Building Electrification 2019 Reach Code Language
Modifications to Title 24, Part 6
Version Date: 29 October 2019

Please read:

1. This language is specifically for Climate Zone 4.
2. This model code language is based on technical feasibility and recently approved and enacted code language by other local cities and the state but has not been tested in a court of law. It is the responsibility of each city to review and understand this language as part of normal city adoption processes.
3. This is one model code, and sections can be revised/re-worded based on City preferences or other model codes available.
4. Language highlighted in green can be removed without significant deviation of the overall reach code intent. Please reach out to PCE/SVCE with any questions.
5. Here is the version history:

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 29, 2019</td>
<td>Original version released</td>
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<tr>
<td>June 25, 2019</td>
<td>Version 2 released with the following modifications.</td>
</tr>
<tr>
<td></td>
<td>1) 100.1(b) - ADU definition</td>
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<td>2) 140.0(b)</td>
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<tr>
<td></td>
<td>a. Electric-ready wire gauging has been generalized for flexibility</td>
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<td></td>
<td>b. Heat pump water heater floor area and ducting requirements have an added exception.</td>
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<td>3) 140.1</td>
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<td></td>
<td>a. Nonresidential performance requirements revised format</td>
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<td>b. Exception added for CEA documentation</td>
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<td></td>
<td>4) 140.2 – Clarifications of applicability of prescriptive measures, and measure description</td>
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<td>5) 150.0</td>
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<tr>
<td></td>
<td>a. Clarifications of applicability of prescriptive measures, and measure description</td>
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<td></td>
<td>b. Addition of electric-ready space heating option</td>
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<tr>
<td></td>
<td>c. Revision to heat pump water heater floor area and ducting requirement language, including added exception.</td>
</tr>
<tr>
<td></td>
<td>d. Added requirement for water heaters serving multiple dwelling units</td>
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<td>6) 150.1(b)</td>
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<tr>
<td></td>
<td>a. Clarification that ADUs are exempted from performance requirements</td>
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<td></td>
<td>b. Clarification that mixed-fuel buildings must meet Energy Efficiency Design Rating requirements.</td>
</tr>
<tr>
<td></td>
<td>c. Added exception for buildings with limited solar access.</td>
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<td>7) 150.1(c) – Added detail on prescriptive measures.</td>
</tr>
<tr>
<td>August 2, 2019</td>
<td>Version 3 released with the following modifications.</td>
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<tr>
<td></td>
<td>1) 100.1(b) – Definitions updated, rearranged, and simplified.</td>
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<td>2) 140.0(b)</td>
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<td></td>
<td>a. Clarification and simplification of electric readiness applicability.</td>
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<tr>
<td></td>
<td>b. Minor grammatic updates.</td>
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<td></td>
<td>c. Revised “inductive range” to “electric range”</td>
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<td>d.</td>
<td>Removed space heating reversing valve and programming requirements.</td>
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<td>e.</td>
<td>Clarified that solar thermal exception is additional to other prescriptive requirements.</td>
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<td>3)</td>
<td>140.1 – Updated compliance margin to account for most recent cost effectiveness studies.</td>
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<td>4)</td>
<td>150.0(h)</td>
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<tr>
<td>a.</td>
<td>Removed space heating reversing valve and programming requirements.</td>
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<tr>
<td>b.</td>
<td>Clarification and simplification of electric readiness applicability and exceptions.</td>
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<tr>
<td>c.</td>
<td>Removed ‘optional’ highlight from space heating electric readiness requirement.</td>
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<td>5)</td>
<td>150.0(n)</td>
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<tr>
<td>a.</td>
<td>Re-introduced state mandatory requirement for a gas supply line with a capacity of at least 200,000 Btu/hr when a gas system is installed.</td>
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<tr>
<td>b.</td>
<td>Reverted to original code language to avoid legality or procedural issues. Heat Pump Water Heater readiness is still enabled, but not plug-and-play.</td>
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<tr>
<td>c.</td>
<td>Eliminated exception for space/ventilation requirements for simplicity and to encourage future demand flexibility capability.</td>
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<td>6)</td>
<td>150.0(s)</td>
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<tr>
<td>a.</td>
<td>Clarification and simplification of electric readiness applicability.</td>
</tr>
<tr>
<td>b.</td>
<td>Minor grammatic updates.</td>
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<tr>
<td>c.</td>
<td>Revised “inductive range” to “electric range”</td>
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<tr>
<td>d.</td>
<td>Added standalone cooking oven requirement.</td>
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<td>7)</td>
<td>150.1</td>
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<tr>
<td>a.</td>
<td>Revised language edits without changing conceptual approach.</td>
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<td>b.</td>
<td>Made CEA a compliance credit rather than a requirement.</td>
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</table>

