

Residential Electrification Readiness

Code Language:

Add new text as follows:

R103.2.2 Electrification system. The construction documents shall provide details for additional electric infrastructure, including branch circuits, conduit, or pre-wiring, and panel capacity in compliance with the provisions of this code.

Add new text as follows:

R105.2.5 Electrical rough-in inspection. Inspections at electrical rough-in shall verify compliance as required by the code and the approved plans and specifications as to the locations, distribution, and capacity of the electrical system.

Revise numbering as follows:

R105.2.5 R105.2.6 Final inspection.

Add new definitions as follows:

ALL-ELECTRIC BUILDING. A building that contains no combustion equipment, or plumbing for combustion equipment, installed within the building, or building site.

APPLIANCE. A device or apparatus that is manufactured and designed to utilize energy and for which this code provides specific requirements.

COMBUSTION EQUIPMENT. Any equipment or appliance used for space heating, service water heating, cooking, clothes drying, or lighting that uses fuel gas or fuel oil.

EQUIPMENT. Piping, ducts, vents, control devices and other components of systems other than appliances that are permanently installed and integrated to provide control of environmental conditions for buildings. This definition shall also include other systems specifically regulated in this code.

FUEL GAS. A natural gas, manufactured gas, liquified petroleum gas or a mixture of these.

FUEL OIL. Kerosene or any hydrocarbon oil having a flash point not less than 100°F (38°C).

MIXED-FUEL BUILDING. A building that contains combustion equipment or includes piping for combustion equipment.

Revise text as follows:

R401.3 Certificate. A permanent certificate shall be completed by the builder or other approved party and posted on a wall in the space where the furnace is located, a utility room, or an approved location inside the building. When located on an electrical panel, the certificate shall

not cover or obstruct the visibility of the circuit directory label, service disconnect label, or other required labels. The certificate shall list the predominant R-values of insulation installed in or on ceiling/roof, walls, foundation (slab, below-grade wall, and/or floor) and ducts outside conditioned spaces; U-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration; the results from any required duct system and building envelope air leakage testing done on the building; and the results from the whole-house mechanical ventilation system flow rate test. Where there is more than one value for each component, the certificate shall list the value covering the largest area. The certificate shall list the types and efficiencies of heating, cooling, whole house mechanical ventilation, and service water heating appliances, including fuel sources. Where a gas-fired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall list "gas-fired unvented room heater," "electric furnace" or "baseboard electric heater," as appropriate. An efficiency shall not be listed for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters. The certificate shall list the fuel sources for cooking and clothes drying equipment. The certificate shall list where combustion equipment is installed, the certificate shall indicate information on the installation of additional electric infrastructure including which equipment and/or appliances include additional electric infrastructure, capacity reserved on the electrical service panel for replacement of each piece of combustion equipment and/or appliance

R402.1 General. The building thermal envelope shall comply with the requirements of Sections R402.1.1 through R402.1.5.

Exceptions:

1. The following low-energy buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope assemblies* complying with this section shall be exempt from the building thermal envelope provisions of Section R402.
 - 1.1 Those containing no combustion equipment with a peak design rate of energy usage less than 3.4 Btu/h·ft² (10.7 W/m²) or 1.0 watt/ft² of floor area for space conditioning purposes.
 - 1.2 Those containing no combustion equipment that do not contain *conditioned space*.

Add new text as follows:

R404.2 Additional electric infrastructure (Mandatory). *Combustion equipment shall be installed in accordance with this section.*

R404.2.1 Equipment serving multiple units. *Combustion equipment that serves multiple dwelling units shall comply with Section C405.10.*

R404.2.2 Combustion water heating. Water heaters shall be installed in accordance with the following:

1. A dedicated 240-volt branch circuit with a minimum capacity of 30 amps shall terminate within 3 feet (914 mm) from the water heater and be accessible to the water heater with no obstructions. Both ends of the branch circuit shall be labeled with the words "For Future Heat Pump Water Heater" and be electrically isolated.

