CITY OF MILPITAS
Building & Safety Department
455 E. Calaveras Blvd.
Milpitas, CA 95035
408-586-3240
www.ci.milpitas.ca.gov

RESIDENTIAL WATER HEATER

1. PERMIT INFORMATION:

- ❑ The replacement of an existing or installation of a new water heater requires a plumbing permit.
- ❑ A Building Permit may be issued only to a State of California Licensed Contractor or the Homeowner.
- ❑ If the work is performed by the Homeowner personally or by his/her workers, and an inspection indicates the work cannot be completed satisfactorily, then a licensed contractor must perform the work.
- ❑ If the Homeowner hires workers, State Law requires the Homeowner to obtain Worker's Compensation Insurance. Proof of this insurance is required prior to inspection.

2. INSTALLATION REQUIREMENTS:

- ❑ **Building Codes:** All work must comply with the 2010 California Building Code (CBC), 2010 California Residential Code (CRC), 2010 California Electrical Code (CEC), 2010 California Plumbing Code (CPC), 2010 California Energy Code based upon 2008 Building Energy Efficiency Standards (CEnC) and 2011 Milpitas Municipal Code (MMC).
- ❑ Refer to the "*Water Piping*" handout for detailed information regarding replacement of water piping (requires separate online permit).
- ❑ All pipe, pipe fittings, traps, fixtures, material, and devices used in a plumbing system shall be listed or labeled (third-party certified) by an approved listing agency (CPC 301.1.1).
- ❑ Listed water heaters shall be installed in accordance with their listings and the manufacturer's instructions (CPC 505.3.1).
- ❑ The minimum capacity for water heaters shall be in accordance with the first hour rating (this can be found on the "Energy Guide" label on the heater) as follows: (CPC 501.0)

Number of Bathrooms	1 to 1.5		2 to 2.5			3 to 3.5	
Number of Bedrooms	1	2-3	2	3-4	5	3	4-6
First Hour Rating, Gallons	42	54	54	67	80	67	80

- ❑ Location:
  - A fuel burning (gas) water heater may be installed in a closet located in a bathroom or bedroom if installed in accordance with CPC Section 505.1.
  - Water heaters, except direct vent type, shall be located as close as practical to the vent (CPC 505.2).
  - Clearances shall not be such as to interfere with combustion air, draft hood clearance and relief, and accessibility for servicing. (CPC 505.3.1)

- ❑ General requirements:

  - Water heaters shall be anchored or strapped to resist horizontal displacement due to earthquake motion. Straps shall be located within the top 1/3 of the water heater unit and one within the bottom 1/3. The bottom strap must be located at least 4" above the water heater controls. (CPC 508.2)

  - Water heaters supported on the ground shall rest on level concrete or other approved base extending not less than three (3) inches above the adjoining ground level (CPC 508.3).

  - Water heaters located in a garage, or in an adjacent space opening into the garage that is not part of the living area, must be elevated so the burners and burner-ignition devices are at least 18" above the garage floor surface, unless the heater is listed as flammable vapor ignition resistant (FVIR). Heater shall be located or protected so it is not subject to physical damage by a moving vehicle. (CPC 508.14)

  - Installer 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 to the inspector, service personnel, and the owner or operator (CPC 508.26).

  - Water heaters installed outdoors shall be listed for outdoor installation or provided with protection to the degree the environment requires. Appliances listed for outdoor installation shall be installed in accordance with its listing. (CPC 508.27)

  - Water heaters installed on roofs shall be installed in accordance with CPC Section 509.0.

  - Water heaters installed in attics, attic-ceiling assembly, floor-ceiling assembly, or floor-subfloor assembly where damage results from a leaking water heater, a water-tight pan of corrosion-resistant materials shall be installed beneath the heater with not less than a ¾ inch drain to an approved location (CPC 508.4). The end of the drain should be in a location that will draw attention to the need for determining the cause of the leak.

  - Dielectric unions shall be used at all points of connection where there is a dissimilarity of materials (CPC 316.2.4).

- ❑ Tankless water heaters shall be listed by an approved testing agency (UL, IAPMO, etc.) and be installed in accordance with it's listing and the manufacturer's requirements. If replacing an existing tank heater with a tankless, it is likely the gas piping will have to be replaced with a larger pipe run back to the meter. Piping shall be sized and installed in accordance with CPC Chapter 12. Some tankless heaters also require an electrical connection and an electrical permit may be required.

- ❑ Pressure regulator - where the water pressure is in excess of 80 psi, an approved type pressure regulator preceded by an adequate strainer. The regulator and strainer shall be accessible, protected from freezing, and shall have the strainer readily accessible for cleaning without removing the regulator or strainer body or disconnecting the supply piping. An approved expansion tank shall be installed in the cold water distribution piping downstream of each such regulator. (CPC 608.2)

- ❑ Expansion Tank - any water system provided with a check valve, backflow preventer, pressure regulator 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. Such expansion tank or other approved 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 the manufacturer's recommendation. (CPC 608.3)

- ❑ Grounding and bonding - metal water (hot and cold) and gas piping systems installed in or attached to a building or structure shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor where of sufficient size, or to the one or more grounding electrodes used in accordance with CEC Section 250.104.

