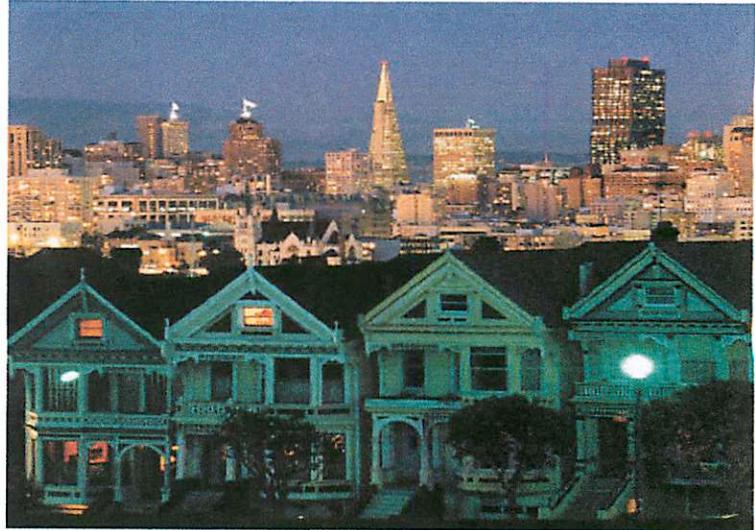


CITY OF CAMARILLO  
BUILDING SERVICES DIVISION

# *GUIDELINES*

*For One Story  
Single-Family Residential  
Construction*



*BUILDING AND  
SAFETY DIVISION*

**CITY OF CAMARILLO**  
**BUILDING SERVICES DIVISION**

This booklet provides general information necessary to build or alter a dwelling in compliance with the Camarillo City Codes. Please contact City Hall at 805-388-5395 for specific questions or additional information.

**PERMITS:** Permits are required to build, alter, repair, move or demolish any building and to do electrical, plumbing, heating, solar, and air conditioning work. Earthwork grading and driveway approaches also require permits from the City's Public Works Department. Permits may be obtained at your Building and Safety Office located in City Hall. Be sure you have all the necessary permits and approvals, including HOA approval, before you start work.

Prior to any construction and/or land disturbing activity, you will need to obtain the required permits. Some areas are within zones where special studies may be needed. The specific requirements for your project can be obtained from your local Building and Safety office.

**PERMIT FEES:** Permit fees for residential buildings and accessory buildings are based on the size of the building being built. We will be happy to provide more detailed fee information. There may be other fees, such as school fees, traffic fees or drainage fees due in your area. We can provide you with that information also.

**ALTERATIONS AND ADDITIONS:** If you intend to add to or otherwise remodel a building, contact your local Building and Safety office at 805-388-5395, or go online to [WWW.CI.CAMARILLO.CA.US](http://WWW.CI.CAMARILLO.CA.US) click on "P" and then click on Permits and check the various Handouts for information

**MOVING PERMITS:** When a building is moved, there are a few additional steps in the application process. We need two photos (one of the front) and a termite certificate showing the building is free of termites. Be sure to bring them in when you apply for the relocation inspection. The permits for the reconstruction work can be obtained anytime before the building is moved. Ask your local office for a relocation application package.

**PLANS:** Typically, 3 sets of plans are required. A set of plans includes a plot plan, foundation, floor, framing and roof plans; at least two elevations, sections, details, specifications and energy information which consists of an energy compliance package, heating and cooling calculations and a list of mandatory features and devices. More detailed requirements for a set of plans can be obtained from City Hall.

**LEGAL DESCRIPTION:** Your Assessor's Parcel Number (APN) is required in addition to the legal description and needs to be written on the application.

**LOCATION ON PROPERTY:** Yards are required around all dwellings. The front yard and other yards fronting on streets are determined by the width of the right of way. Side yards vary with the zone and lot width. This Information may be obtained at City Hall.

**PARKING AND GARAGES:** All dwellings need to have a two car garage with a clear parking area with minimum dimension of 20' by 20'. You may have a door in the common wall between a dwelling and a garage if it is a minimum 1-3/8" thick, solid wood or steel core door, or 20 minute door with a self closer and does not open into a sleeping room (*Section R302.5*). The garage side of this common wall is required to be a minimum 1/2" drywall. The ceiling and any walls supporting livable space above are required to be protected with one-hour fire rated construction (usually 5/8" Type "X" drywall) (*Table R302.6*). Garage door springs and cables need to be approved and installed per manufacturer's instructions (*Section 1211 CBC*).

**ROOM SIZES:** (*Section R304*) The main room in a dwelling needs to have a minimum 120 sq. ft. of floor area. Other rooms except kitchens need only be 70 sq. ft. in area exclusive of cabinets or other built-ins. These rooms need to be a minimum of 7 ft. in width. A 30 in. wide compartment with 24 in. of clear space in front of the toilet is necessary for a toilet compartment.

