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

RESIDENTIAL FURNACE

1. PERMIT INFORMATION:

- ❑ The installation of new or replacement of existing furnace equipment and/or duct work requires a Mechanical Permit. The new furnace must be installed in the same location as the current furnace, otherwise plans must be submitted in person at the Permit Center, 455 E. Calaveras Blvd.
- ❑ Refer to the separate handout for replacement of existing or installation of new air conditioning for additional information.
- ❑ A separate electrical permit is required if new or modifications to the existing electrical circuit is required.
- ❑ A 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 2016 California Residential Code (CRC) or 2016 California Building Code, 2016 California Electrical Code (CEC), 2016 California Mechanical Code (CMC), 2016 California Plumbing Code (CPC), 2016 California Energy Code (CEnC), 2016 California Green Building Code and 2016 Milpitas Municipal Code (MMC).

❑ **General:**

- Appliances shall comply with applicable nationally recognized standards as evidenced by the listing and label of an approved agency or be approved by the Authority Having Jurisdiction. A list of accepted standards is included in CMC Chapter 17. (CMC 301.2)
- Appliances shall be installed in accordance with their listing and the manufacturer's instructions (CMC 303.0, 309.3).
- Installer shall leave the manufacturer's installation and operating instructions attached to the appliance (CMC 303.1).
- Appliances shall be securely fastened in place. Supports shall be designed and constructed to sustain vertical and horizontal loads per the Building Code (CMC 303.4).
- Equipment and appliances shall be accessible for inspection, service, repair and replacement without removing permanent construction. Not less than 30 inches in depth, width and height of working space shall be provided for servicing. (CMC 304.0)
- Air filters shall be installed in a heating, cooling, or makeup air system. Such filters shall comply with the standard, Air Filter Units, Test Performance of, that is referenced in Chapter 17 (CMC 311.2).
- Appliances installed on combustible floors must be listed for said installation. (CMC 904.3).
- Appliances installed in garages and other areas subject to damage shall be guarded with protective barriers or by being elevated or located out of the normal path of vehicles. (CMC 305.1.1)

- Appliances installed in a garage that generates a glow, spark or flame capable of igniting flammable vapors shall be installed with the pilots and burners or heating elements and switches at least 18 inches above the floor level, unless installed in a separate, approved compartment having access only from outside the garage or is listed as flammable vapor ignition resistant (CMC 305.1, 305.1.2).
- For buildings located in flood hazard areas, heating, ventilating, air-conditioning, and other energy-utilizing equipment and appliances shall be elevated at or above the design flood elevation, or shall be designed and installed to prevent water from entering or accumulating within the components and to resist loads and stresses including the effects of buoyancy (CMC 305.2).
- Outside air exhaust and intake openings shall be located at or above the elevation required by the building code for utilities and attendant equipment or the elevation of the lowest floor, whichever is greater (CMC 305.2.2).
- Outside or return air for heating or cooling systems shall not be taken from any of the following locations: (CMC 311.3)
    - Less than 10 feet from an appliance vent outlet, a plumbing drainage vent, or the discharge outlet of an exhaust fan, unless the outlet is 3 feet above the outside air inlet.
    - Less than 10 feet above the surface of an abutting public way, driveway, sidewalk, street, alley or driveway.
    - A hazardous or insanitary location, or a refrigeration machinery room.
    - An area, the volume of which is less than 25 percent of the entire volume served by such system, unless there is a permanent opening to an area the volume of which is equal to 25 percent of the entire volume served.
    - **Exception:** Such openings where used for a heating or cooling air system in a dwelling unit shall be permitted to be reduced to not less than 50 percent of the required area, provided the balance of the required return air is taken from a room or hall having not less than three doors leading to other rooms served by the furnace.
    - A closet, bathroom, toilet room, or kitchen.
    - Rooms or spaces containing fuel burning appliance therein. Where such room or space serves as source of return air:
    - **Exceptions:**
        - This shall not apply to fireplaces, fireplace appliance, residential cooking appliance, direct vent appliance, enclosed furnaces, and clothes dryers installed within the room or space.
        - This shall not apply to a gravity type or listed vented wall heating or cooling air system.
        - This shall not apply to a blower-type heating or cooling air system installed in accordance with the following requirements:
            - Where the return air is taken from a room or space having a volume exceeding one cubic foot for each 10 Btu per hour fuel input rating of all fuel burning appliances therein.
            - Not less than 75 percent of the supply air is discharged back into the same room or space.
            - Return air inlets shall not be located within 10 feet from any appliance firebox or draft diverter in the same enclosed room or confined space.
- Return air from one dwelling unit shall not discharge into another dwelling unit (CMC 311.4).
- Appliances on roofs shall be installed in accordance with CMC 303.8, 304.2, and 304.3.
- Appliances installed in attics and under-floor spaces shall be in accordance with CMC 304.4.
- Wall furnaces shall be installed in accordance with CMC Section 907.0.
- Floor furnaces shall be installed in accordance with CMC Section 906.0.

- **Location:**

  - A furnace may be installed in a bedroom or bathroom if (CMC 902.2 and 904.0):
    - Installed in a closet located in the bedroom or bathroom, provided the closet is equipped with a listed, gasketed door assembly, a listed, self-closing and latching device, threshold and bottom door seal, all combustion air must be obtained from the outdoors, and the closet shall be for the exclusive use of the furnace, or
    - The furnace is of the direct-vent type.

- **Clearances to Combustibles: (CMC 904.2)**

  - Listed central heating furnaces shall be installed with clearances per the terms of their listings and the manufacturer's installation instructions.
  - Unlisted central heating furnaces shall be installed in accordance with CMC Table 904.2.

- **Condensate drains (CMC 310.0):**

  - Condensate drains shall be discharged to an approved plumbing fixture or disposal area. If discharged into the drainage system, equipment shall drain by means of an indirect waste pipe. The waste pipe shall have a slope of not less than 1/8 inch per foot or 1 percent slope and shall be of approved corrosion-resistant material of piping not smaller than ¾". Condensate shall not drain over a public way. (CMC 310.1)
  - Where equipment or an appliance is installed in a space or area where damage is capable of resulting from condensate overflow, provide overflow protection as follows:
  - Provide an additional watertight pan of corrosion-resistant material installed beneath the cooling coil, unit, or appliance, with a separate ¾" drain line to an approved observable exterior location or a water level detection device interlocked to shut off unit upon detection of water in the pan, or
  - A water level detection device that will shut off the appliance or equipment in the event the primary drain is blocked.