**September 9, 2019**  
Version 5 released with following modifications:  
1) Section 140.0 (b)  
 a. Updated electrical readiness requirements for nonresidential buildings  
2) Minor formatting updates to add page numbers and change highlight color  

**October 29, 2019**  
Version 5.1 released with following modifications:  
1) 150.1(b)1.A – Free Standing ADUs now fall under the same energy performance requirements as any residential new construction.
City of X Adopts California Energy Code, 2019 Edition, Title 24, Part 6 of the California Code of Regulations in its full form with the following local amendments:

ALL BUILDINGS
SUBCHAPTER 1 ALL OCCUPANCIES—GENERAL PROVISIONS
SECTION 100.1(b) – DEFINITIONS
In this article the following definitions apply:

ALL-ELECTRIC BUILDING is a building that has no natural gas or propane plumbing installed within the building, and that uses electricity as the source of energy for its space heating, water heating (including pools and spas), cooking appliances, and clothes drying appliances.

CERTIFIED ENERGY ANALYST is a person registered as a Certified Energy Analyst with the California Association of Building Energy Consultants as of the date of submission of a Certificate of Compliance as required under Section 10.103.

ELECTRICALLY HEATED MIXED-FUEL BUILDING is a mixed-fuel building that uses electricity as the source of energy for its space heating and water heating (including pools and spas) appliances. Space heating and water heating appliances that use electricity for displays or other purposes, but use gas or propane for heating fuel, are excluded.

FREE STANDING ACCESSORY DWELLING UNIT is a detached building that is not intended for sale separate from the primary residence, on a lot that is zoned for single-family or multifamily use, located on the same lot as an existing dwelling, and does not exceed 1,200 square feet of total floor area.

MIXED-FUEL BUILDING is a building that is plumbed for the use of natural gas or propane as fuel for space heating, water heating (including pools and spas), cooking appliances or clothes drying appliances.

NONRESIDENTIAL
SUBCHAPTER 5 NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL OCCUPANCIES—PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES FOR ACHIEVING ENERGY EFFICIENCY
SECTION 140.0 - PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES
Nonresidential, high-rise residential and hotel/motel buildings shall comply with all of the following:

(a) The requirements of Sections 100.0 through 110.12 applicable to the building project (mandatory measures for all buildings).

(b) The requirements of Sections 120.0 through 130.5 (mandatory measures for nonresidential, high-rise residential and hotel/motel buildings) and:

1. Electric-Readiness. Mixed-fuel buildings shall include the following components for each gas terminal or stub out, based on the appliance it is designed to serve:

   A. Water Heating:
i. A dedicated 208/240 volt 50-amp or greater electrical receptacle that is connected to the electric panel with conductors of adequate capacity, within 3 feet from the appliance and accessible with no obstructions;

ii. Both ends of the conductor shall be labeled with the words “For Electric Range” and be electrically isolated;

iii. A reserved double-pole circuit breaker space in the electrical panel adjacent to the circuit breaker for the branch circuit and labeled with the words “For Future Electric Range”; and

iv. Other electrical components, including conductors, receptacles, or blank covers, related to this section shall be installed in accordance with the California Electrical Code.

D. Stand Alone Cooking Oven

i. A dedicated 208/240-volt, 50 amp or greater receptacle that is connected to the electric panel with conductors of adequate capacity, within 3 feet of the appliance and accessible with no obstructions;

ii. Both ends of the conductor shall be labeled with the word “For Future Electric Oven” and be electrically isolated; and

iii. A double-pole circuit breaker in the electrical panel labeled with the words “For Future Electric Oven”.
2. **Solar Photovoltaic Systems.** Solar photovoltaics shall be installed as follows:

A. **New non-residential buildings with less than 10,000 square feet of gross floor area shall provide a minimum of a 3-kilowatt photovoltaic system.**

B. **New non-residential buildings greater than or equal to 10,000 square feet of gross floor area shall provide a minimum of a 5-kilowatt photovoltaic system.**

**EXCEPTION to Section 140.0(b):** As an alternative to a solar photovoltaic system, all of the building types listed above may provide a solar hot water system (solar thermal) with a minimum collector area of 40 square feet, additional to any other solar thermal equipment otherwise required for compliance with Part 6.