- ❑ Heaters installed in attics shall comply with the following: (CPC 509.4)

  - An attic access opening and passageway shall be installed that is at least as large as the largest component of the appliance but not less than 22w inches x 30 inches.

  - Where the height of the passageway is less than 6 feet, the distance from the access opening to the appliance shall not exceed 20 feet.

  - The passageway shall be unobstructed and shall have a solid flooring not less than 24 inches wide.

  - A level working platform not less than 30 inches by 30 inches shall be provided in front of the service side of the heater.

  - 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.

  - If heater is installed on top of ceiling framing, with the total weight not exceeding 400 lbs, then, as a minimum: (Policy #BDP-BLG04)

    - Water heater shall be located on a ¾" plywood platform attached to the ceiling joists with #10 wood screw or 8d penny nails 6" o.c. at the plywood panel edges and 12"o.c. at intermediate joists.

    - If seismic strapping to the adjacent walls is not possible, provide strapping to the ceiling joists below. Use ¾" x 24 gauge perforated plumbers tape encircling top 1/3 of the water heater. Provide minimum 3 evenly spaced diagonal braces to ceiling joists with similar plumbers tape or ½" diameter EMT conduit with flatten edges. Use 1/4" diameter x 1" round head machine bolt with washer and nut for bracing connections.

    - Attach diagonal braces to wood ceiling joists with ¼" diameter x 3" long lag screws or 1/4" diameter x 2" machine bolts with washers and nut to metal joists.

    - Protect plywood with corrosion-resistant pan as required by CPC 508.4 (see above).

- ❑ Water valves and unions:

  - A fullway valve shall be installed on the cold water supply pipe to each water heater at or near the water heater (CPC 605.2).

  - Valves shall be brass or other approved material. Each gate or ball valve shall be a fullway type with working parts of non-corrosive material. Valves shall meet the requirements of NSF 61, Standard for Drinking Water System Components, as referenced in Table 14-1. (CPC 605.1)

  - A union shall be installed in the water supply piping not more than 12 inches of regulating equipment, water heating, conditioning tanks, and similar equipment that requires service by removal or replacement (CPC 609.5).

- ❑ Water piping connectors:

  - Listed flexible copper water connectors shall be installed in readily accessible locations, unless otherwise listed (CPC 604.4).

  - Flexible corrugated connectors of copper or stainless steel shall be limited to 24 inches in length (CPC 604.12).

  - Flexible metallic water heater connectors or reinforced flexible water heater connectors connecting water heating to the piping system shall be in compliance with the applicable standards referenced in Table 14-1 (CPC 604.14).

- ❑ Relief valves:

  - All storage water heaters shall have an approved, listed, adequately sized combination pressure and temperature relief valve (CPC 608.3).

  - The installation of temperature, pressure, and vacuum relief devices or combinations thereof, and automatic gas shutoff devices, shall be installed in accordance with their listings and the manufacturer's instructions. 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. (CPC 505.6).

  - Relief valves 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 6 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 (such as a garage floor if the floor slopes to drain and will not cause damage). 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. (CPC 608.5)

  - Most manufacturers allow a maximum of four 90 degree elbows and a maximum length 30 feet.

  - Discharge from a relief valve into a water heater pan shall be prohibited (CPC 508.5).

  - Where a hot-water storage tank or an indirect water heater is located at an elevation above the fixture outlets in the hot-water system, a vacuum relief valve shall be installed on the storage tank or heater (CPC 608.7).

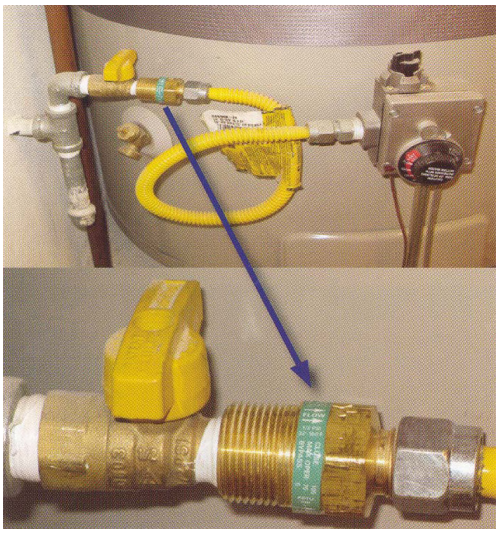
- ❑ Gas piping and gas shut-off valves:

  - New gas piping must be installed back to the meter or calculations must be provided to show the existing piping is adequately sized.

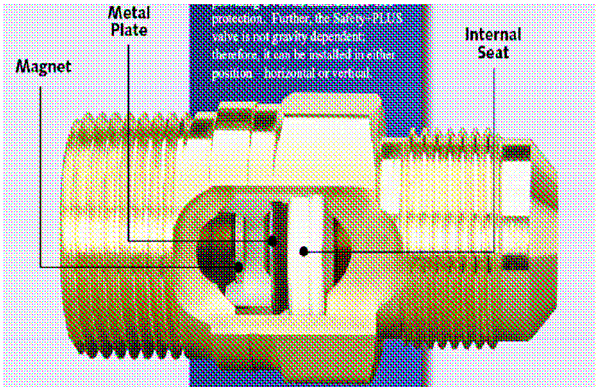
  - It is the responsibility of the installer to verify that the new or existing gas supply is correctly sized before installation. Refer to the separate handout *"Natural Gas Piping"* for additional information.