- **Electrical:**

  - A readily accessible approved disconnect must be installed on the electric supply adjacent to and in sight from the furnace (CMC 301.4) (CEC 440.14). A clear working space 30" wide x 36" deep must be provided in front of the disconnect (CEC 110.26(A)).
  - A 15 or 20 amp receptacle outlet must be installed at an accessible location for the servicing of the heating and air-conditioning equipment. The receptacle shall be located on the same level and within 25 feet of the equipment. The receptacle outlet shall not be connected to the load side of the equipment disconnecting means. (CMC 301.4) (CEC 210.63)
  - Receptacles shall be listed tamper-resistant unless located more than 5 ½ feet above the floor (CEC 406.12(A)).
  - Receptacles located outdoors and in garages shall be GFCI (CEC 210.8). Exterior receptacles shall be provided with a weatherproof cover whether the attachment plug is inserted or removed in the receptacle. (CEC 406.9 (B)(1))
  - Central heat equipment shall be supplied by an individual branch circuit. New circuit breakers must be listed and approved for installation in the panel. (CEC 422.12).
  - The panel must be labeled (CEC 408.4).

- **Ducts:**

  - Duct systems used with blower type equipment that are portions of a heating, cooling, absorption, evaporative cooling, or outdoor air ventilation system shall be sized in accordance with an approved standard listed in Table 1701.1, or by other approved methods. (CMC 601.2).
  - Duct materials shall comply with CMC 602.0.
  - Factory made air ducts and Flexible air ducts and connectors shall be listed and labeled in accordance with UL 181 and installed in accordance with terms of their listing, the manufacturer's installation instructions, and SMACNA HVAC Duct Construction Standards – Metal and Flexible. (CMC 603.4, 603.5)
  - Joints and seams for duct systems shall comply with SMACNA HVAC Duct Construction Standards – Metal and Flexible. Joints of duct systems shall be made substantially air-tight by means of tapes, mastics, gasketing, or other means. Crimp joints for round ducts shall have a contact lap of at least 1 ½ inches and shall be mechanically fastened by means of at least 3 sheet metal screws equally spaced around the joint, or an equivalent fastening method. (CMC 603.10)
  - Closure systems for rigid or sheet metal ducts and plenums shall listed in accordance with UL 181A. Closure systems for flexible air ducts shall be listed in accordance with UL 181B. (CMC 603.10)
  - Joints and seams and all reinforcements for factory-made air ducts and plenums shall meet with the conditions of prior approval in accordance with the installation instructions that shall accompany the product. (CMC 603.10)
  - Factory made air ducts shall not be used for vertical risers in air duct systems serving more than two stories and shall not penetrate a fire-resistance-rated assembly or construction. (603.4)
  - Factory made air ducts shall be installed with not less than 4 inches of separation from earth, except where installed as a liner inside of concrete, tile, or metal pipe and shall be protected from physical damage. (603.4)
  - Air ducts installed under a floor in a crawl space shall not prevent access to any area of the crawl space and where it is required to move under ducts a minimum vertical clearance of 18 inches shall be provided (CMC 603.2).
  - Ducts shall be securely fastened in place at each change of direction and as set forth in the SMACNA HVAC Duct Construction Standards – Metal and Flexible. Riser ducts shall be held in place by means of metal straps or angles and channels to secure the riser to the structure. (CMC 603.3, 603.4, 603.5)
  - Metal and factory-made ducts shall be installed with at least 4 inches separation from earth. (CMC 603.3, 603.4)
  - Supports for rectangular metal ducts shall be installed on two opposite sides of each duct and shall be riveted, bolted, or metal screwed to each side of the duct at not more than the intervals specified. (CMC 603.3.1).
  - Supports for 40 inch maximum diameter round ducts, when suspended from above, shall be supported with on hanger per interval and in accordance with the following: (CMC 603.3.2)
    - Ducts shall be equipped with tight-fitting circular bands extending around the entire perimeter of the duct at each specified support interval.
    - Circular bands shall be not less than 1 inch wide nor less than equivalent to the gauge of the duct material that it supports.
    - **Exception:** ducts 10 inches and less in diameter may be supported by No. 18 gauge galvanized steel wire.
    - Each circular band shall be provided with a means of connecting to the suspending support.
    - Ducts shall be braced and guyed to prevent lateral or horizontal swing.
  - Ducts installed in structures that are located in areas classified as seismic design category C, D, E, or F shall be in accordance with the building code. (603.3.3)
  - Ducts installed in locations where they are exposed to mechanical damage by vehicles or from other causes shall be protected by approved barriers (CMC 603.7).
  - Installers shall provide the manufacturers field fabrication and installation instructions. In the absence of specific supporting materials and spacing, approved factory made air ducts shall be permitted to be installed in accordance with SMACNA HVAC Duct Construction Standards. (CMC 603.8)

- In flood hazard areas, ducts shall be located above the elevation required by the building code for utilities and attendant equipment or the elevation of the lowest floor, whichever is higher, or shall be designed and constructed to prevent water from entering or accumulating within the ducts during flood. (CMC 603.9)
- Duct coverings shall not penetrate a fire-resistance-rated assembly. (CMC 604.1.2)
- Supply air and return air ducts and plenums shall be insulated to a minimum installed level of R-6 (CEnC 150(m)1).
- For the purpose of determining installed R-value of duct wrap, the installed thickness of insulation must be assumed to be 75 percent of the nominal thickness due to compression (CEnC 150(m)5(B)).
- Metal ducts and inner core of flexible ducts shall be mechanically fastened (CMC 603.10, CEnC 150(m)1).
- Openings shall be sealed with mastic, tape, or other duct-closure system that meets the applicable requirements of UL181, UL181A or UL181B or aerosol sealant that meets the requirements of UL723. (CMC 603.10, CEnC 150(m)1)
- If mastic or tape is used to seal openings greater than ¼ inch, the combination of mastic and either mesh or tape shall be used. (CEnC 150(m)1)
- Building cavities, support platforms for air handlers, and plenums defined or constructed with materials other than sealed sheet metal, duct board, or flexible duct shall not be used for conveying conditioned air. Building cavities and support platforms may contain ducts. (CEnC 150(m)1)
- Ducts installed in cavities and support platforms shall not be compressed to cause reductions in the cross-sectional area of the ducts (CEnC 150(m)1).
- Duct systems shall comply with UL181 for ducts and closure systems, including collars, connections, and splices, and be labeled as complying with UL181 (CEnC 150(m)2A & 3).
- All pressure sensitive tapes, mastics, aerosol sealants, heat activated tapes, sealants, mastics or other closure systems shall comply with UL181 and UL181A and UL181B. Mastic sealants and mesh shall be nontoxic and water resistant. Sealants shall be rated for exterior used and tested in accordance with ASTM C731 and D2202, and if for exterior application ASTM C732. Aerosol sealants shall meet the requirements of UL723. (CEnC 150(m)2 & 3).
- Joints and seams of duct systems and their components shall not be sealed with cloth back rubber adhesive duct tapes unless such tape is used in combination with mastic and drawbands or it has on its backing "CEC approved" (CEnC 150(m)2 & 3).
- Draw bands must be either stainless steel worm-drive hose clamps or UV resistant nylon duct ties. Draw bands must have a minimum tensile strength rating of 150 pounds and be tightened as recommended by the manufacturer with an adjustable tensioning tool. (CEnC 150(m)E).