**CEILING HEIGHT:** (*Section R305*) The ceiling in living rooms, bedrooms and other habitable rooms is at least 7 ft. 6 in. above the floor. Halls, laundries, kitchens, storerooms and bathrooms need only 7 ft. For rooms with sloping ceilings, the code requires the prescribed ceiling height be maintained in one-half the area of the room. However, no portion of the room which has a ceiling height of less than 5 feet shall be used in the computations for minimum floor area. In the case of a room with a furred ceiling, the code requires the prescribed ceiling height in two thirds of the area and, as in all cases for projections below the ceiling, the furred area may not be less than 7 feet above the floor.

**ATTIC ACCESS AND VENTILATION:** In order to get into the attic for repairs and maintenance, a 22 in. x 30 in. scuttle is required for attics with a min. 30 in. or more in height above access opening. (*Section R807*) If mechanical equipment is in the attic, the access needs to be large enough to remove and replace the equipment (*See California Mechanical Code*). Cover these openings with rust resistant wire netting with 1/4 inch mesh.

If a forced air unit (heating unit) is in the attic, the scuttle needs to be min. 30 in. x 30 in. with a min. 24 in. wide and max. 20 ft. long catwalk to the unit controls. A light switch and light are also required (*See California Mechanical Code*).

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**WINDOWS:** All habitable rooms need windows for natural light (*Section R303*). Kitchens, bathrooms and laundry rooms are an exception and may use artificial light. To determine the area of the required windows, multiply the floor area of the room by 8%.

Ventilation of occupied spaces shall be through windows, doors, louvers or other complying openings to the outdoors. (*Section R303*). To determine the area of openable exterior openings for natural ventilation, multiply the floor area of each room by 4%. (*Section R303*) Rooms containing bathtubs, showers, spas and similar bathing fixtures shall also be mechanically ventilated per the *California Mechanical Code (Section 1203.4.1)*. The mechanical system shall change the air every 12 minutes.

An exterior exit door out of a bedroom is not required if one of the windows has a minimum 20 in. wide net openable area of at least 5.7 sq. ft. (*Section R310*). The opening height needs to be at least 24 in. and the sill no more than 44 in. above the floor. (Please be aware that the two dimensions alone, 20" x 24", do not provide the required 5.7 sq. ft. of net openable area). If the required net opening is no more than 44" above the OUTSIDE grade, a 5.0 sq. ft. net opening is allowed. (*Section R310.1.1 Exc.*)

**STAIRWAYS:** Stairs in dwellings need only be 36 in. wide. The height of the risers cannot exceed 7-3/4" and the tread depth shall be at least 10" (*Section R311.7.4*). Open sides of stairways and landings more than 30" high require guardrails with maximum 4" openings. On landings and balconies guardrails need to be a min. 42 in. high, and on stairs, guardrails need to be 34" to 38" high with maximum openings of 4-3/8". The guardrail can also serve as the handrail for stairs if the top rail has an approved gripping surface. The headroom clearance, measured vertically from the nosings of the treads, is at least 6 ft. 8 in. (*Section R311.7.2*).

**FIRE WARNING SYSTEMS:** To warn you if a fire starts while you are sleeping, an approved smoke detector with an audible alarm is required. Install the detectors in accordance with the approved manufacturer's instructions. Locate the detectors in each bedroom, in the hallway or area leading to bedrooms, in basements, and at least one on each floor. When bedrooms are above the first floor, a detector is required to be placed at the ceiling of the upper level in close proximity to the stairway (*Section R314.3*). Other conditions such as ceilings of different height require special treatment Contact us for these additional requirements.

**HIGH FIRE HAZARD AREAS:** In high fire hazard areas, there are special requirements for roofing, opening protection and exterior construction. Check with us to see if your property is located in one of these designated areas.

**ENERGY CONSERVATION:** Energy conservation standards have been established by the State. The standards for insulation, windows and orientations will vary according to the compliance approach chosen. Contact our office or the City's Website for clarification of the minimum information necessary for compliance.

Mandatory features for all residential buildings:

1. Weather-strip exterior doors and windows.
2. Caulk and seal joints and penetrations to unconditioned areas.
3. Manufactured doors and windows to be certified and labeled.
4. Exhaust fans need damper controls.
5. For fireplaces:
  - a) Tight-fitting, closeable metal or glass door(s).
  - b) Outside air intake with dampers and controls in fireplaces located on the outside walls or over wood floors.
  - c) Flue dampers and controls.
  - d) No continuous burning gas pilots.
6. Vapor barriers in Upper Desert and Mountain areas.
7. Insulate heating and air conditioning ducts.
8. Automatic setback thermostats for heating and cooling system.
9. Wrap storage type water heater and storage and backup solar water heaters with R-12 insulation.
10. Insulate the first 5 feet of hot water pipes closest to the water heater with R-4 insulation.
11. Gas cooking appliances equipped with intermittent ignition devices.
12. Use fluorescent fixtures for general lighting in kitchens and bathrooms.
13. Slab edge insulation should be water and vapor resistant.
14. Heating and air conditioning equipment, water heaters, shower heads and faucets to be certified by the California Energy Commission (CEC).
15. Insulation to meet CEC standards and be listed.