  - Gas connectors must comply with CPC Section 1212.0. Listed flexible gas connectors in compliance with CSA Z21.24, Standard for Connectors for Gas Appliances may be used if installed in accordance with their listing. Connectors must be located completely in the same room as the appliance.

- An approved Excess Flow Gas Shut-off Device (non-motion sensitive) shall be installed at the gas fuel appliance outlet when replacing any existing or installing any new gas fuel appliance. The Excess Flow Device shall be installed between the shutoff valve and the connector (see diagram page 7 *not the photo below*). (MMC II-170-2.00)

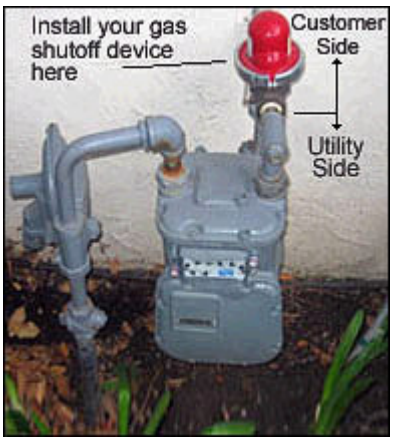


Close up view of an excess flow device:



- An approved Seismic Gas Shut-off Device (motion sensitive) *or* an approved Excess Flow Gas Shut-off Device (non-motion sensitive) shall be installed downstream of the gas utility meter (after PG&E service tee), but upstream of any appliances, when providing alteration or addition to the existing gas fuel line. (MMC II-170-2.00)

"California Valve"



- Automatic Gas Shut-off Devices shall be installed by a contractor licensed in the appropriate classification by the State of California and in accordance with the manufacturer's instructions.

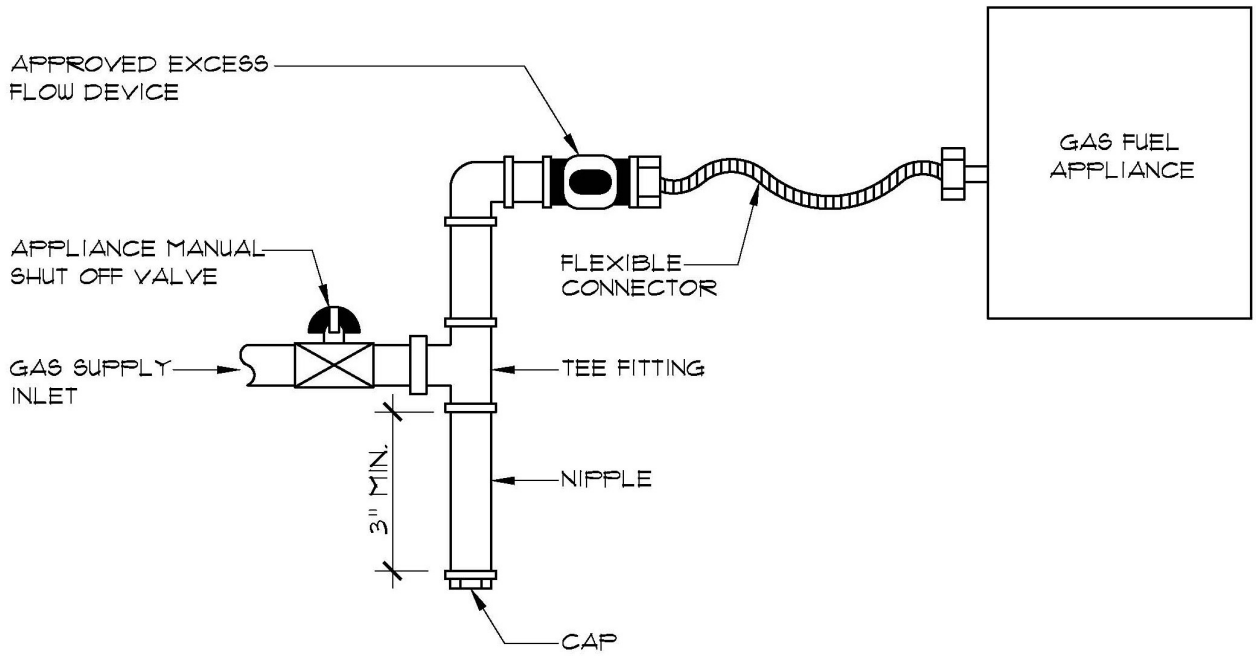
- Seismic Gas Shut-off Devices (motion sensitive) must be mounted rigidly to the exterior of the building or structure containing the fuel gas piping. This requirement need not apply if the Building and Safety Department determines that the Seismic Gas Shut-off Device (motion sensitive) has been tested and listed for an alternate method of installation.

- Both Seismic Gas Shut-off Devices (motion sensitive) and Excess Flow Gas Shut-off Devices (non-motion sensitive) must be certified by the Office of State Architect and be listed by an approved listing and testing agency such as IAS, IAPMO, UL or the Office of State Architect.