(c) Either the performance compliance approach (energy budgets) specified in Section 140.1 or the prescriptive compliance approach specified in Section 140.2 for the Climate Zone in which the building will be located. Climate zones are shown in FIGURE 100.1-A.

**SECTION 140.1 - PERFORMANCE APPROACH: ENERGY BUDGETS**

An addition to an existing building or a newly constructed All-Electric Building complies with the performance approach if the energy budget calculated for the Proposed Design Building under Subsection (b) is no greater than the energy budget calculated for the Standard Design Building under Subsection (a).

A newly constructed Mixed-Fuel Building complies with the performance approach if the energy budget calculated for the Proposed Design Building under Subsection (b) has a compliance margin, relative to the energy budget calculated for the Standard Design Building under Subsection (a), of at least the value specified for the corresponding occupancy type in Table 140.1-A below.

**Table 140.1-A MIXED FUEL BUILDING COMPLIANCE MARGINS**

<table>
<thead>
<tr>
<th>Occupancy Type</th>
<th>Compliance Margin</th>
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<tbody>
<tr>
<td>Office / Mercantile</td>
<td>14%</td>
</tr>
<tr>
<td>All other occupancies</td>
<td>6%</td>
</tr>
</tbody>
</table>

(a) **Energy Budget for the Standard Design Building.** The energy budget for the Standard Design Building is determined by applying the mandatory and prescriptive requirements to the Proposed Design Building. The energy budget is the sum of the TDV energy for space-conditioning, indoor lighting, mechanical ventilation, service water heating, and covered process loads.

(b) **Energy Budget for the Proposed Design Building.** The energy budget for a Proposed Design Building is determined by calculating the TDV energy for the Proposed Design Building. The energy budget is the sum of the TDV energy for space-conditioning, indoor lighting, mechanical ventilation and service water heating and covered process loads.

(c) **Calculation of Energy Budget.** The TDV energy for both the Standard Design Building and the Proposed Design Building shall be computed by Compliance Software certified for this use by the Commission. The processes for Compliance Software approval by the Commission are documented in the ACM Approval Manual.
EXCEPTION 1 to Section 140.1: For newly constructed buildings, if the Certificate of Compliance is prepared and signed by a Certified Energy Analyst and the energy budget for the Proposed Design is no greater than the Standard Design Building, the required compliance margin is reduced by 1%.

SECTION 140.2 – PRESCRIPTIVE APPROACH
To comply using the prescriptive approach, a building shall be designed with and shall have constructed and installed systems and components meeting the applicable requirements of Sections 140.3 through 140.9 and additionally the following measures as applicable intended to exceed the prescriptive requirements:

a) Mixed-Fuel Buildings of Hotel, Motel, and High-Rise Multifamily Occupancies
   1. Install fenestration with a solar heat gain coefficient no less than 0.45.
   2. Design Variable Air Volume (VAV) box minimum airflows to be equal to the zone ventilation minimums.
   3. Include economizers and staged fan control in air handlers with a mechanical cooling capacity ≥ 33,000 Btu/h
   4. Reduce the total lighting power density (Watts/ft²) by ten percent (10%) from that required from Table 140.6-C.
   5. In common areas, without claiming any Power Adjustment Factor credits, do the following:
      A. Control to daylight dimming plus off per Section 140.6(a)2H; and
      B. Perform Institutional Tuning per Section 140.6(a)2J.
   6. Install one drain water heat recovery device per every three guest rooms that is field verified as specified in the Reference Appendix RA3.6.9.

b) All Other Mixed-Fuel Nonresidential Buildings
   1. Install fenestration with a solar heat gain coefficient no greater than 0.22.
   2. Limit the fenestration area on east-facing and west-facing walls to one-half of the average amount of north-facing and south-facing fenestration.
   3. Design Variable Air Volume (VAV) box minimum airflows to be equal to the zone ventilation minimums.
   4. Include economizers and staged fan control in air handlers with a mechanical cooling capacity ≥ 33,000 Btu/h
   5. Reduce the total lighting power density (Watts/ft²) by ten percent (10%) from that required from Table 140.6-C.
   6. Improve lighting without claiming any Power Adjustment Factor credits:
      A. In office spaces, control to daylight dimming plus off per Section 140.6(a)2H;
      B. Install Occupant Sensing Controls in Large Open Plan Offices per Section 140.6(a)2J; and
      C. Perform Institutional Tuning per Section 140.6(a)2J.
Low-rise residential buildings shall comply with the applicable requirements of Sections 150(a) through 150.0(rs).