❑ **Gas piping and shut-off vales:**

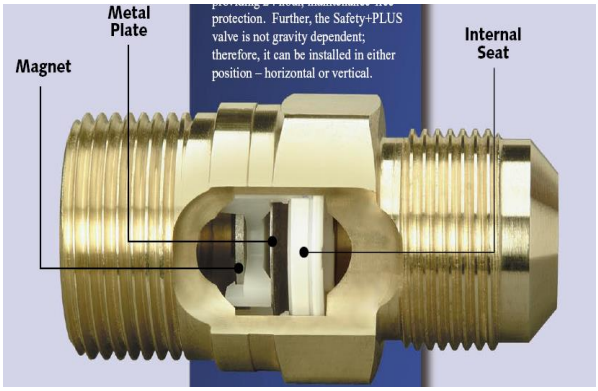
- A separate plumbing permit is required if a new gas line is required to supply the new furnace. New gas piping added to an existing permitted system must be installed separately back to the meter outlet or calculations must be provided to show the existing piping to the proposed location is adequately sized. (CMC 1308.1.1)

- 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 connections to building piping or other approved outlets must comply with CMC Section 1313.0. 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 and not pass through an appliance housing, cabinet, or casing unless protected against damage acceptable to the Authority Having Jurisdiction (1313.1(7)).

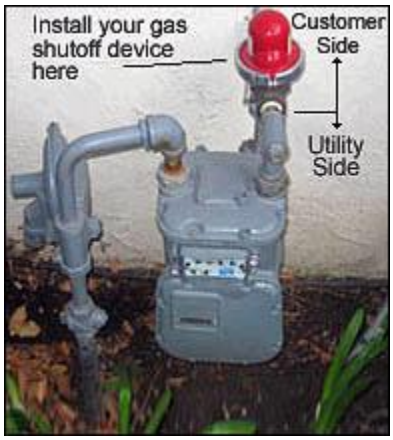
- An approved Excess Flow Gas Shut-off Device (non-motion sensitive) shall be installed at the gas fuel appliance outlet when replacing any existing or installing any new gas fuel appliance. The Excess Flow Device shall be installed between the shutoff valve and the connector (see diagram page 8 *not 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.

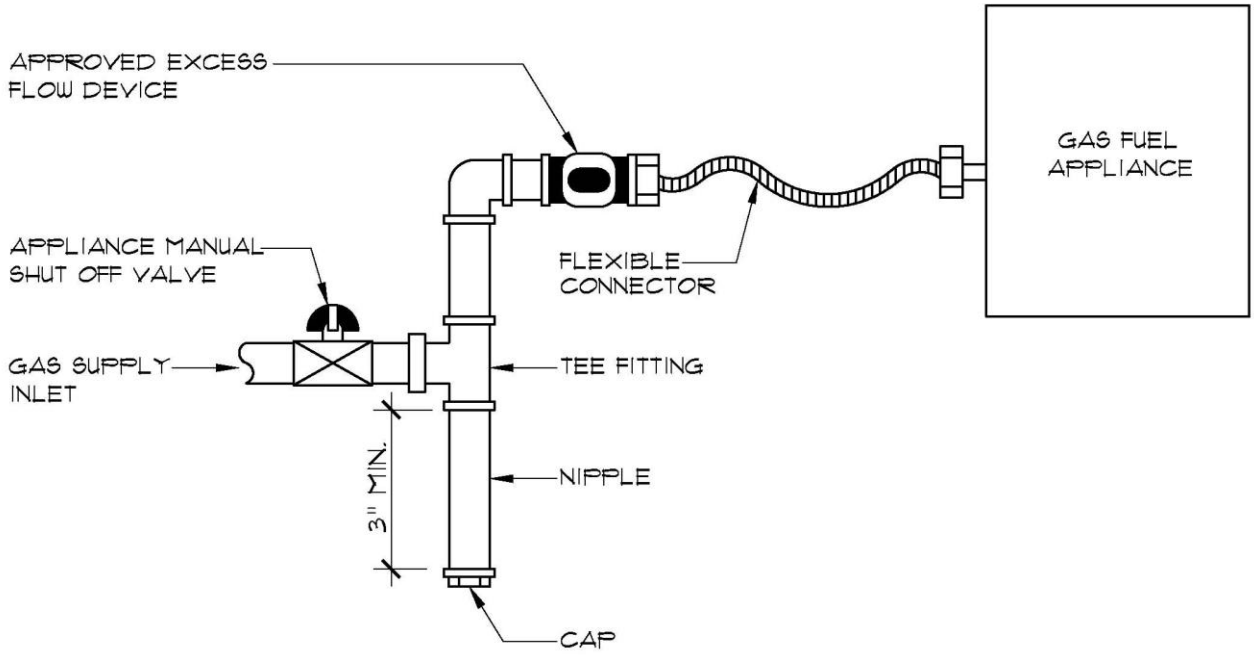
- Seismic Gas Shut-off Devices (motion sensitive) must be mounted rigidly to the exterior of the building or structure containing the fuel gas piping. This requirement need not apply if the Building and Safety Department determines that the Seismic Gas Shut-off Device (motion sensitive) has been tested 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. Sediment traps shall be installed after shutoff valve and before the appliance to allow for draining and cleaning. 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 1313.7, 1311.8)



- ❑ Combustion air:

  - Most furnaces 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 furnace 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 heater space is lower than that in the vent, products of combustion might "spill" out of the draft hood and enter the interior environment.

  - Air for combustion, ventilation, and dilution of flue gases for gas utilization equipment installed in buildings shall be obtained by application of one of the methods below. Gas utilization equipment of other than natural draft (direct-vent) and Category I vented appliances shall be provided with combustion, ventilation, and dilution air in accordance with the equipment manufacturer's instructions. Where infiltration does not provide the necessary air, outdoor air shall be introduced in accordance with methods below. (CMC 701.1).

  - Where exhaust fans, clothes dryers, and kitchen ventilation systems, interfere with the operation of appliances, makeup air shall be provided (CMC 701.3).

- Combustion air must be provided per CMC Section 701.0. 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. (CMC 701.4)

  - 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. [CMC 701.5(1)]

  - 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 [CMC 701.5(2)]

  - Combustion, ventilation and dilution air shall not be obtained only from a bedroom or bathroom unless the bedroom or bathroom has the required volume in accordance with CMC Section 701.4 (CMC 902.2).

  - 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. (CMC 701.6)

    - 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: (CMC 701.6.2)
    - 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: (CMC 701.7)
    - 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 (CMC 701.9).
    - 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: (CMC 701.10)
    - 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 so that they are in the full open position prior to main burner ignition.

