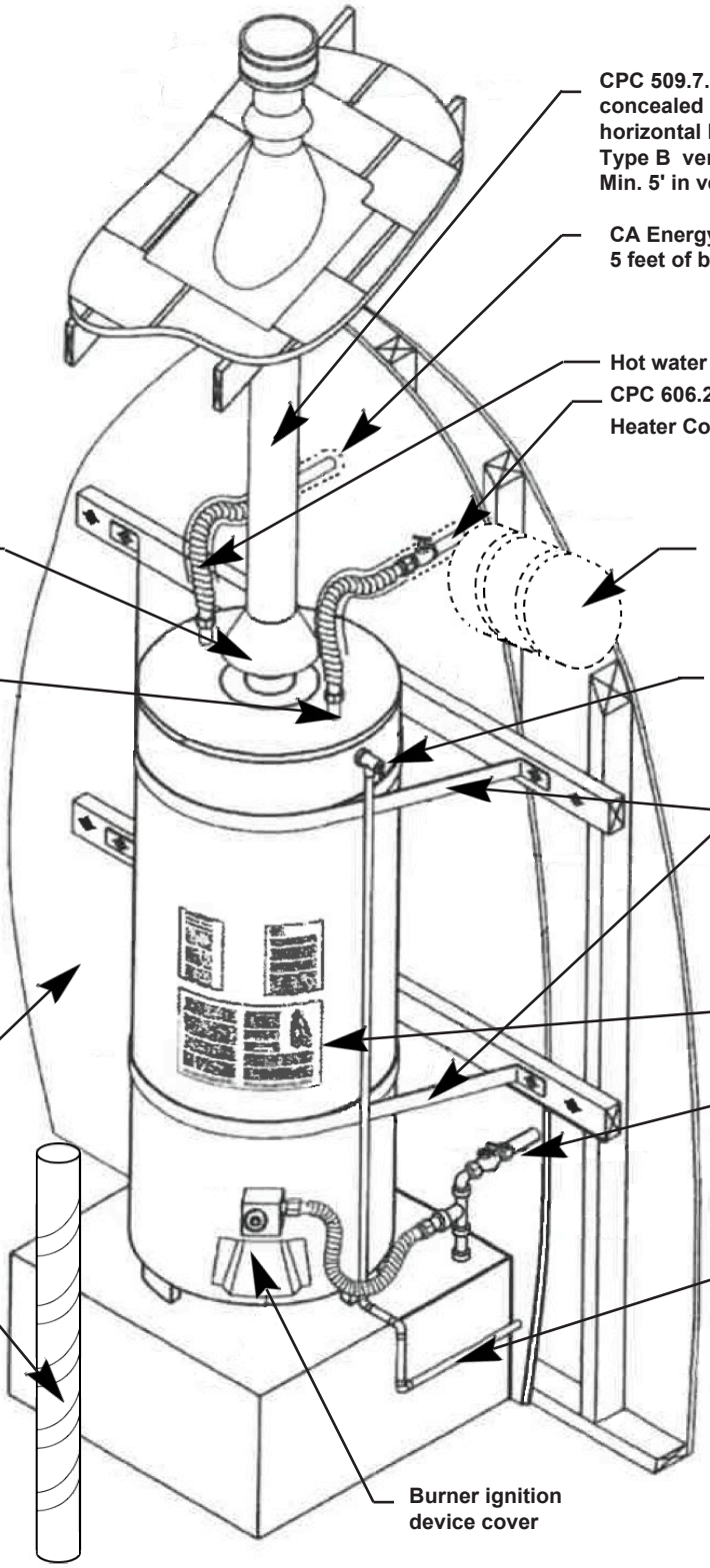
Residential
Water Heater Installations

CA Plumbing Code

Community Development

Building Division
201 N. Broadway
760-839-4647
www.escondido.org



CPC 509.7.3 Vent Connector: Single-wall metal pipe shall not be concealed or used as a vent. 3" Diameter vent connector Max. horizontal Length 4'6". CPC Table 510.2.1
Type B vent double wall for concealed or non-concealed spaces, Min. 5' in vertical Ht. above appliance. CPC 509.6.1.1

CA Energy Code 150.0(j) Required 1" Min. insulation of the first 5 feet of both water lines. CPC 609 .11

Hot water line.