2. A condensate drain that is no more than 2 inches (51 mm) higher than the base of the installed water heater and allows natural draining without pump assistance shall be installed within 3 feet (914 mm) of the water heater.
3. The water heater shall be installed in a space with minimum dimensions of 3 feet (914 mm) by 3 feet (914 mm) by 7 feet (2134 mm) high.
4. The water heater shall be installed in a space with a minimum volume of 700 cubic feet (20,000 L) or the equivalent of one 16-inch (406 mm) by 24-inch (610 mm) grill to a heated space and one 8-inch (203 mm) duct of no more than 10 feet (3048 mm) in length for cool exhaust air.

R404.2.3 Combustion space heating. Where a building has combustion equipment for space heating, the building shall be provided with a designated exterior location(s) in accordance with the following:

1. Natural drainage for condensate from cooling equipment operation or a condensate drain located within 3 feet (914 mm), and
2. A dedicated branch circuit in compliance with IRC Section E3702.11 based on heat pump space heating equipment sized in accordance with R403.7 and terminating within 3 feet (914 mm) of the location with no obstructions. Both ends of the branch circuit shall be labeled “For Future Heat Pump Space Heater.”

Exception: Where an electrical circuit in compliance with IRC Section E3702.11 exists for space cooling equipment.

R404.2.4 Combustion clothes drying. A dedicated 240-volt branch circuit with a minimum capacity of 30 amps shall terminate within 6 feet (1829 mm) of natural gas clothes dryers and shall be accessible with no obstructions. Both ends of the branch circuit shall be labeled with the words “For Future Electric Clothes Drying” and be electrically isolated.

R404.2.5 Combustion cooking. A dedicated 240-Volt, 40A branch circuit shall terminate within 6 feet (1829 mm) of natural gas ranges, cooktops and ovens and be accessible with no obstructions. Both ends of the branch circuit shall be labeled with the words “For Future Electric Range” and be electrically isolated.

R404.2.6 Other combustion equipment. *Combustion equipment* and end-uses not covered by Sections R404.6.2-5 shall be provided with a branch circuit sized for an *electric appliance, equipment* or end use with an equivalent capacity that terminates within 6 feet (1829 mm) of the *appliance or equipment*.

Residential Electric Vehicle Readiness

Code Language:

Add new definitions as follows:

AUTOMOBILE PARKING SPACE. A space within a building or private or public parking lot, exclusive of driveways, ramps, columns, office and work areas, for the parking of an automobile.

ELECTRIC VEHICLE (EV). An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and electric motorcycles, primarily powered by an electric motor that draws current from a building electrical service, EVSE, a rechargeable storage battery, a fuel cell, a photovoltaic array, or another source of electric current.

ELECTRIC VEHICLE READY SPACE (EV READY SPACE). An automobile parking space that is provided with a branch circuit and either an outlet, junction box or receptacle, that will support an installed EVSE.

Add new text as follows:

R404.3 Electric Vehicle Power Transfer Infrastructure. New automobile parking spaces for one- and two-family dwellings and townhouses shall be provided in accordance with this section. All other new residential parking facilities shall be provided with electric vehicle power transfer infrastructure in accordance with Section C405.11 of the International Energy Conservation Code-Commercial Provisions.

R404.3.1 Quantity. Each dwelling unit with a designated attached or detached garage or other onsite private parking provided adjacent to the dwelling unit shall be provided with one EV ready space.

R404.3.2 EV Ready Spaces. Each branch circuit serving EV ready spaces used to comply with Section R404.3 shall comply with all of the following:

1. Terminate at an outlet or enclosure located within 3 feet (914 mm) of each EV ready space it serves.
2. Have a minimum circuit capacity of 9.6 kVA (or 40A at 240V).
3. The panelboard or other electrical distribution equipment directory shall designate the branch circuit as “For electric vehicle supply equipment (EVSE)” and the outlet or enclosure shall be marked “For electric vehicle supply equipment (EVSE).”
4. Where a circuit is shared or managed, it shall be in accordance with NFPA 70.

