

 Building Division	FINAL INSPECTION	Revision Date: 6/1/2016
	Town of Tiburon Building Division 1505 Tiburon, Tiburon, CA 94920	General Requirements/Checklist for: RESIDENTIAL
		Codes Enforced: 2013 CRC,CPC,CMC, CEC, CAL Green Town of Tiburon Municipal Code (TMC)
The information provided in this document is general and intended as a guide only. Each project is unique and additional requirements may be enforced as deemed appropriate.		

UTILITIES RELEASE

Inspector shall release final utilities (gas/electrical) when final is approved.

PRIOR TO FINAL BUILDING INSPECTION

- Required sign-offs from other departments (Planning, Public Works and Fire Department)
- The applicant is required to submit the following to the permit center:
 - ✓ The Green Point Rater's acceptance of Cal-Green (NEW CONSTRUCTION ONLY) for Division A4.1 (Planning and Design); Division A4.3 (Water Efficiency and Conservation); Division A4.4 (Material Conservation and Resources Efficiency); Division A4.5 (Environmental Quality); and Division A4.6 (Tier 1 Measures).
 - ✓ Complete Marin Zero Waste Form B-1 showing all waste was taken to an approved dump facility.
 - ✓ List of subcontractors.
 - ✓ Completed Final Cost Evaluation Form.
- At final inspection**, the enforcement agency shall require the builder to leave compliance, operating, maintenance, and ventilation information in the building for the "building owner at occupancy" which includes the following: (Title 24 Volume 1 Administrative Regulations for the California Energy Commission article §10-103(b))
 - ✓ Certificate of Compliance (CF-1R).
 - ✓ Installation Certificate(s) (CF-6R) (these can be multiple compliance forms ENV, LTG, MECH).
 - ✓ Certificate(s) of Field Verification and Diagnostic Testing (CF-4R), if applicable.
 - ✓ Operating information for all applicable features, materials, components, and mechanical devices installed in the building.
 - ✓ Maintenance information for all applicable features, materials, components, and manufactured devices that require routine maintenance for efficient operation.
 - ✓ A description of the quantities of outdoor air that the ventilation system(s) are designed to provide to the building's conditioned space, and instructions for proper operation and maintenance of the ventilation system.
- Online CEC forms - http://www.energy.ca.gov/title24/2008standards/residential_manual.html

CONTRACTOR RESPONSIBILITIES DURING BUILDING INSPECTION

- Have Permit(s), Approved Plans and Documentation available during inspection.
- All revisions submitted, approved and attached to plans.
- All plan check fees paid.
- Special inspection reports and final affidavit.
- Verify compliance with approved plans and required sequential inspections are signed off.
- Building must have power for testing circuits and circuit tester.
- Provide safe and adequate size ladder(s) for roof and attic inspection. Ladder shall extend a min. of 36" above roof edge and be full height to attic access scuttle (per OSHA requirements).
- Have proper torque wrenches and tools for electrical panel & A/C inspection.

EXTERIOR

- Damaged City sidewalks/curbing shall be replaced or repaired prior to final.
- Address numbers shall be placed on house, plainly legible and visible from the street or road fronting the property.
 - ✓ Numbers shall contrast with background.
 - ✓ Numbers shall be Arabic numerals or alphabetical letters with a min. height of 4" and min. 1/2" stroke width.
- All exterior work shall be complete and wood painted.
- Door locks shall be installed on all entry and exit doors.
- All penetrations of exterior finish are to be sealed or properly screened for insects and weather protection including but not limited to electrical lines, cable, water and gas pipes, AC condenser lines.
- Exterior Elevations View: Verify the final house matches the approved plans. (i.e. windows, doors, Sky lights, grading ordinances, etc.).
- Protection of exposed ABS/plastic piping from sun's ultra violet rays: Apply 2 coats of latex paint (2013 CPC section 313.4).
- Hose bib backflow preventers or vacuum breakers shall be installed at hose bibs with the set screw tightened & broken off and pressure regulators. Vacuum breaker on irrigation system shall be 6" above highest head (2013 CPC sections 603.2.3, 603.4.7).
- Backflow prevention device: A "double check back flow prevention device" is required when fire sprinklered off the domestic water service. A "Reduced Pressure Principle Backflow Prevention Assembly" device is required when solar water heating, gray water/used water, well water, rain catchment, or other unapproved water supply is used at site. Device shall be installed on owner's property adjacent to the point of service within 5 feet of the property line (2013 CPC 602.3).
- EXPANSION TANK: All water systems provided with a backflow prevention device and or a pressure regulator shall be provided with an approved, listed, and adequately sized expansion tank when a water system contains storage water heating equipment such as a water heater tankless water heater and boiler (2013 CPC sections 608.2, 608.3).
- Electrical outlets: Minimum of one accessible grade level GFI protected outlet in front and one in rear of the dwelling not more than 6 1/2' ft. above grade and shall be listed & gasketed (2013 CEC article 210.52(E)). The covers shall be While-in-use/Bubble type (2013 CEC article CEC 406.8 (B)).
- Receptacles in damp or wet locations shall be a listed weather-resistant type "WR" (2013 CEC article 406.8 (A) & (B)).
- Backwater valve is required where there are fixtures with flood level rims located below one foot above the elevation of the next upstream manhole cover. Back water valve shall be accessible, of approved materials, and shall be enclosed in a masonry pit with removable cover.
 - ✓ Cleanouts for drains that pass through a backwater valve shall be clearly identified with a permanent label stating "BACKWATER VALVE DOWNSTREAM" (2013 CPC sections 710.1, and 710.6).
 - ✓ Water service shall have a fullway valve controlling all outlets and shall be installed on the discharge side of the water meter. If applicable "Non Metallic Water Service" shall be stated/labeled on main electrical panel (2013 CPC section 605.2, 609.5 and IAPMO installation standards 7-90).

EXTERIOR (continued)

- Water pressure regulator required when water pressure exceeds 80 PSI shall be an approved type with an adequate strainer (2013 CPC section 608.2).
- Wood siding clearance between wood siding and earth shall not be less than 6" unless sheathing and wall framing are naturally durable or preservative-treated wood.
- Exterior Stucco/plaster weep screed clearance shall be a min. of 4" above earth or 2" above paved surfaces.
- Lighting: All exterior lighting mounted to the building or to other buildings on the same lot shall be high efficacy luminaries OR shall be controlled by a photo control and motion sensor combination and shall be listed for damp or wet location.
 - ✓ Caulked seal around light fixtures is required (2013 CEC 210.70 (2) (b) Title 24 California Energy Code).
- Exterior landings at doors: The width shall not be less than the width of the stairway or door, whichever is greater.
 - ✓ Fully opened doors shall not reduce the required dimension of the landing by more than 7". Landing length in direction of travel shall be a min. of 36".
 - ✓ Outdoor stairways and landings shall be designed to shed water a min ¼" per foot away from house.
- Splash blocks (minimum 2'-0" long) under down spouts and slope away from foundation.

A/C COMPRESSOR

- A/C compressor(s) shall be located per approved site plan.
- Disconnect shall be readily accessible and not more than 6'-7" above grade (Do not install disconnect behind unit) (2013 CEC article 440.14, 404.8 (A) (1)).
- Identification of equipment: Attach permanent labeling (phenolic engraved plaque) on A/C unit and disconnect (2013 CMC section 304.5).
- Secure A/C unit to platform 3" above grade. Prefabricated platform shall be secured to grade with steel stakes on all corners (2013 CMC section 304.4).
- Verify that circuit breaker and/or fuse are sized per name plate (2013 CEC article 440.4 (B)).
- During inspection, contractor shall torque all terminals per manufacturer listing (2013 CEC article 110.3(B), CEC110.14).
- Flood zone: A/C compressor(s) shall be raised above the base flood elevation (BFE).
- Metal flex is not allowed in wet/exterior location. Liquid-tight flexible metal conduit is approved for wet locations (2013 CEC article 348.12(1)).
- Verify that an accessible electrical receptacle is installed at the same level and within 25' of the A/C unit. The outlet shall not be connected to the load side of the A/C disconnect (2013 CEC article 210.63).

SAFETY GLASS REQUIRED

- When edge of glass is less than 24" from door edge and less than 60" above ground.
- When glass is more than 9 sq. ft. and edge of glass is less than 18" above floor/ground and top edge is more than 36" above ground and within 36" of walking surfaces.
- When glass is within 60" of the water's edge at swimming pool, hot tub, or spa.

AIR EXHAUST, CHIMNEY, VENT AND DUCT TERMINATION

- Flood zone area: Air exhaust and intake openings shall be located at or above flood elevation (2013 CMC section 308.2.2)
- Chimney terminations must be 2' above any roof/structure within 10' and not less than 3' above the highest point where the chimney passes through the roof (See figure 2013 CMC section 802.5.2.1).

AIR EXHAUST, CHIMNEY, VENT AND DUCT TERMINATION (continued)

- Spark arrester shall be approved, screened, accessible and removable for cleaning. Architectural Shroud(s) are not allowed unless listed as part of the fireplace.
- Chimneys or vents with a metal thickness of 3/16 inch or more shall require only a connection to the lightning protection system (NFPA 780 article 4.8.8.1).
 - ✓ The connection for 4.8.8.1 shall be made using a main-size lightning conductor and a bonding device that has a surface contact area of no less than 3 inch² and shall provide two or more paths to ground, as is required for strike termination devices (NFPA 780 article 4.8.8.2).
- Dryer exhaust duct termination: Duct shall terminate independently to the outside of the structure and be equipped with an approved back-draft damper (no screens).
 - ✓ Shall be listed for roof/horizontal or wall/vertical termination not closer than 3'-0" from any openings including under-floor air vents.
 - ✓ Where roof top dryer vent is installed recommend a secondary vent box (2013 CMC section 504.3.1).
- Environmental air duct exhaust such as hoods, dryer and bathroom vents shall terminate a min. of 3'-0" from property line and 3'-0" from openings into a building (2013 CMC section 504.3.1).
- Gas appliance vents 12" or smaller shall terminate a min. of 12" above any portion of a building within 10' horizontally when 6:12 or flatter; see CMC Figure 8-2 for vents larger than 12".
 - ✓ Vents within 8' of a wall shall terminate a min. of 2' above the walls roof edge.
Exception: Direct-Vent (2013 CMC section 802.6.2, 802.8.1).
- Direct-Vent input clearance to opening: <10k Btu = 6", >10k Btu-50k Btu = 9", > 50k Btu = 12".
 - ✓ The bottom of the vent shall be located a min. of 12" above grade. Architectural Shroud(s) are not allowed unless listed for use with the gas appliance.
- Vent termination is installed per manufacturer's installation instructions (2013 CMC section 802.8.3).
- Waste vents shall terminate vertically no less than 6" above roof, nor less than 1'-0" from any vertical surface and 10'-0" from or 3' above any opening such as windows, doors, air intake, nor less than 3' from any lot line.
 - ✓ Side wall vent may not terminate under vented soffit (2013 CPC section 906.1, 2).

ROOF

- Verify flashing of fire place, metal edging/drip edge, down spouts, vent caps.
- Roof gutters shall be of non-combustible materials or min. schedule 40 plastic pipe.
- Paint all ABS/Plastic vent pipes (IAPMO Product Installation standards section).
- Skylight curbs required at 3:12 slope, min. 4" for less than 3:12 roof.
- Penetration in roof 30" or more requires a cricket (skylight and fireplace).

FLAT ROOF/BALCONY DRAINS

- Primary drain(s)** shall be properly sized per 2013 CPC Table 11-1.
- Secondary drain(s)**
 - ✓ Shall be the same size as the primary drain with the inlet flow line 2" above the low point of the roof and shall be an independent system **OR**
 - ✓ Overflow scupper(s) shall be installed with the inlet flow line located 2" above the low point of the roof and the scupper opening a min. of 4" high and have a width equal to the circumference of the primary drain.
 - ✓ Overflow drains shall not be connected to the primary drain (2013 CPC section 1101.11.2.1, 2).

FLAT ROOF/BALCONY DRAINS (continued)

- Minimum 1/4" per foot slope to drain.**
- Strainer(s) for flat deck** primary drain(s) shall be level with the deck with the inlet area not less than 2 times the area of the drain pipe (2013 CPC section 1105.3).
- Strainer(s) for all flat roof** secondary drain(s) shall be a min. of 4" above with the inlet area no less than 1-1/2 times the size of the inlet pipe (2013 CPC section 1105.3).

GRADING AND DRAINAGE

- Site Grading** and Drainage per approved plan. Install splash blocks (min. 2' long) under down spouts.
 - ✓ Drainage away from foundation shall be a min. slope of 5% (6" for 10').
 - ✓ Pipe collection systems and drywells are not allowed except basement window well/egress area sump pump discharge.
 - The acceptable method of outletting of the subgrade system is at a bubbler box on property 10' min. from property lines/city sidewalk.
 - No connection of roof water leaders may occur with this outlet.
 - No site water shall enter onto adjoining lot or property.

VENTILATION AND FLOOD VENT OPENINGS

- Roof/Attic:** Min. net free ventilation 1/150 sq. ft. of area with 50% at upper portion a min. of 3' above eave or cornices vents and the balance ventilation provided by eave or cornice vents.
 - ✓ Openings to attics shall be covered with corrosion-resistant wire mesh openings a min. of 1/8" not to exceed 1/4".
- Under-floor:** Minimum net free ventilation 1/150 sq. ft. of area and placed to provide cross ventilation of under-floor space.
 - ✓ Openings shall be covered with corrosion-resistant wire mesh with mesh openings not exceeding 1/8" openings.
- Verify under floor **air and flood vent** openings are covered for their height and width with corrosion-resistant metal screen with max. 1/4" openings.
- Flood vents:** Any louver, screens or other opening covers shall not block or impede the automatic flow of floodwaters into and out of the enclosed areas (Engineering Standard ASCE 24-98).
- Verify that roof, eave and under floor ventilation openings/vents** are not blocked/covered.
- All exposed wood at foundation vents shall be protected.

GAS PRESSURE TEST

- Verify Utilities
- Test pressure:** 10 PSI on 15 PSI GAGE for 15 minutes (2013 CPC 1214.3.1, 2, 3).
- Gas pipe passing through outside wall is protected against corrosion by coating, wrapping or sleeve, caulk around sleeve (2013 CPC section 1211.2 and 1211.1.5).
- Maintain a 3' clear and level working space** in front of the gas meter.
- Gas Meters** exposed to vehicular traffic shall be protected by bollards (2013 CPC section 1209.6.2).
- Dielectric fitting** required between underground and above ground metal gas pipe.

WATER FEATURES, FIRE PITS AND OUTDOOR COOKING FACILITIES

- Swimming pool, spa, hot tubs and fountains:** Verify that approved/listed anti-entrapment cover/drain grate is installed at all suction outlets including side outlets. (2013 CBC Appendix G section AG 106). Properties with swimming pools must comply with swimming pool enclosure guidelines.