**NOISE INSULATION:** Noise insulation is necessary in the floors and walls between various units in multiple family dwellings (*Section 1207 CBC*). Contact us for detailed requirements.

### **WOOD FRAME CONSTRUCTION**

**SITE PREPARATION AND FOUNDATIONS:** In order to protect your building from termites, be sure that all roots, stumps, wood forms and wood scraps are removed from under the building to a depth of 12 in. below the ground.

A continuous concrete foundation is needed for bearing walls. See the framing detail provided on page 5 for size and framing attachment.

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**CONCRETE MIX:** When ordering ready-mix concrete specify at least 4,500 psi concrete, with a water to cement ratio of 0.45 and Type V cement.

**UNDERFLOOR VENTILATION AND ACCESS:**

Areas under the first floor of a wood frame house need cross ventilation openings on at least two (2) opposite sides of the building. The total area in square feet of all openings needs to be 1 sq. ft. for each 150 sq. ft. of underfloor area. Cover these openings with rust-resistant wire netting with ¼ in. mesh. An 18 in. x 24 in. access can be either through the floor or through the outside wall.

**MUDSILLS:** Foundation plates and other members in contact with the foundation are to be either approved treated lumber or foundation grade redwood.

**FOUNDATION STUDS:** Foundation studs 4 ft. or less in height can be the same size as the studs above. When over 4 ft. they are to be sized for additional story. Studs less than 14 in. in height are to be braced by solid blocking or shear paneled on both sides.

**GIRDERS:** Floor joists may be supported on girders with piers. Girder ends resting on concrete requires 3 in. bearing and if in a girder pocket, provide ½ in. air space at the tops, sides and end.

**FLOOR JOISTS:** Floor joists bearing on sills and girders shall have 1½ in. of bearing. Be sure to lap them 4 in. and nail to the joist coming from the other side.

If a header joist is over 4 ft. long, it and the trimmer joists are required to be doubled. Use joist hangers when the

header joist is over 6 ft. long and/or when the tail joists are over 12 ft. long.

To prevent floor joists from turning, the ends are required to be blocked solid. Also block them at each support. Be sure to double the joists under and parallel to bearing walls. Bearing walls perpendicular to the joist do not have to line up exactly with the wall or beam below as long as they are not more than one (1) joist depth offset.

**WALLS AND PARTITIONS:** The top plate on a frame wall should be doubled to tie all the walls in the building together. This is done by lapping all the corners and intersections and by lapping splices at least 4 feet. These plates also serve as fireblocks. Other places still need fireblocks. Some of them are between the studs in line with stair stringers, at the top and bottom riser, at dropped ceilings, bay windows and raised floors.

Openings for windows and doors are allowed in bearing walls if the load above them is supported by a properly sized header. A king stud and trimmer is needed at each end of the header.

**BRACING:** Your home must be constructed with adequate bracing to resist wind and seismic forces. Braced wall panels are required at each corner and along the building perimeter, not more than 25 ft. on center. To meet this requirement, typical light-frame construction usually incorporates plywood braced wall panels (shear panels) or Portland cement plaster (stucco) on exterior walls. 1" x 4" diagonal braces are no longer considered adequate bracing for wind and seismic forces. Contact us for additional information on braced wall panel requirements and options.

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**ELECTRICAL**  
*2010 California Electrical Code*

Show receptacle spacing and location on the floor plan. A schedule of the electrical panel showing all circuits, main overcurrent device size of the service entrance conductors and the grounding electrode conductor, will generally provide sufficient electrical information.

**LOAD CALCULATION SINGLE-FAMILY DWELLING, 100 AMP MINIMUM (220.82)**

_____ sq. ft. floor area @ 3 watts per sq. ft .....	=	_____	watts
Two appliance circuits @ 1500 watts each .....	=	3,000	watts
Laundry circuit .....	=	1,500	watts
Range at nameplate rating .....	=	_____	watts
Water heater at nameplate .....	=	_____	watts
Dishwasher at nameplate rating .....	=	_____	watts
Clothes dryer at nameplate rating (5,000 watts minimum) .....	=	_____	watts
Either space heating or 100% of air conditioning, whichever had greatest demand, counting 65% of heating load .....	=	_____	watts
Total wattage of all other fixed appliances, garbage disposers, etc. (Not electric ranges, dryers, A/C equipment or heating equipment.) If 4 or more, compute 75% of the total load .....	=	_____	watts
<b>TOTAL</b>		_____	watts
Compute first 10,000 watts at 100% .....	=	10,000	watts
Compute remainder at 40% .....	=	_____	watts
	<b>LOAD =</b>	_____	= _____ watts
	<b>NET LOAD =</b>	_____	watts
<b>NET LOAD</b> _____ divided by 240 volts .....	=	_____	AMP.