- Combustion air ducts: (CMC 701.11)

  - Ducts shall be of galvanized steel or a material having equivalent corrosion resistance, strength, and rigidity. Within dwelling units, unobstructed stud and joist spaces not required to be insulated per Energy Code requirements shall not 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 appliance(s).

  - 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 convey flue and vent gases to the outdoors (CMC 802.3). The venting system shall satisfy the draft requirements of the appliance in accordance with the terms of its listing and the manufacturer's instructions. (CMC 802.3.1)

- Gas vents shall be installed in accordance with the manufacturer's installation instructions. (CMC 802.6)

- Single-wall metal pipe shall not be used as a vent in dwellings and residential occupancies (CMC 802.7.3).

- 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 [CMC 802.6.3.1(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 or exceeding seven times the smaller draft hood outlet area (CMC 802.6.3.1(4)).

- Type B or L for Category 1 appliance 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. (CMC 802.6.3.2)

- Type B and L vents shall terminate at least 5 feet in vertical height above the highest connected appliance draft hood or flue collar (CMC 802.6.2.1).

- Type B-W gas vent shall terminate at least 12 feet in vertical height above the bottom of the wall furnace (CMC 802.6.2.2).

- Screws, rivets and other fasteners shall not penetrate the inner wall of double wall vents except at the transition from the appliance draft hood outlet, flue collar, or single wall metal connector to a double wall vent (CMC 802.6.1).

- The vent passing through a roof shall extend through the roof flashing, roof jack, or roof thimble and be terminated with a listed termination cap (CMC 802.6.2.5).

- A chimney for a residential type or low heat appliance shall extend not less than 3 feet above the highest point where it passes through a roof of a building and not less than 2 feet higher than a portion of a building within a horizontal distance of 10 feet. (CMC 802.5.4)

- A chimney shall extend not less than 5 feet above the highest connected appliance draft hood or flue collar. (CMC 802.5.4.2)

- Decorative shrouds shall not be installed at the termination of factory built chimneys except where such shrouds are listed and labeled for use with the specific factory built chimney system and are installed in accordance with the manufacturer's installation instructions. (CMC 802.5.4.3)

- A vent extending through an exterior wall shall not terminate adjacent to the wall or below eaves or parapets, except as permitted in CMC 802.2.4 (Direct Vent) and 802.3.3 (Mechanical Draft) (CMC 802.6.2.3).

- The vent cap bottom 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 the installed roof penetration) or 2 feet above a vertical wall or similar obstruction within 8 feet. (CMC 802.6.2)

- Gas vents larger than 12" shall or are within 8 feet of a vertical wall or similar obstruction, shall terminate not less than 2 feet above the highest point where they pass through the roof and not less than 2 feet above a portion of a building within 10 feet horizontally. (CMC 802.6.2(1))

- A vent shall terminate at least 3 feet above a force air inlet located within 10 feet (CMC 802.6.2.6).

- Direct vent appliances shall terminate in accordance with CMC 802.8.3.

- Mechanical draft systems shall be installed in accordance with CMC 802.3.3.

- Vents serving gas appliances located on more than one floor shall be sized and installed in accordance with CMC Section 802.6.4.

- Vents must be supported and spaced in accordance with their listing and the manufacturer's instructions (CMC 802.6.7)

❑ Vent connectors for Category 1 appliances shall be installed as follows:

- A vent connector shall be used to connect the appliance to a gas vent, unless the vent connects directly to the appliance (CMC 802.10).

- Where the vent connector used for an appliance having a draft hood or a Category 1 appliance is located in or passes through and unconditioned area, attic or crawl space, that portion of the vent connector shall be listed Type B, Type L, or listed vent material having equivalent insulation qualities. (CMC 802.10.1.1)

- Vent connectors for listed gas appliances having draft hoods, appliances having draft hoods and equipped with listed conversion burners, and Category 1 appliances that are not installed in attics, crawl spaces, or other unconditioned areas shall be: (CMC 802.10.1.2(1)).

    - 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.

- Vent connectors shall not be covered with insulation (CMC 802.10.1.2(2)).

- 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. (CMC 802.10.12)

- Two or More Appliances Connected to a Single Vent - Where two or more openings are provided into one vent, either 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. (CMC 802.10.3)

- Where two or more connectors enter a common vent, the smaller connector shall enter at the highest level consistent with the available headroom or clearance to combustible material. (CMC 802.10.3.1)

- Vent connectors serving natural draft (Category 1) venting appliances shall not be connected to a portion of a mechanical draft system operating under positive static pressure, such as those serving Category III or Category IV appliances. (CMC 802.10.3.2)

- The minimum clearances from single wall metal connectors and combustibles shall be 6". The clearances from Type B connectors shall be per its listing. (CMC 802.10.4)

- The maximum vent connector horizontal length shall be 18 inches per inch of vent connector diameter as provided in CMC Table 803.2.1. (CMC 803.2.1) Exceeding vent connector maximum length will require a reduction in vent connector capacity in accordance with CMC 803.2.2.

- 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. (CMC 802.10.7)

- Joints between sections of vent connector piping and connections to flue collars or draft hood outlets shall be fastened by sheet metal screws, or in accordance with the listed vent manufacturer's instructions, or other approved means. (CMC 802.10.5)

- 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. **Exception:** Vent connectors attached to a mechanical draft system installed in accordance with the appliance and draft system manufacturer's installation instructions. (CMC 802.10.6)

- 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 (CMC 802.10.8).

- 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 (CMC 802.10.2.2.).

- 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 CMC Section 803. (CMC 802.10.2)

3. ENERGY REQUIREMENTS:

- ❑ Installation of new or replacement of existing heating equipment must comply with all applicable mandatory measures of the California Energy Code. Refer to the attached Minimum Efficiencies handout and HVAC-Alteration handout from Energy Code Ace for requirements.

- ❑ **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:

  - CF1R-ALT-03-E.

  The CF1R-ALT-03-E form will guide you on the other forms required prior to installation and prior to final. Forms can be obtained at http://www.energy.ca.gov/2015publications/CEC-400-2015-032/appendices/forms/.

