

**2019 Low-Rise Residential Mandatory Measures Summary**

NOTE: Low-rise residential buildings subject to the Energy Standards must comply with all applicable mandatory measures, regardless of the compliance approach used. Review the respective section for more information. \*Exceptions may apply.

§ 110.0(a)1	<b>Building Envelope Measures:</b>
§ 110.0(a)5	<b>Air Leakage:</b> Manufactured fenestration, exterior doors, and exterior pit doors must limit air leakage to 0.3 CFM per square foot or less when tested per NFRC-400, ASTM E233 or AIAA/WMA/MSA 1011.5.2/440-2011.*
§ 110.0(b)5	<b>Labeling:</b> Fenestration products and exterior doors must have a label meeting the requirements of § 110.11(a).
§ 110.0(b)6	<b>Field fabricated exterior doors and fenestration products:</b> Must use U-factors and solar heat gain coefficient (SHGC) values from Tables 110.0.A, 110.0.B, or 110.0.C for exterior doors. They must be caulked and/or weather-stripped.*
§ 110.7	<b>Air Leakage:</b> All joints, penetrations, and other openings in the building envelope that are potential sources of air leakage must be caulked, caulked, or weather-stripped.
§ 110.0(a)6	<b>Insulation Certification by Manufacturers:</b> Insulation must be certified by the Department of Consumer Affairs, Bureau of Household Goods and Services (BHGS).
§ 110.0(a)8	<b>Insulation Requirements for Heated Slab Floors:</b> Heated slab floors must be insulated per the requirements of § 110.0(a).
§ 110.0(a)9	<b>Roofing Products Solar Reflectance and Thermal Emittance:</b> The thermal emittance and aged solar reflectance values of the roofing material must meet the requirements of § 110.0(a) and be labeled per § 110.11 when the installation of a cool roof is specified on the CFIR.
§ 110.0(a)10	<b>Radiant Barrier:</b> When required, radiant barriers must have an emittance of 0.05 or less and be certified to the Department of Consumer Affairs.
§ 150.0(a)	<b>Ceiling and Wallboard Insulation:</b> Minimum R-12 insulation in wood frame ceiling, or the weighted average U-factor must not exceed 0.043. Minimum R-10 or weighted average U-factor of 0.054 or less in a rafter roof alteration. Rite access doors must have permanently attached insulation using adhesive or mechanical fasteners. The attic access must be gasketed to prevent air leakage. Insulation must be installed in direct contact with a continuous roof or ceiling which is sheathed to limit infiltration and exfiltration as specified in § 110.7, including but not limited to electric insulation either above or below the roof deck or onto a sloped ceiling.*
§ 150.0(b)	<b>Loose-fill Insulation:</b> Loose-fill insulation must meet the manufacturer's required density for the labeled R-value.
§ 150.0(c)	<b>Wall Insulation:</b> Minimum R-13 insulation in 2.4-inch wood framing wall or have a U-factor of 0.102 or less, or R-20 in 2.6-inch wood framing or have a U-factor of 0.071 or less. Opaque non-framed assemblies must have an overall assembly U-factor not exceeding 0.102. Masonry walls must meet Table 150.1(A) or (B).*
§ 150.0(d)	<b>Raised-floor Insulation:</b> Minimum R-19 insulation in raised wood framed floor or 0.037 maximum U-factor.*
§ 150.0(e)	<b>Slab Edge Insulation:</b> Slab edge insulation must meet all of the following: have a water absorption rate, for the insulation material alone without facings, no greater than 0.3 percent; have a water vapor permeance no greater than 20 perm per inch; be protected from physical damage and UV light deterioration; and, when installed as part of a heated slab floor, meet the requirements of § 110.0(g).
§ 150.0(g)1	<b>Vapor Retarder:</b> In climate zones 1 through 16, the earth floor or unvented crawl space must be covered with a Class I or Class II vapor retarder. This requirement also applies to controlled ventilation crawl spaces for buildings complying with the exception to § 150.0(g).