CPC 606.2 Cold water line, full way shutoff valve required. Water Heater Connectors Max. 24". CPC 604.13

Draft hood

CPC 608.3 Water systems provided with a check valve, backflow preventer or normally closed device that prevents dissipation of building pressure back into the water main shall be equipped with an approved, listed and adequately sized expansion tank.

Location for dielectric connection if required. CPC605.15

CPC 504.6 Approved temperature and pressure relief valve(TPR Valve).

CPC 507.2 State of California, State Architect approved earthquake strapping method of product, within the top and bottom 1/3 of the water heater. the bottom strap shall be a minimum of 4" above the controls.

Manufacturer's label installation information and specifications.

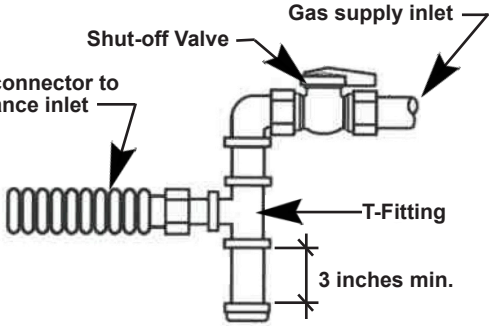
Stud wall

CPC 1212.9 Gas shut-off valve and sediment trap shall be installed in a vertical position downstream of the shut-off valve, before the flex connector.

T&P valve drain pipe to the outside of the building and terminate facing down 6" Min. to 24" Max. above the ground with no threads on the end of pipe. Material shall be rated at not less than the operating temperature of system. Discharge from a relief valve into a water heater pan is prohibited. CPC 608.5

Protective pipe bollard if subject to vehicular damage. CPC 507.13.1

Burner ignition device cover



Sediment trap installation

CPC 507.13 Appliances in garages shall be installed so that all burners or burner ignition device are a Min. 18" above the floor unless listed as "Flammable Vapor Ignition Resistant" (FVIR).

CPC 507.5 Drain pan 1 1/2" is required where structural damage results from a leaking water heater, 3/4" drain shall be to an approved location.

GENERAL NOTES

1. 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.
2. Most home improvement stores sell kits to anchor and strap water heaters. These kits must be approved by the State of California, State Architect. This is demonstrated by the seal of the State Architect, which looks like a sea-shell with inches "ACCEPTABLE METHOD" written below. Install these kits per the installation instructions. Other methods may be submitted to the Building Official for approval.
3. Manufacturer's labels include instructions for installation and requirements for clearances from combustibles and other important information, so it is important to review this information prior to installation.
4. Access to water heaters must be provided with an opening at least 22 x 30 inches wide and large enough to remove the heater. See the code for additional requirements. CPC 508.4
5. Fuel gas piping flex connectors must be approved for the type of installation, exterior or interior grade based on location. CPC 1212.1
6. Provide a full-way valve on the inlet side of the heater. CPC 606.2
7. Mixing of dissimilar metals is not permitted, unless dielectric insulators are used in the connections. CPC 507.1
8. A sediment trap shall be installed in a vertical position downstream of the shut-off valve and before the flex-connector. CPC 1212.9
9. If the water supply is a closed system, an expansion tank at the water heater will be required. Closed systems include backflow devices and check valve systems. CPC 608.3