The service disconnecting means requires a rating not less than the load served, determined by the load calculation above. The following are minimum requirements for a single-family dwelling:

Main Switch Rating	100 amp.(minimum) 230.79(C)
Service Entrance Conduit Size	1-1/4"
Service Entrance Conductor Size (copper)	3-No. 4 THW
Service Entrance Conductor Size (aluminum)	3-No. 2 THW
Service Grounding Electrode Conductor	No. 8 copper (Armored)

**SERVICE:** The serving utility company will not normally make a service drop and attach to conduit less than 1¼ in. rigid steel. If you plan to use electrical metallic tubing or other approved service entrance, or are building in areas subject to snow loading, consult with the local electrical utility company and your Building Inspector.

For main circuit breakers, 200 amperes and smaller, install breakers with a 10,000 ampere interrupting capacity (singlefamily residentials, duplexes or individually metered mobilehomes).

Install the service conduit or other point of attachment so that the service drop will be at least 12 ft. above any residential yard or driveway. 230.24(B)(2)

Extend the service conductors at least 18 in. beyond the weatherhead and identify the neutral conductor white or gray.

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Mount the service so the center of the meter socket is between 4 ft. and 6 ft. 3 in. above grade.

**GROUNDING AND BONDING:** The 100 amp. service ground may be No. 8 if armored or in conduit, or No. 6 bare if it follows closely along the building finish. *250.64(B)*

Use a UL listed ground clamp to attach the grounding electrode conductor to an approved electrode in a location which will remain accessible without crawling when the building is completed. *250.68(A), 250.70*

Where aluminum grounding conductors are used, install one (1) size larger than required for copper and maintain at least 18 in. above ground. Provide protection for any aluminum grounding conductor run through stucco or concrete. *250.64(A)*

When using a metallic water service for the service ground, supplement it with an additional electrode. Contact your local Building Inspector for information on the "UFER" (concrete encased) electrode before placing your foundation. *250.53(D)(2)*

Bond interior water and gas piping to the grounding conductor's terminal at the service. Isolate neutral wires from the bond wires in subpanels. All subpanels require bonding back to the main panel ground. *250.104(A) & (B)*

**WORKING SPACE:** Maintain at least a 30 in. wide x 36 in. deep work space in front of the electrical service equipment. *110.26*

**WIRING:** Use approved raintight equipment in exposed areas outside of a building.

If nonmetallic sheathed cable is installed in exposed locations it must be run on the inside edge of framing members. Provide running boards at any location where cables are subject to damage. (See Article 334 of the NEC for additional wiring requirements.) *334.15 (A)*

Neutral conductors No. 6 and smaller require white or natural gray insulation. Conductors No. 4 or larger may be identified where terminating in enclosures with a white or gray color paint or tape.

When the white wire in nonmetallic sheathed cable is used as a hot wire, as in a 240-volt circuit, identify the conductor red or black where it is visible.

Install a properly sized outlet or junction box at each outlet, switch or junction point. A junction box may be installed

in an attic where there is at least 30 in. of headroom. Leave at least 6 in. of "make-up" wire at each outlet (receptacle, switch, fixture or junction box). *300.14*

Use nonmetallic sheathed cable with 15 or 20 and 30 ampere capacity circuits with a grounding conductor of the same size as the circuit conductors. For cable with 40 and 60 ampere capacity, the grounding conductor needs to be 30 ampere capacity.

For lighting or convenience outlet circuits, install wiring with a minimum 15 ampere capacity (No. 14 copper). *210.23(A)*

Install at least two small appliance circuits, rated at 20 amperes each, in the kitchen/dining area (No. 12 copper). Provide separate circuits for garbage disposals, trash compactors and dishwashers. Their recommended circuit ampacities are 15, 15 and 20 amperes respectively. *210.11(C)(1)*

Provide receptacles at any wall space 2 ft. or more in width in livable rooms, including the wall space occupied by fixed panels (i.e. fixed panel of sliding glass door) in exterior walls, so that no point on any wall is over 6 ft. from an outlet in that space (one receptacle every 12 ft). Include fixed room dividers or free-standing bar-type counters in the 6 ft. measurement. *210.52*

In kitchen and dining areas, install a receptacle at each counter space 12 in. or wider. Any outlet rendered inaccessible by the installation of stationary appliances, including refrigerators, are not counted as one of these required receptacles. Any receptacle which is part of a fixture or appliance, or is located over 5½ ft. above the floor, is also not counted as one of the required outlets.

All branch circuits that supply 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets & hallways or similar rooms or areas, are required to be protected by an ARC-Fault Circuit Interrupter (AFCI) type circuit breaker. *210.12(B)*

Section *406.11* requires that new and renovated Dwelling Units shall have Tamper-Resistant receptacles. These receptacles have spring-loaded shutters that close off the contact openings, or slots, of the receptacles. When a plug is inserted into the receptacle, both springs are compressed and the shutters then open, allowing for the metal prongs to make contact to create an electrical circuit.