WATER FEATURES, FIRE PITS AND OUTDOOR COOKING FACILITIES (continued)

- Fire Pit and BBQ:** Verify installed per plan, appliance is listed, gas shutoff valve is accessible and within 6' from appliance.
 - ✓ Gas connector is listed for exterior location and properly sized (see tag on connector).
 - ✓ Gas piping is properly sized and if covered by structure properly vented.

DETACHED GARAGE

- Verify that eave does not protrude into 3' set back** (metal rain gutters are ok).
- Exterior wall fire separation distance** (2013 CRC T -R302.1 (1), R302.1 (2), 313.3.1.1(4)).
 - ✓ **Non-sprinklered dwellings**
 - 3' requires 1-hour walls with no openings
 - 3'-5' requires 1-hour walls & 25% openings
 - 5' or more no fire protection of walls or openings
 - ✓ **Sprinklered dwellings**
 - 3' requires 1-hour walls with no openings
 - More than 3' no fire protection of walls or openings
- Illumination:** A minimum of one wall switched controlled lighting outlet shall be installed to provide illumination on the exterior side of outdoor entrances or exits (man door).
Exception: Vehicle door in garage shall not be considered as an outdoor entrance or exit (2013 CEC article 210.70 (A) (2) (a) & (b)).
- Receptacle outlet:** A minimum of one receptacle outlet is required in detached garage with electrical power (2013 CEC article 210.52 (G)).
- GFCI protection** at all electrical receptacles (2013 CEC article 210.8(A) (2)).
- Exposed electrical** cable within 7' from the floor shall be protected with rigid metal conduit electrical metallic tubing, or schedule 80 PVC rigid nonmetallic conduit extending at least 6" above the floor (2013 CEC article 398.10 (C), 334.15 (B)).
- Set up for hot check.**
- During inspection contractor shall torque** service conductors, circuit breakers per manufacturers' listings (2013 CEC article 110.3 (B), 110.14 FPN).
- Where there is only one ground rod,** provide a second ground rod a minimum distance of 6' apart.
 - ✓ **Bond with #6 AWG.** Connections at rods must be accessible (2013 CEC article 250.66 (a), 250.56).
- Verify panel is listed** for use.
- Circuit breakers to match manufacture** of panel requirements.
- Verify listed breakers (2013 CEC article 110.3).
- Oxide inhibitor applied to aluminum conductor terminations in lugs/breakers.**
- No double lugging allowed unless specifically approved** (2013 CEC article 110.14(A)).
- Verify wire size complies with (2013 CEC article 310 & table 310.15(b)).
- Main panel grounds and neutrals shall be on the same bus bar,** or if on separate bus bars, the bus bars must be connected by a bonding jumper the same size as GEC (2013 CEC article 250.142).
- Sub panel grounds and neutrals** shall be on a separate bus bar (2013 CEC article 250.6).
- Unused K/O and openings** shall be sealed with listed plugs (2013 CEC article 110.12(A)).
- Provide proper phasing** for multi wire branch circuits.
- Panels with more than 6 disconnects** req. main breaker unless specifically approved (2013 CEC article 230.70 & 250.32(D)).
- Panel boards at separate structures require a main disconnect and grounding electrode** (2013 CEC article 250.32(D)).

DETACHED GARAGE (continued)

- ✓ Dedicated circuit for furnace (2013 CEC article 422.12).
- ✓ Dedicated circuit for (built-in) microwave.
- ✓ Dedicated circuit for range hood and not on small appliance circuit (2013 CEC article 210.52(B) (2)).
- ✓ Two dedicated circuits for heated Hydro-Massage bathtub motors.
- ✓ Minimum (2)-20 amp small appliance circuits @ kitchen & dining, pantry & breakfast areas (2013 CEC article 210.11(C) (1)).
- ✓ Minimum (1)-20 amp circuit for laundry receptacle (2013 CEC article 210.11(C) (2)).
- ✓ Minimum (1)-20 amp circuit for bathrooms receptacles (2013 CEC article 210.11(C) (3)).
- **GFCI protection** is required at all receptacles in garages and unfinished basements.
 - ✓ Receptacles that are not readily accessible and for appliances not easily moved such as clothes washer, freezer, sump pump are exempt (2013 CEC article CEC 210.8(A)).
- **Lighting and receptacle outlets shall be protected with a Combination type AFCI** and shall be independently identified/labeled as such and installed in Dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas (2013 CEC article 210.12(B)).
Exception:
Remodels using existing panels are not required to install AFCI breakers, unless panel is compatible for AFCI breakers.
- **Tamper Resistant Receptacles in Dwelling Units:** In all areas specified in 210.52 every kitchen, family room, dining room, living room, parlor, library, den, sunroom, bedroom, recreation room, bathroom, garage, basement, laundry and outdoor area, all 125-volt, 15- and 20-ampere receptacles shall be listed tamper resistant receptacles (2013 CEC article 406.11, 210.52).
- **Verify labeling of circuits** for main and Sub-panel.
- **Handle tie at garbage disposal and dishwasher for single yoke** (2013 CEC article 210.4(b)).
- **Circuit breaker cannot exceed 80% of its rating.**
- Grounding electrode and Grounding Electrode Conductor (per 2013 CEC table 250.66 & articles 250.64, 250.70).
 - ✓ **If the Grounding Electrode Conductor is run in conduit** the conduit must be bonded at the service panel enclosure and at the grounding electrode with listed fittings (2013 CEC article 250.84 and 250.90).
- **Confirm supplemental ground to water and gas** metal piping service (2013 CEC Table 250.66).
- **Main disconnect 6'-7" from top of handle to floor/grade** and location is readily accessible clearance of 36" deep X 30" wide X 78" in height (2013 CEC articles 404.8(A)(1), 230.70(A)(1)).
- **Internal parts/equipment shall not be damaged** and free of contaminates (2013 CEC article 110.12(C)).
- **Electrical panel shall be clean of debris.**
 - ✓ Contaminated panel must be replaced (2013 CEC article 110.12(c), 110.12).
- Verify roof flashing at riser is sealed/watertight.
- Underground service raceway shall be sealed at panel (Duct seal - 2013 CEC article 230.8).
- **Plastic water service pipe** requires blue insulated minimum **18 AWG copper tracer wire.**
 - ✓ Plastic pipe is only allowed when **not** using water service as an electrical ground.
 - ✓ Tracer wire must terminate above ground at each end of the plastic piping.
 - ✓ Nonmetallic pipe identification:

DETACHED GARAGE (continued)

- A label shall be fastened to the main electric meter panel stating "**THIS STRUCTURE HAS A NON-METALLIC WATER SERVICE**" (2013 CPC section 604.8, 609.5, and IAPMO Installation Standards 7-90, 609.5 IAPMO installation standards 7-90).
- Verify electric service riser provides for required clearance of service entrance conductors above roof.

EXTERIOR AND INTERIOR GUARDS, HANDRAILS, STAIRWAYS AND LANDINGS**GUARDS AND HANDRAILS**

- Handrails are required at all stairs having four or more risers.
- **Guards are required** along open-sided walking surfaces 30" above grade/floor (2013 CRC section R312.1).
- **Required guards** at open-sided walking surfaces including stairs, porches, balconies or landings shall not be less than 42" high measured vertically above the adjacent walking surface, adjacent fixed seating or the line connecting the leading edges of the treads (2013 CRC section R312.2).

Exceptions:

- 1) **Guards** on the open sides of stairs shall have a height not less than 34 inches measured vertically from a line connecting the leading edges of the treads.
 - 2) **Where the top of the guard** also serves as a handrail on the open sides of stairs, the top of the guard shall not be less than 34 inches and not more than 38 inches measured vertically from a line connecting the leading edges of the treads.
- **Exterior woodplastic composite guards** - Woodplastic composite guards shall comply with the provisions of 2013 CRC section R317.4.
 - **Handrails** - Handrails shall be provided on at least one side of each continuous run of treads or flight with four or more risers (2013 CRC section R311.7.7).
 - **Height** - Handrail height, measured vertically from the sloped plane adjoining the tread nosing, or finish surface of ramp slope, shall be not less than 34 inches and not more than 38 inches (2013 CRC section R311.7.7.1).

Exceptions:

- 1) The use of a volute, turnout or starting easing shall be allowed over the lowest tread.
 - 2) When handrail fittings or bendings are used to provide continuous transition between flights, the transition from handrail to guardrail, or used at the start of a flight, the handrail height at the fittings or bendings shall be permitted to exceed the maximum height.
- **Continuity** - Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above the lowest riser of the flight.
 - ✓ Handrail ends shall be returned or shall terminate in newel posts or safety terminals.
 - ✓ Handrails adjacent to a wall shall have a space of not less than 1 1/2 inch between the wall and the handrails (2013 CRC section R311.7.7.2).

Exceptions:

- 1) Handrails shall be permitted to be interrupted by a newel post at the turn.
 - 2) The use of a volute, turnout, starting easing or starting newel shall be allowed over the lowest tread.
- **Grip-size** - All required handrails shall be of one of the following types or provide equivalent graspability (2013 CRC section R311. 7.7.3).

GUARDS AND HANDRAILS (continued)

- 1) **Type I** - Handrails with a circular cross section shall have an outside diameter of at least 1- $\frac{1}{4}$ inches and not greater than 2 inches.
 - ✓ If the handrail is not circular, it shall have a perimeter dimension of at least 4 inches and not greater than 6 $\frac{1}{4}$ inches with a maximum cross section of dimension of 2- $\frac{1}{4}$ inches.
 - ✓ Edges shall have a minimum radius of 1/100 inch.
- 2) **Type II** - Handrails with a perimeter greater than 6 $\frac{1}{4}$ inches shall have a graspable finger recess area on both sides of the profile.
 - ✓ The finger recess shall begin within a distance of $\frac{3}{4}$ inch measured vertically from the tallest portion of the profile and achieve a depth of at least $\frac{5}{16}$ inch within $\frac{7}{8}$ inch below the widest portion of the profile.
 - ✓ This required depth shall continue for at least $\frac{3}{8}$ inch to a level that is not less than 1- $\frac{3}{4}$ inches below the tallest portion of the profile.
 - ✓ The minimum width of the handrail above the recess shall be 1- $\frac{1}{4}$ inches to a maximum of 2- $\frac{3}{4}$ inches.
 - ✓ Edges shall have a minimum radius of 0.01 inch.

Structural strength for Guards/Guardrails

- Live load** - The minimum uniformly distributed live load shall be as provided in Table R301.5.

TABLE R301.5	
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS	
(in pounds per square foot)	
USE	LIVE LOAD
Guardrails and handrails^d	200^h
Guardrail in-fill components^h	
<p>For SI: 1 pound per square foot = 0.0479k Pa, 1 square inch = 645 mm², 1 pound = 4.45 N.</p> <p>d. A single concentrated load applied in any direction at any point along the top.</p> <p>h. Glazing used in handrail assemblies and guards shall be designed with a safety factor of 4. The safety factor shall be applied to each of the concentrated loads applied to the top of the rail, and to the load on the in-fill components. These loads shall be determined independent of one another, and loads are assumed not to occur with any other live load.</p>	

STAIRWAYS**Construction**

- Attachment** - Exterior landings, decks, balconies, stairs and similar facilities **shall be positively anchored to the primary structure** to resist both vertical and lateral forces or shall be designed to be self-supporting.
- ✓ Attachment **shall not be** accomplished by use of toenails or nails subject to withdrawal (2013 CRC section R311.S.1).
- Width** - Stairways shall not be less than 36 inches in clear width at all points above the permitted handrail height and below the required headroom height.
- ✓ Handrails shall not project more than 4- $\frac{1}{2}$ inches on either side of the stairway and the minimum clear width of the stairway at and below the handrail height, including treads and landings, shall not be less than 31- $\frac{1}{2}$ inches where a handrail is installed on one side and 27 inches where handrails are provided on both sides (2013 CRC section R311.7.1).

Exception:

The width of spiral stairways shall be in accordance with 2013 CRC section R311. 7.9.1.

STAIRWAYS (continued)

- **Headroom** - The minimum headroom in all parts of the stairway shall not be less than 6 feet 8 inches measured vertically from the sloped line adjoining the tread nosing or from the floor surface of the landing or platform on that portion of the stairway (2013 CRC section R311.7.2).

Exception:

Where the nosings of treads at the side of a flight extend under the edge of a floor opening through which the stair passes, the floor opening shall be allowed to project horizontally into the required headroom a maximum of 4-¾ inches.

- **Walkline** - The walkline across winder treads shall be concentric to the curved direction of travel through the turn and located 12 inches from the side where the winders are narrower.
 - ✓ The 12-inch dimension shall be measured from the widest point of the clear stair width at the walking surface of the winder.
 - ✓ If winders are adjacent within the flight, the point of the widest clear stair width of the adjacent winders shall be used (2013 CRC section R311.7.3).
- **Stair treads and risers** - Stair treads and risers shall meet the requirements of this section. For the purposes of this section, all dimensions and dimensioned surfaces shall be exclusive of carpets, rugs or runners (2013 CRC section R311.7.4).
- **Riser height** - The maximum riser height shall be 7-¾ inches. The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 inch (2013 CRC section R311.7.4.1).
- **Tread depth** - The minimum tread depth shall be 10 inches.
 - ✓ The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge.
 - ✓ The greatest tread depth within any flight of stairs shall not exceed the smallest by more than 3/8 inch.
 - ✓ Consistently shaped winders at the walkline shall be allowed within the same flight of stairs as rectangular treads and do not have to be within 3/8 inch of the rectangular tread depth.
 - ✓ **Winder treads** shall have a minimum tread depth of 10 inches measured between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline.
 - ✓ **Winder treads** shall have a minimum tread depth of 6 inches at any point within the clear width of the stair.
 - ✓ **Within any flight of stairs**, the largest winder tread depth at the walkline shall not exceed the smallest winder tread by more than 3/8 inch (2013 CRC section R311.7.4.2).
- **Profile** - The radius of curvature at **the nosing** shall be no greater than 9/16 inch.
 - ✓ A nosing not less than ¾ inch but not more than 1-¼ inches shall be provided on stairways with solid risers.
 - ✓ The greatest nosing projection shall not exceed the smallest nosing projection by more than 3/8 inch between two stories, including the nosing at the level of floors and landings.
 - ✓ Beveling of nosings shall not exceed ½ inch.
 - ✓ **Risers** shall be vertical or sloped under the tread above from the underside of the nosing above at an angle no more than 30 degrees (0.51 rad) from the vertical.
 - ✓ **Open risers** are permitted, provided that the opening between treads does not permit the passage of a 4-inch diameter sphere (2013 CRC section R311.7.4.3).

Exceptions:

- 1) A nosing is not required where the tread depth is a minimum of 11 inches.