- Both Seismic Gas Shut-off Devices (motion sensitive) and Excess Flow Gas Shut-off Devices (non-motion sensitive) must have a thirty (30) year warranty which warrants that the valve or device is free from defects and will continue to operate properly for thirty (30) years from the date of installation.

- Where Automatic Gas Shut-off Devices are installed voluntarily or as required by code, they shall be maintained for the life of the building or structure or be replaced with a valve or device complying with the requirements of this section.

- Where a sediment trap is not incorporated as a part of the gas appliance, a sediment trap shall be installed as close to the inlet of the appliance as practical at the time of equipment installation. The sediment trap shall be either a tee fitting with a capped nipple in the bottom outlet, as illustrated below, or other device recognized as an effective sediment trap. Trap shall be installed after shutoff valve to allow for draining. Sediment traps are not required on illuminating appliances, ranges, clothes dryers, decorative vented appliances for installation in vented fireplaces, gas fireplaces, and outdoor grills. (CMC 1312.6.3)



- Combustion air:

  - Gas appliances of other than natural draft design and other than Category I vented appliances shall be provided with combustion, ventilation, and dilution air in accordance with the appliance manufacturer's instructions (CPC 507.1.1). Most water heaters vent by gravity, their flue gases are lighter than the air in the environment in which the combustion occurs so they naturally rise up in a vent that is open to the atmosphere at the top. The open draft hood on the top of the water heater allows additional air to dilute the flue gases. Insufficient combustion air is hazardous. If there is not sufficient oxygen to fully burn the fuel at the correct temperature, deadly carbon monoxide will also be a product of combustion. If the air pressure in the water heater space is lower than that in the vent, products of combustion might "spill" out of the draft hood and enter the interior environment.

  - Makeup air requirements for the operation of exhaust fans, kitchen ventilation systems, clothes dryers, and fireplaces shall be considered in determining the adequacy of a space to provide combustion air requirements (CPC 507.1.4).

  - Combustion air must be provided per CPC Section 507.0. When the appliance is located in a large room or space (e.g. garage) the combustion air may come from that area. When located in a closet, combustion air must be provided by one or more openings between the closet and a large room or space, directly to the outside, to an area that communicates directly with the outside, or a combination of these. The following are minimum opening requirements:

- Indoor air:
  - All air from indoors by infiltration (appliance in same room) – the room must have a minimum 50 cubic feet per 1,000 Btu/hour of all appliances. Indoor rooms must have sufficient infiltration from the outdoors to continuously replenish the indoor air. The rate of infiltration is dependent on the number and size of gaps and cracks around openings in the building. Buildings of Unusually Tight Construction (less than 40% air changes per hour) require calculations of the infiltration rate (CPC 507.2)
  - Openings used to connect indoor spaces on the same story – each opening shall have a free area of not less than 1 square inch/1,000 Btu/hour of the total input rating of all gas appliances in the space, but not less than 100 square inches. One opening shall commence within 12 inches of the top, and one opening shall commence within 12 inches of the bottom of the enclosure. The minimum dimension of the air openings shall not be less than 3 inches. (CPC 507.3)
  - Openings used to connect indoor spaces on different stories – the volumes of spaces in different stories shall be considered as communicating spaces where such spaces are connected by one or more openings in doors or floors having a total free area of not less than 2 square inches/1,000 Btu/hour of the total input rating of all gas appliances in the space (CPC 507.3)
- Outdoor air – Outdoor combustion air shall be provided through opening(s) to the outdoors in accordance with the following. The minimum dimension of the air opening(s) shall not be less than 3 inches. (CPC 507.4)
  - Two permanent openings, one within 12 inches of the top and one within 12 inches of the bottom of the enclosure. The openings shall communicate directly, or by ducts, with the outdoors or spaces that freely communicate with the outdoors as follows:
    - Where directly communicating with the outdoors or where communicating through vertical ducts, each opening shall have a free area of not less than 1 square inch/4,000 Btu/hour of total input rating of all appliances in the enclosure.
    - Where communicating with the outdoors through horizontal ducts, each opening shall have a free area of not less than 1 square inch/2,000 Btu/hour of total input rating of all appliances in the enclosure.
  - One permanent opening, commencing within twelve inches of the top of the enclosure. The appliance shall have clearances of not less than 1 inch from the sides and back and 6 inches from the front of the appliance. The opening shall directly communicate with the outdoors or shall communicate through a vertical or horizontal duct to the outdoors or spaces that freely communicate with the outdoors and shall have a minimum free area of:
    - 1 square inch/3,000 Btu/hour of total input rating of all appliances in the enclosure, and not less than the sum of the areas of all vent connectors in the space.
- Combination of indoor and outdoor combustion air shall be in accordance with the following: (CPC 507.5)
  - Indoor openings shall comply with the requirements for indoor air above.
  - Outdoor openings shall comply with the requirements for outdoor air above.

- The outdoor openings size shall be calculated as follows:
  - The ratio of interior spaces shall be the available volume of communicating spaces divided by the required volume.
  - The outdoor size reduction factor shall be one (1) minus the ratio of interior spaces.
  - The minimum size of outdoor openings shall be the full size of outdoor openings calculated in accordance with the requirements for outdoor air above (one or two openings), multiplied by the reduction factor. The dimension of air openings shall not be less than 3 inches.