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All 125-volt, single-phase, 15 and 20 ampere receptacles installed to serve kitchen counter top surfaces need ground-fault circuit-interrupter protection for personnel. *210.8(A)(6)*

Install receptacles within 36 in. to each washbasin, in each basement, attached garage, detached garages with electric power and at least one receptacle in hallways 10 ft. or more in length and one exterior receptacle at the front and rear of one and two family dwellings. *210.52*

Install grounding-type receptacles throughout. Groundfault circuit interrupters are required for all receptacles located outdoors, in crawl spaces under building, in bathrooms, within 6 ft. of wet bar sinks and for the required convenience work with receptacles in garages. *210.8(A) & 406.3(A)*

**LIGHTING OUTLETS:** Provide lighting outlets as follows:

At least one (1) wall-switch controlled light in every habitable room, hallway, stairway, attached garage, detached garage with electric power, bathrooms, and at all outdoor entrances. *210.70*

A wall-switched receptacle in lieu of a lighting outlet is permitted in all habitable rooms except kitchens and bathrooms. Install at least one (1) lighting outlet in the attic, underfloor space, utility room or basement suitable for storage or if it contains equipment which requires service. *210.70*

Lighting fixtures maintaining at least a 12 in. horizontal clearance in clothes closets from any area where combustible material may be stored is a proper installation (storage shelf area is considered to continue vertically to the closet ceiling). *410.8*

A flush recessed fixture with a solid lens or ceiling mounted fluorescent fixture requires 6 in. horizontal clearance from any area where combustible materials may be stored. Incandescent fixtures with open or partially enclosed lamps and hanging lights (pendant fixtures) are not allowed in clothes closets. *410.8*

**LAUNDRY AND BATHROOM CIRCUITS:** Provide separate 20 ampere circuits for laundry and bathroom receptacle outlets. If there is only one (1) receptacle on the circuit, install a 20 ampere rated receptacle, and if a duplex receptacle is installed it may be rated 15 ampere, 125-volts. *210.21(B)(1) & (3), 210.52(D) & (F)*

**OUTLET/JUNCTION BOXES:** Plastic boxes are usually marked on the inside with their volume (in cubic inch capacity) along with the maximum number and size of conductors allowed in the box. *314.16(A)*

**CENTRAL HEATING EQUIPMENT:** Central heating equipment requires an individual branch circuit sized per the manufacturer's installation instructions. *422.12*

Use the following table and rules to size plastic or metal boxes that are not marked with their volumes and number of conductors allowed. *314.16(A)(1)*

**AREA REQUIRED FOR EACH CONDUCTOR IN OUTLET BOXES**

<b>A.W.G.</b> <b>Size</b>	<b>Free Space For</b> <b>Each Conductor</b>
#18	1.5 cu. in.
#16	1.75 cu. in.
#14	2 cu. in.
#12	2.25 cu. in.
#10	2.50 cu. In.
# 8	3 cu. In.
# 6	5 cu. In.

**Add the area of two (2) conductors for the following:**

- Each yoke or strap containing one or more devices (switch or receptacles) mounted in the box. (The free space will be based on the largest conductor connected to the device.) *314.16(B)(4)*
- Conductors spliced together (with wire nuts, etc.). *314.16(B)(1)*
- Looped unbroken conductors not less than twice the minimum length required for free conductors. *314.16(B)(1)*

**Add the area of one (1) conductor for the following:**

- Each type of fixture stud, hickey, or cable clamp. The free space will be based on the largest conductor entering the box. (Romex connectors attached to the outside of the box do not count.) *314.16(B)(2)*
- One or more equipment grounding conductors (the free space will be based on the largest equipment grounding conductor entering the box.). *314.16(B)(5)*

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- Isolated equipment grounding conductors. *314.16(B)(5)*
- Unspliced conductors running through the box.  
*314.16(B)(1)*
- Each conductor originating outside of the box and terminating inside the box. *314.16(B)(1)*

**No additional area required for the following:**

- Maximum 4 fixture wires not larger than No. 14 plus ground from fixture canopy. *314.16(B)(1)*
- Conductors that do not leave the box. *314.16(B)(1)*

Make sure all work is inspected and passed by the Building Inspector before concealing.

Your local Building Inspector is prepared to assist you with any construction problem which may arise. Feel free to call for an appointment.

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**HEATING AND AIR CONDITIONING**  
*2010 California Mechanical Code*

**ACCEPTANCE:** Appliances are designed for the use of a particular type of fuel. Be sure they are only connected to the type of fuel specified on the label. Some appliances can be converted to use another fuel provided it is re-labeled to indicate that such a conversion has been made.