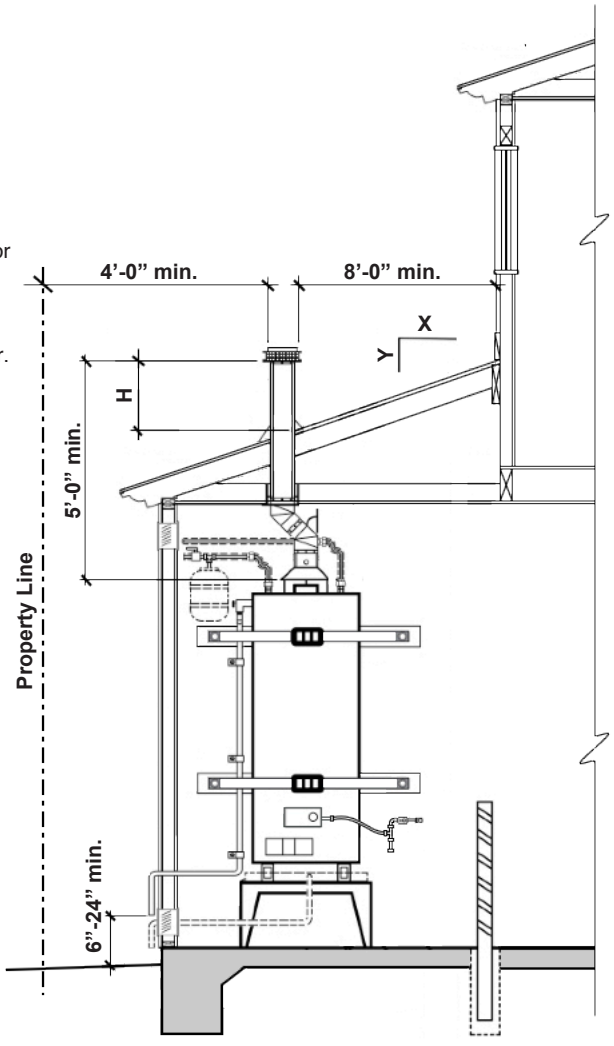
LOCATION REQUIREMENTS

1. Interior Installation - The water heater shall not be installed in a room used for sleeping purposes (with exceptions CPC 504.1 (1),(2)), in clothes closets or in any confined space opening into a bedroom or bath. A drain pan at least 1.5 inches deep must be provided with a drain to an approved location or fixture. CPC 507.5
2. Exterior Installation - The water heater must be located on a level concrete slab at least 3 inches above grade and located in an approved enclosure.
3. Garage Installation - The burner of the water heater must be located at least 18 inches above the floor to preclude the ignition of combustible vapors unless listed as Flammable Vapor Ignition Resistant (FVIR) & must be protected from vehicular damage. CPC 507.13
4. Change of Water Heaters - Water heaters which are relocated must comply with all new code requirements. CPC 507.2 All new and replacement Water Heaters shall be braced, anchored, or strapped to resist displacement due to earthquake motion. *HSC 19211 (a)*

VENTING REQUIREMENTS CPC 509

1. Vents must terminate in accordance with the drawing to the right. Consult the code for conditions not shown.
2. Single wall vent connectors must be fastened with sheet metal screws, rivets, etc.
3. Single wall vent connectors must start and end in the same place as the water heater. No portion of the connector can be concealed within the construction of the building
4. Vent connectors must be the same size as the draft hood outlet on the appliance. They must slope up from the draft hood to the vent at least 1/4 inch per foot. The total horizontal length the venting system, including vent and vent connector, must not exceed 75% of the vertical height of the vent.
5. Provide separation to combustible materials as required by labeling requirements of vent pipe.
6. When a vent penetrates a ceiling, a thimble (also known as a bucket or fire stop) shall be installed at the ceiling line.

TABLE 509.6.1	
Y/X	**H (MIN FEET)** of
Flat to 6/12	1.0
> 6/12 to 7/12	1.25
> 7/12 to 8/12	1.5
> 8/12 to 9/12	2.0
> 9/12 to 10/12	2.5
> 10/12 to 11/12	3.25
> 11/12 to 12/12	4.0
> 12/12 to 14/12	5.0
> 14/12 to 16/12	6.0
> 16/12 to 18/12	7.0
> 18/12 to 20/12	7.5
> 20/12 to 12/12	8.0



H = 12" min. for type "B" vent
24" min. for type "L" vent (CPC Table 509.6.1)

INTERNATIONAL CODE COUNCIL
San Diego Area Chapter

2016 Residential Water Heater Replacement Check-list

Chapter Policy
Plumbing
P-01

July 2018

The intent of this Water Heater Replacement Check list is to provide installers a general reference for the enforcement of code requirements in the Greater San Diego Area. This checklist is for storage type water heaters only. This checklist does not cover all the code requirements found in the plumbing code. Be sure to check with local jurisdictions for adopted local amendments and code updates.

Unless otherwise noted, the following code excerpts apply to new and replacement water heaters. It is important to note that an existing water heater is a water heater that was previously inspected and approved by the Authority Having Jurisdiction.