§ 150.0(g)2	<b>Vapor Retarder:</b> In climate zones 14 and 15, a Class I or Class II vapor retarder must be installed on the conditioned space side of all insulation at all exterior walls, vented attics, and unvented attics with air-permeable insulation.*
§ 150.0(g)	<b>Fenestration Products:</b> Fenestration, including skylights, separating conditioned space from unconditioned space or outdoors must have a maximum U-factor of 0.75, or the weighted average U-factor of all fenestration must not exceed 0.59.*
§ 110.5(e)	<b>Fireplaces, Decorative Gas Appliances, and Gas Log Measures:</b>
§ 110.5(e)1	<b>Pilot Light:</b> Continuously burning pilot lights are not allowed for indoor and outdoor fireplaces.
§ 150.0(e)1	<b>Closable Doors:</b> Masonry or factory-built fireplaces must have a closable metal or glass door covering the entire opening of the firebox.
§ 150.0(e)2	<b>Combustion Intake:</b> Masonry or factory-built fireplaces must have a combustion intake, which is at least six square inches in area and is equipped with a readily accessible, operable, and light-tight damper or combustion air control device.*
§ 150.0(e)3	<b>Flue Damper:</b> Masonry or factory-built fireplaces must have a flue damper with a readily accessible control.*
§ 110.0(d)5	<b>Space Conditioning, Water Heating, and Plumbing System Measures:</b>
§ 110.0(d)5	<b>Certification:</b> Heating, ventilation and air conditioning (HVAC), equipment, water heaters, showerheads, faucets, and all other regulated appliances must be certified by the manufacturer to the California Energy Commission.
§ 110.0(d)6	<b>HVAC Efficiency:</b> Equipment must meet the applicable efficiency requirements in Table 110.2A through Table 110.2K.*
§ 110.2(b)	<b>Controls for Heat Pumps with Supplementary Electric Resistance Heaters:</b> Heat pumps with supplementary electric resistance heaters must have controls that prevent supplementary heater operation when the heating load can be met by the heat pump alone, and in which the cut-on temperature for compression heating is higher than the cut-on temperature for supplementary heating, and the cut-off temperature for compression heating is higher than the cut-off temperature for supplementary heating.*
§ 110.2(b)2	<b>Thermostats:</b> All heating or cooling systems not controlled by a central energy management control system (EMCS) must have a setback thermostat.*
§ 110.3(a)4	<b>Water Heating Recirculation Loops Serving Multiple Dwelling Units:</b> Water heating recirculation loops serving multiple dwelling units must meet the air release valve, backflow prevention, pump priming, pump isolation valve, and recirculation loop connection requirements of § 110.3(a)4.
§ 110.3(a)6	<b>Isolation Valves:</b> Instantaneous water heaters with an input rating greater than 6.9 kBtu per hour (2 kW) must have isolation valves with hose bibbs or other fittings on both cold and hot water lines to allow flushing the water heater when the valves are closed.*
§ 110.5	<b>Pilot Lights:</b> Continuously burning pilot lights are prohibited for natural gas: fan-type central furnaces, household cooking appliances (except appliances without an electrical supply voltage connection with pilot lights that consume less than 150 Btu per hour), and pool and spa heaters.*
§ 150.0(h)1	<b>Building Cooling and Heating Loads:</b> Heating and/or cooling loads are calculated in accordance with the ASHRAE Handbook, Equipment Volume, Applications Volume, and Fundamentals Volume, and Fundamentals Volume, and the SMACNA Residential Comfort System Installation Standards Manual, or the ACCA Manual J, using design conditions specified in § 150.0(h)2.

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§ 150.0(h)3A	<b>Cleanances:</b> Air conditioner and heat pump outdoor condensing units must have a clearance of at least five feet from the outlet of any dryer.
§ 150.0(h)3B	<b>Liquid Line Driv:</b> Air conditioners and heat pump systems must be equipped with liquid line filter driers if required, as specified by the manufacturer's instructions.
§ 150.0(g)1	<b>Storage Tank Insulation:</b> Unfired hot water tanks, such as storage tanks and backup storage tanks for solar water-heating systems, must have a minimum of R-12 external insulation or R-16 internal insulation where the internal insulation R-value is indicated on the exterior of the tank.