Lighting Efficacy

Code Language:

SECTION R202 GENERAL DEFINITIONS

Revise as follows:

HIGH-EFFICACY LAMPS. LIGHT SOURCES. Compact fluorescent lamps, light-emitting diode (LED) lamps, T-8 or smaller diameter linear fluorescent lamps, or other lamps with an efficacy of not less than ~~the following:~~ 65 lumens per watt, or luminaires with an efficacy of not less than 45 lumens per watt.

1. ~~60 lumens per watt for lamps over 40 watts.~~
2. ~~50 lumens per watt for lamps over 15 watts to 40 watts.~~
3. ~~40 lumens per watt for lamps 15 watts or less.~~

R404.1 Lighting equipment (Mandatory). ~~Not less than 90 percent of the~~ All permanently installed lighting fixtures, excluding kitchen appliance lighting fixtures, shall contain only high-efficacy ~~lamps~~ lighting sources.

Exterior Lighting for Multifamily

Code Language:

Add new text as follows:

R404.1.1 Exterior lighting (Mandatory). Connected exterior lighting for residential buildings shall comply with Section C405.4 of the International Energy Conservation Code—Commercial Provisions.

Exceptions:

1. Detached one- and two-family dwellings.
2. Townhouses.
3. Solar-powered lamps not connected to any electrical service.
4. Luminaires controlled by a motion sensors.
5. Lamps and luminaires that comply with Section R404.1.

Exterior Lighting Control Requirements

Code Language:

Add new text as follows:

R404.2 Exterior lighting controls (Mandatory). Where the total permanently installed exterior lighting power is greater than 30 watts, the permanently installed exterior lighting shall comply with the following:

1. Lighting shall be controlled by a manual on and off switch which permits automatic shut off actions.
Exception: Lighting serving multiple dwelling units.
2. Lighting shall be automatically shut off when daylight is present and satisfies the lighting needs.
3. Controls that override automatic shut off actions shall not be allowed unless the override automatically returns automatic control to its normal operation within twenty-four hours.

Ventilation Fan Efficacy

Revise as follows:

R403.6.1 Mechanical ventilation (Mandatory) ~~Whole house mechanical ventilation system fan efficacy. Fans used to provide whole house mechanical ventilation shall meet the efficacy requirements of Table R403.6.1.~~

~~**Exception:** Where an air handler that is integral to tested and listed HVAC equipment is used to provide whole house mechanical ventilation, the air handler shall be powered by an electronically commutated motor.~~

Fans used to provide whole-dwelling mechanical ventilation shall meet the efficacy requirements of Table R403.6.2 at one or more rating points. Fans shall be tested in accordance with HVI 916 and listed. The airflow shall be reported in the product listing or on the label. Fan efficacy shall be reported in the product listing or shall be derived from the input power and airflow values reported in the product listing or on the label. Fan efficacy for fully ducted HRV, ERC, balanced, and in-line fans shall be determined at a static pressure of not less than 0.2 inch w.c. (49.85 Pa). Fan efficacy for ducted range hoods, bathroom and utility room fans shall be determined at a static pressure of not less than 0.1 inch w.c. (24.91 Pa).

FAN LOCATION	AIR FLOW RATE MINIMUM (CFM)	MINIMUM EFFICACY (CFM/WATT) ^b
HRV or ERV	Any	1.2 cfm/watt
Range hoods	Any	2.8 cfm/watt
In-line fan	Any	2.8 3.8 cfm/watt
Other Exhaust Fan	<90	1.4 2.8 cfm/watt
	≥90	2.8 3.5 cfm/watt
<u>Air-handler that is integrated to tested and listed HVAC equipment</u>	<u>Any</u>	<u>1.2 cfm/watt</u>

For SI: 1 cubic foot per minute = 28.3 L/min.