**VENTING AND VENT CONNECTORS:** Typically, gas-fired appliances, such as water heaters and blower-type warm air furnaces, are vented using type "B" venting materials which are listed, generally by Underwriters Laboratory (UL) and are installed with not less than the minimum clearances indicated in the label. When single-wall vent connector material is used for connecting a gas-fired appliance to a type "B" vent, a minimum of 6 in. from combustibles is maintained for the connector installation. *802.7.4*

**CONDENSING FURNACES:** A plastic pipe venting system which is an integral part of a listed condensing appliance shall be installed in accordance with the appliance listing, manufacturer's installation instructions and applicable local requirements. Provide the instruction booklet with the unit when calling for inspection. *310.0*

**BLOWER-TYPE WARM AIR FURNACES:** Warm air furnaces are not allowed to be installed in a room used or designed to be used as a bedroom, bathroom or closet, or in any enclosed space with access only through such room or space. Furnaces installed in attics and under floor spaces may have access through a closet.

For conventional installations, (as illustrated on the next page) the room or space is 12 in. wider than the furnace(s). Provide clear spaces of 3 in. along the sides and back of the furnace with 6 in. in front when the access door is closed. Sufficient working space, generally not less than 30 in. in the least dimension is provided along the entire front or firebox side of the furnace when the door of the furnace enclosure is fully opened. *305*

**GENERAL COMBUSTION AIR PROVISIONS FOR GAS FIRED WATER HEATERS AND WARM AIR FURNACES:** If the volume of the room or space in which fuel burning appliances are installed is equal to or greater

than 50 cu. ft. per 1000 Btu per hour (Btu/h) of the aggregate input ratings of the appliances, infiltration may be regarded as adequate for providing combustion air. *507.2.1*

A room or space that does not meet this minimum area needs at least two additional combustion air openings. To determine the size of the combustion air openings, total the aggregate input Btu/h rating of the appliances and call your local building department

Combustion air ducts and openings frequently consist of 2 or more of approximately equal areas, one located within 12 in. of the floor of the enclosure and one within 12 in. of the ceiling. Combustion air ducts from the building exterior are usually constructed of galvanized steel. However, unobstructed stud and joist spaces may be used, provided not more than one required fire stop is removed. Where not otherwise prohibited, the combustion air supply may be obtained from an attic area provided: *507.3*

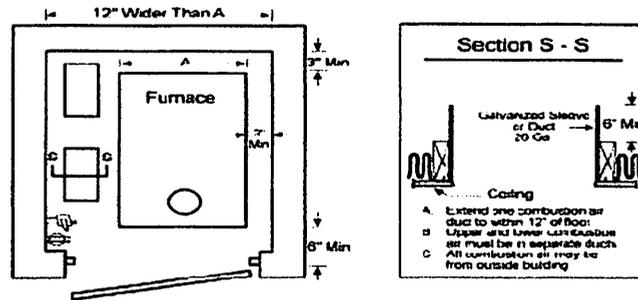
1. Attic ventilation if properly sized is sufficient to provide the required volume of combustion air.

2. The combustion air opening is provided with a galvanized sleeve of not less than No. 26 gauge extending from the appliance enclosure to at least 6 in. above the top of the ceiling joists and insulation. (See illustration on next page).

3. Screens are not installed on either end of a combustion air duct which terminates in an attic. *507.9(5)*

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**Typical Residential Forced Air Furnace Installation**



**NOTES:**

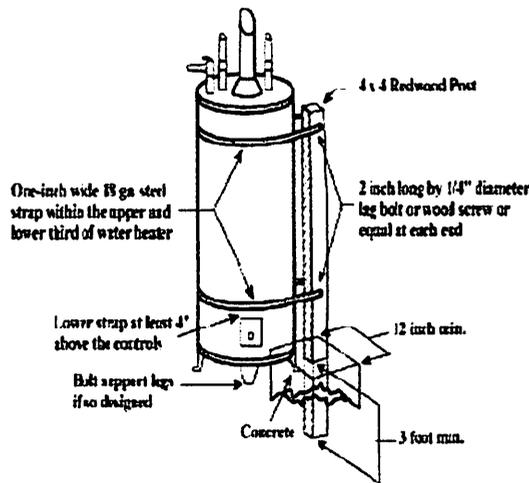
1. Combustion Air: One-half within 12" of ceiling and one-half within 12" of floor.
2. Ducts:
  - Supply and Return — Insulated galv. steel or approved equal, or approved factory made airducts.
  - Combustion Air — Galv. steel — 26 gauge. Unlined stud and joist spaces also permitted, provided:
    - a. Not more than one required fire stop is removed.
    - b. The space used forms a continuous sealed air passage to the opening into the compartment.
3. Front Working Space: 30" in front of furnace when door is open.
4. Vent: U. L. approved type "B" gas vent.
5. Vent Connector: Galv. Steel
  - To 5" diameter ..... 28 ga. min.
  - 5" to 9" diameter ..... 26 ga. min.
6. Clearances: Manufacturer's recommended clearances shall apply when greater than those shown.