- ❑ Outdoor condensing units shall have a clearance of at least 5 feet from the outlet of any dryer vent. (CEnC 150.0(h)3A)

4. SMOKE ALARMS, CARBON MONOXIDE ALARMS & SPARK ARRESTERS:

- ❑ In single family and multi-family residences (including townhomes, condominiums and apartments), installation of smoke alarms, carbon monoxide alarms and spark arresters is required prior to the final inspection as follows: (CRC R314 & R315 and CBC 907.2.11)

  Smoke Alarms listed in accordance with UL 217, listed and approved by the California State Fire Marshal and tested & maintained in accordance with the manufacturer's instructions shall be installed in existing or new dwellings as follows: **in each sleeping room, outside each separate sleeping area in the immediate vicinity of the bedrooms and on each story of the dwelling.** In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level. Alarms that no longer function shall be replaced. New smoke alarms that are solely battery powered must have a non-replaceable and non-removable battery capable of powering the smoke alarm for at least 10 years. Fire alarm systems shall be permitted in lieu of smoke alarms if they comply with the provisions of NFPA 72. The installation of smoke alarms and smoke detectors shall also comply with the following requirements:

  1. Smoke alarms shall not be located where ambient conditions, including humidity and temperature, are outside the limits specified by the manufacturer's published instructions.
  2. Smoke alarms shall not be located within unfinished attics or garages or in other spaces where temperatures can fall below 40°F or exceed 100°F.
  3. Where the mounting surface could become considerably warmer or cooler than the room, such as a poorly insulated ceiling below an unfinished attic or an exterior wall, alarms shall be mounted on an inside wall.

4. Smoke alarms shall be installed a minimum of 20 feet horizontal distance from a permanently installed cooking appliance, except Ionization smoke alarms with an alarm-silencing switch or Photoelectric smoke alarms shall be permitted to be installed 10 feet or greater from a permanently installed cooking appliance and Photoelectric smoke alarms shall be permitted to be installed greater than 6 feet from a permanently installed cooking appliance where the kitchen or cooking area and adjacent spaces have no clear interior partitions and the 10 foot distances would prohibit the placement of a required smoke alarm or smoke detector. Smoke alarms listed for use in close proximity to a permanently installed cooking appliance can be installed in accordance with their listing.
5. Smoke alarms shall be installed not less than a 3 foot horizontal distance from the door or opening of a bathroom that contains a bathtub or shower unless this would prevent placement of a smoke alarm required by the code.
6. Smoke alarms shall not be installed within a 36 inch horizontal path from the supply registers of a forced air heating or cooling system and shall be installed outside of the direct airflow from those registers.
7. Smoke alarms shall not be installed within a 36 inch horizontal path from the tip of the blade of a ceiling-suspended (paddle) fan.
8. Where stairs lead to other occupied levels, alarm shall be located so that smoke rising in the stairway cannot be prevented from reaching the alarm by an intervening door or obstruction.
9. For stairways leading up from a basement, alarms shall be located on the basement ceiling near the entry to the stairs.
10. For tray-shaped ceilings (coffered ceilings), alarms shall be installed on the highest portion of the ceiling or on the sloped portion of the ceiling within 12 inch vertically down from the highest point.
11. Smoke alarms installed in rooms with joists or beams shall comply with the requirements of NFPA 72.
12. Heat alarms and detectors installed in rooms with joists or beams shall comply with NFPA 72.

Carbon Monoxide Alarms listed in accordance with UL 2034, or combination carbon and smoke alarm listed in accordance with UL2034 and UL217, listed and approved by the California State Fire Marshal and installed and maintained in accordance with the manufacturer's instructions shall be installed in existing or new dwellings having a fuel-fired appliance, fireplace or an attached garage with an opening communicating with the dwelling as follows: **outside each separate sleeping area in the immediate vicinity of bedroom(s) and on every occupiable level of a dwelling unit.** If there is a fuel-burning appliance located with a bedroom or its attached bathroom, an alarm shall be located within the bedroom.

Power supply: Smoke and carbon monoxide alarms shall receive their primary power from the building wiring and shall be equipped with a battery back-up. Wiring shall be permanent and without a disconnecting switch other than as required for overcurrent protection. Smoke and carbon monoxide alarms are permitted to be solely battery operated (carbon monoxide alarms can also be plug-in with battery back-up) in existing buildings where no construction is taking place; in existing areas of buildings undergoing alterations or repairs that do not result in the removal of interior walls or ceiling finishes exposing the structure unless there is an attic or crawl space available which could provide access for building wiring without the removal of interior finishes; where repairs or alterations are limited to the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck; or when work is limited to the installation, alteration or repairs of plumbing or mechanical systems or the installation, alteration or repair of electrical systems which do not result in the removal of interior wall or ceiling finishes exposing the structure.

Interconnection: Where more than one smoke or carbon monoxide alarm is required to be installed within an individual dwelling or sleeping unit, the alarms shall be interconnected in such a manner that the activation of one alarm will activate all of the alarms in the individual unit, except interconnection is not required in buildings that are not undergoing alterations, repairs or construction of any kind; where alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure unless there is an attic or crawl space available which could provide access for interconnection without the removal of interior finishes; where repairs or alterations are limited to the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck; or when work is limited to the installation, alteration or repairs of plumbing, mechanical or electrical systems which do not result in the removal of interior wall or ceiling finishes exposing the structure.

Spark arresters: When a permit has been issued and the value of the work exceeds $1,000, a spark arrester must be installed on all fireplace chimneys if one does not already exist, per MMC Section II-3-2.06. Spark arresters shall be constructed in conformance with CRC Section 1003.9.2.

5. WATER CONSERVING FIXTURES:

- ❑ When required, all non-compliant plumbing fixtures must be replaced. Refer to the attached *"Water Conserving Certificate of Compliance"* handout for details on when this is required.

6. INSPECTION PROCEDURES:

- ❑ A rough mechanical inspection shall be scheduled and approved prior to work inside walls, ceilings, or other spaces being covered with finish materials. A final inspection shall be scheduled after all work is complete. For each inspection, 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.

7. QUESTIONS:

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

2016 ENERGY CODE

Ace Resources Title 24, Part 6 Triggers

Residential

HVAC – Alterations

Split Systems and Packaged Systems

	Mandatory Requirements					Prescriptive Requirements	
Change This ***(and nothing else)***	Setback Thermostat §110.2(c), §150.2(b)1Fi	Cooling Load Calcs §150.0(h), §150.2(b)1C	Heating Load Calcs §150.0(h), §150.2(b)1C	HERS: Duct Seal and Test §150.0(m)1-3 & 11 §150.2(b)1C, D, & E	Air Filtration and HERS: Cooling Coil Airflow and Fan Watt Draw §150.2 (b)1C, D	Duct Insulation §150.2(b)1D	HERS: Refrigerant Charge §150.2(b)1F
Whole Split or Packaged System *(no ducts added or replaced)*	**YES**	no	no[C]	**YES**[D]	no	no	**YES**[H, I]
Evaporator Coil (cooling coil), Condenser Coil, or Outdoor Condensing Unit	**YES**	no	no[C]	**YES**[D]	no	no	**YES**[H, I]
Furnace *(air handler)*	**YES**	no	no[C]	**YES**[D]	no	no	**YES**[H, I]
Compressor, Refrigerant Metering Device	**YES**	no	no[C]	no	no	no	**YES**[H, I]
Some Ducts >40 feet of new or replacement	no	maybe[B]	maybe[C, B]	**YES**[E]	no	**YES**[G]	no
"All New" Ducts[A]	no	maybe[B]	maybe[C, B]	**YES**[E]	**YES**[F]	**YES**[G]	no
Whole Split or Packaged System and All New Ducts	**YES**	**YES**[B]	**YES**[C, B]	**YES**[E]	**YES**[F]	**YES**[G]	**YES**[H, I]

Note:
- Replacing the blower wheel fan is considered a repair and does NOT trigger the Energy Standards.
- All new HVAC equipment must meet minimum federal efficiency requirements
- Cooling line insulation is triggered if the line set (cooling system, suction line) is replaced or repaired. Line sets ≤1.5" in diameter must have 0.75" thick insulation.