STAIRWAYS (continued)

- 2) The opening between adjacent treads is not limited on stairs with a total rise of 30 inches or less.
- **Exterior wood/plastic composite stair treads** - Wood/plastic composite stair treads shall comply with the provisions of (2013 CRC section R317.4).
 - **Landings for stairways** - There shall be a floor or landing at the top and bottom of each stairway.
Exception:
A floor or landing is not required at the top of an interior flight of stairs, including stairs in an enclosed garage, provided a door does not swing over the stairs.
 - ✓ **A flight of stairs** shall not have a vertical rise larger than 12 feet between floor levels or landings.
 - ✓ **The width of each landing** shall not be less than the width of the stairway served.
 - ✓ Every landing shall have a minimum dimension of 36 inches measured in the direction of travel (2013 CRC section R311.7.5).
 - **Stairway walking surface** - The walking surface of treads and landings of stairways shall be sloped no steeper than one unit vertical in 48 inches horizontal (2-percent slope) (2013 CRC section R311. 7.6).
 - **Handrails** - Handrails shall be provided on at least one side of each continuous run of treads or flight with four or more risers (2013 CRC section R311. 7.7).
 - **Under-stair protection** - Enclosed accessible space under stairs shall have walls, under-stair surface and any soffits protected on the enclosed side with 1/2-inch gypsum board (2013 CRC section R302.7).
 - **Fireblocking** shall be provided in wood-frame construction in the following locations:
 - ✓ In concealed spaces between stair stringers at the top and bottom of the run.
 - ✓ Enclosed spaces under stairs shall comply with 2013 CRC section R302.7.
 - **Stairway illumination** - All interior and exterior stairways shall be provided with a means to illuminate the stairs, including the landings and treads. Interior stairways shall be provided with an artificial light source located in the immediate vicinity of each landing of the stairway.
 - ✓ For interior stairs the artificial light sources shall be capable of illuminating treads and landings to levels not less than 1 foot-candle (11 lux) measured at the center of treads and landings.
 - ✓ Exterior stairways shall be provided with an artificial light source located in the immediate vicinity of the top landing of the stairway.
 - ✓ Exterior stairways providing access to a basement from the outside grade level shall be provided with an artificial light source located in the immediate vicinity of the bottom landing of the stairway (2013 CRC section R303.6).
Exception:
An artificial light source is not required at the top and bottom landing, provided an artificial light source is located directly over each stairway section.
 - **Light activation** - Where lighting outlets are installed in interior stairways, there shall be a wall switch at each floor level to control the lighting outlet where the stairway has six or more risers.
 - ✓ The illumination of exterior stairways shall be controlled from inside the dwelling unit (2013 CRC section R303.6.1).
Exception:
Lights that are continuously illuminated or automatically controlled.

STAIRWAYS (continued)

- Safety glass** required in walls enclosing stairway landings or within 5 feet of the bottom and top of stairway where the bottom edge of the glass is less than 60 inches above a walking surface.

MEANS OF EGRESS

- Means of egress** - All dwellings shall be provided with a means of egress as provided in this section.
 - ✓ The means of egress shall provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the dwelling to the exterior of the dwelling at the required egress door without requiring travel through a garage (2013 section R311.1).
- Egress door** - At least one egress door shall be provided for each dwelling unit.
 - ✓ The egress door shall be side-hinged, and shall provide a minimum clear width of 32 inches when measured between the face of the door and the stop, with the door open 90 degrees (1.57 rad).
 - ✓ The minimum clear height of the door opening shall not be less than 78 inches in height measured from the top of the threshold to the bottom of the stop.
 - ✓ Other doors shall not be required to comply with these minimum dimensions.
 - ✓ Egress doors shall be readily openable from inside the dwelling without the use of a key or special knowledge or effort (2013 CRC section R311.2).
- Floors and landings at exterior doors** - There shall be a landing or floor on each side of each exterior door. The width of each landing shall not be less than the door served.
 - ✓ Every landing shall have a minimum dimension of 36 inches measured in the direction of travel. Exterior landings shall be permitted to have a slope not to exceed ¼ unit vertical in 12 units horizontal (2-percent).
Exception:
Exterior balconies less than 60 square feet and only accessible from a door are permitted to have a landing less than 36 inches measured in the direction of travel (2013 CRC section R311.3).
- Floor elevations at the required egress doors** - Landings or floors at the required egress door shall not be more than 1-½ inches lower than the top of the threshold.
Exception:
The exterior landing or floor shall not be more than 7-¾ inches below the top of the threshold provided the door does not swing over the landing or floor.
- When exterior landings or floors serving the required egress door are not at grade, they shall be provided with access to grade by means of a ramp in accordance with section R311.8 or a stairway in accordance with section R311.7 (2013 CRC section R311.3.1).
- Floor elevations for other exterior doors** - Doors other than the required egress door shall be provided with landings or floors not more than 7-¾ inches below the top of the threshold.
Exception:
A landing is not required where a stairway of two or fewer risers is located on the exterior side of the door, provided the door does not swing over the stairway (2013 CRC section R311.3.2).
- Storm and screen doors** - Storm and screen doors shall be permitted to swing over all exterior stairs and landings (2013 CRC section R311.3.3).
- Vertical egress** - Egress from habitable levels including habitable attics and basements not provided with an egress door in accordance with section R311.2 shall be by one or more ramps in accordance with section R311.8 or one or more stairways in accordance with section R311.7 or both.

MEANS OF EGRESS (continued)

- ✓ For habitable levels or basements located more than one story above or more than one story below an egress door, the maximum travel distance from any occupied point to a stairway or ramp that provides egress from such habitable level or basement, shall not exceed 50 feet (2013 CRC section R311.4).

MINIMUM ROOM AREAS

- **Minimum area** - Every dwelling unit shall have at least one habitable room that shall have not less than 120 square feet of gross floor area (2013 CRC section R304.1).
- **Other rooms** - Other habitable rooms shall have a floor area of not less than 70 square feet.
Exception: Kitchens (2013 CRC section R304.2).
- **Minimum dimensions** - Habitable rooms shall not be less than 7 feet in any horizontal dimension.
Exceptions:
 - 1) Kitchens.
 - 2) Limited-density owner-built rural dwellings. See section R301.1.1.1 (2013 CRC section R304.3).
- **Height effect on room area** - Portions of a room with a sloping ceiling measuring less than 5 feet or a furred ceiling measuring less than 7 feet from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required habitable area for that room (2013 CRC section R304.4).
- **Minimum height** - Habitable space, hallways, bathrooms, toilet rooms, laundry rooms and portions of basements containing these spaces shall have a ceiling height of not less than 7 feet (2013 CRC section R305.1).
Exceptions:
 - 1) For rooms with sloped ceilings, at least 50 percent of the required floor area of the room must have a ceiling height of at least 7 feet and no portion of the required floor area may have a ceiling height of less than 5 feet.
 - 2) Bathrooms shall have a minimum ceiling height of 6 feet 8 inches at the center of the front clearance area for fixtures.
 - ✓ The ceiling height above fixtures shall be such that the fixture is capable of being used for its intended purpose.
- **Basements** - Portions of basements that do not contain habitable space, hallways, bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches (2013 CRC section R305.1.1).
Exception:
Beams, girders, ducts or other obstructions may project to within 6 feet 4 inches of the finished floor.
- **Toilet facilities** - Every dwelling unit shall be provided with a water closet, lavatory, and a bathtub or shower (2013 CRC section R306.1).
- **Kitchen** - Each dwelling unit shall be provided with a kitchen area and every kitchen area shall be provided with a sink (2013 CRC section R306.2).
- **Sewage disposal** - All plumbing fixtures shall be connected to a sanitary sewer or to an approved private sewage disposal system (2013 CRC section R306.3).
- **Water supply to fixtures** - All plumbing fixtures shall be connected to an approved water supply. Kitchen sinks, lavatories, bathtubs, showers, bidets, laundry tubs and washing machine outlets shall be provided with hot and cold water (2013 CRC section R306.4).

MINIMUM ROOM AREAS (continued)

- **Bathtub and shower spaces** - Bathtub and shower floors and walls above bathtubs with installed shower heads and in shower compartments shall be finished with a nonabsorbent surface. Such wall surfaces shall extend to a height of not less than 6 feet (1829 mm) above the floor (2013 CRC section R307.2).

Exception:

- ✓ A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6 feet 8 inches above a minimum area 30 inches by 30 inches at the showerhead.

UNDER-FLOOR SPACE

- **Ventilation** - The under-floor space between the bottom of the floor joists and the earth under any building (except space occupied by a basement) shall have ventilation openings through foundation walls or exterior walls.
 - ✓ The minimum net area of ventilation openings shall not be less than 1 square foot for each 150 square feet of under-floor space area, unless the ground surface is covered by a Class 1 vapor retarder material.
 - ✓ When a Class 1 vapor retarder material is used, the minimum net area of ventilation openings shall not be less than 1 square foot for each 1,500 square feet of under-floor space area.
 - ✓ One such ventilating opening shall be within 3 feet of each corner of the building (2013 CRC section R40S.1).
- **Openings for under-floor ventilation** - The minimum net area of ventilation openings shall not be less than 1 square foot for each 150 square feet of under-floor area.
 - ✓ One ventilation opening shall be within 3 feet of each corner of the building.
 - ✓ Ventilation openings shall be covered for their height and width with any of the following materials provided that the least dimension of the covering shall not exceed ¼ inch:
 - 1) Perforated sheet metal plates not less than 0.070 inch thick.
 - 2) Expanded sheet metal plates not less than 0.047 inch thick.
 - 3) Cast-iron grill or grating.
 - 4) Extruded load-bearing brick vents.
 - 5) Hardware cloth of 0.035 inch wire or heavier.
 - 6) Corrosion-resistant wire mesh, with the least dimension being 1/8 inch thick.

Exception:

The total area of ventilation openings shall be permitted to be reduced to 1/1500 of the under-floor area where the ground surface is covered with an approved Class I vapor retarder material and the required openings are placed to provide cross ventilation of the space.

- ✓ The installation of operable louvers shall not be prohibited (2013 CRC section R408.2).

- **Unvented crawl space** - Ventilation openings in under-floor spaces specified in sections R408.1 and R408.2 shall not be required where (2013 CRC section R408.3):
 - 1) Exposed earth is covered with a continuous Class I vapor retarder. Joints of the vapor retarder shall overlap by 6 inches and shall be sealed or taped.
 - 1.1. The edges of the vapor retarder shall extend at least 6 inches up the stem wall and shall be attached and sealed to the stem wall; and
 - 2) One of the following is provided for the under-floor space:
 - 2.1. Continuously operated mechanical exhaust ventilation at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet of crawlspace floor area, including an air pathway to the common area (such as a duct or transfer grille).

UNDERFLOOR SPACE (continued)

- ✓ Crawl space perimeter walls shall be insulated in accordance with the minimum insulation requirements established in the California Energy Code.
 - ✓ Crawl space insulation shall be permanently fastened to the wall and extend downward from the floor to the finished grade level and then vertically and/or horizontally for at least an additional 24 inches.
 - 2.2. Conditioned air supply sized to deliver at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet of under-floor area, including a return air pathway to the common area (such as a duct or transfer grille).
 - ✓ Crawl space perimeter walls shall be insulated in accordance with the minimum insulation requirements established in the California Energy Code. Crawl space insulation shall be permanently fastened to the wall and extend downward from the floor to the finished grade level and then vertically and/or horizontally for at least an additional 24 inches.
 - 2.3. Plenum in structures complying with the California Mechanical Code, if under-floor space is used as a plenum.
- Access shall be provided to all under-floor spaces** - Access openings through the floor shall be a minimum of 18 inches by 24 inches (2013 CRC section R408.4 access).
- ✓ Openings through a perimeter wall shall be not less than 16 inches by 24 inches.
 - ✓ When any portion of the through-wall access is below grade, an areaway no less than 16 inches by 24 inches shall be provided.
 - ✓ The bottom of the areaway shall be below the threshold of the access opening.
 - ✓ Through wall access openings shall not be located under a door to the residence (see the Under Floor Furnace checklist for access requirements where mechanical equipment is located under floors).
- Removal of debris** - The under-floor grade shall be cleaned of all vegetation and organic material.
- ✓ All wood forms used for placing concrete shall be removed before a building is occupied or used for any purpose.
 - ✓ **All construction materials shall be removed before a building is occupied or used for any purpose** (2013 CRC section R408.5).
- Finished grade** - The **finished grade of under-floor surface** may be located at the bottom of the footings; however,
- ✓ Where there is evidence that the groundwater table can rise to within 6 inches of the finished floor at the building perimeter **or**;
 - ✓ Where there is evidence that the surface water does not readily drain from the building site, the grade in the under-floor space shall be as high as the outside finished grade, unless an approved drainage system is provided (2013 CRC section R408.6).
- Flood resistance** - For buildings located in areas prone to flooding as established in Table R301.2(1) (2013 CRC section R408.7):
- 1) Walls enclosing the under-floor space shall be provided with flood openings in accordance with 2013 CRC section R322.2.2.
 - 2) The finished ground level of the under-floor space shall be equal to or higher than the outside finished ground level on at least one side.
- Exception:** Under-floor spaces that meet the requirements of FEMA/FIA TB 11-1.
- General Ducts Under Floor or Crawl Space** – Air ducts installed under a floor in a crawl space shall be installed as follows (2013 CMC section 604.1):

UNDERFLOOR SPACE (continued)

- 1) Shall not prevent access to any area of the crawl space.
 - 2) Where it is required to move under ducts for access to areas of the crawl space a minimum vertical clearance of eighteen (18) inches shall be provided.
- Protection Against Flood Damage** - In flood hazard areas, ducts shall be located above the design flood elevation or shall be designed and constructed to prevent water from entering or accumulating within the ducts during floods up to the design flood elevation.
 - ✓ If the ducts are located below the design flood elevation, the ducts shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the design flood elevation (2013 CMC section 604.6).
 - Verify under-floor plumbing cleanouts are within 20 feet from access.
 - Verify that all under-floor vents are clear and not blocked by debris.