- Mechanical air supply – where combustion air is provided by a mechanical air supply system, the combustion air shall be supplied from outdoors at the minimum rate of 0.35 cubic feet/min per 1,000 Btu/hour for all appliances located in the space (CPC 507.7).
  - Where exhaust fans are installed, additional air shall be provided to replace the exhausted air.
  - Each of the appliances served shall be interlocked to the mechanical air supply system to prevent main burner operation where the mechanical air supply system is not in operation.
  - Where combustion air is provided by the building's mechanical ventilation system, the system shall provide the specified combustion air rate in addition to the required ventilation air.

- Louvers, grilles and screens: (CPC 507.8)
  - The required size of openings shall be based on the net free area of each opening. Where the free area through a louver or grille is known, it shall be used. Where the design and free area are not known, it shall be assumed that wood louvers will have a 25 percent free area and metal louvers and grilles will have a 75 percent free area. Non-motorized louvers and grilles shall be fixed in the open position.
  - Screens shall be not less than ¼ inch mesh.
  - Motorized louvers shall be interlocked with the appliance.

- Combustion air ducts: (CPC 507.9)
  - Ducts shall be of galvanized steel or a material having equivalent corrosion resistance, strength, and rigidity. Within dwelling units, unobstructed stud and joist spaces shall be prohibited from conveying combustion air, provided that not more than one fireblock is removed.
  - Ducts shall terminate in an unobstructed space, allowing free movement of combustion air to the appliances.
  - Ducts shall serve a single space.
  - Ducts shall not service both upper and lower combustion air openings where both such openings are used. The separation between ducts serving upper and lower combustion air openings shall be maintained to the source of combustion air.
  - Ducts shall not be screened where terminating in an attic space.

- Intakes for combustion air ducts located exterior to the building shall have the lowest side of the combustion air intake openings located at least 12 inches vertically from the adjoining finished grade level.

- Horizontal upper combustion air ducts shall not slope downward toward the source of combustion air.

❑ Vents shall be as follows:

- A venting system shall be designed and constructed to develop a positive flow adequate to remove flue or vent gases to the outside atmosphere (CPC 510.3.1). The venting system shall satisfy the draft requirements of the appliance in accordance with the terms of its listing and the manufacturer's instructions (CPC 510.3.2). Refer to Table 5-18 for capacity of existing asbestos cement vent pipe.

- Type B gas vent is a vent for venting listed gas appliances with draft hoods and other Category I appliances listed for use with Type B gas vents (CPC 502.9).

- Type L gas vent is a vent for venting appliances listed for use with type L vents and appliances listed for use with Type B gas vents (CPC 502.10).

- Single-wall metal pipe shall not be used as a vent in dwellings and residential occupancies (CPC 510.7.4.1).

- For sizing an individual gas vent for a single, draft-hood-equipped appliance, the effective area of the vent connector and the gas vent shall be at least the area of the appliance draft hood outlet but no larger than seven times the draft hood outlet area [CPC 510.6.3.1(3)]. Vents for two draft-hood-equipped appliances shall be the size of the larger draft hood outlet area plus 50 percent of the smaller draft hood outlet area [CPC 510.6.3.1(4)].

- Type B or L 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 into exceed 75 percent of the vertical height of the vent. (CPC 510.6.1.1)

- Type B and L vents shall terminate at least 5 feet in vertical height above the highest connected appliance draft hood or flue collar (CPC 510.6.2.1).

- Screws, rivets and other fasteners shall not penetrate the inner wall of double wall vents (CPC 510.6.1.2).

- The vent passing through a roof shall extend through the entire roof flashing, roof jack, or roof thimble and be terminated with a listed termination cap (CPC 510.6.1).

- The vent shall terminate a minimum 12" (more if roof slope exceeds 6:12) above the roof (measured from the high side of the roof where the vent passes through to the lowest discharge opening) or 2 feet above a vertical wall or similar obstruction within 8 feet. (CPC 510.6.2)

- A vent shall terminate at least 3 feet above a force air inlet located within 10 feet (CPC 510.6.2.6).

- A vent extending through an exterior wall shall not terminate adjacent to the wall or below eaves or parapets, except as permitted in CPC 510.2.5 and 510.3.4.

- Direct vent appliances shall terminate in accordance with CPC 510.8.3.

- Mechanical draft systems shall be installed in accordance with CPC 510.3.4.

- Vents serving gas appliances located on more than one floor shall be sized and installed in accordance with CPC Section 510.6.4.

- Vents must be supported and spaced in accordance with their listing and the manufacturer's instructions (CPC 510.6.5)

❑ Vent connectors shall be installed as follows:

- A vent connector shall be used to connect the water heater to the vent, unless the vent connects directly to the heater (CPC 510.10.1).

- Vent connectors for listed gas appliances with draft hoods that are not installed in attics, crawl spaces, or other unconditioned areas shall be: (CPC 510.10.2.4)

  - Type B or L vent material.
  - Galvanized sheet steel at least 0.018 inches thick.
  - Aluminum (1100 or 3003 alloy or equivalent) sheet at least 0.027 inches thick.
  - Stainless steel sheet at least 0.012 inches thick.
  - Smooth interior wall metal pipe having resistance to heat and corrosion equal to or exceeding that of the galvanized, aluminum or stainless material listed above.
  - Listed vent connector.