- ☐ It shall be unlawful for any person to install, remove, or replace or cause to be installed, removed, or replaced any water heater without first obtaining a permit from the Authority Having Jurisdiction to do so. (2016 CPC 502.1)

- ☐ The installing agency shall leave the manufacturer's installation, operating, and maintenance instructions in a location on the premises where they will be readily available for reference and guidance for the Authority Having Jurisdiction, service personnel and the owner or operator. (2016 CPC 507.24)

- ☐ Plumbing systems shall be installed in a manner conforming to this code, applicable standards, and the manufacturer's installation instructions. In instances where the code, applicable standards, or the manufacturer's instructions conflict, the more stringent provisions shall prevail. (2016 CPC 309.4)

- ☐ The installation of temperature, pressure and vacuum relief devices or combinations thereof, and automatic gas shutoff devices, shall be installed in accordance with the terms of their listings and the manufacturer's instructions. (2016 CPC 504.6)

- ☐ All new and replacement water heaters must meet minimum energy efficiency requirements and be on the most current list of approved appliances on the California Energy Commission website. http://www.appliances.energy.ca.gov/

- ☐ Any water system provided with a check valve, backflow preventer, or any 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. (2016 CPC 608.3)
  - *Commentary: A check valve or other normally closed device will create a closed system which requires an expansion tank. Inspectors will require an expansion tank when a check valve is visible. A qualified plumber may further determine that the system is closed at non-visible locations through the use of tools and test equipment. Items such as water meters and water softeners and regulators sometimes have built-in check valves.*

- ☐ An approved expansion tank shall be installed in the cold water distribution piping downstream of each pressure regulator to prevent excessive pressure from developing due to thermal expansion and to maintain the pressure setting of the regulator. (2016 CPC 608.2)
  - *Commentary: Expansion tanks will be required on new construction homes that have a water pressure regulating device. Expansion tanks must be properly sized and pressurized in accordance to the manufacturer's instructions. See Footnote #1.Pressure in water systems is considered excessive when the pressure exceeds 80 psi. Damage can occur to water heaters and other components in the water system when they are subjected to excessive water pressure. When water is heated, it causes expansion and increased pressures in both the hot and cold water piping system. In an open system, water can only push back into the street provided that the street pressure is less than the expanding water pressure. A properly sized and installed*

expansion tank protects the water heater and other water system components from excessive water pressure within the range of the regulator setting and the relief valve setting. Most warranties for plumbing fixtures and water heaters become null and void when the products are subjected to excessive pressure.

- ☐ A shutoff valve shall not be placed between the relief valve and the water heater or on discharge pipes between such valves and the atmosphere. The hourly Btu discharge capacity of the device shall be not less than the input rating of the water heater. (2016 CPC 504.6)

- ☐ Relief valves shall be an approved automatic type with drain. Discharge piping serving a temperature relief valve, pressure relief valve, or combination of both shall have no valves, obstructions, or means of isolation and be provided with the following: Equal to the size of the valve outlet and shall discharge full size to the flood level of the area receiving the discharge and pointing down. Materials shall be rated at not less than the operating temperature of the system and approved for such use. Discharge pipe 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 6 inches above the ground and pointing downwards. Discharge in such a manner that does not cause personal injury or structural damage. No part of such discharge pipe shall be trapped or subject to freezing. The terminal end of the pipe shall not be threaded. Discharge from a relief valve into a water heater pan shall be prohibited. (2016 CPC 608.5)

- ☐ Residential water heaters shall be sized in accordance with table 501.1(1). (2016 CPC 501.1).

- ☐ Water heaters installed in residential garages shall be installed so that burners and burner-ignition devices are located not less than 18" above the floor unless listed as flammable vapor ignition resistant. (2016 CPC 507.13)
  - *Commentary: Since July 1st 2003, water heater manufacturers have been required to incorporate Flammable Vapor Ignition Resistant (FVIR) Technology into 30, 40 and 50 gallon gas water heaters that are sold in the United States. Water heaters with FVIR technology may be installed on the floor of a residential garage. Electric water heaters do not have mandated FVIR technology and may cause a small spark when heating. Electric water heaters should be placed on a stand unless documentation is provided by the installer/manufacturer that verifies FIVR construction.*

- ☐ Water heaters shall be located or protected so they are not subject to physical damage by a moving vehicle. (2016 CPC 507.13.1)
  - *Commentary: An acceptable bollard design consists of 2"or larger schedule 40 pipe, embedded 3 feet into the ground, encased in a 12" diameter footing and filled with concrete. Flanged bollards, fastened with bolts to a concrete floor, wheel stops and elevating the water heater may also be acceptable when approved by the Authority Having Jurisdiction.*

- ☐ Water heaters shall be anchored or strapped to resist horizontal displacement due to earthquake motion. Strapping shall be at points within the upper one third and lower one-third of its vertical dimensions. At the lower point, a minimum distance of 4" inches shall be maintained above the controls with the strapping. (2016 CPC 507.2)

- ☐ A water heater supported from the ground shall rest on level concrete or other approved base extending not less than 3" above the adjoining ground level. (2016 CPC 507.4)

- ☐ Water heaters installed in attics must have adequate support for the weight of the water heater. See the 2016 CRC section R301.4, the actual weights of materials and construction shall be used for determining dead load with consideration for the dead load of fixed service equipment. It is recommended to check with the local building department for permit history and/ or submittal requirements.