KITCHEN

- Ceiling height shall be** minimum 7 feet 0 inches in kitchen.
- Clear passageway** minimum 36 inches between counter fronts and appliances or counters and walls.
- Airgaps required** - No domestic dishwashing machine shall be directly connected to a drainage system of food waste disposer without the use of an approved dishwasher airgap fitting on the discharge side of the dishwashing machine.
 - ✓ Listed airgaps shall be installed with the flood-level (FL) marking at or above the flood level of the sink or drainboard, whichever is higher (2013 CPC section 807.4).
- Kitchen faucets** with pull out flexible line shall have an anti-siphon device (2013 CPC section 603.2.3).
- All receptacles** serving the countertop shall be GFCI protected (2013 CEC article 210.8(B)).
- Wall counter top receptacles** shall be spaced a maximum of 48 inches on center and within 24 inches from edge of the sink and counters (2013 CEC article 210.52(C) (4)).
- Counter tops** 12 inches or more in width require a receptacle outlet (2013 CEC article 210.52(C) (1)).
- Islands and peninsulas** shall be provided with a minimum of (1) receptacle (2013 CEC article 210.52(C) (1), (2) and (3)).
- Outlets shall not be mounted over 20 inches above counter top or more than 12 inches below counter (2013 CEC article 210.52(C) (5)).
- Under kitchen sink:** Dish washer hose is properly installed, Air gap discharge hose shall be sloped to drain pipe, check for leaks; **Electrical outlet face plate shall be installed.**
- Provisions for range must be present** either as a capped off gas line or a 220 volt outlet installed in wall.
 - ✓ If stove is to be wired directly, it shall be hooked up for inspection.
- Kitchen range clearance to combustibles** shall have a vertical clearance of 30 inches unless protected by ¼ inch insulating millboard or metal hood, then the clearance can be reduced to 24 inches.
 - ✓ Gas range must have approved anti-tip installed (2013 CMC section 917.1).
- Domestic Range hood exhaust duct** shall terminate outside, shall have a 3-foot clearance to windows and doors and other openings, shall be air tight and be equipped with a back draft damper.
 - ✓ **Makeup air may be required when large stove exhaust hoods are installed.**
 - Calculations demonstrating sufficient combustion and supply air requirements shall be provided to the inspector for verification of adequacy (2013 CPC section 507.1.4 and Title

KITCHEN (continued)

- 24 Volume 1 Administrative Regulations for the California Energy Commission article §10-103(b)).
- ✓ Ducts used for domestic kitchen range ventilation shall be of metal and shall have smooth interior surfaces. Ducts for domestic range hoods shall only serve cooking appliances (2013 CMC section 504.2).

Exception:

Ducts (**must meet smoke/flame spread listing for this installation**) for domestic kitchen downdraft grill-range ventilation installed under a concrete slab floor may be of approved Schedule 40 PVC provided:

- 1) The under-floor trench in which the duct is installed shall be completely backfilled with sand or gravel.
 - 2) Not more than one (1) inch of six (6) inch diameter PVC coupling may protrude above the concrete floor surface.
 - 3) PVC pipe joints shall be solvent cemented to provide an air and grease-tight duct.
 - 4) The duct shall terminate above grade outside the building and shall be equipped with a back-draft damper.
- **Shut-off valves** shall be accessible rigid piping upstream from the flexible connector and within 6 feet of the gas appliance (2013 CPC section 1212.4).
 - **Gas appliance connectors** shall not extend from one room to another, through any wall, floor, partition or appliance housing.
 - ✓ Verify that connector is the properly sized and listed for the appliance it serves (see BTU rating on connector tag) (2013 CPC section 1212.1).
 - **Junction boxes** shall be accessible and have required working clearances.
 - **Kitchen lighting** shall be all high efficacy OR 50% of total wattage may be low efficacy, all low efficacy and high efficacy lighting shall be switched/controlled separately.
 - ✓ Recessed can lights shall be IC and AT Rated (California Energy Code).

WET BARS

- **GFCI protection** is required for all receptacles located within 6 feet 0 inches of wet bar sink edge (2013 CEC article 210.8(A) (7)).

SMOKE AND CARBON MONOXIDE ALARMS

- **PHOTOELECTRIC SMOKE ALARMS** shall be installed in each sleeping room, outside each separate sleeping area in the immediate vicinity of the bedroom(s), and on each additional story, including basements and habitable attics (2013 CRC section R314).
 - ✓ **CARBON MONOXIDE ALARMS** shall be installed outside each separate sleeping area in the immediate vicinity of the bedroom(s), and on each additional story, including basements and habitable attics (2013 CRC section R315).
- **Smoke and Carbon Monoxide alarms** - For purposes of clarification, CA Health and Safety Code section 13113.8 is repeated.
 - a) On and after January 1, 1986, **every** single-family dwelling and factory-built housing, as defined in section 19971, which is sold shall have an operable smoke detector. The detector shall be approved and listed by the State Fire Marshal and installed in accordance with the State Fire Marshal's regulations. Unless prohibited by local rules, regulations, or ordinances, a battery-operated smoke detector shall be deemed to satisfy the requirements of this section (2013 CRC section R314.6.3).
- **Location** - Smoke alarms shall be installed in the following locations:

SMOKE AND CARBON MONOXIDE ALARMS (continued)

- 1) In **each** sleeping room.
 - 2) Outside **each** separate sleeping area in the immediate vicinity of the bedrooms.
 - 3) On **each** additional story of the dwelling, **including basements and habitable attics** but not including crawl spaces and uninhabitable attics.
 - ✓ 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.
 - ✓ When more than one smoke alarm is required to be installed within an individual dwelling unit the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual unit (2013 CRC section R314.3).
- Alterations, repairs and additions** - When alterations, repairs or additions requiring a permit occur, or when one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with smoke alarms located as required for new dwellings (2013 CRC section R314.3.1).
Exceptions: See section R314.6.
- Power source** - Smoke alarms shall receive their primary power from the building wiring provided that such wiring is served from a commercial source and shall be equipped with a battery backup.
 - ✓ Smoke alarms with integral strobes that are not equipped with battery backup shall be connected to an emergency electrical system.
 - ✓ Smoke alarms shall emit a signal when the batteries are low. Wiring shall be permanent and without a disconnecting switch other than as required for over-current protection (2013 CRC section R314.4).**Exceptions:**
 - 1) Smoke alarms are permitted to be solely battery operated in existing buildings where no construction is taking place.
 - 2) Smoke alarms are permitted to be solely battery operated in buildings that are not served from a commercial power source.
 - 3) Smoke alarms are permitted to be solely battery operated 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, crawl space or basement available which could provide access for building wiring without the removal of interior finishes.
- Interconnection** - Where more than one smoke alarm is required to be installed within an individual dwelling or sleeping unit, the **smoke alarms shall be interconnected** in such a manner that the activation of one alarm will activate all of the alarms in the individual unit. The alarm shall be clearly audible in all bedrooms over background noise levels with all intervening doors closed (2013 CRC section R314.5).
Exceptions:
 - 1) Interconnection is not required in buildings that are not undergoing alterations, repairs or construction of any kind.
 - 2) Smoke alarms in existing areas are not required to be interconnected where alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for interconnection without the removal of interior finishes.

SMOKE AND CARBON MONOXIDE ALARMS (continued)

- **Existing buildings housing Group R-3** - Occupancies established prior to the effective date of these regulations may have their use continued if they conform or are made to conform to provisions of these regulations to the extent that reasonable and adequate life safety against the hazards of fire, panic and explosion is substantially provided.
 - ✓ Additional means of egress, the installation of automatic sprinkler systems, automatic fire alarm system or other life safety measures may be required to provide reasonable and adequate safety.
- Note:** It is the intent of this section that every existing occupancy need not mandatorily conform to the requirements for new construction. Reasonable judgment in the application of requirements must be exercised by the enforcing agency (2013 CRC section R314.6).
- **For purposes of clarification Health and Safety Code section 13113.7 is repeated.**
 - a) Except as otherwise provided in this section, a smoke detector, approved and listed by the State Fire Marshal pursuant to section 13114, shall be installed, in accordance with the manufacturer's instructions in each dwelling intended for human occupancy within the earliest applicable time period as follows:
 - 1) For all dwelling units intended for human occupancy, upon the owner's application on or after January 1, 1985, for a permit for alterations, repairs, or additions, exceeding one thousand dollars (\$1,000) (2013 CRC section R314.6.2).

BEDROOMS, BASEMENTS, AND ALL SLEEPING ROOMS

- **Emergency escape and rescue required** - Basements, habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening.
 - ✓ Where basements contain one or more sleeping rooms, emergency egress and rescue openings shall be required in each sleeping room.
 - ✓ Where emergency escape and rescue openings are provided they shall have a sill height of not more than 44 inches above the floor.
 - ✓ Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with 2013 CRC section R310.3.
 - ✓ The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside.
 - ✓ Emergency escape and rescue openings with a finished sill height below the adjacent ground elevation shall be provided with a window well in accordance with 2013 CRC section R310.2.
 - ✓ Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way (2013 CRC section R310.1).

Exception:

Basements used only to house mechanical equipment and not exceeding total floor area of 200 square feet.

- **Minimum opening area** - All emergency escape and rescue openings shall have a minimum net clear opening of 5.7 square feet (2013 CRC section R310.1.1).

Exception:

Grade floor openings shall have a minimum net clear opening of 5 square feet.

- **Minimum opening height** - The minimum net clear opening height shall be 24 inches (2013 CRC section R310.1.2).
- **Minimum opening width** - The minimum net clear opening width shall be 20 inches (2013 CRC section R310.1.3).

BEDROOMS, BASEMENTS, AND ALL SLEEPING ROOMS (continued)

- **Operational constraints** - Emergency escape and rescue openings shall be maintained free of any obstructions other than those allowed by this section and shall be operational from the inside of the room without the use of keys, tools or special knowledge (2013 CRC section R310.1.4).
- **Window wells** - The minimum horizontal area of the window well shall be 9 square feet with a minimum horizontal projection and width of 36 inches.
 - ✓ The area of the window well shall allow the emergency escape and rescue opening to be fully opened (2013 CRC section R310.2).
- **Exception:**

The ladder or steps required by section R310.2.1 shall be permitted to encroach a maximum of 6 inches into the required dimensions of the window well.
- **Ladder and steps** - Window wells with a vertical depth greater than 44 inches shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position.
 - ✓ **Ladders or steps** required by this section shall not be required to comply with sections R311.7 and R311.8.
 - ✓ **Ladders or rungs** shall have an inside width of at least 12 inches, shall project at least 3 inches from the wall and shall be spaced not more than 18 inches on center vertically for the full height of the window well (2013 CRC section R310.2.1).
- **Bulkhead enclosures** - Bulkhead enclosures shall provide direct access to the basement.
 - ✓ The bulkhead enclosure with the door panels in the fully open position shall provide the minimum net clear opening required by section R310.1.1.
 - ✓ Bulkhead enclosures shall also comply with section R311.7.8.2 (2013 CRC section R310.3).
- **Bars, grilles, covers and screens** - Bars, grilles, covers, screens or similar devices are permitted to be placed over emergency escape and rescue openings, bulkhead enclosures, or window wells that serve such openings, provided the minimum net clear opening size complies with sections R310.1.1 to R310.1.3, and
 - ✓ Such devices shall be releasable or removable from the inside without the use of a key, tool, special knowledge or force greater than that which is required for normal operation of the escape and rescue opening.
 - ✓ The release mechanism shall be maintained operable at all times:
 - Such bars, grills, grates or any similar devices shall be equipped with an approved exterior release device for use by the fire department only when required by the authority having jurisdiction.
 - **Where security bars (burglar bars)** are installed on emergency egress and rescue windows or doors, on or after July 1, 2000, such devices shall comply with California Building Standards Code, Part 12, Chapter 12-3 and other applicable provisions of this code (2013 CRC section R310.4).
- **Switched Lighting** shall be high efficacy (fluorescent or occupant sensor or dimmer). Closets that are less than 70 square feet are exempt from this requirement (California Energy Code).
- **Closet light clearances:** Surface incandescent lights shall be fully enclosed and a min. of 12 inches clearance from storage/shelf area. Fluorescent lights shall be a min. of 6 inches from storage/shelf. Recessed lights in wall or ceiling shall be a min. 6 inches from storage area (2013 CEC article 410.8(D)(1), (2), (3), (4)).
- **Roof/balcony drains:** Verify that second floor exterior balcony has primary and secondary drains, ¼ inch per foot slope to drains and min 2 inches clearance from weep screed or wood to paving.

BEDROOMS, BASEMENTS, AND ALL SLEEPING ROOMS (continued)

- ✓ Verify on permit card that second story decks and drain assembly requires a water test (2013 CPC section 1101.11).

GLAZING

- **Identification - Each pane of glazing installed in hazardous locations** as defined in section R308.4 shall be provided with a manufacturer's designation specifying who applied the designation, designating:

- ✓ The type of glass and the safety glazing standard with which it complies, which is visible in the final installation.
- ✓ The designation shall be acid etched, sandblasted, ceramic-fired, laser etched, embossed, or be of a type which once applied cannot be removed without being destroyed.
- ✓ **A label shall be permitted in lieu of the manufacturer's designation** (2013 CRC section R308.1).

Exceptions:

- 1) For other than tempered glass, manufacturer's designations are not required provided the building official approves the use of a certificate, affidavit or other evidence confirming compliance with this code.
- 2) Tempered spandrel glass is permitted to be identified by the manufacturer with a removable paper designation.

- **Louvered windows or жалousies** - Regular, float, wired or patterned glass in жалousies and louvered windows shall be no thinner than nominal 3/16 inch and no longer than 48 inches. Exposed glass edges shall be smooth (2013 CRC section R308.2).

- **Wired glass prohibited** - Wired glass with wire exposed on longitudinal edges shall not be used in жалousies or louvered windows (2013 CRC section R308.2.1).

- **Human impact loads** - Individual glazed areas, including glass mirrors in hazardous locations such as those indicated as defined in section R308.4, shall pass the test requirements of section R308.3.1 (2013 CRC section R308.3).

Exceptions:

- 1) Louvered windows and жалousies shall comply with 2013 CRC section R308.2.
- 2) Mirrors and other glass panels mounted or hung on a surface that provides a continuous backing support.
- 3) Glass unit masonry complying with section R610.

- **Hazardous locations** - The following shall be considered specific hazardous locations for the purposes of glazing (2013 CRC section R308.4):

- 1) Glazing in all fixed and operable panels of swinging, sliding and bi-fold doors.

Exceptions:

- ✓ Glazed openings of a size through which a 3-inch diameter sphere is unable to pass.
- ✓ Decorative glazing.
- 2) Glazing in an individual fixed or operable panel adjacent to a door where the nearest vertical edge is within a 24-inch arc of the door in a closed position and whose bottom edge is less than 60 inches above the floor or walking surface.

Exceptions:

- ✓ Decorative glazing.
- ✓ When there is an intervening wall or other permanent barrier between the door and the glazing.
- ✓ Glazing in walls on the latch side of and perpendicular to the plane of the door in a closed position.

GLAZING (continued)

- ✓ Glazing adjacent to a door where access through the door is to a closet or storage area 3 feet or less in depth.
- ✓ Glazing that is adjacent to the fixed panel of patio doors.
- 3) Glazing in an individual fixed or operable panel that meets all of the following conditions:
 - ✓ The exposed area of an individual pane is larger than 9 square feet; and
 - ✓ The bottom edge of the glazing is less than 18 inches above the floor; and
 - ✓ The top edge of the glazing is more than 36 inches above the floor; and
 - ✓ One or more walking surfaces are within 36 inches, measured horizontally and in a straight line, of the glazing.

