



# Water Heater Check List

- ✓ Lo-nox WH required per BAAQMD
- ✓ Per energy code MECH-01, compliance doc required for permit & CF-6R required for final.

Expansion tank by  
**WATTS®**

6 in. min. to combustibles for single wall or 1 in. min. clearances for type "B" vent

Expansion tank when required.  
For explanation [click here](#)

For sizing [click here](#)  
**WATTS®**

Expansion tank must be secured to structure

Full-way valve

Insulate the first 5 ft. of hot & cold water per energy code. If recirc line installed, insulate all hot & recirc piping

Flexible listed connector

Water heater must be braced to resist displacement during earthquake

Solid support behind WH at strap location to prevent movement

Listed gas shutoff valve ahead of sediment trap & gas connector

Drip tee or sediment trap  
*(see below)*

8 ft. min.

12 in. min. above the roof deck  
(for roofs with slope < 6:12)

5 ft. min. above collar

Vent adequately supported

Unions req. within 12 in. of WH

Relief valve within 6 in. of top of WH

Approved straps installed:  
top & bottom strap within 1/3 of top & bottom of WH  
Bottom strap min. 4 in. above controls

Protective bollards  
(only in garage)

TPRV valve to drain to outside of building 6 in. to 24 in. above ground

Pipe supported to wall



## Water Heater Checklist

The intent of this check list is to provide installers a general reference for the enforcement of code requirements in the City of Oakland. 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. (2010 CPC 503)
- 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. (2010 CPC 508.26)
- 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. (2010 CPC 310.4)
- 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. (2010 CPC 505.6)
- 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 shall be provided with an approved, listed, and adequately sized expansion tank or other approved device having a similar function to control thermal expansion. (2010 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. (2010 CPC 608.2) *Commentary: This is a new requirement. 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. 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. (2010 CPC 505.6)
- Relief valves located inside a building shall be provided with a drain, not smaller than the relief valve outlet, of galvanized steel, hard-drawn copper piping and fittings, CPVC or listed relief valve drain tube with fittings that will not reduce the internal bore of the pipe or tubing (straight lengths as opposed to coils) and shall extend from the valve to the outside of the building, with the end of the pipe not more than two feet nor less than six inches above ground or the flood level of the area receiving the discharge and pointing downward. Such drains shall be permitted to terminate at other approved locations. Relief valve drains shall not terminate in a building's crawl space. No part of such drain pipe shall be trapped or subject to freezing. The terminal end of the drain pipe shall not be threaded. (2010 CPC 608.5)
- Discharge from a relief valve into a water heater pan shall be prohibited. (2010 CPC 508.5)
- Residential water heaters shall be sized in accordance with table 5-1. (2010 CPC table 5-1)



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- 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. (2010 CPC 508.14) *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 FVIR construction.*
- Water heaters shall be located or protected so they are not subject to physical damage by a moving vehicle. (2010 CPC 508.14.2) *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. (2010 CPC 508.2)
- 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. (2010 CPC 508.3)
- Water heaters installed in attics must have adequate support for the weight of the water heater.  
*See the 2010 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 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. (2010 CPC 508.4)
- 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" (2010 CPC 509.4.2)
- 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. (2010 CPC 509.4.1)
- The passageway shall be unobstructed and shall have solid flooring not less than 24" inches wide from the entrance opening to the appliance. (2010 CPC 509.4.3)
- A level working platform not less than 30" x 30" shall be provided in front of the service side of the appliance. (2010 CPC 509.4.4)
- 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. 2010 CPC 509.4.5)
- 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. (2010 CPC 505.3.1, 510.6.1.1)
- 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. (2010 CPC 1212.1.3) *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. 2010 CPC 1215