§ 150.0(g)2A	<b>Water Piping, Solar Water-heating System Piping, and Space Conditioning System Line Insulation:</b> All domestic hot water piping must be insulated as specified in Section 102.11 of the California Plumbing Code. In addition, the following piping conditions must be met: a minimum insulation wall thickness of one inch or a minimum insulation R-value of 7.7; the first five feet of cold water pipes from the storage tank; all hot water piping with a nominal diameter equal to or greater than 3/4 inch and less than one inch; all hot water piping with a nominal diameter less than 3/4 inch that is associated with a domestic hot water recirculation system, from the heating source to storage tank or between tanks; buried below grade; and from the heating source to kitchen fixtures.*
§ 150.0(g)3	<b>Insulation Protection:</b> Piping insulation must be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind as required by Section 120.3(b). Insulation exposed to weather must be water resistant and protected from UV light (no adhesive tapes). Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space must include, or be protected by, a Class I or Class II vapor retarder. Pipe insulation buried below grade must be installed in a waterproof and non-oxidizable casing or sleeve.
§ 150.0(h)1	<b>Gas or Propane Water Heating Systems:</b> Systems using gas or propane water heaters to serve individual dwelling units must include all of the following: A dedicated 125 volt, 20 amp electrical receptacle connected to the electric panel with a 120/240 volt 3 conductor, 10 AWG copper branch circuit, within three feet of the water heater without obstruction. Both ends of the ungrounded conductor must be labeled with the word "open" and be electrically isolated. Have a reserved single pole circuit breaker space in the electrical panel adjacent to the circuit breaker for the branch circuit and labeled with the words "Future 240V Line", a Category III or IV vent, or a Type B vent with straight pipe between the outdoor termination and the space where the water heater is installed, a condensate drain that is no more than two inches higher than the base of the water heater, and allows natural draining without pump assistance, and a gas supply line with a capacity of at least 200,000 Btu per hour.
§ 150.0(h)2	<b>Recirculating Loops:</b> Recirculating loops serving multiple dwelling units must meet the requirements of § 110.3(a)5.
§ 150.0(h)3	<b>Solar Water-heating Systems:</b> Solar water-heating systems and collectors must be certified and rated by the Solar Rating and Certification Corporation (SRCC), the International Association of Plumbing and Mechanical Officials, Research and Testing (APMO R&T), or by a listing agency that is approved by the Executive Director.
§ 110.8(d)3	<b>Ducts and Fans Measures:</b>
§ 110.8(d)3	<b>Ducts:</b> Insulation installed on an existing space-conditioning duct must comply with § 604.0 of the California Mechanical Code (CMC). If a contractor installs the insulation, the contractor must certify to the customer, in writing, that the insulation meets this requirement.
§ 150.0(h)1	<b>CMC Compliance:</b> All air distribution system ducts and plenums must meet the requirements of the CMC §§ 607.0, 607.0.1, 607.0.2, 607.0.3, 607.0.4, 607.0.5, 607.0.6, 607.0.7, 607.0.8, 607.0.9, 607.0.10, 607.0.11, 607.0.12, 607.0.13, 607.0.14, 607.0.15, 607.0.16, 607.0.17, 607.0.18, 607.0.19, 607.0.20, 607.0.21, 607.0.22, 607.0.23, 607.0.24, 607.0.25, 607.0.26, 607.0.27, 607.0.28, 607.0.29, 607.0.30, 607.0.31, 607.0.32, 607.0.33, 607.0.34, 607.0.35, 607.0.36, 607.0.37, 607.0.38, 607.0.39, 607.0.40, 607.0.41, 607.0.42, 607.0.43, 607.0.44, 607.0.45, 607.0.46, 607.0.47, 607.0.48, 607.0.49, 607.0.50, 607.0.51, 607.0.52, 607.0.53, 607.0.54, 607.0.55, 607.0.56, 607.0.57, 607.0.58, 607.0.59, 607.0.60, 607.0.61, 607.0.62, 607.0.63, 607.0.64, 607.0.65, 607.0.66, 607.0.67, 607.0.68, 607.0.69, 607.0.70, 607.0.71, 607.0.72, 607.0.73, 607.0.74, 607.0.75, 607.0.76, 607.0.77, 607.0.78, 607.0.79, 607.0.80, 607.0.81, 607.0.82, 607.0.83, 607.0.84, 607.0.85, 607.0.86, 607.0.87, 607.0.88, 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