NOTE: The requirements of Sections 150.0(a) through 150.0(rs) apply to newly constructed buildings. Sections 150.2(a) and 150.2(b) specify which requirements of Sections 150.0(a) through 150.0(rs) also apply to additions or alterations.

h) Space-Conditioning Equipment.

5. Systems using gas or propane space heating equipment shall include the following components:

A. A designated exterior location for a future heat pump compressor unit with either a drain or natural drainage for condensate from possible future operation as cooling equipment.

B. A dedicated 208/240 volt, 30-amp or greater electrical circuit that is connected to the electric panel with conductors of adequate capacity, terminating within 3 feet from the designated future location of the compressor unit with no obstructions. In addition, all of the following:

   i. Both ends of the unused conductor shall be labeled with the word “For Future Heat Pump Space Heater” and be electrically isolated;

   ii. A double pole circuit breaker in the electrical panel labeled with the words “For Future Heat Pump Space Heater;” and

   iii. Other electrical components, including conductors, receptacles or blank covers, related to this section shall be installed in accordance with the California Electrical Code.

**EXCEPTION to Section 150.0(h)5.** If a 240-volt 30 amp or greater electrical circuit and compressor unit location exists for space cooling equipment.

n) Water Heating System.

1. Systems using gas or propane water heaters to serve individual dwelling units shall include the following components:

   A. A dedicated 125 volt, 20-amp or greater electrical receptacle that is connected to the electric panel with a 120/240 volt 3 conductor, 10 AWG copper branch circuit, within 3 feet from the water heater and accessible to the water heater with no obstructions. In addition, all of the following:

      i. Both ends of the unused conductor shall be labeled with the word “spare For Future Heat Pump Water Heater” and be electrically isolated; and
ii. A reserved single pole circuit breaker space in the electrical panel adjacent to the circuit breaker for the branch circuit in A above and labeled with the words “Future 240V Use “For Future Heat Pump Water Heater;”

iii. Other electrical components, including conductors, receptacles or blank covers, related to this section shall be installed in accordance with the California Electrical Code.

B. A Category III or IV vent, or a Type B vent with straight pipe between the outside termination and the space where the water heater is installed; and

C. A condensate drain that is no more than 2 inches higher than the base of the installed water heater, and allows natural draining without pump assistance, and

D. A gas supply line with a capacity of at least 200,000 Btu/hr.

E. Located in an area that is both:
   i. At least 3 feet by 3 feet by 7 feet high; and
   ii. Has a minimum volume of 760 cubic feet or a ventilation plan that includes the equivalent of one 16 inch by 24 inch grill for warm supply air and one 8 inch duct of no more than 10 feet in length for cool exhaust air.

**EXCEPTION to Section 150.0(n)1.E: Free Standing Accessory Dwelling Units.**

2. Water heating recirculation loops serving multiple dwelling units shall meet the requirements of Section 110.3(c).5.

3. Solar water-heating systems and collectors shall be certified and rated by the Solar Rating and Certification Corporation (SRCC), the International Association of Plumbing and Mechanical Officials, Research and Testing (IAPMO R&T), or by a listing agency that is approved by the Executive Director.

4. Instantaneous water heaters with an input rating greater than 6.8 kBTU/hr (2kW) shall meet the requirements of Section 110.3(c).7.

5. Systems using gas or propane water heaters to serve multiple dwelling units and/or common areas shall:
   A. Be located in a space that can accommodate a heat pump water heating system of equivalent capacity and performance; and
   B. Have a condensate drain that is no more than 2 inches higher than the base of the installed water heater, and allows natural draining without pump assistance; and
   C. Include designated raceways and reserved capacity on the main electrical panel and subpanels, if applicable, sufficient to power a heat pump hot water heater of equivalent capacity and performance. Plans shall include calculations and installations for equivalent capacity and performance, electrical power, conductors, raceway sizes and panel capacities in accordance with the California Electrical Code.