Exceptions:

- ✓ Decorative glazing.
- ✓ When a horizontal rail is installed on the accessible side(s) of the glazing 34 to 38 inches above the walking surface.
 - The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and be a minimum of 1½ inches in cross sectional height.
 - Outboard panes in insulating glass units and other multiple glazed panels when the bottom edge of the glass is 25 feet or more above grade, a roof, walking surfaces or other horizontal [within 45 degrees (0.79 rad) of horizontal] surface adjacent to the glass exterior.
- 4) **All glazing in railings regardless of area or height above a walking surface.**
 - ✓ Included are structural baluster panels and nonstructural infill panels.
- 5) **Glazing in enclosures** for or walls facing hot tubs, whirlpools, saunas, steam rooms, bathtubs and showers where the bottom exposed edge of the glazing is less than 60 inches measured vertically above any standing or walking surface.

Exception:

Glazing that is more than 60 inches, measured horizontally and in a straight line, from the waters edge of a hot tub, whirlpool or bathtub.

- 6) **Glazing in walls and fences adjacent to indoor and outdoor swimming pools,** hot tubs and spas where the bottom edge of the glazing is less than 60 inches above a walking surface and within 60 inches, measured horizontally and in a straight line, of the water's edge. This shall apply to single glazing and all panes in multiple glazing.
- 7) **Glazing adjacent to stairways,** landings and ramps within 36 inches horizontally of a walking surface when the exposed surface of the glazing is less than 60 inches above the plane of the adjacent walking surface.

Exceptions:

- ✓ When a rail is installed on the accessible side(s) of the glazing 34 to 38 inches above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and be a minimum of 1½ inches in cross sectional height.
- ✓ The side of the stairway has a guardrail or handrail, including balusters or in-fill panels, complying with 2013 CRC sections R311.7.6 and R312 and the plane of the glazing is more than 18 inches from the railing, or
- ✓ When a solid wall or panel extends from the plane of the adjacent walking surface to 34 inches to 36 inches above the walking surface and the construction at the top of that wall or panel is capable of withstanding the same horizontal load as a guard.

GLAZING (continued)

- 8) **Glazing adjacent to stairways** within 60 inches horizontally of the bottom tread of a stairway in any direction when the exposed surface of the glazing is less than 60 inches above the nose of the tread.

Exceptions:

- ✓ The side of the stairway has a guardrail or handrail, including balusters or in-fill panels, complying with 2013 CRC sections R311.7.6 and R312 and the plane of the glass is more than 18 inches from the railing; or
- ✓ When a solid wall or panel extends from the plane of the adjacent walking surface to 34 inches to 36 inches (914 mm) above the walking surface and the construction at the top of that wall or panel is capable of withstanding the same horizontal load as a guard.

TABLE R308.3.1(1)
MINIMUM CATEGORY CLASSIFICATION OF GLAZING USING CPSC 16 CFR 1201

EXPOSED SURFACE AREA OF ONE SIDE OF ONE LITE	GLAZING IN STORM OR COMBINATION DOORS (Category Class)	GLAZING IN DOORS (Category Class)	GLAZED PANELS REGULATED BY ITEM 7 OF SECTION R308.4 (Category Class)	GLAZED PANELS REGULATED BY ITEM 6 OF SECTION R308.4 (Category Class)	GLAZING IN DOORS AND ENCLOSURES REGULATED BY ITEM 5 OF SECTION R308.4 (Category Class)	SLIDING GLASS DOORS PATIO TYPE (Category Class)
9 square feet or less	I	I	NR	I	II	II
More than 9 square feet	II	II	II	II	II	II

For SI: 1 square foot = 0.0929 m².

NR means "No Requirement."

TABLE R308.3.1(2)
MINIMUM CATEGORY CLASSIFICATION OF GLAZING USING ANSI Z97.1

EXPOSED SURFACE AREA OF ONE SIDE OF ONE LITE	GLAZED PANELS REGULATED BY ITEM 7 OF SECTION R308.4 (Category Class)	GLAZED PANELS REGULATED BY ITEM 6 OF SECTION R308.4 (Category Class)	DOORS AND ENCLOSURES REGULATED BY ITEM 5 OF SECTION R308.4 ^a (Category Class)
9 square feet or less	No requirement	B	A
More than 9 square feet	A	A	A

For SI: 1 square foot = 0.0929 m².

a. Use is permitted only by the exception to Section R308.3.1.

HALLWAYS

- Switched lighting shall be high efficacy (fluorescent or occupant sensor or dimmer).
- The minimum ceiling height in a hallway is 7 feet 0 inches.
- The minimum width of the hallway 36 inches.
- Smoke alarms are required on ceiling or wall outside of each separate sleeping room in the immediate vicinity of the bedrooms (minimum 3 feet 0 inches clearance from any air supply or per manufacture instructions).
- Hallways 10 feet or more in length require minimum (1) electric receptacle AFCI protected (2013 CEC article 210.52(H)).
- Minimum of (1) switch controlled light in hallway requires dimmer or fluorescent (2013 CEC article 210.70(2) (A)).

LAUNDRY ROOMS

- Switched lighting shall be high efficacy fluorescent or occupant sensor).
- The minimum ceiling height in a laundry room is 7 feet 0 inches.
- Electric dryer requires 3-wire with ground 4 prong outlet (2013 CEC article 250.54).
- GFCI protection required for receptacles located within 6 feet 0 inches of laundry sink edge (2013 CEC article 210.8(A)(7)).
- Shut-off valve** shall be accessible rigid piping upstream from the flexible connector and within 6 feet of the gas appliance (2013 CPC section 1212.4).

LAUNDRY ROOMS (continued)

- **Gas appliance connectors** shall not extend from one room to another, through any wall, floor, partition or appliance housing.
 - ✓ Verify that connector is the properly sized and listed for the appliance it serves (see BTU rating on connector tag - 2013 CPC section 1212.1).
- **Flexible transition ducts:** Shall be listed and approved, not more than 6 feet long and shall not be concealed within construction (2013 CMC section 504.3.2.1).
- Dryer duct minimum 4-inch diameter, 26 gage metal, **smooth interior (no screws)**, maximum 14 feet 0 inch long including (2)-90 degree elbows and shall terminate to the outside with a back draft damper (2013 CMC section 504.3).
- **In-line booster fans** are considered an Alternate Method and shall be pre-approved prior to installation.
 - ✓ This method is discouraged because of accessibility and maintenance issues and is not allowed in under floor/crawlspace areas.
- **Dryer in closet** requires a minimum opening of 100 square inches for makeup air (2013 CMC section 504.3.2).
- When floor drains are installed, they shall have a trap primer to maintain wet seal if subject to infrequent use, have a back water valve if subject to reverse flow of sewage and shall be vented (2013 CPC).

BATHROOMS

- The minimum ceiling height in a bathroom is 7 feet.
- Shower or tub equipped with a shower head minimum height of 6 feet 8 inches (2013 CRC section R305.1).
- **All hardwired lighting shall be high efficacy OR controlled by a MANUAL-ON motion sensor** (2013 California Energy Code section 150(K)).
- **Hanging light fixtures** are not allowed within 3 feet horizontal and 8 feet vertical from tub and shower (2013 CEC section 410.4(d)).
- **All lights and fixtures** used over tubs and showers listed for wet use (2013 CEC article 410-4(a)).
- **Separate circuits for lights and receptacles** (2013 CEC article 210-11(C) (3)).
- **Light fixtures in shower** shall have non-metallic trim and be protected by GFCI circuit (2013 CEC article 410.4 A & D).
- GFCI protection shall be provided for all outlets in bathrooms, with at least one outlet 36 inches of the outside edge of each basin (2013 CEC article 210-8(a)(1) & 210-52(d)).
- **Exhaust fans** at shower shall be listed for wet location and shall be GFCI protected.
- **Hydromassage** bathtubs motors shall be accessible, on a dedicated circuit with their own GFCI circuit and bonded with minimum 8 AWG copper wire (2013 CEC article 680.72 & 74, 2013 CPC section 414.1).
- **Water closet** spaces shall be at least 30 inches wide; 15 inches minimum from wall to center of W/C with at least 24 inches clear in front of the W/C (2013 CPC section 407.5).
- **Water closet base caulked at floor.** All new water closets shall be 1.6 gallon per flush maximum (2013 CPC section 408.2, Table 14-1 Standard IAPMO PS 93-2004a).
- **Safety glazing** at all windows less than 60 inches above bottom of tub & shower floor and at tub and shower enclosures panels & door (check for bug).
- **Shower door or rod shall be installed.**
- **Shower enclosure doors shall open outward** for egress and maintain 22 inches clearance (2013 CPC section 411.6).
- **Shower compartment** minimum 1024 sq. in. encompassing a 30 inches circle (2013 CPC section CPC 411.7).
- **The threshold/dam** shall not be less than 2 inches and not more than 9 inches measured from the top of the drain (2013 CPC section CPC 411.6).

BATHROOMS (continued)

- Vacuum breakers required for handheld shower head (2013 CPC section CPC 603.0).
- Accessible full way control valve installed for each sink (2013 CPC section CPC 605.5).
- Check that sink cleanout is accessible.
- Tub and shower valves must be approved pressure-balanced or thermostatic mixing type adjusted to a maximum of 120 degrees (2013 CPC section 418).
- Bathrooms** containing bathtubs, showers, spas shall be **mechanically ventilated**. Fan shall be capable of 5 air changes per hour. Fan shall terminate minimum 3'-0" from opening or air intake. NO EXCEPTION FOR WINDOW (2013 CMC section 504.1).
- Bath and shower spaces:** Bathtub/shower compartments shall have nonabsorbent surface extending **72"** above the floor (2013 CRC section R307.2).
- Steam showers:** Verify light is listed for steam shower, is GFCI protected, and has an electrical disconnect for steam generator.

EXTERIOR WINDOWS

- General** - Windows and doors shall be installed and flashed in accordance with the fenestration manufacturers written installation instructions.
 - ✓ Window and door openings shall be flashed in accordance with 2013 CRC section R703.8.
 - ✓ Written installation instructions shall be provided by the fenestration manufacturer for each window or door (2013 CRC section R612.1).
- Flashing** - Approved corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components (2013 CRC section R703.8).
 - ✓ Self-adhered membranes used as flashing shall comply with AAMA 711.
 - ✓ The flashing shall extend to the surface of the exterior wall finish.
 - ✓ **Approved corrosion-resistant flashings** shall be installed at all of the following locations:
 - 1) Exterior window and door openings.
 - 2) Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage.
- Window sills** - In dwelling units, where the opening of an operable window is located more than 72 inches above the finished grade or surface below, the lowest part of the clear opening of the window shall be a minimum of 24 inches above the finished floor of the room in which the window is located.
 - ✓ Operable sections of windows shall not permit openings that allow passage of a 4 inch diameter sphere where such openings are located within 24 inches of the finished floor (2013 CRC section R612.2).

Exceptions:

- 1) Windows whose openings will not allow a 4-inch diameter sphere to pass through the opening when the opening is in its largest opened position.
 - 2) Openings that are provided with window fall prevention devices that comply with 2013 CRC section R612.3.
 - 3) Openings that are provided with fall prevention devices that comply with ASTM F 2090.
 - 4) Windows that are provided with opening limiting devices that comply with section R612.4.
- Window fall prevention devices** - Window fall prevention devices and window guards, where provided, shall comply with the requirements of ASTM F 2090 (2013 CRC section R612.3).
 - Window opening limiting devices** - When required elsewhere in this code, window opening limiting devices shall comply with the provisions of this section (2013 CRC section R612.4).
 - General requirements** - Window opening limiting devices shall be self acting and shall be positioned to prohibit the free passage of a 4-inch diameter rigid sphere through the window opening when the window opening limiting device is installed in accordance with the manufacturer's instructions (2013 CRC section R612.4.1).

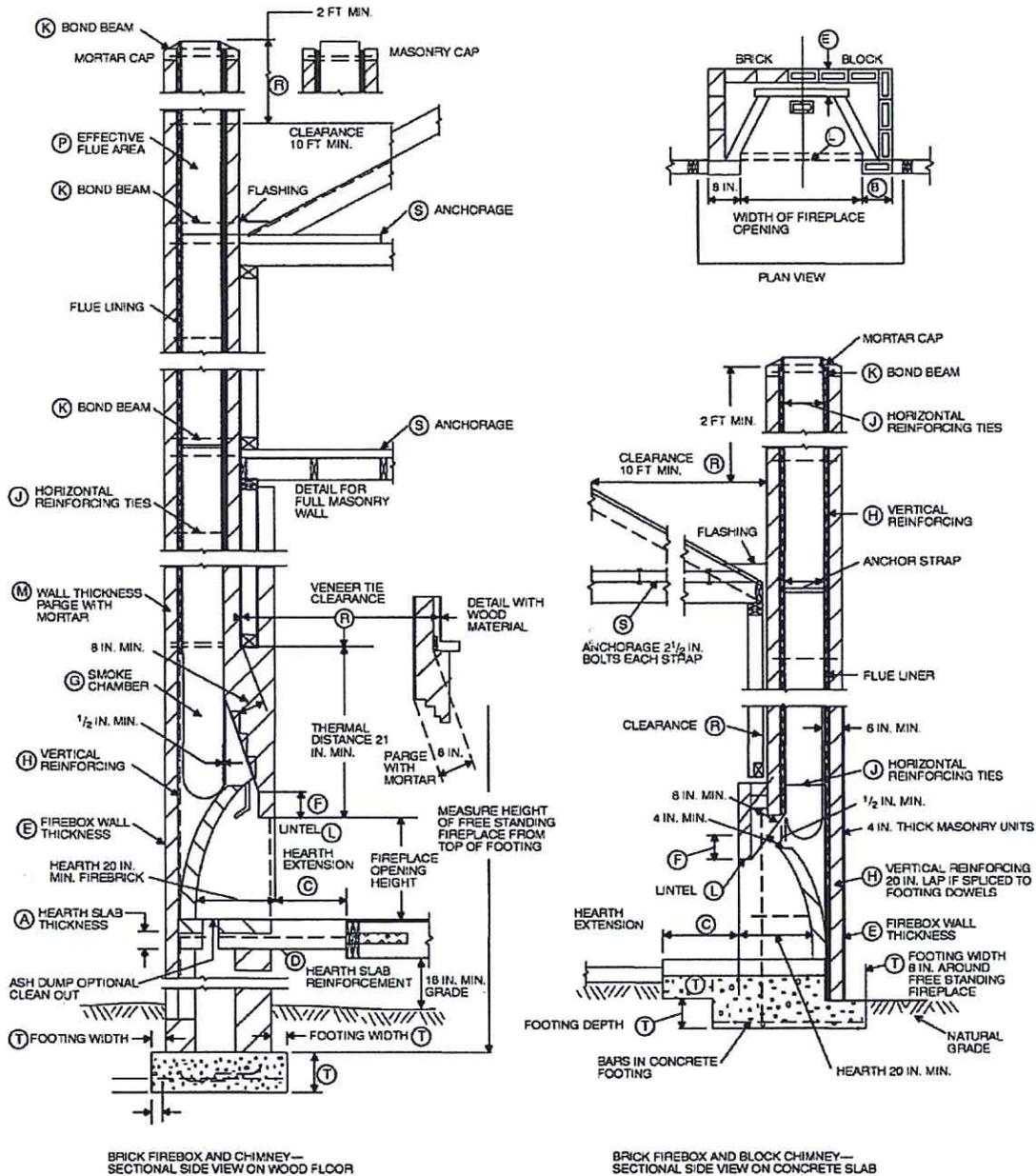
EXTERIOR WINDOWS (continued)

- Operation for emergency escape** - Window opening limiting devices shall be designed with release mechanisms to allow for emergency escape through the window opening without the need for keys, tools or special knowledge (2013 CRC section R612.4.2).
- Window opening limiting devices** shall comply with all of the following:
 - 1) Release of the window opening-limiting device shall require no more than 15 pounds (66 N) of force.
 - 2) The window opening limiting device release mechanism shall operate properly in all types of weather.
 - 3) Window opening limiting devices shall have their release mechanisms clearly identified for proper use in an emergency.
 - 4) The window opening limiting device shall not reduce the minimum net clear opening area of the window unit below what is required by 2013 CRC section R310:1.1 of the code.

