



WATER HEATER

INSTALLATION REQUIREMENTS

Planning & Building • 2263 Santa Clara Ave., Rm. 190
Alameda, CA 94501-4477
510.747.6800 • F: 510.865.4053 • TDD: 510.522.7538
Hours: M, W, Th – 7:30 am – 4:30 pm
T – 7:30 am – 4:00 pm

PERMIT AND INSPECTION: A permit is required for installation, removal, or replacement of water heater. Installation of chimneys or vents shall be inspected before they are covered or concealed, and no equipment or part shall be covered or concealed until a final water heater inspection is completed.

LOCATION: Water heater shall not be installed in bedrooms or bathrooms unless:

1. Fuel-burning water heaters may be installed in a closet, used exclusively for the water heater, provided the closet is equipped with a listed, gasketed door assembly and a listed self-closing device. The door assembly shall be installed with a threshold and bottom door seal. All combustion air for such installations shall be obtained from the outdoors;
OR
2. The water heater is of the direct-vent type.

PROTECTION DEVICES: A water heater installation shall be provided with a pressure-limiting device, temperature-limiting device, vacuum relief device or combinations thereof, and automatic gas shutoff device.

AIR FOR COMBUSTION AND VENTILATION:

1. **Indoor Combustion Air.** The total required volume of indoor air shall be calculated for the sum of all appliances located within the space. The minimum required volume shall be 50 cubic feet per 1,000 Btu/hr. Openings used to connect indoor spaces shall be sized and located as follow:
 - a. **Combining spaces on the same story.** Each opening shall have a minimum free area of 1 square inch per 1,000 Btu/hr of the total input rating of all gas appliances, but not less than 100 square inches. One opening shall be within 12 inches of the top, and one opening shall be within 12 inches of the bottom of the enclosure. The minimum dimension of air openings shall not be less than 3 inches.
 - b. **Combining spaces in different stories.** The volumes of spaces in different stories shall be connected by one or more openings in doors or floors having a total minimum free area of 2 square inches per 1,000 Btu/hr of total input rating of all gas appliances.
2. **Outdoor Combustion Air.**
 - a. **Two Permanent Openings Method.** Two permanent openings, one within 12 inches of the top and one within 12 inches of the bottom of the enclosure shall be provided. The openings shall open directly, or by ducts, with the outdoors.
 - i. **Vertical ducts:** Each opening shall have a minimum free area of 1 square inch per 4,000 Btu/hr.
 - ii. **Horizontal ducts:** Each opening shall have a minimum free area of 1 square inch per 2,000 Btu/hr.
 - b. **One Permanent Opening Method.** One permanent opening within 12 inches of the top of the enclosure shall be provided. The opening shall have a minimum free area of 1 square inch per 3,000 Btu/hr.
3. **Mechanical Combustion Air Supply.** The combustion air shall be supplied from outdoors at the minimum rate of 0,35 cubic feet per minute per 1,000 Btu/hr for all appliances within the space.

PIPING: When additional gas utilization equipment is being connected to a gas piping system, the existing piping shall be checked to determine if it has adequate capacity.



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PROTECTIONS FROM SEISMIC DAMAGE:

1. 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.
2. 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.
3. Water heater located in attic, on ceiling or sub-floor assembly shall be provided with a watertight pan with a minimum ¾-inch diameter drain to an approved location. Discharge from a relief valve into a water heater pan is prohibited.
4. Three (3) straps shall be provided for water heater with the capacity of 52 to 75 gal. For water heater with over 75 gal of capacity, an engineered seismic anchorage system shall be provided.
5. All bracing details included in the publication "Guidelines for Earthquake Bracing of Residential Water Heaters," dated November 30, 2005, published by the Division of the State Architect are accepted by the City of Alameda. A copy of this complete document is available for review in the Building Services Office, Room 190, City Hall.

INSTALLATION IN RESIDENTIAL GARAGE: All burners and ignition devices shall be located not less than 18 inches above the floor unless listed as flammable vapor ignition resistant, or when the water heater is installed in a separate enclosed space having access only from outside of the garage. Water heater shall be located or protected from physical damage by a moving vehicle.

OUTDOOR INSTALLATION: Water heater shall be protected to the degree that the outdoor environment requires unless it is listed for outdoor installation.

INSTALLATION IN ATTICS: Attic access shall be provided through an opening at least as large as the largest component of the appliance, and not less than 22 inches x 30 inches. Where the height of the passageway is less than 6 feet, the distance from the passageway access to the appliance shall not exceed 20 feet. The passageway shall be unobstructed and shall have solid flooring not less than 24 inches wide. A level working platform not less than 30 inches x 30 inches shall be provided in front of the service side of the appliance. A permanent 120-volt receptacle outlet and a lighting fixture shall be installed near the appliance.