- Listed single-wall vent connectors may be used but must be located in the same room as the heater (CPC 510.7.4.3).

- Single wall metal pipe shall not originate in any unoccupied attic or concealed space (CPC 510.7.4.3).

- A vent connector shall not pass through any ceiling, floor, or fire-resistance-rated wall. A single-wall metal pipe shall not pass through any interior wall. A vent connector made of Type B material and serving a heater with a draft-hood may pass through walls if clearance to combustibles is maintained. (CPC 510.10.14)

- Where two or more openings are provided into one vent, the openings shall either be at different levels, or the connectors shall be attached to the vertical portion of the vent at an angle of 45 degrees or less relative to the vertical. Where two or more connectors enter a common vent, the smaller connector shall enter at the highest level possible consistent with the available headroom or clearance to combustible material. Vent connectors serving natural draft venting appliances shall not be connected to a vent serving other appliances operating under positive static pressure. (CPC 510.10.4)

- The minimum clearances from single wall metal connectors and combustibles shall be 6". The clearances from Type B connectors shall be per its listing. (CPC 510.10.5)

- Connectors shall be installed so as to avoid turns or bends (CPC 510.10.6).

- Vent connector shall be as short as practical and the water heater located as close as practical to the vent. The maximum horizontal length of a single-wall connector shall be 75 percent of the height of the vent. The maximum horizontal length of a type B connector shall be 100 percent of the height of the vent. The maximum length of an individual connector for a 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 vent. (CPC 510.10.9)

- Joints between sections of vent connector piping and connections to flue collars or draft hood outlets shall be fastened by sheet metal screws, in accordance with the manufacturer's instructions, or other approved means (CPC 510.10.7).

- Vent connectors shall be installed without any dips or sags and shall slope upward toward the vent not less than 1/4 inch per foot (CPC 510.10.8).

- Vent connectors shall be supported for the design and weight of the material employed to maintain clearances and prevent physical damage and separation of joints (CPC 510.10.10).

- Vent connectors serving two draft-hood equipped appliances shall be at least the area of the larger vent connector plus 50 percent of the areas of small flue collar outlets (CPC 510.10.3.4).

- Vent connector for an appliance with a single draft hood outlet shall be the size of the flue collar. The size of the connector when there is more than one outlet or more than one appliance served by a common connector shall be in accordance with CPC Section 511. (CPC 510.10.3)

3. ENERGY REQUIREMENTS:

- ❑ Water heater installations must comply with all applicable mandatory measures of the California Energy Code. Refer to the attached form MF-1R for a list of the mandatory requirements.

- ❑ Water heater must be certified by the California Energy Commission. For a listing of approved appliances, go to http://www.appliances.energy.ca.gov/.

- ❑ **Title 24 Energy Compliance Reports:** The following forms must be filled out and submitted with the permit application, or for online permits, attached to the permit:

  - Mandatory Measures form MF-1R.
  - Certificate of Compliance form CF-1R ALT.
  - Installation Certificate CF-6R-MECH-01.

- ❑ Service water heating systems and equipment may be installed only if the manufacturer has certified that the system or equipment complies with all of the requirements of the California Energy Code [Section 113(a)]. For a listing of approved appliances, go to http://www.energy.ca.gov/appliances.