A The system is considered to have "all new" ducts when 75% or more of the ducts are new material and up to 25% reused parts from the existing duct system (e.g., registers, grilles, boots, air handler, coil, plenums, duct material) if the reused parts are accessible and can be sealed to prevent leakage.

B Cooling and heating load calculations are required when ducts are added to serve new conditioned space, such as an addition.

C Heating equipment must meet CBC minimum capacity requirements.

D Duct system leakage must be ≤15% in total, or ≤10% to the outside. Or, if unable to meet the sealing requirements, all accessible leaks must be sealed and verified by a HERS rater. §150.2(b)1E applies.

E Unless exceptions apply, duct systems must be sealed and verified if >40 feet of new or replacement ducts are installed. In all climate zones, when new duct systems are installed in unconditioned space, leakage must be ≤5% of the air handler airflow.

F When new duct systems are installed, cooling coil airflow must be >350 CFM per ton, and fan watt draw must be ≤0.58W/CFM. Alternatively, the system can meet the requirements in Table 150.0-B or Table 150.0-C (Return Duct Sizing and Filter Sizing).

G When adding or replacing >40 feet of ducts in unconditioned space: CZ 1-10 and 12-13: R-6; CZ 11 and 14-16: R-8. HERS verification is required for insulated ducts in conditioned space. Mandatory duct insulation requirements (R-4.2) apply to all new or replacement ducts (not existing or unaltered ducts).

H HERS verification of refrigerant charge is required in climate zones 2 and 8–15 only when a refrigerant containing component of an air conditioner or heat pump is replaced or installed in an existing building.

I Although there are no commercially available HVAC systems with approved Fault Indicator Displays (FID) devices at the time of publication (July 2016) the Energy Standards do allow use of a CEC-approved FID should such equipment become available during the 2016 code cycle.

For More Information

Primary Sources

- Energy Standards Section 110.2 – Mandatory Requirements for Space-Conditioning Equipment
  energycodeace.com/site/custom/public/reference-ace-2016/index.html#!Documents/section1102mandatoryrequirementsforspaceconditioningequipment.htm
- Energy Standards Section 150.0 – Mandatory Features and Devices
  energycodeace.com/site/custom/public/reference-ace-2016/index.html#!Documents/section1500mandatoryfeaturesanddevices.htm
- Energy Standards Section 150.1 – Performance and Prescriptive Compliance Approaches for Newly Constructed Residential Buildings
  energycodeace.com/site/custom/publicreference-ace-2016/index.html#!Documents/section1501performanceandprescriptivecomplianceapproachesforlowr.htm
- Energy Standards Section 150.2 – Energy Efficiency Standards for Additions and Alterations in Existing Buildings that Will Be Low-Rise Residential Occupanices
  energycodeace.com/site/custom/public/reference-ace-2016/Documents/section1502energyefficiencystandardsforadditionsandalterationsto.htm

California Energy Commission Information & Services

- Energy Standards Hotline: 1-800-772-3300 (Free) or Title24@energy.ca.gov
- Online Resource Center:
  energy.ca.gov/title24/orc/
  - The Energy Commission's main web portal for Energy Standards, including information, documents, and historical information

Additional Resources

- Energy Code Ace:
  EnergyCodeAce.com
  - An online "one-stop-shop" providing free resources and training to help appliance and building industry professionals decode and comply with Title 24, Part 6 and Title 20. The site is administered by California's investor-owned utilities.
    Of special interest: 2016 Fact Sheet on Residential HVAC Alterations
    energycodeace.com/content/resources-fact-sheets
    Please register with the site and select an industry role for your profile in order to receive messages about all our free offerings!

This program is funded by California utility customers under the auspices of the California Public Utilities Commission and in support of the California Energy Commission.

Residential Heating & Cooling Equipment
Minimum Efficiencies

Gas- and Oil-Fired Central Furnaces – Minimum Heating Efficiencies

Appliance	Rated Input (Btuh)	Minimum Efficiency (%)	
		AFUE	Thermal Efficiency
Weatherized gas central furnaces with single phase electrical supply	<225,000	81%	—
Non-weatherized gas and oil central furnaces with single phase electrical supply	<225,000	80%	—
Weatherized oil central furnaces with single phase electrical supply	<225,000	78%	—
Non-weatherized oil central furnaces with single phase electrical supply	<225,000	83%	—
Gas central furnaces	≥225,000	—	80%
Oil central furnaces	≥225,000	—	81%

Table 4-1 of 2016 Residential Compliance Manual (based on the California Appliance Efficiency Regulations Title 20, Tables E-4 and E-6)

Heat Pump – Minimum Heating Efficiencies

Single-phase air source heat pumps		
Configuration	**Size (Btuh)**	**Minimum Heating Efficiency**
Packaged	<65,000 Cooling Capacity	8.0 HSPF
Split	<65,000 Cooling Capacity	8.2 HSPF
Space-constrained packaged	<65,000 Cooling Capacity	7.4 HSPF
Space-constrained split	<65,000 Cooling Capacity	7.4 HSPF
Small Duct High Velocity	<65,000 Cooling Capacity	7.7 HSPF
Note – HSPF: Heating Season Performance Factor		

Adapted from Table 4-3 of 2016 Residential Compliance Manual (based on Title 20)

(Smaller) Central Air Conditioners and Heat Pumps — Minimum Cooling Efficiencies

Appliance	Type	Size (Btuh)	SEER Effective 1/1/2015	EER Effective 1/1/2015
Central Air Conditioners[A]	Split System	<45,000	14.0	12.2
		≥45,000 and <65,000	14.0	11.7
	Single Package	<65,000	14.0	11.0
Central Air Source Heat Pumps	Split System	<65,000	14.0	NR
	Single Package	<65,000	14.0	NR
Space Constrained Air Conditioner	Split System	<65,000	12.0	NR
	Single Package	<65,000	12.0	NR
Space Constrained Heat Pump	Split System	<65,000	12.0	NR
	Single Package	<65,000	12.0	NR
Small Duct, High Velocity Air Conditioner	All	<65,000	12.0	NR
Small Duct, High Velocity Heat Pump	All	<65,000	12.0	NR

Adapted from Table 4-6 from 2016 Residential Compliance Manual (based on Title 20 Table C-2 and Federal Appliance Standards)

A Central split system air conditioners and central single package air conditioners installed on or after January 1, 2015 must comply with the minimum SEER and EER requirements of Table 4-6 in the Residential Compliance Manual regardless of date of manufacturer.