- ☐ When a water heater is located in an attic, 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" diameter drain to an approved location. (2016

CPC 507.5)

- ☐ An attic in which an appliance is installed shall be accessible through an opening and passageway not less than as large as the largest component of the appliance and not less than 22" x 30" (2016 CPC 508.4)

- ☐ Where the height of the passageway is less than 6 feet, the distance from the passageway access to the appliance shall not exceed 20 measured along the centerline of the passageway. (2016 CPC 508.4.1)

- ☐ The passageway shall be unobstructed and shall have solid flooring not less than 24" inches wide from the entrance opening to the appliance. (2016 CPC 508.4.2)

- ☐ A level working platform not less than 30" x 30" shall be provided in front of the service side of the appliance. (2016 CPC 508.4.3)

- ☐ A permanent 120-volt receptacle outlet and a lighting fixture shall be installed near the appliance. The switch controlling the lighting fixture shall be located at the entrance to the passageway. (2016 CPC 508.4.4)

- ☐ The clearances shall not be such as to interfere with combustion air, draft hood clearance and relief, and accessibility for servicing. Listed water heaters shall be installed in accordance with their listings and the manufacturer's instructions. (2016 CPC 504.3.1, 509.6)

- ☐ Flexible gas supplies. Listed flexible gas connectors shall be in compliance with CSA Z21.24, Standard for Connectors for Gas Appliances. The connector shall be used in accordance with the terms of their listing that are completely in the same room as the appliance. (2016 CPC 1212.1)
  - *Note: CSA certifies gas connectors up to 6' (72"). Joining two or more connectors is not permitted by product standards. Flexible gas connectors can only be used above ground. The gas supply outlet must be in the same room as the appliance and the connector must not be concealed within or run through any wall, floor or partition. According to the requirements of the CSA specification that governs appliance gas connectors, the connector and fittings are design for use only on the original installation and are not to be reused for another appliance or at another location.*

- ☐ Water heaters connected to a piping system shall have an accessible, approved manual shutoff valve with a non-displaceable valve member, or a listed gas convenience outlet installed within six (6) feet (1.8 m) of the appliance it serves. Where a connector is used, the valve shall be installed upstream of the connector. (2016 CPC 1212.5)

- ☐ 1212.8 Sediment Trap. Where a sediment trap is not incorporated as a part of the gas utilization appliance, a sediment trap shall be installed downstream of the appliance shutoff valve as close to the inlet of the appliance as practical, before the flex connector, where used at the time of appliance installation. The sediment trap shall be either a tee fitting with a capped nipple in the bottom outlet, as illustrated in CPC Figure 1212.8, or other device recognized as an effective sediment trap. (2016 CPC 1212.8)
  - *Commentary: A sediment trap is required at water heaters. See attached Figures for an acceptable sediment trap design. Sediment traps help prevent debris in the gas system from clogging the inlet screen on the gas control valve and help prevent debris from damaging the control valve. Most warranties are null and void if it is determined that debris caused damage to the gas control valve.*

- ☐ When an additional or replacement appliance is installed or an appliance is converted to gas from another fuel, the location in which the appliance is to be operated shall be checked to verify the following: (1) Air for combustion and ventilation is provided where required, in accordance with the provisions of Section 506.0. Where existing facilities are not adequate, they shall be upgraded to Section 506.0 specifications. (2) The installation components and appliances meet the clearances to combustible material. (3) It shall be determined that the installation and operation of the additional or replacement appliance does not render the remaining appliance unsafe for continued operation. (2016 CPC 507.6, 507.6.(1))

- ☐ Joints between sections of connector piping and connections to flue collars or draft hood outlets shall be fastened in accordance with one of the following methods (1) By sheet metal screws. (2) Vent connectors of listed vent material shall be assembled and connected to flue collars or draft hood outlets in accordance with the manufacturer's instructions. (3) Other approved means.
  - *Commentary: The vent connector must be fastened to the draft hood, at each joint and to the first B-vent fitting. Three sheet metal screws or more are typically needed to hold the joint rigidly in place.*