CHIMNEY/GAS VENT: A chimney shall extend at least 3 feet above the highest point where it passes through a roof and at least 2 feet higher than any portion of a building within a horizontal distance of 10 feet. A gas vent passing through a roof shall extend through the entire roof flashing, roof jack, or roof thimble and be terminated with a listed cap. A gas vent extending through an exterior wall shall not terminate adjacent to the wall or below eaves or parapets. Chimneys or gas vents shall extend at least 5 feet above the highest connected equipment draft hood outlet or flue collar. They shall be supported for the design and weight of the materials employed, or shall be supported in accordance with their listings and manufacturers' instructions. Direct-vent equipments shall be installed in accordance with their lists and manufacturer' instructions.



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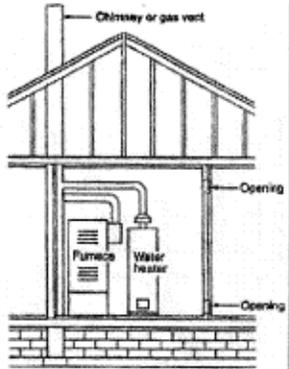


FIGURE 5-7 All Combustion Air from Indoor Spaces through Indoor Combustion Air Openings. [NFPA 54: Figure A.9.3.2.3(1)]

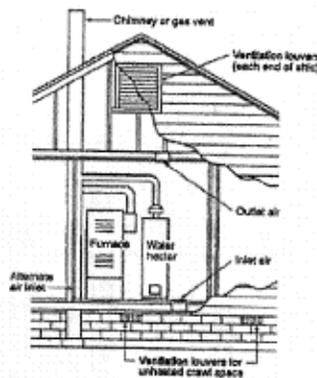


FIGURE 5-8 All Combustion Air from Outdoors – Inlet Air from Ventilation Crawl Space and Outlet Air to Ventilated Attic. [NFPA 54: Figure A.9.3.3.1(a)]

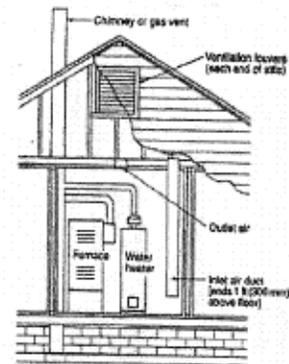


FIGURE 5-9 All Combustion Air from Outdoors through Ventilation Attic. [NFPA 54: Figure A.9.3.3.1(b)]

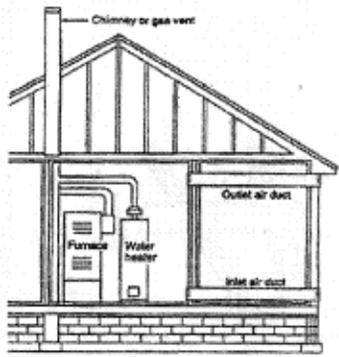


FIGURE 5-10 All Combustion Air from Outdoors through Horizontal Ducts. [NFPA 54: Figure A.9.3.3.1(2)]

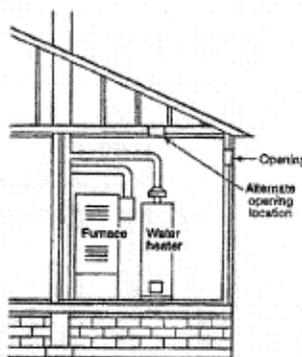


FIGURE 5-11 All Combustion Air from Outdoors through Single Combustion Air Opening. [NFPA 54: Figure A.9.3.3.2]