**WATER HEATER ANCHORAGE REQUIREMENTS**

The California Plumbing Code requires water heaters to be anchored for earthquakes. One of the following methods shall be deemed to meet that requirement:

**Water Heater Anchorage Requirements**

A. Anchor the water heater to an adjacent wall with a minimum of two, 1-1/2" wide, 16 gauge, galvanized steel straps. Straps to be within the upper one-third (1/3) and lower one-third (1/3) of the water heater. At the lower point, a minimum distance of four (4) inches shall be maintained above the controls with the strapping. Provide a 1-1/2" long by 3/8 inch diameter lag screw at each end of each strap. The lag screw shall penetrate a minimum of one and one quarter inches into a minimum two by four



framing member in the adjacent wall.  
 B. Where there is no solid construction for attaching the straps, a 4 x 4 redwood post or equal shall be imbedded in a concrete foundation, (minimum twelve inch diameter by three feet in depth). The length of post shall equal at least the height of the water heater after the imbedment. And the straps shall then be anchored to the post (see adjacent illustration).  
 C. Other method(s), when found to be equal.

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**EQUIPMENT LOCATIONS AND ACCESSIBILITY**

**HORIZONTAL AND ATTIC FURNACES:** Generally an attic access opening and passageway of not less than 30" x 30" with continuous flooring of 24 in. wide from the opening to the furnace will accommodate servicing or replacing the equipment. Locate the access within 20 ft. of the furnace and provide a light at the furnace with the switch at the access.

**EXCEPTION:** The access opening and passageway into the space may be 22 in. by 30 in., provided the largest piece of equipment can be removed through the opening. Provide documentation to use the exception on the plans. *904.11*

**FLOOR FURNACE:** Locate a 24 in. x 18 in. access opening in the foundation or through the floor within 20 ft. of the furnace. Floor furnaces are not intended for installation on concrete floors. Clearances for floor furnaces are as follows: *912.7 & 8*

1. All sides - 12 in.
2. From ground - 6 in. may be reduced to 2 in. if sealed from the manufacturer.

The register of floor furnace with a horizontal warm air outlet shall not be placed closer than 6 in from the nearest wall. Provide 18 in clearance from two adjoining sides of the register to walls. The remaining sides shall be a min. of 6 in. from a wall. Wall register models shall not be placed closer than 6 in. to a corner. *912.4(B)*

Ducts shall be installed to maintain a vertical clearance of 18 in. for all portions of the duct that would obstruct access to any part of the crawl space. *604.1*

**VENTED WALL HEATERS:** Wall heaters are installed in walls between studs (2 in. x 4 in.) and are vented to an approved type "BW" vent. There are several conditions with which the "BW" vent must comply. Check your installation instructions and consult with your inspector if necessary. *928.0*

**ROOM HEATERS:** Such heaters shall be so placed as not to cause a hazard to walls, floors or doors. Room heaters designed and marked "For use in incombustible fire-resistive fireplace only," shall not be installed elsewhere. *924.0*

**CLOTHES DRYER:** Moisture-exhaust ducts for clothes dryers are required to terminate on the outside of the building and be equipped with a back-draft damper. The

duct must not be connected or installed with sheet metal screws or similar fasteners which may obstruct the flow. Clothes dryer moisture-exhaust duct shall not be connected to a gas vent connector, gas vent or chimney. The maximum duct length cannot exceed a total combined horizontal and vertical length of 14 ft., including two (2) 90 degree elbows. Two ft. (2') shall be deducted for each 90-degree elbow in excess of two (2). When a compartment or space for domestic clothes dryer is provided, a minimum 4-in. diameter moisture-exhaust duct of approved material shall be installed. When installed in a closet or room with a volume of less than 1,750 cubic feet, a 100 square inch opening is required in the door or other approved location for make-up air. *504.3*

The exhaust duct shall terminate 3 feet from the property line and 3 feet from any opening into the building. *504.5*

**APPLIANCES IN GARAGES:** Except for laundry appliances (washer and dryer), appliances generating a glow, spark or flame capable of igniting flammable vapors may be installed in a garage, if the pilots and burners or heating elements and switches are at least 18 in. above the floor level. *308.1*

**LIQUEFIED PETROLEUM GASES:** Liquefied petroleum gas-burning appliances, except range-top burners, shall be capable of automatically shutting off the gas to the pilot and main burner in the event of ignition failure. *306.0*

**ROOF MOUNTED EQUIPMENT:** Heating or cooling equipment located on roofs shall have a clearance of at least 6 ft between the equipment and the edge of the roof or provide rigidly secured guards or rails at least 42 in high. All electrical equipment shall be provided with a disconnecting means within sight of the equipment. One 120 V GFI protected out shall be supplied within 25 ft of the equipment. *904.10.2*

