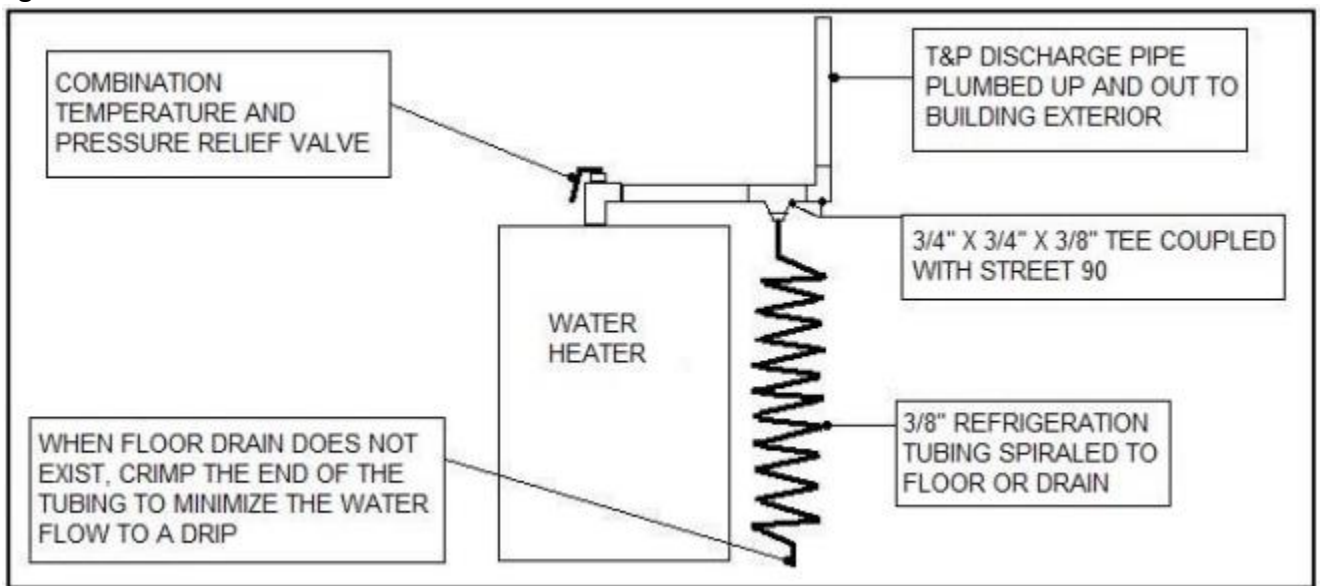
**CPC Figure 509.6.2 and Table CPC 509.6.2 – Type B gas vent Termination**

**CLOSET INSTALLATION**

- ☐ Water heaters installed in a closet located in a bedroom or bathroom shall have a listed, gasketed door assembly and a listed self-closing device with no hold open mechanism. The door assembly shall be installed with a threshold and bottom door seal. All combustion air shall be obtained from the outdoors. (CPC 504.1(1))

**BASEMENT INSTALLATION**

- ☐ Temperature and pressure relief valve (T&P) shall be plumbed up and out to the building exterior per Figure CPA 046.



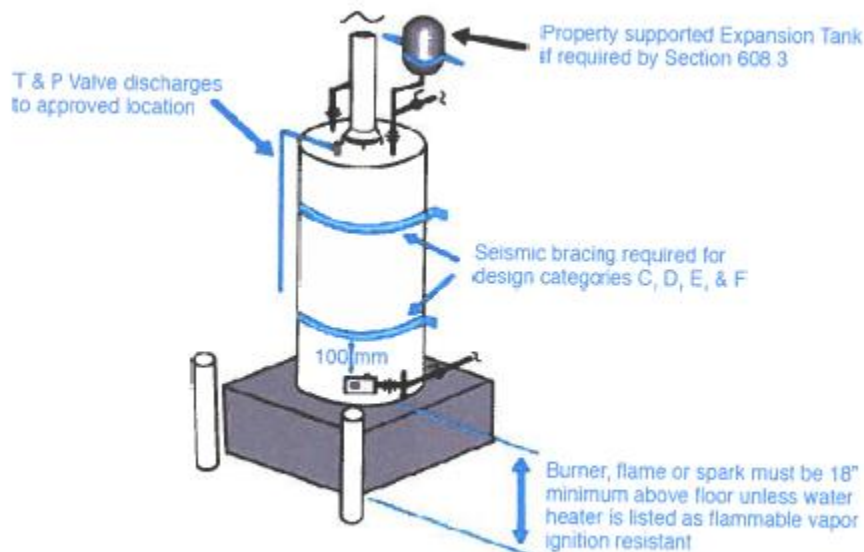
**Figure CPA 046—Water Heater/Electric Heat Pump Water Heater Basement Installation**

**ATTIC INSTALLATION**

- Attic trap door or opening shall not be less than 22"x30" or as needed to remove the largest piece of equipment, but in no case smaller than the water heater. (CPC 508.4)
- An unobstructed solidly floored working space is required in front of the water heater not less than 30" x 30" and a minimum of 30" headroom. (CPC 508.4.3)
- An unobstructed catwalk not less than 24" wide is provided from attic opening to the water heater. Where the height of the passage way is less than 6' the distance from the access to the appliance shall not be greater than 20'. (CPC 508.4.1)
- A permanent 120-volt receptacle outlet and a lighting fixture shall be installed near the appliance. The switch controlling the light fixture should be located at the entrance to the passage way. (CPC 508.4.4)
- Install drip pan with 3/4" drain pipe under tankless water heater in attic and all furred spaced subject to water damage. Pan shall drain to exterior. (CPC 507.5)

**GARAGE INSTALATION**

- Water heaters installed in a garage shall be installed so that burners and burner ignition devices are at least 18" above the garage floor surface unless listed as flammable vapor ignition resistant. (CPC 507.13)
- Appliances installed in garages, warehouses, or other area 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. (CPC 507.13.1)



**FIGURE 507.13A**  
**RESIDENTIAL GARAGE WATER HEATER INSTALLATION**