- ☐ Type B vents shall extend in a generally vertical direction with offsets not exceeding 45 degrees, except that a vent system having not more than one 60 degree offset shall be permitted. Any angle greater than 45 degrees from the vertical is considered horizontal. The total horizontal distance of a vent plus the horizontal vent connector serving draft-hood-equipped appliances shall not exceed 75 percent of the vertical height of the vent. (2016 CPC 509.6.3.2)

- ☐ The maximum horizontal length of a single-wall connector shall be 75 percent of the height of the chimney or vent except for engineered systems. (2016 CPC 509.10.7.1)

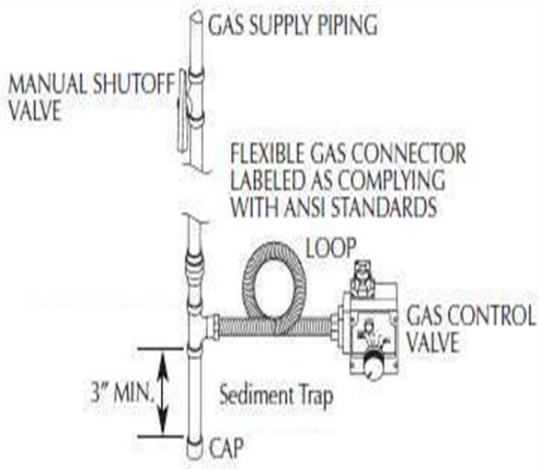
- ☐ The maximum horizontal length of a Type B double-wall connector shall be 100 percent of the height of the chimney or vent, except for engineered systems. The maximum length of an individual connector for a chimney or vent system serving multiple appliances, from the appliance outlet to the junction with the common vent or another connector shall be 100 percent of the height of the chimney or vent. (2016 CPC 509.10.7.2)

- ☐ A gas vent shall terminate in accordance with one of the following: (1) Above the roof surface with a listed cap or listed roof assembly. Gas vents 12" in size or smaller with listed caps shall be permitted to be terminated in accordance with Figure 5-2, provided they are at least eight 8' from a vertical wall or similar obstruction. (2016 CPC 509.6.2) See the attached figure 509.6.2

- ☐ A Type B or a Type L gas vent shall terminate at least five 5' in vertical height above the highest connected appliance draft hood or flue collar. (2016 CPC 509.7.2)

- ☐ Electric water heaters are required to have a disconnect within sight of the water heater or have a breaker that is of a locking type. (See 2016 CEC 422.30 and 422.31(B)

Sediment trap diagram



2016 CPC Figure 1212.8

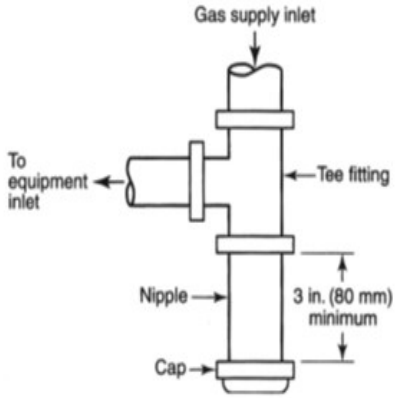
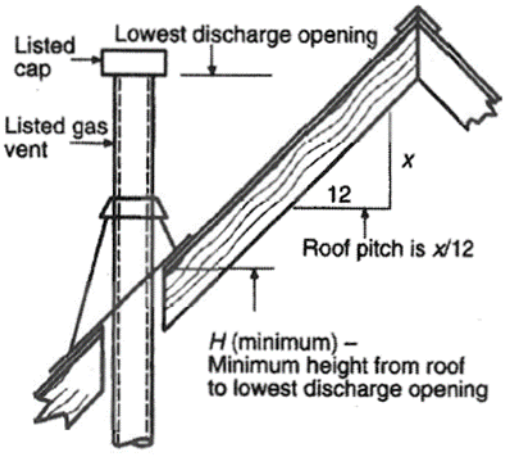


FIGURE 509.6.2

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]



Footnotes:

1. See the following web pages for more information.

   http://www.aohomeinspection.com/pdf/Thermal-expansion-control.pdf

   http://www.hotwater.com/lit/bulletin/bulletin45.pdf

   http://www.watts.com/pages/learnAbout/thermalExpansion.asp?catId=64#generalinfo

2. See the following websites for more information.

   http://media.wattswater.com/IOM-D-RES-1132.pdf