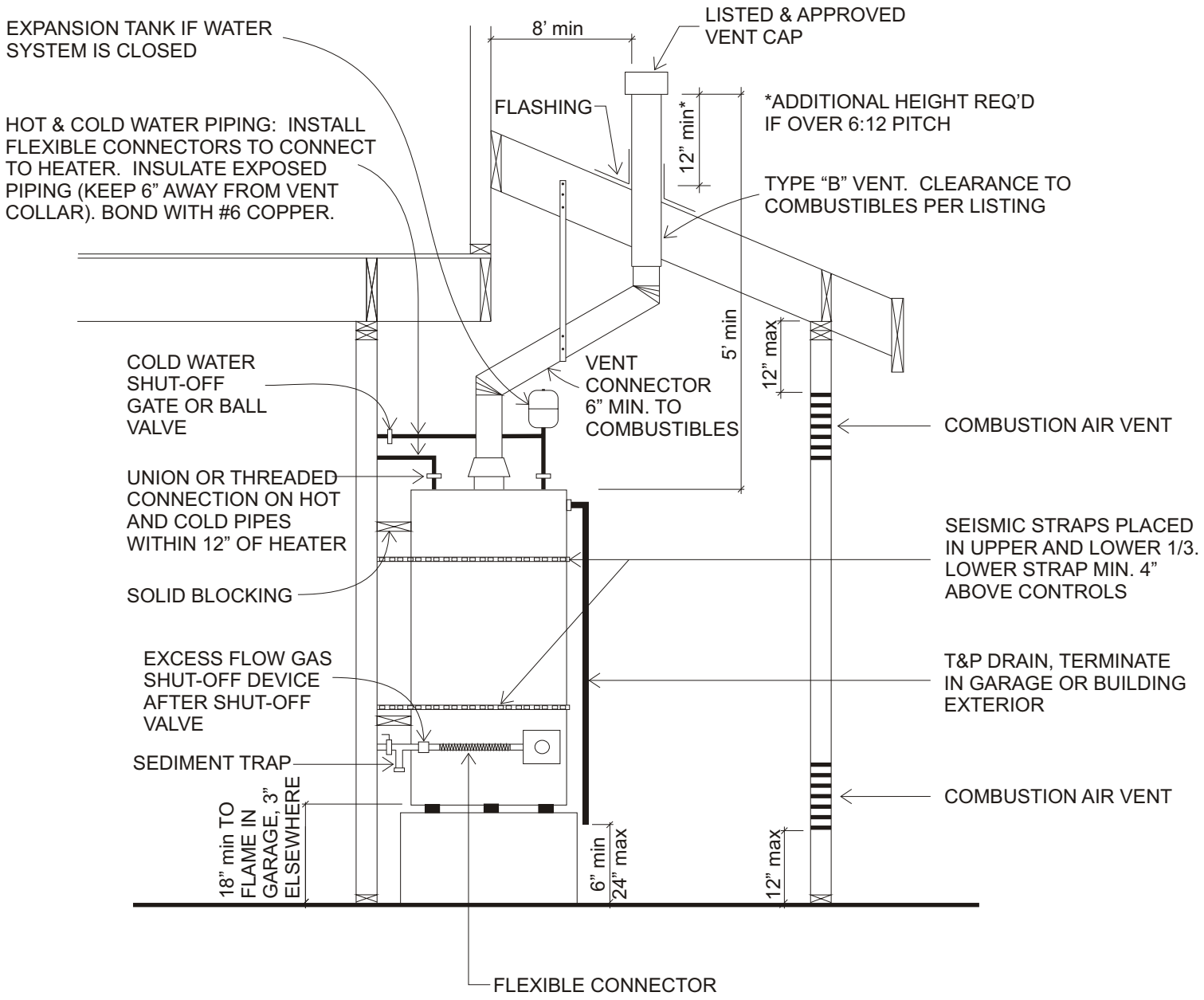
- ❑ Circulating service water-heating systems shall have a control capable of automatically turning off the circulating pump when hot water is not required [CEnC Section 113(c) (2)].

4. INSPECTION PROCEDURES:

- ❑ A final inspection is required after the water heater has been installed and all work completed. The Permit Card with the Energy Compliance Report forms completely filled out and attached, and the Approved Job Copy of the Drawings (if any) must be presented to the inspector. Permits expire 180 days after issuance or last inspection passed, whichever is the latest.

5. QUESTIONS:

- ❑ If you have any questions regarding your project contact the Building & Safety Department at (408) 586-3240



HEATER IN GARAGE WILL REQUIRE PROTECTIVE BOLLARDS IF IT MIGHT BE DAMAGED BY VEHICLE. WATERTIGHT PAN UNDERNEATH WITH MIN. 3/4" DRAIN TO APPROVED LOCATION REQUIRED IF INSTALLED ON WOOD FLOOR, IN CEILING OR IN ATTIC.

STANDARD WATER HEATER INSTALLATION

Mandatory Measures Summary	Water Heater Only	MF-1R
Residential		
Site Address:	**Enforcement Agency:** City of Milpitas	**Date:**

Space Conditioning, Water Heating and Plumbing System Measures:
§110-§113: HVAC equipment, water heaters, showerheads, faucets and all other regulated appliances are certified by the Energy Commission.
§113(c)5: Water heating recirculation loops serving multiple dwelling units and High-Rise residential occupancies meet the air release valve, backflow prevention, pump isolation valve, and recirculation loop connection requirements of §113(c)5.
§115: Continuously burning pilot lights are prohibited for natural gas: fan-type central furnaces, household cooking appliances (appliances with an electrical supply voltage connection with pilot lights that consume less than 150 Btu/hr are exempt), and pool and spa heaters.
§150(h): Heating and/or cooling loads are calculated in accordance with ASHRAE, SMACNA or ACCA.
§150(i): Heating systems are equipped with thermostats that meet the setback requirements of Section 112(c).
§150(j)1A: Storage gas water heaters rated with an Energy Factor no greater than the federal minimal standard are externally wrapped with insulation having an installed thermal resistance of R-12 or greater.
§150(j)1B: Unfired storage tanks, such as storage tanks or backup tanks for solar water-heating system, or other indirect hot water tanks have R-12 external insulation or R-16 internal insulation where the internal insulation R-value is indicated on the exterior of the tank.
§150(j)2: First 5 feet of hot and cold water pipes closest to water heater tank, non-recirculating systems, and entire length of recirculating sections of hot water pipes are insulated per Standards Table 150-B.
§150(j)2: Cooling system piping (suction, chilled water, or brine lines),and piping insulated between heating source and indirect hot water tank shall be insulated to Table 150-B and Equation 150-A.
§150(j)2: Pipe insulation for steam hydronic heating systems or hot water systems >15 psi, meets the requirements of Standards Table 123-A.
§150(j)3A: Insulation is protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind.
§150(j)3A: Insulation for chilled water piping and refrigerant suction lines includes a vapor retardant or is enclosed entirely in conditioned space.
§150(j)4: Solar water-heating systems and/or collectors are certified by the Solar Rating and Certification Corporation.