[...]

s) **Clothes Drying and Cooking.** Buildings plumbed for natural gas or propane clothes drying or cooking equipment shall include the following components for each gas terminal or stub out:  
1. **Clothes Drying**
A. A dedicated 208/240-volt, 30-amp or greater electrical receptacle that is connected to the electric panel with conductors of adequate capacity, within 3 feet of the appliance and accessible with no obstructions;

B. Both ends of the unused conductor shall be labeled with the words “For Future Heat Pump Clothes Dryer” and be electrically isolated;

C. A double pole circuit breaker in the electrical panel labeled with the words “For Future Heat Pump Clothes Dryer;” and

D. Other electrical components, including conductors, receptacles or blank covers, related to this section shall be installed in accordance with the California Electrical Code.

2. Cooktop

A. A dedicated 208/240-volt, 50-amp or greater electrical receptacle that is connected to the electric panel with conductors of adequate capacity, within 3 feet of the appliance and accessible with no obstructions;

B. Both ends of the unused conductor shall be labeled with the words “For Future Electric Range” and be electrically isolated;

C. A double pole circuit breaker in the electrical panel labeled with the words “For Future Electric Range;” and

D. Other electrical components, including conductors, receptacles or blank covers, related to this section shall be installed in accordance with the California Electrical Code.

3. Stand Alone Cooking Oven

A. A dedicated 208/240-volt, 20-amp or greater or greater receptacle within 3 feet of the appliance and accessible with no obstructions;

B. Both ends of the unused conductor shall be labeled with the words “For Future Convection Oven” and be electrically isolated;

C. A double pole circuit breaker in the electrical panel labeled with the words “For Future Electric Oven;” and

D. Other electrical components, including conductors, receptacles or blank covers, related to this section shall be installed in accordance with the California Electrical Code.

SUBCHAPTER 8 LOW-RISE RESIDENTIAL BUILDINGS - PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES

SECTION 150.1 - PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES FOR LOW-RISE RESIDENTIAL BUILDINGS

b) Performance Standards. A building complies with the performance standards if the energy consumption for the Proposed Design Building is no greater than the energy budget calculated for the Standard Design Building using Commission-certified compliance software as specified by the Alternative Calculation Methods Approval Manual. Mixed-Fuel Buildings must additional reach an EDR margin above the Standard Design in order to comply with performance standards.

1. Newly Constructed Buildings. The Energy Budget for newly constructed buildings is expressed in terms of the Energy Design Rating, which is based on TDV energy. The Energy Design Rating (EDR) has two components, the Energy Efficiency Design Rating, and the Solar Electric Generation and Demand Flexibility Design Rating. The Solar Electric Generation and Demand Flexibility Design Rating shall be subtracted from the
Energy Efficiency Design Rating to determine the Total Energy Design Rating. The Proposed Building shall separately comply with the Energy Efficiency Design Rating and the Total Energy Design Rating in the following ways:

A. **All-Electric Building.** All Electric Buildings comply if both the Total Energy Design Rating and the Energy Efficiency Design Rating for the Proposed Building are no greater than the corresponding Energy Design Ratings for the Standard Design Building.

B. **Electrically-Heated Mixed-Fuel Buildings.** Buildings with a permanent supply of electricity as the only source of energy for water-heating and space-heating comply if:
   a. **Single family.** The energy consumption calculated for the Proposed Design Building shall be at least 2 EDR points less than the Energy Efficiency Design Rating calculated for the Standard Design Building.
   b. **Multifamily.** The energy consumption calculated for the Proposed Design Building shall be at least 1 EDR point less than the Energy Efficiency Design Rating calculated for the Standard Design Building.

C. **Mixed-Fuel Buildings:** A Mixed-fuel Building complies with the performance standards if the Energy Efficiency Design Rating of the Proposed Building is no greater than the Energy Efficiency Design Rating for the Standard Design Building and:
   a. **Single family.** The energy consumption calculated for the Proposed Design Building shall be at least 10 EDR points less than the Total Energy Design Rating calculated for the Standard Design Building.
   b. **Multifamily.** The energy consumption calculated for the Proposed Design Building shall be at least 11 EDR Points less than the Total Energy Design Rating calculated for the Standard Design Building.

**EXCEPTION 1 to Section 150.1(b)(1).** Buildings with limited solar access are excepted if all of the following are true:
   a. The Total Energy Design Rating for the Proposed Building is no greater than the Standard Design Building; and
   b. A photovoltaic (PV) system(s) meeting the minimum qualification requirements as specified in Joint Appendix JA11 is installed on all available areas of 80 contiguous square feet or more with effective annual solar access. Effective annual solar access shall be 70 percent or greater of the output of an unshaded PV array on an annual basis, wherein shade is due to existing permanent natural or manmade barriers external to the dwelling, including but not limited to trees, hills, and adjacent structures; and
   c. The Energy Efficiency Energy Design Rating for the Proposed Building is no greater than the respective value for the Standard Design Building by the EDR margin in Table 150.1(b)(1) below.