- a. When tested in accordance with HVI Standard 916.
- b. Design outdoor airflow rate / watts of fan used

Additional Efficiency Packages

Code Language:

Revise as follows:

R401.2 Compliance. Projects shall comply with one of the following:

1. Sections R401 through R404 and Section R407.
2. Section R405 and the provisions of Sections R401 through R404 indicated as “Mandatory.”
3. The energy rating index (ERI) approach in Section R406.

Revise as follows:

R405.3 Performance-based compliance. ~~Compliance based on simulated energy performance requires that a proposed residence (proposed design) be shown to have an annual energy cost that is less than or equal to the annual energy cost of the standard reference design in accordance with this section.~~ The proposed design of an *all-electric building* shall have an annual energy cost that is less than or equal to 95 percent of the annual energy cost of the standard reference design. The proposed design of a *mixed-fuel building* shall have an annual energy cost that is less than or equal to 90 percent of the annual energy cost of the standard reference design. Energy prices shall be taken from a source approved by the code official, such as the Department of Energy, Energy Information Administration’s State Energy Data System Prices and Expenditures reports. Code officials shall be permitted to require time-of-use pricing in energy cost calculations.

Revise as follows:

R406.3 ERI-based compliance. Compliance based on an ERI analysis requires that the rated *proposed* design and confirmed built dwelling be shown to have an ERI less than or equal to the appropriate value for the proposed *mixed-fuel building* or the proposed *all-electric building* as indicated in Table R406.4 when compared to the *ERI reference design*.

Replace Table R406.4 as follows:

TABLE R406.4 MAXIMUM ENERGY RATING INDEX

<u><i>All-Electric Building</i></u>	<u><i>Mixed Fuel Building</i></u>
52	<u>47</u>

SECTION R407 **ADDITIONAL EFFICIENCY PACKAGE OPTIONS**

R407.1 Scope. Where required by Section R401.2, *buildings* shall comply with this section. *All-electric buildings* shall install one Additional Efficiency Package Option in accordance with Section R407.2. *Mixed-fuel buildings* shall install two Additional Efficiency Package Options in accordance with Section R407.2. The option selected for compliance shall be identified in the Certificate required by Section R401.3.

R407.2 Additional Efficiency Package Options. Additional efficiency package options for compliance with Section R401.2.1 are set forth in Sections R407.2.1 through R407.2.5.

R407.2.1 Enhanced envelope performance option. The total building thermal envelope UA, the sum of U-factor times assembly area, shall be less than or equal to 95 percent of the total UA resulting from multiplying the U-factors in Table R402.1.4 by the same assembly area as in the proposed building. The UA calculation shall be performed in accordance with Section R402.1.5. The area-weighted average SHGC of all glazed fenestration shall be less than or equal to 95 percent of the maximum glazed fenestration SHGC in Table R402.1.2.

R407.2.2 More efficient HVAC equipment performance option. Heating and cooling equipment shall meet or exceed one of the following efficiencies:

1. Greater than or equal to 95 AFUE natural gas furnace and 16 SEER air conditioner.
2. Greater than or equal to 10 HSPF / 16 SEER air source heat pump.
3. Greater than or equal to 3.5 COP ground source heat pump.

For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in this section and shall be sized to serve 100 percent of the cooling design load. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in this section and shall be sized to serve 100 percent of the heating design load.

R407.2.3 Reduced energy use in service water heating option. The hot water system shall meet or exceed one of the following efficiencies:

1. Greater than or equal to 0.82 EF fossil fuel service water heating system.
2. Greater than or equal to 2.0 EF electric service water heating system.
3. Greater than or equal to 0.4 Solar Fraction solar water heating system.