Federally Regulated Residential Water Heaters — Minimum Domestic Hot Water (DHW) Efficiencies

Product Class	Rated Storage Volume	Energy Factor (EF)
Gas-fired Water Heater	≥20 gal and ≤55 gal	$0.675-(0.0015*V_S)$
	>55 gal and ≤100 gal	$0.8012-(0.00078*V_S)$
Oil-fired Water Heater	≤50gal	$0.68-(0.0019*V_S)$
Electric Water Heater[1]	≥20 gal and ≤55 gal	$0.96-(0.0003*V_S)$
	>55 gal and ≤120 gal	$2.057-(0.00113*V_S)$
Tabletop Water Heater	≥20 gal and ≤100 gal	$0.93-(0.00132*V_S)$
Instantaneous Gas-fired Water Heater	<2 gal	$0.82-(0.0019*V_S)$
Instantaneous Electric Water Heater	<2 gal	$0.93-(0.00132*V_S)$
Grid-Enabled Water Heaters	>75 gal	$1.061-(0.00168*V_S)$

Note – V_S: Rated Storage Volume – the water storage capacity of a water heater (in gallons).

[1] For electric storage water heaters > 55 gallons, the efficiency level suggests performance comparable to a heat pump water heater.

From Table 5-4 of the 2016 Residential Compliance Manual (per U.S. Department of Energy)

Requirements for Contractor and Demolition Professionals

THE Mercury Thermostat Collection Act OF 2008

The Mercury Thermostat Collection Act of 2008 requires construction and demolition professionals to properly remove and dispose of out-of-service mercury-added thermostats.

Effective July 1, 2009, the law requires the following:

Contractors who install heating, ventilation, and air-conditioning components are required to:

- Handle and transport out-of-service mercury-added thermostats in accordance with the Universal Waste Regulations found in CA Code of Regulations, Title 22, Chapter 23.
- Take out-of-service mercury-added thermostats to a collection location that is operated in accordance with Universal Waste Regulations.

Persons engaged in building demolition are required to:

- Remove out-of-service mercury-added thermostats prior to demolition in accordance with all applicable California regulations.
- Handle and transport out-of-service mercury-added thermostats in accordance with the Universal Waste Regulations found in CA Code of Regulations, Title 22, Chapter 23.
- Take out-of-service mercury-added thermostats to a collection location that is operated in accordance with Universal Waste Regulations.

Collection bins for out-of-service mercury-added thermostats are required by law to be provided at HVAC wholesaler locations in California. *To find a HVAC wholesaler near you, visit* **http://www.thermostat-recycle.org** [1].

Collection bins may also be found at local government agency household hazardous waste (HHW) collection facilities. *To find a HHW collection facility near you, visit* **http://www.dtsc.ca.gov/HazardousWaste/UniversalWaste/HHW.cfm**

Failure to comply with this law may result in penalties of up to twenty-five thousand dollars ($25,000) for each separate violation or, for continuing violations, for each day that a violation continues.

Learn more about the law and the obligations for contractors and building demolition at: **http://www.dtsc.ca.gov/HazardousWaste/Mercury_Therm_Act.cfm**

For questions/concerns, contact DTSC at **thermostats@dtsc.ca.gov** *or DTSC's Regulatory Assistance Officers at* **800-72-TOXIC (800-728-6942).**

1. The link provides additional information that may be useful or interesting and is being provided consistent with the intended purpose of the Mercury Thermostat Collection Act. However, DTSC cannot attest to the accuracy of information provided by this link or any other linked site. Providing links to a non-DTSC Web site does not constitute an endorsement by DTSC or any of its employees of the sponsors of the site or the information or products presented on the site.

Department of Toxic Substances Control

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

WATER CONSERVING CERTIFICATE OF COMPLIANCE

Project Address: _____ Permit Number: _____

If the Building Inspector cannot physically inspect all plumbing fixtures in the building or cannot verify compliance due to lack of product markings or data, this Certificate of Compliance may be signed by the property owner(s) and given to the Building Inspector. The Building Inspector must inspect and verify all plumbing fixtures or receive this Certificate prior to final inspection.

California Civil Code Section 1101 requires the following. **Note this law applies only to properties built and available for use or occupancy on or before January 1, 1994.**

On or before January 1, 2017, for any **one and two family** residential building, *all non-compliant plumbing fixtures shall be replaced* with water-conserving plumbing fixtures (regardless of whether property undergoes alterations or improvement).

As of January 1, 2014, for any **multi-family** (more than two units) residential building and any **commercial** building, *all non-compliant plumbing fixtures shall be replaced* with water-conserving plumbing fixtures in the following circumstances:

1. Additions, if the sum of concurrent building permits by the same permit applicant would increase the floor area of the building by more than 10%, all non-compliant fixtures must be upgraded throughout the building. This includes all common area plumbing fixtures as well as fixtures in private individual units or tenant unit owned by the same owner.

2. Alterations or improvements, if total construction cost in the building permit exceeds $150,000, all non-compliant fixutres that service the specific area of the alteration or improvement will be required to be upgraded.

3. Any alteration to a room that contains non-compliant plumbing fixtures will require all fixtures in that room to be upgraded.

On or before January 1, 2019, for any **multi-family** (more than two units) residential building and any **commercial** building, *all non-compliant plumbing fixtures shall be replaced* with water-conserving plumbing fixtures (regardless of whether property undergoes alterations or improvement).

The requirementss of this law shall not apply to any of the following:

1. The requirements of this law shall be postponed one year from the date of issuance of a demolition permit for the building. If the building is not demolished after one year, the provision of this law shall apply even though the demolition permit is still in effect or a new demolition permit has been issued.

2. Registered historical sites.

3. Real property for which a licensed plumber certifiers in writing that, due to the age or configuration of the property or its plumbing, installation of water-conserving plumbing fixtures is not technically feasible.

4. A building for which water service is permanently disconnected.

5. The property was built and available for use or occupancy after January 1, 1994.

I/We, the owner(s) of this property, certifiy under penalty of perjury:

- ❑ All existing plumbing fixtures meet the minimum requirements of water-conserving as noted below.
- ❑ All non-compliant plumbing fixtures have been replaced with water-conserving plumbing fixtures in accordance with Civil Code Sections 1101.1 through 1101.8, the current California Plumbing Code and California Green Building Standards Code, and manufacturer's installation requirements, and that the water-conserving plumbing fixtures comply with the requirements as noted below.
- ❑ I/We are exempt for reason #____ listed above. If for reason #3, attached is a letter from a licensed plumber.