FIRE PLACE

- Verify radiant heat barrier underlayment for non-masonry hearth was previously inspected and approved.
- Damper stop clamp** shall be installed in all fireplaces that have a damper. The clamp shall be listed and installed per manufacturer's instructions [NFGC sec 8.3.1.2] [ANSI 2223.1].
- Verify metal damper is located a minimum of 8 inches above the top of the fireplace opening or at the top of the fire place opening and is operable from the room containing the fireplace. Damper controls are allowed in the fireplace (2013 CRC section R1001.7.1).
- If the fireplace opening is less than 6 square feet, the hearth shall extend a minimum of 16 inches from the front, and minimum 8 inches beyond each side of the fireplace opening. If the opening exceeds 6 square feet, the hearth shall extend a minimum of 20 inches from the front and 12 inches beyond sides.
- Combustible materials, such as a wood mantel, shall have a minimum 6-inch clearance from fire place opening and shall not project more than 1/8-inch for each 1-inch distance above opening (ex. you may have a 3/4-inch projection when 6 inches away from opening).
- Maintain a clearance to combustibles of 2 inches from masonry on front and sides and 4 inches on back.
 - ✓ The air space shall not be filled. Trim, drywall, and sheathing edges are permitted to abut masonry provided they are 12 inches minimum from inside surface of nearest firebox opening.
- Shut-off valve** shall be accessible rigid piping upstream from the flexible connector and within 6 feet of the gas appliance (2013 CPC section 1212.4).
- Gas appliance connectors** shall be used in accordance with the terms of their listing shall not extend from one room to another, through any wall, floor, partition or appliance housing.
 - ✓ Verify that connector is properly sized and listed for the appliance it serves. (See BTU rating on connector tag.) (2013 CPC section 1212.1)
- Glass doors** and screen shall be permanently attached to fireplace opening. (2013 CMC section 907.3 Title 24 150 E 1 A)

FIRE PLACE (continued)



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

FIGURE R1001.1
FIREPLACE AND CHIMNEY DETAILS

2010 CALIFORNIA RESIDENTIAL CODE

509

ATTACHED GARAGES AND CARPORTS

□ **Exterior walls** - Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with 2013 Table R302.1(1); or for dwellings and accessory buildings equipped throughout with an automatic residential fire sprinkler system installed in accordance with section R313 shall comply with 2013 CRC Table R302.1(2) (2013 CRC section R302.1).

Exceptions:

4) **Detached garages accessory to a dwelling** located within 2 feet of a lot line are permitted to have roof eave projections not exceeding 4 inches.

ATTACHED GARAGES AND CARPORTS (continued)

- **Dwelling/garage opening/penetration protection** - Openings and penetrations through the walls or ceilings **separating the dwelling from the garage** shall be in accordance with sections R302.5.1 through R302.5.3 (2013 CRC section R302.5).
- **Opening protection** - Openings from a private garage directly into a room used for sleeping purposes shall not be permitted.
 - ✓ Other openings between the garage and residence shall be equipped with solid wood doors not less than 1-3/8 inches in thickness, solid or honeycomb core steel doors not less than 1-3/8 inches thick, or 20-minute fire-rated doors.
 - ✓ Doors shall be self-closing and self-latching (2013 CRC section R302.5.1).

Exception:

Where the residence and the private garage are protected by an automatic residential fire sprinkler system in accordance with 2013 CRC sections R309.6 and R313, other door openings between the private garage and the residence need only be self-closing and self-latching.

○ This exception shall not apply to rooms used for sleeping purposes.

- **Duct penetration** - Ducts in the garage and ducts penetrating the walls or ceilings separating the dwelling from the garage shall be constructed of a minimum #26 gage sheet steel or other approved material and **shall have no openings into the garage** (2013 CRC section R302.5.2).
- **Dwelling/garage and/or carport fire separation** - The garage and/or carport shall be separated as required by 2013 CRC Table R302.6.
 - ✓ **Openings in garage walls** shall comply with 2013 CRC section R302.5.
 - ✓ This provision does not apply to garage walls that are perpendicular to the adjacent dwelling unit wall.
 - ✓ A separation is not required between the dwelling unit and a carport, provided the carport is entirely open on two or more sides and there are not enclosed areas above (2013 CRC section R302.6).

**TABLE R302.6
DWELLING/GARAGE AND/OR CARPORT SEPARATION**

SEPARATION	MATERIAL
From the residence and attics	Not less than 1/2-inch gypsum board or equivalent applied to the garage side
From all habitable rooms above the <i>garage or carport</i>	Not less than 5/8-inch Type X gypsum board or equivalent
Structure(s) supporting floor/ceiling assemblies used for separation required by this section	Not less than 1/2-inch gypsum board or equivalent
Garages located less than 3 feet from a dwelling unit on the same lot	Not less than 1/2-inch gypsum board or equivalent applied to the interior side of exterior walls that are within this area

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

- **Floor surface** - Garage floor surfaces shall be of approved noncombustible material. The area of floor used for parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway.(2013 CRC section R309.1)
- Carports - Carports shall be open on at least two sides. Carport floor surfaces shall be of approved noncombustible material. Carports not open on at least two sides shall be considered a garage and shall comply with the provisions of this section for garages. (2013 CRC section R309.2)

Exception:

Asphalt surfaces shall be permitted at ground level in carports.

- ✓ The area of floor used for parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway.

ATTACHED GARAGES AND CARPORTS (continued)

- Flood hazard areas** - For buildings located in flood hazard areas as established by 2013 CRC Table R301.2(1), garage floors shall be:
 - 1) Elevated to or above the design flood elevation as determined in 2013 CRC section R322; or
 - 2) Located below the design flood elevation provided they are at or above grade on at least one side, are used solely for parking, building access or storage, meet the requirements of section R322 and are otherwise constructed in accordance with this code (2013 CRC section R309.3).
- Automatic garage door openers** - Automatic garage door openers, if provided, shall be listed in accordance with UL 325.
 - ✓ See Health and Safety Code sections 19890 and 19891 for additional provisions for residential garage door openers (2013 CRC section R309.4).
- Extension garage door springs** - Every extension garage door spring sold or offered for sale, whether new or sold as a replacement, or installed in any garage or carport which is accessory to a dwelling covered by this code, shall conform to the requirements for garage door springs located in section 1211 of the California Building Code (2013 CRC section R309.5).
- Means of egress** - The means of egress shall provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the dwelling to the exterior of the dwelling at the required egress door **without requiring travel through a garage** (2013 CRC section R311.1).
- Landings for stairways**
 - Exception:**
 - ✓ A floor or landing is not required at the top of an interior flight of stairs, **including stairs in an enclosed garage**, provided a door does not swing over the stairs (2013 CRC section R311.7.5).
- Gas appliances shall be protected** from vehicular traffic with bollards (i.e. gas water heater, furnace, dryer) (2013 CPC section 508.14, NFPA 54.9.1.10.1, 2, & 3).
 - 1) **Gas utilization appliances in residential garages** and in adjacent spaces that open to the garage and are not part of the living space of a dwelling unit shall be installed so that burners and burner-ignition devices are located not less the 18 inches above the floor unless listed as a flammable vapor ignition resistant.
 - 2) Such appliances shall be located or protected so it is not subject to physical damage by a moving vehicle.
 - 3) When appliances are installed in a separate enclosed space having access only from outside of the garage, such appliances shall be permitted to be installed at floor level, providing the required combustion air is taken from the exterior of the garage.
- Attached and detached garage shall have at least one (1) switch controlled light. Light shall be high efficacy or occupant sensor (2013 CEC article 210.70(1)).
- Drywall joints and fasteners shall be taped at walls and ceilings adjacent to conditioned spaces.

ATTIC ACCESS

- Exposed attic insulation** - All exposed insulation materials installed on attic floors shall have a critical radiant flux not less than 0.12 watt per square centimeter (2013 CRC section R302.10.4).
- Attic access** - Buildings with combustible ceiling or roof construction shall have an attic access opening to attic areas that exceed 30 square feet and have a vertical height of 30 inches or greater.
 - ✓ **The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members.**
 - ✓ The rough-framed opening **shall not be less than 22 inches by 30 inches** and shall be located in a hallway or other readily accessible location.
 - ✓ When located in a wall, the opening shall be a minimum of 22 inches wide by 30 inches high.

ATTIC ACCESS (continued)

- ✓ When the access is located in a ceiling, **minimum unobstructed headroom in the attic space shall be 30 inches at some point above the access** measured vertically from the bottom of ceiling framing members (2013 CRC section R807.1).
 - See the California Mechanical Code for access requirements where mechanical equipment is located in attics.

WATER HEATERS

- **An approved expansion tank** shall be installed when a pressure **regulator, back flow preventer, or** any other normally closed device that prevents dissipation of building pressure back into the water main (2013 CPC section 608.3).
 - ✓ Expansion tanks shall be listed and adequately sized for each system or;
 - ✓ Other approved device having a similar function to control thermal expansion.
 - ✓ Approved devices shall be installed on the building side of the check valve; backflow preventer shall be sized and installed in accordance with the manufacturer's directions/manual.
 - Tank pressure must be adjusted to be over system pressure and installer shall label adjusted pressure on each tank.
- **Insulate first 5 feet** hot and cold water pipe (California Energy Code section 150(J)).
- Water heater shall have minimum R-12 exterior insulation if energy efficiency factor is 0.58 or less (California Energy Code section 151(b)).
- **Shut-off valves** shall be accessible, installed in rigid piping upstream from the flexible connector and within 6 feet of the gas appliance (2013 CPC section 1212.5).
 - ✓ Where a connector is used, the valve shall be installed upstream of the connector.
 - ✓ A union or flanged connection shall be provided downstream from this valve to permit removal of controls.
- **Gas appliance connectors** shall not extend from one room to another, through any wall, floor, partition or appliance housing.
 - ✓ Verify that connector is the properly sized and listed for the appliance it serves (see BTU rating on connector tag) (NFPA 54:9).
- **Quick Disconnect Devices** – Quick-disconnect devices used to connect appliances to the building gas piping shall be listed for each use.(NFPA 54:9.6.5)
 - ✓ **Where installed indoors**, an approved manual shutoff valve with a nondisplaceable valve member shall be installed upstream of the quick-disconnect device.
- **Sediment Trap** – Where a sediment trap is not incorporated as a part of the gas utilization appliance, **a sediment trap shall be installed downstream of the appliance shutoff valve as close to the inlet of the appliance as practical.** (NFPA 54:9.6.7)

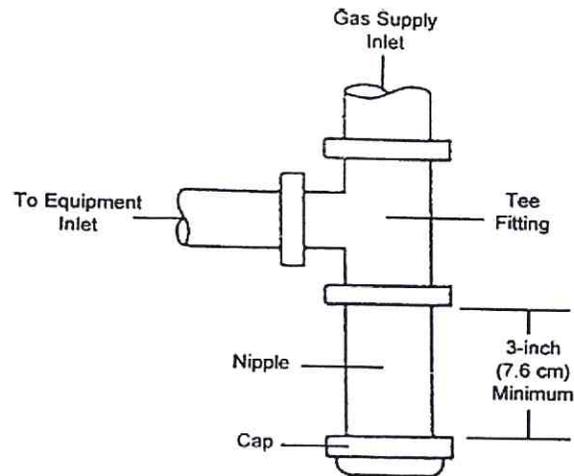
WATER HEATERS (continued)**Example Sediment Trap Detail**

Figure 5.9a
Recommended Sediment Trap

- **Protection from Seismic Damage** – Water heaters **shall be anchored or strapped** to resist horizontal displacement due to earthquake motion.
 - ✓ Strapping shall be at points within the upper one third and lower one third of its vertical dimensions.
 - ✓ At the lower point, a minimum of four inches shall be maintained above the controls with strapping.
 - ✓ All new and replacement water heaters and all existing residential water heaters shall be braced, anchored, or strapped to resist falling or horizontal displacement due to earthquake motion.
 - ✓ At a minimum any water heater shall be secured in accordance with the California Plumbing Code or modifications made thereto by a city, county, or city and county pursuant to CA H&S Code section 17958.5 (2013 CPC section 508.2, CA H&S Code section 19211(a)).
- **Bond metallic hot water piping** to cold water pipe to gas pipe with #6 copper wire and approved weaver clamps (2013 CEC article 250.4).
- **Fullway shut off valve** shall be installed on the discharge side of each water meter and on each unmetered water supply.
 - ✓ Water piping supplying more than one building on any one premises shall be equipped with a separate fullway valve to each building, so arranged that the water supply can be turned on or off to any individual or separate building provided that supplying piping to a single-family residence and building accessory thereto shall be permitted to be controlled on one valve.
 - ✓ Such shutoff valves shall be accessible at all times. A fullway valve shall be installed on the discharge piping from water supply tanks at or near the tank. A fullway valve shall be installed on the cold water supply pipe to each water heater or near the water heater (2013 CPC section 605.2).
- **Combustion air, ventilation, and dilution of flue gases for gas utilization appliances** installed in building shall be obtained by application of one of the methods covered in 2013 CPC sections 507.2.1 through 507.7. Gas utilizations appliances of other than natural draft and Category I vented appliances shall be provided with combustion, ventilation, and dilution air in accordance with the appliance manufacturer's instructions. Where infiltration does not provide the necessary air, outdoor air shall be introduced in accordance with methods covered in 2013 CPC sections 507.4 through 507.7.