R407.2.4 More efficient duct thermal distribution system option.. The thermal distribution system shall meet or exceed one of the following efficiencies:

1. 100 percent of ducts and air handlers located entirely within the *building thermal envelope*.
2. 100 percent of ductless thermal distribution system or hydronic thermal distribution system located completely inside the *building thermal envelope*.
3. 100 percent of duct thermal distribution system located in *conditioned space* as defined by Section R403.3.7.

R407.2.5 Improved air sealing and efficient ventilation system option. The measured air leakage rate shall be less than or equal to 3.0 ACH50, with either an Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV) installed. Minimum HRV and ERV requirements, measured at the lowest tested net supply airflow, shall be greater than or equal to 75 percent Sensible Recovery Efficiency (SRE), less than or equal to 1.1 W/CFM Fan Energy and shall not use recirculation as a defrost strategy. In addition, the ERV shall be greater than or equal to 50 percent Latent Recovery/Moisture Transfer (LRMT).

Manufactured Homes Scope Clarification

Code Language:

R101.2 Scope. This code applies to *residential buildings* and the *building* sites and associated systems and equipment. This code shall not apply to manufactured homes built according to the U.S. Department of Housing and Urban Development Manufactured Home Construction and Safety Standards.

Existing Building Scope Clarification

Code Language:

Add the following exception to Section R401.2 Compliance:

R401.2 Compliance. Projects shall comply with one of the following:

1. Sections R401 through R404.
2. Section R405 and the provisions of Sections R401 through R404 indicated as "Mandatory."
3. The energy rating index (ERI) approach in Section R406.

Exception: *Additions, alterations, repairs and changes of occupancy to existing buildings complying with Chapter 5.*

Cool Roof Requirement

Code Language:

Add new text as follows:

R402.6 Roof Solar Reflectance. Roofs shall be rated by the Cool Roof Rating Council and comply with the initial and three-year aged minimum solar reflectance values in Table 402.6.

TABLE 402.6 MINIMUM ROOF SOLAR REFLECTANCE^a

<u>ROOF SLOPE</u>	<u>INITIAL SOLAR REFLECTANCE</u>	<u>THREE-YEAR AGED SOLAR REFLECTANCE^{b,c}</u>
<u>Low-slopes less than or equal to 2 units vertical to 12 units horizontal</u>	<u>0.65</u>	<u>0.50</u>
<u>Steep-slopes greater than 2 units vertical to 12 units horizontal</u>	<u>0.25</u>	<u>0.15</u>

- a. The use of area-weighted averages to comply with these requirements shall be permitted. Materials lacking 3-year-aged tested values for solar reflectance shall be assigned a 3-year-aged solar reflectance in accordance with Section R402.6.1.
- b. Aged solar reflectance tested in accordance with ASTM C1549, ASTM E903 or ASTM E1918 or CRRC-S100.

R402.6.1 Aged solar reflectance Where an aged solar reflectance required by section 402.6 is not available, it shall be determined in accordance with Equation 4-4

$$R_{aged} = [0.2 + 0.7(R_{initial} - 0.2)]$$

(Equation 4-4)

R_{aged} = Aged solar reflectance

R_{initial} = Initial solar reflectance determined in accordance with CRRC-S100

Exceptions: Roofs where more than 75 percent of roof area complies with one or more of the exceptions below:

1. Portions of the roof that are covered by the following
 - 1.1. Photovoltaic systems or components
 - 1.2. Solar air or water heating systems or components
 - 1.3. Vegetative roofs or landscaped roofs
 - 1.4. Above roof decks or walkways
 - 1.5. Skylights
 - 1.6. HVAC systems and components, and other opaque objects mounted above the roof

2. Portions of roof shaded during the peak sun angle on the summer solstice by permanent features of the building or by permanent features of adjacent buildings
3. Portions of roofs that are ballasted with a minimum stone ballast of 17 pounds per square foot (74kg/m²) or 23 psf (117kg/m²) pavers