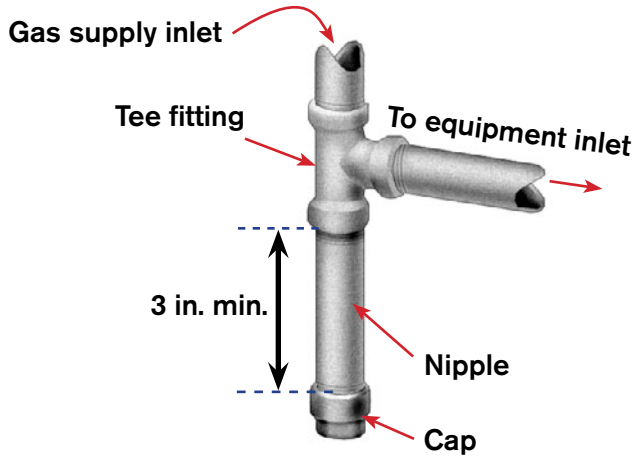
## Water Heater Checklist

- 1212.7 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 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 on page 5, or other device recognized as an effective sediment trap. (2010 CPC 1212.7) *Commentary: A sediment trap is required at water heaters. See attached Figure on page 4 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 507.0. Where existing facilities are not adequate, they shall be upgraded to Section 507.0 specifications. (2) The installation components and appliances meet the clearances to combustible material. (3) It shall be determined that the installation and operation of an additional or replacement appliance does not render remaining appliance unsafe for continued operation. (2010 CPC 508.6, 508.6.1)
- 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. (2010 CPC 510.6.1.1)
- 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. (2010 CPC 510.10.9.2)
- 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. (2010 CPC 510.10.9.3)
- 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 the illustration on page 5, provided they are at least eight 8' from a vertical wall or similar obstruction. (2010 CPC 510.6.2) See the illustration on page 5.
- 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. (2010 CPC 510.6.2.1)
- 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 2010 CEC 422.30 and 422.31B)

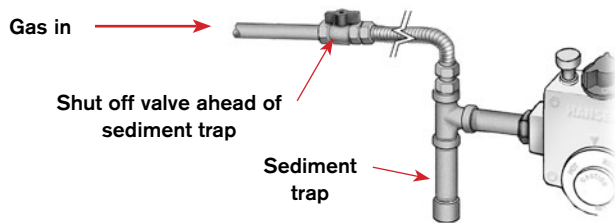


# Water Heater Checklist

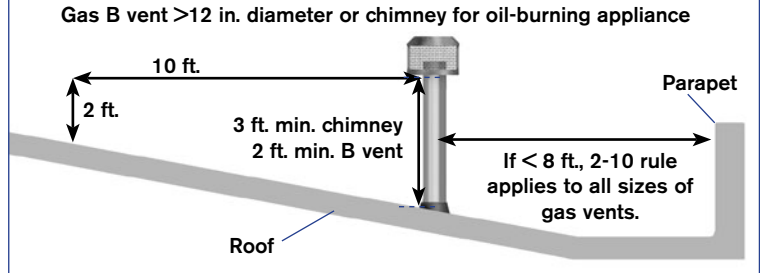
## Sediment Trap



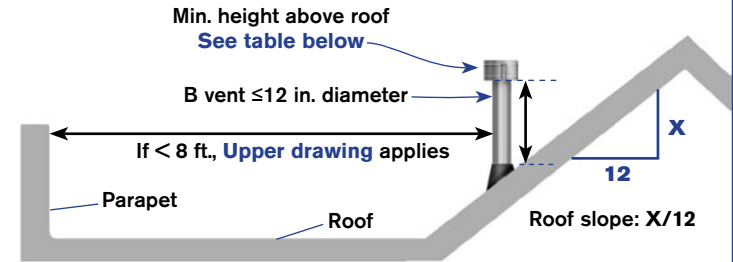
*Sediment traps should be placed as close as possible to appliance inlets.*



## Chimney & Vent Terminations



## B Vent Termination



### B VENT TERMINATION HEIGHT

Roof Slope	Min. Height (ft.)	Roof Slope	Min. Height (ft.)
Flat to 6/12	1	>11/12 to 12/12	4
>6/12 to 7/12	1¼	>12/12 to 14/12	5
>7/12 to 8/12	1½	>14/12 to 16/12	6
>8/12 to 9/12	2	>16/12 to 18/12	7
>9/12 to 10/12	2½	>18/12 to 20/12	7½
>10/12 to 11/12	3¼	>20/12 to 21/12	8

### TYPICAL GAS CONNECTOR FLOW CAPACITY (BTUs NATURAL GAS)

Size	12"	18"	24"	30"	36"	48"	60"	72"
3/4"	290,900	290,900	290,900	270,500	255,900	215,000	197,400	173,900
1/2"	180,000	164,200	150,000	136,000	125,000	106,000	93,200	86,000
3/8"	102,000	93,100	85,000	77,100	71,100	60,500	53,200	49,100
1/4"	48,000	43,800	40,000	36,400	33,400	28,300	24,900	23,100

For more information, click here:

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

For sizing calculator, click here:

[http://www.watts.com/pages/support/sizing\\_DET.asp](http://www.watts.com/pages/support/sizing_DET.asp)



# Water Heater Checklist

## For Water Heaters & Other Category 1 Appliances

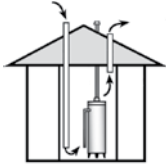
Gas vent shall be supported, strapped or braced in accordance with their listings and manufacturers installation instruction. (2010 CPC Sec. 510.6.5).