WATER HEATERS (continued)**Exceptions:**

- 1) This provision shall not apply to direct-vent appliances.
- Type B** (double wall) vent may pass through floors and ceilings with a minimum 1-inch clearance to combustibles or per manufacture listing.
 - ✓ Type B or Type L gas vent shall terminate at least 5 feet in vertical height above the highest connected appliance draft hood or flue collar (NFPA 54:12.7.2(2)).
 - ✓ Vent joints shall be secured with a minimum of 3 screws specific for B or L double wall vent material (2013 CPC section 510.6).
 - Single wall vents** shall not be used as a vent in dwellings and residential occupancies (2013 CPC section 510.7).
 - ✓ **Single wall vents** shall be used only for runs directly from the space in which the gas utilization appliance is located through the roof or exterior wall to the outer air.
 - ✓ A single wall vent passing through a roof shall extend without interruption through the roof flashing, roof jacket, or roof thimble.
 - ✓ Single wall vents shall not pass through walls, floors, ceilings, and unoccupied attics, concealed, cold and unconditioned spaces.
 - ✓ Secure joints with a minimum of 3 screws.
 - Water heaters located in an attic, attic-ceiling assembly, floor-ceiling assembly, or floor-subfloor assembly** where damage results from a leaking water heater, a water-tight pan of corrosion-resistant materials shall be installed beneath the water heater with not less than three-quarters of an inch diameter drain to an approved location (2013 CPC section 508.4).
 - Water heater installed in a closet located in a bedroom or bathroom** shall have a listed, gasketed door assembly and a listed self-closing device with no hold open mechanism. The door assembly shall be installed with a threshold and bottom door seal. All combustion air shall be obtained from the outdoors (2013 CPC sections 505.1, 505.1.2, 507.4).
 - Attic water heaters** shall meet requirements for appliance access, lighting & receptacle (2013 CPC section 509.4).
 - Temperature and pressure relief valve (TPRV)** shall terminate to the outside or other approved location with ¾-inch discharge pipe pointing down, terminating a minimum 6 inches and maximum 24 inches above grade. Pressure relief valve piping to be hard drawn copper or galvanized steel **not permitted to drain into water heater pan and PVC is not an approved material** (2013 CPC sections 505.4 & 508.5 – see also Water Heater installation checklist for basement T&P termination requirements).

TANKLESS WATER HEATER (Additional requirements)

- Note: Expansion tank** is required to be installed when a pressure **regulator or back flow preventer** is installed at the water service.
- An approved single line diagram of the gas pipe sizing shall be available during inspection. Inspector shall verify proper gas pipe sizing.
- Tankless water heater **shall be installed per manufacture installation instructions** (the installation manual shall be available for inspector during inspection).
- Tankless water heater shall be independently vented with a category III (Stainless steel) venting system. Verify clearances to combustibles – direct vent kits may be available from the manufacturer that provide for reduced clearances.
- Tankless water heater shall be listed for their location, exterior or interior.

FURNACE GENERAL REQUIREMENTS

- Flood zone area** – refer to Underfloor Furnace requirements.
- Listed Appliances** - Except as otherwise provided in the code, the installation of appliances regulated by this code shall conform to the conditions of listing.

FURNACE GENERAL REQUIREMENTS (continued)

- ✓ **The appliance installer shall leave the manufacturer's installation and operating instructions attached to the appliance.**
 - ✓ Clearances of listed appliances from combustibile materials shall be as specified in the listing or on the rating plate (2013 CMC section 303.1).
 - **Central-heating furnaces** not listed for closet or alcove installation shall be installed in a room or space having a volume at least twelve times the total volume of the furnace; central-heating boilers not listed for closet or alcove installation shall be installed in a room or space having a volume sixteen times the volume of the boiler (2013 CMC section 303.2).
- Exceptions:**
- 1) The installation clearances for furnaces and boilers in rooms not large in comparison with the size of the equipment **shall be as specified in the appliance listing regardless of whether the enclosure is of combustibile or noncombustibile materials and shall not be reduced** by the protection methods described in Table 3-2 or any other method.
- **Identification of Equipment** - When more than one heating, cooling, ventilating, or refrigerating system is installed on the roof of a building or within a building, it shall be permanently identified as to the area or space served by the equipment (2013 CMC section 303.6).
 - **Assembly and Installation** - A central-heating boiler or furnace shall be installed in accordance with the manufacturer's instructions and shall be installed on a floor of noncombustibile construction with noncombustibile flooring and surface finish and with no combustibile material against the underside thereof, or on fire-resistive slabs or arches having no combustibile material against the underside thereof (2013 CMC section 904.3).
- Exceptions:**
- 1) Appliances listed for installation on a combustibile floor.
 - 2) Installation on a floor protected in an approved manner [NFPA 54:10.3.3].
- **Under-floor Installation** - Furnaces installed in an under-floor area of the building shall comply with the sections 904.3.1.1 through 904.3.1.3 (2013 CMC section 904.3.1).
 - **Supported by Ground** - Where a furnace is supported by the ground, it shall be installed on a concrete slab not less than three inches above the adjoining ground level (2013 CMC section 904.3.1).
 - **Supported from Above** - Where a furnace is supported from above, a minimum clearance of six inches shall be provided from finished grade (2013 CMC section 904.3.2).
 - **Excavation** - Where excavation is necessary to install a furnace, it shall extend to a depth of six inches below and twelve inches on all sides of the furnace, except on the service side, which shall have thirty inches. If the depth of the excavation for either the furnace or passageway exceeds twelve inches, walls shall be lined with concrete or masonry four inches above the adjoining ground level (2013 CMC section 904.3.3).
 - ✓ Minimum requirements for a noncombustibile platform floor shall be one layer ¾-inch plywood and one layer of hardy board or Durock (USG - cement board) and 26 gage galvanized sheet metal or pan under furnace.
 - ✓ When a "**Down Flow**" furnace requires a base plate it shall be installed per manufactures instructions.
 - **Anchorage of Appliances** - Appliances designed to be fixed in position shall be securely fastened in place.
 - ✓ Supports for appliances shall be designed and constructed to sustain vertical and horizontal loads within the stress limitations specified in the Building Code (2013 CMC section 303.4, 1313.1(7), NFPA 54-09:9.6.1.2).

FURNACE GENERAL REQUIREMENTS (continued)

- **Combustion air** - See example illustrations for approved methods of obtaining combustion air. Direct vent appliances are exempt from the provisions of Chapter 7 in the CMC and shall be installed per the appliance listing (2013 CMC Chapter 7 example illustrations).

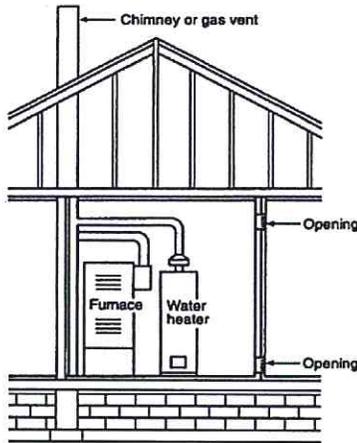


FIGURE 7-1
 ALL COMBUSTION AIR FROM ADJACENT INDOOR SPACES THROUGH INDOOR COMBUSTION AIR OPENINGS. [NFPA 54: A.9.3.2.3(1)]

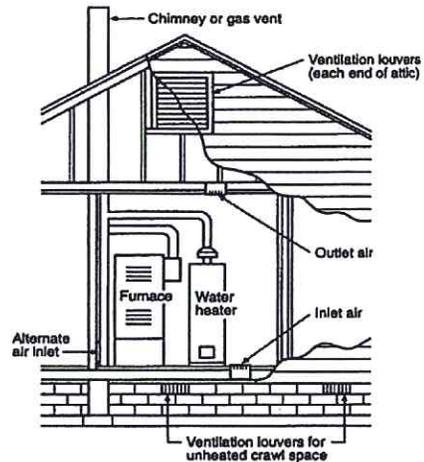


FIGURE 7-2
 ALL COMBUSTION AIR FROM OUTDOORS - INLET AIR FROM VENTILATED CRAWL SPACE AND OUTLET AIR TO VENTILATED ATTIC. [NFPA 54: A.9.3.3.1(1)(A)]

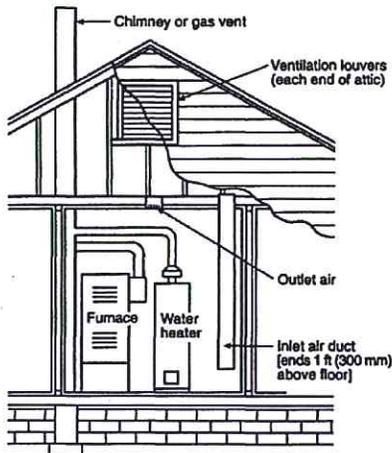


FIGURE 7-3
 ALL COMBUSTION AIR FROM OUTDOORS THROUGH VENTILATED ATTIC. [NFPA 54: A.9.3.3.1(1)(B)]

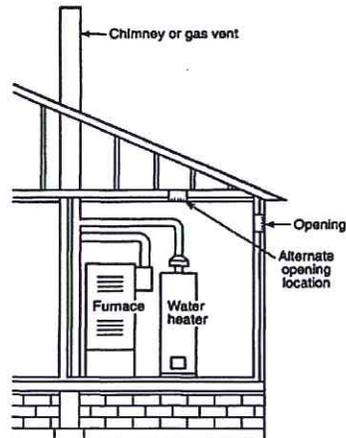


FIGURE 7-5
 ALL COMBUSTION AIR FROM OUTDOORS THROUGH SINGLE COMBUSTION AIR OPENING. [NFPA 54: A.9.3.3.2]

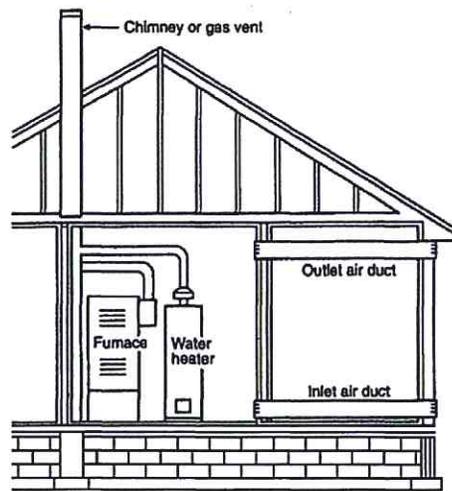


FIGURE 7-4
ALL COMBUSTION AIR FROM OUTDOORS THROUGH
HORIZONTAL DUCTS. [NFPA 54: A.9.3.3.1(2)]

GAS APPLIANCE CONNECTION REQUIREMENTS

- **Valves at Regulators** - An accessible gas shutoff valve shall be provided upstream of each gas pressure regulator.
 - ✓ Where two (2) gas pressure regulators are installed in series in a single gas line, a manual valve shall not be required at the second regulator (2013 CMC section 1312.9.1 and NFPA 54:7.9.1).
- **Valves Controlling Multiple Systems** (2013 CMC section 1312.9.2)
 - (a) **Accessibility of Gas Valves** - Main gas shutoff valves controlling several gas piping systems shall be readily accessible for operation and installed so as to be protected from physical damage.
 - ✓ They shall be marked with a metal tag or other permanent means attached by the installing agency so that the gas piping systems supplied through them can be readily identified [NFPA 54:7.9.2.1].
 - (b) **Shutoff Valves for Multiple House Lines** - In multiple tenant buildings supplied through a master meter, or through one (1) service regulator where a meter is not provided, or where meters or service regulators are not readily accessible from the appliance location, an individual shutoff valve for each apartment or tenant line shall be provided at a convenient point of general accessibility.
 - ✓ In a common system serving a number of individual buildings, shutoff valves shall be installed at each building [NFPA 54:7.9.2.2].
- **Emergency Shutoff Valves** - An exterior shutoff valve to permit turning off the gas supply to each building in an emergency shall be provided.
 - ✓ The emergency shutoff valves **shall be plainly marked** as such and their locations posted as required by the Authority Having Jurisdiction (2013 CMC section 1312.9.3 and NFPA 54:7.9.2.3).
- **Appliance Shutoff Valves and Connections** - Appliances connected to a piping system shall have an accessible, approved manual shutoff valve with a nondisplaceable valve member or a listed gas convenience outlet installed within six (6) feet of the appliance it serves.
 - ✓ Where an I-connector is used, the valve shall be installed up-stream of the connector.
 - ✓ A union or flanged connection shall be provided downstream from this valve to permit removal of controls.
 - ✓ Shutoff valves serving decorative gas appliances shall be permitted to be installed in fireplaces if listed for such use (2013 CMC section 1313.4, NFPA article 54:9.6.4).

GAS APPLIANCE CONNECTION REQUIREMENTS (continued)**Exceptions:**

- 1) Shutoff valves shall be permitted to be accessibly located inside or under an appliance when such appliance can be removed without removal of the shutoff valve.
 - 2) Shutoff valves shall be permitted to be accessibly located inside wall heaters and wall furnaces listed for recessed installation where necessary maintenance can be performed without removal of the shutoff valve.
- Installation of Piping** - Piping shall be installed in a manner not to interfere with inspection, maintenance, or servicing of the appliance (2013 CMC section 1313.8, NFPA 54:9.6.8).
 - Electrical Bonding and Grounding** (2013 CMC section 1312.13)
 - (a) Pipe and Tubing other than CSST.
 - ✓ Each aboveground portion of a gas piping system other than CSST that is likely to become energized shall be electrically continuous and bonded to an effective ground-fault current path.
 - ✓ Gas piping, other than CSST shall be considered to be bonded when it is connected to appliances that are connected to the appliance grounding conductor of the circuit supplying that appliance [NFPA 54-09:7.13.1].
 - (b) CSST gas piping systems shall be bonded to the electrical service grounding electrode system at the point where the gas service enters the building.
 - ✓ The bonding jumper shall not be smaller than 6 AWG copper wire [NFPA 54-09:7.13.2].
 - (c) Gas piping shall not be used as a grounding conductor or electrode. This does not preclude the bonding of metallic piping to a grounding system [NFPA 54-09:7.13.3].
 - Lightning Protection System** - Where a lightning system is installed, the bonding of the gas piping shall be in accordance with NFPA 780 Standard for Installation of Lightning Protection Systems (2013 CMC section 1312.14 and NFPA 54-09:7.13.4).
 - Bimetallic connectors and fittings shall be used for splicing or bonding dissimilar metals (NFPA 780 article 4.3.3.2).
 - Metal Roof Top Units** - Roof top mechanical units with continuous metal housings less than 3/16 inch thick such as air-conditioning/heating units, metal air intake/exhaust housings, cooling towers, and so forth, shall be protected by 4.8.9.1 through 4.8.9.2.2 (NFPA 780 article 4.8.9).
 - The connection shall be made to bare metal at the base or lower edges of the unit using main-size lightning conductors and bonding devices that have a surface contact area of not less than 3 inches² and shall provide two or more paths to ground, as is required for strike termination devices (NFPA 780 article 4.8.9.2.1).
 - These two main bonding plates shall be located as far apart as practicable at the base or lower edges of the unit's electrically continuous metal housing and connected to the lightning protection system (NFPA 780 article 4.8.9.2.2).
 - Underground metallic piping, electrical system and telecommunication grounding electrodes shall not be used in lieu of lightning ground electrodes; this provision shall not prohibit the required bonding together of these items as required by 4.14.1 (NFPA 780 article 4.13.1.3).
 - This **interconnection** shall include lightning protection, electric service, communications, and antenna system grounds, as well as underground metallic piping systems (NFPA 780 article 4.14.1.1).
 - Underground metallic piping systems** shall include water service, well casings located within 25 feet of the structure, gas piping, underground conduits, underground liquefied petroleum gas piping systems, and so on (NFPA 780 article 4.14.1.2).
 - Interconnection to a gas** line shall be made on the customer's side of the meter (NFPA 780 article 4.14.1.3).