<table>
<thead>
<tr>
<th>Building Type</th>
<th>Energy Efficiency EDR Margin</th>
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EXCEPTION 2 to Section 150.1(b)1.C. If the Certificate of Compliance is prepared and signed by a Certified Energy Analyst and the Total Energy Design Rating of the Proposed Design is no greater than the Standard Design Building, the Total Energy Rating of the Proposed Building complies with this section if it is at least 9 points less than the Total Energy Design Rating for the Standard Design Building.

EXCEPTION 1 to Section 150.1(b)1. A community shared solar electric generation system, or other renewable electric generation system, and/or community shared battery storage system, which provides dedicated power, utility energy reduction credits, or payments for energy bill reductions, to the permitted building and is approved by the Energy Commission as specified in Title 24, Part 1, Section 10-115, may offset part or all of the solar electric generation system Energy Design Rating required to comply with the Standards, as calculated according to methods established by the Commission in the Residential ACM Reference Manual.

2. Additions and Alterations to Existing Buildings. The Energy Budget for additions and alterations is expressed in terms of TDV energy. A building complies with the performance standards if the energy consumption calculated for the Proposed Design Building is no greater than the energy budget calculated for the Standard Design Building.

3. Compliance Demonstration Requirements for Performance Standards.
   A. Certificate of Compliance and Application for a Building Permit. The application for a building permit shall include documentation pursuant to Sections 10-103(a)1 and 10-103(a)2 which demonstrates, using an approved calculation method, that the building has been designed so that its Energy Efficiency Design Rating and the total EDR meets or exceeds the Standard design EDR for the applicable Climate Zone.

c) Prescriptive Standards/Component Package. Buildings that comply with the prescriptive standards shall be designed, constructed, and equipped to meet all of the requirements for the appropriate Climate Zone shown in TABLE 150.1-A or B. In TABLE 150.1-A and TABLE 150.1-B, a NA (not allowed) means that feature is not permitted in a particular Climate Zone and a NR (no requirement) means that there is no prescriptive requirement for that feature in a particular Climate Zone. Installed components shall meet the following requirements:

   A. Mixed-Fuel Single Family
      a. Ducts shall comply with 2019 Reference Appendices RA3.1.4.1.3, which requires that all ductwork shall be located entirely in conditioned space and shall be confirmed to have less than or equal to 25 cfm leakage to outside when measured as specified by Section RA3.1.4.3.8.
b. Slab floor perimeter insulation shall be installed with an R-value equal to or greater than R10. The minimum depth of concrete-slab floor perimeter insulation shall be 16 inches or the depth of the footing of the building, whichever is less.

c. Design the hot water distribution system to meet minimum requirements for the basic compact hot water distribution credit according to the procedures outlined in the 2019 Reference Appendices RA4.4.6

d. Central Fan Integrated Ventilation Systems. The duct distribution system shall be designed reduce external static pressure to meet a maximum fan efficacy equal to:
   - Gas Furnaces: 0.35 Watts per cfm
   - Heat Pumps: 0.45 Watts per cfm,
   according to the procedures outlined in the 2019 Reference Appendices RA 3.3.

e. Include either:
   i. 5 kWh battery of battery storage, OR
   ii. A solar water heating system with a minimum solar savings fraction of 0.20.

**EXCEPTION to 150.1(c)15.A.e.** Electrically-Heated Mixed-Fuel buildings do not need to include battery or solar water heating.

B. Mixed-Fuel Multifamily

a. Slab floor perimeter insulation shall be installed with an R-value of equal to or greater than R10. The minimum depth of concrete-slab floor perimeter insulation shall be 16 inches or the depth of the footing of the building, whichever is less.

b. Design the hot water distribution system to meet minimum requirements for the basic compact hot water distribution credit according to the procedures outlined in the 2019 Reference Appendices RA4.4.6

c. Central Fan Integrated Ventilation Systems. Central forced air system fans used to provide outside air, shall have an air-handling unit fan efficacy less than or equal to 0.35 W/CFM. The airflow rate and fan efficacy requirements in this section shall be confirmed through field verification and diagnostic testing in accordance with all applicable procedures specified in Reference Residential Appendix RA3.3. Central Fan Integrated Ventilation Systems shall be certified to the Energy Commission as Intermittent Ventilation Systems as specified in Reference Residential Appendix RA3.7.4.2.

d. Include either:
   i. 2.75 kWh of battery storage per dwelling unit, OR
   ii. A solar water heating system with a minimum solar savings fraction of 0.20.