Prescriptive Certificate of Compliance: Residential	Water Heater Only	CF-1R-ALT
Residential Alterations		
Project Name:	**Climate Zone #** 4	**# of Stories**

General Information		
Site Address:	**Enforcement Agency:** City of Milpitas	**Date:**
Building Type ☐ Single Family ☐ Multi Family		
Conditioned Floor Area (CFA): _____	Project Type: ☐ Alterations ☐ Envelope ☐ Fenestration ☐ Roof ☐ HVAC Replacement or Change Out ☐ Duct Replacement ☒ Water Heater	
NOTE: This form is not to be used for Newly Constructed Buildings or Additions		

WATER HEATING

List water heaters and boilers for both domestic hot water (DHW) heaters and hydronic space heating. Individual dwelling DHW heaters must be gas or propane fired, and may not exceed 50 gallons. Hot water pipe insulation from the DHW heater to the kitchen(s) and on all underground hot water pipes is required in all component packages in all climate zones.

Water Heater Type/Fuel Type[1]	Distribution Type (Standard, Recirculating)[2]	Number In System	Tank Capacity (gal)	Energy Factor or Thermal Efficiency	External Tank Insulation R-Value[3]

1. Indicate Type (Storage Gas, Heat Pump, Instantaneous, etc.)
2. Recirculating systems serving multiple dwelling units shall meet the recirculation requirements of §150(n). The Prescriptive requirements do not allow the installation of a recirculating water heating system for single dwelling units.
3. The external water heating tank and pipes shall be insulated to meet the requirements of §150(j).

Documentation Author's Declaration Statement	
• **I certify that this Certificate of Compliance documentation is accurate and complete.**	
Name:	Signature:
Company:	Date:
Address:	If Applicable ☐ CEA or ☐ CEPE (Certification #):
City/State/Zip:	Phone:

Responsible Building Designer's Declaration Statement

- I am eligible under Division 3 of the California Business and Professions Code to accept responsibility for the building design identified on this Certificate of Compliance.
- I certify that the energy features and performance specifications for the building design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 1 and 6 of the California Code of Regulations.
- The building design features identified on this Certificate of Compliance are consistent with the information provided to document this building design on the other applicable compliance forms, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.

Name:	Signature:
Company:	Date:
Address:	License:
City/State/Zip:	Phone:

For assistance or questions regarding the Energy Standards, contact the Energy Hotline at: 1-800-772-3300.

Registration Number: _____ *Registration Date/Time:* _____ *HERS Provider:* _____

INSTALLATION CERTIFICATE		CF-6R-MECH-01
Domestic Hot Water (DHW)		**(Page 1 of 2)**
Site Address:	**Enforcement Agency:**	**Permit Number:**

1. WATER HEATING SYSTEMS:

Heater Type	CEC Certified Mfr Name & Model Number	Distribution Type (Std, Point-of-Use, etc)	If Recirculation, Control Type	# of Identical Systems	Rated Input (kW or Btu/hr)[1]	Tank Volume (gallons)	Efficiency (EF, RE)[1]	Standby Loss (%)[1]

*Note 1: For **small gas storage** (rated input less than or equal to 75,000 Btu/hr), **electric resistance** and **heat pump water heaters**, list Energy Factor (EF). For **large gas storage water heaters** (rated input of greater than 75,000 Btu/hr), list Recovery Efficiency (RE), Thermal Efficiency, Standby Loss and Rated Input. For **instantaneous gas water heaters**, list the Thermal Efficiency and Rated Input.*

2. Mandatory Measures

TO COMPLY - ALL BOXES MUST BE CHECKED

☐ §110-§113: Water heaters, showerhead and faucets are certified by the California Energy Commission.

§150(j): Water System Pipe and Tank Insulation. And Cooling Line Insulation

1. Storage tank insulation

☐ A. Storage gas water heaters rated with an Energy Factor no greater than the federal minimal standard are externally wrapped with insulation having an installed thermal resistance of R-12 or greater; and

☐ B. Unfired storage tanks or other indirect hot water tanks have R-12 external insulation or R-16 internal insulation where the internal insulation R-value is indicated on the exterior of the tank.

2. Water piping and cooling system line insulation thickness and conductivity

☐ First 5 feet of hot and cold water pipes closest to water heater tank, non-recirculating systems, and entire length of recirculating sections of hot water pipes are insulated per Standards Table 150-B; and

☐ Pipe insulation for steam hydronic heating systems or hot water systems >15 psi, meets the requirements of Standards Table 123-A.

☐ Insulation is protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind.

☐ §151(f)8D: If indicated on the CF-1R, all hot water piping that runs from the hot water source to the kitchen fixtures is insulated per Standards Table 150-B.

3. Central Water Heating in Buildings with Multiple Dwelling Units (required for prescriptive)

TO COMPLY - ALL BOXES MUST BE CHECKED

- ☐ All hot water piping in main circulating loop is insulated to requirements of §150(j)
- ☐ Central hot water systems serving six or fewer dwelling units which have (1) less than 25' of distribution piping outdoors; (2) zero distribution piping underground; (3) no recirculation pump; and (4) insulation on distribution piping that meets the requirements of Section 150(j)
- ☐ Central hot water systems serving more than 6 dwelling units - presence of either a time control or a time/temperature control

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.**

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:		Responsible Person's Signature:
CSLB License:	Date Signed:	Position With Company (Title):