_____
Signature of Property Owner(s)

_____ Date: _____
Print Name(s)

The following non-compliant fixtures shall be replaced with water-conserving fixtures as noted: (CGBC 4.303 & 5.303)

- Existing water closets that exceed 1.6 gallons per flush shall be replaced with one that has an effective flush volume not to exceed **1.28 gallons per flush**. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-type toilets. The effective flush volume of dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.
- Existing urinals that exceed 1.0 gallons per flush shall be replaced with one that uses not more than an average of **0.125 gallons per flush** (0.47 L) for wall mounted and **0.5 gallons** (1.89 L) for other types of urinals.
- Existing single shower heads that exceed 2.5 gallons per minute shall be replaced with one that has a maximum flow rate of not more than **2.0 gallons per minute** at 80 psi. Shower heads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads.
- When a shower is served by more than one showerhead, the combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed **2.0 gallons per minute** at 80 psi, or the shower shall be designed to allow only one shower outlet to be in operation at a time. A hand-held shower shall be considered a showerhead.
- Existing residential lavatory faucets that exceed 2.2 gallons per minute shall be replaced with one that has a maximum flow rate not to exceed **1.2 gallons** (4.54 L) per minute at 60 psi. The minimum flow rate shall not be less than 0.8 gallons (3.03 L) per minute at 20 psi.
- Existing lavatory faucets in residential common and public use areas (outside of dwellings or sleeping units) and in commercial areas that exceed 2.2 gallons per minute shall be replaced with one that has a maximum flow rate not to exceed **0.5 gallons per minute** at 60 psi.
    - Metering faucets shall have a maximum flow rate of **0.20 gallons per cycle commercial** or **0.25 residential**.
- Existing kitchen faucets that exceed 2.2 gallons per minute shall be replaced with one that has a maximum flow rate not to exceed **1.8 gallons per minute** at 60 psi. Residential kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1.8 gallons per minute at 60 psi.
    - Note: Where complying faucets are unavailable, aerators or other means may be used to achieve reduction.

STATE OF CALIFORNIA

ALTERATIONS - HVAC

CEC-CF1R-ALT-03-E (Revised 03/15) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	CF1R-ALT-03-E
Alterations - HVAC CZ 1, 3 to 7 and 16 (formerly CF-1R-ALT-HVAC)	(Page 1 of 1)

Site Address:				**Enforcement Agency:**	**Date Prepared:**	**Permit#:**
Equipment Type		Equipment Efficiency		New: Ducting, *Plenums, Lineset* Required R-value	Conditioned Floor Area (sq ft)	Thermostat
☐ Packaged System ☐ Split System ☐ Furnace	☐ Evaporator Coil ☐ Condensing Unit ☐ Lineset	_____AFUE _____SEER _____EER	_____COP _____HSPF	☐ R-6 *(CZ 1,3-7)* Ducts ☐ R-8[1] *(CZ 16)* Ducts ☐ R-6 (*all CZ's*) Plenums ☐ R-5 or R7.5 Lineset[3]	Served by system _____sq ft	☐ Setback *(If not already present, must be installed)*

HERS VERIFICATION SUMMARY Installer determines work to be completed and matches to one of the options below. At permit application this form is allowed to be filled out by hand. For final inspection all forms are to be registered (no hand filled forms allowed) and a copy left on site.

☐ **1. HVAC Changeout/Repair Can include new ducting**	**Required Compliance Documents to be left on site for Final**:
All Equipment, Condenser Unit, Evaporator Coil, Air Handler/Furnace	CF1R-ALT-02-E CF2R: MECH-01, MECH-20-HERS CF3R: MECH-20-HERS

Installer Requirement: Duct leakage (≤ 15% or, ≤ 10% to outside, or seal all accessible leaks)
Exempted from duct leakage testing if:
☐ 1. Duct system registered with HERS provider as previously sealed, or ☐ 2. There is less than 40 linear feet of duct in unconditioned space, or ☐ 3. Existing duct systems are constructed, insulated or sealed with asbestos (list manufacture date of building _____)

☐ 2. **New HVAC System**	**Required Compliance Documents to be left on site for Final**:
All new equipment and All New Ducts[2]	CF1R-ALT-02-E CF2R-MECH-01, MECH-20-HERS, MECH-22-HERS, MECH-(23 or 24)-HERS CF3R-MECH-20-HERS, MECH-22-HERS, MECH-(23 or 24)-HERS[2]

Installer Requirement: Duct leakage ≤ 6%, Fan Efficacy (.58W/CFM), Air Flow ≥ 350 CFM/ton (or Standards Table 150.0-C / D alternative)

☐ 3. **All New Ducts with Replacement**	**Required Compliance Documents to be left on site for Final**:
Includes replacing or installing All New Ducts[2] and one or more of the following: Condenser Unit, Evaporator Coil, Furnace	CF1R-ALT-02-E CF2R-MECH-01, MECH-20-HERS, MECH-(23 or 24)-HERS CF3R-MECH-20-HERS, MECH-(23 or 24)-HERS

Installer Requirement: Duct leakage ≤ 6%, Air Flow ≥ 350 CFM/ton (or Standards Table 150.0-C / D alternative)
☐ Exempted from duct leakage testing I existing duct systems are constructed, insulated or sealed with asbestos.

☐ 4. **New Ducting over 40 feet**	**Required Compliance Documents to be left on site for Final**:
Adding or replacing ducts in unconditioned space but less than All New Ducts[2]	CF1R-ALT-02-E CF2R: MECH-20-HERS CF3R: MECH-20-HERS

Installer Required to: Duct leakage (≤ 15% or, ≤ 10% to outside, or seal all accessible leaks)
☐ Exempted from duct leakage testing I existing duct systems are constructed, insulated or sealed with asbestos.

[1] All **new** ducting R-8 required when more than 40 ft installed and R-6 when less than 40 ft installed. This includes in walls, between floors etc.
[2] A New Duct system is when the duct system is constructed of at least 75 percent new duct material, and up to 25 percent may consist of reused parts from the dwelling unit's existing duct system (e.g., registers, grilles, boots, air handler, plenums, duct material.
[3] R-5 (1" thick insulation) for linesets 1" and less. R-7.5 (1.5" thick insulation) for linesets over 1 inch. Most mfg will require Suction line Diameter with insulation as the following 1.5-2T-2⅛", 2.5-3T-2¾", 3.5 to 4T-2⅞", 5T-4⅛"

Contractor (Documentation Author's /Responsible Designer's Declaration Statement)

I certify the following under penalty of perjury, under the laws of the State of California:
1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the California Business and Professions Code to accept responsibility for the information on this document.
3. That the energy features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 1 and 6 of the California Code of Regulations (CCR).
4. That the energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the CCR.
5. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.

Responsible Designer Name:	Responsible Designer Signature:	Date Signed:	License:

Company :	Address:	City/State/Zip:	Phone:

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