**EXCEPTION to 150.1(c)15.B.d.** Electrically Heated Mixed-Fuel buildings do not need to include battery or solar water heating.

e. All ductwork shall be located entirely in conditioned space with ducts tested to have less than or equal to 25 cfm leakage to outside. Ductwork shall meet the
requirements of Verified Low Leakage Ducts in Conditioned Space (VLLDCS) in the 2019 Reference Appendices RA3.1.4.3.8.

f. Buildings with steep-sloped roofs shall have a minimum aged solar reflectance of 0.25.

**Subchapter 9 Low-Rise Residential Buildings – Low-Rise Residential Buildings – Additions and Alterations to Existing Low-Rise Residential Buildings**

**Section 150.2 - Energy Efficiency Standards for Additions and Alterations to Existing Low-Rise Residential Buildings**

**Additions.** Additions to existing low-rise residential buildings shall meet the requirements of Sections 110.0 through 110.9, Sections 150.0(a) through (q) and 150.0(s), and either Section 150.2(a)1 or 2.
SUMMARY

ALL CONSTRUCTION MANDATORY

All new construction, additions, or alterations must comply with the following mandatory requirements:

- Water heating: 240V/30A circuit, condensate drain, location/design that includes air source and footprint
- Clothes Drying: 240V/40A circuit
- Cooking: 240V/50A circuit
- Space air conditioning: Heat pump operation capability and/or 240V/30A circuit if only space-heating provided

For new construction, compliance documentation prepared by a Certified Energy Analyst receives a performance credit.

RESIDENTIAL PERFORMANCE AND PRESCRIPTIVE

<table>
<thead>
<tr>
<th>Project Type and Size</th>
<th>Performance Path Requirements</th>
<th>Prescriptive Path Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single and Two-family New Construction</td>
<td>1. All Electric. Demonstrate that the proposed home will be all electric, OR</td>
<td>Build All Electric and Meet 2019 Title 24 Part 6.</td>
</tr>
<tr>
<td></td>
<td>2. Mixed Fuel Building. Proposed Design Building shall be at least 10 EDR points less than the Total Energy Design Rating calculated for the Standard Design Building, OR</td>
<td>Mixed Fuel Building</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. Low leakage ducts in conditioned space per 2019 Reference Appendices RA3.1.4.1.3 and RA3.1.4.3.8.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Install R-10 perimeter slab insulation at a depth of 16-inches.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Compact hot water distribution per 2019 Reference Appendices RA4.4.6.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. Maximum central fan integrated ventilation system efficacy of 0.35 Watts/cfm and verification by a HERS rater according to 2019 Reference Appendices RA3.3.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. Either 1) 5 kWh battery OR 2) A solar water heating system with a minimum solar savings fraction of 0.20.</td>
</tr>
<tr>
<td></td>
<td>3. Electrically Heated Mixed-Fuel Building (electric space and water heating, gas cooking and/or clothes drying). Proposed Design Building shall be at least 2 EDR points less than the Energy Efficiency Design Rating</td>
<td>Electrically Heated Mixed-Fuel Building</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. Low leakage ducts in conditioned space per 2019 Reference Appendices RA3.1.4.1.3 and RA3.1.4.3.8.</td>
</tr>
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<td>b. Install R-10 perimeter slab insulation at a depth of 16-inches.</td>
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<td></td>
<td>c. Compact hot water distribution per 2019 Reference Appendices RA4.4.6.</td>
</tr>
<tr>
<td>Multifamily New Construction 3 stories or less</td>
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<tr>
<td>-----------------------------------------------</td>
<td>---------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>1. All Electric.</strong> Demonstrate that the proposed building will be all-electric, OR</td>
<td><strong>Build All Electric</strong> and Meet 2019 Title 24 Part 6.</td>
<td></td>
</tr>
<tr>
<td><strong>2. Mixed Fuel Buildings.</strong> Proposed Design Building shall be at least 11 EDR points less than the Total Energy Design Rating calculated for the Standard Design Building, OR</td>
<td><strong>Mixed Fuel Building</strong></td>
<td></td>
</tr>
<tr>
<td>a. Install R-10 perimeter slab insulation at a depth of 16-inches.</td>
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<td></td>
</tr>
<tr>
<td>c. Maximum central fan integrated ventilation system efficacy of 0.35 Watts/cfm and verification by a HERS rater according to 2019 Reference Appendices RA3.3.</td>
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<td></td>
</tr>
<tr>
<td>d. Either 1) 2.75 kWh battery per dwelling unit OR 2) A solar water heating system with a minimum solar savings fraction of 0.20.</td>
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</tr>
<tr>
<td>e. Meet the requirements of Verified Low Leakage Ducts in Conditioned Space (VLLDCS) in the 2019 Reference Appendices RA3.1.4.3.8, with less than or equal to 25 cfm leakage to outside.</td>
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</tr>
<tr>
<td>f. Install a roofing product that’s rated by the Cool Roof Rating Council to have an aged solar reflectance (ASR) of greater than or equal to 0.25.</td>
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</tr>
</tbody>
</table>