**PREFABRICATED FIREPLACES AND FIREPLACE STOVES:** Prefabricated fireplaces, fireplace stoves, and their chimneys may be used when listed and installed in accordance with their listing. *908.2*

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**PLUMBING**  
*2010 California Plumbing Code*

**MATERIALS:** Plumbing materials and fixtures have been tested for your safety. Any labeled approved materials and fixtures may be used in accordance with their approval. You may contact your Building Inspector to verify acceptance of new or unique plumbing products and applications. *301.2*

**SOIL AND WASTE LINES:** Cast iron, schedule 40 ABS -DWV, or schedule 40 PVC-DWV are used under structures. ABS-DWV, or PVC-DWV plastic are limited to two stories. ABS and PVC are not to be exposed on the outside of a building, except for vents projecting through the roof. Such vents are to be painted with vinyl paint. *701.1*

Soil and waste lines less than 4 in have a fall of 1/4 in. per foot. 4 in or greater has a fall of 1/8 in per foot. *708.0*

All piping in the ground is to be laid on a firm soil bed. Do not place piping into or embed it in concrete or masonry walls or footings. *313.2*

**WATER PIPE AND FITTINGS:** Use type "M" copper tubing or galvanized steel water piping for installations above the floor and for outdoor, in ground locations. For jointless installations under a slab floor, type "L" copper may be used. Approved CPVC, PE or PVC water pipe may be used underground, outside the building. CPVC water pipe may be used within a building. Used pipe may be installed provided it was previously used only for water piping. Use factory wrapped or coated piping, with joints primed and wrapped with approved tape if you plan to use galvanized pipe under the slab. Be sure not to run it in or below the foundations. *604.0*

Install a fullway valve to control all water outlets on the discharge side of the meter or at the building on unmetered systems. *605.2*

The building supply will be 3/4 in. or larger depending on the demand, length and other factors. *610.8*

Care must be exercised when installing any pipe (especially plastic) in rocky soils. Pipe should be installed in a rock-free trench, and bedded with rock-free selected soil to prevent damage to pipe. *315.4*

The burial depth, under ordinary soil conditions, is 12 in. for plastic, steel or copper pipe. *313.4*

**INADEQUATE WATER PRESSURE:** Install a tank and pump if the water pressure in the main supply will not provide at least 15 lb. per sq. in. at the highest fixture. *608.1*

**EXCESSIVE WATER PRESSURE:** Install an approved type pressure regulator preceded by an adequate strainer to reduce the pressure to 80 psi, or less where the pressure is in excess of 80 psi.

**PRESSURE RELIEF VALVES:** Water heaters require an approved combination pressure and temperature relief valve Drain the valve to the outside of the building and terminate the drain line 6 to 24 inches above grade. Point the drain line downwards and make sure there are no traps in the line or threads on the end of the pipe. *505.6*

**GAS PIPE AND FITTINGS:** Approved plastic Polyethylene (PE) natural gas yard piping and fittings may be installed in exterior underground locations. For other locations use standard weight iron, steel, CSST or brass, of iron pipe size. Valves and fittings must be approved for the gas being used. *1209.5*

**SHUT-OFF VALVE:** Install a shut-off valve for each appliance, ahead of the union or listed metal appliance connector. The shut-off valve is required within 6 ft. of the appliance. This valve is in addition to the one on the appliance. *1212.4*

**PIPING INSTALLATION:** Use factory wrapped or coated gas piping in underground locations with primer and approved 10 mil tape (two layers) on joints. Due to the corrosive soils, an additional two layers of 10 mil tape is required over the factory wrapped/coated gas piping and joints.

Gas piping cannot be imbedded in any kind of masonry or concrete or be installed under a slab floor building. Locate exposed gas piping 6 in. above grade. Metallic gas piping is to be buried 18 in. below grade. Approved plastic gas yard piping requires at least 18 in. of earth cover. A number 14 insulated copper tracer wire is required to be installed with and attached to the plastic piping and terminate above grade at each end. *1211.2*

Where unions are necessary, use "right and left" nipples and couplings. Bushings shall not be used in concealed

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locations. Ground joint unions may be used at exposed fixtures or appliance connections, and in exposed exterior locations immediately on the discharge side of a building shut-off valve. *1211.3*

**GAS TEST:** An air test is required for final inspection of the building, without shut-off valves installed. Install a pressure gauge and pump air into the line to 3 P.S.I. The gauge should show no drop for 10 minutes. The Building Inspector will check the test. *1214.3*

**CONNECTION:** Semi-rigid or flexible gas connectors may be used in lieu of standard pipe to connect appliances to the gas system when not more than 6 ft. long. This type connector cannot be run through walls, ceilings, floors or appliance housing. The connector material shall be approved for the location. *1212.2*

**SEDIMENT TRAPS:** Shall be installed at FAU and water heaters. They shall be installed as close as possible to the appliance inlet. *1212.7*

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