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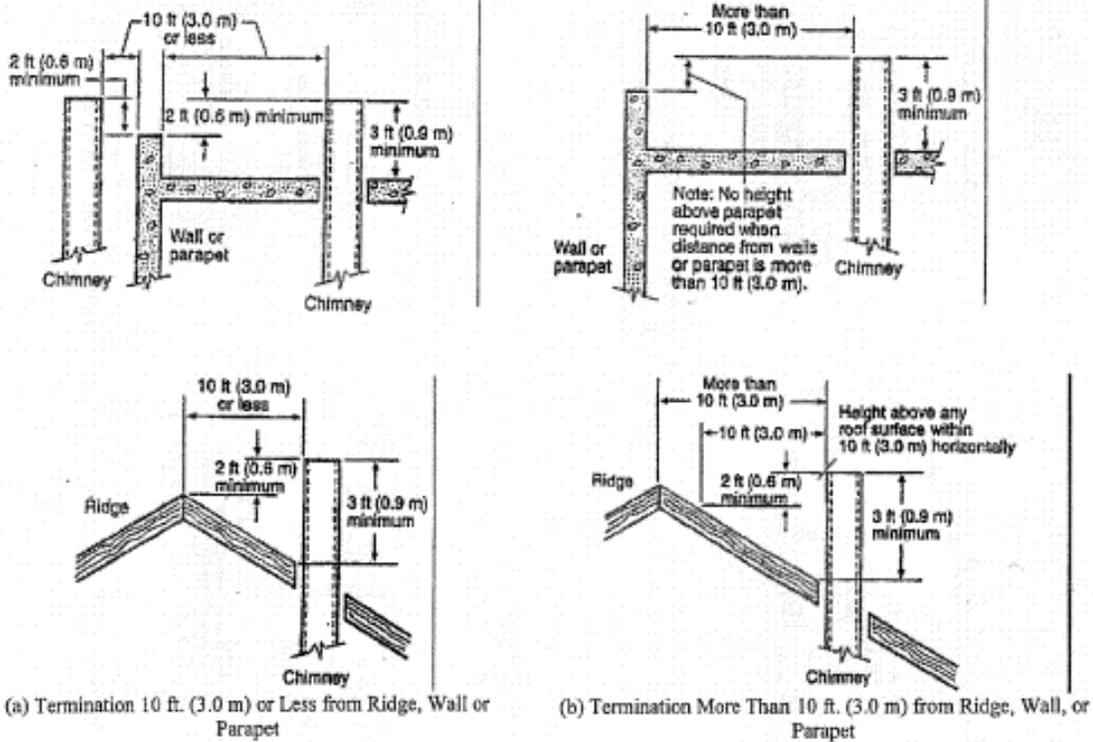


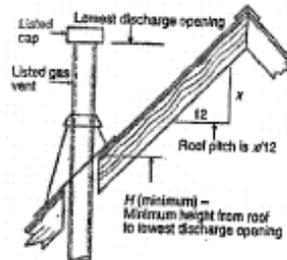
FIGURE 5-1 Typical Termination Locations for Chimneys and Single-Wall Metal Pipes Serving Residential-Type and Low-Heat Equipment [NFPA 54: Figure 12.6.2.1]



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Roof pitch heights

Roof pitch	H (minimum) ft.	m
Flat to 6/12	1.0	0.30
Over 6/12 to 7/12	1.25	0.38
Over 7/12 to 8/12	1.5	0.46
Over 8/12 to 9/12	2.0	0.76
Over 9/12 to 10/12	2.5	0.76
Over 10/12 to 11/12	3.25	0.99
Over 11/12 to 12/12	4.0	1.22
Over 12/12 to 14/12	5.0	1.52
Over 14/12 to 16/12	6.0	1.83
Over 16/12 to 18/12	7.0	2.13
Over 18/12 to 20/12	7.5	2.27
Over 20/12 to 21/12	8.0	2.44

FIGURE 5-2 Gas Vent Termination Locations for Listed caps 12 in. (300 mm) or Less in Size at Least 8 ft. (2.4 m) from a Vertical Wall [NFPA 54: Figure 12.7.2 and Table 12.7.2]

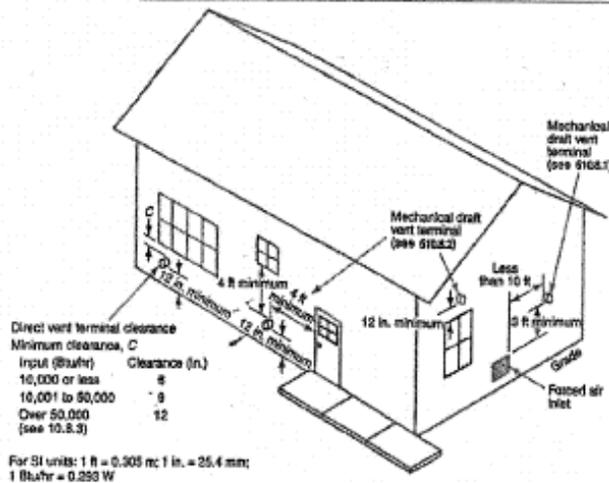


FIGURE 5-12 Exit Terminals of Mechanical Draft and Direct-Vent Venting Systems. [NFPA 54: Figure A.12.9]