GAS APPLIANCE CONNECTION REQUIREMENTS (continued)

- Flexible connectors** shall not pass through any walls, partitions, ceilings, floors or concealed locations (2013 CMC section 1313.1 (3 & 4)).
- Disconnect** shall be adjacent to and within site of furnace (2013 CMC section 308).
- Dedicated circuit** shall be provided for furnace (2013 CEC article 422.12).
- Identification** - When more than one furnace is installed it shall be permanently identified as to the area or space served by the furnace (2013 CMC section 303.6).
- Automatic Control Devices** - Heating appliances shall be equipped with a listed device or devices that will shut off the fuel supply to the main burner or burners in the event of pilot or ignition failure.
- In addition, liquefied petroleum gas-air-burning heating appliances shall be equipped with a listed automatic device or devices that will shut off the flow of gas to the pilot in the event of ignition failure (2013 CMC section 305).

Exception:

- The listed shutoff devices shall not be required on range or cooking tops, log lighters, lights, or other open-burner manually operated appliances, or listed appliances not requiring such devices and specific industrial appliances as approved by the Authority Having Jurisdiction.
- Heating appliances whose manual fuel controls are not readily accessible from the main portion of the building being heated shall be equipped with remote controls.
- Forced-air and gravity-type warm-air furnaces shall be equipped with a listed air outlet temperature limit control that cannot be set for temperatures higher than 250°F (121°C).
 - ✓ Such controls shall be located in the bonnet or plenum, within two (2) feet (610 mm) of the discharge side of the heating element of gravity furnaces or in accordance with the conditions of listing.
- Electric duct heaters shall be equipped with an approved automatic reset air outlet temperature limit control that will limit the outlet air temperature to not more than 200°F (93°C).
 - ✓ The electric elements of the heater shall be equipped with fusible links or a manual reset temperature limit control that will prevent outlet air temperature in excess of 250°F (121°C).
- Central- heating furnace(s) shall be listed for closet or alcove installation.** Where not listed for closet, the furnace shall be installed in a room or space having 12 times the volume of the furnace (2013 CMC section 303.2).

FURNACE IN BEDROOM, BATHROOM, or CLOSET (2013 CMC sections 902, 904)

- Furnace shall be direct vent type.
- Closet shall be equipped with a listed, gasketed door assembly.
- Listed self closing device (**HOLD-OPEN FEATURE IS NOT ALLOWED**).
- The door assembly shall be installed with a threshold and bottom door seal.
- All combustion air shall be obtained from the outdoors.
- The closet shall be used for exclusive use of the furnace (**NOT FOR STORAGE**).

FURNACE IN ATTIC

- Whole house fan is not allowed** when furnace is located in attic or furnace derives its combustion air from either the attic or the inside of house.
- Truss system shall be engineered for furnace location.**
- Attic access** minimum 22 inches x 30 inches net clear opening (appliance must fit through opening) (2013 CMC sections 904.11.1).
- Access cover** shall be insulated with R-30, recommend rigid foam.
- Electrical wiring** shall be protected within 6 feet of attic access scuttle opening (2013 CEC article 320.23).

FURNACE IN ATTIC (continued)

- Passageway** - Minimum 24 inches wide, unobstructed, solid flooring (2013 CMC sections 904.11.3).
- Maximum 20 feet from access to appliance if passageway is less than 6 feet high (2013 CMC section 904.11.2).
- Minimum 30 inches x 30 inches level working platform** at front or service side of unit (2013 CMC section 904.11.4).
- Light and receptacle** outlet required. Timer type light switch shall be located at attic entry and receptacle outlet within 25 feet of furnace (2013 CMC section 904.11.5).
- Properly support** and secure unit (2013 CMC section 303.4).
- Automatic setback thermostat** needs to be installed for furnace.
- Verify that insulation collar is properly installed.**

FURNACE UNDERFLOOR

- Protection Against Flood Damage** - For buildings located in flood hazard areas, heating, ventilating, air-conditioning, refrigeration, miscellaneous heat-producing, and energy-utilizing equipment and appliances shall be elevated at or above the design flood elevation (2013 CMC section 307.2).
Exception:
Equipment and appliances are permitted to be located below the design flood elevation **provided that they are designed and installed to prevent water from entering** or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the design flood elevation in compliance with the flood-resistant construction requirements of the Building Code.
- Walls Below Buildings in Flood Hazard Areas Subject to High Velocity Wave Action** - In flood hazard areas subject to high velocity wave action, equipment and appliances, including piping, shall not be mounted on or penetrate walls intended to break away under flood loads (2013 CMC section 307.2.1).
- Air Exhaust and Intake Openings** - Outside air exhaust openings and air intake openings shall be located at or above the design flood elevation (2013 CMC section 307.2.2).
- Crawl space** access opening in foundation minimum 18 inches x 24 inches, or by a trap door minimum 24 inches x 24 inches provided the largest piece of equipment can be removed from the opening.
- Underfloor** cover shall be insulated with R-30, recommend rigid foam.
- Duct Clearances:** Metal and factory made air ducts shall be installed with a minimum 4-inch separation from earth (2013 CMC section 604.2 & 3).
- Air ducts** installed under floor in a crawl space shall be installed so as to maintain a vertical clearance of 18 inches for all portions of the duct that would obstruct access to any part of the crawl space (2013 CMC section 604.1).
- Passageway to furnace minimum 24 inches x 18 inches (2013 CMC section 904.11.2).
- Clearance** - The lowest portion of the floor furnace shall have at least a six (6) inch clearance from the general ground level.
 - ✓ A reduced clearance to a minimum of two (2) inches is permitted, provided the lower six (6) inches portion of the floor furnace is sealed by the manufacturer to prevent entrance of water.
 - ✓ Where these clearances are not present, the ground below and to the sides shall be excavated to form a "basin-like" pit under the furnace so that the required clearance is provided beneath the lowest portion of the furnace.
 - ✓ A twelve (12) inch clearance shall be provided on all sides except the control side that shall have an eighteen (18) inch clearance (2013 CMC section 912.7, NFPA 54: 10.11.7).

FURNACE UNDERFLOOR (continued)

- Seepage Pan** - Where the excavation exceeds twelve (12) inches in depth or water seepage is likely to collect, a water-tight copper pan, concrete pit, or other suitable material shall be used, unless adequate drainage is provided or the appliance is sealed by the manufacturer to meet this condition.
 - ✓ A copper pan shall be made of not less than sixteen (16) oz/ft² sheet copper.
 - ✓ The pan shall be anchored in place so as to prevent floating, and the walls shall extend at least four (4) inches above the ground level with at least six (6) inches clearance on all sides, except the control side, which shall have at least eighteen (18) inches clearance (2013 CMC section 912.9, NFPA 54: 10.11.9).
- Secure unit in place (2013 CMC section 303.4).
- Light and receptacle** outlet are required.
 - ✓ Timer type light switch shall be located at under floor entry. Receptacle outlet within 25 feet of furnace (2013 CMC section 904.11.5).
- Installation** - The installation of floor furnaces shall comply with the following requirements (2013 CMC section 912.1):
 - a) Listed floor furnaces** shall be installed in accordance with their listing and the manufacturer's instructions.
 - b) Unlisted floor furnaces** shall not be installed in combustible floors.
 - c) Thermostats** controlling floor furnaces shall not be located in a room or space that can be separated from the room or space in which the register of the floor furnace is located [NFPA54:10.11.1].
- Temperature Limit Controls** (2013 CMC section 912.2)
 - a) Listed automatically operated floor furnaces** shall be equipped with temperature limit controls.
 - b) Unlisted automatically operated floor furnaces** shall be equipped with a temperature limit control arranged to shut off the flow of gas to the burner in the event the temperature at the warm-air outlet register exceeds 350°F above room temperature [NFPA 54: 10.11.2].
- Combustion and Circulating Air** - Combustion and circulating air shall be provided in accordance with section 701.0 (2013 CMC section 912.3, NFPA54:10.11.3).
- Placement** - The following provisions apply to furnaces that serve one story.
 - a) Floors** - Floor furnaces shall not be installed in the floor of any doorway, stairway landing, aisle, or passageway of any enclosure, public or private, or in an exitway from any such room or space (2013 CMC section 912.4, NFPA 54: 10.11.4(1)).
 - b) Walls and Corners** - The register of a floor furnace with a horizontal warm-air outlet shall not be placed closer than six (6) inches from the nearest wall. A distance of at least eighteen (18) inches from two adjoining sides of the floor furnace register to walls shall be provided to eliminate the necessity of occupants walking over the warm-air discharge. The remaining sides shall be a minimum of six (6) inches from a wall. Wall-register models shall not be placed closer than six (6) inch to a corner [NFPA 54: 10.11.4(2)].
 - c) Draperies** - The furnace shall be placed so that a door, drapery, or similar object cannot be nearer than twelve (12) inches to any portion of the register of the furnace [NFPA54:10.11.4(3)].
- Bracing** - The space provided for the furnace shall be framed with doubled joists and with headers not lighter than the joists (2013 CMC section 912.5, NFPA 54: 10.11.5).
- Support** - Means shall be provided to support the furnace when the floor register is removed (2013 CMC section 912.6, NFPA 54: 10.11.6).
- Clearance** - The lowest portion of the floor furnace shall have at least a six (6) inch clearance from the general ground level.

FURNACE UNDERFLOOR (continued)

- ✓ A reduced clearance to a minimum of two (2) inches is permitted, provided the lower six (6) inches portion of the floor furnace is sealed by the manufacturer to prevent entrance of water.
- ✓ Where these clearances are not present, the ground below and to the sides shall be excavated to form a "basin-like" pit under the furnace so that the required clearance is provided beneath the lowest portion of the furnace.
- ✓ A twelve (12) inch clearance shall be provided on all sides except the control side that shall have an eighteen (18) inch clearance (2013 CMC section 912.7, NFPA 54: 10.11.7).
- **Access** - The space in which any floor furnace is installed shall be accessible by an opening in the foundation not less than twenty-four (24) inches x eighteen (18) inches or by a trap door not less than twenty-four (24) inches x twenty-four (24) inches in any cross-section thereof, and a passageway not less than twenty-four (24) inches x eighteen (18) inches in any cross-section thereof (2013 CMC section 912.8, NFPA 54: 10.11.8).
- **Wind Protection** - Floor furnaces shall be protected, where necessary, against severe wind conditions (2013 CMC section 912.10, NFPA 54:10.11.10).
- **Upper-Floor Installations** - Listed floor furnaces shall be permitted to be installed in an upper floor, provided the furnace assembly projects below into a utility room, closet, garage, or similar non-habitable space.
 - ✓ In such installations, the floor furnace shall be enclosed completely (entirely separated from the non-habitable space) with means for air intake to meet the provisions of section 701.0, with access for servicing, the minimum furnace clearances of six (6) inches to all sides and bottom, and with the enclosure constructed of portland cement plaster or metal lath or other noncombustible material (2013 CMC section 912.11, NFPA 54: 10.11.11).
- **First Floor Installation** - Listed floor furnaces installed in the first or ground floors of buildings shall not be required to be enclosed unless the basements of these buildings have been converted to apartments or sleeping quarters, in which case the floor furnace shall be enclosed as specified for upper floor installations and shall project into a non-habitable space (2013 CMC section 912.12, NFPA 54:10.11.12).

FURNACE IN GARAGE

- Ignition minimum 18 inches above floor unless listed sealed combustion chamber assembly (2013 CMC section 307.1).
- Down flow furnaces require base plate per manufacturer specifications.
- Protection from moving vehicles (install bollard(s)) (2013 CMC section 307.1).
- Install 26 gage metal over combustibles in front of burners per manufacture specifications. (2013 CMC section 904.3 exception (2), NFPA 54:9.3.3)
- **Gas burning appliance venting** shall comply with 2013 CMC chapter 8 requirements.
- **High efficiency gas appliance** - Vent termination per manufacture instructions.

EJECTOR PUMPS

- Cleanouts for drains that pass through a backwater valve shall be clearly identified with permanent label stating "backwater valve downstream" (2013 CPC section 710.1).
- Drainage piping serving fixtures that are located below the crown level of the main sewer shall discharge into an approved water-tight sump or receiving tank, so located as to receive the sewage or wastes by gravity (2013 CPC section 710.2).
- A sewage ejector or sewage pump receiving the discharge of water closets or urinals (2013 CPC section 710.3):
 - Shall have a discharge capacity of not less than 20 gallons per minute.

EJECTOR PUMPS (continued)

- In single dwelling, the ejector or pump shall be capable of passing a 1½ inch diameter solid ball, and the discharge piping of each ejector or pump shall have a backwater valve and gate valve, and be not less than 2 inches in diameter.
- In other than single dwelling units, the ejector or pump shall be capable of passing a 2 inch diameter solid ball, and the discharge piping of each ejector or pump shall have a backwater valve and gate valve, and be not less than 3 inches in diameter.
 - ✓ The minimum size of any pump or any discharge pipe from a sump having a water closet connected thereto shall be not less than 2 inches.
- The discharge line from such ejector, pump, or other mechanical device shall be provided with an accessible backwater or swing check valve and gate or ball valve.
 - ✓ If the gravity drainage line connected to the discharge line connects horizontally the method of connection shall be from the top through a wye branch fitting.
 - ✓ The gate or ball valve shall be located on the discharge side of the backwater or check valve.
- Gate or ball valves, when installed in drainage piping, shall be fullway type with working parts or corrosion-resistant metal.
 - ✓ Size 4 inches or more in diameter shall have cast-iron bodies, and sizes less than 4 inches cast-iron or brass bodies.
- Backwater valves, gate valves, fullway ball valves, unions, motors, compressors, air tanks, and other mechanical devices required by this section shall be located where they will be accessible for inspection and repair at all times and unless continuously exposed, shall be enclosed in a masonry pit fitted with an adequately sized removable cover.
- Receptacle outlets shall not be located in pits.
 - ✓ Install receptacle minimum 12 inches above floor level.

INSPECTOR SHALL RELEASE FINAL UTILITIES GAS OR ELECTRICAL WHEN FINAL IS APPROVED.
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