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<tr>
<th>3. Electrically Heated Mixed-Fuel Building (electric space and water heating, gas cooking and/or clothes drying). Proposed Design Building be at least 1 EDR point less than the Energy Efficiency Design Rating calculated for the Standard Design Building.</th>
<th><strong>Electrically Heated Mixed-Fuel Building</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Install R-10 perimeter slab insulation at a depth of 16-inches.</td>
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</tr>
<tr>
<td>c. Maximum fan efficacy of 0.35 Watts/cfm and verification by a HERS rater according to 2019 Reference Appendices RA3.3.</td>
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</tbody>
</table>

**NONRESIDENTIAL PERFORMANCE AND PRESCRIPTIVE**

<table>
<thead>
<tr>
<th>Nonresidential New Construction – Office or Retail Occupancies</th>
<th>All Electric. Demonstrate that the proposed building will be all electric</th>
<th>Build All Electric and Meet 2019 Title 24 Part 6.</th>
</tr>
</thead>
</table>
| Mixed Fuel Buildings, All Occupancies **Except Office and Mercantile**; Demonstrate that the energy use of the proposed building is 6% more efficient than the 2019 State Energy Code. | Mixed Fuel Buildings, All Occupancies **Except Office and Mercantile**, as applicable:  
  a. Install fenestration with a solar heat gain coefficient either i) no less than 0.45 in hotels/motels/high-rise multifamily, or ii) no greater than 0.22 in all other space types. 
  b. Design Variable Air Volume (VAV) box minimum airflows to be equal to the zone ventilation minimums. 
  c. Include economizers and staged fan control in air handlers with a mechanical cooling capacity ≥ 33,000 Btu/h
  d. Reduce the lighting power density (Watts/ft²) by ten percent (10%) from that required from Table 140.6-C. 
  e. In common areas, improve lighting:  
    1) Control to daylight dimming plus off per Section 140.6(a)2H  
    2) Perform Institutional Tuning per Section 140.6(a)2J  
    f. Install one drain water heat recovery device per every three guest rooms that is field verified as specified in the Reference Appendix RA3.6.9. |
Mixed Fuel Buildings, Office and Mercantile Occupancies,
Demonstrate that the energy use of the proposed building is 14% more efficient than the 2019 State Energy Code:

- a. Install fenestration with a solar heat gain coefficient no greater than 0.22.
- b. Limit the fenestration area on east-facing and west-facing walls to one-half of the average amount of north-facing and south-facing fenestration.
- c. Design Variable Air Volume (VAV) box minimum airflow to be equal to the zone ventilation minimums;
- d. Include economizers and staged fan control in air handlers with a mechanical cooling capacity ≥ 33,000 Btu/h;
- e. Reduce the lighting power density (Watts/ft²) by ten percent (10%) from that required from Table 140.6-C;
- f. Improve lighting:
  1) Control to daylight dimming plus off per Section 140.6(a)2H
  2) Install Occupant Sensing Controls in Large Open Plan Offices per Section 140.6(a)2I
  3) Perform Institutional Tuning per Section 140.6(a)2J

Mixed Occupancy
For buildings that do not fall under the exceptions of 100.0(f) of Title 24 Part 6, the building must meet the performance requirements under the residential and nonresidential sections in this table based on a weighted-average by floor area.

Nonresidential Additions and Alterations
Meet 2019 Title 24 Part 6.

Meet the appropriate prescriptive requirements under the residential and nonresidential elsewhere in this table, as applicable.

Meet 2019 Title 24 Part 6.