The maximum horizontal length of a single-wall connector shall not exceed 75 percent of the height of vent. The maximum horizontal length of a Type "B" connector shall not exceed 100 percent of the height of vent. (2010 CPC Sec. 510.10.9.2 (3)).

### Air for Combustion, Ventilation & Dilution

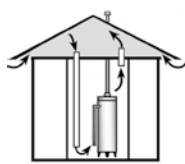
Combustion air must be provided per 2010 CPC Section 507.0. For water heaters located in room large enough to support combustion process (minimum 50 cubic feet of space per 1000 BTU/Hr. of appliances input rating (507.2.1) additional openings not required. In all other instances, please refer to the Code for specific details and requirements.

#### Vertical Ducts to Outdoors



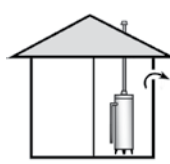
2 vertical ducts  
min. 1 sq.in./4kBtu each

#### Vertical Ducts to Attic



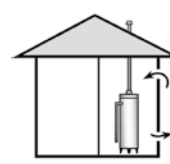
2 openings to ventilated attic  
min. 1 sq.in./4kBtu each &  
sleeved min 6 in. above joist

#### Single-Opening Method



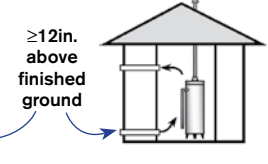
1 opening in upper  
12in. of exterior wall  
min. 1 sq.in./3kBtu

#### 2 Direct Exterior Openings



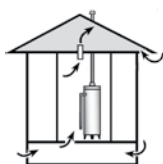
2 openings in exterior wall  
min. 1 sq.in./4kBtu each

#### Horizontal Ducts



2 openings in exterior wall  
min. 1 sq.in./2kBtu each

#### Crawl-Space & Attic Openings

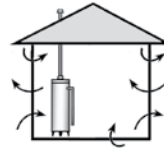


Attic & crawl space  
min. 1 sq.in./4kBtu each

#### Crawl Space Cannot Be Upper Air Source

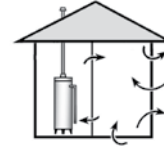


#### All Air from Indoors



Space w/ >0.40 ACH sufficient  
if volume  $\geq 50$  cu.ft./kBtu.

#### Confined Space Indoors



Openings from enclosed appliance space  
to building interior min. 100sq.in. each and  
per table below. One in upper 12 in. & 1  
in. lower 12 in. of enclosed space.

COMBUSTION AIR OPENING SIZES				
Btu	Indoor Air <sup>A</sup>		Outdoor Air Openings	
	Opening size <sup>B</sup>	cu.ft. min. (sq.ft. <sup>C</sup> )	1 in./4kBtu/hr.	1 in./2kBtu/hr.
30k	100 sq.in.	1,500 (188)	15 sq.in.	7.5 sq.in.
40k	100 sq.in.	2,000 (250)	20 sq.in.	10sq. n.
50k	100 sq.in.	2,500 (313)	25 sq.in.	12.5 sq.in.
60k	100 sq.in.	3,000 (375)	30 sq.in.	15 sq.in.
80k	100 sq.in.	4,000 (500)	40 sq.in.	20 sq.in.
100k	100 sq.in.	5,000 (625)	50 sq.in.	25 sq.in.
125k	125 sq.in.	6,250 (781)	62.5 sq.in.	31.3 sq.in.
150k	150 sq.in.	7,500 (938)	75 sq.in.	37.5 sq.in.

A. For construction w/ known air infiltration rate >0.40/hr.  
 B. Req'd opening between confined space (<50 cu.ft. per kBtu's) & unconfined space.  
 C. Ex: sq. ft. for 8 ft. ceiling – use actual room volume.